



República Federativa do Brasil  
Ministério do Desenvolvimento, Indústria  
e do Comércio Exterior  
Instituto Nacional da Propriedade Industrial

(11) (21) PI 0304958-2 A



(22) Data de Depósito: 30/05/2003  
(43) Data de Publicação: 28/09/2004  
(RPI 1760)

(51) Int. Cl<sup>7</sup>:  
G09B 5/00

**(54) Título: DISPOSITIVO DE  
ENSINAMENTO/APRENDIZADO ELETRÔNICO COM  
SISTEMA DE LEITURA MULTISENSORIAL  
INTERATIVO**

(30) Prioridade Unionista: 30/05/2002 US 60/385,159

(71) Depositante(s): Mattel, Inc. (US)

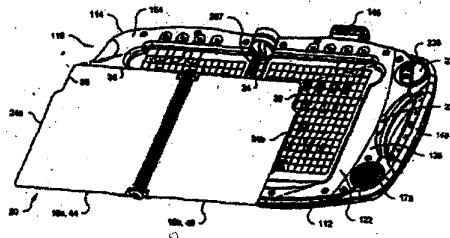
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(86) Pedido Internacional: PCT US03/17013 de 30/05/2003

(87) Publicação Internacional: WO 03/102895 de 11/12/2003

(57) Resumo: "DISPOSITIVO DE ENSINAMENTO/APRENDIZADO ELETRÔNICO COM SISTEMA DE LEITURA MULTISENSORIAL INTERATIVO". Um dispositivo de ensinamento/aprendizado eletrônico (100) opera com e sem um elemento em folha impressa (20) possuindo uma disposição do conteúdo selecionável por meio de um conjunto de sensor que responde ao usuário (142) sob uma superfície (130) configurada para receber o elemento. O conjunto de sensor é formado por pontos cruzados de dois conjuntos de linhas condutoras cruzadas (246, 248), um conjunto sendo acionado seqüencialmente com uma onda quadrada de freqüência de rádio e o outro conjunto sendo amostrado seqüencialmente através de uma conexão de amplificador de alta impedância com um circuito de detecção assíncrona. Em que mais de um local de ponto cruzado é ativado por usuário, os algoritmos (Figura 12) são utilizados para identificar um local de sensor de ponto cruzado como a seleção ativada pelo usuário.



Relatório Descritivo da Patente de Invenção para "**DISPOSITIVO DE ENSINAMENTO/APRENDIZADO ELETRÔNICO COM SISTEMA DE LEITURA MULTISENSORIAL INTERATIVO**".

Fundamentos da Invenção

5 A presente invenção refere-se geralmente aos dispositivos de ensinamento/aprendizado eletrônicos para um sistema de ensinamento/aprendizado multissensorial interativo. Mais particularmente, a presente invenção refere-se aos dispositivos de ensinamento/aprendizado eletrônicos que permitem que uma criança ou outro estudante ative a fala e som eletrônicos pela seleção de palavras ou imagens no dispositivo ou pelo menos nas páginas dos livros de múltiplas páginas ou outros elementos de folha impressos inseridos de forma removível dentro de uma área com recessos do dispositivo.

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Os dispositivos eletrônicos e interativos de primeiro estágio de aprendizado são bem conhecidos e têm sido empregados por muitos anos como acessórios de ensino e dispositivos de entretenimento. Muitos dos primeiros dispositivos de "leitura" desenvolvidos utilizaram cartões individuais com palavras e/ou gráficos impressos em cada cartão. Essas leitoras utilizavam microcontroladores com software que mapeavam o conteúdo de 20 cada cartão individualmente. Essas palavras ou gráficos impressos no cartão eram associados com os sons armazenados e os efeitos sonoros localizados na memória. A seleção de uma palavra ou gráfico impresso no cartão pelo usuário geraria o som de áudio associado da leitora. A associação típica seria para o leitor pronunciar de forma audível a palavra ou letra selecionada 25 impressa no cartão.

A maior parte dos primeiros dispositivos de leitura por cartão empregavam um conjunto de painéis de comutadores de membrana. Esses eram formados por uma folha de membrana flexível com contatos elétricos impressos sobrepondo-se a um substrato com contatos elétricos separados 30 e algum tipo de separador fino e aberto para manter a membrana do substrato separada até os pontos na membrana serem pressionados. Os comutadores de membrana eram dispostos de forma a combinarem com o

conteúdo dos cartões. Os cartões eram localizados na leitora e um método de identificação de cartão era empregado de forma que a leitora soubesse que cartão estava no dispositivo de leitura. Os métodos de identificação de cartão variavam de percepção ótica do cartão até registro manual. Um todo comum de identificação de cartão ou página é selecionar o cartão ou página localizado na leitora pressionando um ponto localizado no cartão que é único para esse cartão. A seleção de uma palavra, letra ou gráfico impresso no cartão era realizada pressionando-se para baixo a palavra selecionada, letra ou gráfico para fechar os contatos do comutador de membrana localizados sob o cartão. O microprocessador então produziria o áudio associado através de um dispositivo de saída audível (por exemplo, alto falante) no alojamento do dispositivo de leitura de livro. Muitos dispositivos foram desenvolvidos e utilizavam essa técnica básica de associação de palavra, letra ou gráfico impresso com arquivos de som de áudio armazenados.

Em alguns casos os cartões individuais eram utilizados separadamente ou juntos para formar pequenos livros que eram colocados no dispositivo de leitura. Para uso com um dispositivo de comutador de membrana, os cartões impressos ou páginas do livro precisam ser muito finos e flexíveis a fim de permitir que a força de pressão no cartão ou página do livro seja transferida para os comutadores de membrana localizados sob o livro.

A fim de se superar essa desvantagem, novos dispositivos de leitura foram desenvolvidos e utilizam uma caneta apontadora eletrônica portátil que injeta um sinal eletrônico em um conjunto de sensores de recebimento localizados sob o livro. As mesmas permitiram o uso de livros mais grossos com páginas mais grossas. No entanto, uma desvantagem dos dispositivos de caneta é que o usuário, tipicamente crianças muito novas, devem ser treinadas a utilizarem a caneta ao passo que o método de seleção por dedo utilizado pelos desenhos de comutador de membrana é mais intuitivo para o público alvo.

Acredita-se que um dispositivo agradável ao usuário projetado para um dispositivo de leitura eletrônica fácil de se utilizar, e mais particularmente para a seleção precisa do conteúdo através do dedo, aumentará

significativamente o valor dos acessórios eletrônicos convencionais de leitura e, através de um jogo divertido e interessante, auxiliará de forma mais apreciável uma criança ou estudante no desenvolvimento de suas técnicas de leitura.

## 5 Breve Sumário da Invenção

Em um aspecto, a invenção é um método de operação de um dispositivo de ensinamento/aprendizado eletrônico interativo configurado para receber um produto em folha impressa possuindo uma orientação predeterminada no dispositivo e um conteúdo selecionável, o dispositivo compreendendo um alojamento que inclui uma plataforma configurada para receber o produto em folha impressa quando o produto em folha impressa está na orientação predeterminada; uma interface eletrônica de usuário no alojamento incluindo um sensor de posição que responde ao usuário possuindo uma faixa ativa acima da plataforma e incluindo uma pluralidade de sensores individuais dispostos em um conjunto na plataforma; e partes eletrônicas de controle no alojamento incluindo uma memória que possui na mesma instruções associadas com o conteúdo selecionável do produto em folha impressa e um controlador em comunicação elétrica com a interface eletrônica de usuário, o controlador sendo configurado de modo a realizar pelo menos as etapas de operação de acordo com as instruções na memória, determinando uma posição selecionada dentro da faixa ativa do sensor de posição, reconhecendo uma seleção de conteúdo selecionável pelo seletor, e enviando para a interface eletrônica de usuário um sinal associado com a seleção; um método de operação do dispositivo no qual a etapa de determinação compreende as etapas de: identificação de uma pluralidade de possíveis posições de sensor selecionadas pelo usuário; e selecionando apenas uma dentre uma pluralidade de possíveis posições de sensor selecionadas pelo usuário como a seleção.

Em outro aspecto, a invenção é um dispositivo de ensinamento/aprendizado eletrônico interativo possuindo uma plataforma com uma primeira superfície de contato de usuário, geralmente plana, se sobrepondo a um primeiro sensor geralmente plano, o primeiro sensor incluindo uma plura-

lidade de sensores mutuamente adjacentes, que respondem ao toque organizados em um conjunto bidimensional, o conjunto sendo formado por primeiro e segundo conjuntos separados de linhas condutoras individuais geralmente paralelas cruzando de forma transversal uma à outra sob uma superfície superior da plataforma, caracterizada por: um gerador de sinal oscilante de frequência de rádio acoplando de forma cíclica a linhas condutoras individuais ao primeiro conjunto; e um circuito de detecção sincronizada acoplado de forma operacional ao gerador e com linhas condutoras individuais do segundo conjunto para identificar os pontos cruzados individualmente acionados pelo usuário dos primeiro e segundo conjuntos de linhas do conjunto.

#### Breve Descrição das Várias Vistas dos Desenhos

O sumário acima, além da descrição detalhada das modalidades preferidas da invenção que se segue, serão melhor compreendidos quando lidos em conjunto com os desenhos em anexo. Para fins de ilustração da invenção, são ilustradas nos desenhos as modalidades que são atualmente preferidas. Deve-se compreender, no entanto, que a invenção não está limitada às disposições e instrumentalidades precisas ilustradas.

Nos desenhos:

A Figura 1 é uma vista em perspectiva superior de uma modalidade preferida da presente invenção ilustrando um dispositivo de ensinamento/aprendizado eletrônico na posição fechada;

A Figura 2 é uma vista em perspectiva superior do dispositivo na Figura 1 parcialmente sobreposto por um livro aberto em uma posição de duas páginas;

A Figura 3 é uma vista plana superior do dispositivo das Figuras 1 e 2 na posição aberta sem um livro;

A Figura 4 é um esquema da parte eletrônica do sensor de posição do dispositivo nas Figuras 1 a 3;

A Figura 5 é um esquema da parte eletrônica do dispositivo das Figuras de 1 a 3;

A Figura 6 é uma vista fragmentada de parte de um canto do

dispositivo das Figuras de 1 a 3 representando a construção de um dos conjuntos de sensor de ponto cruzado;

A Figura 7 é uma vista plana superior de um esquema do conjunto de ponto cruzado (ou grade) para o sensor de posição do dispositivo nas Figuras de 1 a 3;

A Figura 8 é uma vista esquemática de parte de um livro se sobrepondo a parte de um sensor de posição no dispositivo das Figuras de 1 a 3;

As Figuras de 9 a 11 são vistas em corte diagramáticas de um sensor e dos sinais enviados do sensor sem contato humano, nominalmente com o máximo de contato humano, e nominalmente com o mínimo de contato humano, respectivamente;

A Figura 12 é um fluxograma do processo de identificação de toque;

A Figura 13 é um esquema detalhado de um oscilador atualmente preferido;

A Figura 14 é um esquema detalhado de um circuito seletor de coluna atualmente preferido;

A Figura 15 é um esquema detalhado das conexões sugeridas dos conjuntos de sensor de ponto cruzado para outros componentes do circuito de sensor ilustrados em outras figuras;

A Figura 16 é um esquema detalhado de um circuito seletor de fileira atualmente preferido;

A Figura 17 é um esquema detalhado de um circuito de sensor de fileira atualmente preferido;

A Figura 18 é um esquema detalhado de um detetor sincronizado, um multiplexador e um circuito de filtro atualmente preferidos, e

A Figura 19 é um esquema detalhado de um controlador de sensor atualmente preferido.

### 30 Descrição Detalhada da Invenção

Um sistema de ensinamento/aprendizado eletrônico inclui um dispositivo de ensinamento/aprendizado de brinquedo, eletrônico e interati-

vo, software e um ou mais livros ou outros elementos planos impressos removíveis tais como folhas individuais, cartões, estêncil, etc. O software pode ser armazenado em um ou mais cartuchos de processamento auxiliares que acompanham o(s) elemento(s) impresso(s), ou em uma memória dentro do dispositivo 100, ou em ambos. Quando fornecidos juntos, o cartucho e o elemento impresso são um par combinado e são utilizados no dispositivo simultaneamente.

Com referência às Figuras de 1 a 3, é ilustrada uma modalidade atualmente preferida de um dispositivo de ensinamento/aprendizado de brinquedo, interativo e eletrônico, geralmente designado por 100 de acordo com a presente invenção. O dispositivo de aprendizado eletrônico 100 é configurado para uso independente além de para receber um livro 10 ou outro(s) elemento(s) plano(s) impresso(s) removível(is).

O dispositivo 100 pode ser configurado, em particular, como uma leitora para livro interativa que possui um sensor que pode perceber a localização de um dedo quando o mesmo é colocado em um livro 10 dentro de uma área de sensor de dedos ativa do dispositivo 100. A área de sensor ativa é preferivelmente combinada com o tamanho do(s) livro(s) ou outro(s) elemento(s) tipo de folha impressa que possa(m) ser colocado(s) no dispositivo 100. O sensor preferido do dispositivo 100 pode perceber a presença de um dedo a uma distância de pelo menos cerca de 0,63 cm (0,25 polegada) da superfície plana do sensor. Essa resolução z (altura) permitirá que o sensor detecte a presença de um dedo através de um livro que tem até pelo menos 0,63 cm (0,25 polegada) de espessura. O sensor possui preferivelmente uma resolução x e y nos planos paralelos ao plano do sensor que é fino o suficiente para selecionar cada palavra ou outros indícios ou ícones gráficos que estejam impressos no livro 10. A resolução é baseada no número de pontos cruzados do sensor, e como os mesmos correspondem em termos de posição às palavras e gráficos na superfície sobre o sensor ou impressos no livro ou em outro elemento plano removível tal como uma folha impressa ou estêncil que possam ser utilizados com o dispositivo 100.

O software dentro de um cartucho de processamento auxiliar

146 ou dentro do dispositivo 100 propriamente dito, contém informação para a produção de efeitos sonoros (incluindo música e fala), ou ações associadas com os gráficos ou palavras impressos dentro do livro ou em outro elemento removível impresso ou com relação às letras, palavras ou outros gráficos impressos na superfície superior do sensor. As coordenadas x e y das palavras ou gráficos e seus efeitos e ações sonoros correspondentes são mapeadas em uma memória localizada no cartucho de processamento auxiliar 146 ou no dispositivo 100 propriamente dito. A seleção de qualquer texto ou gráfico simplesmente através do toque no mesmo produzirá pelo menos 5 uma saída de áudio associada com o texto ou gráfico especificamente selecionado. Essa informação é preferivelmente organizada em uma arquitetura página por página. O usuário do dispositivo 100 interage com o sensor diretamente utilizando quaisquer gráficos que possam estar impressos em sua superfície ou coloca um livro 10 ou outra folha impressa na superfície do 10 sensor e insere o cartucho de processamento auxiliar 146 (se for necessário) para esse livro em uma fenda auxiliar 144 do dispositivo 100 e interage através do objeto impresso 10 e do sensor. O dispositivo 100 pode então produzir uma saída de áudio adequada em resposta a um toque do dedo em qualquer palavra ou gráfico. Essa arquitetura aberta permite a utilização de um 15 número infinito de livros e software no dispositivo genérico 100.

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Com referência às Figuras de 1 a 3, o dispositivo 100 possui um conjunto de alojamento ou simplesmente "alojamento" 110 configurado em particular para receber o livro 10 quando o livro está na orientação predeterminada com lados superior, inferior, esquerdo e direito proximais aos lados superior, inferior, esquerdo e direito do dispositivo 100. O alojamento 25 110 comprehende duas plataformas geralmente planas, uma base 112 e uma cobertura 114 unidas por articulações 180, 182, além de um conjunto de montagem de livro 118, uma trava 220 e um agarre para as mãos 148. A primeira plataforma, a base 112, possui um primeiro recesso de base 128 30 com uma primeira superfície plana com recessos 130. O recesso de base 128 é unido por uma borda com recessos 132 e primeira, segunda e terceira paredes laterais que limitam o recesso 134, 136, 138. Abaixo da superfície

130 encontra-se um sensor de posição que responde ao usuário na forma de uma matriz de linhas condutoras separadas porém cruzadas, que constituem um primeiro conjunto de sensor de ponto cruzado 142 discutido abaixo. Uma fenda para cartucho 144 pode ser fornecida no topo da base 112 para receber 5 um cartucho ROM removível 146 como será discutido para uso com o livro 10 ou outro elemento plano impresso removível (por exemplo, folha, cartão ou gabarito) utilizado com o dispositivo. A segunda plataforma, a cobertura 114, possui um segundo recesso de cobertura 156 com uma segunda superfície plana com recesso 158. O recesso de cobertura 156 é unido 10 por uma borda com recesso 160 e primeira, segunda e terceira paredes laterais que limitam o recesso 162, 164 e 166. Sob a segunda superfície de contato de cobertura 158 encontra-se um segundo sensor na forma de uma matriz de linhas condutoras separadas porém cruzadas, que constituem um segundo conjunto de sensor de ponto cruzado 170 discutido abaixo. Um 15 tentor de alto falante 176 suporta um alto falante 178. Articulações 180 e 182 são ocas e configuradas para fornecerem uma passagem (não-representada) através de cada articulação para condutores elétricos (não-ilustrados) que conectam as partes eletrônicas na base 112 às partes eletrônicas na cobertura 114.

20 Com referência à Figura 2, um livro preferido 10 possui uma pluralidade de páginas 16 conectadas por uma encadernação 17. Qualquer par adjacente dentre a pluralidade de páginas, como as primeira e segunda páginas 16a, 16b, pode ser aberto em uma disposição de duas páginas 20. A disposição de duas páginas 20 possui bordas laterais opostas 24a, 24b dis- 25 tais com relação à encadernação 17. O livro 10 é desenhado para encaixar de forma justa no dispositivo 100 com um mínimo de movimento. Em particular, o alojamento 110 possui uma cavidade para livro 208 formado pela combinação do recesso de base 128 e do recesso de cobertura 156. A cavidade 208 é configurado para receber de forma justa o livro 10 quando o livro 30 10 está na orientação reta predeterminada, os lados superior, inferior, esquerdo e direito do livro 10 proximais aos lados superior, inferior, esquerdo e direito da cavidade 208 e, em particular, para ter um encaixe com espaço

entre a cavidade e o livro 10 ou a disposição de duas páginas 20.

Com referência à Figura 4, são ilustrados em termos abrangentes, os componentes da parte eletrônica 240 do dispositivo 100. A parte eletrônica 240 inclui uma interface de usuário 230 que compreende em adição 5 ao sensor de posição 232 e do alto falante 178, um conjunto gerador de sinal visível 238, controlando, por exemplo, os LEDs 150. Outras interfaces de usuário podem ser fornecidas. Outros componentes e circuitos eletrônicos apresentados do dispositivo 100 são o controlador principal ou microcontrolador 288, acoplado a cada um dos componentes da interface 230 além de, 10 com uma memória 290 e um sintetizador de fala 292. A memória 290 pode conter um conjunto não-volátil de instruções 290a além de um conjunto não-volátil de dados 290b, incluindo, por exemplo, um mapa da cavidade para livro 208 para identificar as localizações do sensor de toque de vários ícones como letras 274, 276 que podem ser fornecidos nas superfícies de recesso 15 130, 158 que cobrem os elementos de sensor. Um conector elétrico externo 144 é fornecido para uso com um cartucho construído de forma adequada 146. Tal cartucho contém pelo menos uma memória acessível 296. Preferivelmente, para o sistema descrito 100, o cartucho indicado 146 inclui seu próprio controlador de cartucho 294 e a memória de cartucho 296 inclui am- 20 bas as instruções de firmware 296a para rodar o microcontrolador 294 e tornar o controlador do dispositivo 288 escravo do controlador de cartucho 294 além de dados 296b que se relacionam especificamente a um livro ou outro elemento impresso que é utilizado com o cartucho 146 e o dispositivo 100. Também fazem parte da parte eletrônica, apesar de não serem apresenta- 25 dos na Figura 5, o suprimento de energia (bateria e/ou conversor AC), o botão liga/desliga 234 e o botão de controle de volume 236.

A Figura 5 apresenta na forma de um diagrama em bloco a parte eletrônica do sensor de posição 250 da Figura 4. A parte eletrônica do sensor 250 é preferivelmente controlada por um controlador de sensor dedicado 30 264, por exemplo, um microprocessador Sunplus SPL130A, que é conectado e controla um circuito de acionador de coluna 254, um par de circuitos de sensor 256a, 256b através de um circuito de seleção de fileira 258, um cir-

cuito de detetor, multiplexador e filtro sincronizado 260, que processa os sinal  
5 de sensor originais e passa os sinais processados para um conversor  
de analógico para digital 262 para digitalização. Alternativamente, as fun-  
ções do microcontrolador de sensor 264 podem ser realizadas pelo micro-  
controlador do dispositivo 288. O sensor de posição 232 no dispositivo 100  
compreende adicionalmente as matrizes de ponto cruzado ou os conjuntos  
de sensor 142, 170 e um oscilador de sinal 252, que energiza os conjuntos  
142, 170 e controla o detetor 260.

A construção dos sensores 142, 170 em cada elemento de alo-  
10 jamento 112, 114 é indicada de forma diagramática na Figura 6, que repre-  
senta os componentes de sensor de posição na base 112. O conjunto de  
sensor 142 é localizado diretamente sob um espaçador plástico 515 que  
forma a superfície de recesso 130. Espaçada sob o conjunto de sensor ou  
matriz 142 encontra-se uma placa de metal eletricamente condutora 510.

15 Com referência à Figura 7, cada uma das matrizes 142, 170  
possui dois conjuntos de linhas condutoras separadas geralmente paralelas  
e individuais dispostas como uma pluralidade de linhas condutoras verticais  
ou de coluna espaçadas (também referidas como linhas de grade vertical)  
248 e uma pluralidade de linhas condutoras horizontais ou de fileira, espa-  
20 çadas ou traços (também referidas como linhas de grade horizontal) 246  
transversais e preferivelmente perpendiculares à pluralidade de linhas con-  
dutoras de coluna 248. Com referência aos conjuntos de linhas 246, 248,  
tratadas por "fileiras" e "colunas" para fins de conveniência, as "fileiras" cor-  
rem de leste para oeste/esquerda para direita enquanto que as "colunas"  
25 são perpendiculares (ou de outra forma transversais) a tais "fileiras" corren-  
do de norte para sul/cima para baixo, mas a nomenclatura pode ser inverti-  
da. O conjunto de linhas condutoras de coluna 248 e o conjunto de linhas  
condutoras de fileira 246 são separados por um espaçador eletricamente  
isolante, por exemplo, uma folha de plástico Mylar. As linhas condutoras de  
30 fileira e coluna 246, 248 são impressas de forma sugerida em tinta condutora  
em lados opostos da folha de Mylar para fornecer isolamento elétrico entre  
os conjuntos e formar a matriz 170. A Figura 7 ilustra a matriz 142 de acordo

com uma modalidade ilustrativa da presente invenção. A matriz 170 é de forma sugerida uma imagem espelhada mas poderia ter uma configuração e construção diferentes. Cada matriz 142,170, de forma sugerida, inclui dezesseis fileiras 246 e dezesseis colunas 248 das linhas ou traços condutores, no entanto, números diferentes de uma ou ambas podem ser utilizados. Cada ponto onde uma linha de fileira 246 e coluna 248 se cruzam cria um sensor de "ponto de cruzamento" individual único. Os conjuntos de linhas de 16 por 16 portanto criam duzentos e cinqüenta e seis sensores individuais de ponto de cruzamento dispostos em um conjunto retangular no recesso 128,

5 10 156 de cada metade de alojamento 112, 114.

A Figura 8 apresenta a parte esquemática de um livro 10 colocado na parte de um conjunto de sensor 142 do dispositivo 100 e, em linhas tracejadas, a mão de um usuário selecionando a palavra "BALL" com um dedo estendido. A operação do dispositivo de leitura de livro interativo 100 permite que um usuário selecione qualquer área ativa na página do livro 10 tocando ou simplesmente apontando suficientemente perto para a área selecionada da página com um dedo. Depois da seleção dessa área ativa, o alto falante 178 do dispositivo de leitura de livro interativo 100 envia uma mensagem audível em resposta à essa seleção. Por meio de exemplo, quando o dedo toca a palavra "BALL", o dispositivo de leitura de livro interativo 100 pode produzir uma saída de áudio falada "BALL" a partir do alto falante 178. A mensagem audível é gerada em resposta direta ao toque do usuário na palavra "BALL". Mensagens audíveis diferentes serão geradas se o usuário tocar outras áreas da página, por exemplo, tocando a palavra "blue" uma mensagem audível "blue" será gerada. O toque no gráfico de bola na página poderia produzir um som de uma bola quicando. O toque em quaisquer áreas da página do livro que não apresentam texto ou o gráfico gerará um som genérico de um único badalo de sino para significar que não existe áudio associado com essa área, uma saída de áudio falada genérica tal como 20 25 30 "try again" ou a seleção de entrada poderá ser simplesmente ignorada. O dispositivo de leitura de livro interativo 100 pode, portanto, ser utilizado para ler o livro, criar efeitos sonoros associados com os gráficos no livro ou qual-

quer outra atividade programada de forma a responder a um toque de dedo. Pode-se observar prontamente a partir da Figura 8 que cada palavra e imagem pode ser mapeada para um ou mais pares de coordenadas x e y de qualquer conjunto 142, 170. Por exemplo, a palavra "BALL" está localizada 5 em R5, C4 e R5, C5 nos conjuntos. Esse mapa de localização é armazenando na memória juntamente com a mensagem audível associada que é reproduzida quando qualquer localização de sensor de ponto cruzado é selecionada.

As Figuras de 9 a 11 ilustram exemplos de três seções transversais do dispositivo 100 sem e com o livro 10. Os desenhos de seção transversal ilustram a partir das Figuras de 9 a 11, o dispositivo 100 sem o livro ou elemento impresso removível ou presença de usuário, e um dedo 505 com as páginas 16 de um livro 10 (em várias espessuras). Cada uma das Figuras de 9 a 11 apresenta adicionalmente um espaçador plástico 515, uma 15 pluralidade de traços de coluna espaçados (vertical) 248, e uma folha não-condutora (por exemplo, Mylar) 525 e um dos traços de fileira espaçados (horizontal) 246 transversais à pluralidade de traços de coluna 248. A folha não-condutora 525 suporta e separa os traços de coluna 248 dos traços de fileira 246 e forma com esses traços, os conjuntos 142, 170. O sensor inclui 20 preferivelmente um plano condutor 510 na forma de uma placa metálica, conectada ao terra do sistema e paralela e espaçada dos conjuntos 142, 170.

O espaçador plástico 515 que forma a superfície superior 130, 158 de qualquer recesso 128, 156, tem aproximadamente 0,20 cm (0,080 polegada) de espessura e está localizado em cima de qualquer um dos 25 conjuntos 142, 170 para agir como um isolante de forma que a superfície de toque do sensor seja separada da matriz 142, 170 por pelo menos esse tanto. O espaçador 515 pode ser um estireno ou ABS com uma constante dielétrica entre cerca e 2 e 3 apesar da espessura da constante dielétrica poderem ser ajustadas para se alcançar uma sensibilidade desejada. A função 30 do espaçador 515 é fornecer uma resposta estável da matriz 142, 170. Eliminando-se o espaçador 515, os sensores de ponto cruzado dos conjuntos seriam muito mais sensíveis, tão altamente sensíveis que páginas únicas

16 mudariam drasticamente o resultado dos conjuntos 142, 170. O efeito de se adicionar páginas é relativamente imperceptível (por exemplo, 15 a 20 miliVolt) com o espaçador 515 no lugar, mas poderia ser mais de uma ordem de magnitude superior sem o espaçador. Pela separação das páginas 16 do 5 livro 10 da matriz 142, 170 por espessura do espaçador plástico 515, o efeito na matriz 140, 162 é muito reduzido. Como mencionado anteriormente, a largura e a espessura dos traços de coluna 248 (colunas verticais) e dos traços de fileira 246 (fileiras horizontais) devem ser mantidas a um mínimo nos pontos cruzados a fim de se reduzir o efeito capacitivo em cada um dos 10 pontos cruzados, mas são preferivelmente aumentadas entre os pontos cruzados e em torno dos pontos cruzados, por exemplo, pelo alargamento dos traços de fileira e coluna individuais no formato de estrelas de quatro pontas ou quadrados diagonais ou similar em torno de locais de pontos cruzados. Sugere-se que o plano condutor 510 seja espaçado de cerca de um quarto 15 de polegada (5 mm) abaixo das matrizes 142, 170. O plano condutor fornece proteção para as matrizes 142, 170 e como resultado disso, afeta a área percebida em torno de cada ponto cruzado nas matrizes 142, 170. O espaçamento do plano 510 perpendicular aos conjuntos planos 142, 170 pode ser ajustado de forma a se ajustar o tamanho da área sensível ou de percepção 20 (isto é, selecionada pelo usuário) em torno de cada ponto cruzado de forma que as áreas de percepção dos pontos cruzados adjacentes não se sobreponham.

Com referência à Figura 7, os traços individuais 246, 248 são estendidos para as bordas laterais e inferior da folha 525 que suporta os traços. Preferivelmente, os traços mais curtos 530 e 535 são estendidos a partir 25 das bordas laterais e inferior, respectivamente, da folha 525, um traço mais curto 530 ou 535 em cada lado de cada traço de sensor 246, 248, respectivamente. Os traços mais curtos 530 e 535 são todos conectados ao terra do sistema através ou com o plano condutor 510. Os traços horizontais 530 30 estendem-se para dentro a partir da borda vertical para um pouco além onde os traços de fileira 246 se alargam para fora para formar os terminais, e, com um comprimento uniforme, fornecem algum controle de impedância. Os tra-

ços verticais 535 estendem-se da borda inferior até um ponto onde os traços verticais 248 começam a correr em paralelo, pouco abaixo de onde esses traços são alargados e dentro de cerca de 12 mm dos pontos cruzados mais baixos. Os traços 535 impedem o acoplamento cruzado entre os traços de 5 coluna 248 quando as colunas estão sendo acionadas pelo oscilador 252.

Em termos gerais, os valores dos sinais gerados pelas matrizes 142, 170 são lidos e armazenados sem interação humana com os conjuntos para se obter um valor de referência para cada ponto cruzado. O valor de referência de cada sensor de ponto cruzado é individualmente determinado 10 e atualizado. Preferivelmente, cada um é uma "média" de sucessivos valores de varredura (por exemplo, cerca de dezesseis) para o ponto cruzado. As varreduras sucessivas são comparadas com os valores de referência para se determinar a proximidade de um dedo humano ou outra extremidade. De acordo com uma modalidade preferida da presente invenção, os dados são 15 acumulados começando-se com zero quando o dispositivo 100 é energizado. Um efeito colateral disto é que se o usuário tiver seu dedo nas matrizes 142, 170 quando esse processo ocorre, os valores de referência para os pontos tocados são inferiores do que deveriam ser sem o toque.

A operação do sensor 232 é como se segue. Apesar de não ser 20 exigido, o sensor 232 é preferivelmente lido pela leitura de sensores de ponto de toque individuais, uma fileira de cada vez, alternando os conjuntos 142, 170 para cada fileira 256. O firmware associado com o microcontrolador 264 direciona o circuito de acionamento de coluna 254 para passar o sinal de excitação de RF, por exemplo, um sinal de onda quadrada de 250 kHz, 25 3300 miliVolt, do oscilador 252 para os traços de coluna 248 dos dois conjuntos 142, 170, preferivelmente em seqüência, acionando a coluna com mesmo posicionamento em cada conjunto 142, 170 juntas. O firmware também direciona o circuito de seleção de fileira 258 para gerar sinais de controle adequados enviados para os circuitos de sensor (fileira) 256a, 256b 30 para conectar de forma alternada o traço de fileira de mesmo posicionamento 246 em cada conjunto 142, 170 ao circuito de detetor, multiplexador e de filtro sincronizado 260 como traços de coluna 248 são seqüencialmente

acionados através de cada conjunto 142, 170. O controlador 264 controla adicionalmente a transferência de dados do circuito 260, que gera um sinal de voltagem analógica de nível dc, através do conversor A/D 262. As fileiras correspondentes 246 são amostradas em cada conjunto 142, 170 antes da  
5 próxima fileira sucessiva ser amostrada, tudo com a mesma coluna acionada em cada conjunto. Dessa forma, o firmware realiza o ciclo dos conjuntos 142, 170 de forma mais rápida, as fileiras 246 um pouco menos rápido e as colunas 248, menos rápido ainda. Preferivelmente, porém não necessariamente, as fileiras 246 são varridas de baixo para cima enquanto as colunas  
10 são acionadas de dentro para fora (direita para esquerda para 170, esquerda para direita para 142).

Depois que os valores iniciais dos conjuntos 142, 170 foram armazenados, os conjuntos 142, 170 são ciclicamente e continuamente varridos, e os resultados para cada sensor de ponto cruzado são comparados com os  
15 valores de referência armazenados, que são propriamente ditos ciclicamente e continuamente atualizados. Se qualquer valor de sensor de ponto cruzado individual tiver um diferencial de seu valor de referência que seja maior do que uma quantidade predeterminada ou limite ("limite"), o controlador 264 marcará o ponto como "tocado" ou "selecionado". Um limite fixo é estabelecido para o dispositivo 100 pela caracterização do dispositivo 100 durante a fabricação. Para o conjunto de circuitos, materiais e estrutura descritos, des-  
20 cobriu-se que com um sinal de onda quadrada de 250 kHz e 3300 miliVolts aplicado, os sensores de ponto cruzado individuais dos conjuntos 142, 170 enviam sinais de cerca de 2200 miliVolts +/- 400 miliVolts sem interação do usuário. A deformação do sinal (isto é, uma queda na intensidade detectada  
25 do sinal) em cada localização de sensor de ponto cruzado para contatos de usuário que variam entre o de um adulto grande tocando diretamente a superfície de cobertura com recesso até uma pequena criança tocando o topo de um livro fechado 10 em cima de tal superfície varia de cerca de 1600 mi-  
30 liVolts no primeiro caso para apenas cerca de 200 a 300 miliVolts no segundo caso. O limite deve ser determinado o mais próximo possível da deformação gerada pelo menor usuário esperado. Nesse dispositivo 100 sendo des-

crito, o limite é, como sugerido, determinado em menos de 200 miliVolts, preferivelmente entre cerca de 190 e 200 miliVolts, para cada sensor de ponto cruzado. Se o valor de voltagem medido para o ponto cruzado sendo percebido for inferior ao valor de referência na memória por uma quantidade 5 igual ou superior à quantidade limítrofe, o ponto é considerado tocado e é "marcado" como tal pelo controlador de sensor 264. Se a diferença for inferior ao limite, o valor de referência é atualizado a cada período de 64 milissegundos (tempo total de varredura), resultando em um acerto dos valores de referência após cerca de um segundo. Depois que as matrizes 142, 170 são 10 varridas, os pontos cruzados que foram "marcados" como tocados por dois ciclos de varredura são considerados válidos e selecionados para processamento adicional por um algoritmo de "melhor candidato" como será descrito.

Para o dispositivo descrito 100, cada 250 microssegundos, dois 15 (2) pontos cruzados (pontos cruzados de posicionamento idêntico associados com cada conjunto 140, 172) são preferivelmente varridos e os dados associados registrados no controlador de sensor 264. Para cada varredura de sensor, cada valor de dados de ponto cruzado é preferivelmente inicialmente comparado com um valor de "Limite Alto". Se o valor de dados exceder esse valor de Limite Alto, o mesmo é ignorado como um candidato para essa varredura e ignorado para atualização do valor de referência para esse 20 sensor. A finalidade do valor de Limite Alto é impedir que valores dados absurdamente altos façam com que o sensor de ponto cruzado apareça permanentemente pressionado. Para se compreender o mecanismo por trás 25 disto é necessário compreender os conceitos descritos abaixo. Portanto, a função do Limite Alto será descrita posteriormente nessa seção.

Como notado acima, para cada varredura de conjunto, cada vez que o valor de dados associado com um sensor de ponto cruzado é lido, o mesmo é comparado com o valor de referência, o que pode ser considerado 30 e referido aqui como "Média de Funcionamento" associada ao sensor de ponto cruzado (ver abaixo). Se o valor de dados for inferior à Média de Funcionamento menos o Limite, o sensor de ponto cruzado é considerado "to-

cado" para essa varredura. O Limite é o valor de dados fixo mencionado acima (isto é, 190 a 200 miliVolts), que representa a deformação mínima que é esperada para indicar que um sensor de ponto cruzado foi considerado tocado.

5           Se o valor de dados não indicar que o sensor de ponto cruzado foi considerado tocado (isto é, o valor de dados < [Média de Funcionamento – Limite]), então o valor de dados é utilizado para atualizar a Média de Funcionamento. Depois da energização do sistema, a Média de Funcionamento para cada ponto é determinada para zero. Toda vez que o valor de dados  
10 para um sensor de ponto cruzado não for superior ao Limite Alto, e não for baixo o suficiente para indicar que o sensor de ponto cruzado foi tocado, o valor de dados é utilizado para atualizar a Média de Funcionamento para esse ponto. A fórmula utilizada para computar a nova Média de Funcionamento é como se segue:

15           Nova Média de Funcionamento = Média de Funcionamento +  
(valor dos dados – Média de Funcionamento)/16.

Dessa forma, a "média de funcionamento" preferida não é verdadeiramente uma média mas ao invés disso, um algoritmo de convergência.

20           Com o conhecimento acima, a função do algoritmo de Limite Alto pode agora ser explicada. O algoritmo de valor de referência/média de funcionamento pode ser enganado pelas situações nas quais os altos níveis de interferência existem e as leituras do sensor de ponto cruzado sobre significativamente. Sem o corte de Limite Alto, valores de dados absurdamente altos (devido a uma fonte contínua de ruído) podem eventualmente resultar em uma Média de Funcionamento absurdamente alta para um determinado sensor de ponto cruzado. Então, quando os valores de dados varridos retornam para sua faixa de valor nominal, se os valores de dados sendo varridos estiverem baixo o suficiente de forma que os valores de dados sejam superiores à Média de Funcionamento absurdamente alta menos o Limite, o sensor de ponto cruzado será considerado tocado. Isso resultará em valores de dados recém varridos nunca sendo utilizados no cálculo da Média de Funci-

onamento e, portanto, não permitirá que a Média de Funcionamento seja baixada para seu nível normal, fazendo com que o sensor de ponto cruzado apareça permanentemente tocado durante a duração do uso do dispositivo 100. Conseqüentemente, o único dado de sensor que é utilizado ou armazenado é o dado que é inferior ao Limite Alto. Para o dispositivo 100 como descrito acima, um valor de Limite Alto de 3100 miliVolts (cerca de cinqüenta por cento maior do que a voltagem nominal) é sugerido.

Na modalidade preferida, o dispositivo 100 inclui adicionalmente um algoritmo de "Recuperação Rápida". Isso compara a última leitura de um ponto cruzado com o valor de referência ou Média de Funcionamento. Se a última leitura for superior em mais do que o Limite de Recuperação Rápida, o valor de referência será determinado igual à última leitura. Esse algoritmo encontra uma situação na qual o usuário "paira" com um dedo sobre um ponto por um período de tempo estendido, o que artificialmente força o valor de referência para baixo. Uma liberação e toque rápidos do mesmo ponto nessa situação pode fazer com que o sistema não responda visto que o diferencial entre o valor de referência e a leitura não é maior do que o valor de limite de toque (Limite). A Figura 12 resume as etapas seguidas na identificação dos sensores "tocados" e na atualização dos valores de referência/Médias de Funcionamento.

A seção anterior descreve em detalhes como cada um dos 512 conjuntos de sensor de ponto cruzado (16x16x2) 142, 170 são determinados como ativos (isto é, "tocados" ou "selecionados") ou não. A varredura de todo o conjunto de pontos cruzados de uma vez leva aproximadamente 64 milissegundos (16x16x250 microsegundos). Durante cada varredura, cada sensor de ponto cruzado é considerado como sendo ativado/tocado ou não.

Depois de cada varredura, os pontos tocados são processados para identificar um "melhor candidato". Em termos gerais, o melhor candidato é o sensor de ponto cruzado selecionado pelo microprocessador do sensor como sendo o ponto mais provável de ter sido selecionado pelo usuário tocando o sensor. Em termos abrangentes, é o ponto tocado que é o mais alto (mais ao norte/Topo) ou o mais alto e mais para a esquerda (isto é,

mais a noroeste/Esquerda Superior) se dois candidatos em potencial de igual altura forem ativados em um conjunto de sensor determinado 142, 170. Para fins de conveniência, os mesmos serão referidos coletivamente como simplesmente o ponto "mais a noroeste". Além disso, o sensor de ponto cruzado deve preferivelmente ser "tocado" por duas varreduras de 64 milissegundos consecutivas para ser considerado como o novo ponto mais a noroeste do sensor. O processo também é apresentado na Figura 12.

O controlador de sensor 264 primeiro identifica um conjunto de sensores tocados. A seguir, o mesmo identifica os que foram tocados por pelo menos dois ciclos de 64 milissegundos consecutivos. Esses são os sensores candidatos mais a noroeste. Preferivelmente, o conjunto esquerdo 140 é processado para os novos candidatos mais a noroeste antes do conjunto da direita 172 ser processado e o conjunto da esquerda recebe prioridade sobre o conjunto da direita em cada varredura. O que isso significa é que se um novo ponto/sensor candidato mais a noroeste identificado no conjunto da esquerda for inferior a um novo, ponto/sensor candidato mais a noroeste identificado no conjunto da direita, o candidato do conjunto da esquerda ainda será selecionado como o novo ponto/sensor mais a noroeste para processamento para melhor candidato. Uma vez que o melhor candidato é escolhido, sua identificação/localização é comunicada a partir do controlador de sensor 264 para o microcontrolador da unidade base 288.

A prioridade do conjunto da esquerda sobre o conjunto da direita, descrita acima, é efetiva apenas quando um sensor de ponto cruzado em cada conjunto é tocado primeiro dentro de uma varredura de 64 milissegundos. No entanto, isso pode se estender para um "tratamento preferencial" de duas varreduras (128 milissegundos) para o conjunto da esquerda se desejado. Ambas as situações são descritas nos exemplos a seguir:

Se um sensor de ponto cruzado relativamente inferior no conjunto da esquerda 142 e um sensor de ponto cruzado relativamente superior 30 no conjunto da direita 170 forem ambos tocados durante a mesma varredura de 64 milissegundos, o sensor de ponto cruzado no conjunto de sensor esquerdo 142 é escolhido como o novo ponto mais a noroeste em potencial se

esse mesmo ponto cruzado de conjunto de sensor esquerdo ainda for tocado durante a próxima varredura.

Se um sensor de ponto cruzado relativamente superior no conjunto de sensor direito 170 for tocado e escolhido como o novo candidato 5 mais a noroeste em potencial durante um ciclo de 64 milissegundos, e se um sensor de ponto cruzado relativamente inferior no conjunto da esquerda 142 for tocado durante o próximo ciclo de varredura de 64 milissegundos e for o novo candidato de ponto mais a noroeste desse conjunto, então o novo sensor de ponto mais a noroeste (o sensor de ponto cruzado inferior) no conjunto da esquerda 142 é escolhido como o novo candidato de ponto mais a noroeste, se esse ponto do conjunto da esquerda ainda for tocado durante a próxima varredura e for processado de acordo.

Uma vez que o novo ponto mais a noroeste (sensor de ponto cruzado) foi escolhido, preferivelmente um algoritmo "Travamento de Sudeste" tem efeito para esse conjunto 142 ou 170. O algoritmo de Travamento de Sudeste faz com que qualquer ponto no mesmo conjunto tocado em varreduras subseqüentes abaixo do novo ponto mais a noroeste seja ignorado até a expiração de um segundo enquanto o novo ponto mais a noroeste permanece selecionado, ou o novo ponto mais a noroeste ser liberado. Após 20 o travamento, todos os pontos cruzados do conjunto se tornam candidatos para o novo ponto mais a noroeste. Esse algoritmo cobre a situação na qual o usuário apóia a parte posterior da mão que está apontando no conjunto depois do dedo ter tocado o conjunto.

O Travamento de Sudeste, quando utilizado, só tem efeito preferivelmente para um conjunto 142, 170 no qual o novo ponto/sensor mais a noroeste reside. Isto é, a situação a seguir pode ocorrer. O novo ponto/sensor mais a noroeste é selecionado a partir do conjunto da direita. Todos os outros sensores de ponto cruzado nesse conjunto em particular que são ao sul do novo ponto/sensor mais a noroeste são "travados" por um segundo ou até que o novo ponto/sensor mais a noroeste seja liberado. Durante esse período de um segundo, um sensor de ponto cruzado no conjunto da esquerda, que é o candidato sensor mais a noroeste tocado nesse con-

junto, pode ser selecionado como o novo ponto mais a noroeste dos dois conjuntos se o mesmo tiver sido tocado duas varreduras consecutivas. Isto é um resultado do fornecimento arbitrário da prioridade para o conjunto de sensor da esquerda 142 entre os dois conjuntos 142, 170.

5 Preferivelmente, um algoritmo de "Busca de Pico" é empregado após um novo ponto mais a noroeste do sensor (dois conjuntos 142, 170) ser identificado. A deformação dos sensores de ponto cruzado imediatamente para Leste (direita), Sul (baixo) e Sudeste (baixo para a direita) do novo sensor de ponto mais a noroeste é examinada para toque e deformações relativas a qualquer sensor tocado dos quatro comparados um com o outro. O sensor dentre os até quatro sensores que possuem a melhor deformação (isto é, alteração do valor de referência/Média de Funcionamento) é selecionado como o "Melhor Candidato" e sua identidade/localização/posição é passada para o microcontrolador principal (unidade de base) 288.

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Toda vez que um novo melhor candidato for selecionado, sua posição é transferida pelo circuito de controle de sensor para o circuito de controle principal (unidade de base) 288. Visto que leva apenas duas varreduras de 64 milissegundos cada para se determinar um melhor candidato e visto que é possível se encontrar um novo melhor candidato em potencial em cada conjunto consecutivamente, é possível que um novo melhor candidato possa ser enviado para o controlador principal 288 nas varreduras consecutivas. O controlador principal 288 decidirá então como utilizar essa informação (atividade corrente interrompida ou não, uso de um sensor de ponto cruzado vizinho ao invés do melhor candidato, etc.).

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O dispositivo 100 também procurará ver se existem múltiplas mãos colocadas no livro 10 devido ao fato de o usuário inadvertidamente poder colocar mais de uma mão no livro. No caso de o sensor de leitura de livro perceber duas mãos colocadas no sensor, o mesmo procurará ver se qualquer registro é um ponto mais a noroeste claramente definido. Se for o caso, o mesmo selecionará esse registro como o melhor candidato. Ao invés de ter que gerar uma saída de áudio para direcionar o usuário para usar "um

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dedo de cada vez", ou qualquer outra declaração adequada quando o dispositivo 10 não puder determinar com precisão razoável o registro provável, a presente invenção pode selecionar um "melhor candidato" com base no algoritmo mencionado acima.

- 5 A Figura 13 é um esquema de um circuito oscilador de sinal atualmente preferido 252. O circuito oscilador de sinal 252 gera e supre um sinal de onda quadrada possuindo uma freqüência de aproximadamente 250 kHz a 3,3 V para o circuito de acionador de coluna 254. O mesmo sinal é passado através da linha 253 para o circuito de detetor, multiplexador e filtro  
10 sincronizado 260 para a detecção sincronizada do sinal oscilante acoplado ao conjunto.

- A Figura 14 é um esquema de um circuito de acionamento de coluna atualmente preferida 254. O circuito de acionamento de coluna 254 excita seqüencialmente as linhas de coluna das matrizes 142, 170, um par  
15 de linhas correspondentes de cada vez sob o controle do circuito 264. Preferivelmente, quatro multiplexadores 254a a 254d são utilizados para acionar trinta e dois traços de coluna 248 em dois conjuntos 142, 170.

- A Figura 15 é um diagrama esquemático das conexões atualmente preferidas do conjunto de dois sensores de ponto cruzado 142 com os  
20 elementos de circuito de acionamento de coluna e percepção de fileira. O conjunto 170 é, de forma sugerida, uma imagem espelhada.

A Figura 16 ilustra de forma esquemática, uma construção atualmente preferida do circuito de seleção de fileira 258, que também é formado basicamente por quatro multiplexadores 258a a 258d.

- 25 A Figura 17 apresenta uma construção atualmente preferida de um dos dois circuitos de sensor preferivelmente idênticos, circuito de sensor "B" (256b da Figura 5), que detecta os sinais dos traços de fileira 246 do conjunto de sensor da direita 142 ilustrado na Figura 15 e envia o resultado do sinal detectado ("PANEL\_R") para o circuito de detetor, multiplexador e filtro sincronizado 260 sob o controle do circuito de seleção de fileira 258.  
30 Eses circuitos de sensor 256a, 256b impõem uma alta carga de impedância aos traços de fileira acoplados 246 através do uso de transisto-

res/amplificadores individuais Q1-Q16 no circuito apresentado 256b. Os resultados (SENSE\_R1 a SENSE\_R16) são mantidos normalmente altos pelo circuito seletor de fileira 258 e eliminados para os transistores individuais Q1-Q16 por esse circuito quando uma fileira 246 está sendo "percebida".

- 5           A Figura 18 é um esquema de uma construção atualmente preferida do circuito de detetor, multiplexador e filtro sincronizado 260 ilustrando os resultados dos conjuntos 142, 170 (PANEL\_L, PANEL\_R), o resultado analógico (POINT ANALOG) do circuito 260 e o registro de temporização (CONTROL\_8) do controlador de sensor 264. O elemento de circuito "U10" é  
10          um chip de comutação múltipla que acopla a saída do conjunto de sensor da esquerda 140 com um detetor sincronizado/amplificador diferencial 260a formado pelos capacitores C24 e C25 e amplificadores U11A e U11B com o conjunto de circuitos relacionado. O resultado desse par de detector/amplificador é passado para um filtro 260b formado pelo amplificador U12A e conjunto de circuito relacionado e retornado para o pino Z0 para multiplexação pelo chip U10 para o conversor A/D 262. O circuito paralelo conectado aos pinos Y0, Y1 e Z1 opera nos sinais de outro conjunto 172. O circuito 260 opera a uma taxa de 250 kHz do sinal de saída do circuito oscilador 252 on line 253.
- 15          A Figura 19 ilustra uma construção atualmente preferida do circuito de controle ou controlador de sensor 264. O circuito de controle 264 inclui preferivelmente um microprocessador de finalidade geral, tal como um Sunplus® Parte Nº SPL130A, ou similar. O conversor A/D pode ser um conversor A/D externo MicroChip MCP 3001. O suprimento de energia (não  
20          apresentado) do dispositivo 100 fornece energia para o circuito de sensor 232.

- 25          Será apreciado pelos versados na técnica que as mudanças podem ser realizadas às modalidades descritas acima sem que se distancie do conceito inventivo amplo da mesma. Deve se apreciar que a presente invenção pode ser utilizada diretamente, por exemplo, sem um livro ou cartão ou folha, mas com indícios formados ou impressos em uma superfície superior sobre o circuito com software que responda à designação de diferentes lo-

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cais na superfície pelo toque ou quase toque do local na superfície. Dessa forma, a presente invenção pode ser utilizada no lugar de outras telas de toque convencionais em outros dispositivos de leitura de livro além de em outros dispositivos educacionais e de entretenimento. É compreendido, portanto, que essa invenção não está limitada às modalidades em particular descritas, mas deve-se cobrir as modificações dentro do espírito e escopo da presente invenção como definidas pelas reivindicações em anexo.

## REIVINDICAÇÕES

1. Dispositivo de ensinamento/aprendizado eletrônico e interativo possuindo uma plataforma com uma primeira superfície de contato de usuário geralmente plana se sobrepondo a um primeiro sensor geralmente plano,  
5 o primeiro sensor incluindo uma pluralidade de sensores mutuamente adjacentes que respondem ao toque organizados em um conjunto bidimensional, o conjunto sendo formado por primeiro e segundo conjuntos separados de linhas condutoras individuais geralmente paralelas cruzando de forma transversal uma sobre a outra sob uma superfície superior da plataforma, caracterizado por:
  - um gerador de sinal oscilante de freqüência de rádio acoplado cicличamente às linhas individuais condutoras do primeiro conjunto; e
  - um circuito de detecção sincronizada operacionalmente acoplado ao gerador e com linhas condutoras individuais do segundo conjunto para identificar os pontos cruzados individuais selecionados pelo usuário dos primeiros e segundos conjuntos de linhas do conjunto.
2. Dispositivo, de acordo com a reivindicação 1, compreendendo adicionalmente um transistor acoplando entre cada linha condutora do segundo conjunto e o circuito de detecção sincronizada, cada linha condutora individual do segundo conjunto sendo acoplada a uma base do transistor acoplada ao circuito de detecção sincronizada.
3. Dispositivo, de acordo com a reivindicação 1, incluindo adicionalmente um plano eletricamente condutor conectado ao terra do sistema e espaçado para longe dos dois conjuntos de linhas condutoras em um lado  
25 do conjunto oposto à plataforma e a uma distância efetiva para reduzir uma área de ativação de usuário ativo em torno de cada ponto cruzado do conjunto dentro da qual a seleção do usuário é percebida pelo circuito de detecção sincronizada o suficiente para impedir a sobreposição das áreas de ativação por usuário adjacentes dos pontos cruzados adjacentes.
4. Dispositivo, de acordo com a reivindicação 1, compreendendo adicionalmente uma linha condutora aterrada entre cada par adjacente de linhas condutoras do primeiro conjunto de forma a reduzir o acoplamento

cruzado entre o par adjacente de linhas condutoras do primeiro conjunto.

5. Dispositivo, de acordo com a reivindicação 1, no qual o gerador é um gerador de onda quadrada.

6. Dispositivo, de acordo com a reivindicação 1, compreendendo  
5 adicionalmente um circuito de controle operacionalmente acoplado ao circuito de detecção sincronizada e configurado para identificar os pontos cruzados do conjunto sendo potencialmente selecionados pelo usuário e identificando um dentre os pontos cruzados potencialmente selecionados como a seleção de resposta do dispositivo à seleção do usuário.

10 7. Dispositivo, de acordo com a reivindicação 1, compreendendo adicionalmente indícios incorporados de forma visível e permanente em uma superfície superior da plataforma através do conjunto em alinhamento através dos pontos cruzados particulares do conjunto para identificação por parte do usuário de indícios selecionados através do conjunto.

15 8. Dispositivo, de acordo com a reivindicação 1, em combinação com um produto em folha impressa configurado para uma orientação predeterminada na plataforma, o produto em folha impressa incluindo indícios impressos localizados na orientação predeterminada em alinhamento através dos pontos cruzados particulares do conjunto para identificação por 20 parte do usuário dos indícios selecionados através do conjunto.

9. Método de operação de um dispositivo de ensinamento/aprendizado eletrônico e interativo configurado para receber um produto de folha impressa possuindo uma orientação predeterminada no dispositivo e um conteúdo selecionável, o dispositivo compreendendo um alojamento 25 incluindo uma plataforma configurada para receber o produto em folha impressa quando o produto em folha impressa está na orientação predeterminada; uma interface eletrônica de usuário no alojamento incluindo um sensor de posição que responde ao usuário possuindo uma faixa ativa acima da plataforma e incluindo uma pluralidade de sensores individuais dispostos em 30 um conjunto na plataforma; e partes eletrônicas de controle no alojamento incluindo uma memória que possui na mesma instruções associadas com o conteúdo selecionável do produto em folha impressa e um controlador em

comunicação elétrica com a interface de usuário eletrônica, o controlador sendo configurado para realizar pelo menos as etapas de operação de acordo com as instruções na memória, determinação de uma posição selecionada dentro da faixa ativa do sensor de posição, reconhecimento de uma seleção 5 do conteúdo selecionável pelo seletor, e envio, para a interface eletrônica de usuário, de um sinal associado com a seleção; em que a etapa de determinação compreende as etapas de: identificação de uma pluralidade de possíveis posições de sensor selecionadas pelo usuário; e seleção de apenas uma dentre uma pluralidade de possíveis posições de sensor selecionadas 10 pelo usuário como a seleção.

10. Método, de acordo com a reivindicação 9, no qual o dispositivo inclui um conjunto de sensor de ponto cruzado formado pelos primeiro e segundo conjuntos de linhas eletricamente condutoras geralmente paralelas cruzando de forma transversal uma sobre a outra sob uma superfície superior 15 da plataforma, e onde a etapa de identificação de uma pluralidade de posições possivelmente selecionadas compreende as etapas de aplicação de um sinal oscilante de freqüência de rádio de onda quadrada ao primeiro conjunto de linhas condutoras e a um circuito de detecção sincronizada acoplado de forma operacional ao segundo conjunto de linhas condutoras.

20 11. Método, de acordo com a reivindicação 10, no qual a etapa de acoplamento compreende adicionalmente a etapa de acoplamento de cada uma das linhas condutoras do segundo conjunto ao detetor sincronizado através de um amplificador de impedância relativamente alta.

25 12. Método, de acordo com a reivindicação 10, no qual a orientação predeterminada inclui lados superior, inferior, esquerdo e direito e onde a etapa de determinação compreende a etapa de seleção de um sensor de ponto cruzado mais superior do conjunto que foi ativado por usuário como uma posição candidata selecionada por usuário.

30 13. Método, de acordo com a reivindicação 12, no qual a etapa de seleção inclui adicionalmente a etapa de identificação de um sensor de ponto cruzado mais à direita do conjunto de ponto cruzado onde sensores igualmente mais superiores do conjunto foram ativados por usuário.

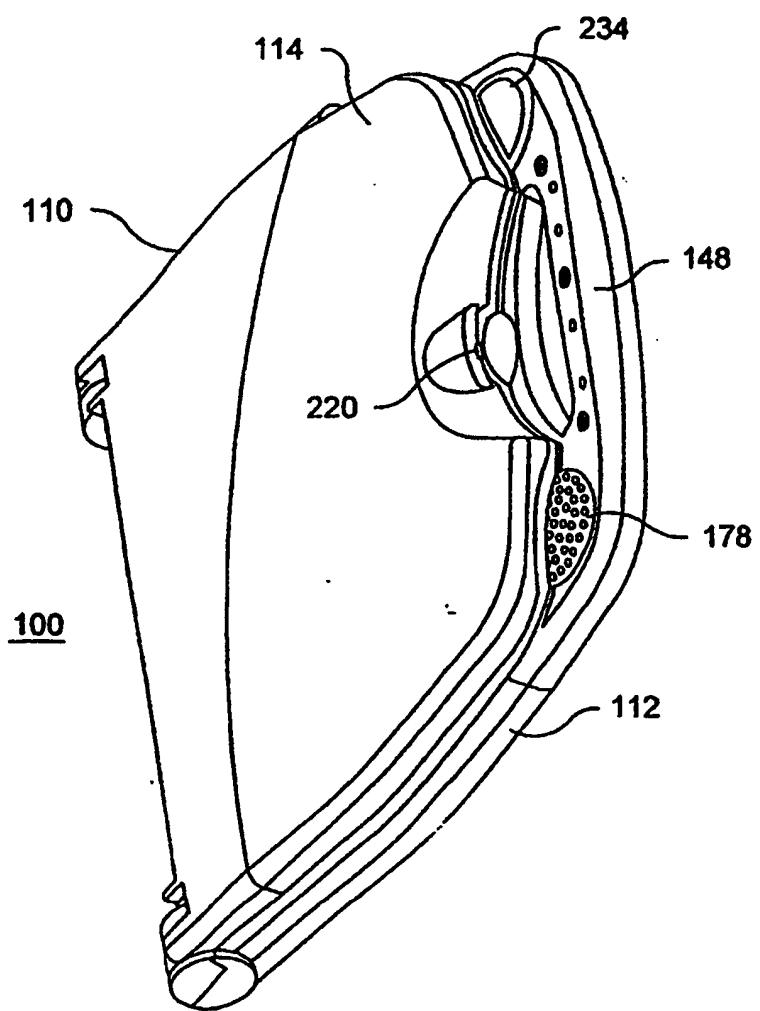
14. Método, de acordo com a reivindicação 13, no qual a etapa de seleção compreende adicionalmente a etapa de identificação de quaisquer outros sensores de ponto cruzado do conjunto que são imediatamente adjacentes à posição candidata selecionada de sensor de ponto cruzado 5 identificada mais acima e à direita e que foi ativada pela seleção do usuário e a identificação de um dos sensores de ponto cruzado imediatamente adjacentes e superior e mais à direita tendo a maior alteração de saída como a seleção.

15. Método, de acordo com a reivindicação 14, compreendendo 10 adicionalmente após a etapa de identificação a seleção, ignorando todos os outros sensores de ponto cruzado do conjunto abaixo do sensor de ponto cruzado da seleção por pelo menos um período de tempo predeterminado.

16. Método, de acordo com a reivindicação 14, compreendendo adicionalmente após a etapa de identificação a seleção, ignorando todos os 15 outros sensores de ponto cruzado do conjunto abaixo do sensor de ponto cruzado selecionado pelo menos até que o sensor de ponto cruzado da seleção seja liberado pelo usuário.

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***Fig. 1***

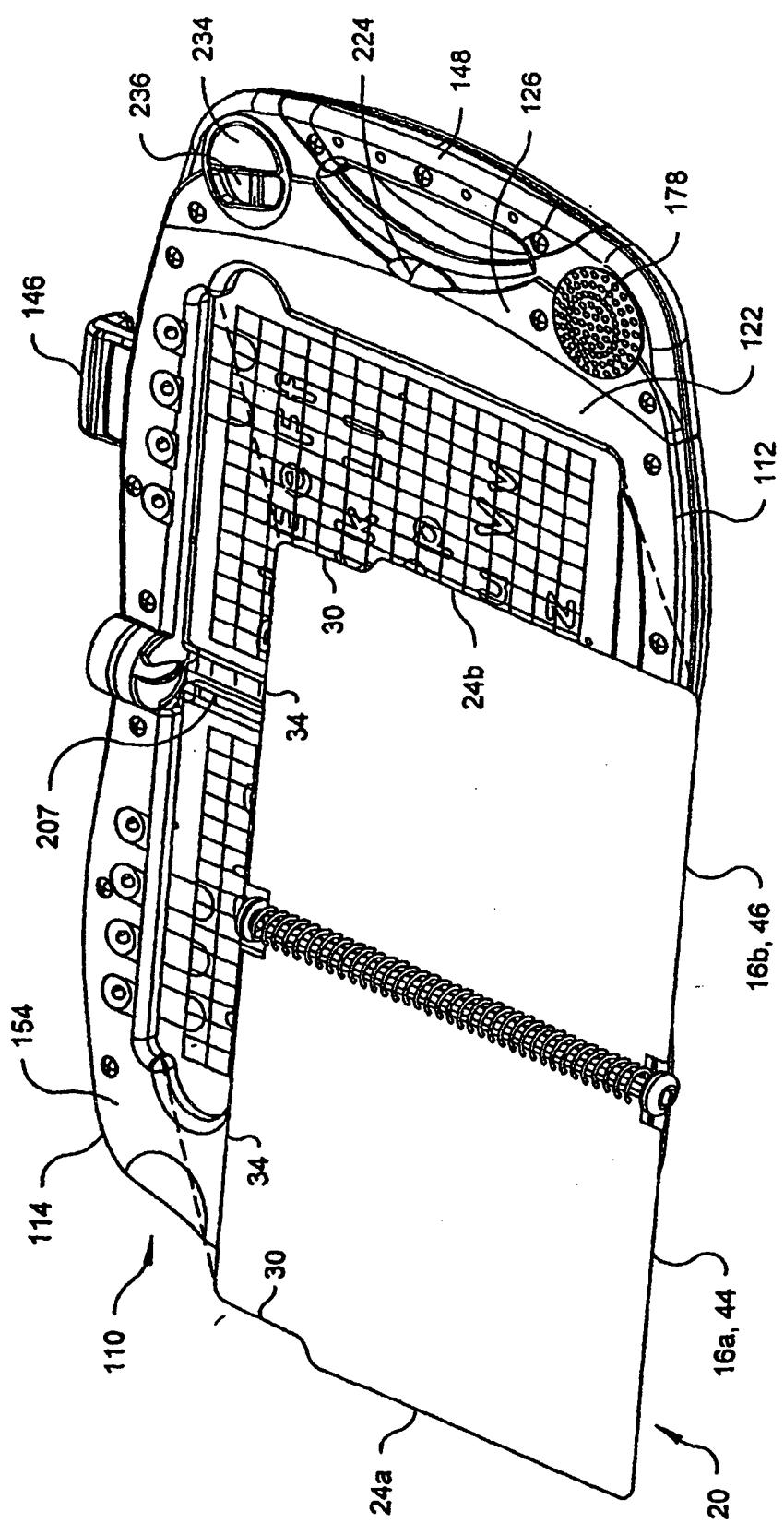


Fig. 2

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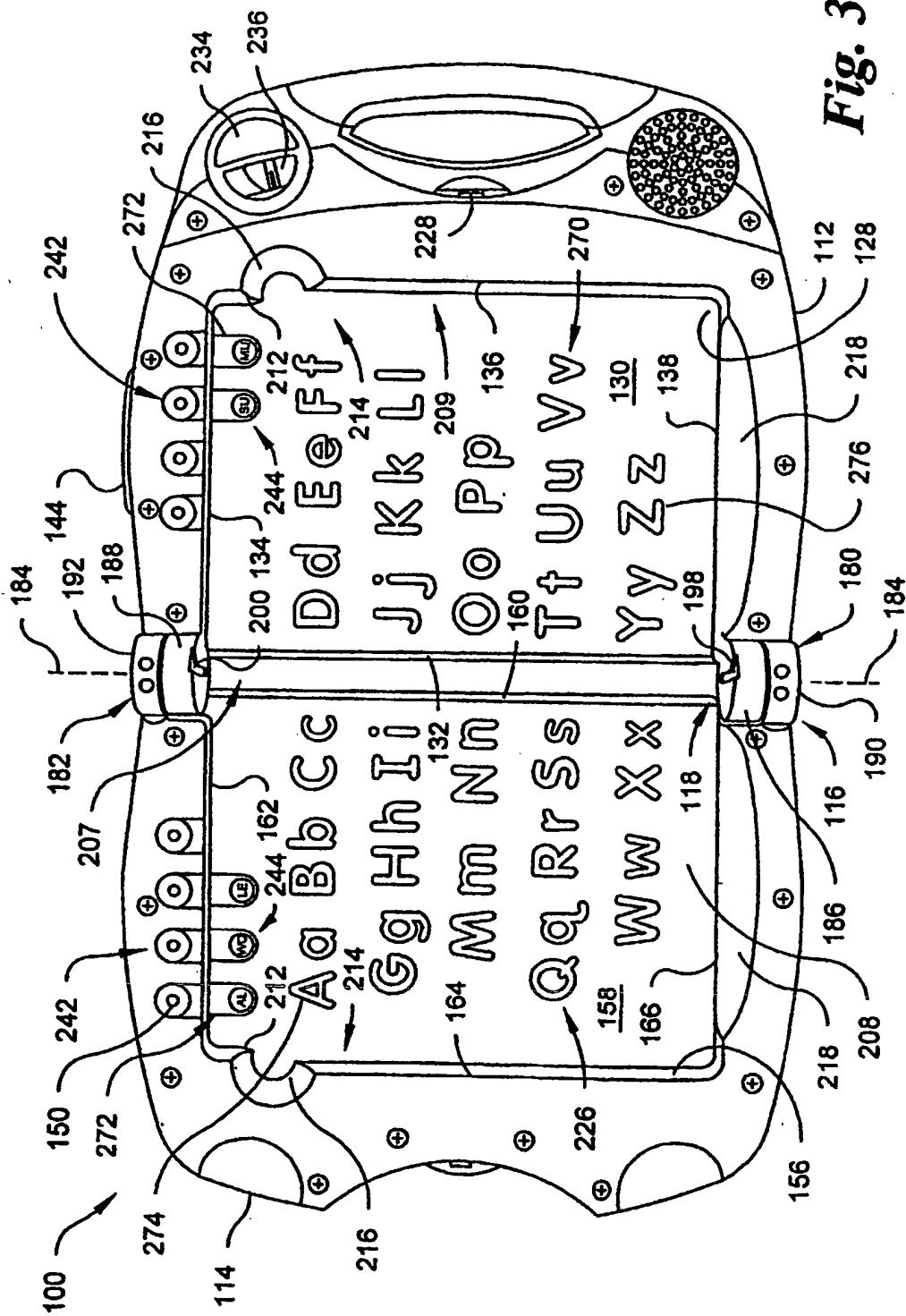
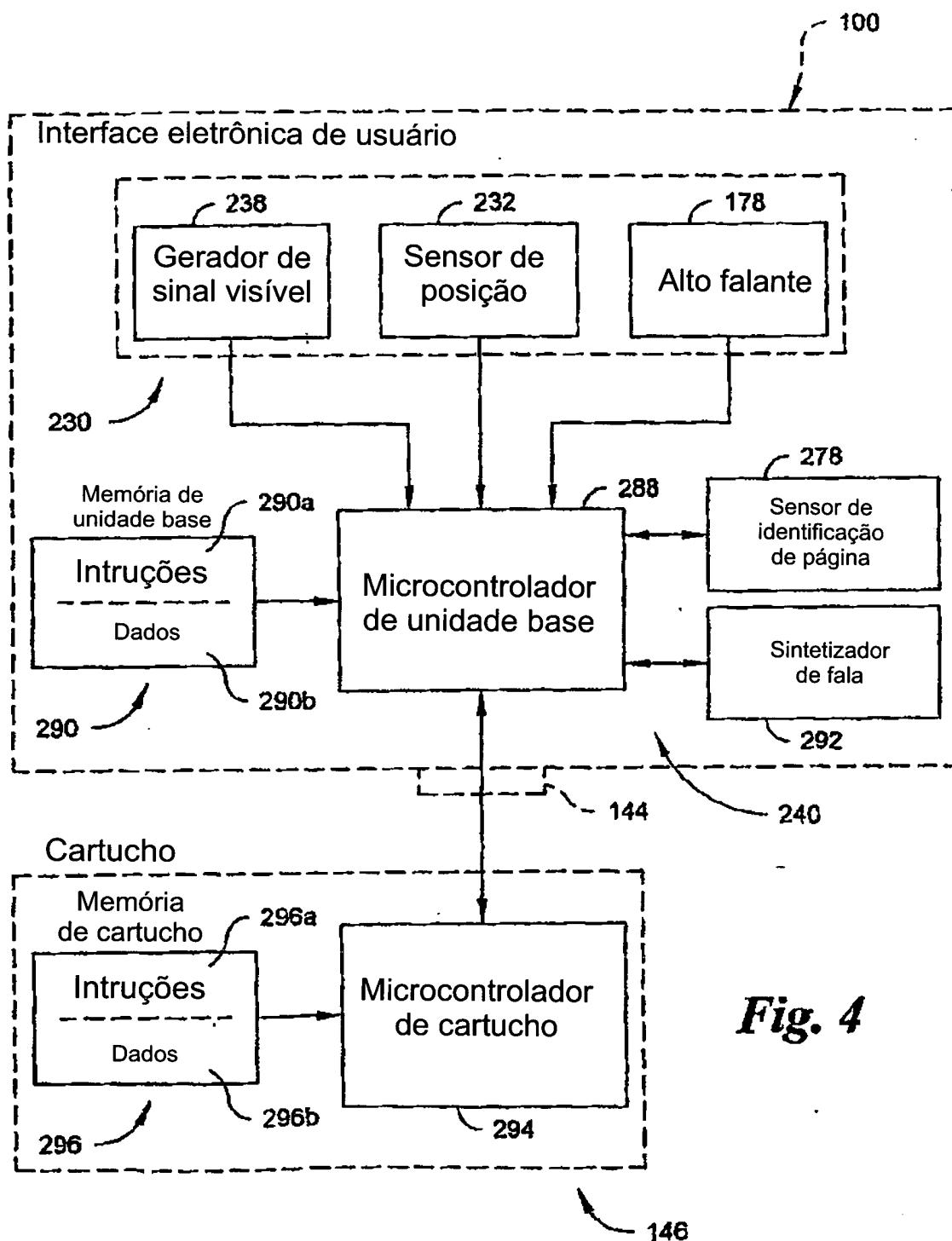


Fig. 3



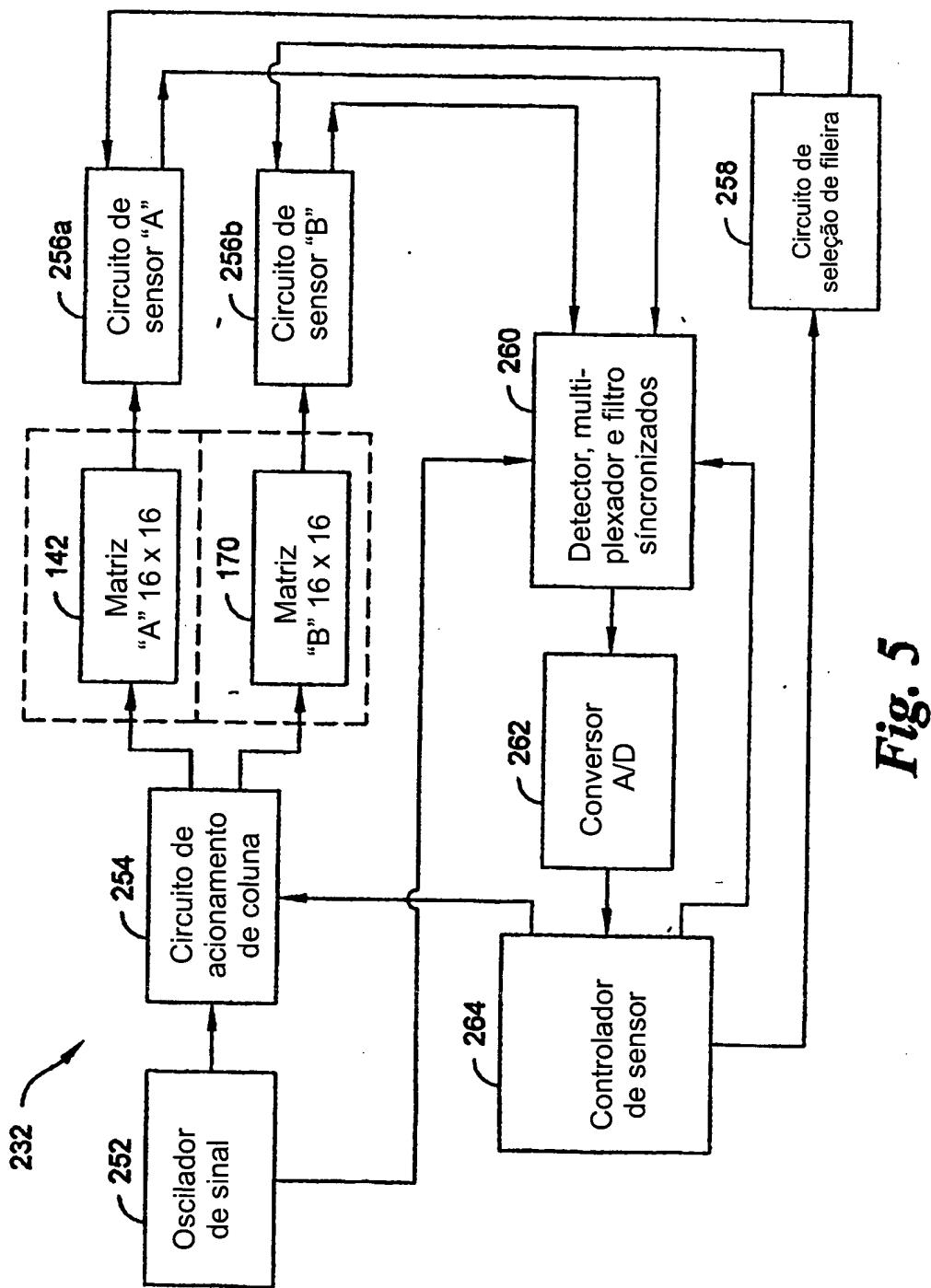
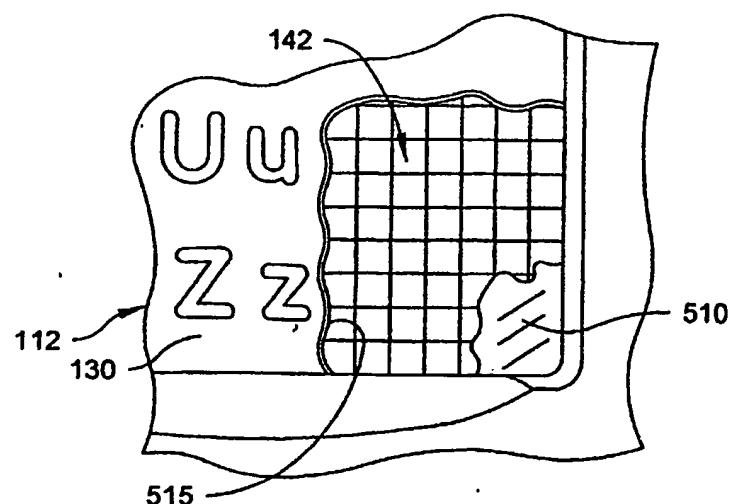
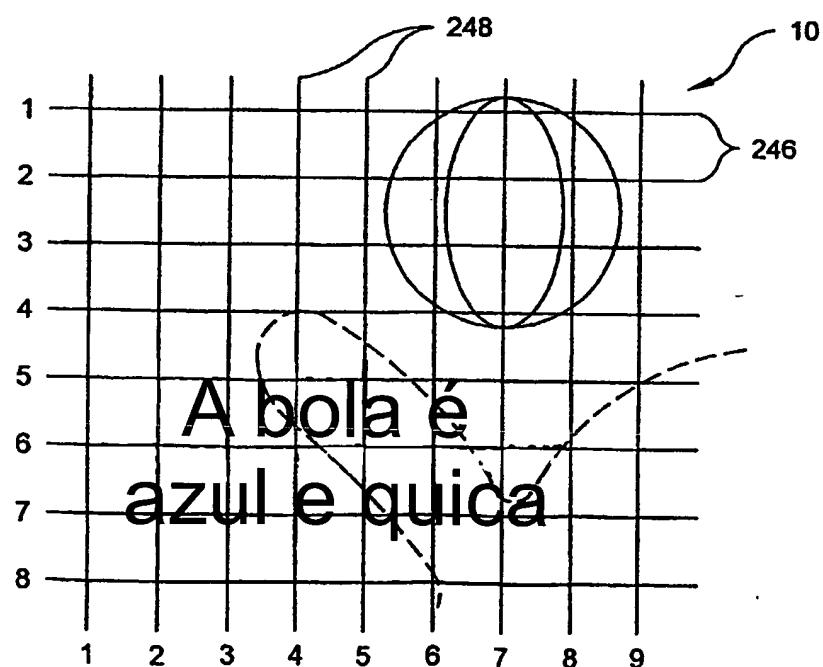


Fig. 5

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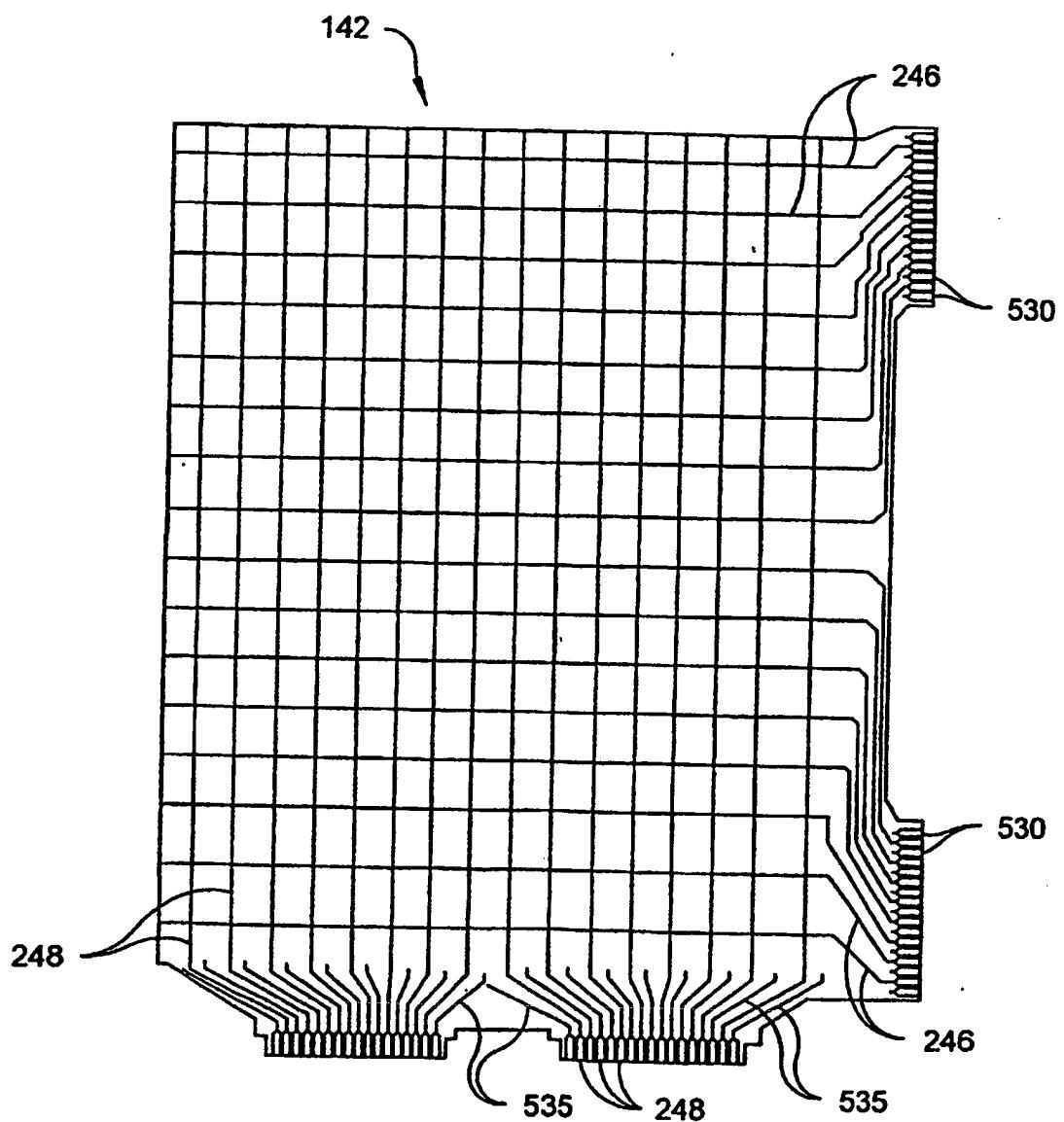
*Fig. 6*



*Fig. 8*

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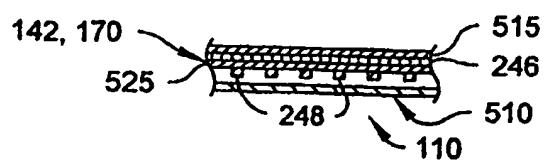
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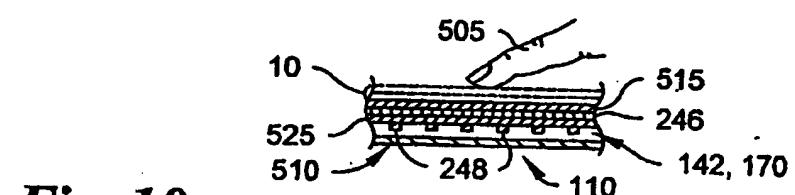
*Fig. 7*

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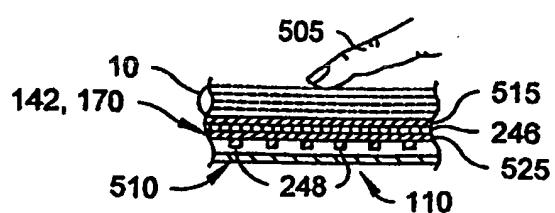
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*Fig. 9*

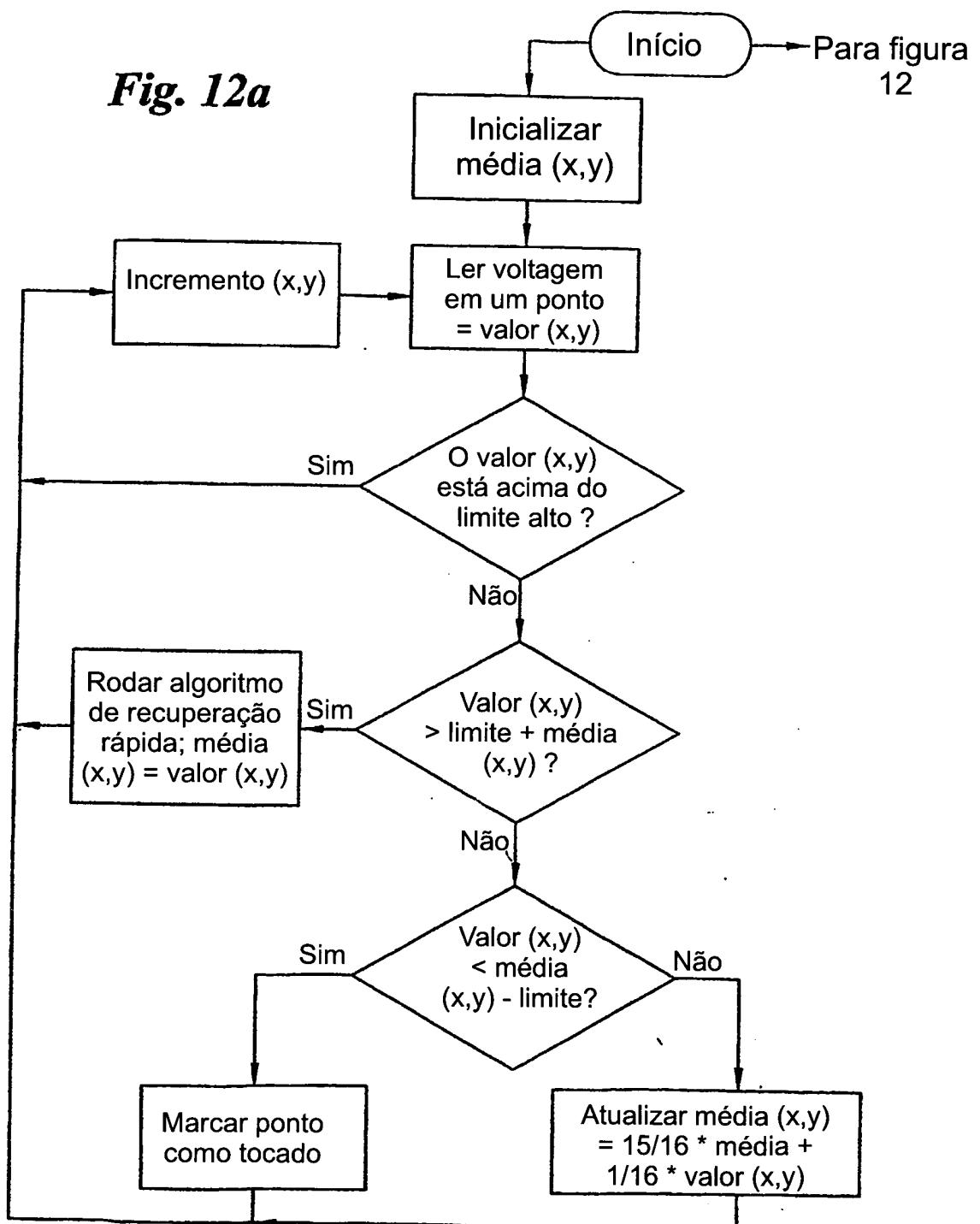


*Fig. 10*



*Fig. 11*



**Fig. 12a**

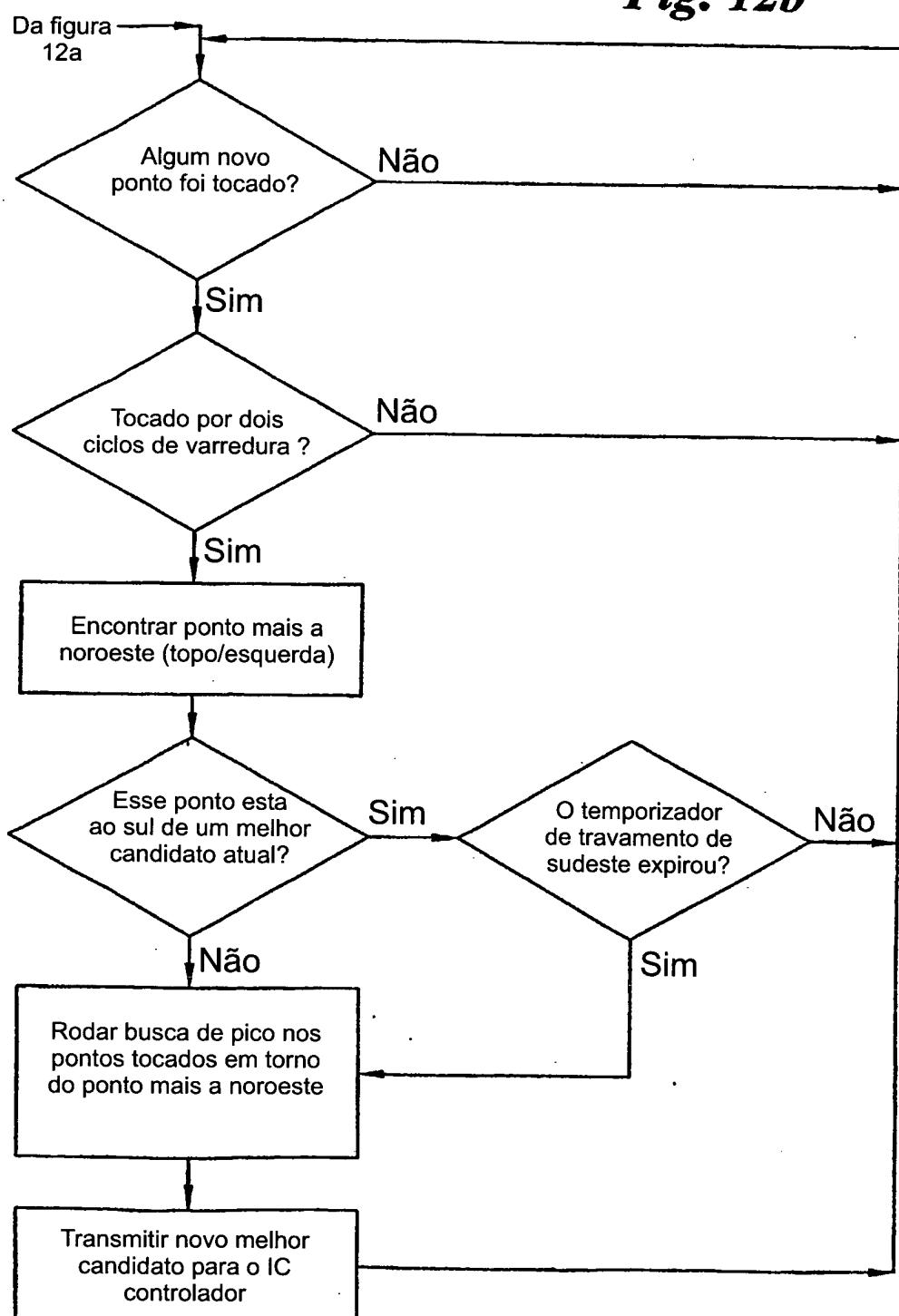
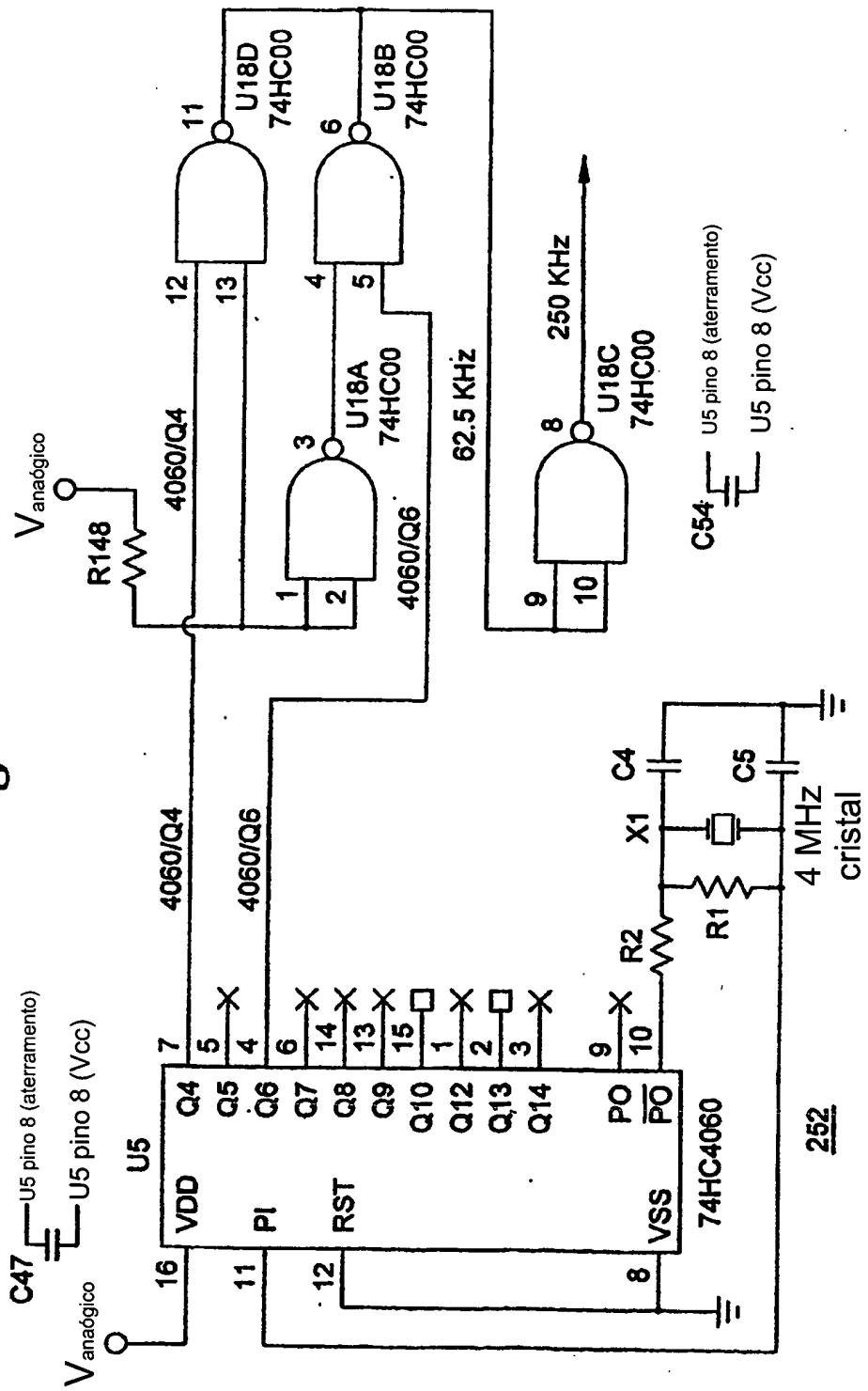
*Fig. 12b*

Fig. 13



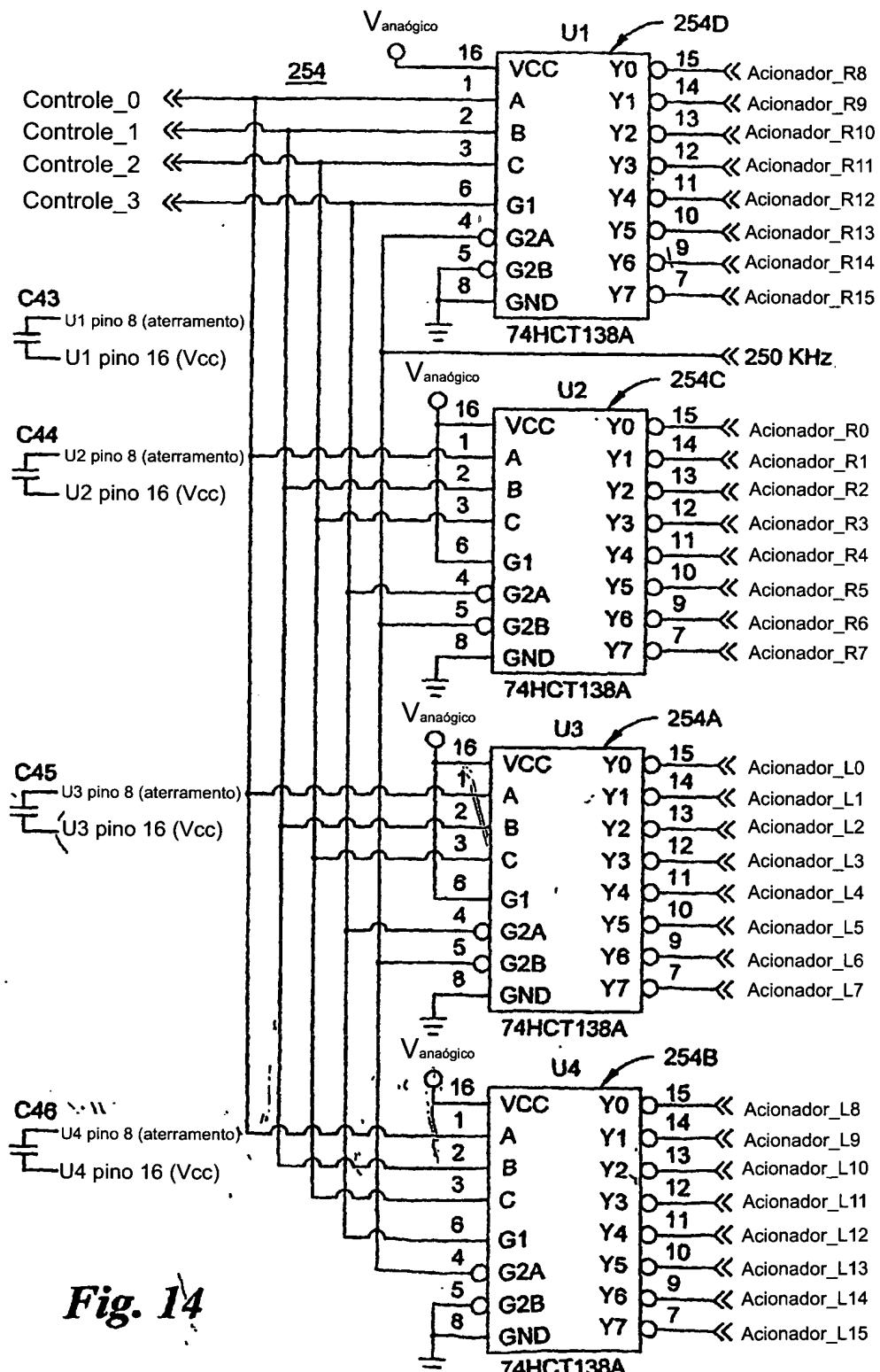
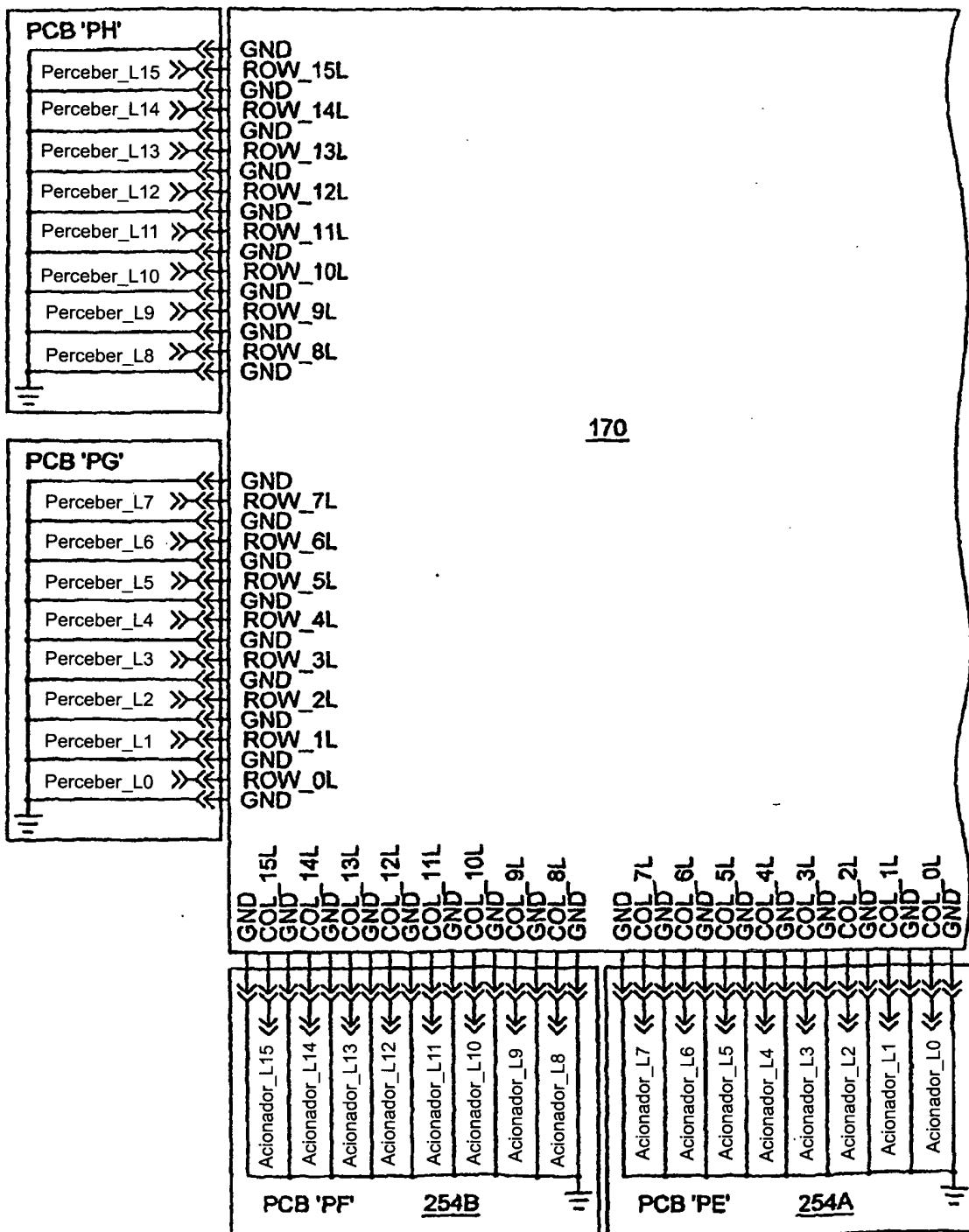


Fig. 14

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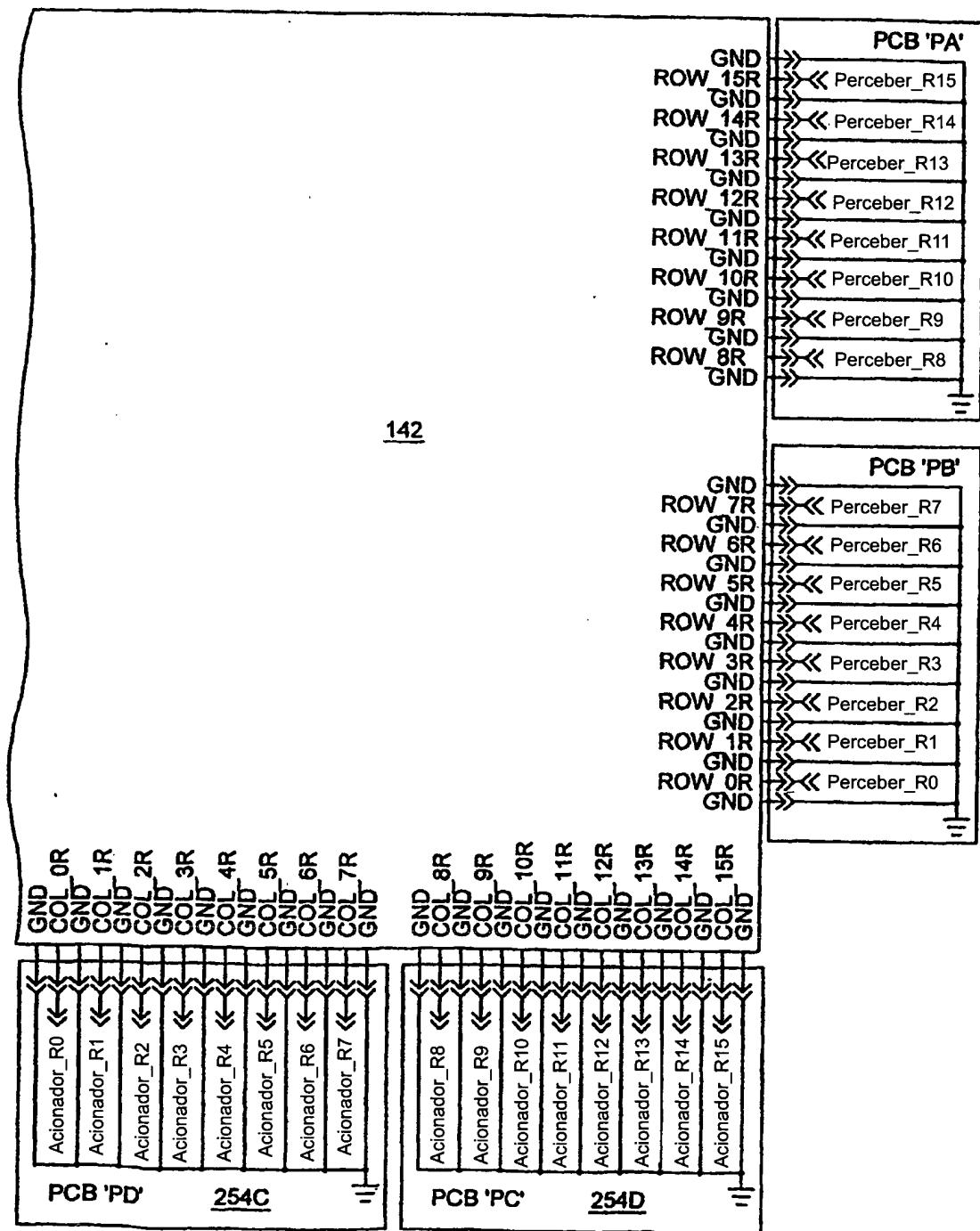
*Fig. 15a*

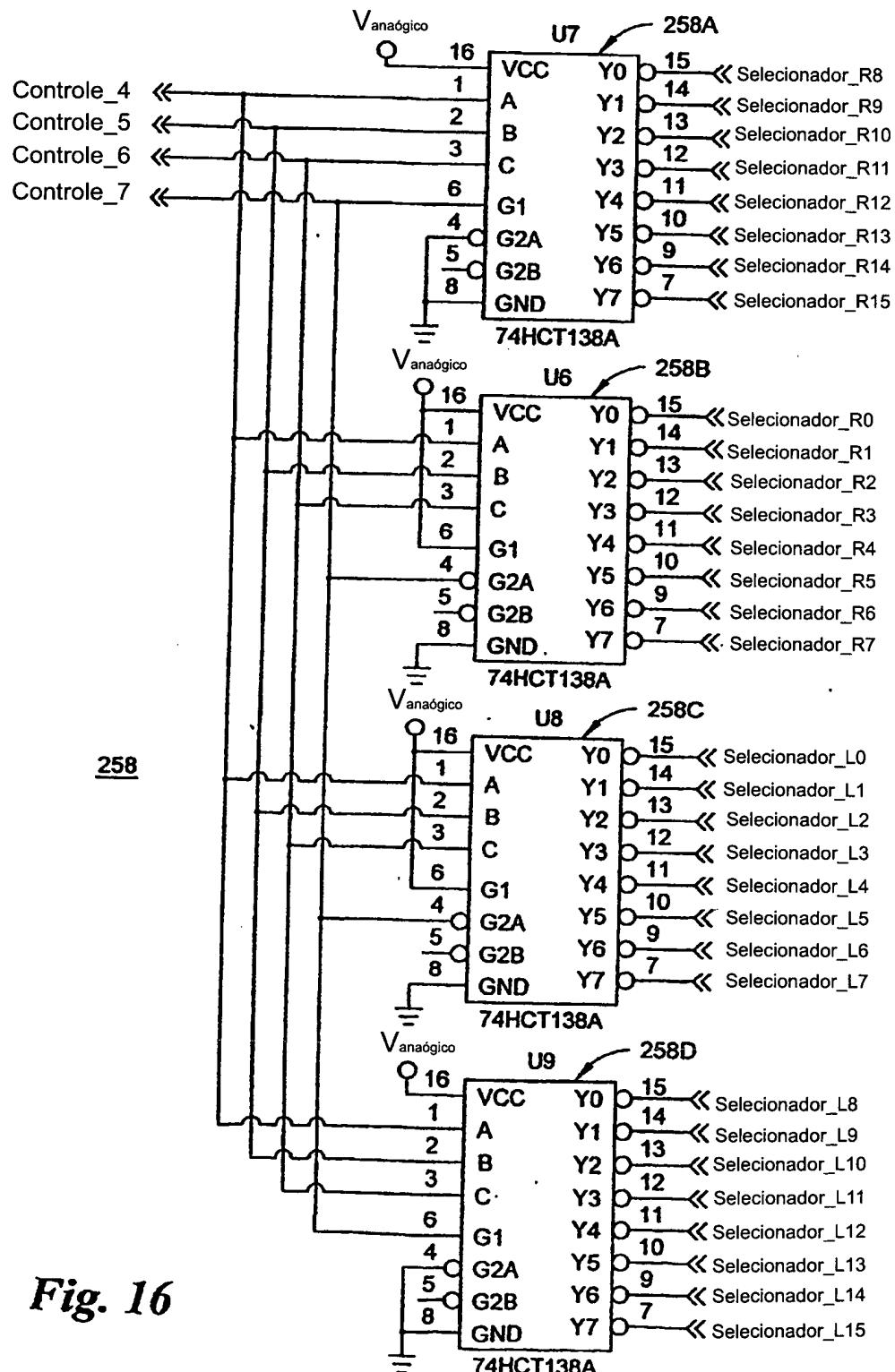


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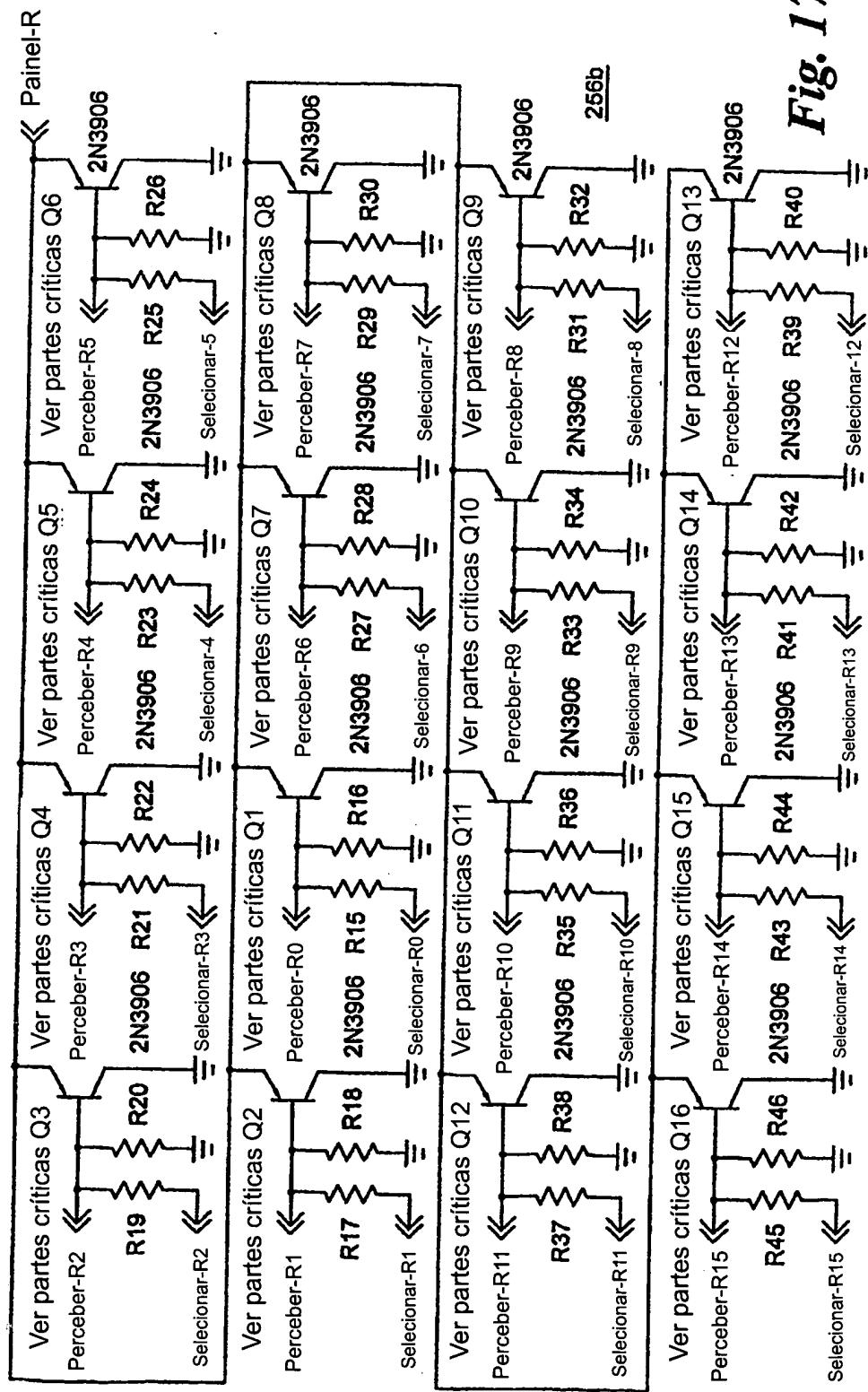
*Fig. 15b*





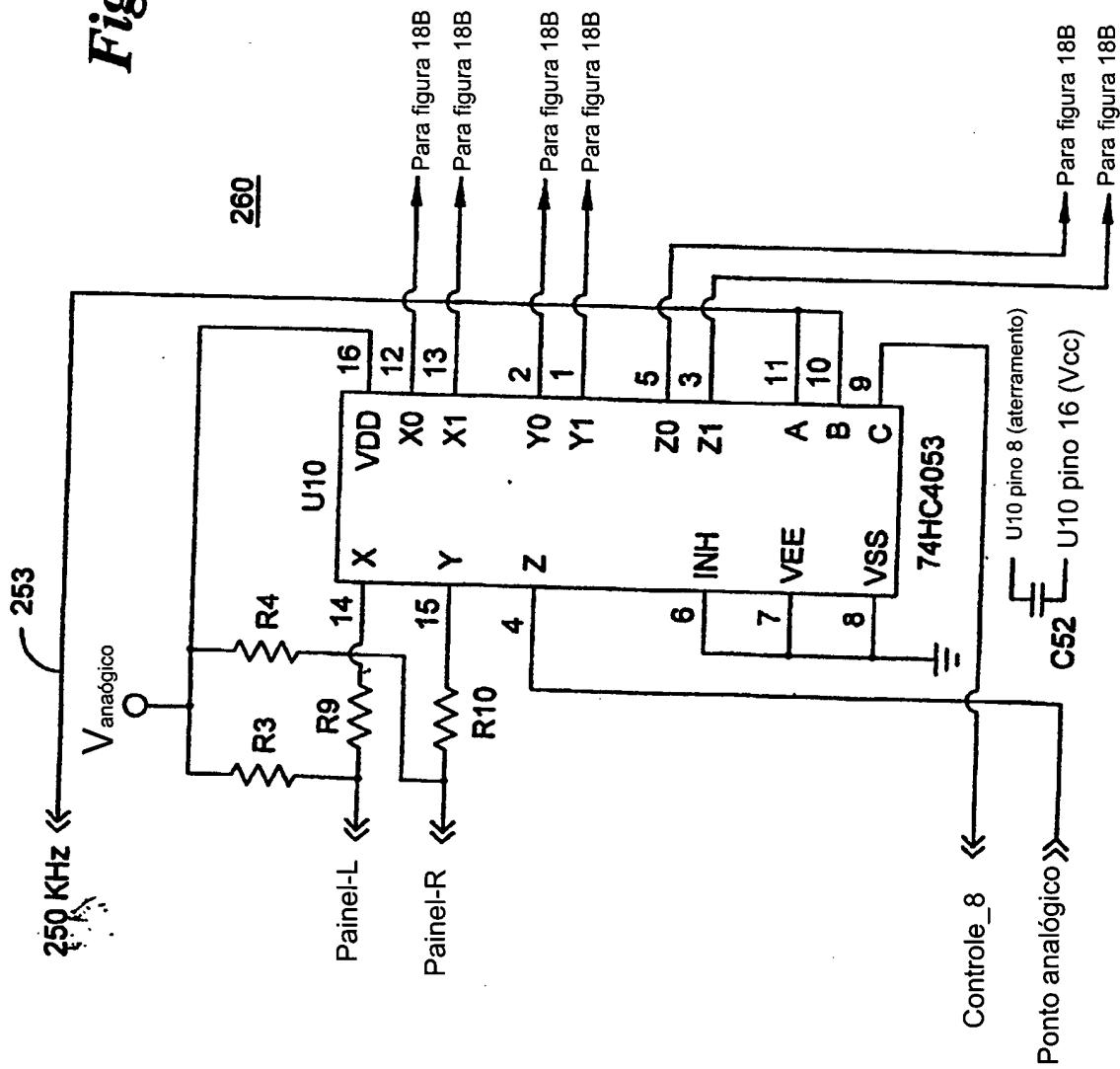
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**Fig. 17**

Fig. 18a



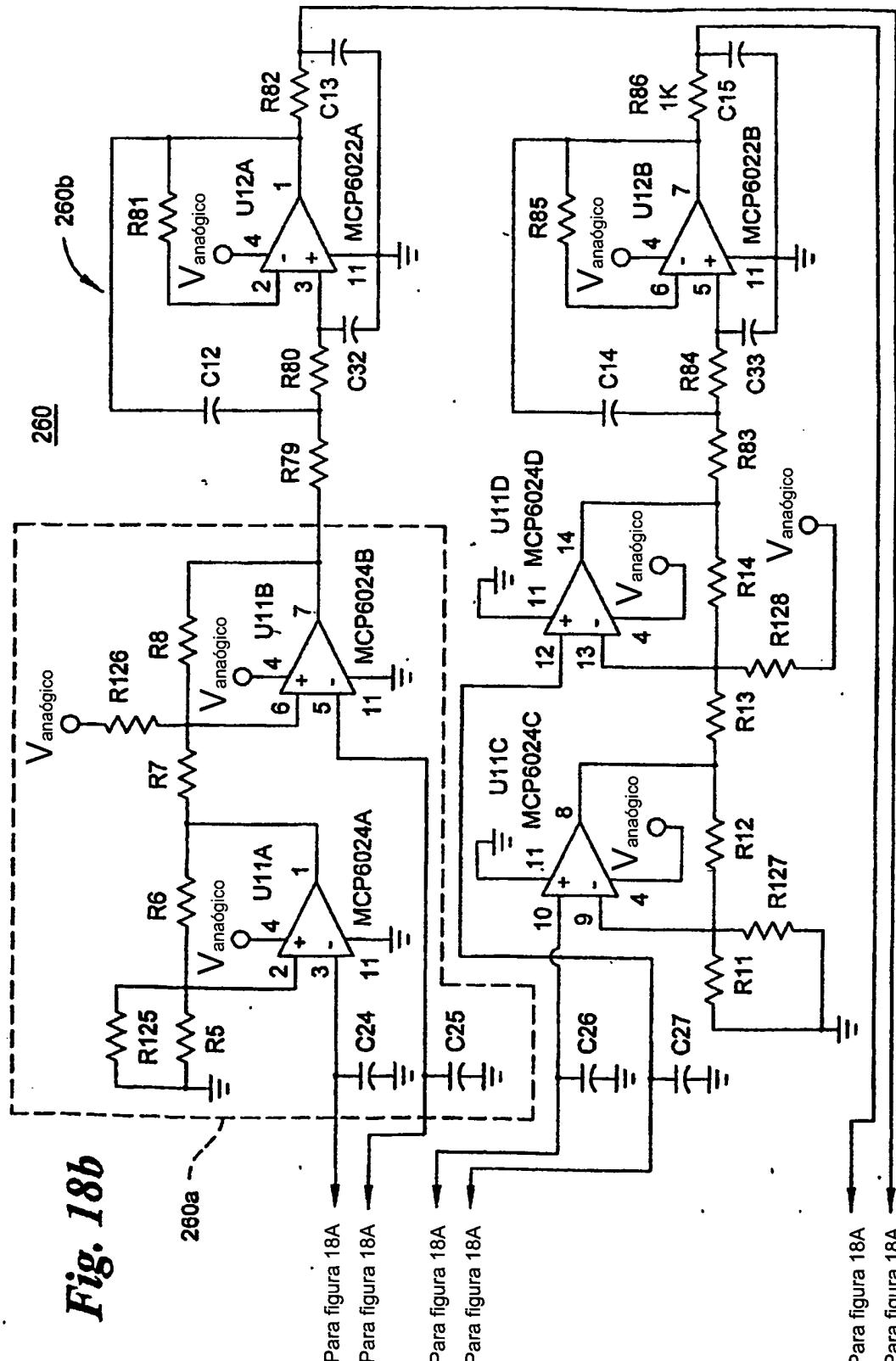
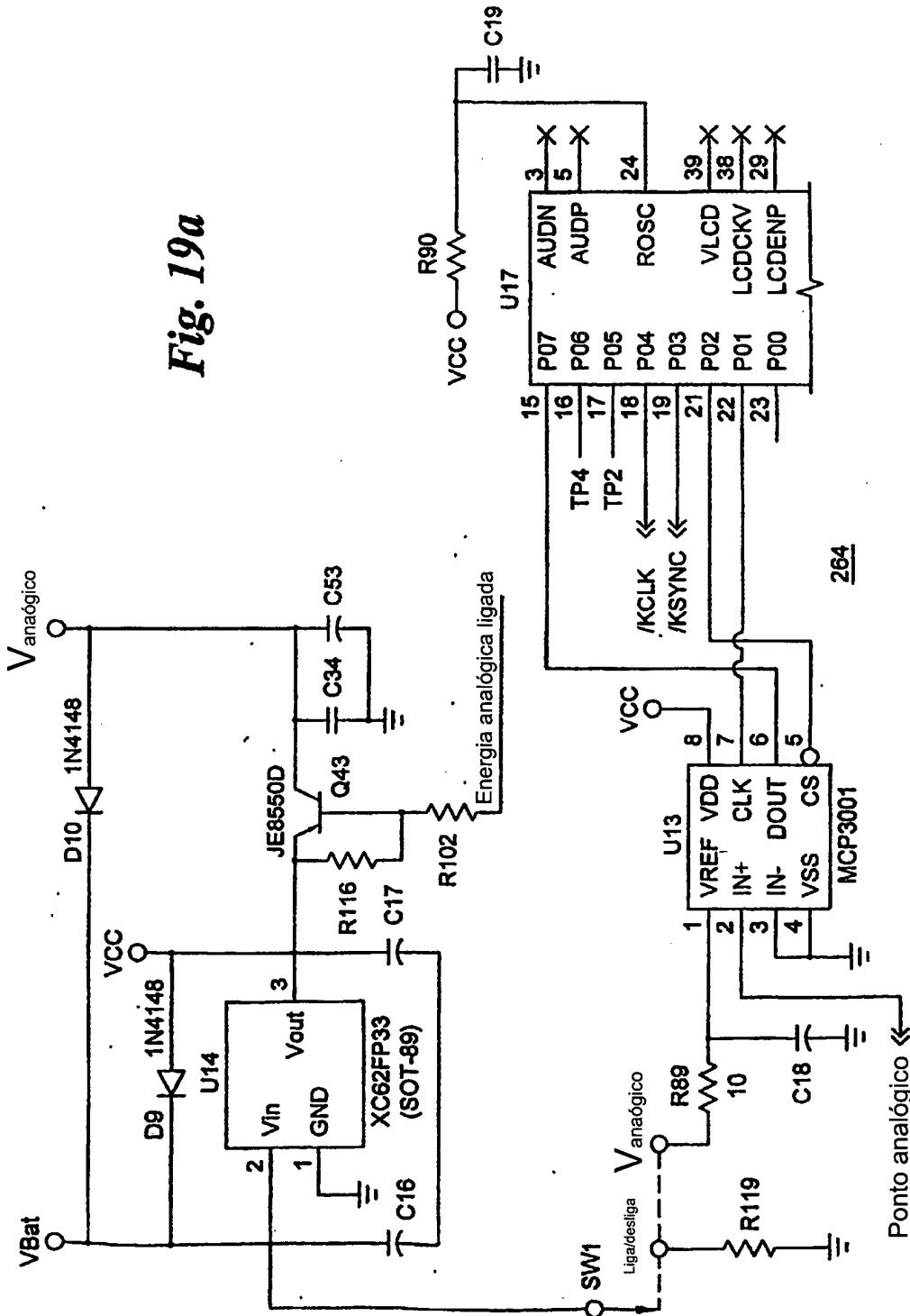


Fig. 19a



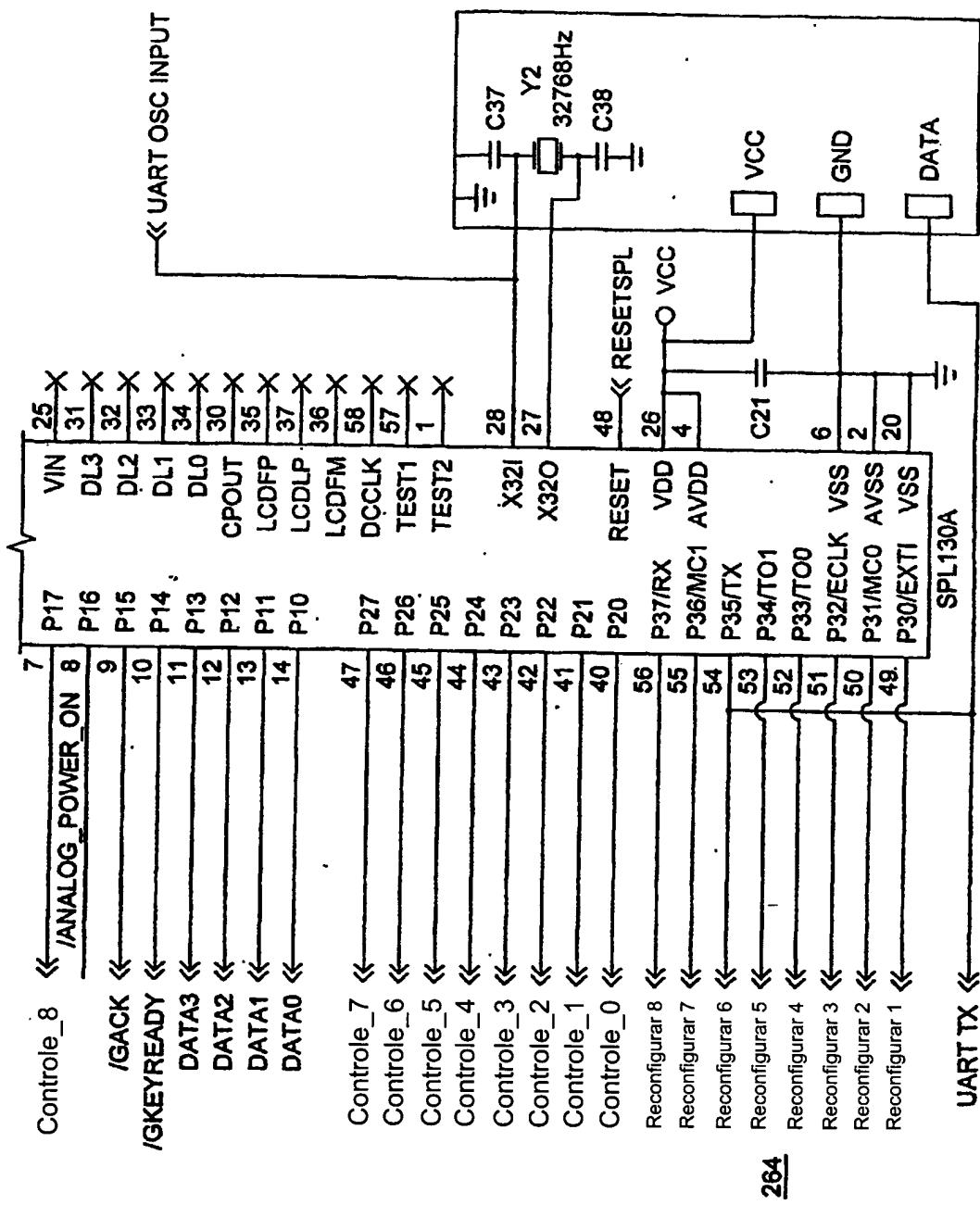


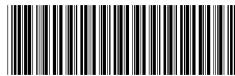
Fig. 19b

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## RESUMO

Patente de Invenção: "**DISPOSITIVO DE ENSINAMENTO/APRENDIZADO ELETRÔNICO COM SISTEMA DE LEITURA MULTISENSORIAL INTERATIVO**".

5           Um dispositivo de ensinamento/aprendizado eletrônico (100) opera com e sem um elemento em folha impressa (20) possuindo uma disposição do conteúdo selecionável por meio de um conjunto de sensor que responde ao usuário (142) sob uma superfície (130) configurada para receber o elemento. O conjunto de sensor é formado por pontos cruzados de  
10          dois conjuntos de linhas condutoras cruzadas (246, 248), um conjunto sendo acionado seqüencialmente com uma onda quadrada de freqüência de rádio e o outro conjunto sendo amostrado seqüencialmente através de uma conexão de amplificador de alta impedância com um circuito de detecção assíncrona. Em que mais de um local de ponto cruzado é ativado por usuário, os  
15          algoritmos (Figura 12) são utilizados para identificar um local de sensor de ponto cruzado como a seleção ativada pelo usuário.



(12) 实用新型专利

(10) 授权公告号 CN 2024222446 U

(45) 授权公告日 2012.09.05

(21) 申请号 201120273970.0

(22) 申请日 2011.07.31

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(51) Int. Cl.

G09B 5/04 (2006.01)

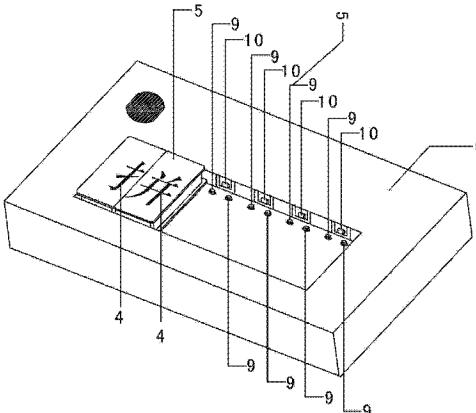
权利要求书 1 页 说明书 2 页 附图 4 页

(54) 实用新型名称

有声拼字算数学习机

(57) 摘要

本实用新型是一种有声拼字算数学习机。由安装有电阻以及五金轴的模块和安装有电子线路的底板所组成。每个模块安装 2 个电阻，外露 3 个金属接触点。模块内的电阻阻值不同，代表不同的偏旁部首、英文字母、数字和运算符号。将偏旁部首、英文字母、数字和运算符号的语音及拼字和数学运算规则录制在 IC 中。模块放入学习机内时，模块内的 3 个五金轴作为导电接触点与机器上对应的 3 个接触点接触形成电路回路，利用电阻电容的充放电原理，在 IC 的相应端口产生 RC 振荡，用计数输入口读得一定时间内的脉冲数量，或是一定数量脉冲所需时间，计算出振荡频率后，与标准电阻下振荡频率的对比，获得该模块的阻值，即学习机识别到该模块对应的偏旁部首、英文字母、数字和运算符号。



1. 一种有声拼字算数学习机，其特征在于由安装有电阻以及五金轴的模块和安装有电子线路的底板所组成。
2. 根据权利要求 1 所述的学习机，其特征是底板上有与模块导电接触点对应的导电接触点以及具有一定弹性的卡扣装置。

## 有声拼字算数学习机

### 技术领域

[0001] 本实用新型涉及儿童学习器具及幼儿园教学器具领域。

### 背景技术

[0002] 传统的拼字积木或拼字卡片以及算数方法由于没有语音效果和自动鉴别对错的能力,儿童无法独立正确使用。而电脑识字和数学运算软件需要电脑作为载体,难以普及。

### 实用新型内容

[0003] 本实用新型为了解决现有技术中的不足,提供了一种有声,能自动判断拼字和算数正误的儿童学习产品。

[0004] 本实用新型的目的是通过以下技术方案来实现:

[0005] 一种有声拼字算数学习机。其特征在于由安装有电阻以及五金轴的模块和安装有电子线路的底板所组成。

[0006] 所述的学习机,其特征是底板上有与模块导电接触点对应的导电接触点以及具有一定弹性的卡扣装置。

[0007] 采用上述技术方案,将模块放入有识别电路和语音电路的学习机中,通过判断模块内的阻值来识别该模块代表的文字或数字,然后学习机发出文字或数字的语音,达到识字和算数的目的。

[0008] 按照本实用新型的学习机,由多个印有汉字的偏旁部首、英文字母、数字和运算符号的塑料模块以及识别塑料模块的电路和语音集成电路组成。

[0009] 按照本实用新型的学习机,每个模块分别代表不同的偏旁部首、英文字母、数字和运算符号。每个模块由模块内焊接的不同阻值的电阻 1,焊接片 2,五金轴 3 和不同的偏旁部首、英文字母、数字和运算符号 4 以及塑料件模块 5 组成。

[0010] 按照本实用新型的学习机,模块上的 3 个导电接触点与机器上相对应的 3 个导电接触点接触后形成电路回路,利用电阻电容的充放电原理,在 IC 的相应端口上产生 RC 振荡,用计数输入口读得一定时间内的脉冲数量,或是一定数量脉冲所需时间,计算出振荡频率后,透过和标准电阻下振荡频率的对比,获得该模块的阻值,即学习机识别到该模块对应的偏旁部首、英文字母、数字和运算符号,学习机发出代表该模块的语音。当 2 个或 2 个以上模块放入学习机时,这 2 个或 2 个以上模块的组合能满足设定的组合规则,机器发出 2 个或 2 个以上模块组合后代表的字或数学算式的语音,如果不能满足设定的组合规则,学习机就发出拼法错误的提示语音。

### 附图说明

[0011] 图 1 为本实用新型的拼字结构示意图;

[0012] 图 2 为本实用新型的算数结构示意图;

[0013] 图 3 为本实用新型的模块内部结构示意图;

[0014] 图 4 为本实用新型的模块外部结构示意图；

[0015] 图 5 为本实用新型的机器的剖面图。

### 具体实施方式

[0016] 如图 1 和图 2 所示，本实用新型由多个印有汉字的偏旁部首、英文字母、数字和运算符号 4 的塑料模块 5 以及能识别塑料模块的学习机 6 组成。

[0017] 如图 3 和图 4 所示，模块由 2 个电阻 1；3 个焊接片 2；3 个五金轴 3；和不同的偏旁部首、英文字母、数字和运算符号 4 和塑料件模块 5 组成。

[0018] 如图 5 所示，学习机 6 由电路板 8 上的能识别模块的电路和语音集成电路；带有弹簧的五金轴 9；喇叭 7；以及固定模块的卡扣装置 10 组成。

[0019] 当模块 5 放入学习机 6 时，模块 5 被学习机 6 的卡扣装置 10 固定，模块 5 中的五金轴 3 和学习机 6 中的带弹簧的五金轴 9 良好接触，形成电路回路，学习机 6 利用电阻电容的充放电原理，在 IC 的相应端口上产生 RC 振荡，用计数输入口读得一定时间内的脉冲数量，或是一定数量脉冲所需时间，计算出振荡频率后，透过和标准电阻下振荡频率的对比，获得该模块 5 内的电阻 3 的阻值，即学习机 6 识别到该模块 5 对应的偏旁部首、英文字母、数字和运算符号 4。当 2 个或 2 个以上模块 5 放入学习机 6 时，这 2 个或 2 个以上模块 5 的组合能满足设定的组合规则，机器发出 2 个或 2 个以上模块 5 组合后代表的字或数学算式的语音，如果不能满足设定的组合规则，学习机就发出拼法错误的语音。

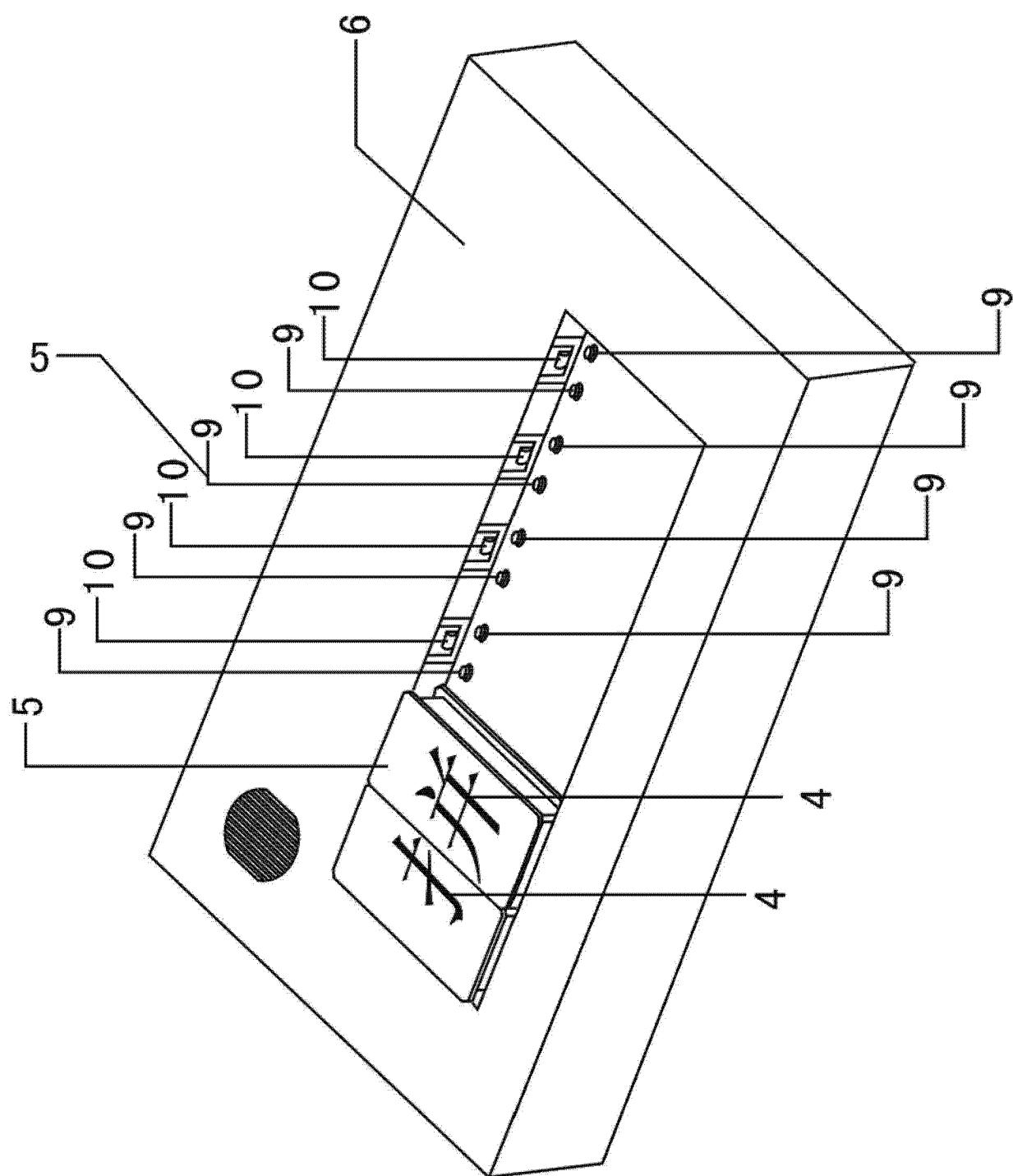


图 1

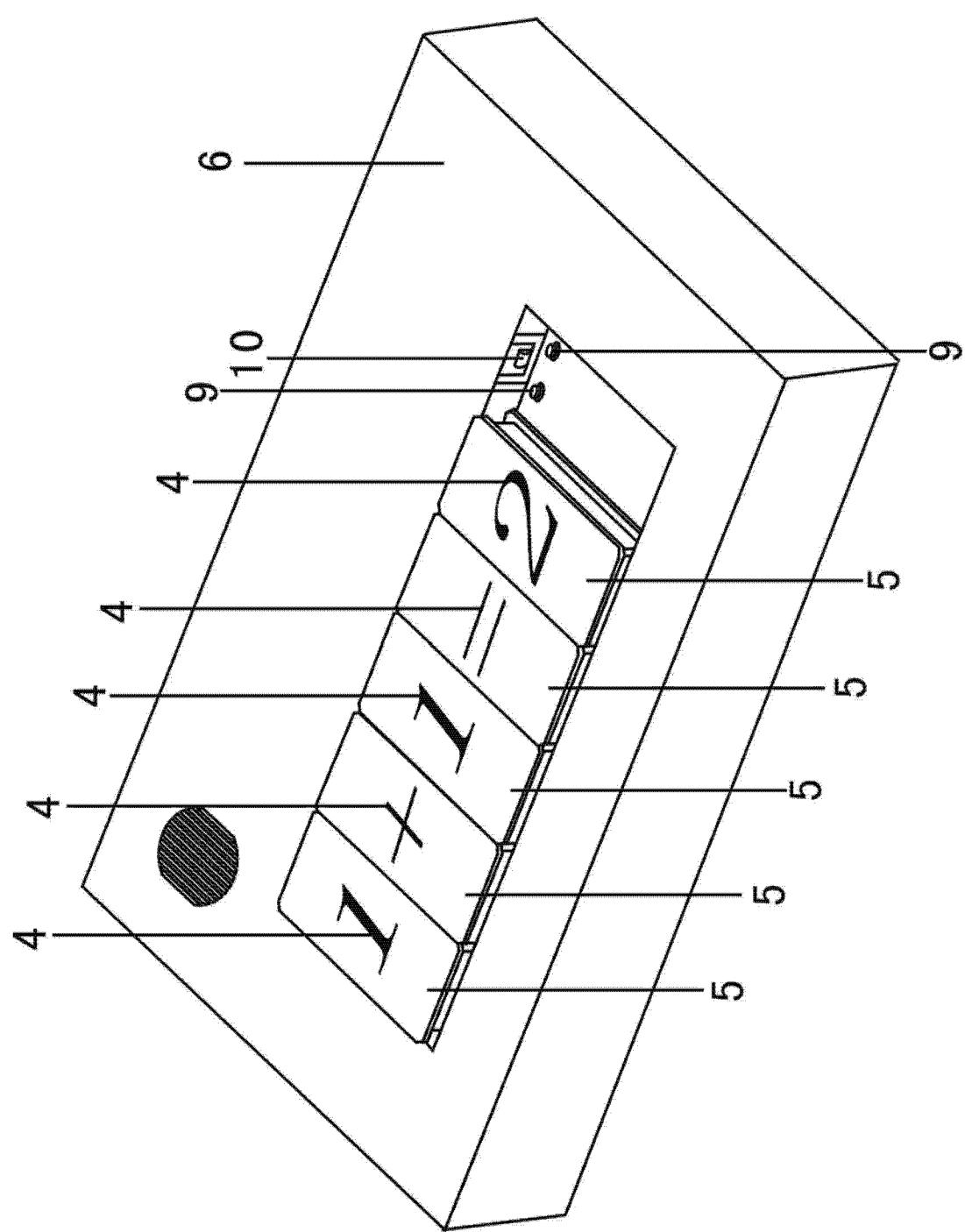


图 2

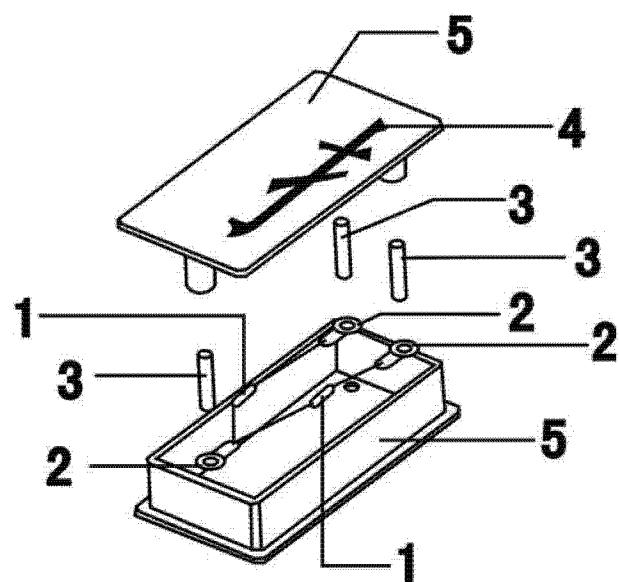


图 3

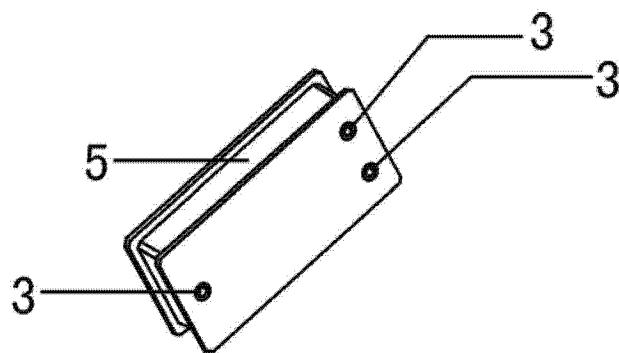


图 4

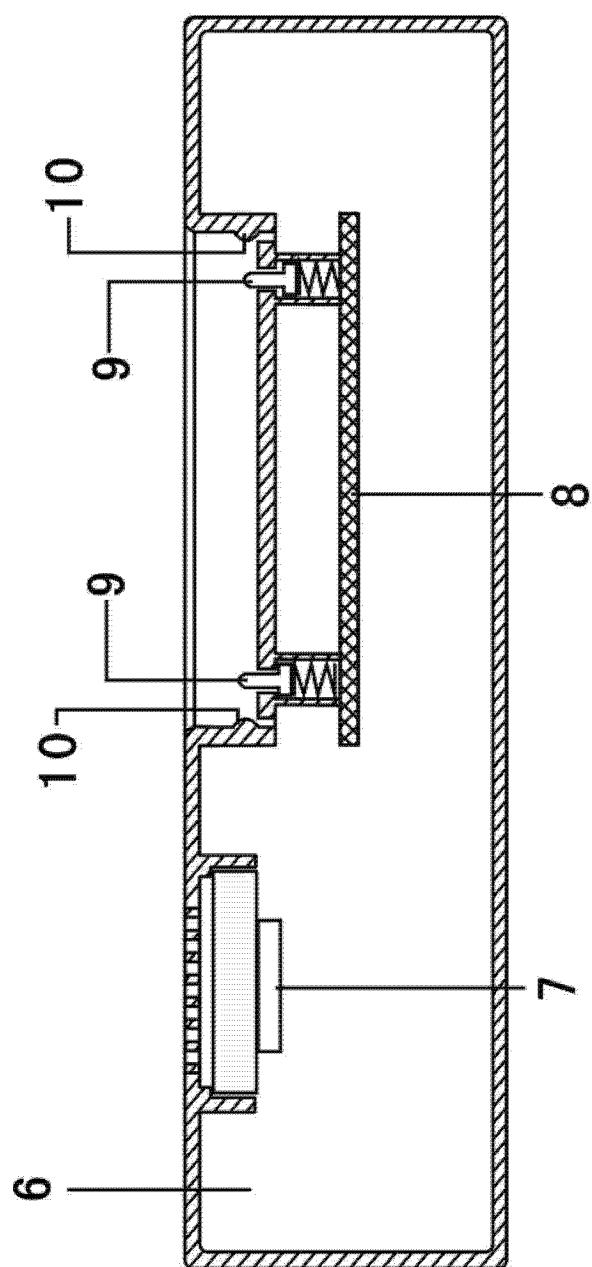


图 5



Europäisches Patentamt  
European Patent Office  
Office européen des brevets

(11) Publication number:

0 310 766  
A1

(12)

## EUROPEAN PATENT APPLICATION

(21) Application number: 88111884.8

(51) Int. Cl.<sup>4</sup>: G09B 17/00

(22) Date of filing: 23.07.88

(30) Priority: 08.10.87 GB 8723594

(43) Date of publication of application:  
12.04.89 Bulletin 89/15

(84) Designated Contracting States:  
DE FR

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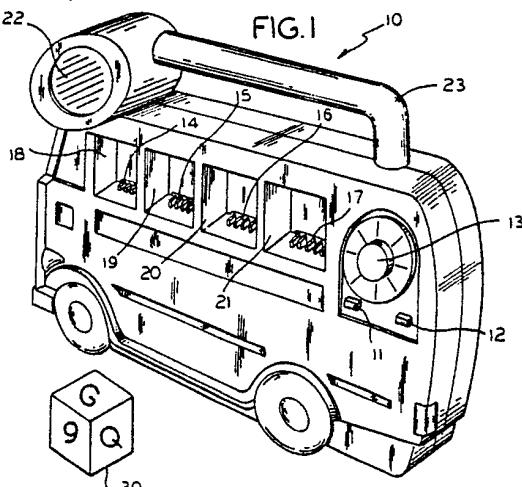
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(54) Electronic instructional apparatus.

EP 0 310 766 A1  
A [57] An electronic instructional apparatus [10] is provided wherein the operator engages in exercises in spelling, arithmetic and associational exercises by responding, in part, to audible prompts provided by the apparatus in the form of requests and/or questions to which the operator must respond. The requests and/or questions are based upon digital data stored within memory representative of numbers, letters of the alphabet, colors and physical objects, such as commonly recognized animals. The operator responds to the requests and/or questions by inserting answer blocks [30] into input cavities [18],[19],-[20],[21] provided in the apparatus housing [23]. Each answer block [30] has disposed thereon a plurality of display faces bearing indicia representative of potential responses to the presented statements and/or questions. Each display face [32],[33],-[34] has corresponding input surfaces [37],[38],[39],-[40],[41],[42] which cooperate with detection ele-

ments [14],[15],[16],[17] to input into said apparatus [10] the response selected by the operator. The apparatus further comprises speech synthesis and sound production elements [70] to produce the audible presentations.



**ELECTRONIC INSTRUCTIONAL APPARATUS****BACKGROUND OF THE INVENTION**

This invention relates to electronic learning aids and teaching machines, and particularly, to an electronic instructional apparatus which is capable of producing audible presentations and which is suitable for use by an operator who is in a preliterate stage of development, such as a preschool age child. The apparatus according to the present invention utilizes response association training in exercises involving spelling, counting and object and color identification.

Electronic instructional apparatus are well known in the prior art. These apparatus are primarily devoted to the instruction of mathematical and spelling skills through the utilization of visual displays which are presented to the child. Several prior art devices operated by presenting upon a visual display screen a mathematical operation to be solved or performed by the operator, through inputting the correct response into the apparatus through a keyboard. Other forms of prior art devices utilize visual displays and visual aids such as picture books to present questions or spelling exercises to the operator of the apparatus. Many of these types of prior art devices do not incorporate speech synthesis features for asking questions or otherwise soliciting responses from the child operator via a synthesized human voice thus often requiring that the child operator have at least minimal reading skills, or alternatively, that the child be assisted in using the apparatus by another individual, often the parent.

An additional prior art device is disclosed in United States Patent No. 4,516,260 issued to Paul S. Breedlove and James H. Moore and assigned to Texas Instruments, Incorporated. The apparatus described therein is capable of making audible presentations to the operator, requiring the operator to provide a response through a keyboard forming part of the apparatus. The apparatus is further capable of operating in a plurality of modes of operation which require the operator to perform a number of different types of spelling and associational exercises. Unfortunately, however, many of these types of prior art devices have nevertheless required that the operator have a certain level of intelligence and coordination to operate the device, skills which may exceed that of the typical preliterate child of preschool age.

A potential disadvantage to such prior art devices is their reliance upon standard alpha-numeric keyboards as input devices. Typically, a preschool aged child is unable to effectively operate such a

standard adult keyboard due to the young child's lack of coordination. Moreover, the prior art often utilized keyboards which are visually unstimulating to young children who accordingly may become tired of such prior art devices and thus not use and benefit from them.

It is, therefore, an object of the present invention to provide an electronic instructional apparatus for a preschool aged, preliterate operator that is visually stimulating and easily useable by children of such age and development.

It is a further object of the present invention to provide an electronic instructional apparatus which provides questions and requests in a manner which the child may comprehend.

It is another object of the present invention to provide an input device which may be manipulated by young children who may lack fully developed coordinational skills and which simultaneously teaches spelling, counting and identification skills with developing the child's coordination.

It is another object of this invention to provide an electronic instructional apparatus which is capable of providing audible presentations of spelling, mathematical, and associational exercises to a preschool age operator.

It is yet another object of this invention that the instructional apparatus be capable of presenting questions or problems in a randomly selected manner, within each mode of operation.

It is another object of the instructional apparatus to provide that the operator present physical responses to audibly presented questions or statements.

It is another object of this invention to provide an instructional apparatus which provides positive audible reinforcement for the operator thereof.

It is another object of this invention to provide an instructional apparatus which provides responses to an operator corresponding to the correctness or incorrectness of the operator's responses to the questions or statements presented by the instructional apparatus.

It is yet still another object of this invention to provide an instructional apparatus which is portable and is durable and inexpensively constructed.

These and other objects of the invention will become apparent in light of the present specification and drawings.

### SUMMARY OF THE INVENTION

The present invention comprises an electronic instructional apparatus for developing and testing a preliterate preschool child's associational and coordinational skills. The apparatus is contained within a housing which, in the preferred embodiment, consists of a stylized school bus. The housing includes in the preferred embodiment four recesses on the front face thereof. Indicia disclosure means are provided which bear indicia on at least one side thereof wherein said indicia disclosure means are capable of being inserted into one or more of the recesses contained within the apparatus housing. The indicia disclosure means are inserted into the recess means such that the indicia which is contained upon the indicia disclosure means appears upon an exposed side of the indicia disclosure means when it is inserted into a recess means.

A memory means is provided for storing data which corresponds to the indicia appearing upon said side of each of said indicia disclosure means. The memory similarly stores data corresponding to predetermined combinations of indicia appearing upon sides of predetermined combinations of said indicia disclosure means. A processor means is provided and is operably associated with the memory means and the detection means, for comparing the identity of the indicia which appears upon the side of each of said inserted indicia disclosure means with the data stored in the memory means. Similarly the processor means is associated with the memory means and the detection means, for comparing the identity of combinations of indicia which appear upon sides of combinations of inserted indicia disclosure means with the data stored in the memory means. The processor means further provides an indication that the identified indicia, appearing on the sides of one or more of the indicia disclosure means which have been inserted into the recess means, is alternatively present, or not present, as data stored in the memory means. An output means is provided and is operably associated with the processor means for providing the operator with an output which is a function of the data stored in the memory means.

In the preferred embodiment of the invention the recess means comprises a cavity disposed in the front surface of the housing means wherein the cavity has a rectangular opening on an exterior surface of the housing means and extends rectangularly into an internal portion of the housing means such that a cavity is formed which is capable of accepting the insertion of one of the indicia disclosure means. Preferably, the indicia disclosure means comprise cubical answer blocks

where each answer block has disposed thereon at least one display face wherein each display face bears thereon operator identifiable visual indicia. In the preferred embodiment of the invention the cubical answer block contains six display faces wherein each of the six faces bears thereon different operator identifiable visual indicia. Moreover, each one of the answer blocks includes for each given display face a plurality of corresponding identification surfaces which are engageable with the detection means contained within the recess means. The identification surfaces are disposed upon the sides of the answer block which are perpendicular to the given display face and the identification surfaces are further disposed upon the portion of each of the perpendicular sides which is distal to the given display face. Accordingly the detection means is engaged with the identification surface corresponding to the display face projecting outwardly from the recess means so long as the answer block is inserted into the recess means.

In the preferred embodiment of the invention, the identification surface comprises a plurality of ridges and notches upon the distal edge of the perpendicular side where the arrangement of ridges and notches represent digital data which identify the color of the answer block and the indicia appearing upon the outwardly projected display face and wherein said digital data is stored in the memory means. Accordingly, the detection means are disposed upon the interior surface distal to the opening of each one of the cavities such that upon insertion of an answer block into a cavity, the identification surface is brought into operable engagement with the detection means. In the preferred embodiment of the invention, the detection means comprise a plurality of switches disposed within each of the cavities where the switches are in alignment with and are responsive to the ridges and notches comprising the identification surfaces of the answer blocks such that the detection means will provide a digital data signal to the processor means representative of the indicia present on the exposed side of the indicia disclosure means when inserted in the cavity.

In the preferred embodiment of the invention the electronic instructional apparatus further includes a prompting means for providing the child operator with a plurality of requests to which operator responses are desired and for providing the correct responses to the operator corresponding to the plurality of requests. The operator responses are provided by the insertion of one or more of the indicia disclosure means into one or more of the recess means in response to said request. As will be explained herein under the modes of operation, the invention is capable of operating in several

different modes having different types of requests and requiring different types of operator responses. The prompting means preferably comprises memory means for storing the plurality of requests and memory means for storing the corresponding correct responses as well as speech synthesis means operably associated with the memory means and processor means for providing the plurality of requests and the corresponding correct responses to the operator in synthesized human speech. In one mode of operation the output of the electronic instructional apparatus provides the operator with an indication of the identity of the indicia appearing upon the exposed side of a particular indicia disclosure means when that indicia disclosure means is inserted into one of the recess means. In another mode of operation the prompting means makes requests of the operator which require the operator to identify specific indicia appearing upon particular indicia disclosure means and requiring the operator to insert particular indicial disclosure means into one of the recess means such that the requested indicia appears upon the exposed side of the indicia disclosure means. An additional mode of the invention includes prompting means which make requests of the operator to spell a given word thus requiring the operator to identify the specific combination of indicia appearing upon particular indicia disclosure means which form the correct spelling of the word and insert the particular combination into the recess means so as to correctly spell that given word. Still another mode of the invention includes prompting means which make requests of the operator towards teaching the operator counting by requesting the operator to insert a specific number of indicia disclosure means into the recess means without regard for the indicia contained thereon. The prompting means may further teach the operator to recognize color by use of indicia disclosure means which are of different color in association with a prompting means which request the operator to insert specific numbers of colored indicia disclosure means into the recess means.

In the preferred embodiment of the invention the electronic instructional apparatus further produces a predetermined series of audible musical sounds upon the insertion of said indicia disclosure means into said recess means wherein the musical sounds as a function of the indicia appearing upon the exposed side of the indicia disclosure means. Moreover, the invention includes means for producing a predetermined series of audible animal sounds upon the insertion of said indicia disclosure means into the recess means where the animal sounds so produced correspond to the indicia appearing upon the exposed side of the indicia disclosure means.

The instructional apparatus of the preferred

embodiment has 6 basic modes of operation. It will be evident to those skilled in the art, however that these modes of operation may be modified, reduced in number, or expanded in capability without departing from the spirit of the present invention. As a matter of design choice, the instructional apparatus of the preferred embodiment is provided with the following modes of operation.

When the "on" button is depressed, the instructional apparatus will begin to operate in the mode of operation which is indicated upon that portion of the operation mode selector switch which is in a designated selection position. If the operation mode selector switch is in the "tells it" mode position, the following procedure will take place. The electronic circuitry within the instructional apparatus will cause an audible presentation to be played through the above-described speaker, requesting that one of the answer blocks be inserted into one input cavities. When one of the answer blocks is placed in an empty input cavity, the particular combination of sensor switches which are depressed as a result of the insertion of the answer block will cause the electronic circuitry to produce an audible presentation which identifies the indicia displayed upon the exposed display face of the inserted answer block. If the exposed indicia comprise either letters or numerals, only an audible statement identifying the letter or numeral will be produced. If however, the indicia represent physical objects, such as easily identified animals, in addition to the statement identifying the indicia, sounds representative of the displayed physical object will be produced. By using the just described procedure, a child operator may be instructed as to the identity of the indicia disposed upon each of the display faces of each of the answer blocks.

The second mode of operation of the instructional apparatus can be achieved by rotating the operation mode selector switch to the "letters" position. Upon selection of the "letters" mode of operation, the electronic circuitry will randomly select, from the letters which are stored within its associated memory means, a particular letter and cause an audible presentation to be produced by the aforementioned speaker which requests that the answer block bearing the selected letter be inserted into one of the input cavities, with the selected letter disposed upon the exposed display face. For example, if the electrical circuitry within the instructional apparatus randomly selects the letter "b", the instructional apparatus will produce the audible presentation, "please give me the letter 'b'". In the "letters" mode of operation, a correct response to the just described audible presentation occurs only if the answer block bearing the letter "b" is inserted into a vacant input cavity with the letter "b" disposed upon the exposed display face.

If the response provided by the operator is correct, the instructional apparatus will produce a corresponding audible presentation acknowledging the correct response, for example "yes, you are right". If an incorrect response is provided, the instructional apparatus will produce an audible presentation which identifies the incorrectly inputted display face which is exposed and repeat the prior request for the randomly selected letter. The request for the particular randomly selected letter will be repeated until a correct respond is provided.

The third mode of operation of the instructional apparatus according to the preferred embodiment is the "spelling" mode of operation. When this mode of operation is selected the electronic circuitry will select randomly select from within its memory means a word which the operator will be requested to spell. An audible presentation will be produced requesting the correct spelling of the randomly selected word. A correct response will occur only when blocks bearing the indicia representing the correct spelling of the requested word are inserted in proper order into consecutively arranged input cavities. The individual blocks bearing the individual letters may be inserted in any sequence so long as the letters appear in the proper literal sequence upon completion of the response. An audible presentation identifying each block will occur after insertion of the particular block. If an incorrect response, such as an inappropriate letter, is inputted, the electronic circuitry will produce an audible presentation identifying the incorrect response and repeating the requested word to be spelled. If a correct response is provided by the operator, an audible presentation acknowledging the correct response will be produced. After a maximum of 4 incorrect attempts to provide a correct response for a given selected word, an audible presentation providing the correct response will be produced. Only words which contain letters found on separate blocks are stored within the memory means of the electronic circuitry. Furthermore, in order for a response to be correct, the answer block bearing the first letter of the response must be inserted in the left-most input cavity, with the remaining blocks in the next adjacent cavities, in proper order.

The fourth mode of operation of the instructional apparatus is the "numbers" mode of operation. This mode of operation is substantially similar to the "letters" mode of operation. In the preferred embodiment, the numerals 1 through 10 are represented upon the various answer blocks. Upon activation of this mode of operation, the electronic circuitry will randomly select from those numerals and produce an audible presentation requesting that one of the numerals be provided. As with the "letters" mode of operation, in order for a response

to be correct, the correct answer block with the appropriate numeral must be inserted into one of the input cavities with the requested numeral upon the exposed face. In the event of an incorrect response, an audible presentation identifying the indicia upon the exposed display face will be provided. The audible presentation requesting the particular selected numeral will be repeated until a correct response is provided, at which time the electronic circuitry will randomly select another numeral to be identified and provided by the operator.

The fifth mode of operation, which is the most complicated interactive mode of operation, is the "counting" mode of operation. The "counting" mode of operation includes five levels of difficulty. Within each level of difficulty, audible presentations responsive to the appropriateness or inappropriateness of the response provided by the operator will be produced. It is necessary for the operator to produce 4 consecutive correct responses to proceed for the first level to the second level, from the second level to the third level, and from the third level to the fourth. In order to proceed from the fourth level to the fifth level, 8 correct responses must be given consecutively. During first level of difficulty operation, the operator is requested to insert randomly selected numbers of answer blocks into the input cavities. During the second level of difficulty operation, the operator is requested to insert answer blocks bearing randomly selected numbers of letters. During the third level of difficulty operation, the operator is requested to insert answer blocks of randomly selected number and color. During fourth level of difficulty operation, the operator is requested to insert blocks whose exposed display faces bear, in the aggregate, a randomly selected number of the above-described physical objects or readily identified animals. Fifth level of difficulty operation provides that questions embodying each of the 4 other levels of operation will be presented to the operator. If an incorrect response is provided, an audible presentation stating the incorrect response and repeating the original presentation, will be produced. Because a correct response may require the insertion of more than one block at a time, after each response by the operator, during "counting" operation, all answer blocks must be removed from all input cavities after each operator response.

The sixth mode of operation, which is a non-interactive mode of operation, is the "music" mode of operation. In this mode of operation, the operator, through the selective insertion of the answer blocks, may cause a production of musical notes and/or animal sounds. A different portion of musical passage is associated, within the memory means of the electronic circuitry, with each of the display faces bearing either a numeral or a letter. Each

display face which depicts an animal or animals, produces, when inserted into an input cavity, audible presentations comprising animal noises appropriate for the animals disposed upon the particular display face which is exposed. When more than one answer block is inserted into the input cavities at a given time, the sounds associated with the exposed display faces will be produced in the order in which the associated blocks were inserted into the input cavities. No voices or words are included in the audible presentations produced in the "music" mode of operation.

FIG. 1 is a side perspective view of the electronic instructional apparatus according to the present invention. The rectangular input cavities for insertable reception of the associated answer blocks are particularly shown.

FIG. 2 is a side perspective view of an answer block, showing, in particular, the identification surfaces associated with the display faces.

FIG. 3 is a side view, partly in section, of the detection means shown cooperating with an answer block. Positioning of the detection means is shown both before and after insertion of the answer block.

FIG. 4 is a reverse angle perspective view of the cooperation of the sensor switches, and an answer block, according to FIG. 3.

FIG. 5 is a rear left-side perspective view of the back side of the apparatus in which is shown the storage compartment for the containment of the answer blocks.

FIG. 6 is a schematic diagram of the electronic circuit means comprising the memory means, and processor means. Also shown are the various amplifier, power supply and switching sub-circuits.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail a specific embodiment, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated.

FIG. 1 is a front right-side perspective view of the electronic instructional apparatus. Instructional apparatus 10 is shown principally comprising case 23, in which is mounted electronic circuitry (not shown in this figure) and one of a plurality of answer blocks 30. The circuitry is coupled to "on" switch 11, "off" switch 12, operation mode selector switch 13, and detection sensor groups 14, 15, 16, and 17, which are disposed within input cavities 18, 19, 20, and 21, respectively. The electronic circuitry is also connected to an audio speaker (not shown), which is mounted behind grill 22. Case 23 may be configured to have any suitable shape,

5 although in the preferred embodiment case 23 is shown as being configured so as to resemble a stylized school bus. The operator, by rotating the operation mode selector switch 13, may change the mode of operation of the electronic instructional apparatus 10. Also shown in FIG. 1 is one of a plurality of answer blocks 30, any one of which may be inserted into any one of input cavities 18-21. The three exposed sides of answer block 30 are shown as bearing indicia thereon. The cooperation of the answer block 30 and input cavities 18-21 are described in detail hereinafter.

An answer block 30, according to the present invention, is seen in perspective view in FIG. 2 and three display faces 34, 35 and 36 are not seen. In the preferred embodiment of the invention, each answer block 30 is a cube, and has 6 generally square display faces of which three display faces 31, 32, and 33 are seen in FIG. 2. Each display face bears indicia, such as numerals, letters of the alphabet, or images of physical objects (not shown), such as numbers of commonly known and easily recognized animals, the indicia so described being representative of potential responses to statements or questions posed by the instructional apparatus, or musical sounds, in a matter to be hereinafter described. If the operator wished, for example, to utilize the numeral 9 as seen in FIG. 2, as a response to a question posed by the apparatus, the operator would locate the answer block which bears the numeral 9 upon one of its display faces and in this example insert answer block 30 into one of the input cavities 18-21, so that display face 32, bearing the numeral 9, would be turned toward the operator. It will be seen that the desired indicia need only appear facing the operator and need not necessarily be "right side up". In order for the instructional apparatus of the present invention to recognize what indicia are displayed on the exposed display face of an inserted answer block 30, each answer block 30 also bears a plurality of input surfaces, corresponding to the 6 display faces of the answer block. The input surfaces corresponding to a given display face are disposed upon the distal edges of the display faces perpendicularly disposed to the given display face. For example, as seen in FIG. 2, the input surfaces 37, 38 correspond to display face 31, which bears the letter G. In addition to the input surfaces which are seen, it is readily understood that 2 additional input surfaces, corresponding to display face 31, extend along the lower edges of the answer block 30, which edges are not seen from the view shown in FIG. 2. Similarly, input surfaces 39 and 40 correspond to display face 32, which bears the numeral 9; further input surfaces 41 and 42 correspond to display 33, which bears the letter Q. In the preferred embodiment of the invention, the 4

input surfaces corresponding to each display face are identical with each other. Furthermore when a block is inserted into one of input cavities 18-21, only the lower one of the input surfaces corresponding to the exposed display face comes into contact with the detection sensor group of the particular input cavity. Since all of the input surfaces corresponding to a given display face are identical, it can be readily seen that the orientation of the indicia of the exposed display face with respect to the horizontal and vertical directions is immaterial to the operation of the apparatus according to the present invention.

FIGS. 3 and 4 illustrate the cooperation of the input surfaces of the answer blocks and the detection sensor groups disposed within the input cavities. Each input surface, as seen in FIG. 2, includes a plurality of notches and ridges, the particular combination of which is unique to its corresponding display face. Inasmuch as the various answer blocks, a plurality of which are contemplated in the preferred embodiment of this invention, are fabricated of various colors, the input surfaces of a given answer block are also representative of the color of said answer block as well as the particular indicia of a given display face.

Each of detection sensor groups 14-17 (as seen in FIG. 1), comprises a plurality of sensor switches 45, one of which is illustrated in FIG. 3. Insertion of an answer block causes the notches and ridges of the answer block to align with the individual detection switches which make up a detection sensor group. Sensor switch 45 is shown prior to insertion of an answer block in an initial unactuated position by the solid lines of FIG. 3. Sensor switch 45 is held in the unactuated position by a biasing means (not shown). Upon insertion of an answer block, detection switch 45 will remain biased in an unactuated position or alternatively will be depressed and thus actuated depending upon whether a notch or ridge, respectively, is aligned with said detection switch 45.

As seen in FIG. 3, the input surface 47, which extends along a lower portion of answer block 30, away from the corner most portion of block 30, corresponds to the display face which is being exposed during insertion of the block. Upon complete insertion of block 30, as indicated by the dashed lines, sensor switch 45 is depressed away from its initial position, and is brought into contact with terminal 46. Both terminals 46 and lead 48, which is supported by sensor switch 45, are operably associated with the above-described electrical circuitry so that when terminal 46 and lead 48 are brought into contact, a signal is sent to said electrical circuitry. Although in the preferred embodiment of the present invention, 6 sensor switches are contemplated within each input sensor

group, as a matter of design choice, any number of sensor switches may be utilized within an input sensor group, depending upon the amount of information which is desired to be represented by each input surface. Since the input surfaces corresponding to each display face are different from the input surfaces corresponding to the other display faces of the answer blocks contemplated in this invention, each combination of depressed and undepressed sensor switches 45 create, when inserted into an input cavity, a signal which identifies, within memory means included in the aforesaid electronic circuitry, stored characteristics of the particular exposed display face and the answer block upon which the particular display face is disposed.

FIG. 5 shows a rear view of the instructional apparatus according to the present invention and specifically shows a storage cavity 50 which may be sealed by closure 51. Cavity 50 provides a place where answer blocks 30 may be stored when the apparatus is being transported, or is otherwise not in use. Closure 51 is shown affixed to a portion of case 23 by strap 52 to prevent closure 51 from being separated from case 23 and thus lost.

FIG. 6 of the drawings is a schematic circuit diagram of the electronic instructional apparatus of the present invention. Integrated circuit chip 70 is shown connected to the various amplifier, power supply and switching sub-circuits. Integrated circuit chip 70 comprises a single chip which internally incorporates a central processing unit, read-only-memory, random-access-memory, speech synthesis and sound production circuitry and input/output control circuitry. Chip 70 thus contains the software which produces the various requests to the operator as well as contains in memory the identification of the different indicia appearing upon the above-described answer blocks. Such types of single chip systems are well known in the art.

Subcircuit 80 illustrates detection switch matrix 81 which is composed in the preferred embodiment of six detection switches for each of the four input cavities. Diodes 82 serve to separate each detection switch from short circuit.

Switch matrix 81 is connected to integrated circuit chip 70 by lines 83 and 84.

Subcircuit 90 illustrates the "off" switch 12 and operation mode selector switch 13 of Fig. 1. Off switch 12 and operation mode selector switch 13 are connected to integrated circuit chip 70 by lines 91 which are shown buffered by resistors 92.

Subcircuit 100 shows the power control circuit of the electronic instructional apparatus, and specifically "on" switch 11. The operation of this power control circuit is common and well known to those skilled in the art. Subcircuit 110 is connected to integrated circuit chip 70 and comprises crystal

111 for providing the timing signals to the central processing unit contained in integrated circuit chip 70.

Subcircuit 120 is a simple amplifier circuit composed of transistor 121, capacitor 122 and resistors 123 and 124 and serves to amplify in a standard manner musical sounds produced by the apparatus and heard through speaker 125. Subcircuit 130 is another common amplifier circuit known to those skilled in the art and serves to amplify the synthesized human speech produced by the speech synthesis element contained in integrated circuit chip 70.

## Claims

1. An electronic instructional apparatus [10] for developing and testing a preliterate preschool operator's associational and coordinational skills, said electronic instructional apparatus characterized by:

- housing means [23],
- said housing means including one or more recess means [18],[19],[20],[21];
- one or more indicia disclosure means [30] bearing indicia on at least one side [32],[33],[34], thereof said indicia disclosure means [30] being capable of insertion into said one or more recess means [18],[19],[20],[21] wherein said indicia is contained upon an exposed side of said indicia disclosure means when inserted into said recess means [18],[19],[20],[21];
- detection means [14],[15],[16],[17] operably associated with each of said one or more recess means [18],[19],[20],[21] for detecting the insertion of said indicia disclosure means [30] into said recess means [18],[19],[20],[21] and for providing an indication of the identity of said indicia appearing upon said exposed side of said inserted individual indicia disclosure means [30] residing in said associated recess means [18],[19],[20],[21];
- memory means for storing data corresponding to said indicia appearing upon said side of each of said indicia disclosure means [30] and for storing data corresponding to predetermined combinations of indicia appearing upon said sides [32],[33],[34] of predetermined combinations of said indicia disclosure means [30];
- processor means operably associated with said memory means and said detection means [14],[15],[16],[17] for comparing the identity of said indicia appearing upon said side [32],[33],[34] of each of said inserted indicia disclosure means [30] and the identity of combinations of indicia appearing upon said sides [32],[33],[34] of combinations of said inserted indicia disclosure means [30] with data stored in said memory means, and for providing an indication that said identified indicia appear-

ing on said sides [32],[33],[34] of said one or more indicia disclosure means [30] is alternatively present, or not present, as data stored in said memory means; and

5 - output means [120],[125] operably associated with said processor means for providing said operator with an output which is a function of said data stored in said memory means.

10 2. The invention characterized in Claim 1 in which said recess means [18],[19],[20],[21] is further characterized as a cavity disposed in said housing means [23], said cavity having a rectangular opening upon an exterior surface of said housing means [23] and extending to an internal portion of said housing means [23] wherein said cavity is capable of accepting the insertion of one of said indicia disclosure means [30].

15 3. The invention characterized in Claim 1 in which said indicia disclosure means [30] is further characterized as a cubical answer block, each answer block having disposed thereon at least one display face [32],[33],[34], each said display face [32] bearing thereon operator identifiable visual indicia.

20 4. The invention characterized in Claim 3 wherein each one of said answer blocks [30] is further characterized as having for each given display face [32],[33],[34] a plurality of corresponding identification surfaces [37],[38],[39],[40],[41],[42] engageable with said detection means [14],[15],[16],[17], said identification surfaces [37],[38],[39],[40],[41],[42] being disposed upon the sides of said answer block [30] which are perpendicular to said given display face [32],[33],[34],

25 5. The invention characterized in Claim 3 wherein each one of said answer blocks [30] is further characterized as having for each given display face [32],[33],[34] a plurality of corresponding identification surfaces [37],[38],[39],[40],[41],[42] further being disposed upon the portion of each of said perpendicular sides distal to said given display face [32],[33],[34] whereby said detection means [14],[15],[16],[17] is engaged with said identification surface [37],[38],[39],[40],[41],[42] so long as said corresponding display face [32],[33],[34] is projecting outwardly from said recess means [18],[19],[20],[21].

30 6. The invention characterized in Claim 4 wherein each identification surface [37],[38],[39],[40],[41],[42] is further characterized as having a plurality of ridges and notches, the arrangement of which represents digital data identifying the indicia appearing upon the display face [32],[33],[34], said digital data being stored in said memory means.

35 7. The invention characterized in Claim 4 in which said detection means [14],[15],[16],[17] are further characterized as being disposed upon an interior surface distal to the opening of each one of said cavities whereby upon insertion of one of said indicia disclosure means [30] into one of said cav-

ties [18],[19],[20],[21], said indicia disclosure means [30] is brought into operable engagement with said detection means [14],[15],[16],[17].

7. The apparatus [10] characterized in Claim 6 in which said detection means [14],[15],[16],[17] is further characterized as a plurality of switches [45]-[46],[48] disposed within said cavities [18],[19]-[20],[21], said switches [45],[46],[48] being in alignment and responsive to said ridges and notches of said identification surfaces [47] so as to provide a digital data signal to said processor means representative of the indicia present on said exposed side [32],[33],[34] of said indicia disclosure means [30].

8. The apparatus [10] characterized in Claim 1 further characterized by prompting means for providing the operator with a plurality of requests, to which operator responses are desired, and correct responses corresponding to said plurality of requests, said operator responses being provided by the insertion of one or more of said indicia disclosure means [30] into said one or more recess [18]-[19],[20],[21] means in response to said request.

9. The apparatus [10] characterized in Claim 8 in which said prompting means is further characterized as having memory means for storing said plurality of requests and said corresponding correct responses,

- speech synthesis means operably associated with said memory means and said processor means for providing said plurality of requests and said corresponding correct responses to said operator in synthesized human speech.

10. The apparatus [10] characterized in Claim 1 and further characterized in that said output means [120],[125] provides an indication to the operator of the identity of the indicia upon said exposed side [32],[33],[34] of said indicia disclosure means [30] when said indicia disclosure means [30] is inserted into one of said recess means [18],[19],[20],[21].

11. The apparatus [10] characterized in Claim 8 and further characterized in that said prompting means makes requests that require the operator to identify specific indicia appearing upon particular indicia disclosure means [30] and insert said particular indicia disclosure means [30] into one of said recess means [18],[19],[20],[21] such that said requested indicia appears upon the exposed side of said [32],[33],[34] indicia disclosure means [30].

12. The apparatus [10] characterized in Claim 8 and further characterized in that said prompting means makes requests of the operator to spell a given word thus requiring the operator to identify a specific combination of indicia appearing upon particular indicia disclosure means [30] and insert said

particular combination of indicia disclosure means [30] into said recess means [18],[19],[20],[21] so as to correctly spell said given word.

13. The apparatus [10] characterized in Claim 5 8 and further characterized in that said prompting means makes requests of the operator toward teaching counting by requesting the operator to insert a specific number of indicia disclosure means [30] into said recess means [18],[19],[20]-[21].

14. The apparatus [10] characterized in Claim 10 8 and further characterized in that said indicia disclosure means [30] are of different colors and in which said prompting means teaches the recognition of colors by requesting the operator to insert specific numbers of specific colored indicia disclosure means [30] into said recess means [18],[19]-[20],[21].

15. The apparatus [10] characterized in Claim 15 8 and further characterized in that said electronic instructional apparatus [10] produces a predetermined series of audible musical sounds upon insertion of said indicia disclosure means [30] into said recess means [18],[19],[20],[21] wherein said musical sounds correspond to said indicia appearing upon the exposed side [32],[33],[34] of said indicia disclosure means [30].

16. The apparatus [10] characterized in Claim 20 8 and further characterized in that said electronic instructional apparatus [10] produces a predetermined series of audible animal sounds upon insertion of said indicia disclosure means [30] into said recess means [18],[19],[20],[21] wherein said animal sounds correspond to said indicia appearing upon the exposed side [32],[33],[34] of said indicia disclosure means [30].

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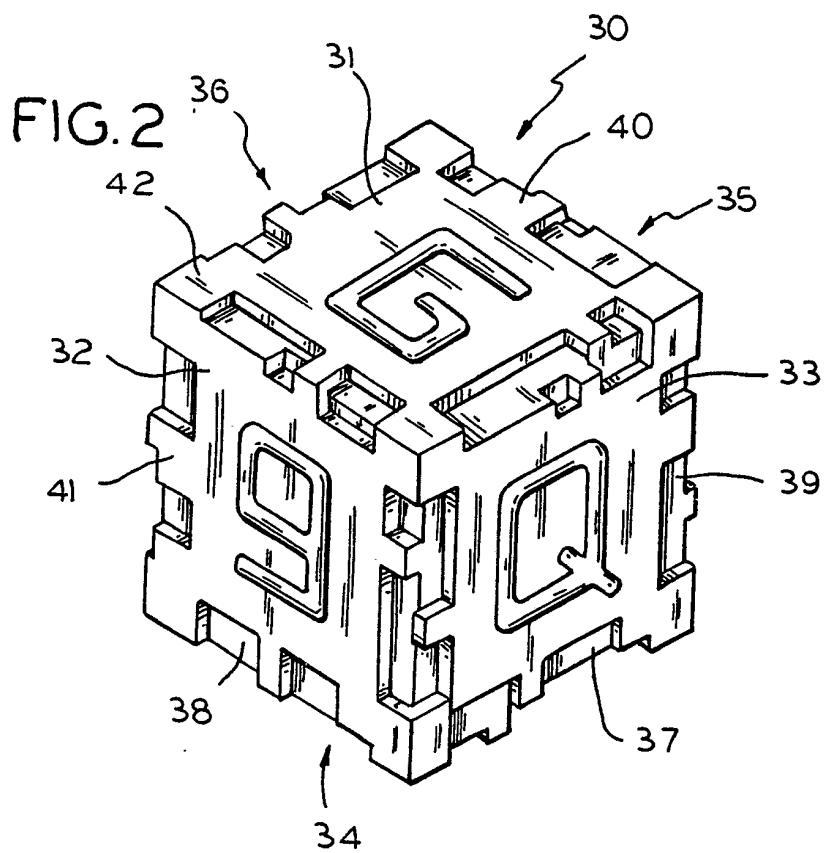
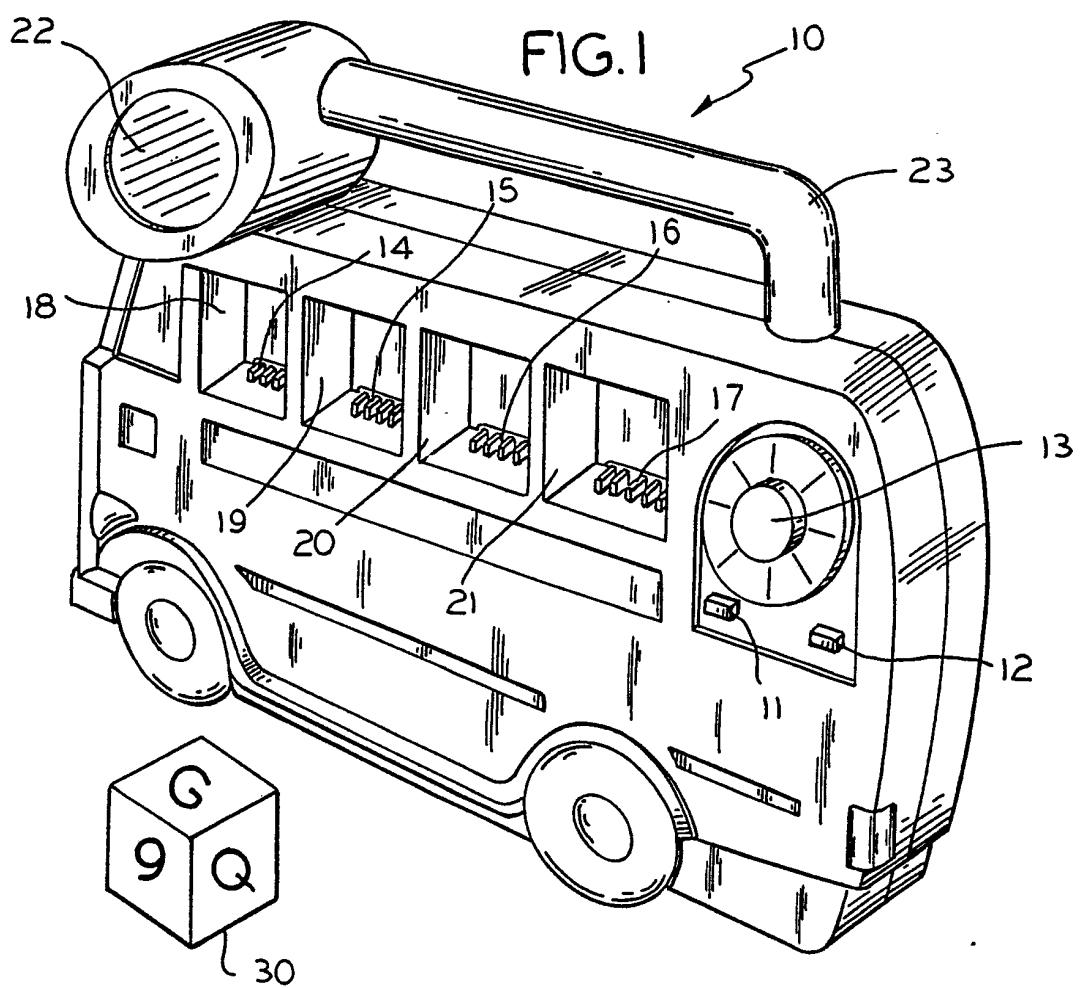


FIG.3

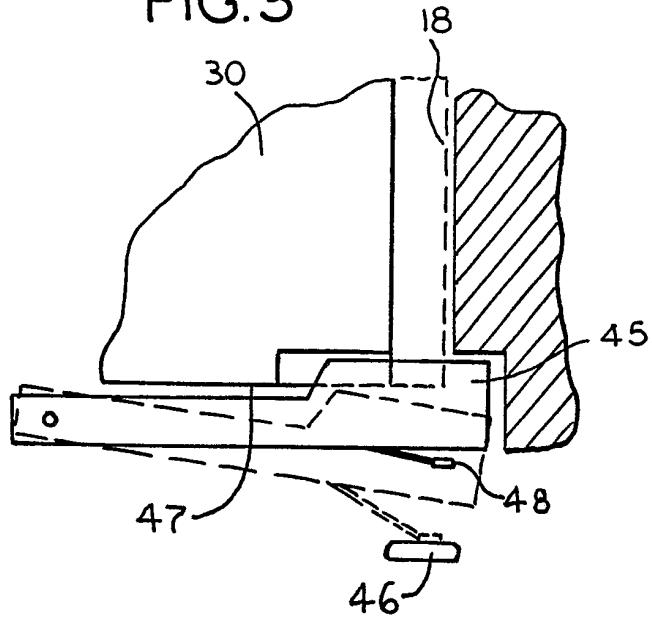


FIG.4

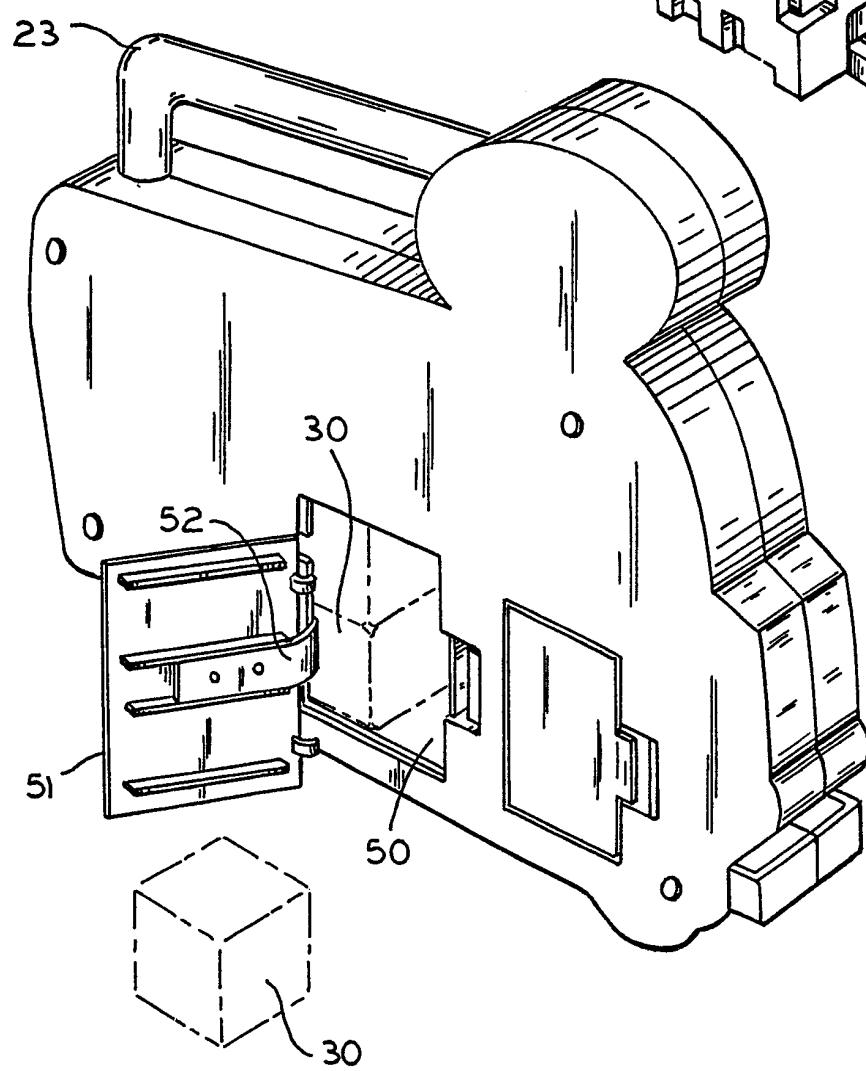
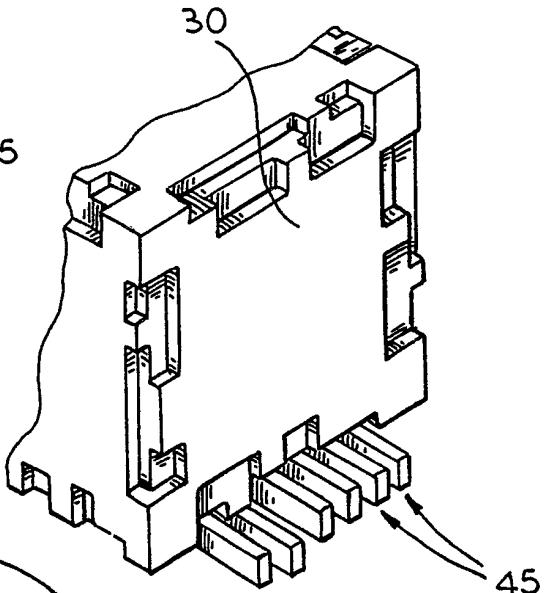


FIG.5

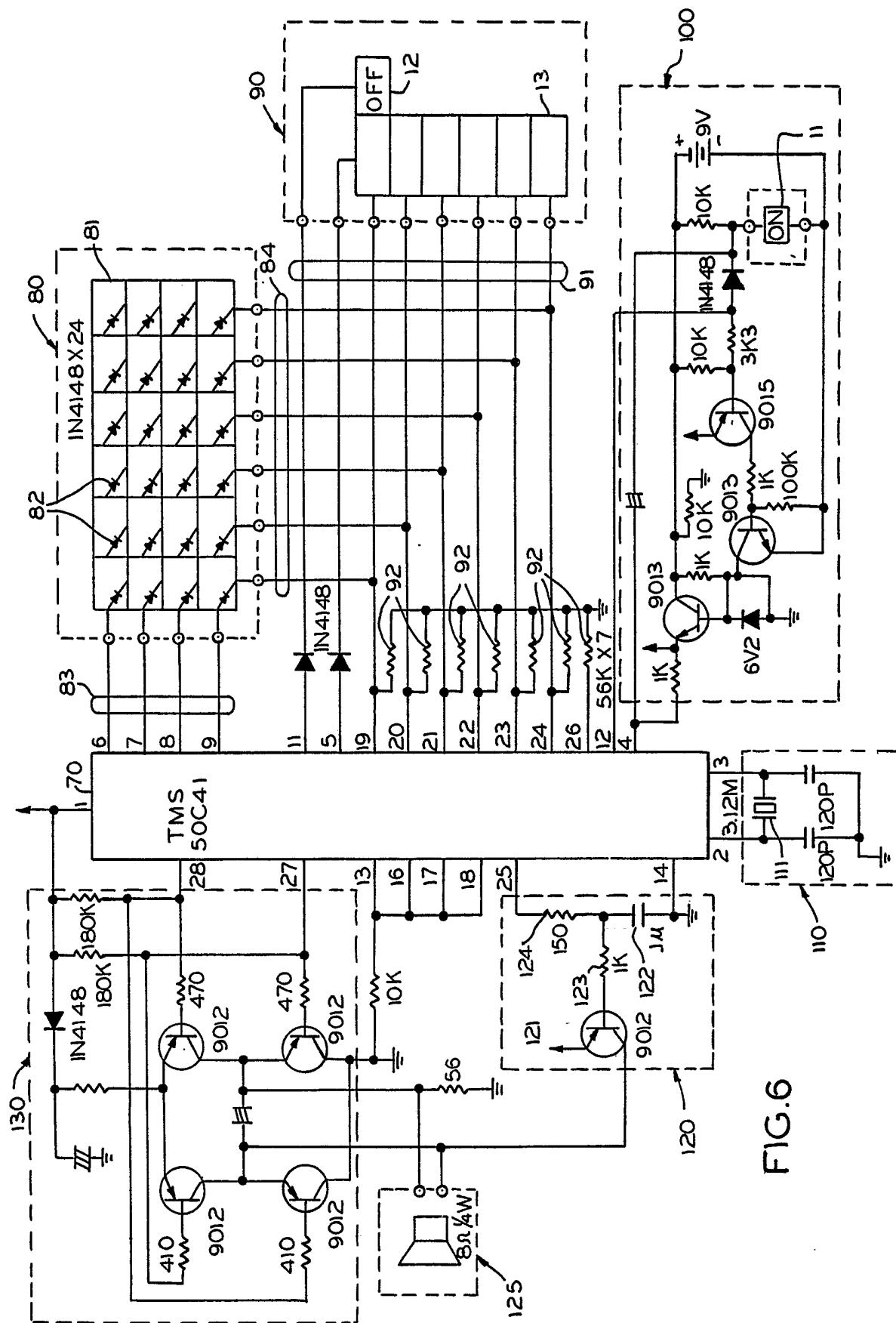


FIG. 6



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number

EP 88 11 1884

## DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	GB-A-2 186 415 (MARVIN GLASS et al.) * Whole document *	1,8-11, 13,14 12,15, 16	G 09 B 17/00
A	---		
A	FR-A-2 499 267 (B. PRIEUR) * Pages 1,2; figure *	3-7	
A	---		
A	DE-A-1 497 741 (U. SCHNELLE) * Page 2, last two paragraphs; page 3, first two paragraphs; figures *	3-7	
D,A	US-A-4 516 260 (P. BREEDLOVE) ---		
A	DE-A-2 847 159 (G. GAZZOLA) * Pages 5,6; figures 2,8 *	1,15	
A	US-A-4 457 719 (A. DITTAKAVI et al.) * Abstract; figures 3,4,6 *	1,16	
	-----		
<b>TECHNICAL FIELDS SEARCHED (Int. Cl.4)</b>			
G 09 B			
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		19-12-1988	ODGERS M. L.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			

RÉPUBLIQUE FRANÇAISE

INSTITUT NATIONAL  
DE LA PROPRIÉTÉ INDUSTRIELLE

PARIS

(11) N° de publication :  
(A n'utiliser que pour les  
commandes de reproduction).

**2 499 267**

A1

**DEMANDE  
DE BREVET D'INVENTION**

(21)

**N° 81 01768**

(54) Jeu de cubes pédagogiques.

(51) Classification internationale (Int. Cl. 3). G 06 F 15/44; A 63 F 7/00; A 63 H 33/26 // G 09 B 19/06.

(22) Date de dépôt..... 30 janvier 1981.

(33) (32) (31) Priorité revendiquée :

(41) Date de la mise à la disposition du  
public de la demande ..... B.O.P.I. — « Listes » n° 31 du 6-8-1982.

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(73) Titulaire : *Idem* (71)

(74) Mandataire :

Jeu de cubes pédagogiques

Description

L'invention concerne un jeu de cubes pédagogiques pour l'enseignement des lettres et de leurs consonnances .

5 L'invention se situe dans le domaine de l'électronique .

Le problème technique que cette invention prétend résoudre est l'impossibilité de mettre à la disposition d'enfants en bas-âge , la technologie dont nous disposons . L'invention permettra aux enfants d'apprendre les lettres de l'alphabet et leurs consonnances , dans leur langue maternelle , ainsi que celles des mots qu'ils pourront former à loisir au cours de leur jeu .

10 L'invention se compose , en se référant à la figure , d'une boite noire ① ou unité centrale munie d'un système d'alimentation ②, d'un organe de commande ③, d'un synthétiseur de voix ④ et de plusieurs cubes ⑤( munis chacuns d'un système d'alimentation propre ⑥) ou unités périphériques . Sur 15 4 des 6 faces de chaque cube est inscrite une lettre différente . L'ensemble des lettres inscrites sur les cubes couvre l'alphabet de la langue choisie . Les lettres très utilisées réapparaissent plus souvent sur les faces des cubes . On dispose la face gauche d'un cube contre la face de lecture ⑦ de la boite noire . Un moyen d'attraction ⑧ (par exemple un aimant permanent ) renforce le 20 lien entre les deux faces . Un moyen d'information ⑨ (par exemple un système d'interrupteurs se fermant lors de l'entrée dans un champ magnétique ) informe le cube de sa situation spatiale . Informé , le cube par un autre système d'information ⑩ ( par exemple un oscillateur à basse fréquence ) va communiquer à la boite noire la lettre qu'il affiche .

25 Un système de contrôle de transmission et de recueil d'information ⑪ dirigé par une séquence préenregistrée dans une mémoire morte , agit suivant ces principales étapes :

30 - une fois reçue par un récepteur ⑫ (par exemple un filtre à oscillation de basse fréquence ) l'information en provenance d'un cube , la séquence bloque ⑬ l'information sur son parcours ( par exemple en coupant par un relais l'alimentation de l'oscillateur à basse fréquence ) et permet (par même système de relais ) à un autre cube de donner son information propre dont la transmission avait été bloqué ( par le même système de relais ) . Un système ( par exemple une combinaison de relais ) permet de répartir l'information dans le temps et d'en savoir 35 l'origine .

35 - l'information reçue est stockée dans une mémoire ⑭  
- ensuite elle ordonne et analyse l'information selon les règles phonétiques de la langue choisie . ⑮

- le résultat de ce travail d'intégration est communiqué au synthétiseur (4) de voix et autres unités périphériques de sortie qui permettraient de sonoriser et de visualiser l'information d'apprentissage .

La boîte noire est équipée d'organe de commande permettant une utilisation 5 variée de l'équipement ( par exemple la répétition d'un mot , des lettres prises séparément ) .

Le dispositif peut être posé sur un plan horizontal ou fixé sur un plan vertical . Tous moyens techniques permettant de réaliser l'invention , tant dans la fabrication que dans le fonctionnement , est protégé par la dite invention .

## Revendications

- 1) Jeu de cubes pédagogiques pour l'enseignement des lettres et de leurs consonnances , caractérisé en ce qu'il comprend une unité centrale ou boîte noire , un organe de commande et des unités périphériques .

(1) (3)

5 2) Jeu de cubes , selon la revendication n°1 , caractérisé en ce que l'unité centrale comprend un système de commande permettant :

- de recevoir des informations en provenance des unités périphériques

- de les ordonner

- de les analyser selon les règles phonétiques de la langue parlée (15)

une mémoire de stockage utilisée pour :

- stocker l'information en provenance des unités périphériques

- stocker l'information analysée en provenance du système de commande .

10 3) Jeu de cubes , selon la revendication n°1 , caractérisé en ce que les unités périphériques sont constituées par :

- pour les unités périphériques d'entrée , par des cubes (6)

- pour les périphériques de sortie par un synthétiseur de voix (4)

15 4) Jeu de cubes , selon la revendication n°1 , caractérisé en ce que les organes de commande comprennent un ensemble de moyen ( quelques boutons-poussoirs ) (3) permettant de faire répéter une ou plusieurs fois une ou plusieurs lettres ou le mot entier .

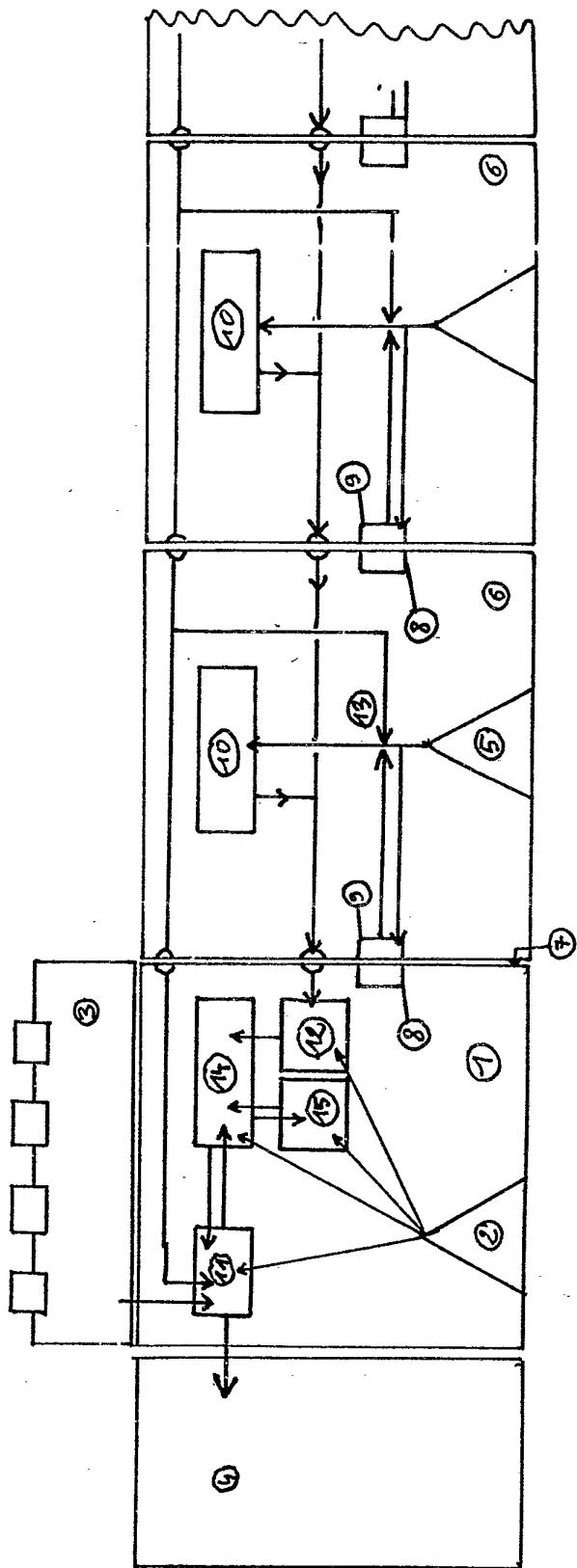
20 5) Jeu de cubes , selon la revendication N°1 , caractérisé en ce que l'unité centrale est alimentée par un système de batteries (2) .

25 6) Jeu de cubes , selon la revendication n°1 , caractérisé en ce que les cubes sont alimentés par un système de batterie , indépendamment de l'unité centrale . (5)

30 7) Jeu de cubes , selon la revendication n°1 , caractérisé en ce que les cubes sont alimentés par un système dépendant de l'unité centrale .

# PLANCHE UNIQUE

2499267





(19) 대한민국특허청(KR)  
 (12) 등록특허공보(B1)

(45) 공고일자 2012년12월27일  
 (11) 등록번호 10-1216197  
 (24) 등록일자 2012년12월20일

(51) 국제특허분류(Int. Cl.)  
*G09B 1/06* (2006.01) *G09B 5/06* (2006.01)

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(21) 출원번호 10-2010-0114866

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(22) 출원일자 2010년11월18일

(72) 발명자

심사청구일자 2010년11월18일

윤충한

(65) 공개번호 10-2012-0053644

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(43) 공개일자 2012년05월29일

(74) 대리인  
 한양특허법인

(56) 선행기술조사문현

US20070278740 A1

KR1020030049317 A

KR1020020012337 A

KR200278339 Y1

전체 청구항 수 : 총 10 항

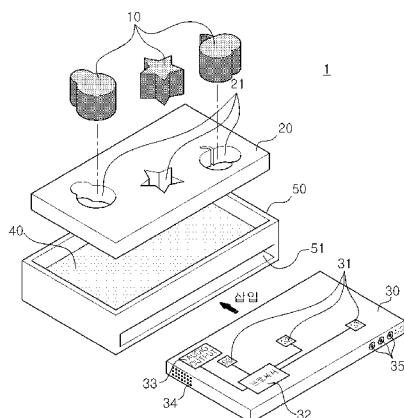
심사관 : 장창국

(54) 발명의 명칭 학습용 목질계 퍼즐

### (57) 요약

학습 효율이 높고, 안전하며 흥미를 유발할 수 있는 학습용 퍼즐을 제공한다. 본 발명의 실시 예에 따른 학습용 목질계 퍼즐은, 퍼즐조각, 베이스부, 회로부를 포함하며, 퍼즐조각이 베이스부에 형성된 홈에 삽입 시 회로부의 스위치가 연결 패드에 형성된 스위치 연결수단에 의해 연결되면서 퍼즐조각에 관한 음성 정보를 출력한다. 퍼즐 조각, 베이스부 및 회로부는 메인 프레임과 탈부착이 가능하여 다른 퍼즐을 사용할 수 있다. 또한 학습용 목질계 퍼즐에는 다양한 외부 전자기기가 연결될 수 있어 그 학습 형태를 확장시킬 수 있는 효과가 있다.

【도면】 - 도1



## 특수 청구의 범위

### 청구항 1

격벽으로 둘러싸여 있고 상부가 개방된 제1 공간 및 측면에 개구부가 형성되어 있고 나머지는 격벽으로 둘러싸인 제2 공간을 갖는 메인 프레임;

상기 제1 공간에 안착되는 베이스부;

상기 제2 공간의 개구부를 통해 삽입 가능한 회로부; 및

상기 제1 공간과 상기 제2 공간을 구분하도록 메인 프레임에 설치된 연결 패드를 포함하고,

상기 베이스부는, 소정의 형상을 띠는 복수의 퍼즐조각 각각이 삽입될 수 있는 홈이 형성되어 있고, 상기 퍼즐조각의 높이보다 낮은 높이를 갖고,

상기 회로부는, 상기 베이스부의 홈에 대응하는 위치에 스위치가 형성되어 있으며, 상기 퍼즐조각이 상기 퍼즐조각에 대응하는 홈에 삽입 시 상기 스위치가 온되면서 상기 퍼즐조각에 관한 음성을 소정시간 출력하고,

상기 연결패드는, 상기 회로부와 상기 베이스부를 전기적으로 절연시키는 한편, 상기 연결패드 중 상기 회로부 측의 면에는 상기 퍼즐조각의 삽입 압력에 의해 상기 스위치를 온시키는 스위치 연결수단이 설치된 것을 특징으로 하는 학습용 목질계 퍼즐.

### 청구항 2

청구항 1에 있어서,

상기 복수의 퍼즐조각, 상기 복수의 퍼즐조각에 대응하는 상기 베이스부 및 상기 베이스부에 대응하는 상기 회로부가 하나의 패키지로 복수개 존재하여, 상기 패키지에 따라 상기 메인 프레임과의 탈부착을 통해 각기 다른 퍼즐이 되는 것을 특징으로 하는 학습용 목질계 퍼즐.

### 청구항 3

청구항 1에 있어서,

상기 회로부에 형성되어 있고, 상기 회로부와 외부 영상기기 및 음성기기를 포함하는 외부의 전자기기를 전기적으로 연결하여 상기 퍼즐조각에 관한 음성정보 및 영상정보 중 하나 이상을 상기 외부의 전자기기로 출력할 수 있는 복수의 포트를 더 포함하는 것을 특징으로 하는 학습용 목질계 퍼즐.

### 청구항 4

청구항 1에 있어서,

상기 회로부는,

상기 퍼즐조각에 대응하는 상기 소정의 형상의 이름에 관한 음성을 출력하는 것을 특징으로 하는 학습용 목질계 퍼즐.

### 청구항 5

청구항 1에 있어서,

상기 메인 프레임, 상기 베이스부 및 상기 회로부의 외부 재질은 목질계인 것을 특징으로 하는 학습용 목질계 퍼즐.

### 청구항 6

청구항 1에 있어서,

상기 회로부는,

외부의 전원으로부터 전력을 공급받아 회로를 구동하거나, 내부의 배터리 수용부에 수용된 배터리로부터 전력을

공급받아 회로를 구동하는 것을 특징으로 하는 학습용 목질계 퍼즐.

### 청구항 7

청구항 1에 있어서,

상기 스위치 연결 수단은 상기 연결 패드 중 상기 회로부 측 일면에 형성된 접점 열선이며, 스위치는 열선 스위치인 것을 특징으로 하는 학습용 목질계 퍼즐.

### 청구항 8

청구항 1에 있어서,

상기 연결 패드는,

상기 스위치와 일정 간격 이격되어 있는 플렉서블한 패드이고,

상기 스위치 연결 수단은,

상기 연결 패드 중 상기 회로부 측 일면에 코팅된 도전성 물질인 것을 특징으로 하는 학습용 목질계 퍼즐.

### 청구항 9

청구항 8에 있어서,

상기 스위치는,

상기 퍼즐조각의 삽입 압력에 의해 도전성 물질인 상기 스위치 연결 수단이 상기 스위치와 닿게 될 때 전기적으로 연결되는 것을 특징으로 하는 학습용 목질계 퍼즐.

### 청구항 10

청구항 1에 있어서,

상기 회로부는,

상기 베이스부의 홈이 형성된 위치에 대응하여 설치된 복수의 스위치;

상기 스위치의 연결에 따라서 연결된 스위치에 대응하는 음성 파일을 선택하는 프로세서; 및

선택된 음성 파일을 음성 정보로 변환하여 출력하는 음성 출력부를 포함하는 것을 특징으로 하는 학습용 목질계 퍼즐.

## 영 세 서

### 기술 분야

[0001] 본 발명은 언어 또는 기타 학습용 퍼즐에 관한 것이다. 더욱 자세하게는, 어린이들이 쉽고 재미있게 영어 학습을 하기 위하여, 퍼즐을 맞추면서 학습을 병행할 수 있는 학습용 퍼즐의 패키지에 관한 것이다.

### 제 2 기술 분야

[0002] 영어 등에 대한 조기 교육 열풍이 일어나면서, 나이가 어린 유소년 층 학습자에 대한 다양한 학습 방법에 대한 연구가 널리 이루어지고 있다. 특히, 유소년 층 학습자가 흥미를 가질 수 있는 컨텐츠를 통하여 학습을 할 수 있는 기술에 대한 연구가 이루어지고 있다.

[0003] 컨텐츠를 통해 학습을 할 수 있는 도구에는, 대표적으로 게임이 있다. 컴퓨터 등 영상 장치에 나타나는 게임 등을 조작하게 하여 학습자에게 흥미를 일으키는 한편, 게임 컨텐츠에 교육용 컨텐츠를 포함시켜 학습 효과 역시 포함할 수 있도록 하는 것이다.

[0004] 게임을 이용한 학습 방법에는, 컴퓨터 등 영상 매체를 통한 학습용 게임의 개발 이외에도, 흔히 접할 수 있는 퍼즐 등의 오프라인 게임을 이용하여 학습자에게 직접적인 게임의 체험을 통해 학습 효과 역시 극대화하는 것이다.

- [0005] 퍼즐은, 학습 능력이 빠르며 직관적인 학습이 그 효과가 매우 큰 유소년 층 학습자에게 매우 효율적인 교육 도구로서 사용되고 있다. 사용자가 직접 퍼즐을 만지고 조립하면서, 그에 따른 교육적 컨텐츠 역시 직접적으로 만지면서 학습을 하게 되어, 학습 효과면에 있어서 다른 장치에 비하여 매우 높은 효과를 보여주고 있다.
- [0006] 교육용 퍼즐로서 가장 널리 알려진 것은 직소 퍼즐이다. 직소 퍼즐은, 일정한 형상으로 흄이 형성된 베이스에 퍼즐 조각을 맞추는 형태의 퍼즐을 뜻한다.
- [0007] 최근 직소 퍼즐을 이용한 학습용 컨텐츠의 개발에 있어서, 음성 및 영상 지원이 되는 학습용 퍼즐이 상용화되고 있다. 그러나 학습용 퍼즐은, 지원되는 음성 및 영상 컨텐츠의 수가 매우 제한되어 있는 단점이 있다. 학습자는 다른 종류의 퍼즐을 통해 학습을 하기 위해, 새로운 제품을 사서 새로운 이용 요령을 익혀야 하는 단점이 존재해 왔다.
- [0008] 또한, 퍼즐은 유소년 층 학습자가 직접 만지면서 사용하기 때문에, 음성 및 영상 지원에 필요한 전기적인 연결에 의해 학습자가 감전 등이 될 가능성이 있다. 또한, 직접 만지면서 사용하는 데 있어서 병균에 취약한 유소년 층 학습자에 대해 그 대책이 취약한 문제점이 존재해 왔다.

### 발명의 내용

#### 제1항 본 발명

- [0009] 이에 본 발명은, 상기 언급한 문제점을 해결하여, 효율적이고 안전한 학습용 퍼즐을 제공하는 데 그 목적이 있다. 더욱 자세하게는, 유소년 학습자가 직접 만지더라도 전기적, 생물학적으로 안전하면서, 학습자가 퍼즐을 만지면서 느낄 수 있는 재질감 역시 좋게 하는 데 그 목적이 있다.
- [0010] 또한, 같은 이용 요령으로 다양한 컨텐츠 및 퍼즐을 체험하여, 비용 및 학습의 효율성을 극대화하는 데 그 목적이 있다.

#### 퍼즐의 해결 수단

- [0011] 상기 목적을 달성하기 위하여, 본 발명의 실시 예에 따른 학습용 목질계 퍼즐은, 격벽으로 둘러싸여 있고 상부가 개방된 제1 공간 및 측면에 개구부가 형성되어 있고 나머지는 격벽으로 둘러싸인 제2 공간을 갖는 메인 프레임; 제1 공간에 안착되는 베이스부; 제2 공간의 개구부를 통해 삽입 가능한 회로부; 및 제1 공간과 상기 제2 공간을 구분하도록 메인 프레임에 설치된 연결 패드를 포함하고, 베이스부는, 소정의 형상을 띠는 복수의 퍼즐조각 각각이 삽입될 수 있는 흄이 형성되어 있고, 퍼즐조각의 높이보다 낮은 높이를 갖고, 회로부는, 베이스부의 흄에 대응하는 위치에 스위치가 형성되어 있으며, 퍼즐조각이 퍼즐조각에 대응하는 흄에 삽입 시 스위치가 온되면서 상기 퍼즐조각에 관한 음성을 소정시간 출력하고, 연결패드는, 회로부와 베이스부를 전기적으로 절연시키는 한편, 연결패드 중 회로부 측의 면에는 퍼즐조각의 삽입 압력에 의해 스위치를 온시키는 스위치 연결수단이 설치된 것을 특징으로 한다.
- [0012] 복수의 퍼즐조각, 복수의 퍼즐조각에 대응하는 베이스부 및 베이스부에 대응하는 회로부는 하나의 패키지로 복수개 존재할 수 있다. 이에 따라서, 패키지에 따라 메인 프레임과의 탈부착을 통해 각기 다른 퍼즐이 된다.
- [0013] 학습용 목질계 퍼즐은, 회로부에 형성되어 있고, 회로부와 외부 영상기기 및 음성기기를 포함하는 외부의 전자기기를 전기적으로 연결하여 퍼즐조각에 관한 음성정보 및 영상정보 중 하나 이상을 외부의 전자기기로 출력할 수 있는 복수의 포트를 더 포함할 수 있다.
- [0014] 회로부는, 퍼즐조각에 대응하는 캐릭터의 이름에 관한 음성을 출력하는 것을 특징으로 한다.
- [0015] 메인 프레임, 상기 베이스부 및 상기 회로부의 외부 재질은 목질계이다.
- [0016] 회로부는, 외부의 전원으로부터 전력을 공급받아 회로를 구동하거나, 내부의 배터리 수용부에 수용된 배터리로부터 전력을 공급받아 회로를 구동하는 것을 특징으로 한다.
- [0017] 스위치 연결 수단은 상기 연결 패드 중 회로부 측 일면에 형성된 접점 열선이며, 퍼즐 조각이 연결 패드에 삽입될 때 접점 열선에 대한 자극에 의해 스위치를 전기적으로 연결시키는 것을 특징으로 한다.
- [0018] 연결패드는, 스위치와 일정 간격 이격되어 있는 플렉서블한 패드이고, 스위치 연결 수단은, 연결 패드 중 회로부 측 일면에 코팅된 도전성 물질일 수 있다. 이 때 스위치는, 퍼즐조각의 삽입 압력에 의해 도전성 물질인 스위치 연결 수단이 스위치와 닿게 될 때 연결된다.

[0019] 회로부는 구체적으로, 캐릭터 형상의 흄이 형성된 위치에 대응하여 설치된 복수의 스위치; 스위치의 연결에 따라서 연결된 스위치에 대응하는 음성 파일을 선택하는 프로세서; 및 선택된 음성 파일을 음성 정보로 변환하여 출력하는 음성 출력부를 포함한다.

[0020] 회로부는, 메인 프레임의 일측에 형성된 개구부를 통해 삽입하여 메인 프레임에 부착되거나, 연결 패드와 메인 프레임의 외벽에 의해 메인 프레임의 하부에 형성된 캐비티에 삽입되고, 고정 수단에 의해 부착되는 형상을 가질 수 있다.

### 발명의 효과

[0021] 상기 언급한 본 발명에 의하면, 학습자는 목질계로 된 퍼즐 조각 및 학습용 퍼즐의 외벽을 만지면서, 안정감 및 좋은 재질감을 느낄 수 있으며, 목질계로 외부를 감싸기 때문에, 전기적으로도 안전한 제품을 제공할 수 있다. 또한, 하나의 제품을 사고 다른 퍼즐은 퍼즐 조각을 포함하는 베이스부와 회로부로 이루어진 패키지를 교체하여 동일한 학습 방법으로 다양한 종류의 퍼즐을 사용할 수 있어, 비용 및 학습 효과를 극대화할 수 있다.

[0022] 추가적으로, 외부의 전자기기 등과 연결시킬 수 있어, 향후 쌍방향 통신 등을 이용하여 만지는 퍼즐로 다양한 학습 방식, 예를 들어 IPTV, 스마트폰 등을 이용한 학습 방식을 이용할 수 있는 확장 효과도 기대할 수 있다.

### 도면의 관련한 설명

[0023] 도 1은 본 발명의 실시 예에 따른 학습용 목질계 퍼즐의 구성도이다.

도 2는 본 발명의 실시 예에서 베이스부, 메인 프레임 및 회로부의 제1 결합 구조를 도시한 것이다.

도 3은 본 발명의 실시 예에서 베이스부, 메인 프레임 및 회로부의 제2 결합 구조를 도시한 것이다.

도 4는 본 발명의 실시 예에서 퍼즐 조각과 베이스부의 높이를 비교한 것이다.

도 5는 본 발명의 실시 예에서 연결 패드의 사시도이다.

도 6은 본 발명의 실시 예에 따른 학습용 목질계 퍼즐의 측단면도이다.

도 7은 본 발명의 또 다른 실시 예에 따른 학습용 목질계 퍼즐의 측단면도이다.

도 8은 본 발명의 실시 예에 따른 학습용 목질계 퍼즐과 외부 기기의 연결 예를 도시한 것이다.

도 9는 퍼즐조각, 베이스부 및 회로부의 패키지 종류의 예를 도시한 것이다.

### 발명을 실시하기 위한 구체적인 내용

[0024] 이하, 첨부된 도면들을 참조하여 본 발명의 다양한 실시 예에 따른 학습용 목질계 퍼즐에 대하여 설명하기로 한다. 도면들에 대한 설명에서, 동일한 참조부호는 동일한 구성을 의미할 것이다.

[0025] 도 1은 본 발명의 실시 예에 따른 학습용 목질계 퍼즐의 구성도이다.

[0026] 도 1을 참조하면, 본 발명의 실시 예에 따른 학습용 목질계 퍼즐(1)은, 퍼즐 조각(10), 베이스부(20), 회로부(30) 및 연결 패드(40)를 포함하는 것을 특징으로 한다. 연결 패드(40)는 메인 프레임(50)에 고정되어 있을 수 있으며, 메인 프레임(50)에는 베이스부(20) 및 회로부(30)가 탈부착 가능하도록 설치될 수 있다.

[0027] 메인 프레임(50)은 도 1에 도시된 바와 같이, 격벽으로 둘러싸여 있고 상부가 개방된 제1 공간(식별번호 없음)과, 측면에 개구부를 갖고 나머지는 격벽으로 둘러싸인 제2 공간(식별번호 없음)을 갖도록 형성되어 있다. 제1 공간과 제2 공간은, 연결패드(40)를 통해 구분된다.

[0028] 먼저 퍼즐 조각(10)은, 소정의 캐릭터의 형상을 띠고, 제1 높이의 크기를 가질 수 있다. 퍼즐 조각(10)은 학습자가 인지할 수 있는 소정의 형상을 가질 수 있으며, 그 예로 단순한 별, 사파, 눈사람 등의 사물이나, 개, 고양이, 나비 등 동물이 될 수 있을 것이다. 본 발명의 일 목적은 영어 학습용 목질계 퍼즐이기 때문에, 본 발명에서는 기본적인 영어 단어로 표현할 수 있는 간단한 물질 또는 생물이라면 어느 것이나 퍼즐 조각(10)의 형태로 사용될 수 있을 것이다.

[0029] 퍼즐 조각(10)은 목질계의 재질을 포함하고 있다. 펄프, 나무조각 등 목질의 재질을 느낄 수 있도록 하는 것이라면 어느 재질이나 가능할 것이다. 바람직하게는 퍼즐 조각(10)이 바닥에 떨어지거나 학습자의 연령에 따라서

학습자에게 위험할 수 있기 때문에, 부드럽고 탄성이 있는 재질로 제작됨이 바람직할 것이다.

[0030] 베이스부(20)는, 복수의 퍼즐 조각(10) 각각이 삽입될 수 있도록 직소 퍼즐의 목적에 맞게 퍼즐 조각(10)에 대응하는 캐릭터 형상의 홈(21)이 형성되어 있을 것이다. 또한, 본 발명에서 베이스부(20)의 높이는 퍼즐 조각(10)의 높이인 제1 높이보다 낮은 제2 높이를 갖고 있을 것이다.

[0031] 직소 퍼즐의 특성 상, 퍼즐 조각(10)이 홈(21)에 삽입될 때, 퍼즐 조각(10)과 베이스부(20)의 높이가 같다면, 퍼즐 조각(10)을 홈(21)으로부터 다시 꺼내는 데 학습자가 불편함을 느낄 수 있다. 특히, 본 발명의 주요 학습자인 유소년 층 학습자에게, 퍼즐의 삽입 및 분리에 있어서 편리함을 주는 것은 학습자의 흥미도에도 큰 영향을 미치기 때문에, 퍼즐 조각(10)과 홈(21)의 삽입 및 분리가 용이해야 할 것이다.

[0032] 퍼즐 조각(10)의 높이인 제1 높이와 베이스부(20)의 높이인 제2 높이의 차이는 학습자가 퍼즐 조각(10)을 홈(21)으로부터 꺼낼 수 있는 정도의 높이라면 어느 높이나 가능할 것이다.

[0033] 베이스부(20)는 메인 프레임(50)과 탈부착이 가능한 구조를 가질 것이다. 도 1에는 도시되어 있지 않지만, 베이스부(20) 또는 메인 프레임(50)에는 베이스부(20)와 메인 프레임(50)이 부착되거나 탈착될 때 고정하는 고정 수단이 형성되어 있을 수 있다. 바람직하게는, 상기의 제1 공간에 베이스부(20)가 안착되는 형식으로 설치될 것이다.

[0034] 도 1에서는 메인 프레임(50)의 상부에 격벽으로 둘러 싸인 캐비티가 존재하여 베이스부(20)를 캐비티 안에 안착시킴으로써 베이스부(20)가 메인 프레임(50)에 설치된다. 그러나, 이하 설명할 회로부(30)와 메인 프레임(50)의 연결 예와 마찬가지로, 내부에 공간이 존재하고 외벽에 일정한 개구부가 형성된 박스형의 메인 프레임(미도시)에 베이스부(20)를 삽입하는 방식 역시 사용될 수 있을 것이다.

[0035] 본 발명에서 베이스부(20)의 외벽은 목질계의 재질을 포함하고 있다. 외벽뿐 아니라, 베이스부(20) 자체가 목질계의 재질로 구성될 수 있으며, 베이스부(20)와 퍼즐 조각(10)의 재질은 동일하거나 서로 다른 목질계의 재질로 구성되어 있을 수 있다.

[0036] 베이스부(20) 및 퍼즐 조각(10)에는 전혀 전기적인 구성이 존재하지 않을 것이다. 이를 통해, 전기 감전 등 전기적인 위험 요소로부터 안전하게 학습자를 보호할 수 있을 것이다.

[0037] 회로부(30)는, 베이스부(20)의 하부에 위치할 수 있다. 또한, 베이스부(20)와 마찬가지로 메인 프레임(50)과 탈부착이 가능한 특징을 가지고 있다. 자세하게는, 제2 공간의 개구부(51)를 통하여 회로부(30)가 삽입 가능하도록 될 것이다.

[0038] 기본적으로 회로부(30)에는, 베이스부(20)의 홈(21)에 대응하는 위치에 복수개의 스위치(31)가 형성되어 있어, 스위치(30)가 연결되면 스위치에 대응하는 음성 정보를 출력하게 된다.

[0039] 더욱 자세하게는, 각 홈(21)에는 상기 언급한 특정 형상의 퍼즐 조각(10)들 각각이 삽입될 수 있다. 각 홈(21)에 대응되는 회로부(30)의 위치에 설치된 스위치(30)에는 고유 식별 번호가 할당되어 있으며, 스위치(30)에 대응하는 식별 번호에 대응하는 데이터는 홈(21)에 삽입되는 퍼즐 조각(10)에 관한 음성 정보인 것이다.

[0040] 예를 들어, 별 모양의 퍼즐조각이 별 모양의 홈에 삽입되면, 별 모양의 홈에 대응하는 위치에 설치된 스위치가 연결되면 별과 관련된 음성정보, 예를 들어 별을 영어로 해석한 “star”의 음성정보가 출력될 수 있는 것이다.

[0041] 음성정보는 소정시간 동안 출력될 수 있다. 상기 언급한 예를 이용하면, 별을 퍼즐에 삽입하게 되면, “star”의 음성정보가 3회 출력될 수 있다. 출력되는 음성정보는 학습 종류에 따라서 다양한 억양, 음성, 크기로 조절되어 출력될 수 있을 것이며, 이는 회로부(30) 또는 메인 프레임(50)에 형성된 조절 버튼들(미도시)을 통해 조절될 수 있을 것이다. 음성정보가 출력되는 소정시간 역시 조절될 수 있을 것이다.

[0042] 회로부(30)는 외부의 전원(미도시)으로부터 전력을 공급받아서 회로를 구동하거나, 내부의 배터리 수용부(미도시)에 수용된 배터리(미도시)로부터 전력을 공급받아 회로를 구동할 수 있을 것이다. 외부의 전원으로부터 전력을 공급받는 경우, 전력을 공급받을 수 있는 어댑터 등이 함께 판매될 수 있을 것이다.

[0043] 회로부(30)는 메인 프레임(50) 탈부착이 가능한 구조로 제작될 수 있다. 도 1의 예에서는, 메인 프레임(50)에 베이스부(20)의 수용 영역을 제외한 나머지 영역에 회로부(30)가 삽입될 수 있도록 개구부(51)가 형성되어 있고, 회로부(30)에는 삽입 및 분리가 가능하도록 손잡이(미도시) 등이 형성되어 있을 수 있을 것이다.

[0044] 또한 회로부(30)와 메인 프레임(50) 각각에는 서로 대응하는 위치에 회로부(30)와 메인 프레임(50)을 기계적 또

는 전기적으로 연결할 수 있는 커넥터 쌍이 형성되어 있을 수 있다. 메인 프레임(50)에 이하 설명할 포트(35) 등이 형성되어 있어 전기적인 연결이 필요할 수도 있을 것이다.

[0045] 또 다른 실시 예에서는, 회로부(30)는 메인 프레임(50)의 외벽 및 이하 설명할 연결 패드(40)에 의해 메인 프레임(50)의 하부에 형성된 캐비티에 삽입되는 구조를 가질 수 있을 것이다. 이 때, 회로부(30) 또는 메인 프레임(50)에는 회로부(30)와 메인 프레임(50)을 고정할 수 있는 수단(미도시)이 형성되어 있을 수 있다.

[0046] 이 때 역시, 또한 회로부(30)와 메인 프레임(50) 각각에는 서로 대응하는 위치에 회로부(30)와 메인 프레임(50)을 기계적 또는 전기적으로 연결할 수 있는 커넥터 쌍이 형성되어 있을 수 있다.

[0047] 회로부(30)는, 그 기능에 따라서 스위치(31), 프로세서(32) 및 음성 출력부(33, 34)를 포함할 수 있을 것이다.

[0048] 스위치(31)는 상기 언급한 바와 같은 기능을 할 것이며, 스위치(31)가 퍼즐 조각(10)의 삽입에 의해 전기적으로 연결되면, 스위치(31)로부터 프로세서(32)로 스위치(31)의 식별 번호가 포함된 데이터가 전송된다.

[0049] 프로세서(32)는 스위치(31)로부터 스위치(31)의 식별 번호가 포함된 데이터가 전송되면, 각 스위치(31)의 식별 번호에 대응되는 음성 정보를 선택하는 기능을 수행한다. 스위치(31)의 식별 번호에 대응되는 음성 정보는 상기 언급한 바와 같이 스위치(31)의 설치 위치에 대응하는 홈(21)에 끼워지는 퍼즐 조각(10)과 관련된 음성 정보를 뜻한다.

[0050] 프로세서(32)가 선택한 음성정보는, 음성 출력부(33, 34)에 전달된다. 음성 출력부(33, 34)는 음성정보를 실제 음성으로 변환하는 칩(33)과 스피커(34)를 포함한다.

[0051] 퍼즐 조각(10)에 관련된 음성정보에는 대표적으로, 퍼즐조각(10)의 형상에 대응하는 캐릭터의 이름에 관한 음성 정보일 수 있다. 예를 들어, 별 모양의 퍼즐조각(10)에 관해서는 “star”의 발음이 음성정보에 포함될 수 있는 것이다. 그러나 이 외에도, 학습 효과를 얻을 수 있고 캐릭터와 연관되는 다양한 음성 정보가 포함될 수 있을 것이다.

[0052] 회로부(30)에는, 회로부(30)와 외부의 영상기기 및 음성기기(미도시)를 포함하는 외부의 전자기기를 전기적으로 연결하여 퍼즐 조각에 관한 음성 및 영상 정보 중 하나 이상을 외부의 전자기기로 출력할 수 있는 복수의 포트들(35)이 형성되어 있을 수 있다. 복수의 포트들(35)은 본 발명의 다른 실시 예에서는 메인 프레임(50)에 형성되어 있을 수 있으며, 이 때 회로부(30)와 메인 프레임(50)은 전기적으로 연결되어 있을 수 있다. 복수의 포트들(35)에는 외부의 전력을 공급하는 어댑터가 연결될 수도 있을 것이다.

[0053] 회로부(30) 및 메인 프레임(50)의 외벽은 본 발명의 실시 예에서, 베이스부(20) 및 퍼즐조각(10)과 마찬가지로 목질계의 재질을 가질 수 있다.

[0054] 연결 패드(40)는, 메인 프레임(50)에 고정되어 있고, 회로부(30)와 베이스부(20)를 전기적으로 절연시키기 위해 절연층을 가지고 회로부(30)와 베이스부(20)의 사이에 위치되도록 형성될 수 있다.

[0055] 연결 패드(40)의 중요한 기능은, 퍼즐조각(10)의 삽입 시 스위치(31)를 전기적으로 연결하도록 하는 것이다. 이를 위하여, 연결 패드(40)에는, 퍼즐조각(10)이 삽입되는 홈(21) 및 홈(21)에 대응하는 스위치(31)의 설치위치에 대응하는 위치에, 스위치 연결 수단(미도시)이 형성되어 있을 수 있다. 스위치 연결 수단에 의하여 스위치의 연결 및 차단이 제어되는 것이다. 이에 따라서, 퍼즐조각(10)이 완전히 홈(21)에 삽입되어 스위치 연결수단을 누를 때에만, 퍼즐 조각(10)에 관한 음성 출력이 될 수 있도록 기능할 것이다.

[0056] 스위치 연결수단은 본 발명의 다양한 실시 예에 따라서, 연결 패드(40) 중 회로부 측 일면에 형성된 접점 열선일 수 있다. 이 경우, 스위치(30)는 열선 스위치일 수 있다. 퍼즐 조각(10)이 홈(21)을 통해 삽입되어 연결 패드(40)에 접촉되면, 접점 열선에 대한 자극에 의해 열선 스위치가 전기적으로 연결되어 음성정보를 출력할 수 있게 되는 것이다.

[0057] 또 다른 실시 예에서, 연결 패드(40)는 플렉서블한 패드일 수 있다. 즉, 퍼즐조각(10)이 홈(21)을 통해 삽입되어 연결 패드(40)에 압력을 가하게 되면, 연결 패드(40)는 압력 방향으로 구부러질 수 있는 것이다. 이 때, 스위치 연결 수단은 연결 패드(40) 중 회로부 측 일면에 코팅 등으로 형성된 도전성 물질(예를 들어 은)일 수 있다. 이 때 스위치 연결수단의 정확한 작동을 위하여, 연결 패드(40)와 스위치(31)는 평소에는 전기적으로 분리될 수 있도록 이격되는 구조를 가질 수 있을 것이다.

[0058] 이 경우, 퍼즐조각(10)이 삽입되면, 삽입 압력에 의하여 스위치 연결 수단인 도전성 물질이 포함된 연결 패드(40)가 하부로 구부러지면서, 전기적으로 차단되어 있던 스위치(31)와 도전성 물질이 닿게 된다. 이 과정을 통

해 스위치(31)는 전기적으로 연결되어, 퍼즐조각(10)에 관한 음성 정보를 출력하게 되는 것이다.

[0059] 도 2는 본 발명의 실시 예에서 베이스부, 메인 프레임 및 회로부의 제1 결합 구조를 도시한 것이다.

[0060] 도 2를 참조하면, 회로부(30)는 메인 프레임(50) 탈부착이 가능한 구조로 제작될 수 있다. 도 1의 예에서는, 메인 프레임(50)에 베이스부(20)의 수용 영역을 제외한 나머지 영역에 회로부(30)가 삽입될 수 있도록 개구부(51)가 형성되어 있다. 회로부(30)에는 삽입 및 분리가 가능하도록 손잡이(미도시) 등이 형성되어 있을 수 있다.

[0061] 즉, 메인 프레임(50)을 기준으로 베이스부(20)의 수용 영역은 연결 패드(40)에 의해 그 외의 영역과 분리되어 있다. 그 외의 영역은 개구부(51)를 제외한 영역이 메인 프레임(50) 및 연결 패드(40)에 의해 폐쇄된 영역을 형성할 것이며, 폐쇄된 영역이 바로 회로부(30)가 삽입되는 영역이 되는 것이다. 회로부(30)는 개구부(51)를 통해 메인 프레임(50)에 삽입될 것이다.

[0062] 도 3은 본 발명의 실시 예에서 베이스부, 메인 프레임 및 회로부의 제2 결합 구조를 도시한 것이다.

[0063] 도 3을 참조하면, 회로부(30)는 메인 프레임(50)의 외벽 및 이하 설명할 연결 패드(40)에 의해 메인 프레임(50)의 하부에 형성된 캐비티에 삽입되는 구조를 가질 수 있을 것이다. 이 때, 회로부(30) 또는 메인 프레임(50)에는 회로부(30)와 메인 프레임(50)을 고정할 수 있는 수단(미도시)이 형성되어 있을 수 있다.

[0064] 즉, 메인 프레임(50)은 측면의 외벽만을 가지는 구조를 떨 수 있으며, 상부 및 하부가 개방되어 있고, 중간에 연결 패드(40)를 형성하여 연결 패드(40)를 통해 베이스부(20) 수용 영역(54)과 회로부(30) 수용 영역(53)으로 구분될 수 있는 것이다.

[0065] 이 때 회로부(30)에 형성된 복수의 포트들(35)의 위치에 대응하는 메인 프레임(50)의 측면에는 포트들(35)을 노출시키기 위한 개구부(52)가 형성되어 있을 수 있다. 개구부(52)는 포트들(35)과 전기적으로 연결되어 포트들(35)의 기능을 대신하는 다른 포트 연결 수단이 될 수도 있을 것이다.

[0066] 도 4는 본 발명의 실시 예에서 퍼즐 조각과 베이스부의 높이를 비교한 것이다.

[0067] 상기 언급한 바와 같이, 본 발명에서 베이스부(20)의 높이는 퍼즐 조각(10)의 높이인 제1 높이(h1)보다 낮은 제2 높이(h2)를 갖고 있을 것이다. 퍼즐 조각(10)이 홈(21)에 삽입될 때, 퍼즐 조각(10)을 홈(21)으로부터 다시 꺼내는 데 학습자가 느낄 수 있는 불편함을 최소화하고, 퍼즐 조각(10)을 두드러지게 보일 수 있도록 하기 위함이다

[0068] 특히, 본 발명의 주요 학습자인 유소년 층 학습자에게, 퍼즐의 삽입 및 분리에 있어서 편리함을 주는 것은 학습자의 흥미도에도 큰 영향을 미치기 때문에, 퍼즐 조각(10)과 홈(21)의 삽입 및 분리가 용이해야 할 것이다.

[0069] 퍼즐 조각(10)의 높이인 제1 높이(h1)와 베이스부(20)의 높이인 제2 높이(h2)의 차이(h1 - h2)는 학습자가 퍼즐 조각(10)을 홈(21)으로부터 꺼낼 수 있는 정도의 높이라면 어느 높이나 가능할 것이다.

[0070] 도 5는 본 발명의 실시 예에서 연결 패드(40)의 사시도이다.

[0071] 연결 패드(40)는 메인 프레임(50)에 고정되어 있을 수 있으나, 교체 등을 위하여 탈부착이 가능한 구조를 가질 수 있다. 연결 패드(40)의 부분 중, 퍼즐 조각(10)이 삽입되는 베이스부(20)의 홈(21)에 대응하는 위치에는, 스위치 연결수단(41)들이 형성되어 있을 수 있다.

[0072] 도 6은 본 발명의 실시 예에 따른 학습용 목질계 퍼즐의 측단면도이다. 이하의 설명에서, 도 1 내지 5에 대한 설명과 중복되는 부분은 그 설명을 생략하기로 한다.

[0073] 도 6을 참조하면, 메인 프레임(50)의 중간에는 연결 패드(40)가 형성되어 있다. 연결 패드(40)에는 스위치 연결 수단(41)이 형성되어 있다. 식별력을 좋게 하기 위하여 도 6에는 버튼과 같은 형상 및 연결 구조의 스위치 연결 수단(41)을 도시하고 있다. 그러나, 본 발명의 실시 예에서 스위치 연결수단(41)은 연결 패드(40)의 하측면, 즉 회로부(30) 측면에 형성된 접점 열선일 수 있다.

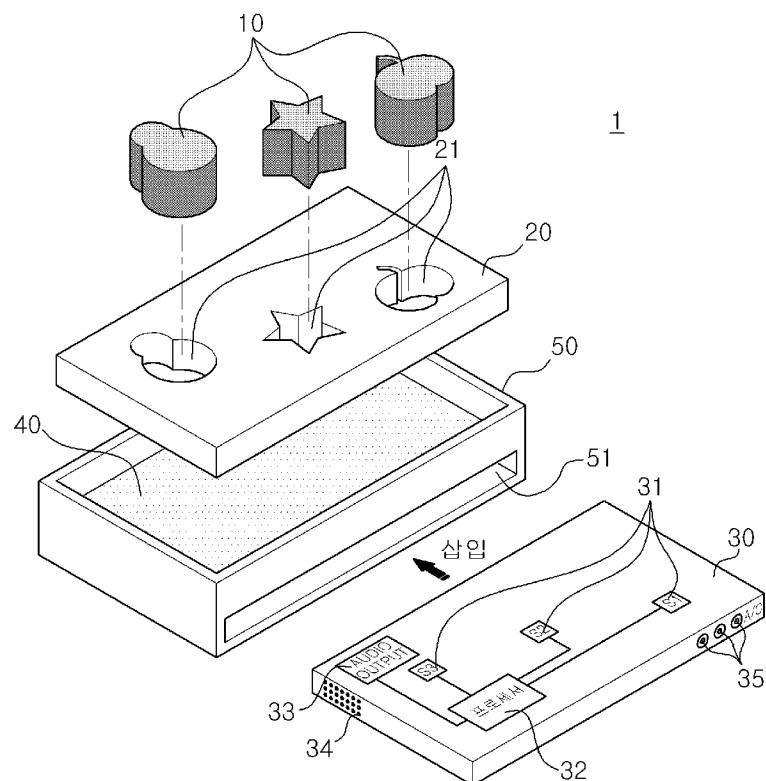
[0074] 또는 접점 열선은 퍼즐조각(10) 자체에 형성되어 있을 수 있다. 이 경우 스위치 연결수단은 퍼즐조각(10)이 될 수 있으며, 연결 패드(40)는 얇은 막이라면 어느 재질을 포함할 수도 있을 것이다.

[0075] 다시 도 6을 참조하면, 베이스부(20)에는 특정 캐릭터 형상의 홈(21)이 형성되어 있다. 홈(21)에 형성된 캐릭터 형상과 일치하는 형상의 퍼즐조각(10)이 삽입되면, 회로부(30)에 형성된 스위치(31)는 스위치 연결수단(41)에 의해 전기적으로 연결된 상태가 될 수 있다. 이를 통해, 퍼즐조각(10)에 관한 음성정보가 재생될 수 있다.

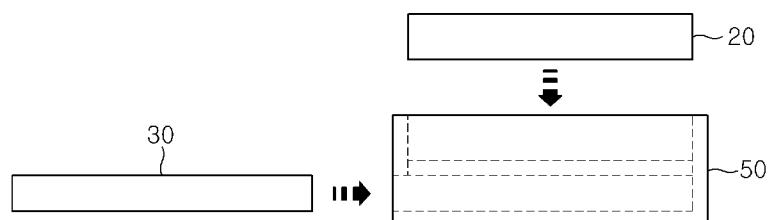
- [0076] 도 7은 본 발명의 또 다른 실시 예에 따른 학습용 목질계 퍼즐의 측단면도이다.
- [0077] 도 7의 실시 예에서는, 연결 패드(40)는 상기 언급한 바와 같이 플렉서블한 재질의 탄성부재가 될 수 있으며, 연결 패드(40)의 하측면, 즉 회로부(30) 측 면에는 스위치 연결수단으로서 도전성 물질(42)이 코팅되어 있을 수 있다. 이를 통해, 퍼즐 조각(10)이 홈(21)을 따라 삽입되고, 연결 패드(40)에 압력을 가하게 되면, 도전성 물질(42)이 스위치(31)와 닿게 되면서 스위치(31)가 연결되는 것이다. 즉, 스위치(31)는 예를 들어 차단된 상태의 도선일 수 있으며, 도전성 물질(42)에 의해 연결될 수 있다.
- [0078] 도 8은 본 발명의 실시 예에 따른 학습용 목질계 퍼즐과 외부 기기의 연결 예를 도시한 것이다. 이하의 설명에서, 도 1 내지 7에 대한 설명과 중복되는 부분에 대해서는 그 설명을 생략하기로 한다.
- [0079] 학습용 목질계 퍼즐(1)과 연결될 수 있는 외부의 전자기기들에는, 영상기기(62), 음성기기(61) 및 전력 공급기기(60)가 포함될 수 있다. 도 8에는 외부의 전자기기들과의 전기적인 연결부분(예를 들어 포트들(35))이 회로부(30)에 형성되어 있으나, 본 발명의 또 다른 실시 예에서는 메인 프레임(50)에 형성되어 있을 수 있다. 이 때, 회로부(30)와 메인 프레임(50)의 연결 부분 중 일부분에는 회로부(30)와 메인 프레임(50)의 포트들(35)을 전기적으로 연결하는 커넥터(미도시)가 형성되어 있을 수 있다.
- [0080] 영상기기(62)는 퍼즐 조각(10)이 베이스부(20)에 삽입되면, 퍼즐 조각(10)과 관련된 영상을 출력할 수 있다. 출력되는 영상에는, 퍼즐조각(10)의 이름에 대한 알파벳 등의 문자정보 및 퍼즐조각(10)과 동일하거나 유사한 형상의 이미지 정보 등이 포함될 수 있다.
- [0081] 음성기기(61)는, 상기 도 1에 대한 설명에서 언급한 스피커(34)의 기능을 외부에서 수행하는 장치이다. 즉, 스피커(34)는 음성기기(61)가 연결되면 작동하지 않고 음성기기(61)로부터만 음성 정보가 출력될 수 있다. 음성기기(61)는 교실 등 넓은 공간에서 학습용 목질계 퍼즐(1)을 사용할 때 음성 출력을 증폭하여 더 큰소리로 음성 정보를 출력할 수 있도록 기능할 수 있을 것이다.
- [0082] 전력 공급기기(60)는, 예를 들어 어댑터로서, 회로부(30) 또는 메인 프레임(50)에 외부로부터의 전력을 공급하는 기능을 수행할 것이다.
- [0083] 도 9는 퍼즐조각, 베이스부 및 회로부의 패키지 종류의 예를 도시한 것이다.
- [0084] 메인 프레임(50) 및 연결 패드(40)의 재사용 및 다양한 학습 컨텐츠의 제공을 위하여, 본 발명의 실시 예에서 베이스부(20) 및 회로부(30)는 메인 프레임(50)에 탈부착이 가능한 구조로 되어 있음은 상기 설명한 바와 같다.
- [0085] 따라서, 다양한 학습 컨텐츠를 하나의 메인 프레임(50) 및 연결 패드(40)를 이용하여 이용할 수 있도록 본 발명에서는 퍼즐조각(10)을 포함하는 베이스부(20)와 회로부(30)는 패키지고 구성되어 제조될 수 있을 것이다.
- [0086] 예를 들어, 학습자가 연결 패드(40)가 설치된 하나의 메인 프레임(50)만을 구매하고, 추후에는, 도 9에 도시된 바와 같은 다양한 퍼즐 패키지(1, 2, 3, 4)를 구매할 수 있다.
- [0087] 물체 맞추기 패키지(1)에는, 특정 물체의 형상을 가진 퍼즐조각(10)과 이에 대응하는 베이스부(20), 그리고 이에 관한 음성정보 및 스위치를 포함하는 회로부(30)가 판매될 수 있다.
- [0088] 또한 영어 알파벳 패키지(3)에는, 영어 알파벳의 형상을 가진 퍼즐조각(10-1)과 이에 대응하는 베이스부(20-1), 그리고 영어 알파벳의 음성정보 및 각 퍼즐조각(10-1)의 위치에 대응하는 스위치를 갖는 회로부(30-1)가 포함되어 있을 수 있다.
- [0089] 이를 통해 학습자는 하나의 메인 프레임(50)만을 가지고, 동일한 이용방법을 통해 다양한 학습용 목질계 퍼즐을 이용하여, 학습 효율을 극대화할 수 있으며, 학습자로 하여금 다양한 학습 컨텐츠를 이용할 수 있도록 하고, 학습자의 흥미에 따라 다른 학습 컨텐츠를 이용할 수 있도록 하여, 본 발명에 의해 제조된 제품에 대한 판매량을 극대화할 수도 있을 것이다.
- [0090] 상기 언급한 본 발명의 실시 예에 따른 학습용 목질계 퍼즐(1)에 대한 설명은 특허청구범위를 제한하는 것이 아니다. 또한, 본 발명의 실시 예 이외에도, 본 발명과 동일한 기능을 수행하는 균등한 발명 역시 본 발명의 권리 범위에 속할 것임은 당연할 것이다.

도면 1

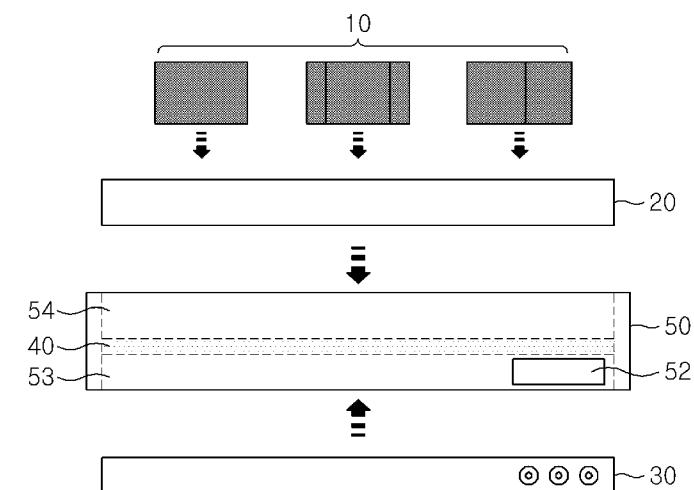
도면 1



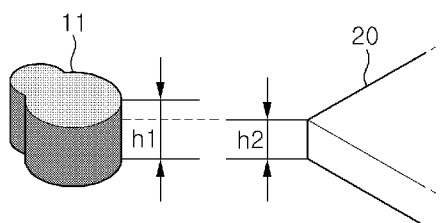
도면 2



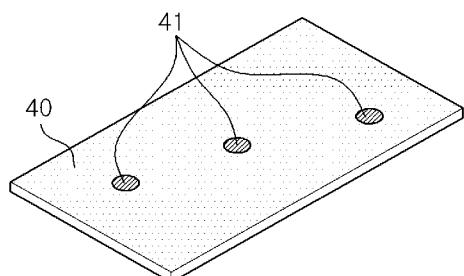
도면 3



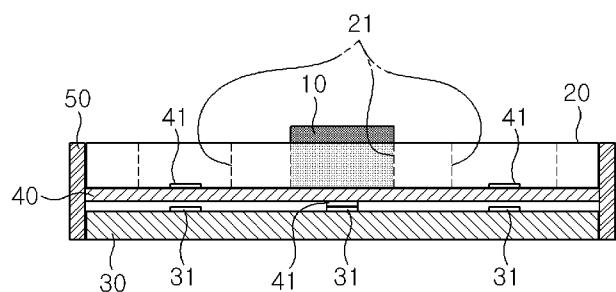
도면 4



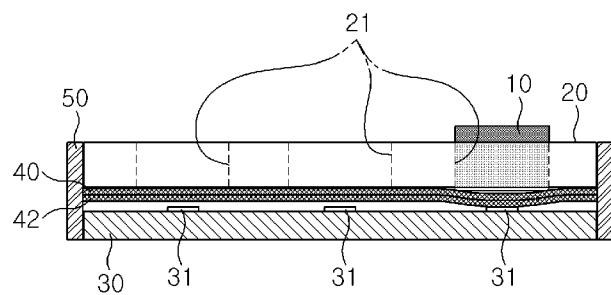
도면 5



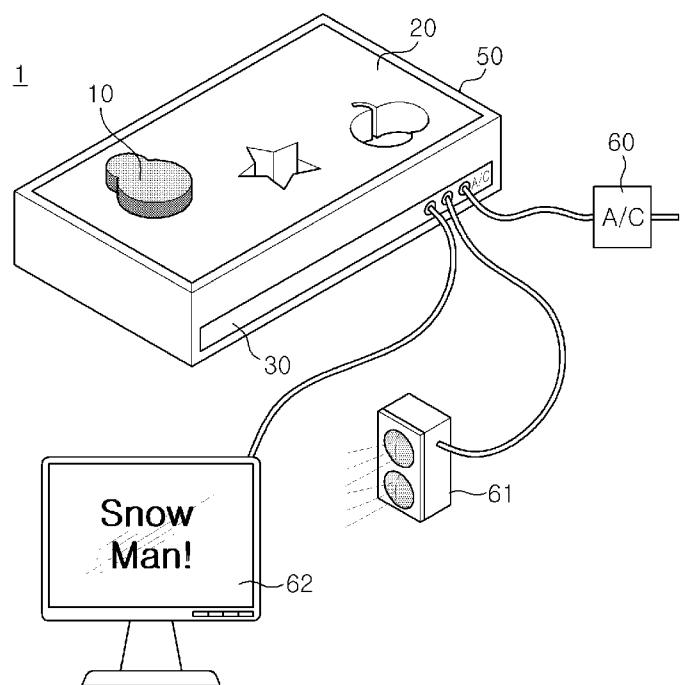
도면 6



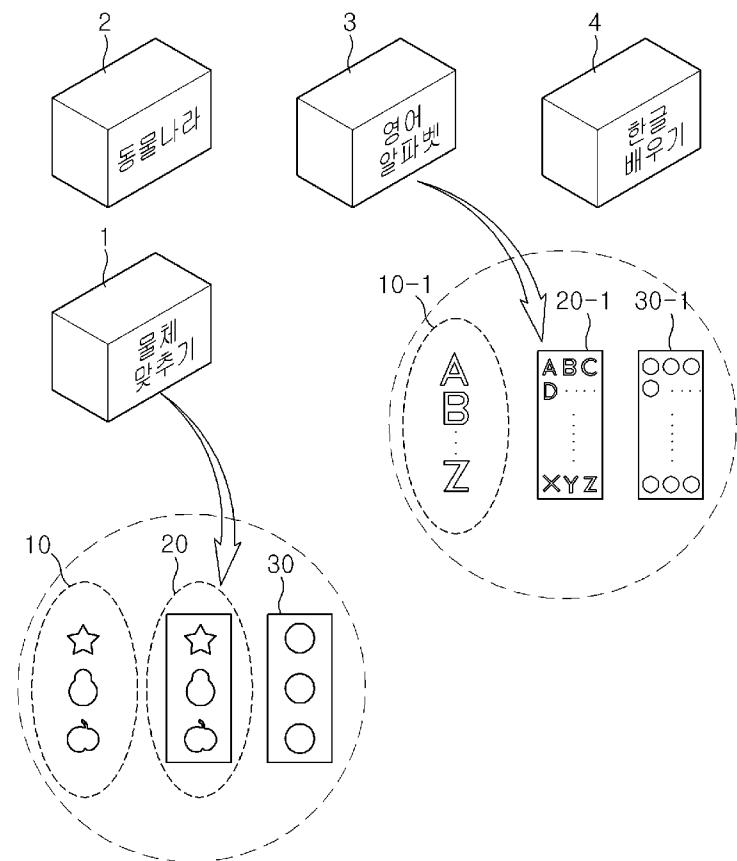
도면7



도면8



도면 9





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(11) 공개번호 10-2010-0002380  
(43) 공개일자 2010년01월07일

(51) Int. Cl.

*G09B 11/06* (2006.01) *G09B 19/00* (2006.01)

(21) 출원번호 10-2008-0062246

(22) 출원일자 2008년06월30일

심사청구일자 2008년06월30일

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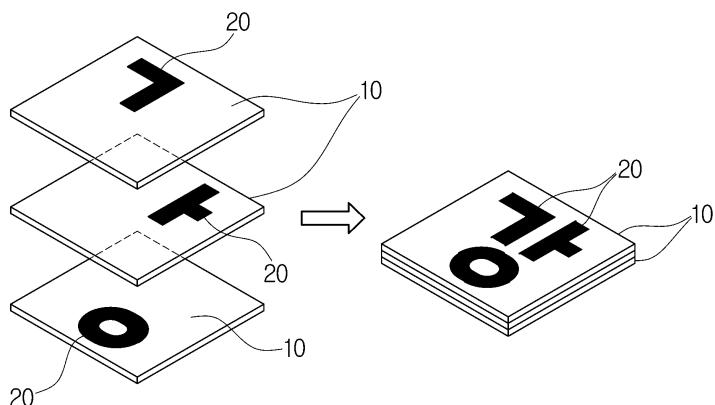
본 발명은 유아 학습용 투명교재에 관한 것으로, 더욱 상세하게는 더욱 상세하게는 주로 유아들이 한글이나 영어와 같은 문자교육과 아울러 색상 조합에 따른 변화를 시각적으로 쉽게 인지할 수 있도록 하여 지능발달과 교육효과를 높일 수 있도록 발명된 것이다.

본 발명의 구성은, 일정두께의 판형상으로 된 투명판(10)에 각종 교습자료(20)가 표시되는 것에 있어서,

상기 교습자료(20)는 모든 투명판(10)에 서로 다른 위치에 각각 표시되어 서로 중첩되게 조합하는 것에 의해 교육 자료가 완성되는 것이다.

여기서 상기 교습자료(20)는 한글의 자음과 모음 및 영문을 포함하게 된다.

또, 교습자료(20)는 숫자나 색상이 나타난 도형을 포함하게 된다.

**대 표 도 - 도1**

## 특허청구의 범위

### 청구항 1

일정두께의 관형상으로 된 투명판(10)에 각종 교습자료(20)가 표시되는 것에 있어서, 상기 교습자료(20)는 모든 투명판(10)에 서로 다른 위치에 각각 표시되어 서로 중첩되게 조합하는 것에 의해 교육 자료가 완성되는 것을 특징으로 하는 유아 학습용 투명교재.

### 청구항 2

청구항 1에 있어서, 상기 교습자료(20)는 한글의 자음과 모음 및 영문을 포함하는 것을 특징으로 하는 유아 학습용 투명교재.

### 청구항 3

청구항 1에 있어서, 상기 교습자료(20)는 숫자나 색상이 나타난 도형을 포함하는 것을 특징으로 하는 유아 학습용 투명교재.

## 명세서

### 발명의 상세한 설명

#### 기술 분야

<1> 본 발명은 유아 학습용 투명교재에 관한 것으로, 더욱 상세하게는 주로 유아들이 한글이나 영어와 같은 문자교육과 아울러 색상 조합에 따른 변화를 시각적으로 쉽게 인지할 수 있도록 하여 지능발달과 교육효과를 높일 수 있도록 발명된 것이다.

#### 배경 기술

<2> 일반적으로, 유아기 및 아동기는 왕성한 호기심을 가지는 시기로, 최근에는 어린이들에게 논리적인 사고력과 판단력을 길러주기 위한 학습교재들이 많이 출시되고 있다.

<3> 아동 교육용 교재로 그림을 활용하는 문자학습교재, 수학영재학습교재 등 많은 교재들이 시중에 유통되고 있고, 각 가정에서는 유통되는 학습교재중 아이에게 적합한 교재를 선택하여 아이들을 교육시키고 있다.

<4> 그 중에서도 아이들에게 그림을 통한 사물의 이름이나 수량들을 가르키는 학습교재를 많이 이용하고 있는 실정이다.

<5> 종래의 학습교재들은 그림과 함께 해당되는 명칭이나 숫자 등을 함께 인쇄하는 방법으로 해당 물품이나 숫자를 인식하는 방법으로 학습을 통하여 사고력과 판단력을 키우는 경우가 많았다.

<6> 또한, 숫자나 한글 및 영어로 된 문자를 일일이 합성수지재로 된 블록 형태로 제작한 것을 구입하고, 이를 블록형태의 교재를 조합하는 방법으로 학습이 이루어지기도 한다.

#### 발명의 내용

##### 해결 하고자하는 과제

<7> 그러나, 해당 문자로 된 블록체를 조합하는 교육재료는 여러번 반복적으로 비교 학습을 하면 아이들이 쉽게 흥미를 잃고, 그로 인하여 학습에 빨리 싫증을 느껴 학습 효과가 저하됨으로써 효율적인 교육이 이루어지지 못하는 문제점이 있었다.

<8> 또한, 가장 큰 문제점은 숫자와 다양한 문자로 된 블록을 일일이 제작해야 하므로써 제작비가 크게 향상될 뿐만 아니라, 이를 구입해야 하는 학부모도 경제적으로 부담을 느끼게 하는 등의 문제점이 있었던 것이다.

<9> 그리고, 블록체 조합에 의한 학습 방법으로는 예로서 색 조합에 따른 색상의 변화와 같은 미술 교육은 이루어질 수 없었다.

<10> 본 발명은 상기와 같은 문제점을 해소하기 위해 안출된 것으로 숫자와 한글 및 영어 교육이 보다 효과적으로

학습될 수 있도록 한 유아 학습용 투명교재는 제공하는데 있다.

- <11> 본 발명의 다른 목적은 보다 저렴한 가격으로 생산 및 소비자 구입이 가능하게 하여 경제적인 이익을 줄 수 있는 유아 학습용 투명교재를 제공하는데 있다.
- <12> 본 발명의 또 다른 목적은 색 조합에 따른 생상 변화를 시각적으로 다양하게 인식할 수 있도록 한 유아 학습용 투명교재를 제공하는데 있다.

### 과제 해결手段

- <13> 이러한 목적을 달성하기 위해 본 발명은, 일정두께의 판형상으로 된 투명판(10)에 각종 교습자료(20)가 표시되는 것에 있어서,
- <14> 상기 교습자료(20)는 모든 투명판(10)에 서로 다른 위치에 각각 표시되어 서로 중첩되게 조합하는 것에 의해 교육 자료가 완성되는 것이다.
- <15> 여기서 상기 교습자료(20)는 한글의 자음과 모음 및 영문을 포함하게 된다.
- <16> 또, 교습자료(20)는 숫자나 색상이 나타난 도형을 포함하게 된다.

### 효과

- <17> 이러한 본 발명의 구성에 의하면, 한글조합이나 영어 문장완성 및 숫자 조합에 관한 학습 효과를 향상시킬 수 있다.
- <18> 또, 색상 결합에 의해 변화되는 미술적 색감 교육이 가능하다.
- <19> 동일 크기의 투명판(10)에 인쇄의 방법으로 각종 교습자료(20)가 표시되므로써 제작이 용이하여 제작자는 물론 그 소비자로 하여금 경제적인 이익을 줄 수 있다.
- <20> 그리고, 부피가 작아 보관 및 유통이 편리한 잇점이 있는 것이다.

### 발명의 실시를 위한 구체적인 내용

- <21> 이하, 본 발명의 바람직한 실시 예를 첨부된 도면에 의거하여 상세히 설명하면 다음과 같다.
- <22> 도 1은 본 발명에 의해 교습자료(20)가 표시된 투명판(10)을 중첩시켜 한글이 조합되는 상태를 보인 사시도이다.
- <23> 도 2는 도 1의 평면도이다.
- <24> 도 3은 본 발명에 의해 교습자료(20)로 숫자 표시된 투명판(10)을 중첩시켜 예로서 3자릿수의 수개념이 완성되는 상태를 보인 사시도이다.
- <25> 도 4는 도 3의 평면도이다.
- <26> 도 5는 영문 한글자의 교습자료(20)가 인쇄된 투명판(10)을 중첩시켜 하나의 단어가 조합되는 상태의 실시예를 보인 평면도이다.
- <27> 도 6은 각 위치마다 다른 영어 단어가 위치되도록 교습자료(20)가 인쇄된 투명판(10)을 중첩시켜 하나의 문장이 조합되는 상태의 실시예를 보인 평면도이다.
- <28> 도 7은 서로 다른 색상이 도형에 인쇄된 교습자료(20)를 중첩시켜 다른 결합색상이 나타나는 색조합을 보인 평면도이다.
- <29> 본 발명은, 일정두께의 판형상으로 된 투명판(10)에 각종 교습자료(20)를 표시하되, 이 교습자료(20)를 모든 투명판(10)에 서로 다른 위치에 각각 표시되어 서로 중첩되게 조합하는 것에 의해 한글이나 영어 단어를 포함한 문장교육, 수계념이나 색상 조합에 따른 미술교육 자료로 완성되는 것이다.
- <30> 여기서 상기 교습자료(20)는 한글의 자음과 모음 및 영문을 포함하게 된다.
- <31> 또, 교습자료(20)는 숫자나 색상이 나타난 도형을 포함하게 된다.
- <32> 상기 투명판(10)은 일정 두께와 크기의 투명 아크릴이나 두꺼운 비닐을 포함한 투명 합성수지재로 동일 학습

용도로 제작되는 경우 그 외곽 크기를 동일하게 제작하게 된다.

<33> 도 1과 도 2는 본 발명에 의한 일 실시예로서 한글의 한자를 조합하는 한글 교육용 학습자료로 완성되는 것을 보이고 있다.

<34> 즉, 예로서 정사각형으로 된 투명판(10)에 초성과 중성 및 종성의 위치에 각각 자음과 모음 및 밟침들을 인쇄하여 제작하여 하나의 셋트로 소비자에게 제공하게 된다.

<35> 따라서, 유아로 하여금 한글의 초성에 해당되는 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택하고(도면에서는 'ㄱ'), 다시 중성에 해당되는 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택(도면에서는 'ㅏ')한 후, 마지막으로 종성에 해당되는 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택(도면에서 'ㅇ')하여 동을 외곽 크기로 된 투명판(10)들을 중첩시키면 예로서 한글자 '강'이 완성되어 보이게 된다.

<36> 이러한 방법으로 다양한 한글을 조합하여 만들 수 있도록 하므로써, 흥미를 유발하면서도 한글 학습효과를 높일 수 있는 것이다.

<37> 도 3과 도 4는 수 개념 및 수 조합에 관한 실시예를 도시한 것으로, 예로서 3자리수로 가로방향으로 길게 직사각형으로 된 투명판(10)에 좌측의 백자리수에 해당되는 위치와, 가운데 10자리수에 해당되는 위치 및 가장 우측의 끝자리수의 위치에 각각 0-10까지의 숫자들을 인쇄하여 제작하여 하나의 셋트로 소비자에게 제공하게 된다.

<38> 따라서, 유아로 하여금 100자리에 해당되는 숫자의 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택하고(도면에서는 '2'), 다시 10자리수에 해당되는 숫자의 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택(도면에서는 '2')한 후, 마지막으로 끝자리수에 해당되는 숫자의 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택(도면에서 '1')하여 동을 외곽 크기로 된 투명판(10)들을 중첩시키면 예로서 '231'이 완성되어 보이게 된다.

<39> 이러한 방법으로 다양한 3자리의 숫자를 조합하여 만들 수 있도록 하므로써, 흥미를 유발하면서도 수학 학습효과를 높일 수 있는 것이다.

<40> 도 5는 영어의 단어조합에 관한 실시예를 도시한 것으로, 예로서 가로방향으로 길게 직사각형으로 된 투명판(10)에 서로 다른 위치마다 영문자 알파벳 "A-Z"에 해당되는 영어 교습자료(20)들을 인쇄하여 제작하여 하나의 셋트로 소비자에게 제공하게 된다.

<41> 따라서, 유아로 하여금 가장 앞자리에 해당되는 영어 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택하고(도면에서는 'a'), 다시 두 번째와 세번째 위치에 해당되는 영문의 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택(도면에서는 'p')한 후, 그리고, 'l'과 마지막으로 끝자리에 해당되는 영문의 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택(도면에서 'e')하여 동일 외곽 크기로 된 투명판(10)들을 중첩시키면 예로서 단어 'apple'이 완성되어 보이게 된다.

<42> 이러한 방법으로 다양한 자리에 인쇄된 알파벳을 조합하여 영어 단어를 만들 수 있도록 하므로써, 흥미를 유발하면서도 한글 학습효과를 높일 수 있는 것이다.

<43> 도 6은 영어의 문장 조합에 관한 실시예를 도시한 것으로, 예로서 가로방향으로 길게 직사각형으로 된 투명판(10)에 서로 다른 위치마다 주어와 동사 및 관사나 형용사, 목적어에 해당되는 영어 교습자료(20)들을 인쇄하여 제작하여 하나의 셋트로 소비자에게 제공하게 된다.

<44> 따라서, 유아로 하여금 가장 앞자리에 해당되는 영어단어 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택하고(도면에서는 'I'), 다시 두 번째 위치에 해당되는 영어의 동사에 해당되는 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택(도면에서는 'like')한 후, 세번째 위치에 해당되는 영어의 관사에 해당되는 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택(도면에서는 'an')한 후, 그리고 끝자리에 해당되는 영문의 목적어에 해당되는 명사 교습자료(20)가 인쇄된 투명판(10)들중 하나를 선택(도면에서 'apple')하여 동일 외곽 크기로 된 투명판(10)들을 중첩시키면 예로서 단어 'apple'이 완성되어 보이게 된다.

<45> 이러한 방법으로 다양한 자리에 인쇄된 단어들을 조합하여 영어 문장을 만들 수 있도록 하므로써, 흥미를 유발하면서도 영어 학습효과를 높일 수 있는 것이다.

<46> 도 7은 미술의 색상 혼합에 따른 변색에 관한 미술교육을 실시예를 도시한 것으로, 예로서 투명판(10)에 서로 다른 위치마다 이색(異色)이 도색된 원형도형의 교습자료(20)들을 인쇄하여 제작하여 하나의 셋트로 소비자에게 제공하게 된다.

<47> 따라서, 유아로 하여금 좌측으로 치우치게 원형 도형에 어느 한 색상이 원형의 도형 교습자료(20)에 인쇄된 투명판(10)들 중 하나를 선택하고(도면에서는 '빨강이나 노랑'), 다시 우측에 치우친 원형 도형에 어느 한 색상이 원형의 도형 교습자료(20)에 인쇄된 투명판(10)들 중 하나를 선택하여(도면에서는 '노랑이나 파랑')하여 동일 외곽 크기로 된 투명판(10)들을 중첩시키면 예로서 두 실시예증 상부에 빨강+노랑=주황색이 나타나는 것을 시각적으로 알 수 있도록 한다.

<48> 또, 도 7에서 표현된 두 실시예종 하부에 노랑+파랑=녹색이 나타나는 것을 시작적으로 알 수 있도록 한다.

<49> 이러한 방법으로 다양한 색상이 인쇄된 도형들을 조합하여 조색을 만들 수 있도록 하므로써, 흥미를 유발하면 서도 미술 학습효과를 높일 수 있는 것이다.

## 도면의 간단한 설명

<52> 도 3은 본 발명에 의해 문자로 숫자가 표시된 투명판을 중첩시켜 예로서 3자릿수의 수개념이 완성되는 상태를 보임. 사시도.

<54> 도 5는 영문 한글자의 문자가 인쇄된 투명판을 중첩시켜 하나의 단어가 조합되는 상태의 실시예를 보인 평면도이다.

<55> 도 6은 각 위치마다 다른 영어 단어가 위치되도록 문자가 인쇄된 투명판을 중첩시켜 하나의 문장이 조합되는 상태의 실시예를 보이 평면도.

<56> 도 7은 서로 다른 색상이 도형에 인쇄된 교습자료를 중첩시켜 다른 결합색상이 나타나는 색조합을 보인 평면도이다.

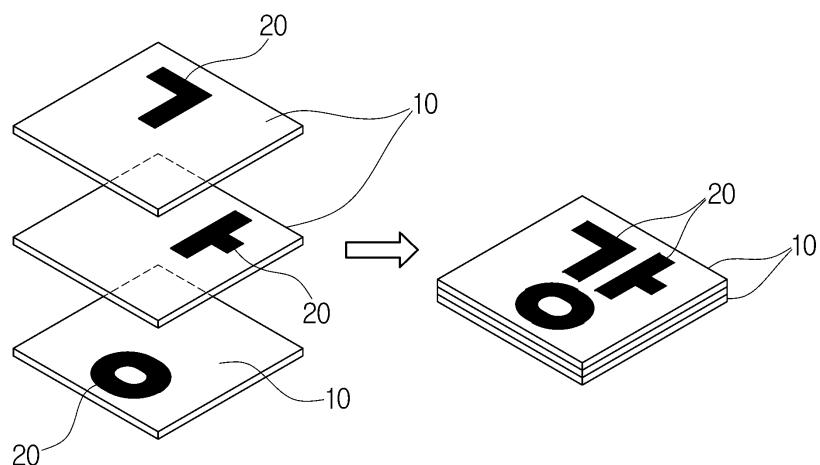
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<58> \* 도면 중 주요 부분에 대한 부호의 설명 \*

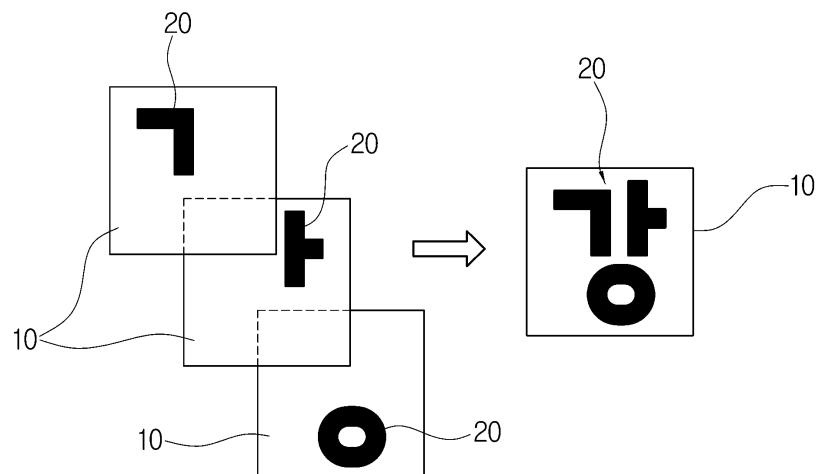
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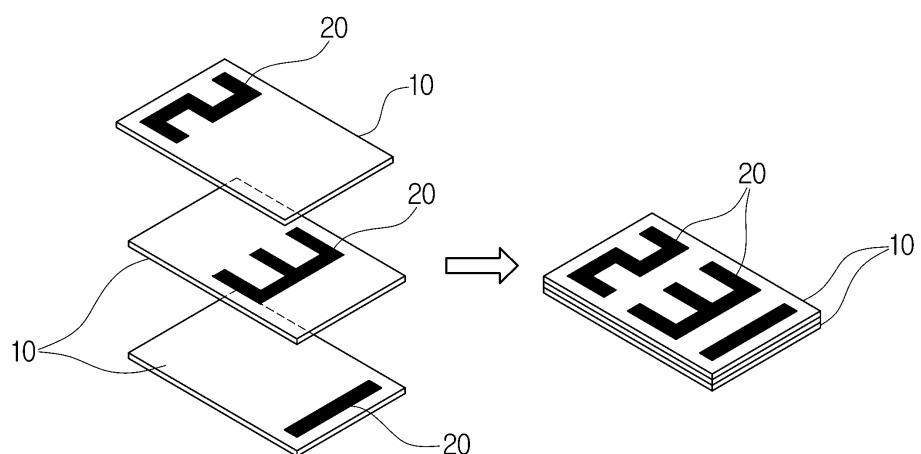
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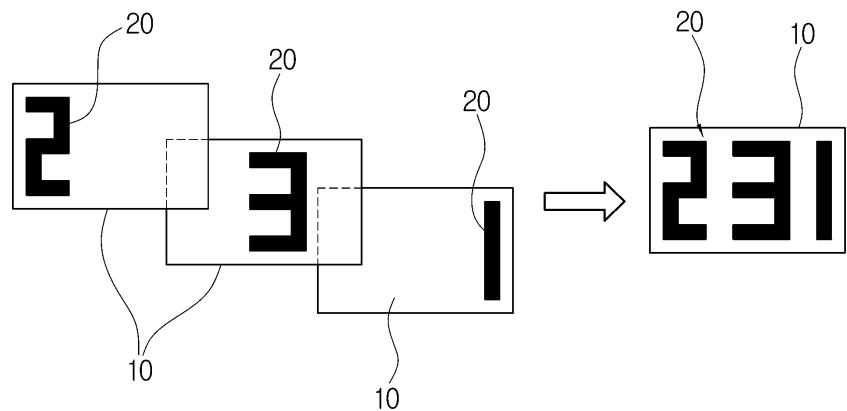
도면2

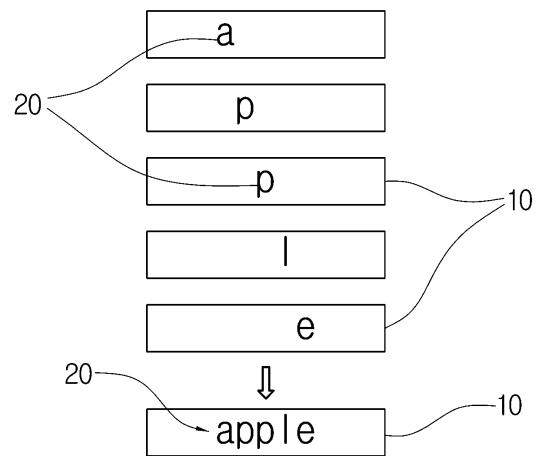
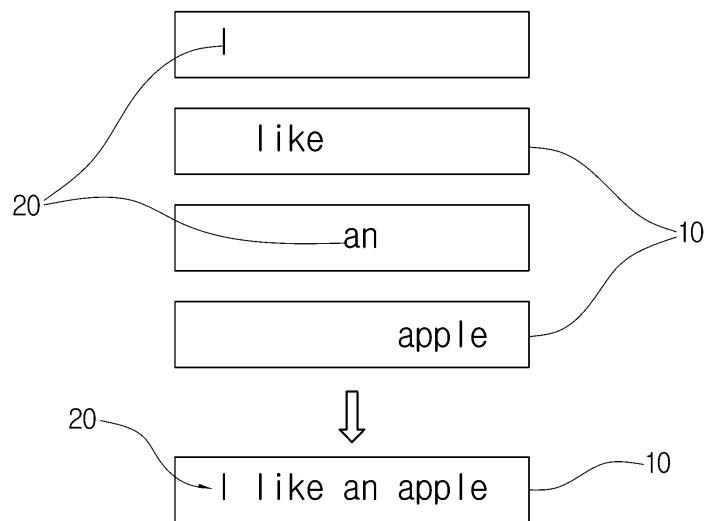


도면3

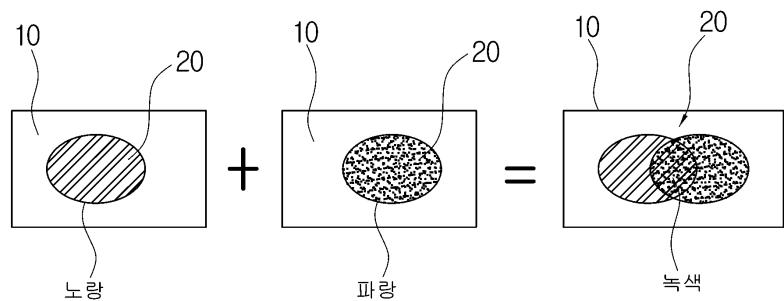
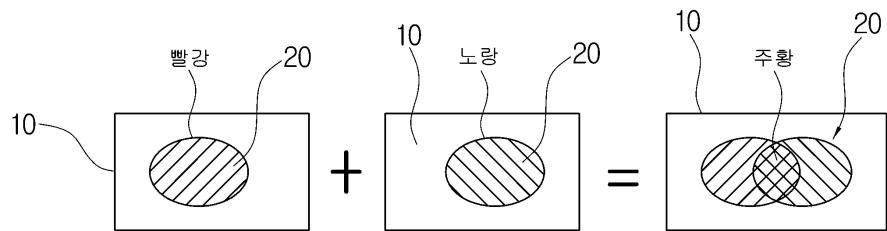


도면4



**도면5****도면6**

도면7





US 20050048450A1

(19) United States

**(12) Patent Application Publication  
Winkler**

(10) Pub. No.: US 2005/0048450 A1

(43) Pub. Date: Mar. 3, 2005

- (54) **METHOD AND SYSTEM FOR  
FACILITATING READING AND WRITING  
WITHOUT LITERACY**

- (52) U.S. Cl. .... 434/185; 434/156

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## ABSTRACT

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(21) Appl. No.: 10/651,944

(22) Filed: Sep. 2, 2003

## Publication Classification

(51) Int. Cl.<sup>7</sup> ..... G09B 19/00; G09B 19/04

The present invention relates a communication media and method of communication which allows anyone to mutely create a representation of their language without requiring of them any prerequisite literacy or rote memorization. Further, the present invention relates to a process of presenting language to someone without requiring from them the ability to hear or requiring from them any prerequisite literacy or rote memorization. Finally, the present invention relates to other methods of utilizing this communication media to transfer written words and sounds of any nature from word to sounds and vice versa without requiring from them the ability to hear or requiring from them any prerequisite literacy or rote memorization.

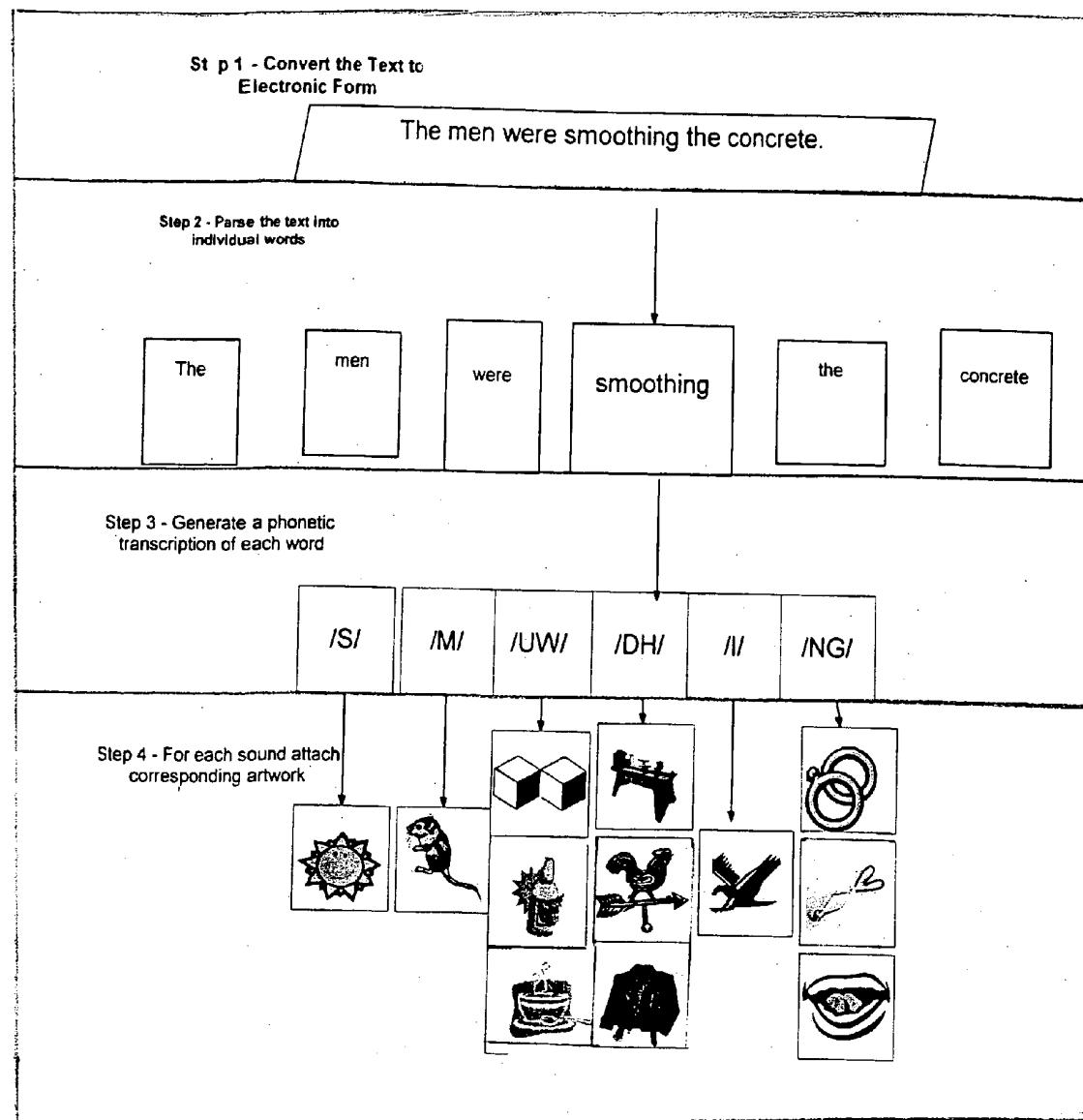


Figure 1

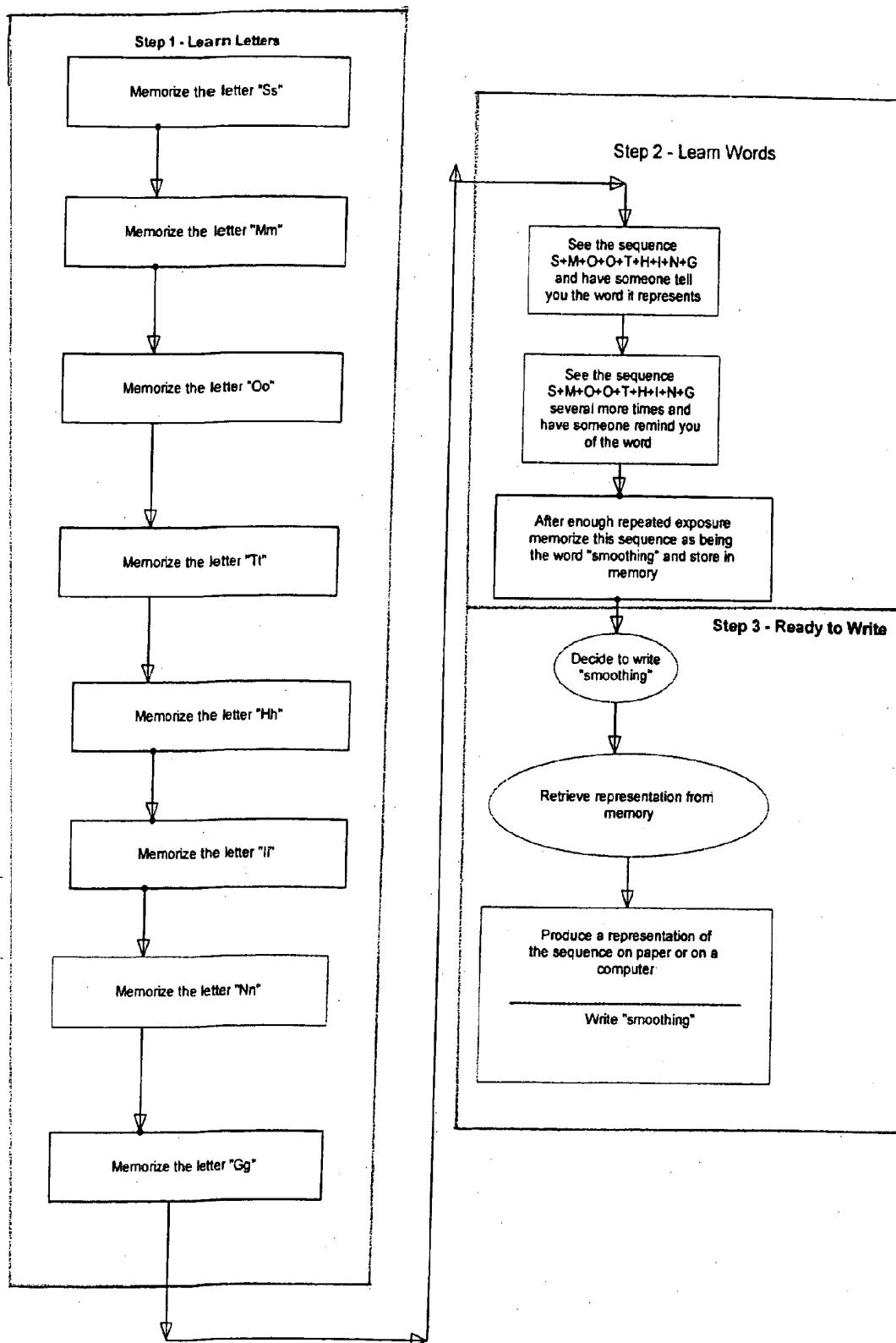


Figure 2

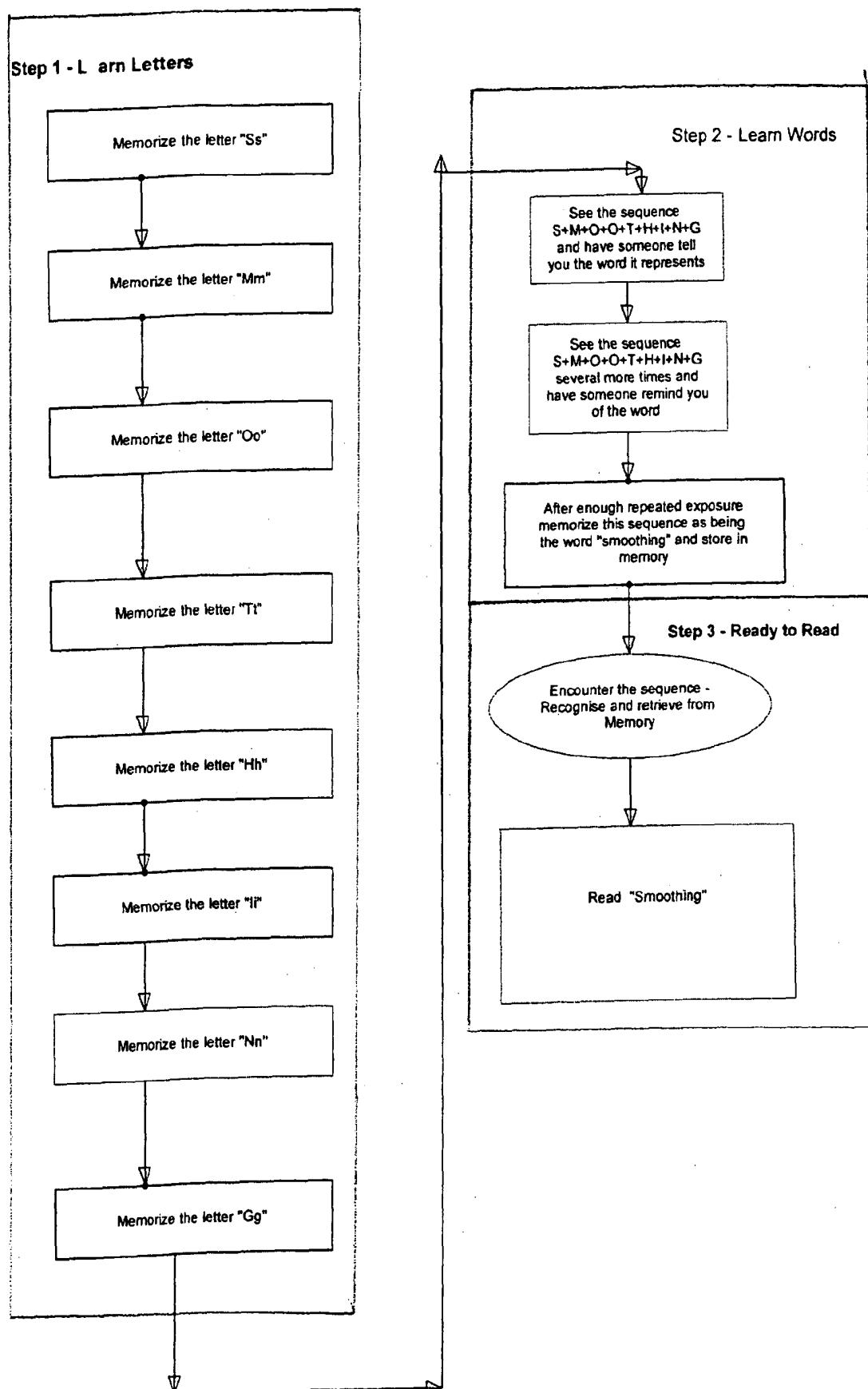


Figure 3

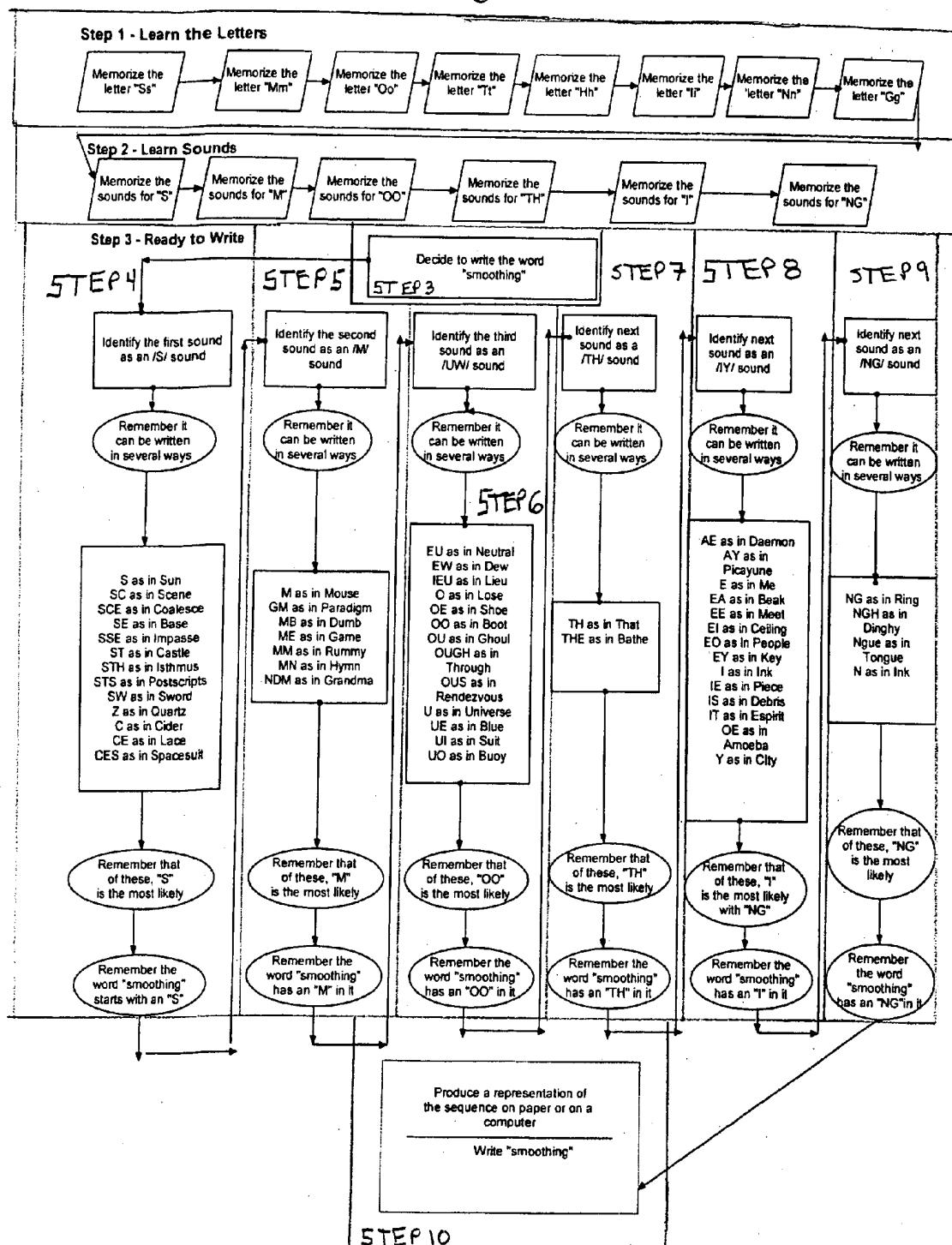


Figure 4

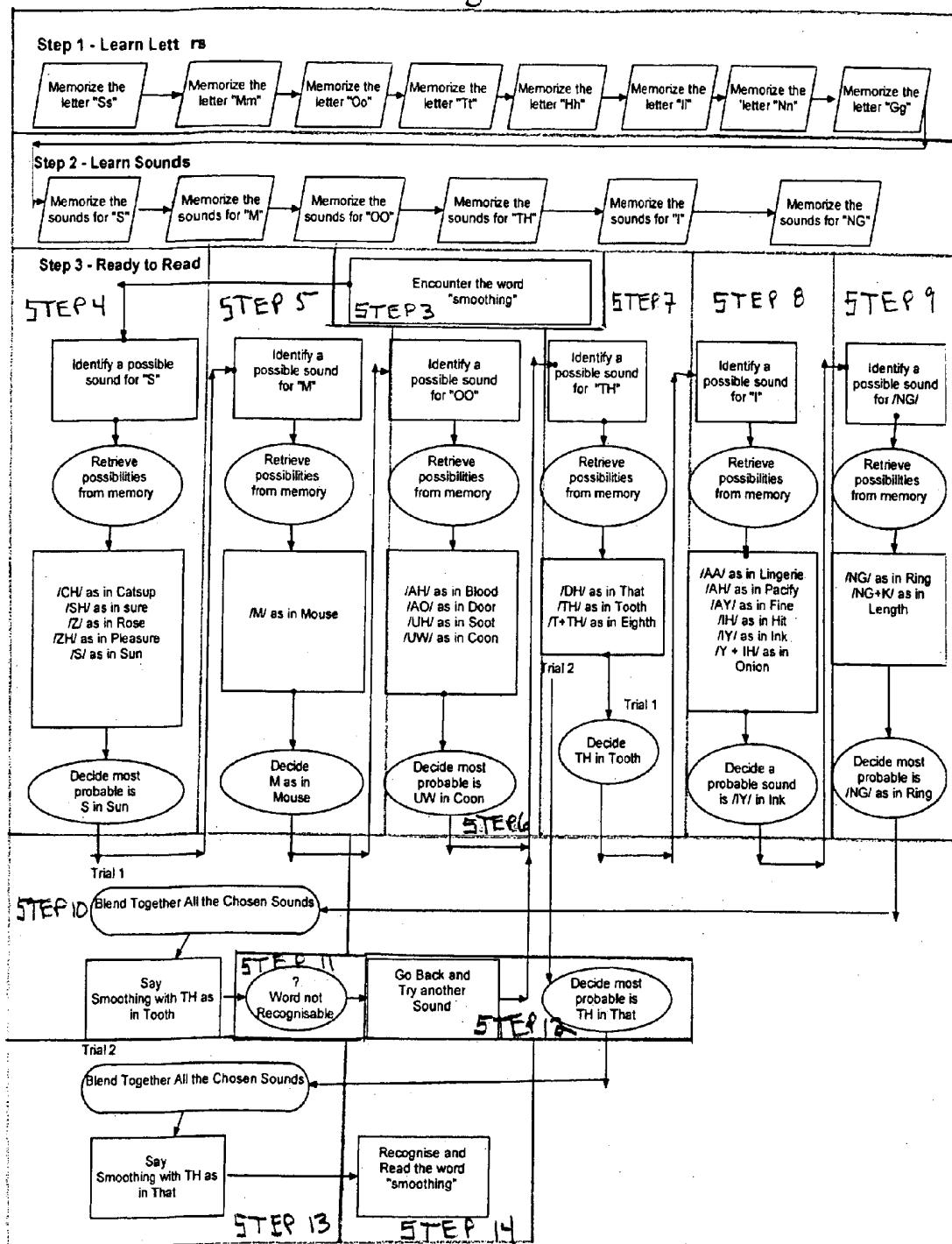


Figure 5

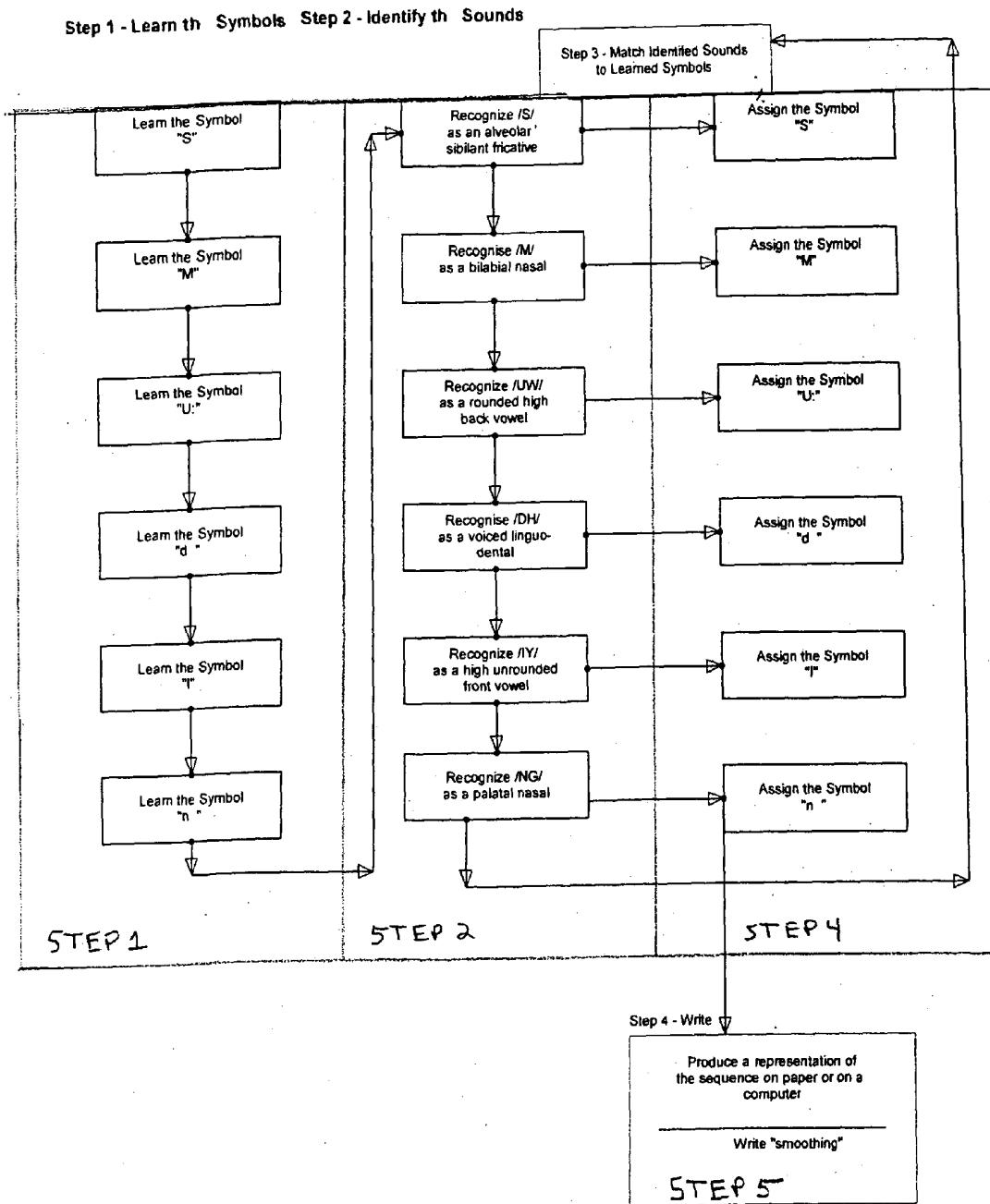


Figure 6

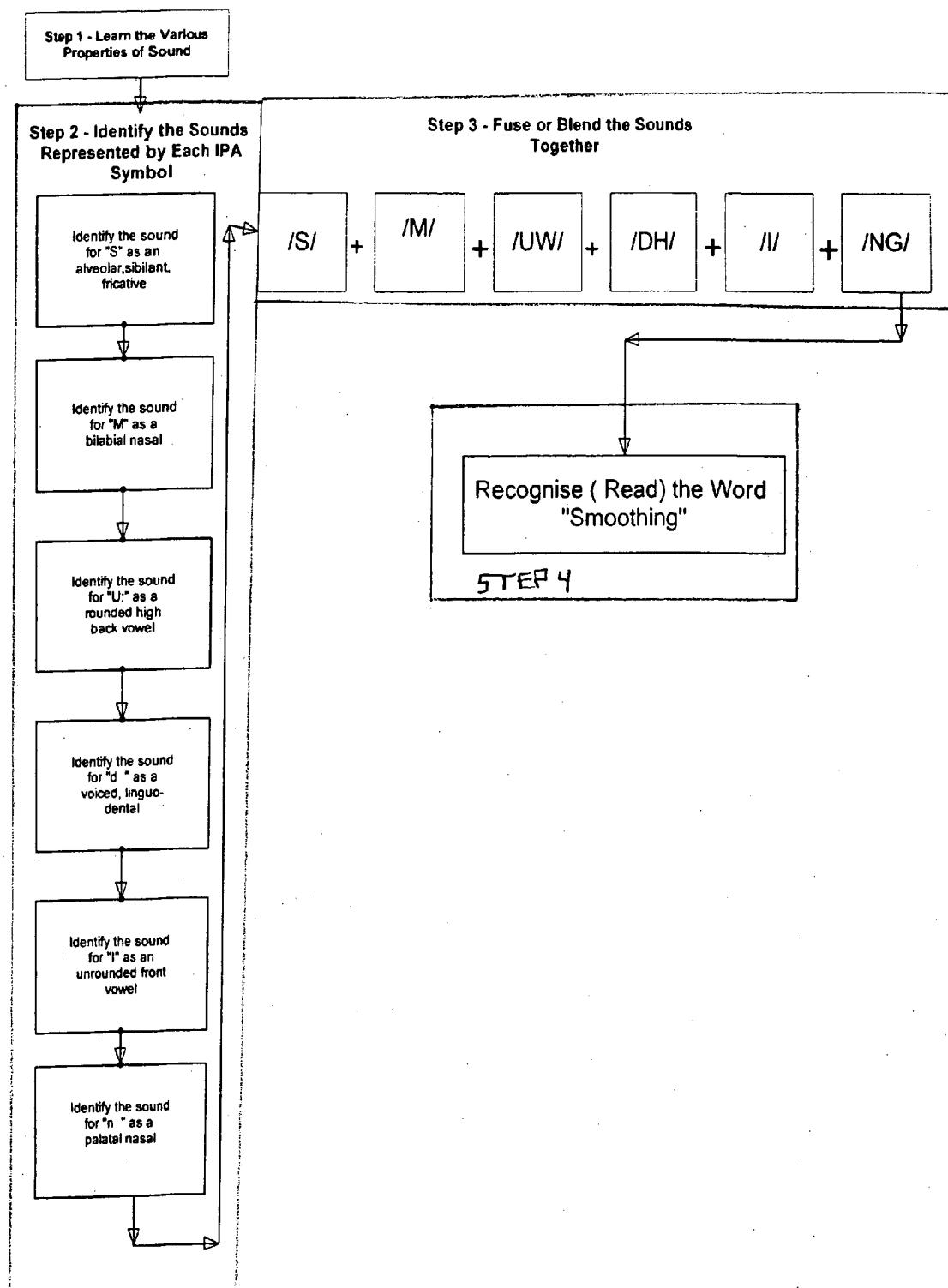


Figure 7

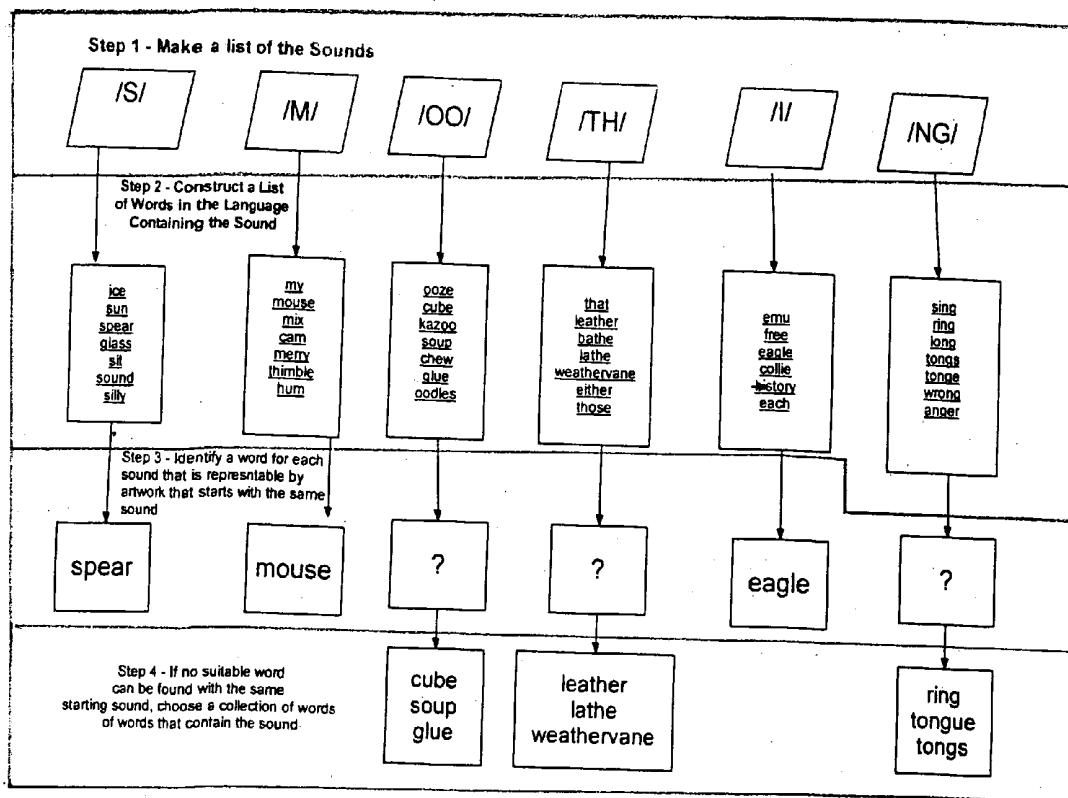
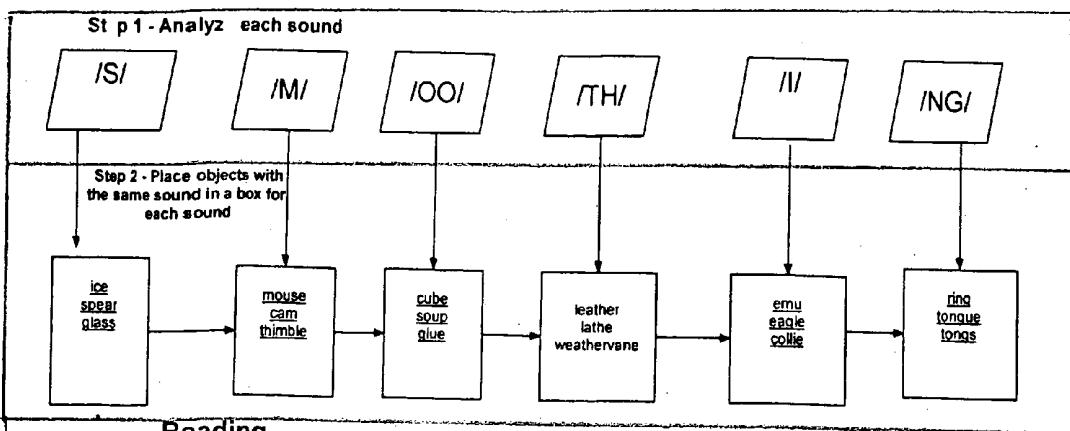


Figure 8

**Writing**



**Reading**

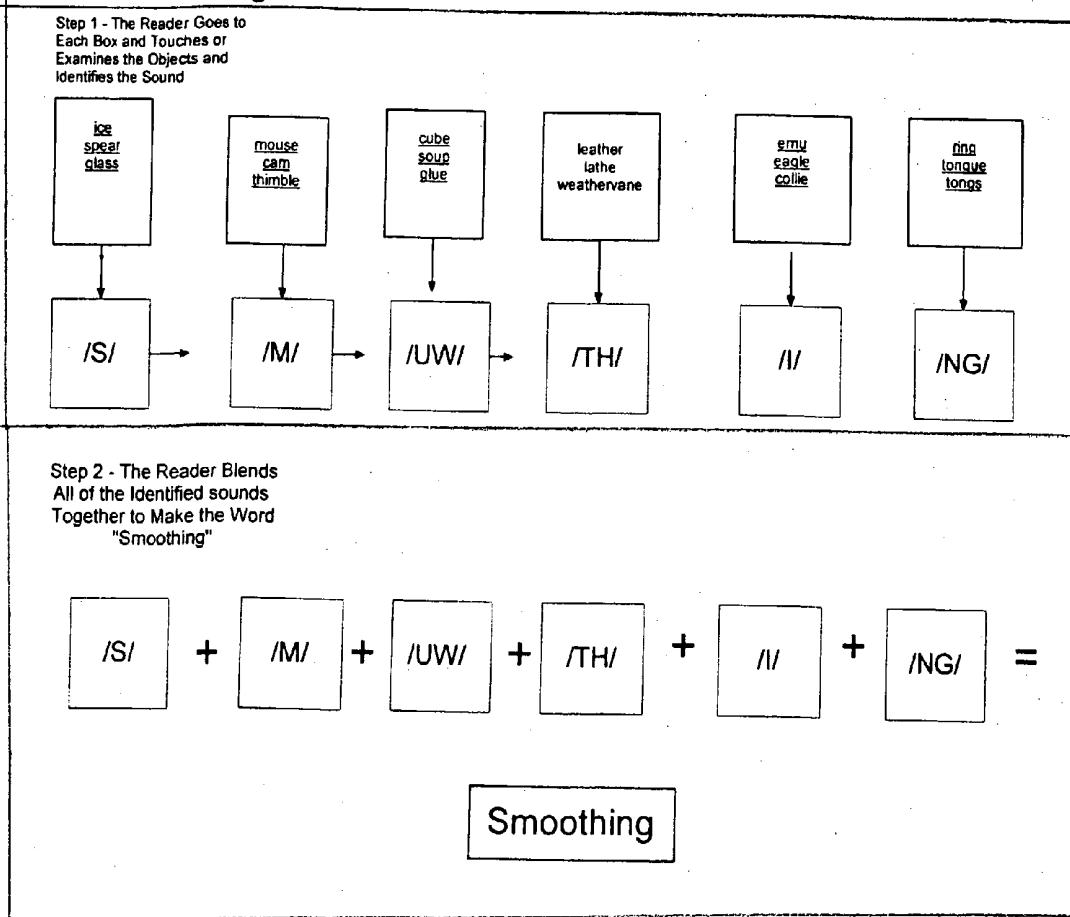


Figure 9

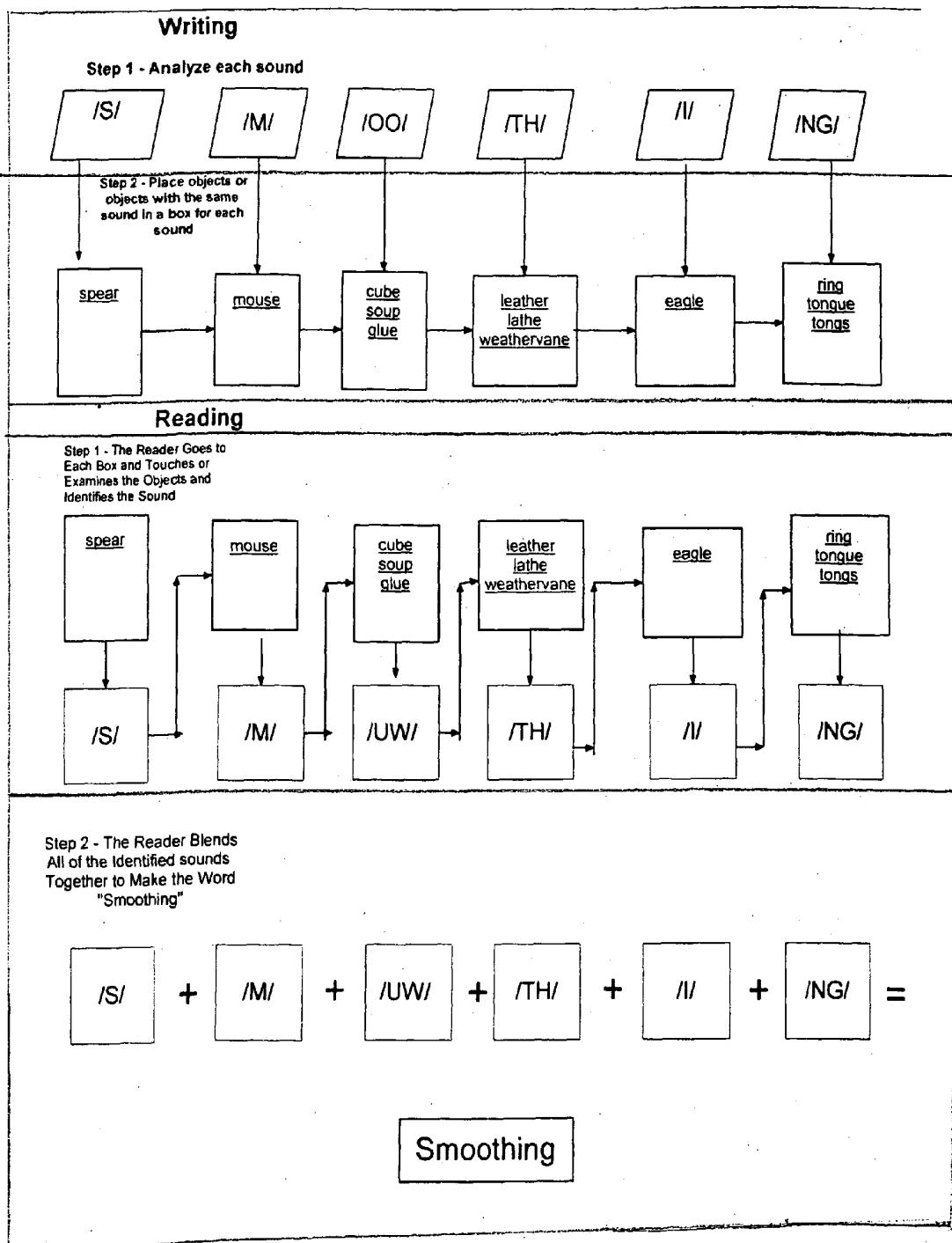
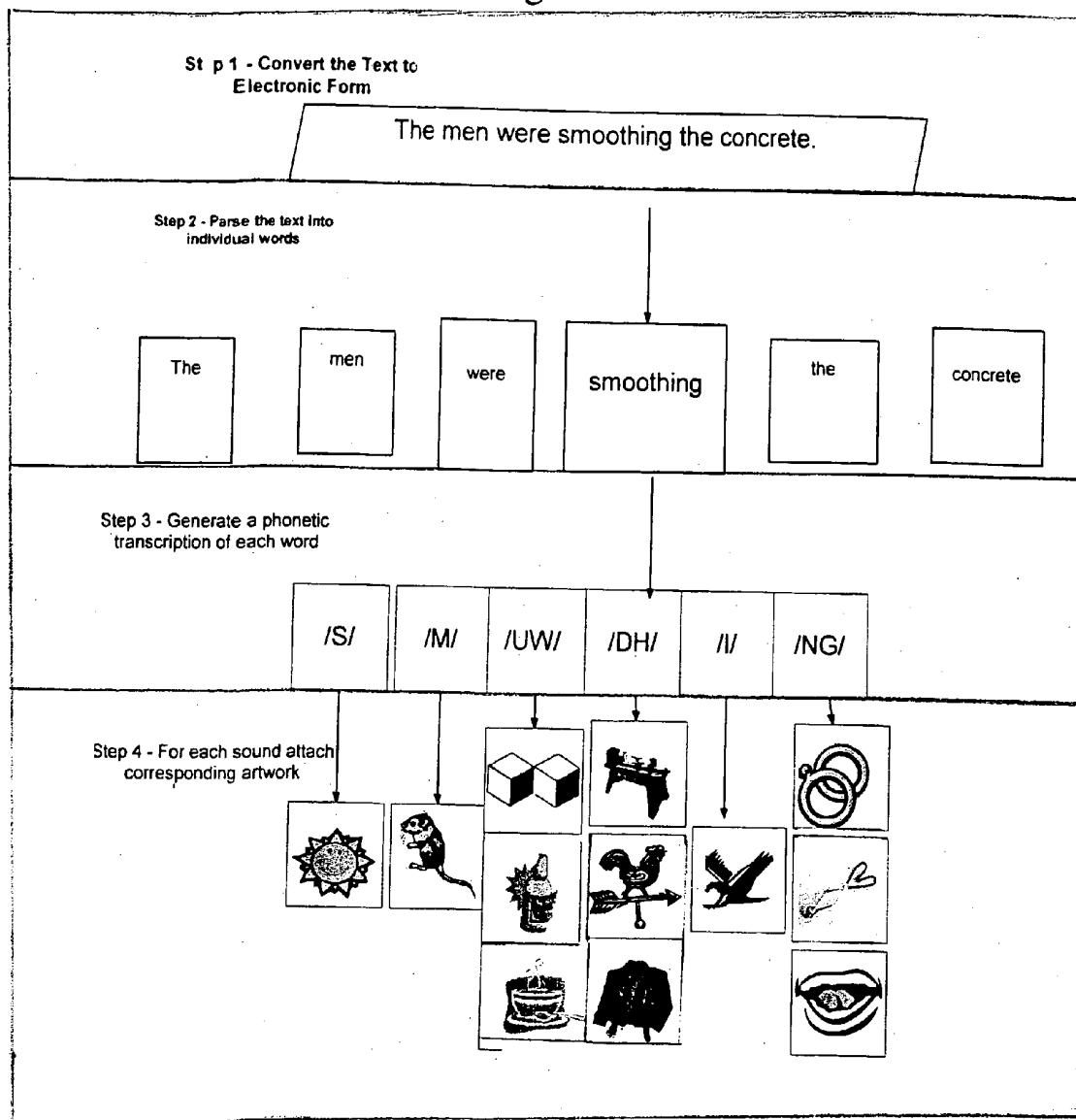


Figure 10



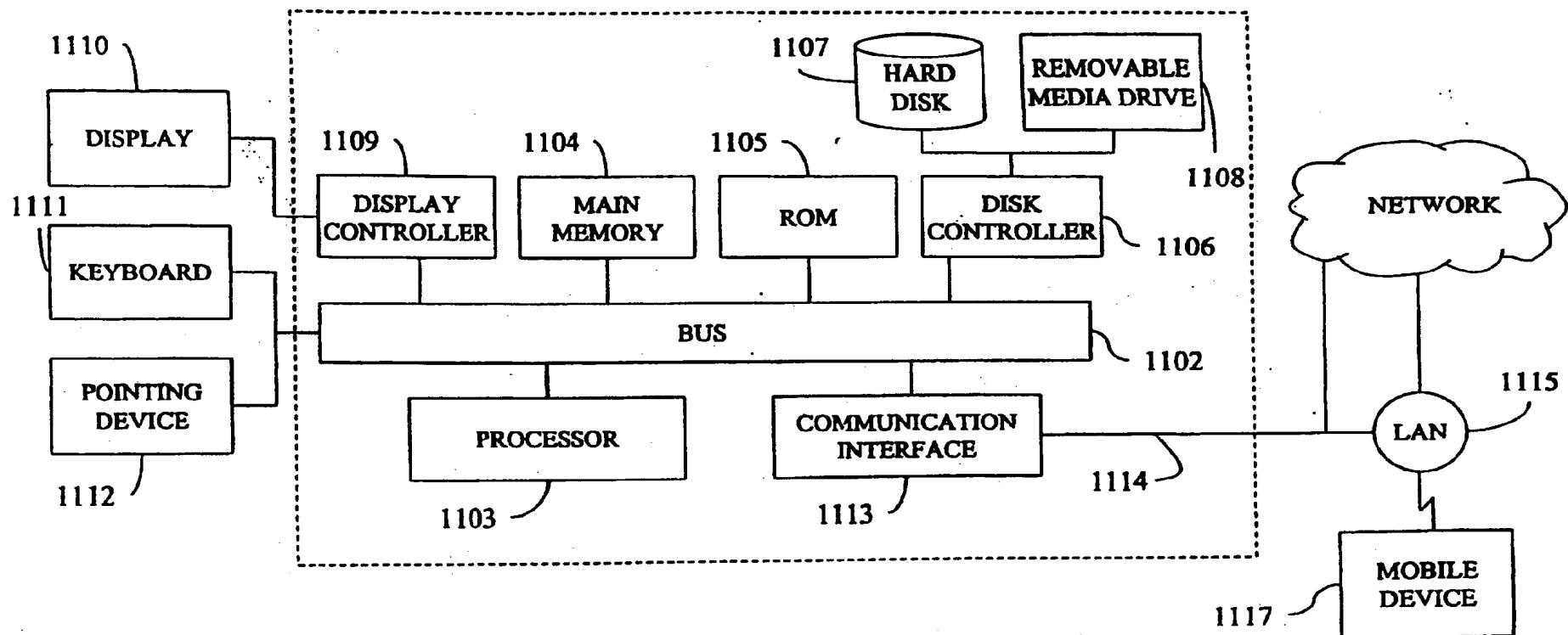


Figure 11

## METHOD AND SYSTEM FOR FACILITATING READING AND WRITING WITHOUT LITERACY

### BACKGROUND OF INVENTION

#### [0001] 1. Field of the Invention

[0002] The present invention relates a communication medium and method of communication which allows anyone to mutely create a representation of their language without requiring of them any prerequisite literacy or rote memorization. Further, the present invention relates to a process of presenting language to someone without requiring from them the ability to hear or requiring from them any prerequisite literacy or rote memorization. Finally, the present invention relates to other methods of utilizing this communication medium to transfer written words and sounds of any nature from word to sounds and vice versa without requiring from them the ability to hear or speak or requiring from them any prerequisite literacy or rote memorization.

#### [0003] 2. Discussion of the Background

[0004] The advantages of writing, publishing, and reading are staggering. Every activity of the modern world relies heavily on those technologies. To gain some awareness of the magnitude, it is probably easiest to focus not on the value of literacy, but on the costs, which have been partially quantified, of illiteracy. A compilation of studies taken from "Illiterate America," by Jonathan Kozol, as well as updated information reported in The Washington Post, the Associated Press, The Baltimore Sun, and The Salt Lake Tribune, drawing on a report of the Senate Select Committee on Equal Educational Opportunity, reported at [www.literacy-research.com/answers.html](http://www.literacy-research.com/answers.html), has concluded that the government spends 200 billion dollars every year in attempts to overcome illiteracy. Further, this study has concluded that the productivity losses, equipment destruction, accidents, etc that can be traced to illiteracy constitutes an additional 200 billion each year. Finally, there has been shown to be a direct relationship between the literacy level of prisoners on their release and their likelihood of returning to crime when released which enabled this study. Congress to quantify an additional 135 billion dollars in costs directly attributed to illiteracy each year of the total 450 billion dollar cost of crime. Therefore, the estimated cost to the United States has been calculated by this study as a staggering 435 billion per year, or about \$1750 per person per year.

[0005] One can estimate the cost for other countries as well because there is a direct relationship between literacy level and income. Hence, in less literate countries the per capita cost of illiteracy is greater. This suggests a very conservative world cost of 7 trillion dollars every year due to illiteracy and less than full literacy.

[0006] Moreover, for the person who is even marginally illiterate, a broad world of activities is closed off, safety is infringed, and the need to feign literacy leads to dangers for others and accidental destruction of machinery. Yet, despite these obstacles to illiterate people and the staggering societal costs outlined above, efforts to reduce illiteracy by simply teaching illiterates to read and write in their native spoken language have made marginal progress at best. Indeed, the failure of these efforts is evidenced by the staggering costs itself. It is clear that an alternative method of combating illiteracy is needed.

### BRIEF DESCRIPTION OF THE FIGURES

[0007] FIG. 1: A process diagram exemplifying writing in English using the Whole Word Method for the word "smoothing".

[0008] FIG. 2: A process diagram exemplifying reading in English using the Whole Word Method for the word "smoothing".

[0009] FIG. 3: A process diagram exemplifying writing in English using the Phonetic Method for the word "smoothing".

[0010] FIG. 4: A process diagram exemplifying reading in English using the Phonetic Method for the word "smoothing".

[0011] FIG. 5: A process diagram exemplifying writing in English using the International Phonetic Alphabet for the word "smoothing".

[0012] FIG. 6: A process diagram exemplifying reading in English using the International Phonetic Alphabet for the word "smoothing".

[0013] FIG. 7: A process diagram exemplifying one embodiment of the present invention including how one may prepare to write the word "smoothing" in English using one embodiment of the present invention.

[0014] FIG. 8: A process diagram exemplifying reading and writing according to one embodiment, e.g. Level 1, of the present invention utilizing the word "smoothing".

[0015] FIG. 9: A process diagram exemplifying reading and writing according to one embodiment, e.g. Level 3, of the present invention utilizing the word "smoothing".

[0016] FIG. 10: A process diagram exemplifying how one may convert standard writing to one embodiment of the present invention utilizing the word "smoothing".

[0017] FIG. 11: a computer system 1101.

### SUMMARY OF THE INVENTION

[0018] An objective of the present invention is to allow anyone to mutely create a representation of their language without requiring of them any prerequisite literacy or rote memorization.

[0019] Another objective of the present invention is to allow for the presentation of language to someone without requiring of them either the ability to hear or requiring of them any prerequisite literacy or rote memorization.

[0020] Yet another objective of the present invention is to allow the automatic acquisition of literacy, without requiring any prerequisite literacy, rote memorization, or access to electronic devices or already literate people.

[0021] Yet another objective of the present invention is to make available to everyone, regardless of their level of literacy, and without requiring of them any rote memorization of any symbols, all the activities which are available to literate people.

[0022] In one embodiment, a collection of objects is gathered. For the first word one wishes to express, one may select from a collection of some objects whose names contain the first sound of the word where the selected

collection is large enough so that the common sound shared therein is unambiguous. One continues in this fashion until one has laid out a list of such collections. This provides, in part, for mute representation of language without requiring any literacy whatsoever of the person performing the writing. Moreover, the collection can be shown to anyone even modestly fluent in the corresponding language with no literacy requirement on that person whatever; thereby presenting language to them inaudibly.

[0023] To read back, one simply reverses the above-mentioned process by first examining the first collection of objects and then identifying the sound that the names for those objects have in common. This process can be repeated for each of the collections, fusing together in sequence the sounds that are in common within each individual collection, enabling the formation of syllables, words, and sentences. Alternatively, one can pre-select such a collection for each sound of the language.

[0024] For economy of effort, it is possible to reduce the collection chosen for expressing a particular sound to just one object therein. Most preferably, the name of the chosen object provides the desired sound as the first sound of the chosen object. While it would be convenient to always be able to just use one object, the typical structure of natural language does not allow for this situation at all times. In fact, some sounds are never used to start words or are so rarely used initially that those few words that do start with that sound are not objects that can be readily represented by an object (i.e. a recognizable symbol). For example, the sound common to "ring" and "tongue" is a palatal nasal, which is never the beginning sound of any English word. The sound common to both "treasure" and "collage" only occurs within English words that have been recently borrowed from other languages, principally the French language. The sound common to both "weather" and "bathe" is almost never found at the beginning of a word, except for demonstratives, such as "the", "there", "this", and "that", as well as archaic pronouns, such as "thou", "thee", "thy", and "thine". Such sounds we will call "obscure sounds", to distinguish them from the "common sounds" which do occur frequently at the beginning of a word.

[0025] This method may be most useful for keeping the attention of children, while showing them how more economical versions of the method work.

[0026] In another embodiment, instead of actual objects, one may use representations of the objects, such as molded plastic toys, or carvings, or tiles or cards with pictures on them, or even ink stamps, all of which are less expensive and easier to manipulate than the actual objects themselves.

[0027] In yet another embodiment, those representations may be connected to some kind of sensor, such as a keyboard or touchscreen, for further processing, which could involve electromagnetic processing, analog or digital, or mechanical. For example, the representations could be mechanically linked to air valves, so that a distinct organ pipe plays for each selection. This representation then could be detected at a distance via objects having matching resonant frequencies to the pipe, for further conversion into other representations of language.

[0028] In yet another embodiment, a selection device is associated with those representations, as say images on a computer screen to be chosen by a mouse, or a detector of eye motion.

[0029] Within these embodiments, one may create a keyboard which replaces letters of the keyboard with the picture collections as described above. Moreover, one may provide a menu of those image collections on a computer screen to be selected by a mouse. It is also possible to utilize a chorded device, which provides a switch or button or proximity sensor for each finger where one utilizes different finger combinations to select for vowels, semivowels, consonants. Further, a finger may choose voicing or not, while another may choose aspiration or not. Still further, another three fingers or so may be utilized to choose a place of articulation, while another finger may be used to select nasality, and so on for the specific identified characteristics human speech. In the meantime, a computer screen may display the appropriate picture of combinations for that sound for the selected language.

[0030] It is also possible to automate the selection process, by converting the desired text into unicode either by producing it as described or by scanning printed text and performing optical character recognition on it. Further, automation may occur by direct conversion from some electronic or computer based form. The unicode text is then parsed into words. Each word may then be converted into the form described above by selecting or creating a number of pictures as described above for each sound of the language which one wishes to represent; thereby generating a phonetic engine for the language. A phonetic engine may be a processor capable of taking a selected word and producing the sounds which make up the selected word. In the case of languages with a regular orthography, such as Spanish, this engine can be readily created. In a more complicated case, such as English, a sizable table of exceptions to the algorithms which occasionally allow discerning the sounds from the spellings may be necessary. In the most complicated cases, such as Chinese, no algorithm is possible and the exception table contains the entire language. It is best to organize this phonetic engine in such a way that the syllabic divisions of the words are clear, so that the reader can be presented with the text in such a way as to make it easy to sound out the picture sequence, and so that any alphabetic writing is associated to the degree that it is meaningful with corresponding sounds, thereby providing the reader the means of acquiring the so-called phonic skills to the extent that the customary written form of the language makes that possible. Of course the occasional homograph may require human intervention. Phonetic dictionaries are generally available, and where they do not provide division into syllables, the rules identified by linguists may be used. The simple device of identifying the consonant clusters that occur at the beginning and at the end of words gives an indication that syllables are likely to end the same way words do, and begin the same way words do, and often that insight is enough to automate the process of dividing words into syllables.

[0031] To publish such a representation may be to either print the sequence of words onto a page or incorporate the sequence of words into an electronic image, each word being displayed with some combination of the typeset version of the word in classical written form, the sequence of collections for each sound of the word, and the typeset version of the individual pieces of the classical written form matched up with the corresponding sounds.

[0032] In a language written left to right, one may place the collection vertically, so that it is clear that all the pictures together pertain to one sound. One may also provide a visual separation between words and/or between syllables. Further, one may place the sound collections left to right, while having below each sound or possibly sequence of sounds the letter or possibly sequence of letters that it corresponds to, as well as the normal classical written form of the whole word. While not necessary, it may be best to also distinctively mark the vowel sounds of each syllable for ease of sound fusion. Still further, one may add directions for reading. Examples of directions for reading include signaling by arrows and having all of the objects face the same direction.

[0033] It would be extremely useful to have a form of mutely created representations of language, and an inaudibly presented language, so as to allow anyone to use such methods. Further, such a language will allow anyone to benefit from another's use of such methods, without requiring the whole or partial rote memorization of symbols.

[0034] It would also be extremely useful to have a means for teaching existing writing systems, with their enormous wealth of existing texts without incurring the enormous training costs which currently is required for currently existing writing systems and communication means.

#### DETAILED DESCRIPTION OF THE INVENTION

[0035] One of the most important technologies in existence is the companion technologies of writing and reading. An example of such a companion technology may include means of representing language by mute means and means of reading. Such mute means and means of reading may be exemplified by the perception of language by deaf means. These technologies have been significantly improved over the years with the addition of publishing means. Examples of publishing means may include the presentation of language in a form suitable for reading. The phrase "silent communication" is meant in this application to mean any task involving writing or publishing.

[0036] Unless specifically defined, all technical and scientific terms used herein have the same meaning as commonly understood by a skilled artisan of communications, linguistics, psychology, and/or computer science.

[0037] As noted in the Background Section above, increased efforts to teach reading, publishing and writing of existing language systems has failed to solve the literacy problem. The biggest hurdle to using existing systems for reading, publishing and writing is the enormous investment of training time that goes into learning to read and write by rote memorization (e.g. rote symbols) and/or by dependence on recognition of previously taught symbols (e.g. recognizable symbols). There are a number of different writing systems in use in the world, though for any one language, there is generally only one widely being used. Writing systems all use a sequence from some collection of commonly agreed upon pattern. For example, these patterns may be formed of ink on paper, of positions of the hands, of electrical pulses, for conveying language. Symbols must be painstakingly memorized via rote memorization. Further, arcane manipulation rules must be mastered or memorized via rote memorization. In one very common approach to

reading, even whole words must be memorized by rote memorization. For many of the worlds' most important writing systems, rote memorization is, in fact, the only way such systems can be either wholly or partially learned. The enormous effort required to obtain literacy in a language such as English is best understood by the Exemplified current methods shown in FIGS. 1-6.

[0038] One method of obtaining literacy in English is the Whole World method. FIGS. 1 and 2 illustrate exemplary processes for learning to write and read an English word, respectively, using the Whole World method.

[0039] As seen in FIG. 1, Writing Using the Whole Word Method requires the following steps:

[0040] Step 1

[0041] Memorize the letter "Ss".

[0042] Memorize the letter "Mm".

[0043] Memorize the letter "Oo".

[0044] Memorize the letter "Tt".

[0045] Memorize the letter "Hh".

[0046] Memorize the letter "Ii".

[0047] Memorize the letter "Nn".

[0048] Memorize the letter "Gg".

[0049] Step 2

[0050] Memorize this sequence as being the word "smoothing". This involves seeing the sequence S+M+O+O+T+H+I+N+G. Further, it involves having someone tell you the word it represents. Still further, it requires repeat exposure to the above-mentioned seeing of the sequence, as well as continual reminders from a second party that the particular sequence of letters S+M+O+O+T+H+I+N+G represents the word "smoothing".

[0051] Step 3

[0052] Produce a representation of this sequence with a presentation device such as ink on paper or a computer driven display. This requires a cognitive decision to write "smoothing" and then a memory retrieval process of which sequence of letters actually represent "smoothing".

[0053] As seen in FIG. 2, Reading Using the Whole Word Method requires the following steps:

[0054] Step 1

[0055] Memorize the letter "Ss".

[0056] Memorize the letter "Mm".

[0057] Memorize the letter "Oo".

[0058] Memorize the letter "Tt".

[0059] Memorize the letter "Hh".

[0060] Memorize the letter "Ii".

[0061] Memorize the letter "Nn".

[0062] Memorize the letter "Gg".

[0063] Step 2

[0064] Memorize this sequence as being the word "smoothing". This involves seeing the sequence S+M+O+

O+T+H+I+N+G. Further, it involves having someone tell you the word it represents. Still further, it requires repeat exposure to the above-mentioned seeing of the sequence, as well as continual reminders from a second party that the particular sequence of letters S+M+O+O+T+H+I+N+G represents the word "smoothing".

[0065] Step 3

[0066] When this sequence is encountered, one is required to recognize it and retrieve it from memory in order to read the word "smoothing".

[0067] Thus, as seen in FIGS. 1 and 2, to prepare to use the whole word method in a language one must first learn the characters which involves memorization of somewhere between a few dozen and 10's of thousands of pen stroke combinations. Once these symbols have been memorized, one must memorize combinations of these symbols which form actual words. In order to be able to perform this rote memorization, one must have excessive exposure to the words as well as some means of being told repeatedly what word that symbol represents, of course, these are substantial obstacles to obtaining literacy by way of the Whole World method.

[0068] The Phonetic Method of obtaining literacy in a language is exemplified by FIGS. 3 and 4, which show process steps for learning to writing and reading in English respectively, using the Phonetic Method.

[0069] As seen in FIG. 3, Writing Using the Phonetic Method requires the following steps:

[0070] Step 1

[0071] Memorize the letter "Ss".

[0072] Memorize the letter "Mm".

[0073] Memorize the letter "Oo".

[0074] Memorize the letter "Tt".

[0075] Memorize the letter "Hh".

[0076] Memorize the letter "Ii".

[0077] Memorize the letter "Nn".

[0078] Memorize the letter "Gg".

[0079] Step 2

[0080] Memorize the sounds for the letter "Ss".

[0081] Memorize the sounds for the letter "Mm".

[0082] Memorize the sounds for the letter "Oo".

[0083] Memorize the sounds for the letter "Tt".

[0084] Memorize the sounds for the letter "Hh".

[0085] Memorize the sounds for the letter "Ii".

[0086] Memorize the sounds for the letter "Nn".

[0087] Memorize the sounds for the letter "Gg".

[0088] Step 3

[0089] Decide to write the word "smoothing"

[0090] Step 4

[0091] Identify the first sound as an /S/ sound. In English, this sound can be represented in the following ways:

[0092] S as in "sun",

[0093] SC as in "scene",

[0094] SCE as in "coalesce",

[0095] SE as in "base",

[0096] SS as in "lass",

[0097] SSE as in "impasse",

[0098] ST as in "castle",

[0099] STH as in "isthmus",

[0100] STS as in "postscripts",

[0101] SW as in "sword",

[0102] Z as in "quartz",

[0103] C as in "cider",

[0104] CE as in "lace", and

[0105] CES as in "spacesuit".

[0106] Then, remember that from among these that "S" is the most likely. Then, remember that every time one has seen the word "smoothing", it has started with an "s".

[0107] Step 5

[0108] Identify the next sound as an /M/ sound. In English, this sound can be represented in the following ways:

[0109] M as in "mouse",

[0110] GM as in "paradigm",

[0111] MB as in "dumb",

[0112] ME as in "game",

[0113] MM as in "rummy",

[0114] MN as in "hymn", and

[0115] NDM as in "grandma"

[0116] Then, remember that from among those that "M" is the most likely. Then, remember that every time one has seen the word "smoothing", it has had the letter "m" in it.

[0117] Step 6

[0118] Identify the next sound as an /UW/ sound. In English this sound can be represented in the following ways:

[0119] EU as in "neutral",

[0120] EW as in "dew",

[0121] IEU as in "lieu",

[0122] O as in "lose",

[0123] OE as in "shoe",

[0124] OO as in "boot",

[0125] OU as in "ghoul",

[0126] OUGH as in "through",

[0127] OUS as in "rendezvous",

[0128] U as in "universe",

[0129] UE as in "blue",

[0130] UI as in "suit", and

[0131] UO as in “buoy”.

[0132] Then, remember that from among these that “OO” is the most likely. Then, remember that every time one has seen the word “smoothing”, it has had two “o’s” in it.

[0133] Step 7

[0134] Identify the next sound as a /TH/ sound. In English, this sound can be represented in the following ways:

[0135] TH as in “that”, and

[0136] THE as in “bathe”.

[0137] Then, remember that from among these that “TH” is the most likely. Then, remember that every time one has seen the word “smoothing” it has had a “th” in it.

[0138] Step 8

[0139] Identify the next sound as an /IY/ sound. In English, this sound can be represented in the following ways:

[0140] AE as in “daemon”,

[0141] AY as in “picayune”,

[0142] E as in “me”,

[0143] EA as in “beak”,

[0144] EE as in “meet”,

[0145] EI as in “ceiling”,

[0146] EO as in “people”,

[0147] EY as in “key”,

[0148] I as in “ink”,

[0149] IE as in “piece”,

[0150] IS as in “debris”,

[0151] IT as in “esprit”,

[0152] OE as in “amoeba”, and

[0153] Y as in “city”.

[0154] Then, remember that from among these “I” is the most likely choice to combine with the next sequence of “ng”. Then, remember that every time one has seen the word “smoothing” it has had an “i” in it.

[0155] Step 9

[0156] Identify the final sound as an /NG/ sound. In English, this sound can be represented in the following ways:

[0157] NG as in “ring”,

[0158] NGH as in “dinghy”,

[0159] NGUE as in “tongue”, and

[0160] N as in “ink”.

[0161] Then, remember that from among these that “NG” is the most likely. Then, remember that every time one has seen the word “smoothing”, it has ended with “ng”.

[0162] Step 10

[0163] Produce a representation of this sequence with a presentation device such as ink on paper or a computer driven display.

[0164] FIG. 4 shows the process steps for Reading Using the Phonetic Method:

[0165] Step 1

[0166] Memorize the letter “Ss”.

[0167] Memorize the letter “Mm”.

[0168] Memorize the letter “Oo”.

[0169] Memorize the letter “Tt”.

[0170] Memorize the letter “Hh”.

[0171] Memorize the letter “Ii”.

[0172] Memorize the letter “Nn”.

[0173] Memorize the letter “Gg”.

[0174] Step 2

[0175] Memorize the sounds for the letter “Ss”.

[0176] Memorize the sounds for the letter “Mm”.

[0177] Memorize the sounds for the letter “Oo”.

[0178] Memorize the sounds for the letter “Tt”.

[0179] Memorize the sounds for the letter “Hh”.

[0180] Memorize the sounds for the letter “Ii”.

[0181] Memorize the sounds for the letter “Nn”.

[0182] Memorize the sounds for the letter “Gg”.

[0183] Step 3

[0184] One encounters the word “smoothing”.

[0185] Step 4

[0186] Identify a possible sound for the letter “s” which could be any of the following:

[0187] CH as in “catsup”,

[0188] SH as in “sure”,

[0189] Z as in “rose”,

[0190] ZH as in “pleasure”, and

[0191] S as in “soup”.

[0192] Then, decide the most probable is the sound in “soup”

[0193] Step 5

[0194] Identify the sound for the letter “m” as M as in “mouse”

[0195] Step 6

[0196] Identify a possible sound for the letters “oo” which could be any of the following:

[0197] AH as in “blood”,

[0198] AO as in “door”,

[0199] H as in “soot”, and

[0200] UW as in “coon”.

[0201] Then, decide that a probable sound is the sound in “coon”

[0202] Step 7

[0203] Identify a possible sound for the letters “th” which could be any of the following:

[0204] TH as in “tooth”,

[0205] DH as in “that”, and

[0206] TH as in “eighth”.

[0207] Then, decide that a probable sound is the sound in “tooth”

[0208] Step 8

[0209] Identify a possible sound for the letter “I” which could be any of the following:

[0210] AA as in “lingerie”,

[0211] AH as in “pacify”,

[0212] AY as in “fine”,

[0213] IH as in “hit”,

[0214] IY as in “ink”, and

[0215] Y+IH as in “onion”.

[0216] Then, decide that a probable sound is the sound in “ink”.

[0217] Step 9

[0218] Identify a possible sound for the letters “ng” which could be:

[0219] NG as in “ring”, and

[0220] NG+K as in “length”.

[0221] Then, decide that a probable sound is the sound in “ring”.

[0222] Step 10

[0223] Blend all of these probable sound combinations together and produce the word “smoothing” having the /TH/ sound pronounced as in “tooth”.

[0224] Step 11

[0225] The word is not recognizable. The /TH/ sound is the incorrect choice.

[0226] Step 12

[0227] Go back and try some alternate sounds. Try the /DH/ sound as in “that” and decide it is the most probable sound.

[0228] Step 13

[0229] Blend all of these probable sound combinations together and produce the word “smoothing” having the /DH/ sound as pronounced in “that”.

[0230] Step 14

[0231] The word is recognized and read.

[0232] Thus, as seen in FIGS. 3 and 4, to prepare to use the phonetic method in a language, one must first learn the alphabet which involves memorization of somewhere between a few dozen and 10's of thousands of pen stroke

combinations. Once these symbols have been memorized, one must learn the sounds the letters can represent and then learn combinations of letters and the sounds the combinations represent. Finally, one has to also memorize the list of exceptions to the ways in which sounds and spellings correspond. Again, these are formidable obstacles to obtaining literacy.

[0233] C. The Process of Reading and Writing in the International Phonetic Alphabet (See FIGS. 6 and 6)

[0234] In some cases, such as codes, each pattern may represent an entire sentence. In the case of Chinese writing, each pattern may represent a single idea, like a word. In the case of certain portions of Japanese writing, each pattern may represent a whole syllable. In the case of the international phonetic alphabet (IPA) used by linguists, each pattern may represent a distinct sound. The most logical and precise of the above-mentioned codes is the IPA. The IPA is exemplified by the following steps which are shown in FIGS. 5 and 6.

[0235] As seen in FIG. 5, writing using the IPA requires the following steps:

[0236] Step 1

[0237] Learn the symbol “S”.

[0238] Learn the symbol “M”.

[0239] Learn the symbol “U:”.

[0240] Learn the symbol “δ”.

[0241] Learn the symbol “I”.

[0242] Learn the symbol “η”.

[0243] Step 2

[0244] Recognize the first sound is an alveolar sibilant fricative for which the corresponding IPA symbol is “S”. Recognize the next sound is a bilabial nasal for which the corresponding IPA symbol is “M”. Recognize the “oo” sound as a rounded high back vowel for which the corresponding IPA symbol is “U:”. Recognize “th” as a voiced linguo-dental fricative for which the corresponding IPA symbol is “δ”. Recognize the “iy” sound as a high unrounded front vowel for which the corresponding IPA symbol is “I”. Recognize the “ng” sound as a palatal nasal for which the corresponding IPA symbol is “η”.

[0245] Step 3

[0246] Match the identified sounds to the learned symbols.

[0247] Step 4

[0248] Assign the corresponding IPA symbol is “S”. Assign the corresponding IPA symbol is “M”. Assign the corresponding IPA symbol is “U:”. Recognize “th” as a voiced linguo-dental fricative for which the corresponding IPA symbol is “δ”. Assign the corresponding IPA symbol is “I”. Assign the corresponding IPA symbol is “η”.

[0249] Step 5

[0250] Produce a representation of this sequence with a presentation device such as ink on paper or a computer driven display.

[0251] As seen in FIG. 6, Reading Using the IPA requires the following steps:

[0252] Step 1

[0253] Learn the various properties of sound such an alveolar sibilant fricative as in the beginning sound of the word “soup”, a bilabial nasal as in the beginning sound of the word “mouse”, a rounded high back vowel as in the vowel sound in the word “boo”, a voiced linguo-dental fricative as in the beginning sound in the word “that”, a high unrounded front vowel as in the vowel sound in the word “ink”, and a palatal nasal as in the ending sound in the word “ring”.

[0254] Step 2

[0255] Identify the sounds represented by each IPA symbol. Identify the sound for the symbol “S” as an alveolar sibilant fricative as in the beginning sound of the word “soup”. Identify the sound for the symbol “M” as a bilabial nasal as in the beginning sound of the word “mouse”. Identify the sound for the symbol “U:” as a rounded high back vowel as in the vowel sound in the word “boo”. Identify the sound for the symbol “ð” as a voiced linguo-dental fricative as in the beginning sound in the word “that”. Identify the sound for the symbol “I” as a high unrounded front vowel as in the vowel sound in the word “ink”. Identify the sound for the symbol “ŋ” as a palatal nasal as in the ending sound in the word “ring”.

[0256] Step 3

[0257] Fuse or blend the learned sounds.

[0258] Step 4

[0259] Recognize the word from those blended sounds as “smoothing”.

[0260] Thus, to understand how to use the IPA, one must first study the various properties of sound. These are classified in this system by many different methods including whether they are voiced or unvoiced, stopped or more continuous, what the position of the lips and tongue are and other various properties. Once one understands sound to prepare to use the IPA in a language, one first identifies the phonemes for that language. One may then identify, for each phoneme, all of its allophones or variants, as well as the patterns where a given allophone is used. For each of these allophones, one then finds the IPA symbol for that sound, making a final decision as to which of those memorized symbols is most appropriate for the sound, and one memorizes or learns the corresponding IPA symbol.

[0261] To write any word, one first analyzes the word into its constituent sounds, usually one syllable at a time. One writes in sequence the IPA symbol chosen or assigned for that sound. To read any word, one takes the first symbol and makes the corresponding sound, and repeats that process for each symbol in the word. One then fuses together those sounds and recognizes the word from that fusion of sounds. If the dialect the word was written in is different from one’s own dialect, the fusion will sound more like the writer’s dialect than the reader’s and the reader will perform the additional step of recognizing the word in their own dialect that matches the word as pronounced in the writer’s dialect.

[0262] In some ways IPA is the easiest code to learn because, for use with any given language, one only has to

learn a few dozen characters. Therefore, its advantage over Chinese writing is enormous because Chinese writing requires tens of thousands of characters. Moreover, the IPA’s representation of sound for any given language is unambiguous. Therefore, there is no need for learning complicated spelling rules within the framework of the IPA. Even Spanish, which may have one of the more consistent writing systems in existence, requires one to learn, for example, that a “g” followed by a “u” is pronounced completely different from a “g” followed by an “i”. Moreover, a “u” after a “g” is not pronounced at all if followed by an “e” or an “i” in Spanish, unless of course there is a pair of dots placed over it.

[0263] The IPA’s regularity dispenses with any need for “spelling rules”. Accordingly, the IPA possesses much regularity. One may simply read by a process of chaining together the sounds which each symbol represents, and write by a process of splitting a word one wants to express into sounds; thereby generating a list of symbols that correspond to the appropriate sound. In spite of those advantages, there are good reasons why this system is not widely used outside of the academic language study world.

[0264] First, while the use of the symbols within the IPA is logical and consistent, the symbols themselves are not. Each symbol of the IPA is a pure symbol whose sound meaning must be learned by rote memorization, e.g. a rote symbol. Rote memorization of pure symbols involves substantial effort for which the repayment is that there is virtually nothing you can read in that writing system. More specifically, no one language uses any of the IPA pure symbol set as the basis of its means of communication. Most people find that the effort which would have to be expended in rote learning of the IPA pure symbol set is better used to master a form of writing that is being used by everything and everyone they actually want to read.

[0265] There is an additional more subtle problem with the IPA. On the one hand, it can convey pronunciation with a fairly high degree of precision. On the other hand, it must. And so regional dialect distinctions must be represented in the writing, which can in itself be a barrier to communication. Therefore, the IPA can not fail to represent dialect distinctions. For example, the word “pen” as pronounced by a native of Kansas sounds different from the same word pronounced by a native of Alabama. The IPA representations for these two pronunciations will necessarily be different. Moreover, in many languages, including German and Portuguese, there is a predictable variation in some sounds at the end of a word, depending on the dialect.

[0266] In addition, the IPA imposes an unnecessary burden on the native speaker of a language, in that there are sound distinctions which the IPA makes which are irrelevant to the native speaker. For example, in the four English words “style”, “tile”, “bat”, and “batter”, there are four distinct sounds represented by “t” which a native English speaker always pronounces distinctly, yet never bothers to cognitively distinguish one pronunciation from the others. An initial “t”, as in “tile”, is always pronounced as an unvoiced plosive alveolar stop, while a “t” after the sibilant “s” is always pronounced as an unvoiced alveolar stop. If the native language is English for example, one can easily tell the two apart by holding one’s palm in front of one’s mouth and noticing the strong puff of air one feels when saying

"tile". This puff of air is absent when one says "style". Most native English speakers, however, are completely unaware of the fact that they say those two sounds differently because this difference in sound is never used in English to distinguish between two words. If one replaces the pronunciation of the "t" sound in "tile" with the "t" sound in "style", one will be understood though may also seem to have a slight Latin accent. French and Spanish do not make the above distinction at all. In linguistic terms, all of the above-mentioned sounds exemplified by "t" are distinct allophones of the same phoneme. Since native speakers of languages are usually not even conscious of such fine linguistic points, it is an unnecessary burden on them to force them to become aware of such fine linguistic points in order to read and write.

[0267] The unicode standard is an attempt to codify all the existing writing systems in the world, assigning a number to each character so as to be able to unambiguously interchange via computer networks expressions in any such system. While it omits some dead languages, and some languages with so few computer literate people that no standard computer form of the language exists, it is probably the most exhaustive collection of characters in existence.

[0268] The unicode standard is a list consisting of the alphabet, the Greek alphabet, the Cyrillic alphabet, the Chinese characters, the Korean characters, the Hindi alphabet, the Hebrew alphabet, the Arabic alphabet, and so on. Each character in the list has been assigned a number, in the same way that the ASCII code assigns a number to each letter of the alphabet. This enables computers to interchange documents written in practically any language, without any ambiguity. Reading and writing using unicode is not different from reading and writing using the alphabet, or the Greek alphabet, or Chinese characters, or whatever. It is just a way for computers to agree on which characters are which. For Example, when you type a letter "a", the computer does not have a little picture of an "a" running around its circuits, the "a" gets stored internally as a number, the same way it stores the number 97. "b" gets stored as 98, and so on. It's only when the letter needs to be displayed that the number 97 gets converted to the picture "a".

[0269] There are of course ways of conveying isolated ideas which do not constitute representations of language. One example of such a way may be charades. Charades involves gestures designed to elicit specific words, and the difficulty of conveying the handful of words in a round of the game shows how unsuitable this mechanism is for conveying actual sentences. Likewise, diagrams and pictures, while often useful for understanding some utterance, don't in and of themselves constitute writing. But in this sense, writing may not only include scratching Chinese characters in the sand, or typing Arabic characters into a computer, but may also include sending naval semaphore signals, or tapping Morse code, or signing for a deaf person.

[0270] Pictorial writing systems may also provide literacy. Probably all writing systems originated as pictures. The advantage of using pictures is that they are mnemonic which is unlike the alphabet which requires years of training to be used effectively. Pictures are recognizable, and hence memorable. In fact, nearly all of the characters used in the worlds writing systems, as they have been gathered together into the unicode standard, are historically derived from

pictures. The disadvantages of those original systems are quite high. Pictures are expensive and time consuming to produce, and not everyone has the level of artistic ability it takes to produce readily recognizable pictures. In fact, all of the characters which originated thousands of years ago as pictures but which have been extensively modified over time appearing in the unicode standard have long since lost any pictorial meaning they once had. If one was told what picture each character of the unicode standard historically developed from, one might be able to envision the faint traces, but one would be unlikely to look at any of the characters of the unicode standard and recognize such traces without such information being provided to them. For example, one would not be able to say "oh, that's a picture of a mountain" without being told that the Chinese character appearing in the unicode standard once derived from a picture of a mountain. For example, the letter "s" once was a picture of a "snake". If one had this knowledge, one could look at an "s" and see how that could be a "snake", but when one sees an "s", one's first thought probably is not "snake".

[0271] In other words, while all writing started out as pictures, no language was ever both fully pictographic and fully alphabetic. In fact, the pictures used in writing have become less pictorial over time to the point where today one cannot look at any of the characters used in any written language today and recognize any of them as pictures. In some cases, if told what the original picture was, one may look at it and see the faint echoes of the picture that once was. When analyzing the Egyptian hieroglyphics, which are the most clearly pictorial writings known, several of the pictures do not in fact depict what one may be convinced that they must have been depicting.

[0272] One reason for the downfalls of pictorial languages is, in part, that without the additional elements of computers, and typesetting and image manipulation software, and image production techniques like monitors and printers, this style of writing is not practical. The cost of making the same pictures over and over again, to a standard that can be recognized without extensive tutelage, is just too high. Another reason for these downfalls is, in part, that without the additional element of using multiple images to convey sound that are never, or only rarely word initial, a fully alphabetic pictographic writing system cannot be completed in most languages, and quite possibly in no language at all. So there have been writing systems that were largely, but perhaps never fully, pictographic. Also, there have been writing systems that were largely, but only in the case of the IPA and perhaps Finnish, fully alphabetic (ie phonetic). However, never have both elements been combined.

[0273] Egyptian writing uses stylized shapes for its symbols. Some, but not all, of these symbols are readily recognizable today. Other symbols are recognized to convey an unintended understanding. For example, one symbol is clearly a snake. For example, one symbol clearly looks like a "feather", however, it is not a "feather" at all, but instead is a "reed". Other symbols are not readily recognizable, but are believable when pointed out such as the picture for a "courtyard". Such symbols are not recognizable symbols but instead are remembered symbols. Still further, some symbols such as "placenta", is not especially recognizable or even easily recognized when pointed out. Such symbols must be incorporated by rote memorization and are therefore rote symbols. Each of the words associated with these rote

symbols had the property of starting with the sound that symbol represented. For example, the symbol the Egyptian writing uses which is the precursor to the roman character "s", is a picture of a snake. While the Egyptian word for "snake" was of course not "snake", it was a word which also happens to start with the same sibilant sound, since snakes hissssss, lots of languages have a hissing sound in their word for snake. Accordingly, no writing system has succeeded in being truly pictorial though, of course, pictures and incomplete pictographic elements and methods are still used for teaching children, such as "a is for apple," "a is for acorn," "a is for armadillo," etc.

[0274] In light of the above, it is understood that the readily recognizable pictures would have required no learning (i.e. recognizable symbols), while the believable pictures would have required some minimal learning (i.e. remembered symbols). Finally, pictures not recognizable, and therefore not readily remembered, require some rote memorization (i.e. rote symbols). For the reader, the greatest disadvantages of this Egyptian writing system are that there are no symbols for vowel sounds because no suitable pictures are found and some of the symbols simply must be learned by rote memorization (i.e. rote symbols), rather than simply recognized or remembered (i.e. recognizable symbols or remembered symbols, respectively).

[0275] Meanwhile, there are substantial difficulties for the writer. More specifically, the writing requires substantial time and effort to draw each picture over and over again. For all of these reasons, this system of Egyptian writing still requires a substantial investment in rote memorization and a substantial amount of time to be able to utilize the same effectively to communicate. Accordingly, it is replaced by the sort of alphabetic writing which uses the easily written, but not pictorial characters, of the sort one presently may be reading within this document.

[0276] Thus, the present inventors have recognized that combating illiteracy by teaching existing reading and writing systems have failed due to the substantial investment required to learn existing systems. The present inventor has ardently pursued the creation of a communication means by which writing and reading can be achieved without the above problems described in current and past communication means. To be able to read and write using the present invention, no knowledge of any alphabet or characters is required; nor is the ability to draw or move a pen required of either the reader or the writer. No symbols need to be memorized, no stylized symbols need be remembered. All that is required is the cognitive ability to make sense of sounds, the sensory ability to identify objects by sight or by touch, and a knowledge of the word in the language which is being represented.

[0277] FIG. 7 is a process diagram illustrating a process to prepare for writing in accordance with an embodiment of the present invention. The process includes the following steps:

[0278] Step 1

[0279] One makes a list of all of the sounds within the language one is working for the word "smoothing".

[0280] Step 2

[0281] One constructs a list of words in the language containing that sound.

[0282] Step 3

[0283] One identifies a word or words for each sound that is clearly able to be represented by an object or a piece of artwork that starts with that sound.

[0284] Step 4

[0285] If there is no such word, one chooses a collection of words that contain the sound and that can be clearly represented by an object or artwork. One wants the collection to be small, but large enough that the sound the collection has in common can be clearly identified. One may gather objects, create sculptures and/or generates artwork for these choices. To write, one may assemble the objects or representations of them. If one is using artwork, one may compose those pieces of artwork in the same way as typesetting composites characters from a font.

[0286] Step 5

[0287] Ready to write.

[0288] FIG. 8 illustrates a process for writing and reading, in accordance with the present invention.

[0289] The embodiment of FIG. 8 is not very efficient for writing, but has the advantage of requiring only minimal intelligence and no learning on the part of the reader. To write a word, one first analyzes each word into syllables and then identifies all of the sounds in each syllable. For each sound, one gets a box and places all of the boxes in a row. For each sound, one thinks of objects that contain that sound and places them in the boxes in the same order as the sound sequence in the word with an arrow which points from the beginning of the row to the end. To more clearly illustrate the process of both reading and writing using the method and the steps involved in the present invention, one will use as an example the English word "smoothing".

[0290] Step 1

[0291] Identify the first sound in "smoothing" as an /S/ sound and think of things that contain that sound. Identify the second sound as an /M/ sound and think of things that contain that sound. Identify the next sound as an /UW/ sound and think of things that contain that sound. Identify the next sound as a /DH/ sound and think of things that contain that sound. Identify the next sound as an /IY/ sound and think of things that contain that sound. Identify the final sound as an /NG/ sound and think of things that contain that sound.

[0292] Step 2

[0293] Place in the first box some ice, a spear and a glass for the /S/ sound.

[0294] Place in the second box a mouse, a cam and a thimble for the /M/ sound. Place in the third box a cube, some glue and some soup for the /UW/ sound. Place in the next box a lathe, some leather and a weathervane for the /DH/ sound. Place in the next box a collie, an eagle and an emu for the /IY/ sound. In the last box, place a ring, a tongue and some tongs for the /NG/ sound.

[0295] As seen in FIG. 8, to read what has been written, the reader goes to the first box marked by the arrow and either looks in the box or reaches in to touch the things in the box. The reader then identifies the sound that is common to all of the objects. The reader then moves down the row from box to box retrieving the sounds. Once the reader has

determined all of the sounds, the reader strings them together to figure out the word. In practice, the reader may perform this method one syllable at a time because it may be more effective use of the reader's short term memory. Again, to more clearly illustrate the process of both reading and writing using this method and the steps involved, one will use as an example the English word "smoothing".

**[0296]** Step 1

**[0297]** The reader goes to the first box and examines or touches the ice, the spear and the glass and identifies the first sound as an /S/ sound. The reader goes to the second box and examines or touches the mouse, the cam and the thimble and identifies the second sound as an /M/ sound. The reader goes to the next box and examines or touches the cube, the glue and the soup and identifies the third sound as a /UW/ sound. The reader moves to the next box and examines or touches the lathe, the leather and the weathervane and identifies the fourth sound as a /DH/ sound. The reader goes to the next box and examines or touches the collie, the eagle and the emu and identifies the fifth sound as the /IY/ sound. The reader goes to the final box and examines or touches the ring, the tongue and the tongs and identifies the final sound as the /NG/ sound.

**[0298]** Step 2

**[0299]** The reader then blends together the sounds /S+/ /M/+ /UW/+ /DH/+ /I/+ /NG/ to produce the word "smoothing". If the reader speaks a different dialect from the writer, the sound he associates with those pictures may not be identical to the sound that the writer was thinking. However, because of the regularity with which dialectic differences often occur, this shifting of sounds can occur automatically, without either writer or reader being aware of it. If the writer from parts of the south was thinking "hiyin" or "piyin", those pictures will read as "hen" and "pen" to the reader from parts of the mid-west. This same mechanism works identically in many languages, including German and Portuguese. As long as you choose pictures which make as many distinctions as the other dialects make, the reader will be able to read your writing and have it sound to him largely as though it had been written in his own dialect. Thus, for example, if you are writing in German, and speak a dialect that does not pronounce "g" differently at the end of a word, if you still choose your representations from words that end in the "g" sound, those words will convey to a speaker of a dialect that does pronounce "g" differently at the end of a word, that different sound, automatically.

**[0300]** In another embodiment of the invention representation of objects may be used rather than the objects themselves. Of course, it would be more practical to use representations such as drawings or sculptures of the objects in the boxes rather than the actual objects. Since there is a relatively small number of sounds in any given language, it is best to mass produce the drawings or sculptures. The drawings may be standardized and replicated on individual media such as stamps or ink stamps. Then, instead of choosing any object one likes, one just chooses from the objects for which that one has stamps. This approach may work equally well using drawn boxes on a computer screen with 2d or 3d graphic representations of the objects. Both reading and writing would proceed as outlined in the examples and steps for Level 1.

**[0301]** In yet another embodiment, one may use only one object in each box if that object starts with the sound one

required. If one can't find a suitable object that starts with the sound one requires, one may still use multiple objects to extract the common sound. To illustrate this, again, one may use the word "smoothing". **FIG. 9** illustrates a process for writing and reading in accordance with this embodiment of the present invention. As seen in this figure, the steps are very similar to that of writing according to Level 1 described above except for the following indicated changes.

**[0302]** Step 1

**[0303]** Identify the first sound in "smoothing" as an /S/ sound and think of things that contain that sound. Identify the second sound as an /M/ sound and think of things that contain that sound. Identify the next sound as an /UW/ sound and think of things that contain that sound. Identify the next sound as a /DH/ sound and think of things that contain that sound. Identify the next sound as an /IY/ sound and think of things that contain that sound. Identify the final sound as an /NG/ sound and think of things that contain that sound.

**[0304]** Step 2

**[0305]** Instead of putting a spear, some ice and a glass in the first box, one only places a spear or a representation of one in the box corresponding the /S/ sound. Instead of putting a mouse, a cam and a thimble in the box, one only places a mouse or a representation of one in the box corresponding for the /M/ sound. In the next box, one continues to use the cube, the glue and the soup (or representations of them) because one may not be able find a suitable object that starts with the /UW/ sound. In the next box, one also continues to use the leather, the lathe and the weathervane (or representations of them) because the only words in English that start with the /DH/ sound are words like "the", "this", "that", "then", "there" and "though" which aren't objects; and therefore, cannot be put in a box or depicted. In the next box instead of the collie, the emu and the eagle, one only places the eagle or a representation of one in the box to correspond with the /I/ sound. In the last box, one again continues to use the ring, the tongue and the tongs (or representations of them) because one may not be able to find an object that begins with the /NG/ sound.

**[0306]** As seen in **FIG. 9**, reading according to this embodiment requires the following steps.

**[0307]** Step 1

**[0308]** The reader observes or feels that there is just one object in the first box, e.g. the spear. The reader observes or feels that there is just one object in the second box, e.g. the mouse. The reader observes or feels that there are three objects in the third box, e.g. the cube, the glue and the soup, as before in Level 1. The reader observes or feels that there are three objects in the fourth box, e.g. the lathe, the leather and the weathervane as before in Level 1. The reader observes or feels that there is just one object in the fifth box, e.g. the eagle. The reader observes or feels that there are three objects in the last box, e.g. the ring, the tongue, and the tongs as before in Level 1.

**[0309]** The reader identifies the first sound as /S/, the first sound in the word "spear". The reader identifies the second sound as /M/, the first sound in the word "mouse". The reader identifies the common sound as the /UW/ sound. The reader identifies the common sound as the /DH/ sound. The

reader identifies the fifth sound as /IY/, the first sound in the word “eagle”. The reader identifies the common sound as the /NG/ sound.

[0310] Step 2

[0311] The reader then blends together the sounds /S/+M/+UW/+DH/+I/+NG/ to produce the word “smooth-ing”.

[0312] In one embodiment, the present invention may be applied to a system or method for converting an existing standard of writing to the inventive method of writing. The steps for this method are shown in FIG. 10, as follows:

[0313] Step 1

[0314] If the text is not already in an electronic form, one may convert it. The preferable electronic form may be Unicode.

[0315] Step 2

[0316] Next, one may parse the text into individual words.

[0317] Step 3

[0318] For each word, one may generate a phonetic transcription of the word.

[0319] In the case of some languages, such as Finnish, the phonetic transcription may be directly produced from the standard writing system. For other languages, such as Chinese, a phonetic dictionary (Such phonetic dictionaries can be found online) may be used. For most languages, such as Greek, an intermediate situation occurs where much of the phonetic expression may be generated algorithmically, but there is a large table of exceptions. Of course the occasional homograph may require human intervention. Phonetic dictionaries are generally available, and where they do not provide division into syllables, the rules identified by linguists may be used. The simple device of identifying the consonant clusters that occur at the beginning and at the end of words gives an indication that syllables are likely to end the same way words do, and begin the same way words do, and often that insight is enough to automate the process of dividing words into syllables.

[0320] Step 4

[0321] For each sound occurring in the phonetic transcription, one attaches the corresponding artwork.

[0322] To convert text represented in this form to a standard representation, one simply reverses the steps by converting first into a phonetic transcription by using the table that one used to convert sounds into artwork (e.g. performing the conversion in the opposite direction). Next, one uses the phonetic dictionary to convert to the classical written form. Further, to communicate with illiterate people, one may combine a representation the above-mentioned form with a presentation device such as ink on paper or a computer driven display.

[0323] By writing, using the present invention, one can express oneself, figure things out, entertain oneself and others, create beautiful calligraphies, raise difficult subjects from a distance, persuade others over time and distance such things as to buy, or sell, or donate or volunteer, to provide a job or to accept one, to support or oppose a cause, to love. One can tell people about events like weddings, parties,

births, graduations. One can train people over time and distance, or inform them about products and their features, how to use products and their features, how to be safe with products and their features. One can identify oneself with badges and business cards and calling cards. One can label things with signs.

[0324] By writing using the present invention, one can disseminate news, events, information, teaching, and warnings. One can entertain with books and magazines, comic books and games. One can create word games, using patterns in words, or fortunes or horoscopes. One can create letters, and agreements, make notes, create calendars, draw up legal documents like wills. One can inform with textbooks, dictionaries, encyclopedias, atlases, journals, newspapers and news websites. One can provide instructions for following recipes and patterns and maps and directions for following medical advice or taking medicines. One can provide diagnostic information, and request diagnostic information. One can provide instructions for learning a skill, such as caring for a car, or taking care of one's health, or complying with laws, or pursuing a sport or hobby or profession. One can award certificates, diplomas, plaques, honor rolls, and trophies.

[0325] In addition, the present invention allows one to facilitate events with tickets and programs and posters. One can create scripts and show credits and create subtitles and closed captions. One can announce events and list schedules for programs, showings, and broadcasts. One can express oneself or give self expression to others, such as with sayings on t-shirts and bumper stickers and decals. One can create signs to give directions or provide warnings.

[0326] One can conduct surveys, create proposals, recruit and provide job descriptions, job instruction and training, and create and fill out job applications. One can create products with sophisticated interfaces, providing control and feedback. One can provide quotes, order forms, release forms. One can advertise via mail, or postcards, pamphlets, brochures, flyers, postage paid reply cards, circulars, leaflets, catalogs, posters, billboards, signs, websites, menus, or through a vending machine, or one can advertise via merchandising materials like coffee mugs, t-shirts, pens, clocks, dartboards, bumper stickers, decals and key chains. One can create packaging that informs and sells, manuals, and ingredient list labeling. One can provide coupons and gift certificates and tickets. One can create warning labels and safety information sheets. One can generate invoices, purchase orders, order forms, bills of lading, pick lists, receipts, bills and contracts. One can make policy manuals, memos, resumes and forms.

[0327] One can create a prospectus, certificates for stocks and bonds and derivatives and letters of credit, deposits, mortgages and insurance policies, as well as the claim forms, application forms and agreements. One can generate checks, credit cards, passbooks, statements for checking and savings, and credit and brokerage accounts. One can create currency and coin, lottery tickets, betting forms, and trading forms. One can draft orders, summonses, briefs, pleadings, wills, contracts, notices, licenses, affidavits and notaries. One can generate tax and customs forms, declarations, census forms, consent forms, ballots, filings, identification, and prescriptions. One can create letters, greeting cards, telexes, telegrams, faxes, and personal ads. One can also

participate in chat rooms and email. One can persuade, sermonize, proselyte, teach, train, indoctrinate, buy, sell, negotiate, and instruct.

[0328] Even just as important, one can do all of the above electronically using the present invention. One can create interfaces for machines, computers, with graphic components like menus and buttons to select, and text boxes. One can provide means for naming files and grasping file structures, provide informative messages and error messages, elicit security information like passwords and pass phrases. One can create software that uses writing to interact with the software user so they can back up and restore, perform artistic tasks like create and edit raster or vector graphics, animations, video, audio, or combinations, like desktop publishing, web page development, creation of greeting cards, scrap books, albums and labels, and typesetting, and printing. Then, one can undergo pattern creation, or Plano gram layout, architectural or mechanical design, interior decorating, and landscaping.

[0329] Further, one can undergo word processing such as text editing or presentations or email; educational software, such as for language learning or translation, spell and grammar checkers, reference libraries, and skill development like typing, or math; financial tasks such as spreadsheets and checkbooks and tax planning and reporting and accounting, auctions, in all their forms, account access to bank accounts, brokerage accounts, mortgage accounts, credit accounts, investment tools and indicators, billing and sales management and customer tracking and invoicing and reporting and shipping; catalogs, directories, database access and update, search engines; communications applications like chat and email and paging and web browsing, and voice over IP and video conferencing and fax over IP and filtering content and fire walling and remote access such as telnet and ftp and ssh and rpc and web services and bulletin boards such as user net and news groups and news services and event notifications such as TV guides, and making connections, like personal ads and reuniting old affiliations like school and church and work and club and neighborhood or other organizations, and natural parents and children separated from them, and genealogy, and web gateways to all of those; control of peripherals such as telephones and scanners and fax modems and cameras and X10 devices and industrial equipment, and providing interfaces for kiosks, touchscreens, video catalogs, point of purchase systems, barcode reader, automated teller machines, automobiles, airplanes, and other vehicles and machines; games; organizational tools like calendars, planners, contact mgmt, sales tracking, maps, directions, birthday reminders, task reminders, Visio, Plano gram, flow charts, organizational charts, project mgmt, forms such as wills, contracts, business plans; conversion of speech to text, text to speech, physical text to electronic text, electronic text to physical text; provide means for one click checkout, or for hyper linking to other sources of information.

[0330] One of the embodiments of the present invention includes an apparatus capable of providing the method according to the present invention. A more specific embodiment is that the apparatus may be, for example, a computer system, among the others mentioned above. FIG. 11 illustrates a computer system 1101 upon which an embodiment of the present invention (entirely or partially) may be implemented. The computer system 1101 includes a bus

1102 or other communication mechanism for communicating information, and a processor 1103 coupled with the bus 1102 for processing the information. The computer system 1101 also includes a main memory 1104, such as a random access memory (RAM) or other dynamic storage device (e.g., dynamic RAM (DRAM), static RAM (SRAM), and synchronous DRAM (SDRAM)), coupled to the bus 1102 for storing information and instructions to be executed by processor 1103. In addition, the main memory 1104 may be used for storing temporary variables or other intermediate information during the execution of instructions by the processor 1103. The computer system 1101 further includes a read only memory (ROM) 1105 or other static storage device (e.g., programmable ROM (PROM), erasable PROM (EPROM), and electrically erasable PROM (EEPROM)) coupled to the bus 1102 for storing static information and instructions for the processor 1103.

[0331] The computer system 1101 also includes a disk controller 1106 coupled to the bus 1102 to control one or more storage devices for storing information and instructions, such as a magnetic hard disk 1107, and a removable media drive 1108 (e.g., floppy disk drive, read-only compact disc drive, read/write compact disc drive, compact disc jukebox, tape drive, and removable magneto-optical drive). The storage devices may be added to the computer system 1101 using an appropriate device interface (e.g., small computer system interface (SCSI), integrated device electronics (IDE), enhanced-IDE (E-IDE), direct memory access (DMA), or ultra-DMA). Or serial ATA, or firewire, or USB or fibre channel.

[0332] The computer system 1101 may also include special purpose logic devices (e.g., application specific integrated circuits (ASICs)) or configurable logic devices (e.g., simple programmable logic devices (SPLDs), complex programmable logic devices (CPLDs), and field programmable gate arrays (FPGAs)).

[0333] The computer system 1101 may also include a display controller 1109 coupled to the bus 1102 to control a display 1110, such as a cathode ray tube (CRT), for displaying information to a computer user. The computer system includes input devices, such as a keyboard 1111 and a pointing device 1112, for interacting with a computer user and providing information to the processor 1103. The pointing device 1112, for example, may be a mouse, a trackball, or a pointing stick for communicating direction information and command selections to the processor 1103 and for controlling cursor movement on the display 1110. In addition, a printer may provide printed listings of data stored and/or generated by the computer system 1101.

[0334] The computer system 1101 performs a portion or all of the processing steps of the invention in response to the processor 1103 executing one or more sequences of one or more instructions contained in a memory, such as the main memory 1104. Such instructions may be read into the main memory 1104 from another computer readable medium, such as a hard disk 1107 or a removable media drive 1108. One or more processors in a multi-processing arrangement may also be employed to execute the sequences of instructions contained in main memory 1104. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions. Thus, embodiments are not limited to any specific combination of hardware circuitry and software.

[0335] As stated above, the computer system 1101 includes at least one computer readable medium or memory for holding instructions programmed according to the teachings of the invention and for containing data structures, tables, records, or other data described herein. Examples of computer readable media are compact discs, hard disks, floppy disks, tape, magneto-optical disks, PROMs (EPROM, EEPROM, flash EPROM), DRAM, SRAM, SDRAM, or any other magnetic medium, compact discs (e.g., CD-ROM), or any other optical medium, punch cards, paper tape, or other physical medium with patterns of holes, a carrier wave (described below), or any other medium from which a computer can read.

[0336] Stored on any one or on a combination of computer readable media, the present invention includes software for controlling the computer system 1101, for driving a device or devices for implementing the invention, and for enabling the computer system 1101 to interact with a human user. Such software may include, but is not limited to, device drivers, operating systems, development tools, and applications software. Such computer readable media further includes the computer program product of the present invention for performing all or a portion (if processing is distributed) of the processing performed in implementing the invention.

[0337] The computer code devices of the present invention may be any interpretable or executable code mechanism, including but not limited to scripts, interpretable programs, dynamic link libraries (DLLs), Java classes, and complete executable programs. Moreover, parts of the processing of the present invention may be distributed for better performance, reliability, and/or cost.

[0338] The term "computer readable medium" as used herein refers to any medium that participates in providing instructions to the processor 1103 for execution. A computer readable medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. Non-volatile media includes, for example, optical, magnetic disks, and magneto-optical disks, such as the hard disk 1107 or the removable media drive 1108. Volatile media includes dynamic memory, such as the main memory 1104. Transmission media includes coaxial cables, copper wire and fiber optics, including the wires that make up the bus 1102. Transmission media also may also take the form of acoustic or light waves, such as those generated during radio wave and infrared data communications.

[0339] Various forms of computer readable media may be involved in carrying out one or more sequences of one or more instructions to processor 1103 for execution. For example, the instructions may initially be carried on a magnetic disk of a remote computer. The remote computer can load the instructions for implementing all or a portion of the present invention remotely into a dynamic memory and send the instructions over a telephone line using a modem. A modem local to the computer system 1101 may receive the data on the telephone line and use an infrared transmitter to convert the data to an infrared signal. An infrared detector coupled to the bus 1102 can receive the data carried in the infrared signal and place the data on the bus 1102. The bus 1102 carries the data to the main memory 1104, from which the processor 1103 retrieves and executes the instructions. The instructions received by the main memory 1104 may

optionally be stored on storage device 1107 or 1108 either before or after execution by processor 1103.

[0340] The computer system 1101 also includes a communication interface 1113 coupled to the bus 1102. The communication interface 1113 provides a two-way data communication coupling to a network link 1114 that is connected to, for example, a local area network (LAN) 1115, or to another communications network 1116 such as the Internet. For example, the communication interface 1113 may be a network interface card to attach to any packet switched LAN. As another example, the communication interface 1113 may be an asymmetrical digital subscriber line (ADSL) card, an integrated services digital network (ISDN) card or a modem to provide a data communication connection to a corresponding type of communications line. Wireless links may also be implemented. In any such implementation, the communication interface 1113 sends and receives electrical, electromagnetic or optical signals that carry digital data streams representing various types of information.

[0341] The network link 1114 typically provides data communication through one or more networks to other data devices. For example, the network link 1114 may provide a connection to a another computer through a local network 1115 (e.g., a LAN) or through equipment operated by a service provider, which provides communication services through a communications network 1116. In preferred embodiments, the local network 1114 and the communications network 1116 preferably use electrical, electromagnetic, or optical signals that carry digital data streams. The signals through the various networks and the signals on the network link 1114 and through the communication interface 1113, which carry the digital data to and from the computer system 1101, are exemplary forms of carrier waves transporting the information. The computer system 1101 can transmit and receive data, including program code, through the network(s) 1115 and 1116, the network link 1114 and the communication interface 1113. Moreover, the network link 1114 may provide a connection through a LAN 1115 to a mobile device 1117 such as a personal digital assistant (PDA) laptop computer, or cellular telephone. The LAN communications network 1115 and the communications network 1116 both use electrical, electromagnetic or optical signals that carry digital data streams. The signals through the various networks and the signals on the network link 1114 and through the communication interface 1113, which carry the digital data to and from the system 1101, are exemplary forms of carrier waves transporting the information. The processor system 1101 can transmit notifications and receive data, including program code, through the network(s), the network link 1114 and the communication interface 1113.

[0342] Numerous modifications and variations on the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the accompanying claims, the invention may be practiced otherwise than as specifically described herein. Moreover, English is used as the language to demonstrate exemplified embodiments. It should be understood that the present invention may be utilized for communication within all languages. For example, the following table provides examples of languages in which the present application may be applied.

Language	Population	Language Family	Region
MANDARIN CHINESE	952,000,000	Sino-Tibetan	CHINA
English	470,000,000	Indo-European	Europe/America/etc.
HINDI	418,000,000	Indo-European	INDIA
Spanish	381,000,000	Indo-European	Europe/America
Russian	288,000,000	Indo-European	Europe/Central Asia
Arabic	219,000,000	Afro-Asiatic	Middle East/N Africa
BENGALI	196,000,000	Indo-European	INDIA
Portuguese	182,000,000	Indo-European	Europe/America
Malay	155,000,000	Malayo-Polynesian	Malaya/Indonesia
Japanese	126,000,000	Altaic	Japan
French	124,000,000	Indo-European	Europe
German	121,000,000	Indo-European	Europe
URDU	100,000,000	Indo-European	INDIA
PUNJABI	94,000,000	Indo-European	INDIA
Korean	75,000,000	Altaic	Korea
TELUGU	73,000,000	Dravidian	INDIA
MARATHI	70,000,000	Indo-European	INDIA
TAMIL	69,000,000	Dravidian	INDIA
CANTONESE CHINESE	66,000,000	Sino-Tibetan	CHINA
SHANGHAI CHINESE	65,000,000	Sino-Tibetan	CHINA
Javanese	64,000,000	Malayo-Polynesian	Indonesia
Vietnamese	64,000,000	Austrasiatic	Indo-China
Italian	63,000,000	Indo-European	Europe
Turkish	59,000,000	Altaic	West & Central Asia
Tagalog	53,000,000	Malayo-Polynesian	Philippines
MIN CHINESE	50,000,000	Sino-Tibetan	CHINA
Thai & Lao	50,000,000	Thai	Indo-China
Swahili	48,000,000	Niger-Kordofanian	East Africa
HUNAN CHINESE	48,000,000	Sino-Tibetan	CHINA
Ukrainian	47,000,000	Indo-European	Europe
KANARESE (Kannada)	44,000,000	Dravidian	INDIA
Polish	44,000,000	Indo-European	Europe
BIHARI (Bhojpuri)	42,000,000	Indo-European	INDIA
GUJARATI	41,000,000	Indo-European	INDIA
Hausa	38,000,000	Afro-Asiatic	West Africa
MALAYALAM	35,000,000	Dravidian	INDIA
Persian	34,000,000	Indo-European	Iran/Central Asia
HAKKA CHINESE	34,000,000	Sino-Tibetan	CHINA
ORIYA	32,000,000	Indo-European	INDIA
Burmese	31,000,000	Sino-Tibetan	Burma

[0343] These numbers are from *The WORLD ALMANAC and BOOK OF FACTS* 1995(Funk & Wagnalls, 1994, pp. 598-599); but their table seems to have overlooked Bihari in India and Hunan Chinese, so I have had to use numbers that may now be out of date. General information about world languages may be found in *The Languages of the World*, by Kenneth Katzner (Routledge & Kegan Paul, revised in 1986). There is a lot of uncertainty about the populations for Chinese "dialects." These numbers should be compared with the table for Chinese dialects. Thorough treatments of Chinese may be found in *The Chinese Language, Fact and Fantasy*, by John DeFrancis (University of Hawaii Press, 1984—DeFrancis is one of the major living scholars of Chinese) and *The Languages of China*, by S. Robert Ramsey (Princeton University Press, 1987).

[0344] The population figures for all these languages are for those who speak them as either first or second languages.

Several languages are widely used as second languages (especially English, French, Russian, Arabic, Malay, and Swahili), and it is hard to provide numbers for some of them in that capacity. Since Arabic is the language of Islâm, Moslems around the world, as far afield as Indonesia (which is now over 90% Moslem), learn it for religious reasons. By some estimates, up to a billion people could have some competence in English.

[0345] The figure for Mandarin includes other Chinese (more than a hundred million) who have learned Mandarin as a second language. Some languages started out as trade languages which were essentially second languages. They continue to have a far smaller number of speakers as first languages than as second. Malay may only be the first language of 50 million people. But as a trade language which has become the national language of Malaysia and Indonesia (called Bahasa Malaysia and Bahasa Indonesia respectively), Malay is one of the major languages of the world. Swahili, which has a large Arabic component (Sawâhîlî in Arabic means "coastal"), may have fewer than ten million speakers as a first language, and thus would not otherwise have appeared on this list.

What is claimed is:

1. A method of mutely communicating in a spoken language, comprising:

selecting a word of a language to communicate;

gathering a plurality of recognizable objects each eliciting a sound of the word to be communicated; and

arranging the plurality of recognizable objects such that at least one object corresponds to each sound of the word and the objects are arranged in a sequence that corresponds to a spoken sequence of the sounds of the word.

2. The method of claim 1, wherein said selecting comprises selecting a word from existing text to be mutely communicated using said method.

3. The method of claim 1, wherein said selecting comprises selecting a word from audio speech to be mutely communicated using said method.

4. The method of claim 1, wherein said gathering comprises gathering a plurality of tangible objects each eliciting a sound of said word.

5. The method of claim 4, wherein said gathering comprises gathering a plurality of three dimensional objects each having a shape that elicits a sound of said word.

6. The method of claim 4, wherein said gathering comprises gathering a plurality of objects each having a pictorial representation thereon, which elicits a sound of said word.

7. The method of claim 4, wherein said gathering comprises gathering a plurality of objects each having a tactile feature that elicits a sound of said word.

8. The method of claim 1, wherein said gathering comprises gathering a plurality of non-tangible images each eliciting a sound of said word.

9. The method of claim 8, wherein said gathering comprises gathering a plurality of images displayed on a display screen, each image eliciting a sound of said word.

10. The method of claim 1, wherein said gathering comprises gathering a plurality of objects from a predefined set of objects determined to represent substantially all sounds of the spoken language.

**11.** The method of claim 1, wherein said gathering comprises gathering a plurality of objects each eliciting a sound of said word according to a predefined set of rules including at least one of the following:

for an isolated object, the first sound of a word of the spoken language associated with said isolated object is the sound elicited by the object, and

for linked objects, the common sound of words of the spoken language associated with each linked object is the sound elicited by the linked objects.

**12.** The method of claim 1, wherein said arranging comprises physically arranging the objects sequentially in a direction that the spoken language is textually written.

**13.** The method of claim 1, further comprising determining an obscure sound and a common sound of the word.

**14.** The method of claim 13, wherein said arranging comprises linking more than one of said recognizable objects to represent said obscure sound, said linked objects having said obscure sound in common.

**15.** The method of claim 13, wherein said determining an obscure sound comprises determining a sound that cannot be represented by the beginning sound of any recognizable object.

**16.** The method of claim 13, wherein said determining an obscure sound comprises determining an obscure sound based on a predetermined set of sounds that have been defined as difficult to elicit by use of a recognizable object.

**17.** The method of claim 1, wherein said selecting a word comprises selecting a plurality of words to communicate a phrase of the language, said method further comprising

gathering a plurality of recognizable objects each eliciting a sound of the phrase to be communicated; and

arranging the plurality of recognizable objects such that at least one object corresponds to each sound of the phrase and the objects are arranged in a sequence that corresponds to the spoken sequence of sounds of the phrase.

**18.** The method of claim 17, wherein said arranging comprises arranging the plurality of objects in groups corresponding to each word of the phrase.

**19.** A method of reading a spoken language, comprising:

analyzing an arrangement of recognizable objects organized in sequence;

determining a sound to be elicited by each of said recognizable objects according to a predetermined set of rules;

blending said sounds elicited by each of the recognizable objects according to said sequence of the recognizable objects;

determining the word of the spoken language based on said blending.

**20.** The method of claim 19, wherein said determining a sound to be elicited by each of said recognizable objects according to a predetermined set of rules including at least one of the following:

for an isolated object, the first sound of a word of the spoken language associated with said isolated object is the sound elicited by the object, and

for linked objects, the common sound of words of the spoken language associated with each linked object is the sound elicited by the linked objects.

**21.** A system for mutely communicating in a spoken language, comprising:

a memory configured to store data configured to facilitate mute communication in said spoken language;

a display screen configured to display recognizable objects used for mute communication in said spoken language; and

a processor configured to:

select a word of a language to communicate;

gathering a plurality of said recognizable objects each eliciting a sound of the word to be communicated; and

display the plurality of recognizable objects in an arrangement on the display screen such that at least one object corresponds to each sound of the word and the objects are arranged in a sequence that corresponds to a spoken sequence of the sounds of the word.

**22.** The system of claim 21, wherein said processor is configured to select by selecting a word from existing text stored in said memory to be mutely communicated using said system.

**23.** The system of claim 21, wherein said processor is configured to select selecting a word from audio speech stored in said memory to be mutely communicated using said system.

**24.** The system of claim 21, wherein said processor is configured to gather by gathering from memory a plurality of images each eliciting a sound of said word, and display said images on said display screen.

**25.** The system of claim 21, wherein said processor is configured to gather by gathering a plurality of objects from a predefined set of objects determined to represent substantially all sounds of the spoken language, said predefined set of objects being stored in said memory.

**26.** The system of claim 21, wherein said processor is configured to gather by gathering a plurality of objects each eliciting a sound of said word according to a predefined set of rules including at least one of the following:

for an isolated object, the first sound of a word of the spoken language associated with said isolated object is the sound elicited by the object, and

for linked objects, the common sound of words of the spoken language associated with each linked object is the sound elicited by the linked objects.

**27.** The system of claim 21, wherein said processor is configured to arrange by spatially arranging the objects on the display screen sequentially in a direction that the spoken language is textually written.

**28.** The system of claim 21, wherein said processor is further configured to determine an obscure sound and a common sound of the word.

**29.** The system of claim 28, wherein said processor is configured to arrange by linking more than one of said recognizable objects to represent said obscure sound, said linked objects having said obscure sound in common.

**30.** The system of claim 28, wherein processor is configured to determine an obscure sound by determining a sound that cannot be represented by the beginning sound of any recognizable object.

**31.** The system of claim 28, wherein said processor is configured to determine an obscure sound based on a predetermined set of sounds that have been defined as difficult to elicit by use of a recognizable object.

**32.** The system of claim 21, wherein said processor is configured to select a word by selecting a plurality of words to communicate a phrase of the language, said processor further configured to:

gather a plurality of recognizable objects each eliciting a sound of the phrase to be communicated; and

arranging the plurality of recognizable objects on the display screen such that at least one object corresponds to each sound of the phrase and the objects are arranged in a sequence that corresponds to the spoken sequence of sounds of the phrase.

**33.** The system of claim 32, wherein said processor arranges by arranging the plurality of objects in groups corresponding to each word of the phrase.

**34.** The system of claim 21, farther comprising at least one of the following:

a scanning device,

an optical character recognition engine,

a representation engine as described in claim,  
a presentation engine as described in claim, and  
a text to speech engine for sound output.

**35.** The method of claim 19, wherein said analyzing comprises analyzing an arrangement of recognizable objects organized in sequence on a display screen

**36.** A computer readable medium containing program instructions for execution on a computer system, which when executed by the computer system, cause the computer system to perform the steps in the method recited in any one of claims 1-18.

**37.** A system for mutely communicating in a spoken language, comprising:

means for selecting a word of a language to communicate;  
means for gathering a plurality of recognizable objects each eliciting a sound of the word to be communicated;  
and

means for arranging the plurality of recognizable objects such that at least one object corresponds to each sound of the word and the objects are arranged in a sequence that corresponds to a spoken sequence of the sounds of the word.

\* \* \* \* \*



US 20030031988A1

(19) **United States**

(12) **Patent Application Publication**

Marcus et al.

(10) **Pub. No.: US 2003/0031988 A1**

(43) **Pub. Date:** **Feb. 13, 2003**

(54) **CHARACTER RECOGNITION  
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(21) Appl. No.: **10/260,903**

(22) Filed: **Sep. 30, 2002**

**Related U.S. Application Data**

(63) Continuation of application No. 09/127,111, filed on Jul. 31, 1998, now Pat. No. 6,464,503, which is a continuation of application No. 08/890,294, filed on Jul. 9, 1997, now Pat. No. 5,823,782.

**Publication Classification**

(51) Int. Cl.<sup>7</sup> ..... **G09B 19/00**  
(52) U.S. Cl. ..... **434/156**

(57) **ABSTRACT**

A system where a child or other individual arranges one or more computer-recognizable characters on a working platform to spell words or provide a mathematical result in response to computer generated questions or prompts, the system then indicating whether the words or mathematical result is correct.

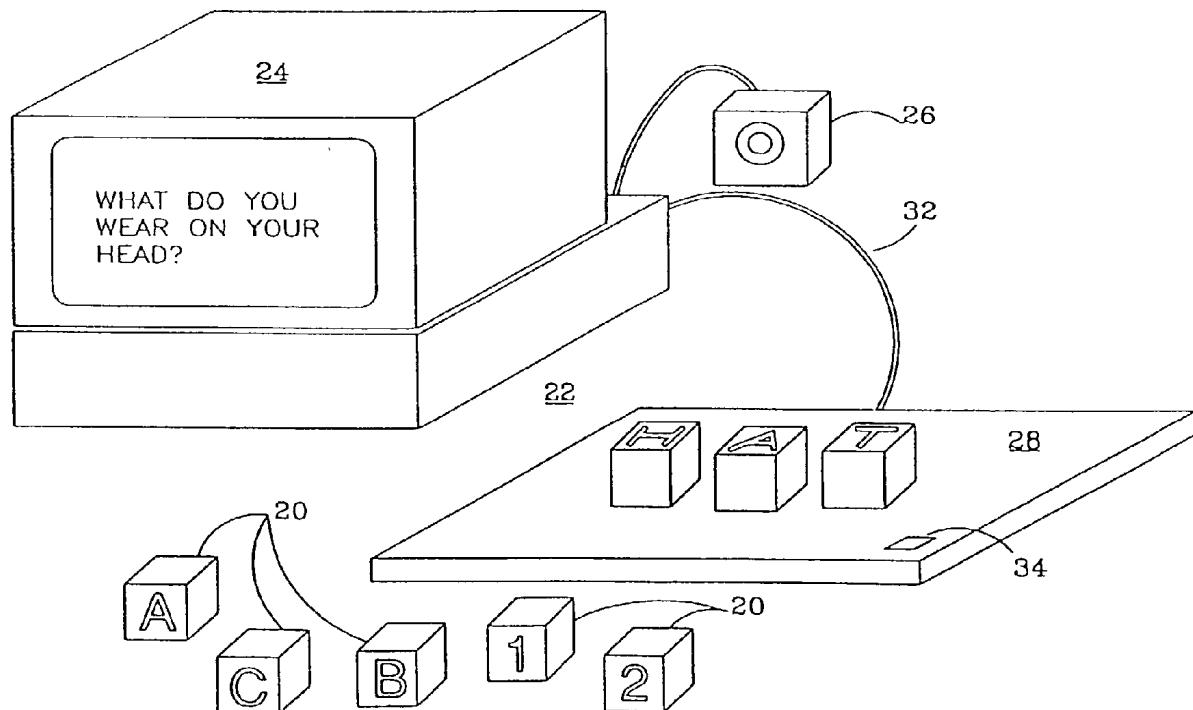


Fig. 1

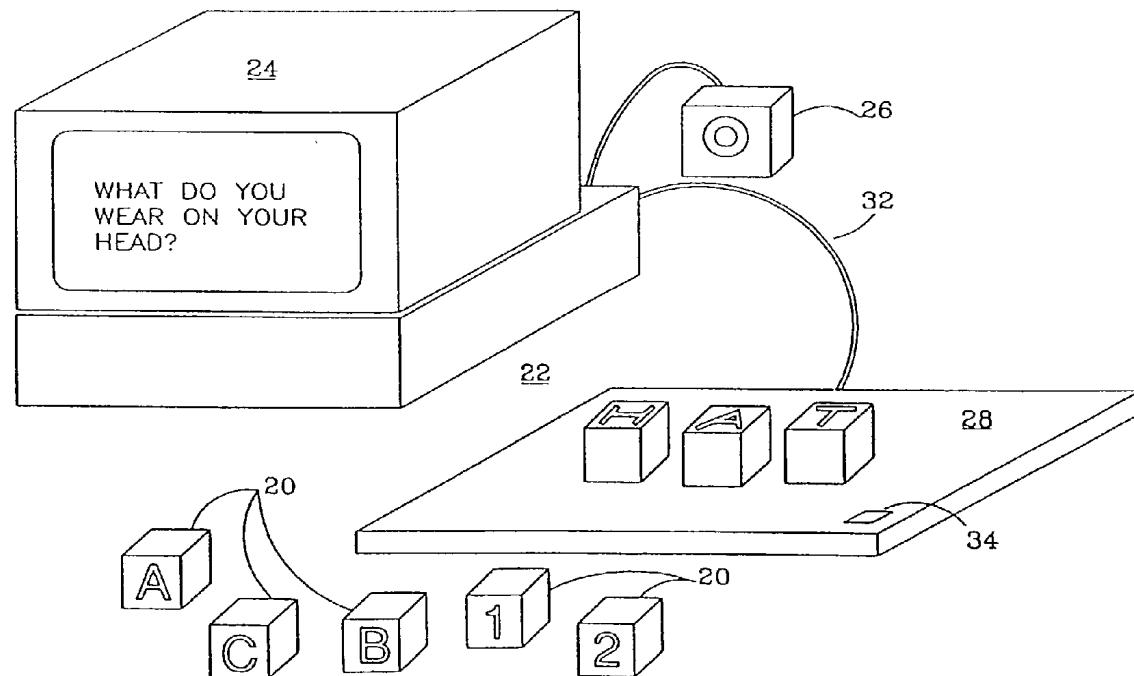


Fig. 2

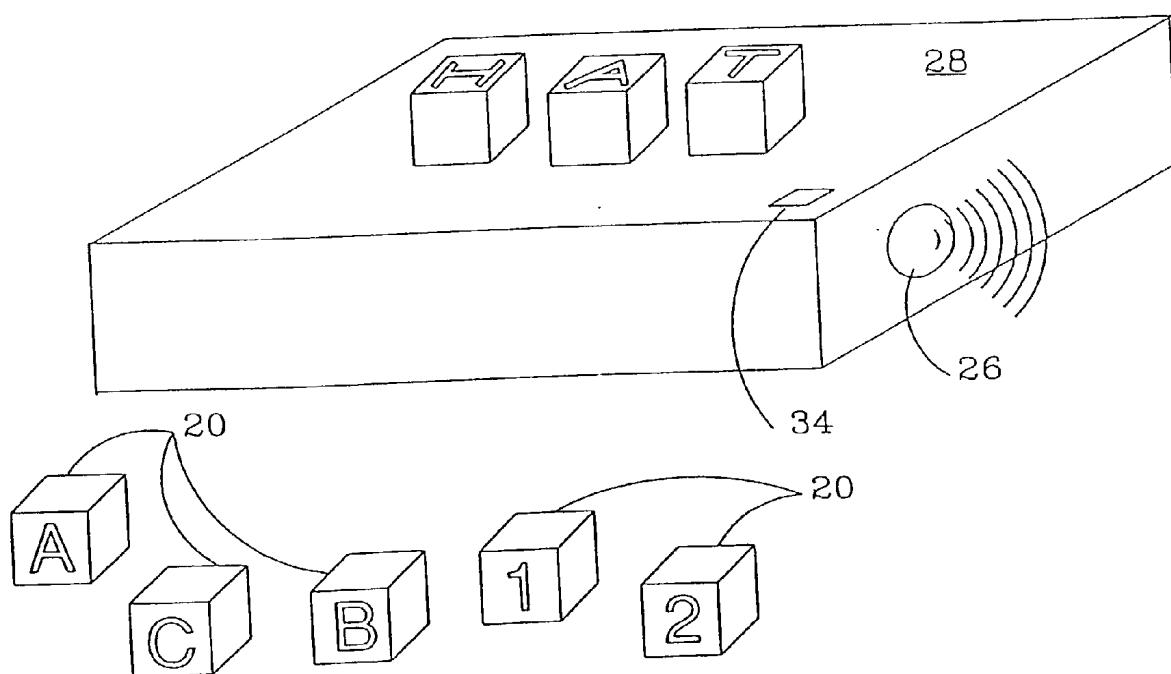
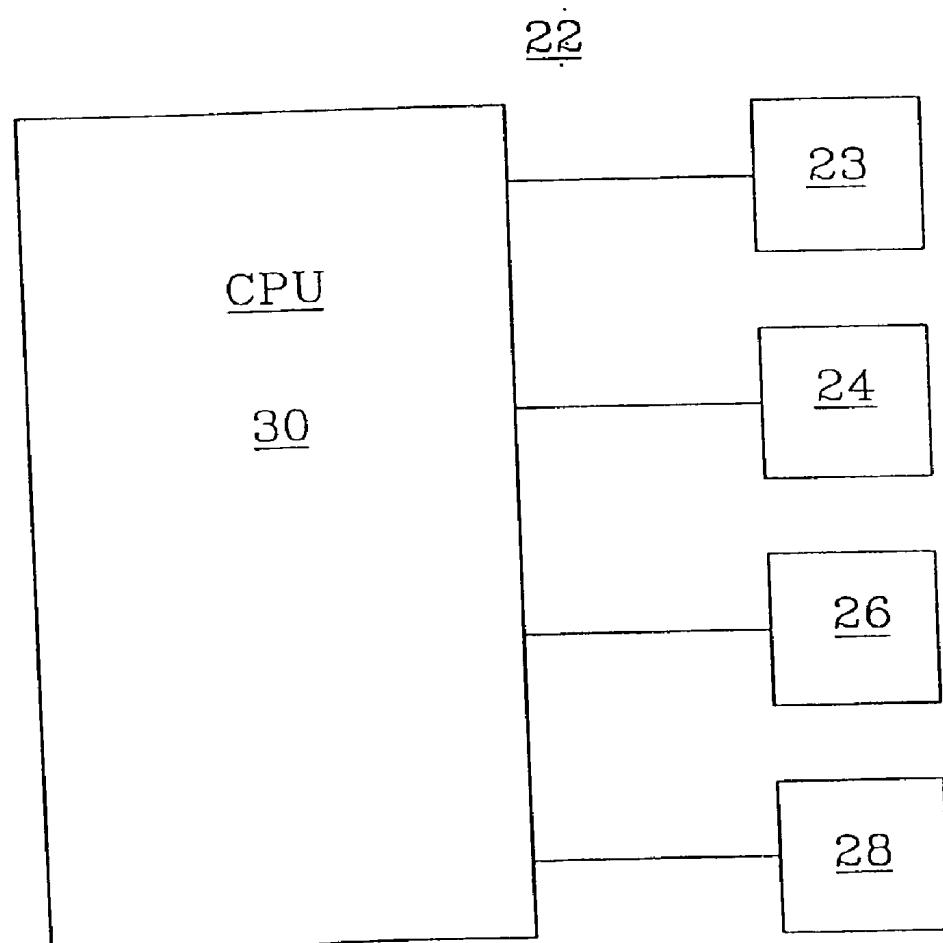


Fig. 3



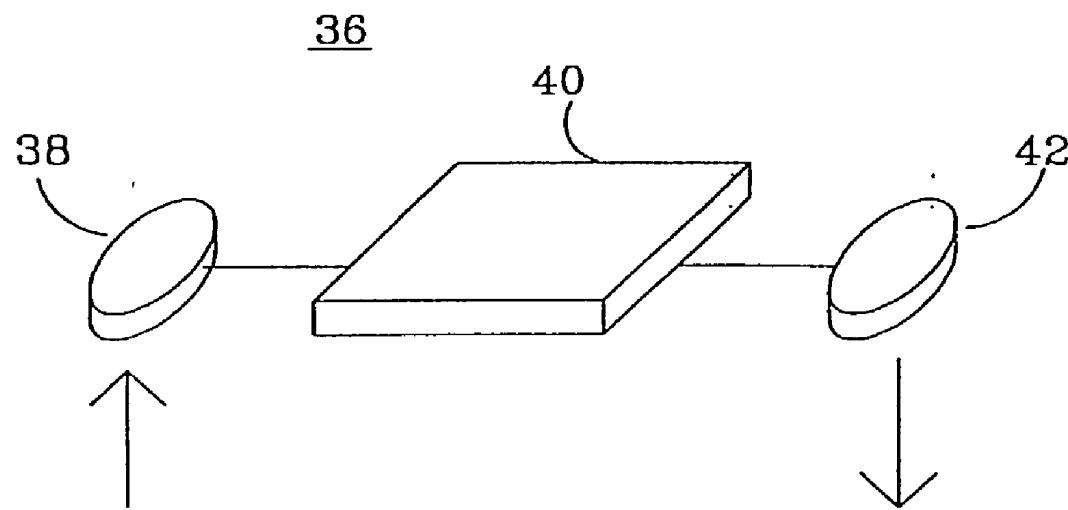


Fig. 4

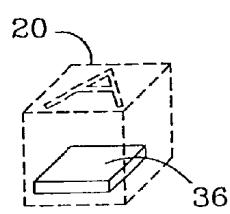


Fig. 5

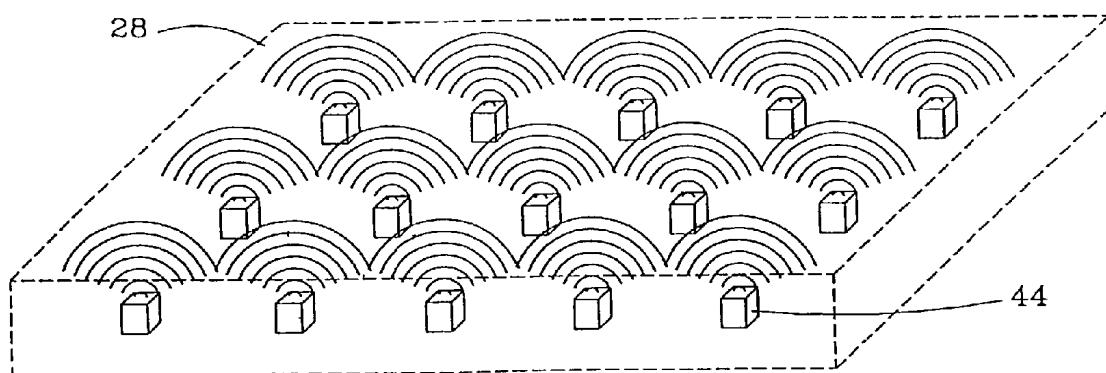


Fig. 6

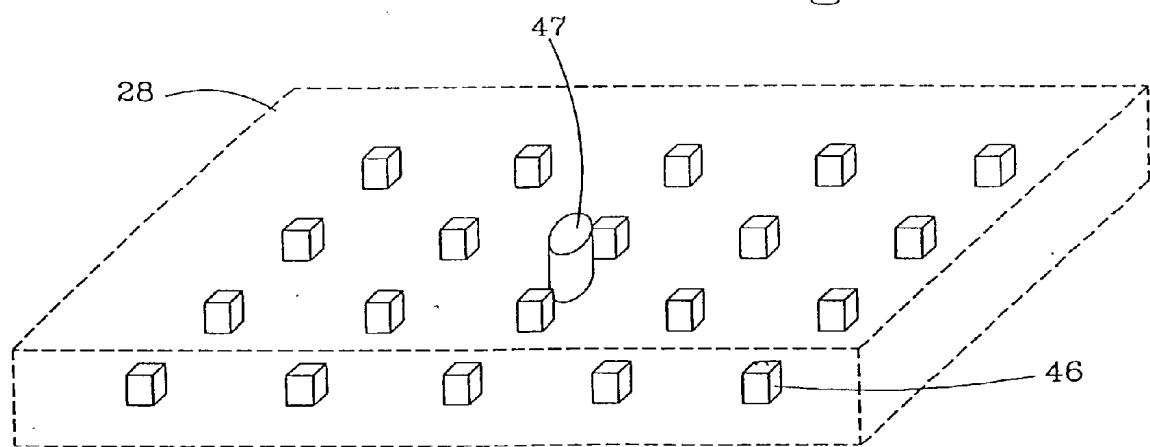


Fig. 7

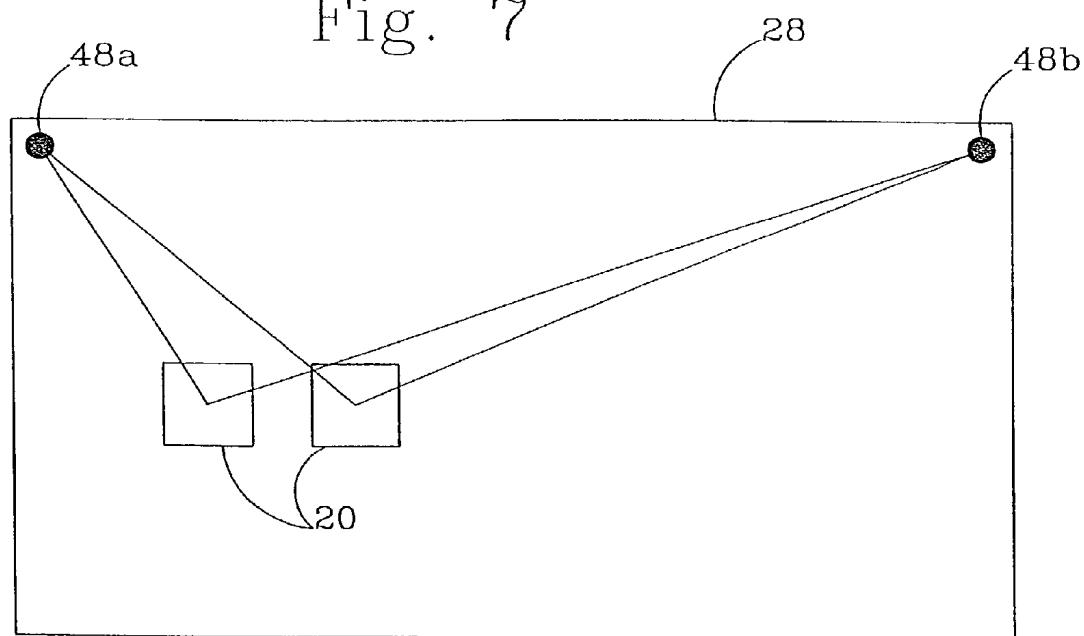
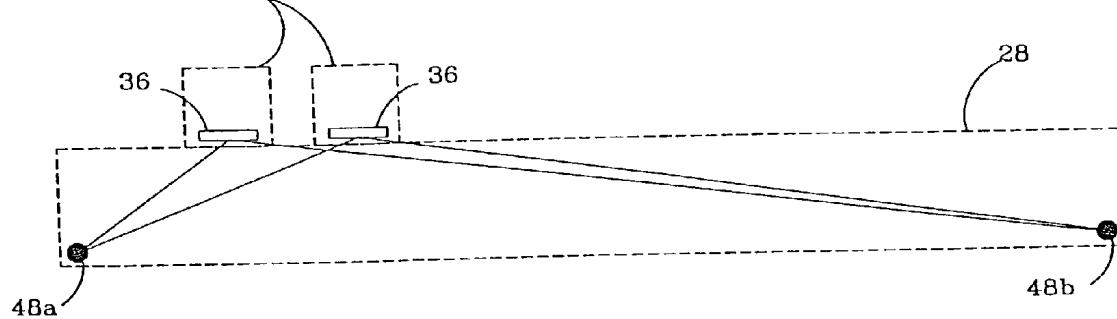


Fig. 8



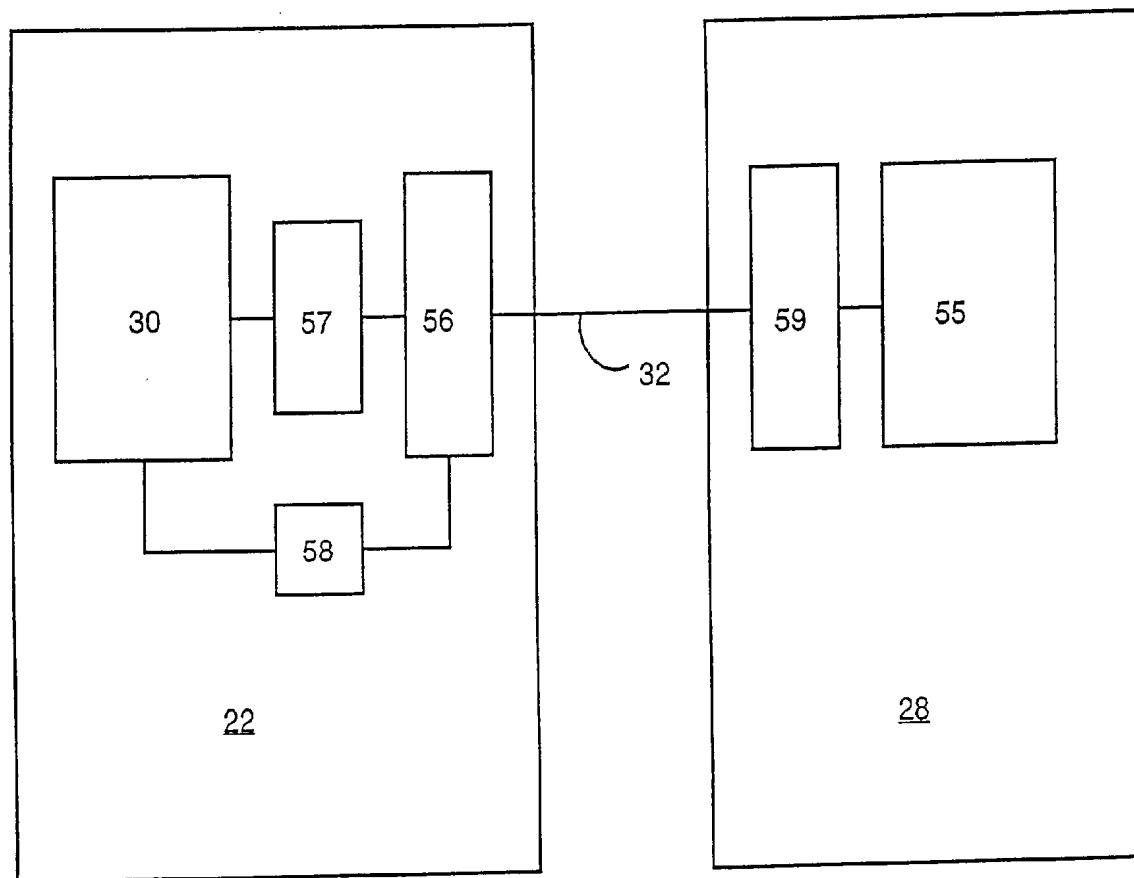


Fig. 9

## CHARACTER RECOGNITION EDUCATIONAL SYSTEM

### BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to an educational system for teaching children language and/or arithmetic, and in particular to a system where a child arranges one or more computer-recognizable characters on a working platform to spell words or provide a mathematical result in response to computer generated questions or prompts, the system then indicating whether the words or mathematical result is correct.

[0003] 2. Description of the Related Art

[0004] As computers continue to grow faster and smarter and smaller, they have become omnipresent, reaching people of all shapes and sizes. Nevertheless, there remains one unchanging constant: in order for the computer to provide the information or operate as desired, some type of data must be provided to the computer. From punchcards in the late 60's and 70's to teletypes of the 70's and 80's to CRTs of the 80's and to mouses and keyboards of today, there always remains a way for the user to enter data into the computer.

[0005] There has been one segment of the population that has largely been excluded from the computer revolution, the young child. This is true primarily for two reasons. First, young children have not yet developed the mental capabilities or the motor skills to interact well with conventional computers, which require data to be entered, for example via the key board or mouse, in a fixed format. Secondly, young children are interested and entertained by simple sensory input, and the vast resources offered by conventional computers are generally too advanced to be of interest to them.

[0006] One simple sensory input of great interest to children is the sense of touch. It is why young children are commonly more interested in the box or wrapping of a gift than the actual gift contained therein. Several games have been developed which indulge a child's sense of touch, such as for example those including building blocks. Some such tactile systems also include letters in an attempt to educate a child while they are using the blocks. However, such tactile systems are ineffective without adult instruction as to what the letters represent. Moreover, the inventors of the present invention are unaware of any such tactile systems that work in combination with the vast resources provided by a computer.

### SUMMARY OF THE INVENTION

[0007] It is therefore an object of the present invention to provide an easy to use, safe and fun computer data entry device for children.

[0008] It is a further object of the present invention to make learning enjoyable for children by providing an educational system including tactile blocks that may be handled by a child indulges a child's enjoyment of.

[0009] It is another object of the present invention to combine a tactile educational system with the vast resources provided by a computer.

[0010] It is a further object of the present invention to provide a system for educating children, which may be used by a child without the aid or presence of an adult, and which may be used by a child at his or her own pace.

[0011] These and other objects are accomplished by the present invention, which takes advantage of the fact that children enjoy the tactile feel of small hand-held blocks in combination with a system to teach them language and/or arithmetic. According to the invention, a working platform has a surface for receiving a plurality of blocks, which blocks include characters on one or more surfaces thereof. When a block is placed on the working platform, the platform is capable of recognizing the location of the block, and the identification of the block.

[0012] The blocks are designed to look and feel like the spelling blocks that are typically found on the market today—i.e., they may be made of wood or plastic and easily fit into young child's hand; they have big, bright letters or pictures or symbols etched or displayed in a variety of colors on one or more of the surfaces of the blocks.

[0013] Preferably, each block includes directly beneath the surface an identification device for each character on the block that is capable of transmitting a signal uniquely representative of the character. When a particular block is placed on the working platform in a particular location, a sensor associated with that location detects the identification of the block.

[0014] The working platform includes a data processing device such as a computer, and digital circuitry that receives as an input the location and the identification of the detected block. The digital circuitry converts this information into a computer usable form and sends it via a data line into the computer.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The invention will now be described with reference to the drawings in which:

[0016] FIG. 1 is an isometric representation of the educational system according to the present invention;

[0017] FIG. 2 is an isometric representation of an alternative embodiment of the educational system according to the present invention;

[0018] FIG. 3 is a schematic representation of the processing device according to the present invention;

[0019] FIG. 4 is a schematic representation of the character identification transmission system according to the present invention;

[0020] FIG. 5 is an isometric view of the character identification and block location systems within the character blocks and working platform according to the present invention;

[0021] FIG. 6 is an isometric view of the block location system within the working platform according to an alternative embodiment of the present invention;

[0022] FIG. 7 is a top view of the block location system within the working platform according to an alternative embodiment of the present invention;

[0023] FIG. 8 is a cross-sectional view of the embodiment of the invention shown in FIG. 7; and

[0024] FIG. 9 is a schematic of a working platform controller according to an embodiment of the invention.

#### DETAILED DESCRIPTION

[0025] The present invention will now be described with reference to FIGS. 1-9 which in general relate to, an education system for teaching children or other individuals language and/or arithmetic. In a preferred embodiment, the system would be utilized by children to spell words and/or to indicate a mathematical result. However, it is understood that the present invention may be utilized by any individual to provide one or more computer-recognizable characters in a desired sequence, generally in response to computer generated questions or prompts.

[0026] Referring now to FIG. 1, the present invention preferably includes a plurality of blocks 20, each containing an alphanumeric character on a surface thereof. The alphanumeric characters may include letters, numbers and/or punctuation marks. In an alternative embodiment of the invention, it is contemplated that the blocks 20 include pictures or symbols such as the sun, moon, animals, etc., in addition to or instead of the alphanumeric characters. In a further embodiment of the present invention, the blocks may include characters made up of raised dots that form braille letters, numbers and other braille characters.

[0027] A character on a surface of a block 20 may be defined by being a different color than the rest of the block surface surrounding the character. The character may additionally be raised or lowered relative to the block surface containing the character. In the embodiment of the invention including braille characters, the characters would of course be at a different elevation relative to the block surface surrounding the characters.

[0028] The blocks 20 are preferably formed of durable and wear-resistant material capable of withstanding substantial shock due to throwing of the block or other similar impacts. Moreover, the blocks are preferably formed of a non-toxic material to avoid injury in the event a child attempts to put the block in his or her mouth. A preferred material is any of several high strength polycarbonates. However, several other materials may be used, such as for example wood and metal. Preferably, the material should allow character-recognition components, certain embodiments of which described hereinafter, to be included with the blocks 20 during block fabrication. Moreover, to make the blocks suitable for use by children, the blocks should be large enough not to fit entirely within a child's mouth, should have all edges rounded, and should be light weight to prevent injury if thrown. It is understood that the above-described characteristics of the blocks that make them suitable for use by children may be omitted in alternative embodiments of the present invention.

[0029] The blocks are used in conjunction with a processing device 22, which may include in part a conventional computer. As shown in the isometric view of FIG. 1 and the schematic representation shown in FIG. 3, the processing device 22 preferably includes a conventional data storage device 23 for storing data, a conventional monitor 24 for visual display, a conventional speaker 26 for audio playback,

a working platform 28 for supporting the blocks 20 and for generating character-identification and block information, and a conventional central processing unit ("CPU") 30 capable of executing software instructions, and capable of communicating with the data storage device 23, the monitor 24, the speaker 26, and the working platform 28. It is understood that one or the other of the monitor 24 and speaker 26 may be omitted in alternative embodiments of the present invention. It is also understood that the data storage device 23 may be omitted in alternative embodiments of the invention.

[0030] Moreover, as shown in the alternative embodiment of FIG. 2, the processing device 22 may be contained within a unitary enclosure, the upper surface of which forms the working platform 28. In the embodiment shown in FIG. 2, the CPU 30, the data storage device 23, and the speaker 26 may be included within the enclosure.

[0031] Once a block is located on the working platform, the platform generates a signal for use by an application program running on the processing device 22 as explained hereinafter. The generation processes in the working platform are controlled by a microprocessor 55 (FIG. 9) in the working platform. As described in greater detail below, the microprocessor 55 scans the working platform for placement of one or more blocks thereon. Upon detection of the placement of a block on the working platform, the microprocessor 55 encodes the location and identification information into an encoded binary message. The message is then sent preferably over a dedicated line 32 to the processing device 22.

[0032] The line 32 is preferably bi-directional so the processing device 22 can send commands or other information to the working platform. For example, in the embodiments described below in which the working platform comprises a touch-sensitive display screen (preferably, flat panel), the bi-directional line allows the processing device 22 to display images on the flat panel screen to facilitate interaction between the application software and user thereof.

[0033] In an alternative embodiment, line 32 may be omitted and replaced by a wireless digital communication link between the processing device 22 and working platform 28. Advantageously, according to this embodiment, the working platform may be used a greater distance from the processing device 22 without concern over extension wires.

[0034] Referring now to FIGS. 1 and 4-5, each block 20 is capable of outputting a character identification signal that uniquely represents the character indicated on the upper surface of the block. The working platform 28 serves to support the blocks 20, to generate character identification information for a block based on the character identification signal output from that block, and also to generate location information indicating the location of a block 20 relative to each other block 20 on the working platform. The working platform forwards the block location information and the character identification information to the processing device 22 via the line 32 coupling the working platform 28 with the CPU 30. The working platform 28 further includes a button 34 which initiates the generation of the block location information and character identification information by the working platform, and also triggers the transfer of the information to the processing device 22. (In an alternative

embodiment, in operation the block location information and the character identification information are continuously generated and transmitted to the processing device 22.) It is understood that structures other than button 34 may be used in alternative embodiments, such as for example a conventional mouse.

[0035] In operation, when a user of the system according to the present invention is finished arranging the blocks 20 on the platform 28, the user depresses button 34, and the generation and transfer of information is initiated. In a preferred embodiment, the block location information and character identification information may converted to a digital signal, which may be transmitted over the line 32 to the CPU 30. The block location and character identification information may be stored and transferred as a multiple bit word, containing both block location information and character identification information. It is understood that the number of bits used to transmit the digital signal may vary in alternative embodiments of the present invention.

[0036] The character identification information and the block location information may be generated by any of several known technologies. As shown in FIGS. 4 and 5, each block 20 preferably includes a transmission system 36 mounted within the block proximate to a surface of the block opposed to the surface including the character. Known transmission systems are sufficiently small so as to allow one or more such systems to be provided within the block. In one embodiment of the present invention, the transmission system includes a receiver 38, a microprocessing chip 40, and a transmitter 42. The microprocessing chip 40 is powered by an energizing signal, in the form of an electromagnetic wave received from the working platform 28, as explained in greater detail below. Receipt of the energizing signal allows the transmission system to operate without an on-board power source. The energizing signal is received in the chip 40 via the receiver 38. Once energized, the chip emits the character identification signal including encoded information uniquely representative of the character on the block. The character information signal is forwarded by the transmitter 42 to the working platform 28, where the signal is converted to a digital signal via an analog-to-digital converter (not shown). Systems such as transmission system 36 are commercially available from Sensor Engineering Co., Hamden, Conn. 06517.

[0037] It is understood that other known technologies may be utilized to communicate the identity of the character on a block 20 to the working platform 28. For example, block 20 may include a transmission system 36 comprised of magnetically encoded data uniquely representative of the character on the block. The magnetically encoded data may be read by one or more sensors such as transducers provided within the working platform. In a further embodiment of the present invention, each block having a different character may have a different weight, which weight is sensed by the working platform to identify the character. It is further contemplated that the working platform and the surface of the block supported adjacent thereto may be transparent so that the transmission system may be any of various optical systems. It is understood that various other known technologies may be used to generate the character identification signal within working platform 28.

[0038] The blocks 20 may include between one and six characters on its respective surfaces. In a preferred embodiment a block 20 will include a transmission system within the block for each of the characters on the surfaces of the block. Thus, for example, in an embodiment where a block 20 includes six characters, the block will include six different transmission systems, with each character/transmission system pair provided proximate to opposed surfaces from each other. It is understood that a block may include less transmission systems than there are characters on the block. In such an embodiment, the transmission system will transmit a particular character identification depending on the orientation of the block 20 on the working platform, i.e., depending on which character was showing on the top surface of the block.

[0039] It is necessary to identify not only the character information, but also the location of a block on the working platform relative to other blocks so as to allow identification of whole words, phrases and/or mathematical results. Therefore, the working platform includes one of various known block location systems. In the embodiment shown in FIG. 5, working platform 28 includes a grid of readers 44. The grid of readers are intended to operate with the transmission system described above including receiver 38, microprocessing chip 40, and transmitter 42. Each reader emits the energizing signal described above to energize the microprocessor chip 40 of a block 20. The microprocessor chip then emits the character identification signal back to the reader via the transmitter 42, whereupon the signal is converted to a digital signal as explained above. Readers such as readers 44 are commercially available from Sensor Engineering Co., Hamden, Conn. 06517.

[0040] The readers 44 and transmission system 36 are configured such that a particular reader 44 will only receive a character identification signal from a block 20 if that block 20 is located proximately thereto. In one embodiment of the invention, a reader will only receive a character identification signal from a block located 2 to 4 inches away. With such a system, it is possible that more than one reader 44 will detect a particular block. However, based on the number of readers within the working platform and the distance range over which a reader will detect a particular block, the microprocessor 55 is able to determine the location of the detected block 20 on the working platform. By identifying which reader receives a particular character identification signal, a block location signal associated with that character identification signal may also be generated.

[0041] It is understood that other known technologies may be utilized to generate the block location signal. For example, as shown in FIG. 6, a grid may be set up as described above, but comprised of a plurality of emitters 46 for emitting the energizing signal. The system may further comprise a single reader 47 for receiving a character identification signal. In order to generate the block location information signal, the microprocessor 55 may control the emitters 46 to fire the energizing signal one emitter at a time. Thus, breaking the emitter grid into a Cartesian plane of x,y coordinates, the emitter at 1,1 fires the energizing signal at a time  $t_1$ . If there is a block 20 located thereabove, its chip is energized and a character identification signal is transmitted to the reader 47. Each emitter 46 fires the energizing signal at a different time. The time  $t$  at which each emitter fires its energizing signal is known. Thus, by identifying the time at which a character identification signal is received in the reader 47, the emitter 46 which caused the generation of

the character identification signal may be determined, and the block location signal may thus be generated.

[0042] In a further embodiment of the present invention, the block location system within the working platform may comprise a single reader, such as for example one of the readers 44 shown in FIG. 5, capable of both transmitting an energizing signal and receiving a character identification signal. In this embodiment, the reader is mounted for translation so that the reader is moved across the entire surface of the working platform. When a character identification signal is sensed by the reader, the position of the reader is noted, and the block location signal associated with the sensed character identification signal is generated.

[0043] Grids of various other known configurations may be utilized in the block location system in alternative embodiments of the invention. For example, a grid of wires may be provided within the working platform, together with a single reader as described above capable of both transmitting an energizing signal and receiving a character identification signal. In this embodiment, in addition to transmitting the character identification signal, each block also emits a magnetic field. Thus, when a block 20 is placed on the working platform, a character identification signal is generated. The magnetic field of that block also generates a current in one or more of the wires of the grid, from which the location of the block may be determined. Alternatively, the grid of wires may be energized sequentially much in the same way as described in connection with FIG. 6 to induce a magnetic field to facilitate detection of the location and identification of the blocks.

[0044] A further embodiment of the present invention is shown in FIGS. 7 and 8, where the position of each block 20 on the working platform may be determined by a pair of sensors 48a and 48b. The sensors 48a, 48b are preferably provided at the upper corners of the working platform. However, the sensors 48a, 48b may alternatively be located at the lower corners, at the left or right corners, or spaced from each other along a side of the working platform. When a reader 44 or an emitter 46 sends an energizing signal to energize a chip 40 as described above, the chip in this embodiment generates both a character identification signal and a proximity signal. The proximity signal is transmitted to both of the sensors 48a and 48b. Once a proximity signal is received in the sensors 48a and 48b, the signal may be used to determine the distance between the chip 40 and the sensors 48a, 48b, respectively, by known technology. Such technologies include surface wave acoustics, measurement of the EM field emanating from the chip, or measurement of the time it takes for the signal to reach the sensors 48a, and 48b. Once the distance between a block 20 and the sensors 48a and 48b, respectively, is determined, the precise location of the block 20 on the working platform 28 may be calculated by triangulation. It is understood that in an embodiment of the invention, the character identification signal may also act as the proximity signal.

[0045] As shown in the cross-sectional view of FIG. 7, the sensors 48a, 48b are preferably located in a lower portion of the working platform 28 so that the proximity signal of a first block does not interfere with a proximity signal of a second block located between the first block and the sensors 48a, 48b.

[0046] It is understood that other known technologies for generating the character identification and block location

information may be used in alternative embodiments of the invention. For example, a further embodiment of the invention incorporating many of the features previously described to identify the location and identification of the placement of a block on the working platform includes the use of a platform that is able to detect the image of the impression of the block on the platform, hereinafter referred to as image-sensitive platforms. Examples of image-sensitive platforms include touch-sensitive surfaces, such as those frequently used in many automated teller machines, or optically-sensitive screens, such as a screen employing one or more arrays of imaging mechanisms, such as charge-coupled devices.

[0047] In this embodiment, the placement of a particular block on the image-sensitive platform creates a unique impression on the image-sensitive screen. The location of this impression is also detectable by the microprocessor 55. For example, in touch-sensitive displays, the controller is able to identify the location of the impression by identifying the pixel or pixels associated with the impressions of the block on the platform. Similarly, in optically-sensitive screens, the controller is able to identify the location of the impression by identifying the array of charge-coupled devices detecting the impression of the block on the platform. The identification of this impression is also detectable by the microprocessor 55. By known imaging techniques, the controller can compare the detected impression information with a plurality of images stored in memory to recognize the identification of the block.

[0048] In an alternative embodiment of the invention, the working platform may have a fixed number of discrete locations into which blocks may only be placed. This is preferably accomplished by providing a fixed number of indentations approximately the size of the block on the surface of the working platform. Typically, the indentations may be a quarter of an inch deep. The indentations may be arranged either in a single row or column or in a multi-dimensional array. According to this embodiment, there would exist only a fixed number of locations on the working platform in which a block may be located. There are advantages associated with this embodiment. Because there are only a fixed number of locations on the working platform in which a block may be placed, the generation of block location and identification information is simplified. In this embodiment, it is possible to have only one reader or sensor associated with each discrete location. The possibility that more than one reader or sensor will detect more than one particular block is greatly reduced or eliminated.

[0049] In operation, when, a block is placed on the working platform and the microprocessor 55 has recognized its location and identification, a series of actions are set into motion. The microprocessor 55 encodes the location and identification information into an binary message compatible with protocols of today's personal computers. An example of such a protocol is set forth in Frank Van Gilluwe, *The PC Undocumented, A Programmer's Guide to I/O, CPUs, and Fixed Memory Areas*. As shown on FIG. 9, the microprocessor 55 sends an encoded message over line 32. The line 32 is connected to the processing device 22 via any of the processing device's many input/output connectors (e.g., mouse connector, keyboard connector or the parallel or serial ports) A controller 56 in the processing device 22 receives the encoded message. The controller 56 translates

the encoded message into a system value and places the value into a buffer **57**. The controller **56** then issues an interrupt request via interrupt control **58** indicating that data is available in output buffer **57**. The operating system of the processing device **22** or application program running thereon uses an interrupt to access the buffer **57** via CPU **30**. Various interrupt functions are used to find and retrieve block information and to determine the block information in the buffer **57**.

[0050] The controller **56** in the processing device **22** communicates with the working platform over line **32**. A synchronized clock line is provided from the controller **56** to the working platform via microprocessor **55** when data are sent from the working platform. Preferably, information over line **32** is sent in an 11-bit serial frame consisting of a start bit, 8 data bits, an odd parity bit and a stop bit. It is understood that different length frames and different configurations of the frames consistent with the processing device **22** are contemplated by the present invention. Internal to the working platform is a first-in-first-out buffer **59**. Preferably, this buffer **59** holds up to 20 bytes of information although a platform buffer of smaller or great size is contemplated within the present invention.

[0051] In the idle state, both the data and clock lines are high. To begin sending the data to the processing device **22**, the working platform sends the start bit on the line **32**. The controller **56** responds by starting the clock line, with the first clock pulse going low. The clock is continued, with the working platform sending each bit in turn. At the 11th clock, the working platform sends the stop bit, and the clock line resumes its idle state.

[0052] Depending on the configuration of the working platform, the data sent from the working platform to the controller **56** normally includes one or more of the following: block identification information, block location information, and/or commands. A placement of a block on the working platform may result in the transmission of identification information alone, location information alone, or both identification and location information to the keyboard controller. While a block is moved on the working platform, the working platform transmits the identification of the moved block and the new locations of the block on the working platform. When a block is removed from the working platform, the working platform will transmit a removal code along with identification of the block removed.

[0053] In operation, the, above-described hardware is preferably used with software applications which, in general, prompt a child to arrange the blocks **20** in a particular configuration on the working platform **28**. The prompt can be, for example, a question that either appears visually on the monitor **24** or is played over the speaker **26**. Once the child has arranged the blocks **20** in what he or she believes to be the correct response to the question, the button **34** is depressed, the microprocessor **55** generates the character identification and block location information, and the result is sent to the CPU **30** (it is understood that the microprocessor **55** may continuously generate character identification and block location information as blocks are set down and lifted from the working platform). The CPU **30** then indicates to the child whether or not that response is correct. If the response is incorrect, the software can prompt the child to try again.

[0054] It is understood that the software may be written to ask a wide variety of questions, appropriate for children of various ages and educational levels. For example, the child may be prompted to spell a series of words, either audibly over the speaker, or by showing a picture of the object to be spelled on the monitor. In one embodiment, the software program may branch to more difficult or simple questions, depending on the number of correct previous answers. In a further embodiment intended for children first learning the alphabet, the child may randomly place a block on the working platform, and the software then audibly indicates the sound of the letter, and shows a number of words including that letter.

[0055] The applications software may be stored within the system on the data storage device **23**, loaded onto the system from a from a floppy drive, or received into the system from a remote location over data transmission lines.

[0056] It is understood that the software and/or hardware according to the present invention may be provided for operation by individuals other than children. For example, as indicated above, the characters on the surfaces of the blocks **20** may be braille characters to teach individuals the braille language.

[0057] In a further embodiment, the blocks **20** may comprise tiles having letters and numbers thereon such as those on the tiles of the board game Scrabble®. In this embodiment, the processing device **22** may be configured to read words formed both vertically and horizontally, and the software may include an encoded dictionary in memory. Thus, the present invention may operate as an electronic Scrabble® game, where letter sequences are formed on the board, and the processing device **22** indicates whether the letter sequences in fact form words found in the stored dictionary.

[0058] Although the invention has been described in detail herein, it should be understood that the invention is not limited to the embodiments herein disclosed. Various changes, substitutions and modifications may be made thereto by those skilled in the art without departing from the spirit or scope of the invention as described and defined by the appended claims.

We claim:

1. An educational system, comprising:
  - an object having at least one visually recognizable symbol thereon;
  - an emitter within said object for emitting a signal uniquely representative of said at least one visually recognizable symbol; and
  - an enclosure, including:
    - a surface for supporting said object, and
    - a processor, including means for receiving said signal from said emitter, said processor capable of identifying said symbol from said signal, and capable of identifying a position of said object on said surface.
2. An apparatus for entering data into a computer, the data being entered via the placement of a plurality of objects on the apparatus, each object having at least one unique item of detectable data associated therewith, comprising:
  - a surface for receiving the placement of an object;

one or more detectors capable of detecting the data associated with an object placed on the surface;  
a line capable of communicating the detected data from the apparatus to the computer.

**3.** An apparatus as in claim 2 whereby the detectors are capable of detecting the location of an object on the surface.

\* \* \* \*



US 20080108028A1

(19) **United States**

(12) **Patent Application Publication**

**Lou-Hsiao**

(10) **Pub. No.: US 2008/0108028 A1**

(43) **Pub. Date: May 8, 2008**

(54) **LANGUAGE LEARNING BOARD GAME**

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(21) Appl. No.: **11/614,611**

(22) Filed: **Dec. 21, 2006**

**Related U.S. Application Data**

(60) Provisional application No. 60/864,512, filed on Nov. 6, 2006.

**Publication Classification**

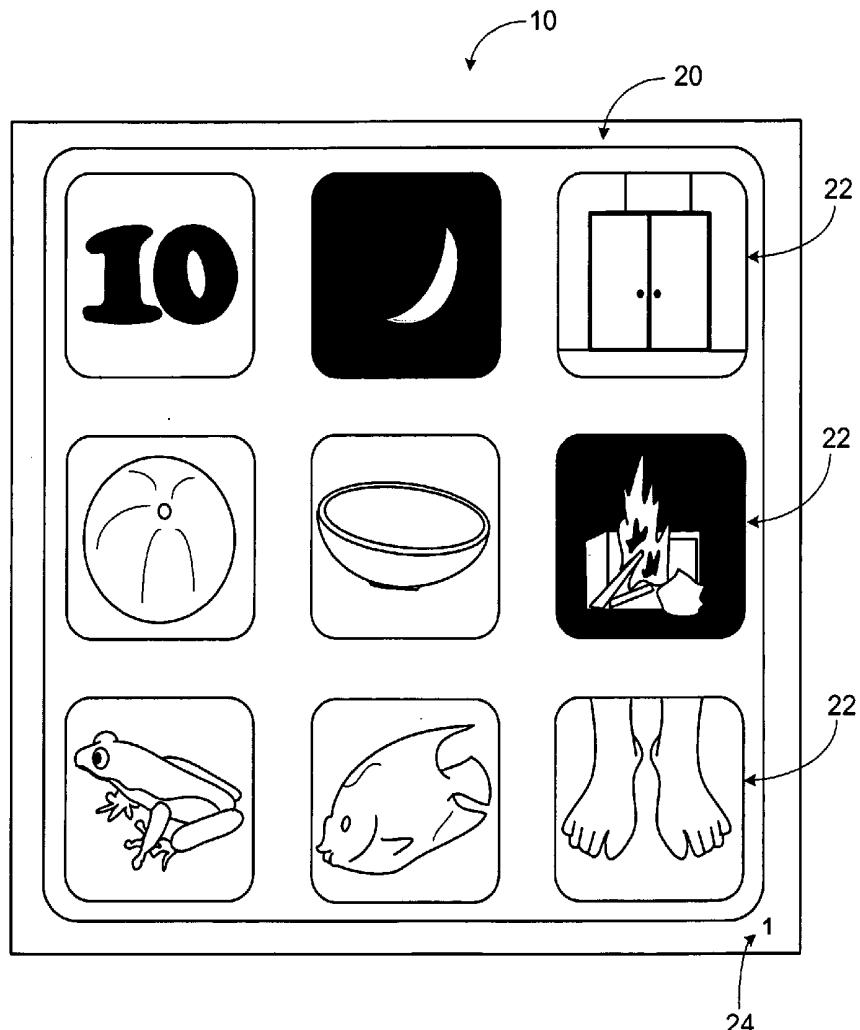
(51) **Int. Cl.**

**G09B 19/22** (2006.01)  
**G09B 19/06** (2006.01)

(52) **U.S. Cl. .... 434/157; 434/129**

(57) **ABSTRACT**

An educational board game that may be played in several ways by either a single player or two or more players in competition with each other is disclosed. Each player plays the game with a game board in conjunction with one or more sets of game cards. The game boards have on one or both surfaces vocabulary elements that may be one or more words or phrases in a first language or that may be an image representing one or more words or phrases. The game boards also may have on one of its surfaces a reference number. A set of game cards may be one-sided, in which case each card may have on a surface one or more words or phrases in a first language. A set of game cards also may be double-sided, in which case the cards may have on a first surface one or more words or phrases in a first language and on a second surface a translation of the words or phrases on the first surface. The double-sided game card also may have on a surface a pronunciation key, a reference number, or both. The game may be played in various implementations depending on the player's age and level of proficiency in that language that is to be learned. An electronic version of the educational board game is also disclosed which includes a device for pronouncing words in a language to be learned.



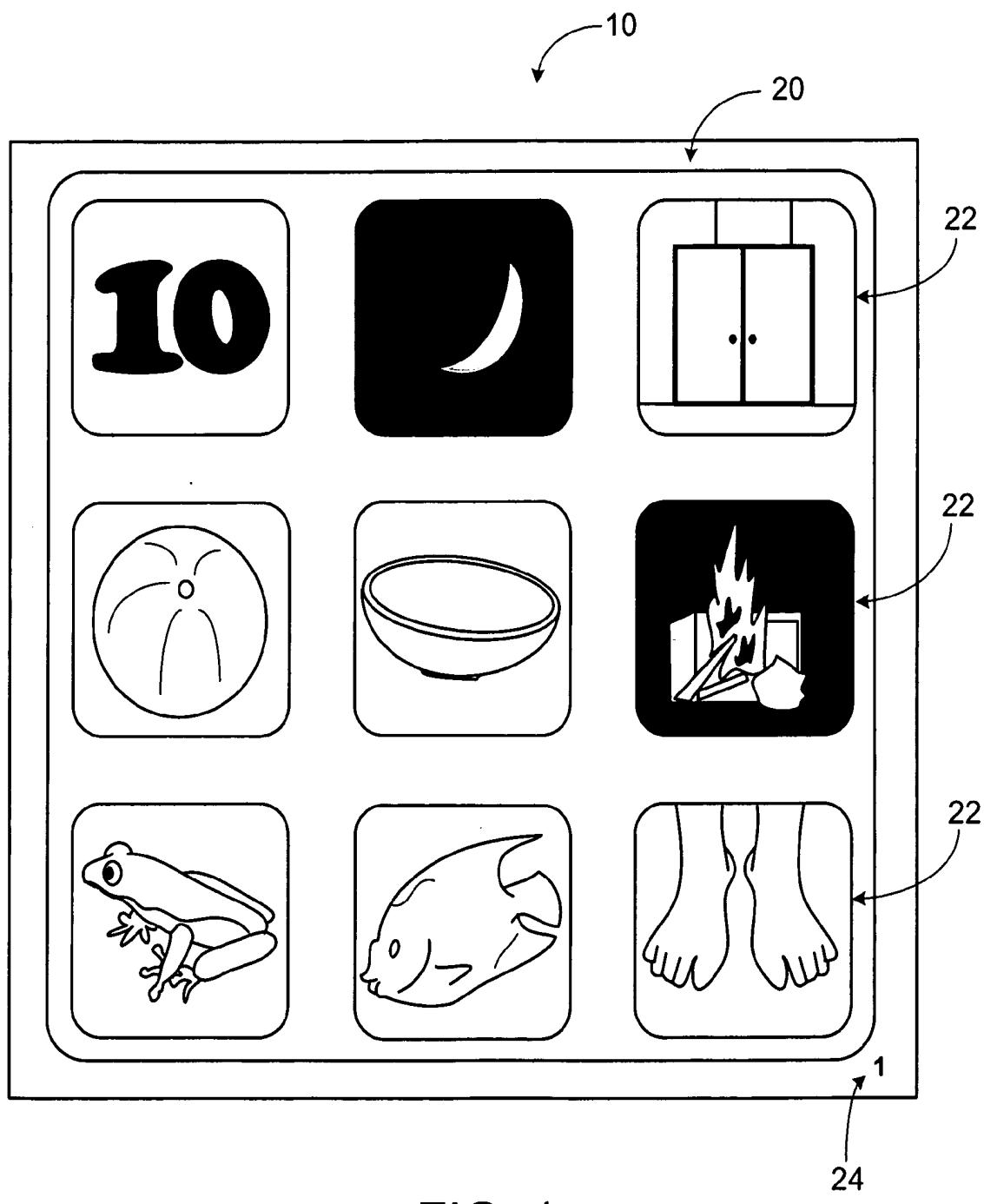


FIG. 1

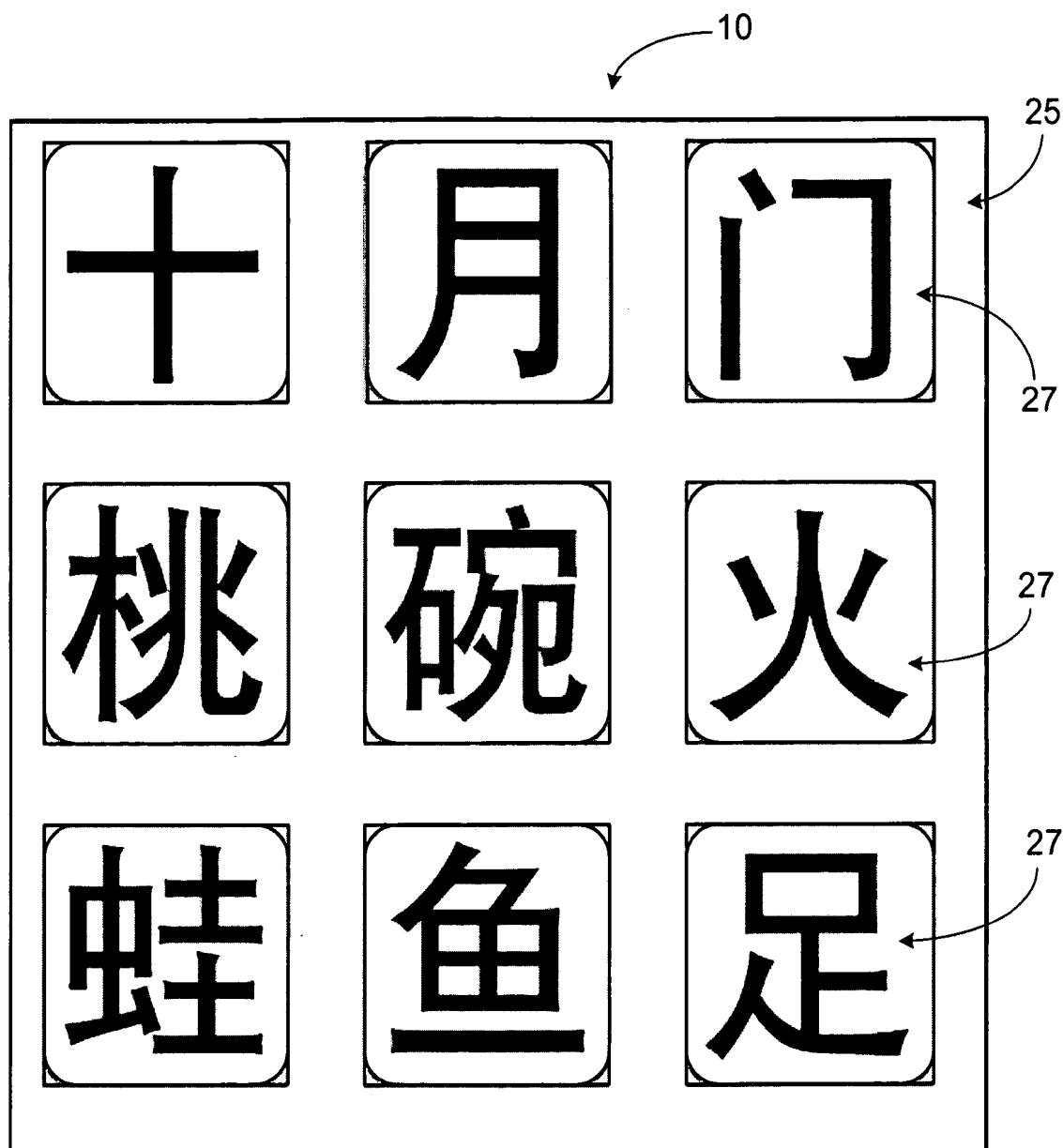


FIG. 2

FIG. 3

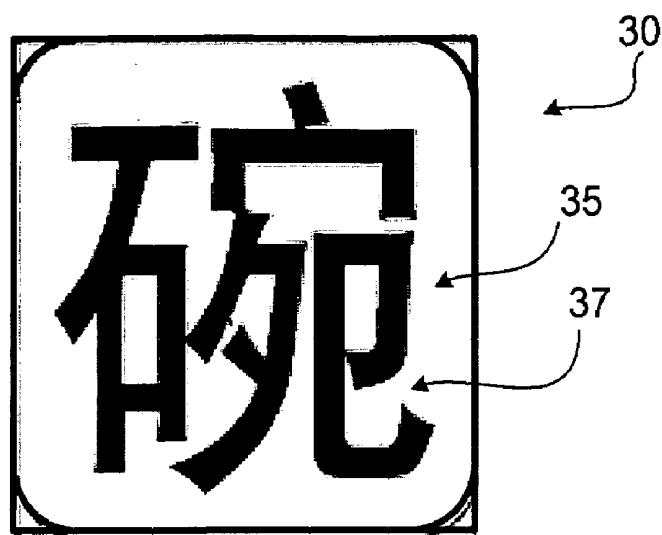


FIG. 4

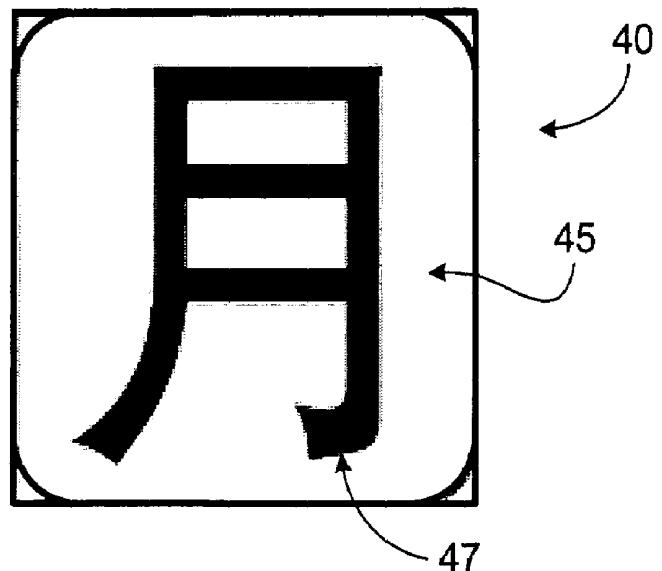
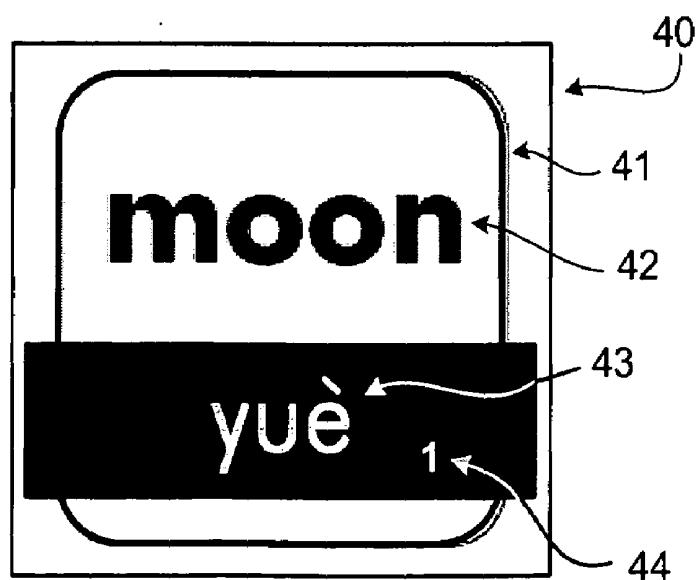


FIG. 5



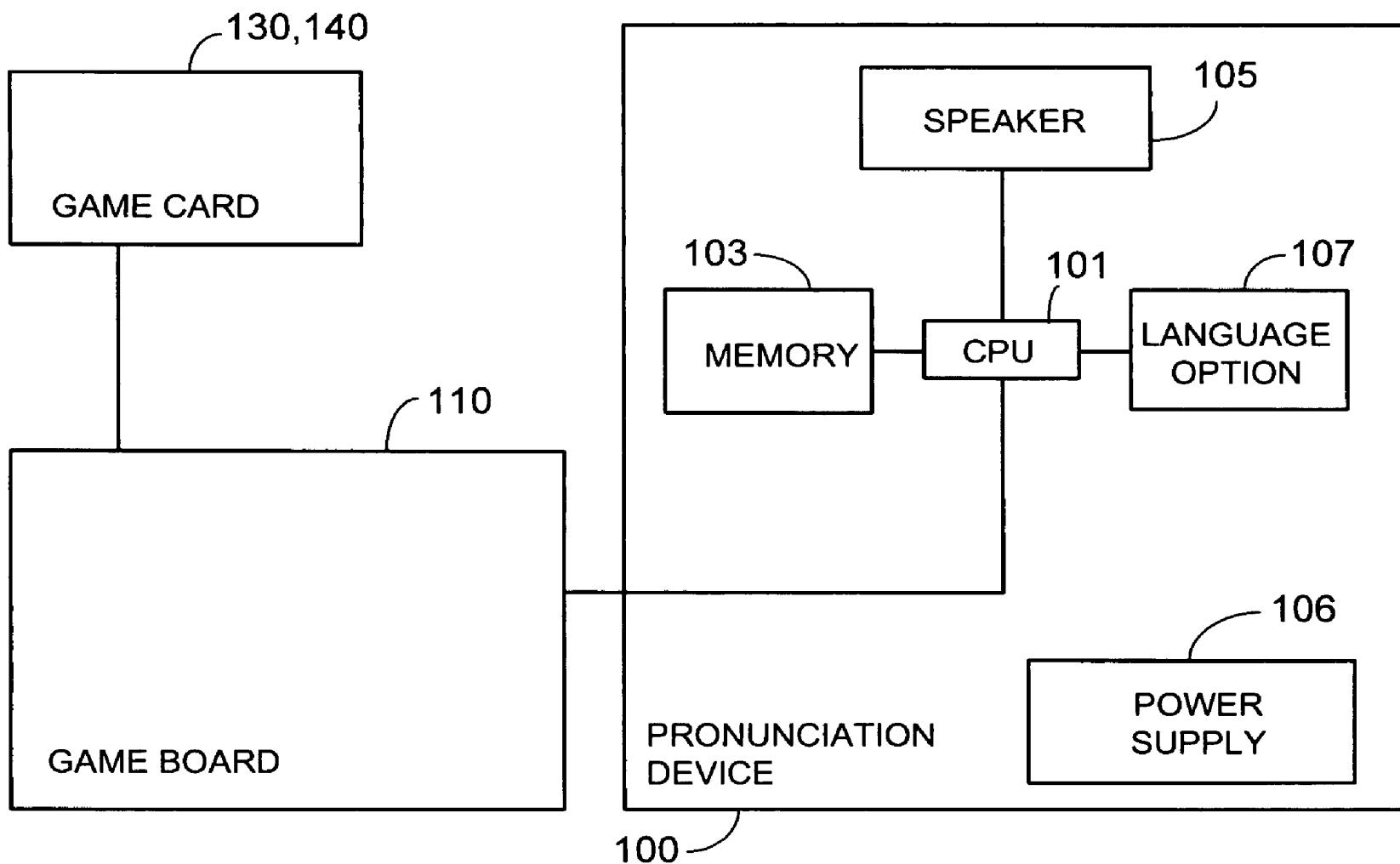


FIG. 6

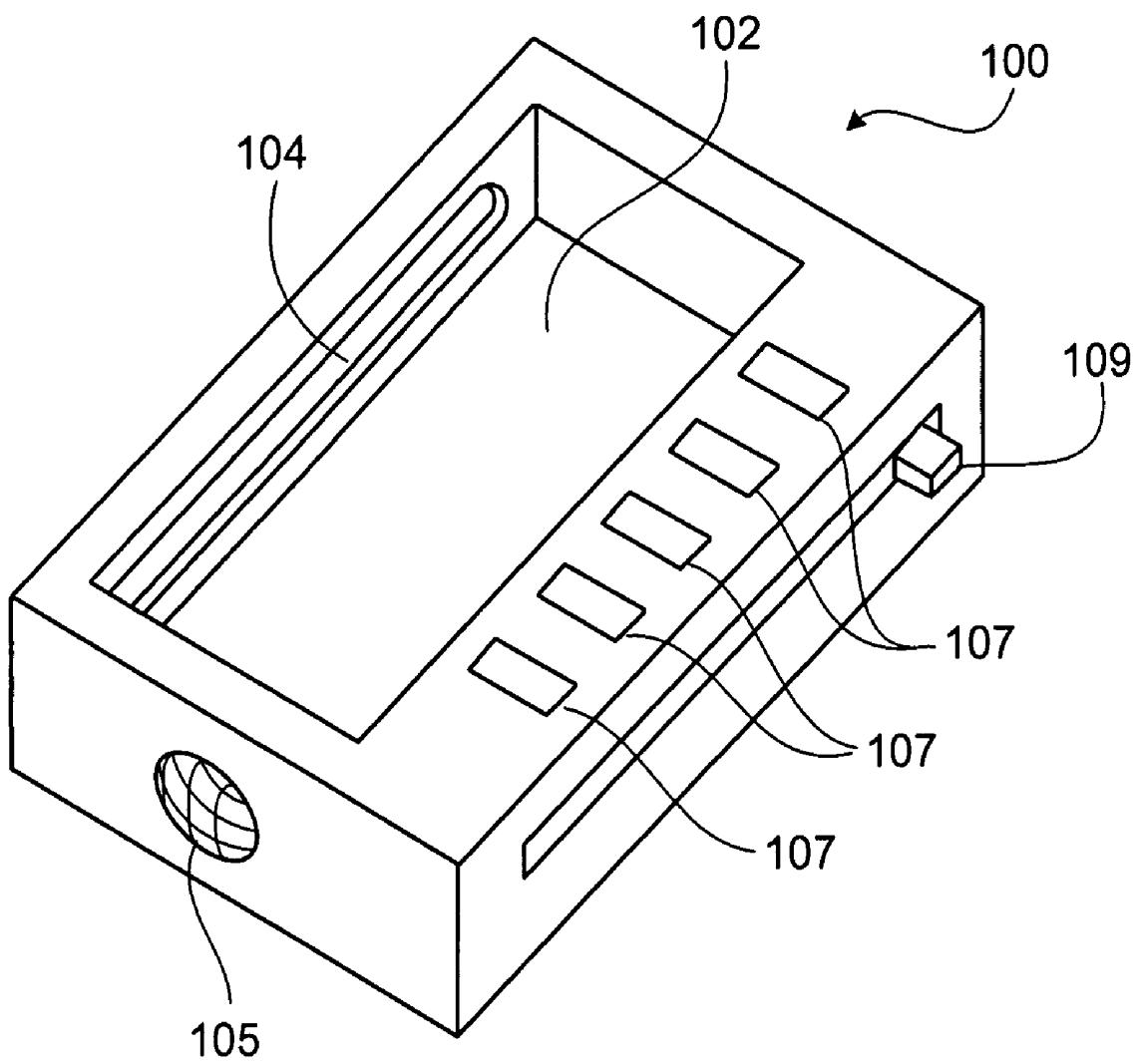


FIG. 7

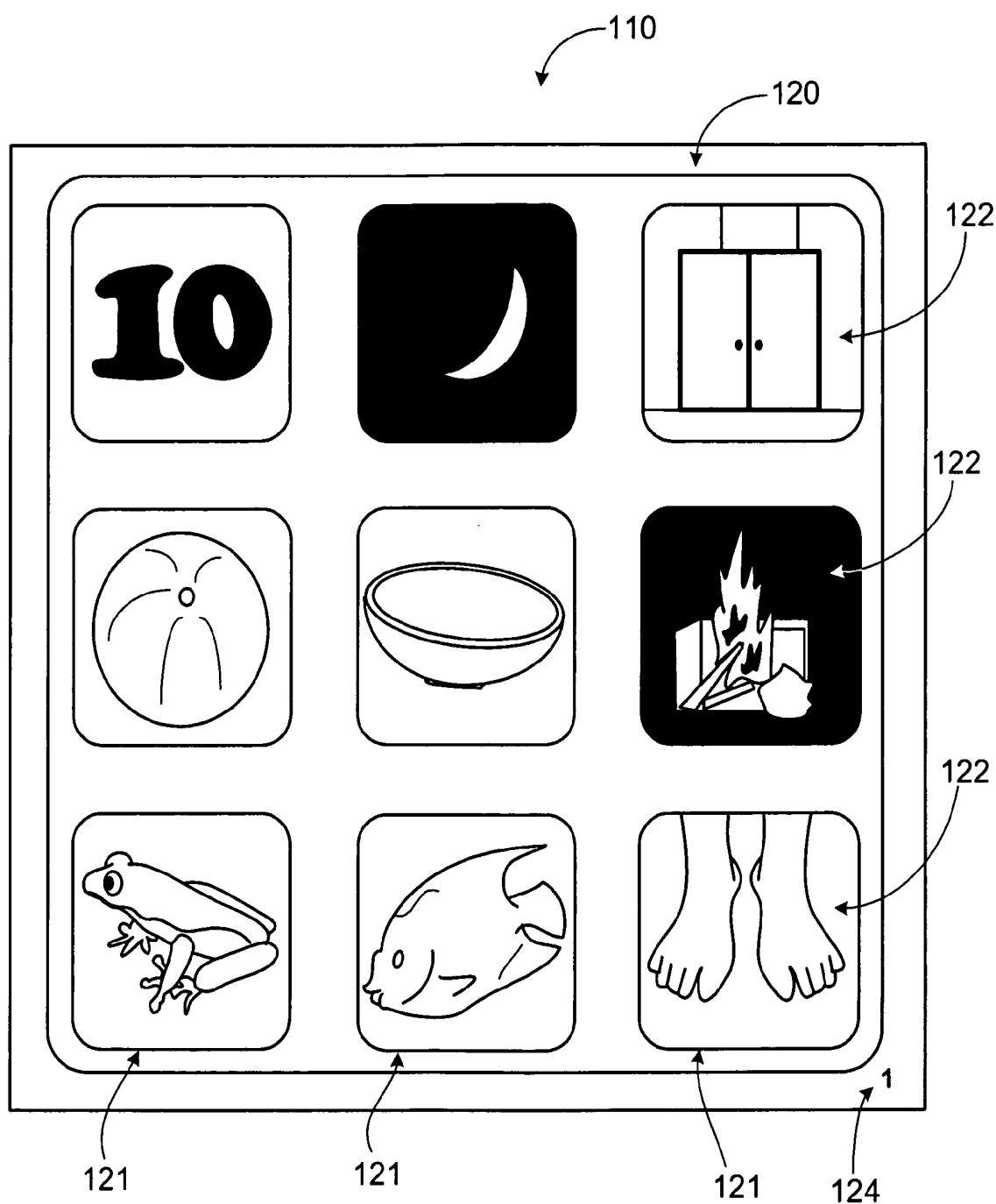


FIG. 8

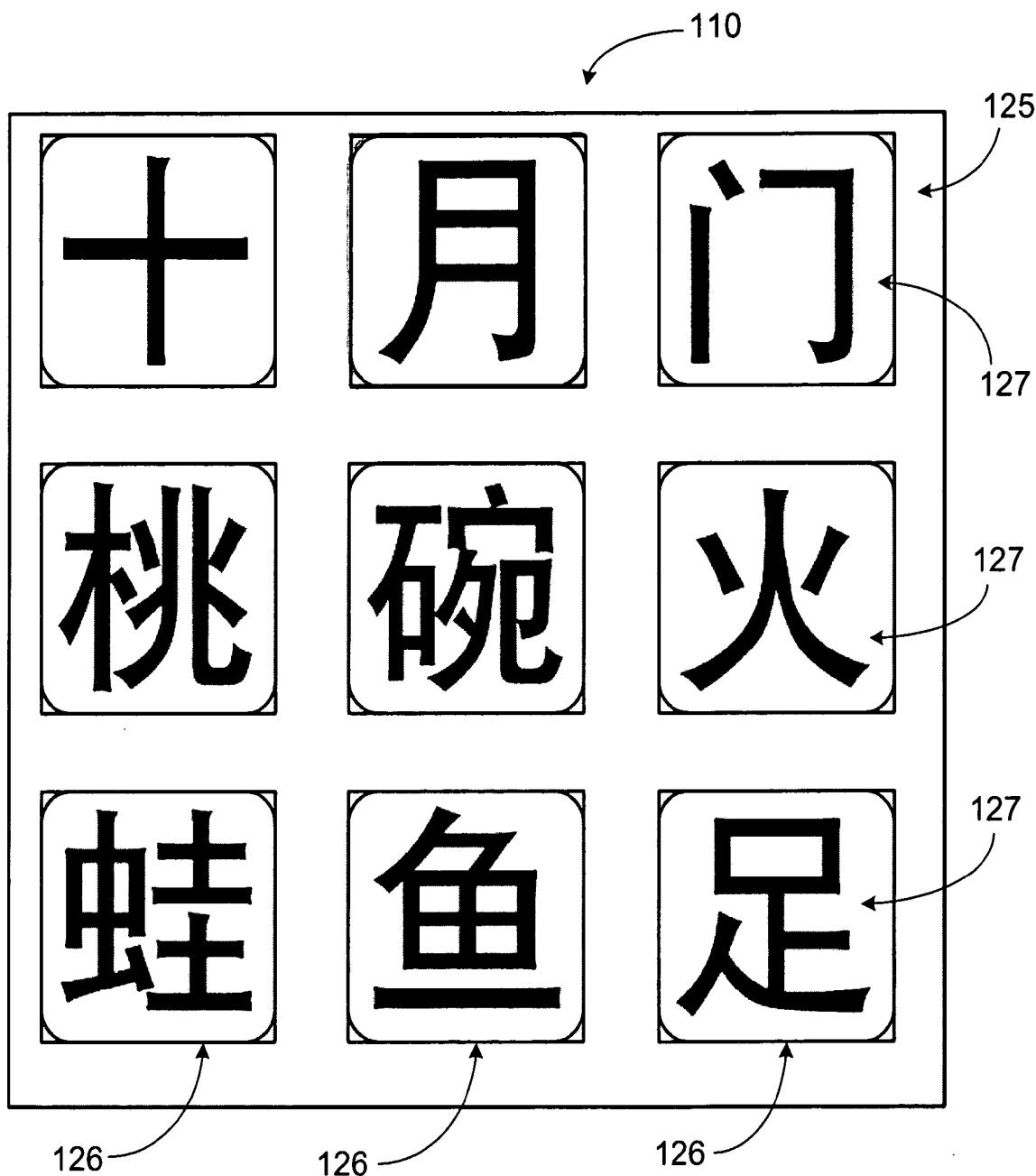


FIG. 9

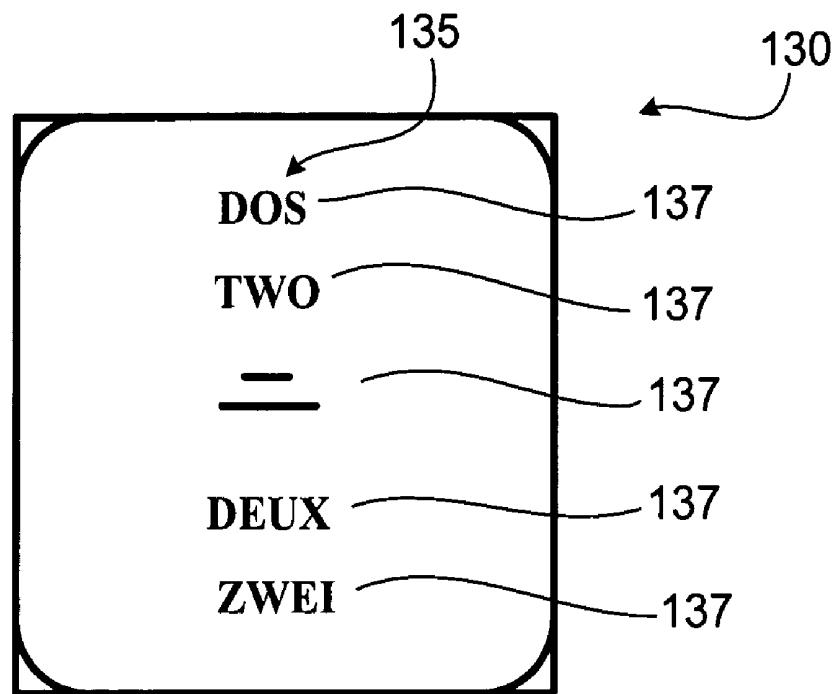


FIG. 10

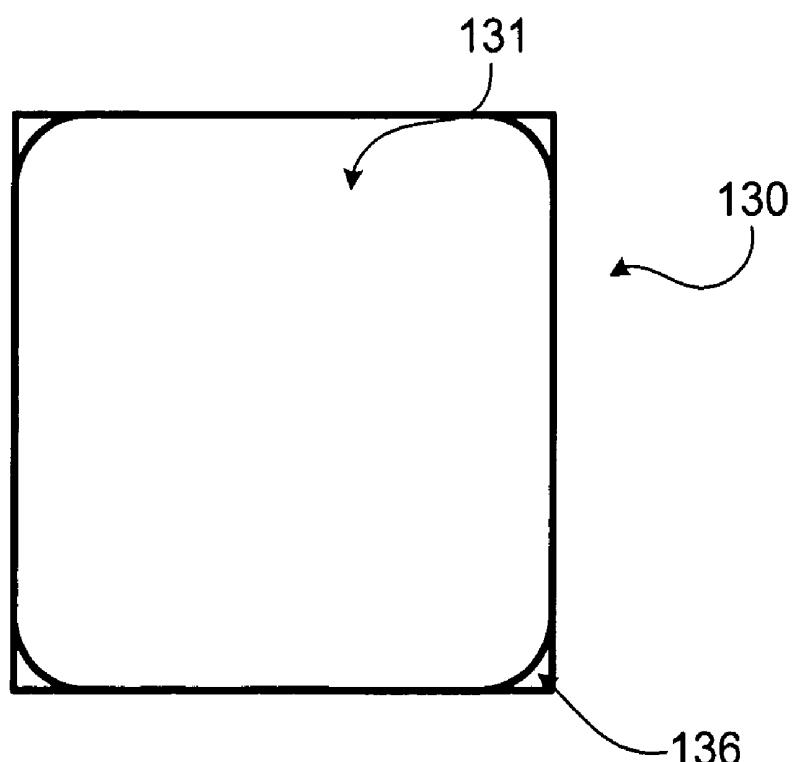


FIG. 11

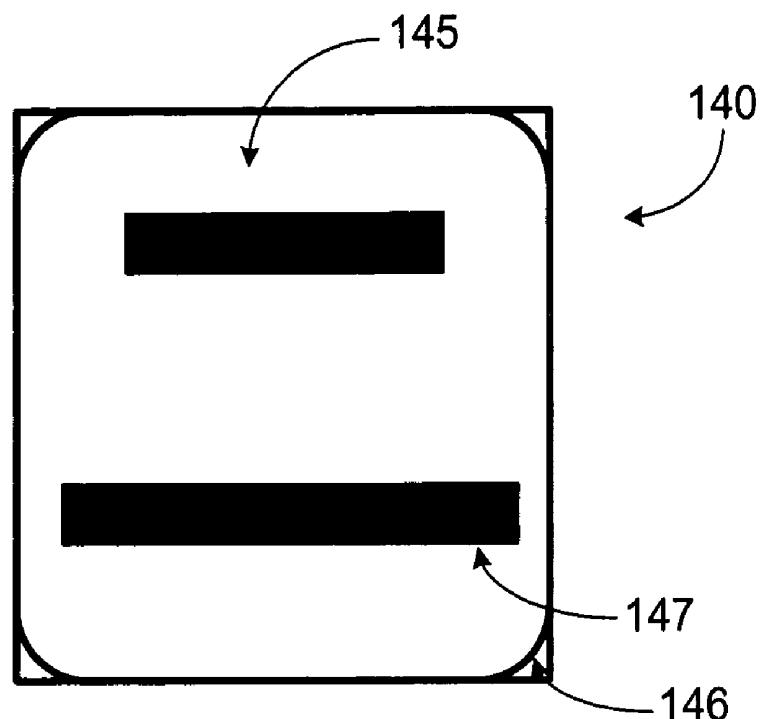


FIG. 12

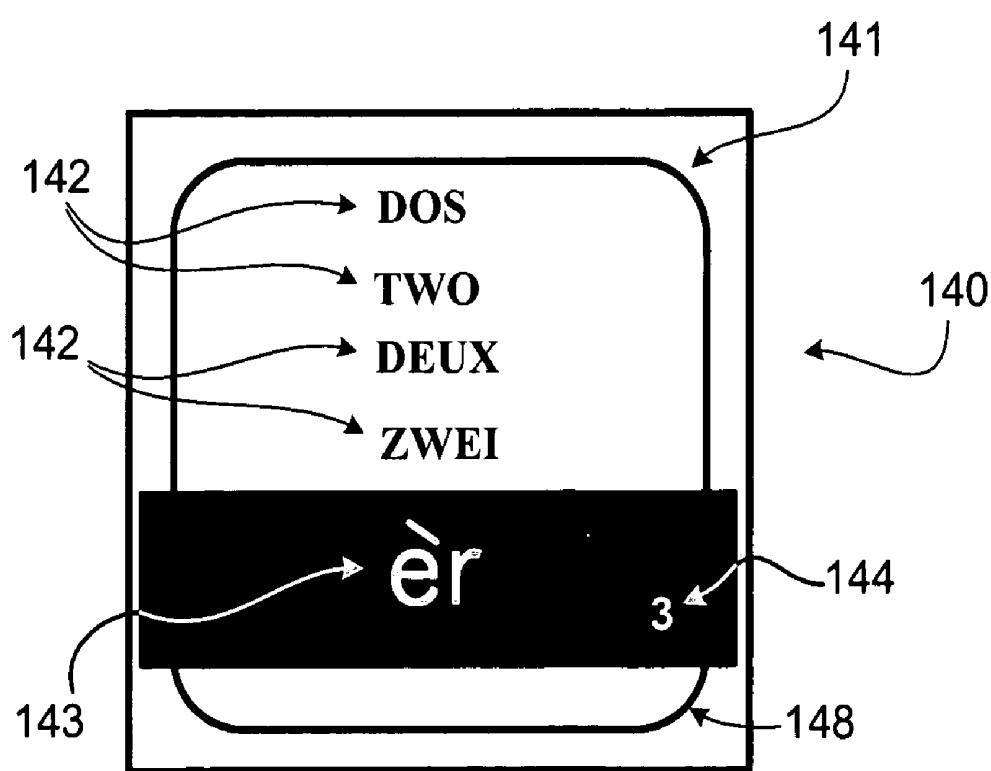


FIG. 13

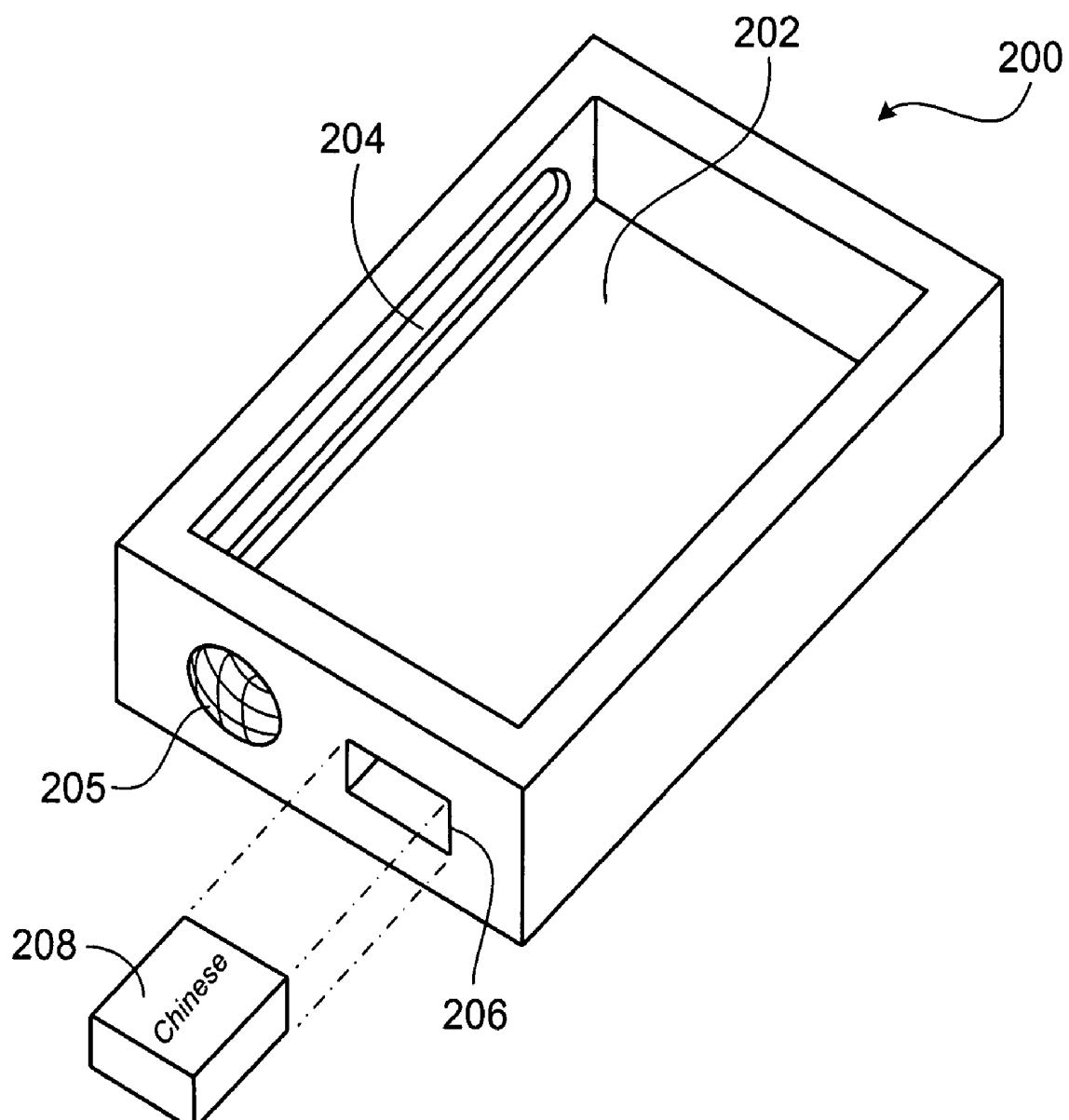


FIG. 14

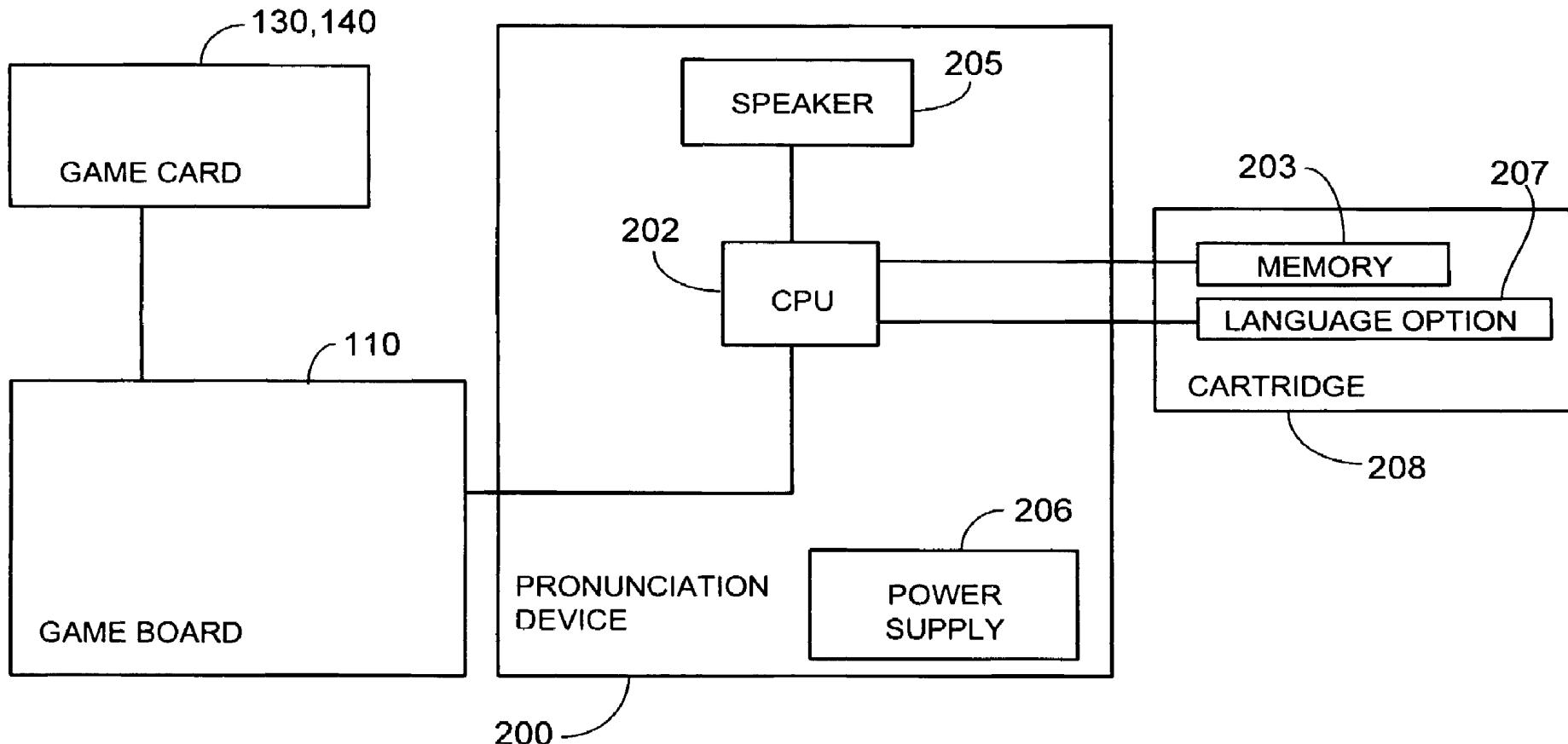


FIG. 15

**LANGUAGE LEARNING BOARD GAME****CROSS REFERENCE TO RELATED APPLICATION(S)**

[0001] This application claims the benefit of priority of U.S. Provisional Patent Application Ser. No. 06/864,512, filed on Nov. 6, 2006.

**TECHNICAL FIELD**

[0002] This disclosure relates to an educational board game, and more particularly to an educational board game that is intended to assist players of all ages in learning and memorizing words or phrases of a language.

**BACKGROUND**

[0003] For many people, learning a new language can be a formidable undertaking. It can be especially difficult to learn a character-based language, such as a language that uses unique characters or symbols for distinct words rather than a combination of letters drawn from a limited alphabet.

[0004] A variety of methods are used to help people learn a new language. One potentially effective method is to incorporate the learning process into a game so that amusement or competition supplants the uneasiness people frequently feel toward learning something new. As the players are being entertained by their participation in the game, repeated exposure to visual or verbal language elements of the game act to familiarize the players with the desired aspects of the language.

[0005] A principal challenge to educational games directed at learning a language, however, is the vast vocabulary typical of virtually all languages commonly used today. It is desirable for the game's participants to not only be able to associate new vocabulary words with the things they represent, but to also learn the proper pronunciation of those words.

[0006] Accordingly, there exists a need for a game that stimulates players of various ages and proficiency levels to learn a language interactively in a manner that is both fun and challenging, and that is adaptable to accommodate new words or phrases to be learned as a player becomes more proficient.

**SUMMARY**

[0007] An educational board game and methods of playing the game are disclosed.

[0008] According to one aspect, the board game includes a game board and a group of cards. The game board has a first surface with a plurality of locations each of which has an image representative of a word or phrase in a first language. The game board also has a second surface with a plurality of locations each of which has a word or phrase in the first language. Each card in the group of cards has on a first surface a word in the first language corresponding to one of the images or words or phrases on a surface of the game board. The words or phrases on the second surface of the game board may be represented by a corresponding one of the images or words or phrases on a surface of the game board.

[0009] Each card also may have on a second surface a translation of the word on the first surface of the card into a second language, a key for pronouncing the word on the first surface of the card, a number for matching to a number on

the game board, or a combination thereof. The board game also may include a second group of cards. Each card in the second group may have on a surface a word in the first language corresponding to one of the images or words or phrases on a surface of the game board.

[0010] The images on the first surface of the game board and the words or phrases on the second surface of the game board may be arranged in respective matrixes. The respective matrixes may be arranged so that each of the words or phrases on the second surface of the game board is in a location corresponding to the location of a corresponding one of the images that represents the word or phrase on the first surface of the game board.

[0011] In addition, the words or phrases may appear in a language having words based on characters or symbols.

[0012] In one implementation, an electronic version of the board game also may include a pronunciation device having a speaker. The cards are adapted to couple to the game board, and the game board is adapted to couple to the pronunciation device. When a card is placed on a corresponding image or word or phrase on the game board, an audible signal representing the pronunciation of the image or word or phrase is generated through the speaker of the pronunciation device. The pronunciation device also may have a selector to allow selection of one of several languages.

[0013] Each card in the group may have a contact for electro-magnetically coupling to a corresponding contact on the game board. In addition, the game board may have a contact for electro-magnetically coupling to a contact on the pronunciation device.

[0014] In one implementation, a cartridge may be included that is adapted to electrically couple to the pronunciation device. The cartridge is preloaded with data representing the pronunciation of images or words or phrases on the game board. The cartridge may have a selector to allow selection of one of several languages.

[0015] In another implementation, a method of playing the game includes selecting a card from a group of cards. Each card in the group has on a first surface a word in a first language corresponding to an image or word or phrase on a surface of a game board. The game board has first and second surfaces. The first surface of the game board has a plurality of locations each of which has an image representative of a word or phrase in the first language and the second surface has a plurality of locations each of which has a word or phrase in the first language. After selecting the card, the player places the selected card on a corresponding image or word or phrase on the game board. The player continues to select and place cards on the game board until a predetermined number of matches have been obtained. In addition, a key for pronouncing the word in the first language on the first surface of the game card may be read.

[0016] The correctness of the placement of a selected card may be verified by referring to a second group of cards that has on each card a translation of the word on the first surface into a second language.

[0017] Multiple players may play the board game. Each player has a game board and the players compete to be the first to place cards from the group of cards on a predetermined number of corresponding images or words or phrases on their respective game boards. A player who discovers an erroneously matched card in another player's board may be declared the winner. In addition, the winner may be the player who is first to state a predetermined word or phrase

after matching cards from the group of cards to a predetermined number of images or words or phrases on the player's game board.

[0018] Selecting a card from a group of cards may include spreading the cards out so that the first surfaces of all cards in the group are facing the same direction. A player may turn a card over, and may keep the card if the card corresponds to an image or word or phrase on the game board or return the card to its original position if the card does not correspond to an image or word or phrase on the game board.

[0019] In addition, the cards may be selected out of a bag. A player may keep the card if the card corresponds to an image or word or phrase on the game board or return the card to the bag if the card does not correspond to an image or word or phrase on the game board.

[0020] The details of one or more implementations are set forth in the accompanying drawings and the description below. Other features and advantages will be apparent from the description and drawings, and from the claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. 1 is a plan view of a playing surface of a representative game board according to an implementation of the present invention.

[0022] FIG. 2 is a plan view of the opposite surface of the representative game board of FIG. 1 according to an implementation of the present invention.

[0023] FIG. 3 is a plan view of a surface of a representative single-sided game card according to an implementation of the present invention.

[0024] FIG. 4 is a plan view of a surface of a representative double-sided game card according to an implementation of the present invention.

[0025] FIG. 5 is a plan view of the opposite surface of the representative double-sided game card of FIG. 4 according to an implementation of the present invention.

[0026] FIG. 6 is a block diagram of an implementation of an electronic version of the game.

[0027] FIG. 7 is a perspective view of an electronic pronunciation device according to an implementation of the present invention.

[0028] FIG. 8 is a plan view of a representative electronic game board according to an implementation of the present invention.

[0029] FIG. 9 is a plan view of the opposite surface of the representative electronic game board of FIG. 8 according to an implementation of the present invention.

[0030] FIG. 10 is a plan view of a surface of a representative single-sided electronic game card according to an implementation of the present invention.

[0031] FIG. 11 is a plan view of the opposite surface of the representative single-sided electronic game card of FIG. 10 according to an implementation of the present invention.

[0032] FIG. 12 is a plan view of a surface of a representative double-sided electronic game card according to an implementation of the present invention.

[0033] FIG. 13 is a plan view of the opposite surface of the representative double-sided electronic game card of FIG. 12 according to an implementation of the present invention.

[0034] FIG. 14 is a perspective view of a second electronic pronunciation device and cartridge according to a implementation of the present invention.

[0035] FIG. 15 is a block diagram of the second electronic pronunciation device of FIG. 14.

#### DETAILED DESCRIPTION

[0036] In a particular implementation, the educational board game may include multiple game boards, each of which includes at least one vocabulary element, and one or more sets of game cards. As shown in FIG. 1, a game board 10 has an image side 20 with pre-selected unique images 22 as the vocabulary elements. The images 22 may be arranged in a matrix. FIG. 1 shows a three-by-three square matrix, but in alternative implementations the images 22 may be arranged in other ways. Each image 22 may be a photographic or illustrated depiction of one or more words. The image side 20 also may include a game board reference number 24 to facilitate gathering a set of game cards.

[0037] A game board 10 may be playable on both sides. On the side opposite to the image side 20, for example, there may be a language side 25 (see FIG. 2), which preferably includes primary language words 27 as vocabulary elements arranged in a matrix of the same dimensions as the matrix on the image side 20. Depending on the language to be learned, the primary language words 27 may consist of one or more characters, symbols, letters of an alphabet, or elements of any other type of writing convention used in the language. Each word 27 is photographically or illustratively represented by the corresponding image 22 on the board's image side 20 and is located at a position in the matrix that corresponds to the image's location in its respective matrix. Thus, for example, the lower right-hand image 22 on the image side 20 of the sample game board in FIG. 1 illustrates "feet." The corresponding lower right-hand primary language word 27 on the language side 25 of the board in FIG. 2 represents the word for "feet" in Chinese.

[0038] FIG. 3 shows a representative single-sided game card 30 that may be used in conjunction with the game boards 10. The single-sided game card 30 is part of a set of such cards and contains on a primary language side 35 at least one primary language word 37 that is substantially identical to a primary language word 27 contained on the language side 25 of one of the game boards 10. The opposite side of the card may be blank. Alternatively, it may contain a graphic, word, or some combination thereof that is identical in all game cards belonging to the set, such as an image bearing the name of the game. The set of cards to which the game card 30 belongs includes at least one card for every vocabulary element (i.e., primary language word 27 or image 22) appearing on the game boards 10 that are being played with.

[0039] In addition to the single-sided game cards 30, the educational board game also may include a set of double-sided game cards 40 (see FIGS. 4-5). A double-sided game card 40 may contain, for example, a primary language word 47 on a primary language side 45 and a secondary language word 42 on a secondary language side 41. The primary language word 47 is substantially identical to a primary language word 27 contained on the language side 25 of a game board 10. The secondary language word 42 is a translation of the primary language word 47 to a second language (e.g., a language that is more familiar to the player than is the language that is to be learned by playing the game). Thus, for example, the sample game card 40 shown in FIG. 4 has on its primary language side 45 a primary language word 47 that is the Chinese word for "moon." As

shown in FIG. 5, on the secondary language side 41 of the card there is a secondary language word 42 that is the English word "moon."

[0040] The double-sided game card 40 also may contain on its secondary language side 41 a pronunciation key 43 that transliterates the primary language word 47 to a language with which the player has some familiarity. For example, the pronunciation key 43 may be a phonetic spelling of the primary language word 47, or alternatively drawn from an established transliteration system such as pinyin. In the example of FIG. 5, the pronunciation key "yuè" is a transliteration of the Chinese character for "moon" on the primary language side 45 of the card 40 into the English language.

[0041] In an alternative implementation, more than one secondary language word 42 may appear on the secondary language side 41 so that a single educational board game may be played by variety of players familiar with a variety of languages.

[0042] Like the single-sided game cards 30, the double-sided game card 40 is part of a set of similar cards comprised of at least one card for every vocabulary element (i.e., primary language word 27 or image 22) appearing on the game boards 10 that are being played with.

[0043] The cards 30, 40 may include a reference number associating a particular game card with a particular game board 10. As shown in FIG. 5, in the preferred embodiment the secondary language side 41 of the double-sided game card 40 has a game card reference number 44 indicating that the card 40 should be paired with a game board 10 bearing the same game board reference number 24.

[0044] Although the foregoing description discloses primary language words 27, 37, 47 and secondary language words 42 that each consist of a single word, in alternative implementations multiple words may be combined to form a phrase or expression. For example, the vocabulary element in the lower right-hand corner in FIG. 2 may consist of the words for "one pair of feet" in the language to be learned rather than the single word "feet." Then the lower right-hand image 22 on the opposite side of the game board 10 (see FIG. 1) should show an image corresponding to the phrase "one pair of feet." In addition, the cards 30, 40 that correspond to vocabulary elements consisting of multiple words should have on their respective surfaces the phrase or expression expressed by the words written in a primary or secondary language.

[0045] Using game boards 10 and at least one of a set of game cards 30, 40, a single player, or two or more players in competition with each other, may play the educational board game described in further detail below. Because the players may be of various ages and proficiency levels in the language to be learned, the game rules may be varied to accommodate them. The game may be played, for instance, at an elementary, intermediate, or advanced level. Additional game boards and cards may be added, for example through expansion packs to the game, as a player advances through the levels and desires to learn additional vocabulary words.

[0046] In one implementation at the elementary level, only the language sides 25 of the game boards 10 and one of the set of game cards 30, 40 are required. Preferably, the double-sided game cards 40 containing the game card reference numbers 44 are used, in which case a young player or one at a beginner's level plays the game by first choosing a game board 10 and using the reference numbers 24, 44 to

collect all the game cards 40 corresponding to the board chosen. Once all the necessary game cards 40 are collected, the player attempts to place each card 40, with the primary language side 45 facing up, over the matching primary language word 27 of the game board 10. To encourage the player to continue until all cards 40 are properly matched, another participant may shout words of encouragement each time a correct match is made.

[0047] In addition, the pronunciation of a primary language word 47 may be incorporated at the elementary level into the learning process by having another participant pronounce the word 47 according to the pronunciation key 43 prior to or after the player's attempt at matching the card 40. As an additional tool for learning the pronunciation of the words 47 at any level of game play, a compact disc or other electronic media containing the proper pronunciation may be included with the game.

[0048] At the next, or intermediate, level the game may be played in several ways by two or more players competing to match game cards 30, 40 to the primary language side 25 of a respective game board 10 chosen by each player. In a first variation of game play, for example, the game setup involves having the players place their chosen game boards 10 with the primary language side 25 face up. The cards of one of the set of game cards 30, 40 are laid out randomly with the primary language words 37, 47 visible and with the cards accessible to all players. After the boards and cards are set, the players wait until a predetermined reference time, whereupon they begin a race to locate the game cards 30, 40 corresponding to their respective game board 10 and to place the appropriate cards over the matching primary language words 27 on their board. The player who is first to situate a matching card 30, 40 over all the primary language words 27 on their board may be determined the winner.

[0049] In a second variation of the game at the intermediate level, the game may be set up by having each player choose a game board 10 and randomly laying out all the double-sided game cards 40 so that their secondary language sides 41 are visible and accessible to all players. Each player's game board 10 should have its primary language side 25 facing up. At a predetermined reference time, the players attempt to locate the cards 40 that correspond to the primary language words 27 on their respective boards 10. The players may accomplish this, for example, by searching the cards 40 for the secondary language words 42 that translate their respective boards' primary language words 27. The players also may rely on the cards' pronunciation keys 43, which transliterate the primary language words 27. In addition, the players may locate the cards by turning over the game cards 40 one at a time to reveal the primary language word 47 on the primary language side 45. If a card is turned over but is not the one sought, the player who turned over the card returns the card to its original position so that other players may access the card. The winner is the first player to match all of the primary language words 27 on his or her board 10 correctly with their corresponding cards 40.

[0050] A third variation at the intermediate level may include providing a bag or other container from which the players randomly select game cards 30, 40. Preferably, the bag should contain only one of the sets of game cards 30 or 40 and should be of an opaque color to ensure random selection. Also preferably, the double-sided game cards 40 should be used. The players may determine a selection order,

for example, according to the age of each player. Each player also should select a game board 10 and place it with the primary language side 25 facing up. After the first player selects a card 30, 40 from the bag, the player either should keep the card if its primary language word 37, 47 matches a primary language word 27 on the player's board 10 or return the card to the bag if no such match is made. The player may be given a limited amount of time to decide whether he or she should keep the card or return it to the bag. If such a time limit is imposed on the player, the other players may remind him or her of how much time is left, for example, by counting up or down to indicate the remaining time. The game play may proceed cyclically through the selection order until a player selects and matches, for example, all of a predetermined subset of cards 30, 40 corresponding to the player's board 10, such as the cards corresponding to a particular row, column, or diagonal of the board's matrix of primary language characters 27. A winner may be declared when all of the subset of cards are properly matched. Alternatively, the player may be required to find matches for all the primary language words 27 on their respective boards 10 before that player is declared the winner.

[0051] At the advanced level, the following variations of the game may be played, for example, with the image side 20 of the game board 10 facing up and with one of the sets of game cards 30, 40. Preferably, the single-sided game cards 30 are used. The initial setup of a first variation may require that the cards 30 be set randomly before the players with the primary language words 37 displayed. At a predetermined reference time, the players compete to collect the cards 30 that bear the primary language words 37 of the images 22 depicted on their respective boards 10. The first player to cover all of his or her board's images 22 with the cards 30 bearing their corresponding primary language words 37 may be the winner.

[0052] In a second, more advanced, variation of the game at the advanced level, the single-sided game cards 30 may be set before the players with their primary language sides 35 facing down such that the players are initially unable to differentiate between the cards 30. According to a predetermined order of selection, for example by age, each player is to randomly turn over a single card 30 and display its primary language side 35 to all players. If the turned over card 30 contains a primary language word 37 that corresponds to an image 22 displayed on the player's board 10, the player should keep the card 30 and place it on the board over its corresponding image 22. If the card 30 does not correspond to any image 22 on the player's board 10, the player should return the card to its original position with the primary language side 35 face down. The game's winner is the first player to match, for example, all of a predetermined subset of cards 30 corresponding to the player's board 10, such as the cards corresponding to a particular row, column, or diagonal of the board's matrix of images 22. In some implementations, a player may be required to match all the images 22 on his or her board 10 to be declared the winner.

[0053] The game may be played in a third variation at the advanced level, wherein the players are to randomly select single-sided game cards 30 out of an opaque bag or other container according to a predetermined selection order. A player making a selection either should keep the card if its primary language word 37 matches an image 22 on the player's board 10 or otherwise return the card to the bag. The

player may be given a limited amount of time to decide whether he or she should keep the card or return it to the bag. The other players also may remind him or her of how much time is left, for example, by counting up or down to indicate the remaining time. The game's winner is, for example, the player who selects and matches all of a predetermined subset of cards 30 corresponding to the images 22 on the player's board 10. In some implementations, a player may be required to match all the images 22 on his or her board 10 to be declared the winner.

[0054] In each of the foregoing variations of the game, an additional step of verifying a winner may be included. For example, the double-sided game cards 40 may be checked to confirm the correctness of matches made by the game's participants. If a player is found to have made an incorrect match, the player may be disqualified and a new winner, for instance the player who discovered the incorrect match, may be declared.

[0055] The educational board game of the present invention also may be implemented in various electronic formats based on hardware, software, or a combination thereof. Electronic versions of the game may be played in substantially the same ways as described above, and may additionally include a device for pronouncing vocabulary elements in a language that a player is desired to learn.

[0056] FIG. 6 shows a block diagram of one implementation of the game in an electronic format that includes a pronunciation device 100, a game board 110 and a game card 130, 140. The game board 110 may be one of a several game boards included in the game, and the game card 130, 140 is one card in a set of single-sided or double-sided game cards. The pronunciation device 100 has a central processing unit (CPU) 101, memory 103, a speaker 105, a power supply 106, and a language option 107. The memory 103 stores information representing the pronunciation of vocabulary elements and may be any electronic storage device, such as a masked Read Only Memory (ROM), Flash memory, Random Access Memory (RAM), or any other similar device. The language option 107 may be included in the pronunciation device 100 if the vocabulary element may be pronounced in more than one language.

[0057] When a card 130, 140 is properly positioned over a corresponding vocabulary element on the board 110, the board recognizes a correct match and indicates the match to the pronunciation device 100. The board may recognize a correct match in various ways. For example, a card may be designed to mechanically or magnetically couple only to the location of a particular vocabulary element on a game board 110. This may be accomplished, for example, by having a mechanical or magnetic trigger on each card that is uniquely positioned and that matches an analogously positioned reciprocal mechanical or magnetic trigger on the vocabulary element that corresponds to the card.

[0058] The game board 110 also may indicate the match to the pronunciation device 100 in a variety of ways. In one implementation, each board 110 may mechanically couple to the device 100 in such a way as to identify to the device which board is being played with, for example through a punch-card system. In addition, the board 110 may indicate which vocabulary element has been matched with a corresponding card, for example, by setting off a mechanical trigger on the board 110 that indicates the location of the vocabulary element and that couples to the device 100. Thus, with the combined information of which board is connected

to the device 100 and which location on the board has been matched, the CPU 101 of the pronunciation device may be able to determine which vocabulary element to pronounce. [0059] As described in further detail below, in alternative implementations, the cards 130, 140 may electromagnetically couple to the game board 110. Similarly, the game board 110 may electromagnetically couple to the pronunciation device 100.

[0060] After the pronunciation device 100 is notified of the correct match, the CPU 101 uses that information to generate an audible signal through the speaker 105 that corresponds to the pronunciation of the vocabulary element in a language indicated by language option 107. For example, the CPU 101 may retrieve from memory 103 the information representing the pronunciation of the correctly matched vocabulary element. The CPU 101 then sends a signal corresponding to that information to the speaker 105. If the vocabulary element may be pronounced in more than one language, the CPU 101 also may selectively retrieve from memory 103 the pronunciation of the vocabulary element in only the language indicated by the language selector 107.

[0061] FIG. 7 shows one implementation of a pronunciation device 100 having an electronic game board receiving area 102. An electronic game board may be placed within the receiving area 102, for example, by inserting the board through a slot 104. When the board is in the receiving area 102, the board should be electromagnetically coupled to the device 100. The device 100 also may include a speaker 105, multiple language options 107 and a language selector 109. The language selector 109 may be moved manually to select a desired language option 107. As described in further detail below, when a player matches an electronic game card to a vocabulary element on a corresponding electronic game board, the device 100 generates an audible sound through the speaker 105 that corresponds to the pronunciation of the word represented by the vocabulary element in the language indicated by the language selector 109.

[0062] Like the game board 10, an electronic game board 110 that electrically couples to the pronunciation device 100 may have an image side 120 including, for example, a matrix of pre-selected unique images 122 as vocabulary elements (see FIG. 8). The board 110 also may have a game board reference number 124. In one implementation, in the vicinity of each image 122 is an electrical contact 121 located such that it will be electrically coupled to an electrical contact on an electronic game card when the card is positioned above the image 122. FIG. 8 shows electrical contacts 121 formed along the boarders of the images 122. Some implementations include contacts that use other types of electro-magnetic coupling.

[0063] Also, like the game board 10, the second side of the electronic game board 110 may have a language side 125 comprising a matrix of primary language words 127 as vocabulary elements (see FIG. 9). The language side 125 has an electrical contact 126 in the vicinity of each primary language word 127, for example along the boarder surrounding each word. The electrical contact 126 associated with a word 127 may be electrically coupled to an electrical contact on an electronic game card corresponding to the word. In an alternative implementation, the image side 120 and the language side 125 may stand alone such that each side is on a separate electronic game board 110. Some implementations use other types of electromagnetic coupling.

[0064] FIGS. 10-11 show opposite surfaces of a representative single-sided electronic game card 130 according to a particular implementation. The card 130 is part of a set of single-sided cards and may have one or more primary language words 137 on a primary language side 135. If multiple words 137 appear on the card 130, each word should be a translation of the others into a different language different. The languages in which the words 137 appear also should be language options 107 available on the electronic game board 110 and which can be selected by a player using the language selector 109.

[0065] On the surface opposite the primary language side 135, there may be a backside 131 having an electromagnetic contact 136, for example, along the boarder of the card (see FIG. 11). Because the card 130 is a single-sided card, the backside 131 may be blank, or may contain a graphic, word, or some combination thereof that is identical in all single-sided game cards 130 in the set.

[0066] As shown in FIGS. 12-13, a representative double-sided electronic game card 140 may have a primary language word 147 on a primary language side 145. The secondary language side 141 may include a pronunciation key 143 and a game card reference number 144. The secondary language side 141 also may have one or more secondary language words 142, each of which is a word representing the same vocabulary element in a different language. The languages in which the words 142, 147 appear also should be language options 107 that are available on the electronic game board 110 and that a player can select using the language selector 109. The two sides 145, 141 may have electrical contacts 146, 148, respectively, for example bordering the words 147, 142.

[0067] With the pronunciation device 100, one or more electronic game boards 110, and one or both of the sets of electronic game cards 130, 140, an electronic implementation of the educational board game may be played according to the various beginner, intermediate, and advanced levels described above. In addition, the player is exposed to the proper pronunciation of words of a language that is to be learned.

[0068] In an embodiment of the electronic implementation of the game, for example, only the double-sided game cards 140 are used in conjunction with the device 100 and either sides of the boards 110. When a board 110 is placed within the receiving area 102 and a card 140 is positioned correctly above a corresponding vocabulary element (i.e., an image 122 or word 127) such that the respective contacts of the board and the card are electro-magnetically coupled, the device 100 recognizes a correct match and the speaker 105 pronounces the word for the vocabulary element. If the player is playing with the image side 120 facing up, the speaker 105 pronounces the word in the language option 107 indicated by the selector 109. In other embodiments, the game may be played with the single-sided game cards 130.

[0069] FIG. 7 shows an example of an implementation of a pronunciation device 100. In an alternative implementation, there does not need to be a fixed number of language options 107. For example, FIG. 14 shows a pronunciation device 200 that includes a game board receiving area 202, a slot 204 through which the board may be inserted, a speaker 205, and a cartridge receiver 206. Also shown is a cartridge 208, which determines the language in which the vocabulary element is pronounced. The cartridge 208 is preloaded with

the pronunciations of words of one or more languages and is connected to the device 200 when inserted into the cartridge receiver 206.

[0070] When a cartridge 208 is coupled to the device 200 and one of the cards 130, 140 is properly matched to a vocabulary element on a board 110 that is positioned within the receiving area 202, the speaker 205 generates an audible signal representing the pronunciation of the word for the vocabulary element in a selected one of the preloaded languages. If the cartridge 208 is preloaded with only Chinese, for example, the word is pronounced in Chinese. If another language is desired, a different cartridge preloaded with that language may be inserted. Alternatively, a single cartridge preloaded with multiple languages may be inserted, in which case the language in which the word is pronounced may be selected, for example, by selecting the position of a language selector or pressing a button located on the cartridge. Preferably, the language in which the word is pronounced by the device 200 matches a language in which the words 137, 147, 142 on the cards 130, 140 appear.

[0071] FIG. 15 shows a block diagram of the pronunciation device 200. Unlike the block diagram shown in FIG. 6 for the pronunciation device 100, the device 200 does not include memory or a language option. Instead, memory 203 and language option 207 is included in the cartridge 208 which electrically couples to the device 200.

[0072] A number of implementations have been described. Various modifications may be made without departing from the spirit and scope of the invention. Accordingly, other implementations are within the scope of the claims.

What is claimed is:

1. A board game comprising:

a game board having first and second surfaces, wherein the first surface has a plurality of locations each of which has an image representative of a word or phrase in a first language and the second surface has a plurality of locations each of which has a word or phrase in the first language; and  
a first group of cards, wherein each card in the group has on a first surface a word in the first language corresponding to one of the images or words or phrases on a surface of the game board.

2. The board game of claim 1 wherein each of the words or phrases on the second surface of the game board is represented by a corresponding one of the images on the first surface of the game board.

3. The board game of claim 1 wherein each card in the group has on a second surface a translation of the word on the first surface into a second language.

4. The board game of claim 1 wherein each card in the group has on a second surface a key for pronouncing the word on the first surface.

5. The board game of claim 1 wherein each card in the group has on a second surface a number for matching to a number on the game board.

6. The board game of claim 3 further comprising a second group of cards, wherein each card in the second group has on a surface a word in the first language corresponding to one of the images or words or phrases on a surface of the game board.

7. The board game of claim 1 wherein the images on the first surface of the game board and the words or phrases on the second surface of the game board are arranged in respective matrixes.

8. The board game of claim 7 wherein the respective matrixes are arranged so that each of the words or phrases on the second surface of the game board is in a location corresponding to the location of a corresponding one of the images that represents the word or phrase on the first surface of the game board.

9. The board game of claim 1 wherein each of the words in the first language on the second surface of the game board is based on a single symbol.

10. Aboard game comprising:

a game board having first and second surfaces, wherein the first surface has a plurality of locations each of which has an image representative of word or phrase in a first language and the second surface has a plurality of locations each of which has a word or phrase in the first language;

a first group of cards, wherein each card in the group is adapted to couple to the game board and has on a first surface a word in the first language corresponding to an image or word or phrase on a surface of the game board; and

a pronunciation device having a speaker, wherein the device is adapted to couple to the game board so that when a card in the group is placed on a corresponding image or word or phrase on the game board, an audible signal representing the pronunciation of the image or word or phrase is generated through the speaker.

11. The board game of claim 10 wherein each of the words or phrases on the second surface of the game board is represented by a corresponding one of the images on the first surface of the game board.

12. The board game of claim 10 wherein the pronunciation device has a selector to allow selection of one of several languages.

13. The board game of claim 10 wherein each card in the group has a contact for electromagnetically coupling to a corresponding contact on the game board.

14. The board game of claim 10 wherein the game board has a contact for electromagnetically coupling to a contact on the pronunciation device.

15. The board game of claim 10 wherein each card in the group has on a second surface a translation of the word on the first surface into a second language.

16. The board game of claim 10 wherein each card in the group has on a second surface a key for pronouncing the word on the first surface.

17. The board game of claim 10 wherein each card in the group has on a second surface a number for matching to a number on the game board.

18. The board game of claim 15 further comprising a second group of cards, wherein each card in the second group is adapted to couple to the game board and has on a surface a word in the first language corresponding to an image or word or phrase on a surface of the game board.

19. The board game of claim 10 further comprising a cartridge adapted to electrically couple to the pronunciation device, wherein the cartridge is preloaded with data representing the pronunciation of images or words or phrases on the game board.

20. The board game of claim 19 wherein the cartridge has a selector to allow selection of one of several languages.

- 21.** A board game comprising:  
a game board having a first surface comprising a plurality of locations each of which has a respective vocabulary element; and  
a first group of cards, wherein each card in the group has on a first surface a word in a first language corresponding to a vocabulary element on a surface of the game board.
- 22.** The board game of claim **21** wherein each of the vocabulary elements is an image representative of a word or phrase in the first language.
- 23.** The board game of **21** wherein each of the vocabulary elements is a word or phrase in the first language.
- 24.** The board game of claim **21** wherein each card in the group has on a second surface a translation of the word on the first surface into a second language.
- 25.** The board game of claim **21** wherein each card in the group has on a second surface a key for pronouncing the word on the first surface.
- 26.** The board game of claim **21** wherein each card in the group has on a second surface a number for matching to a number on the game board.
- 27.** The board game of claim **24** further comprising a second group of cards, wherein each card in the second group has on a surface a word in the first language corresponding to one of the images or words or phrases on a surface of the game board.
- 28.** A method for playing a game comprising:  
selecting a card from a group of cards, wherein each card in the group has on a first surface a word in a first language corresponding to an image or word or phrase on a surface of a game board, wherein the game board has first and second surfaces, wherein the first surface of the game board has a plurality of locations each of which has an image representative of a word or phrase in the first language and the second surface has a plurality of locations each of which has a word or phrase in the first language;  
placing the selected card on a corresponding image or word or phrase on the game board; and  
continuing to select and place cards on the game board until a predetermined number of matches have been obtained.
- 29.** The method of claim **28** including reading a key on a second surface of the selected card, wherein the key is for pronouncing the word in the first language on the first surface.
- 30.** The method of claim **28** including verifying the correctness of the placement of a selected card by referring to a second group of cards, wherein each card in the second group has a translation of the word on the first surface into a second language.
- 31.** The method of claim **28** wherein each of a plurality of players has a game board and the players compete to be the first to place cards from the group on a predetermined number of corresponding images or words or phrases on their respective game boards.
- 32.** The method of claim **31** wherein a player who discovers an erroneously matched card in another player's board is declared the winner.
- 33.** The method of claim **31** including declaring as the winner the player who is first to state a predetermined word or phrase after matching cards from the group of cards to a predetermined number of images or words or phrases on the player's game board.
- 34.** The method of claim **28** wherein selecting a card from a group of cards includes spreading the cards out so that the first surfaces of all cards in the group are facing the same direction.
- 35.** The method of claim **34** wherein selecting a card from a group of cards includes:  
turning a card over; and  
keeping the card if the card corresponds to an image or word or phrase on the game board or returning the card to its original position if the card does not correspond to an image or word or phrase on the game board.
- 36.** The method of claim **28** wherein selecting a card from a group of cards includes:  
selecting a card out of a bag;  
keeping the card if the card corresponds to an image or word or phrase on the game board or  
returning the card to the bag if the card does not correspond to an image or word or phrase on the game board.
- 37.** A method for playing a game comprising:  
coupling a game board to a pronunciation device having a speaker, wherein the pronunciation device is adapted to generate through the speaker signals representing pronunciation of images or words or phrases on the game board, wherein the game board has first and second surfaces, wherein the first surface has a plurality of locations each of which has an image representative of a word or phrase in a first language and the second surface has a plurality of locations each of which has a word or phrase in the first language;  
selecting a card from a group of cards, wherein each card in the group is adapted to couple to the game board and has on a first surface a word in the first language corresponding to an image or word or phrase on a surface of the game board;  
placing the selected card on a corresponding image or word or phrase on the game board so as to generate an audible signal representing the pronunciation of the image or word or phrase through the speaker; and  
continuing to select and place cards on the game board until a predetermined number of matches have been obtained.

\* \* \* \* \*



US 20100167244A1

(19) **United States**

(12) **Patent Application Publication**

SU

(10) **Pub. No.: US 2010/0167244 A1**

(43) **Pub. Date: Jul. 1, 2010**

(54) **LANGUAGE TEACHING SYSTEM OF ORIENTATION PHONETIC SYMBOLS**

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(21) Appl. No.: **12/703,781**

(22) Filed: **Feb. 11, 2010**

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 11/650,598, filed on Jan. 8, 2007, now abandoned.

**Publication Classification**

(51) **Int. Cl.**

**G09B 19/06** (2006.01)

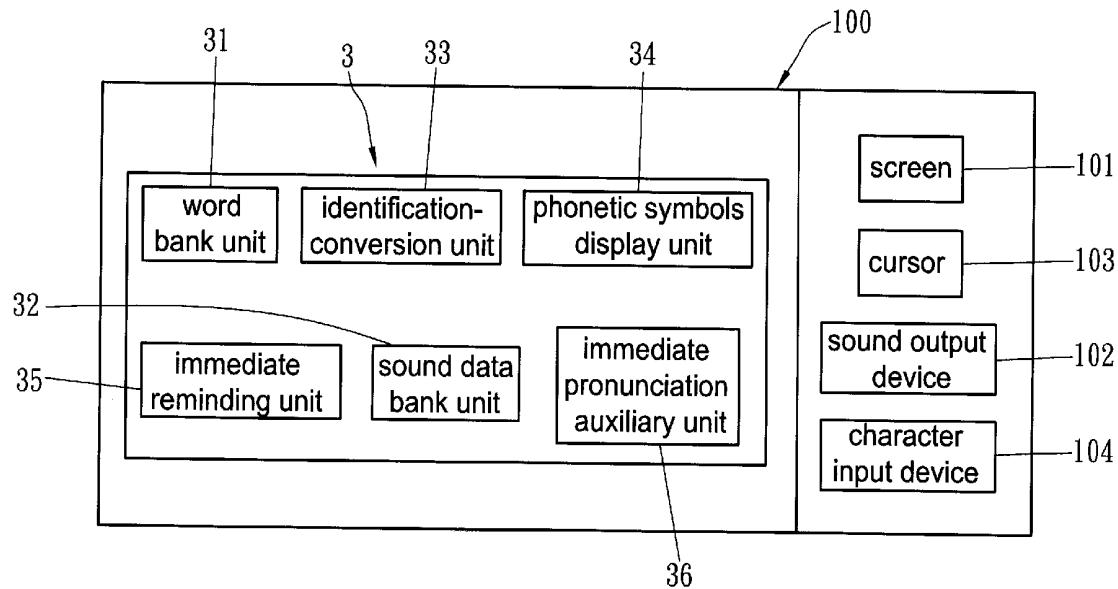
**G09B 5/00** (2006.01)

**G09B 1/00** (2006.01)

(52) **U.S. Cl. ....** **434/157; 434/169; 434/172**

(57) **ABSTRACT**

A language teaching system of orientation phonetic symbols includes a pronunciation teaching module containing a word bank unit and an identification-conversion unit. The word bank unit includes large Chinese vocabulary, English single word data, and Chinese and English phonetic symbol word data. The arrangement of each English letter marked to English orientation phonetic symbol word is the same as a specified English single word, and the arrangement of each English letter marked to Chinese orientation phonetic symbol word is the same as the Chinese phonetic symbols of a specified Chinese character. A specified letter of the English phonetic symbol word is marked with a pronunciation auxiliary mark at its periphery to represent its sound. The identification-conversion unit collates the Chinese orientation phonetic symbol word and displays it on a screen.



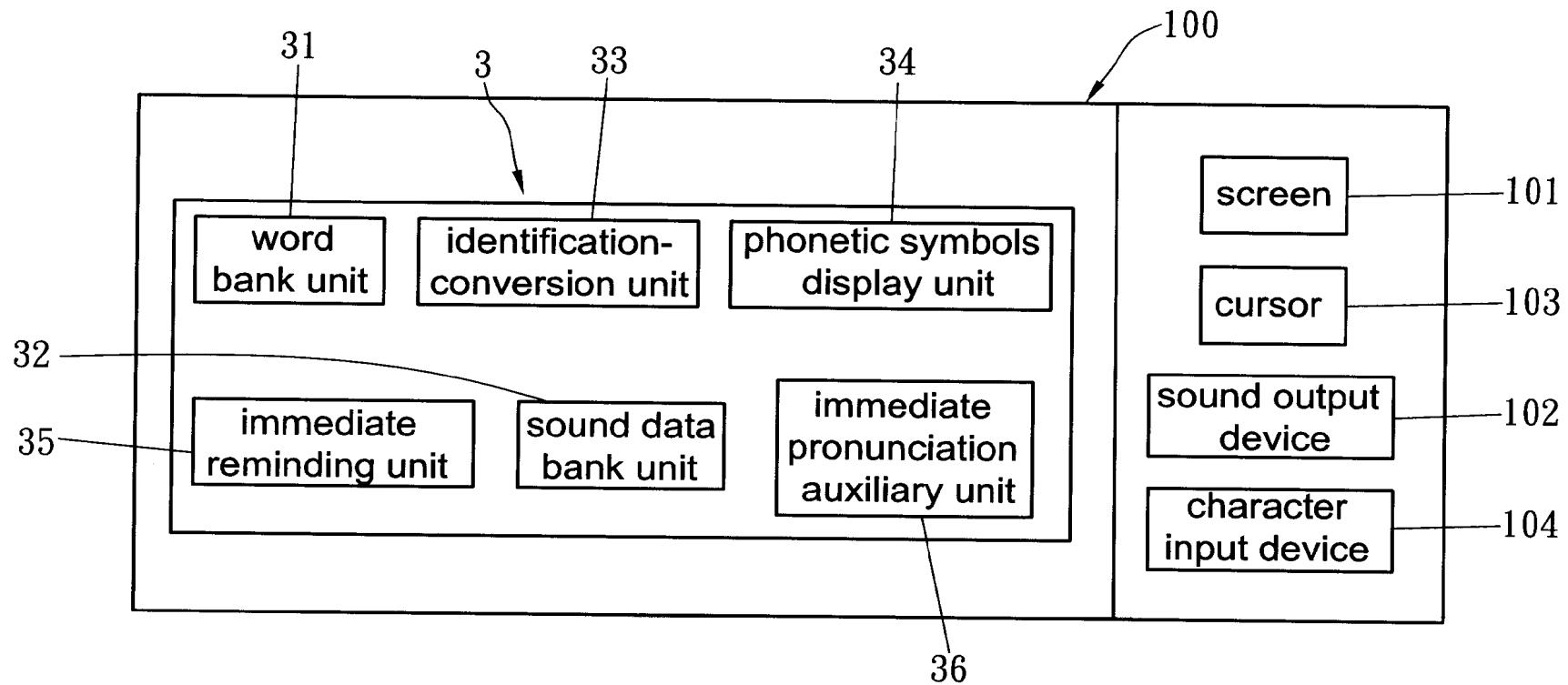


FIG. 1

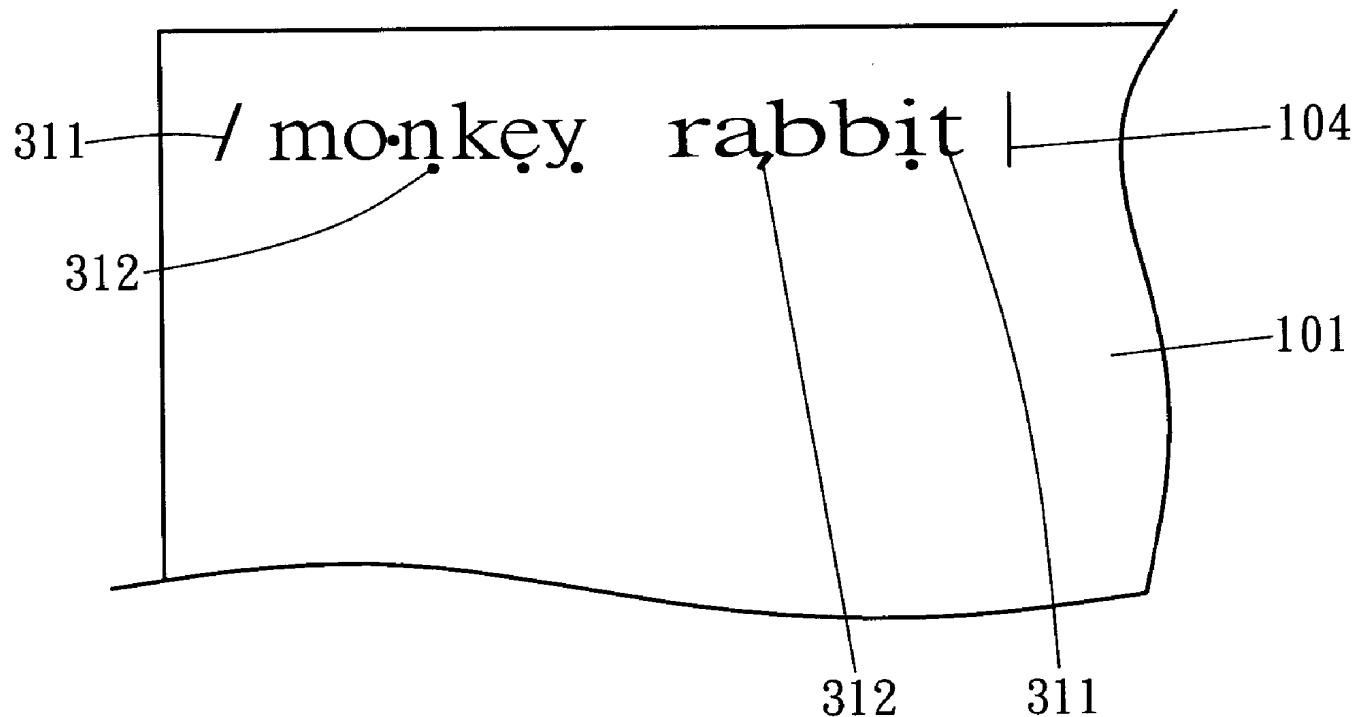


FIG.2

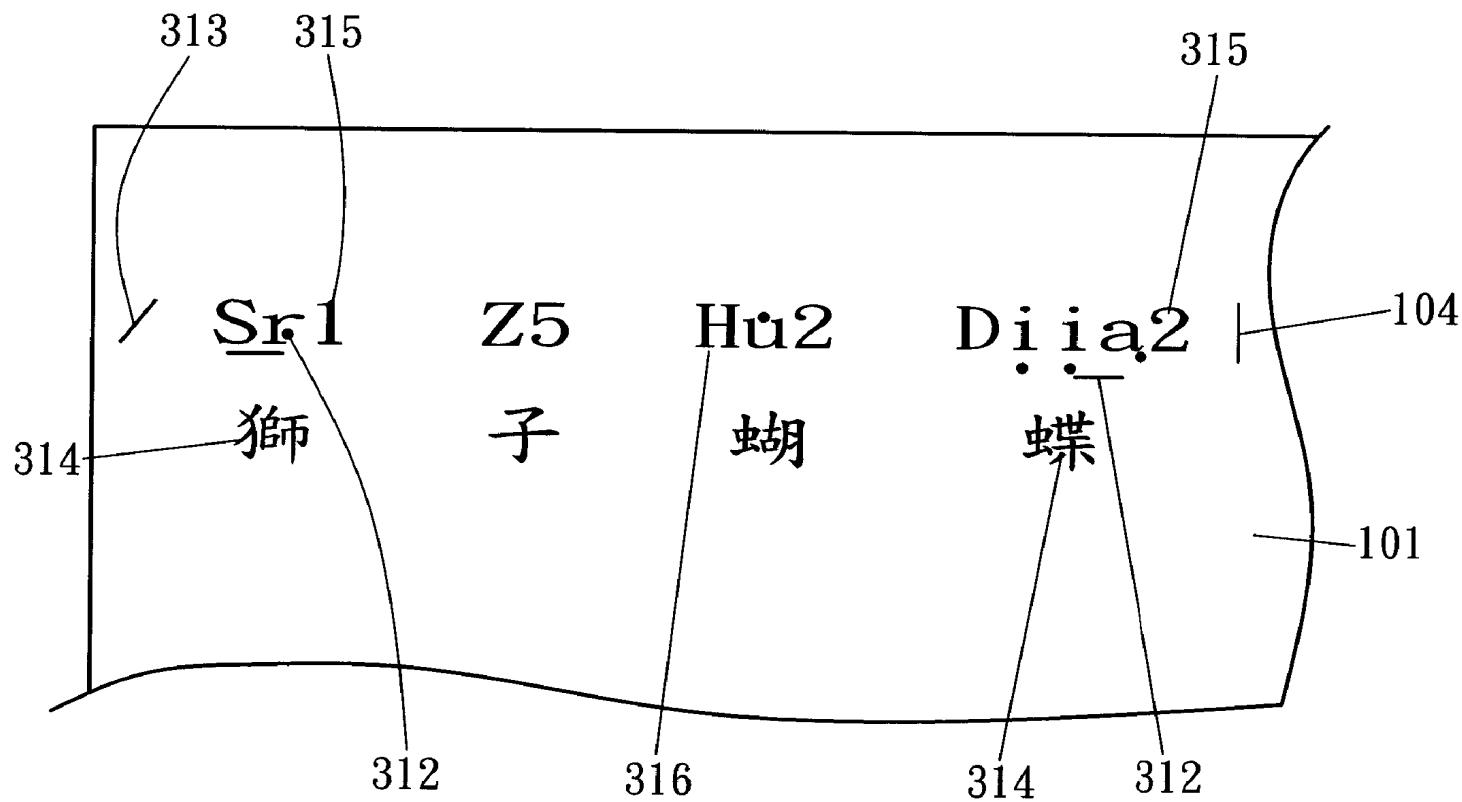


FIG.3

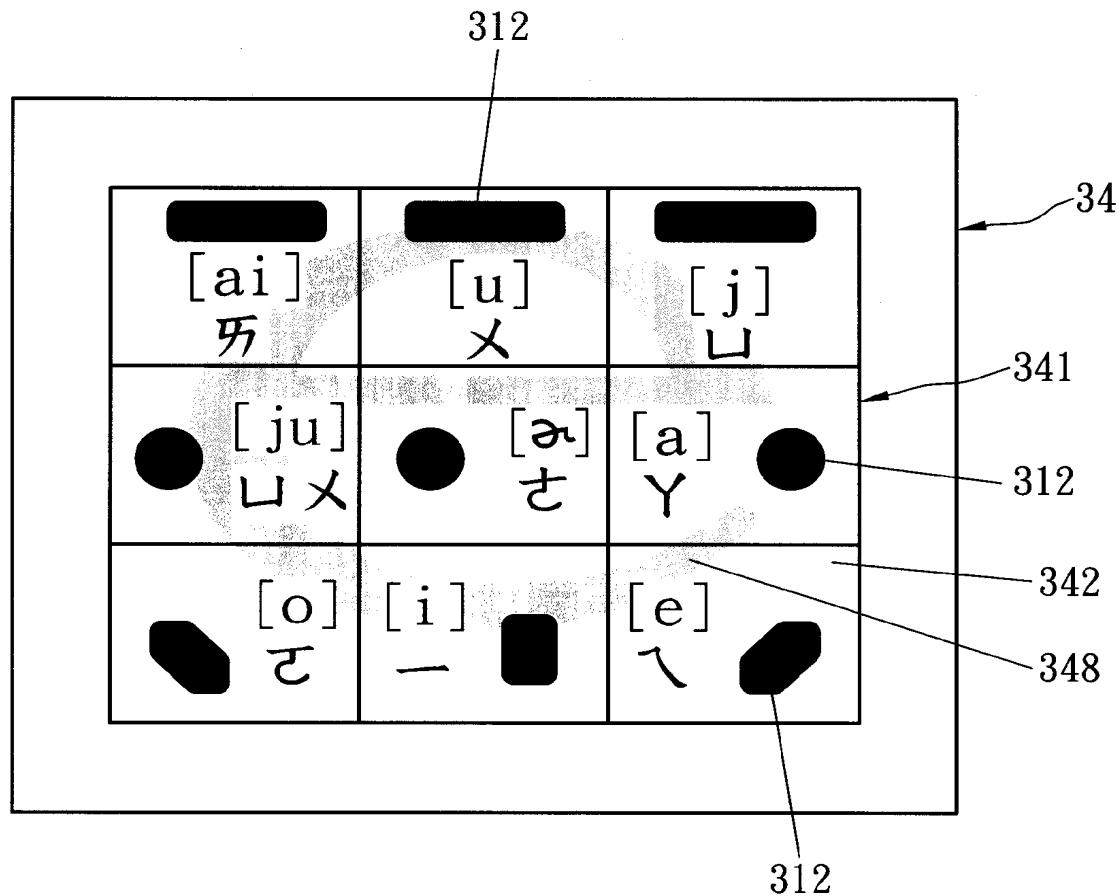


FIG.4

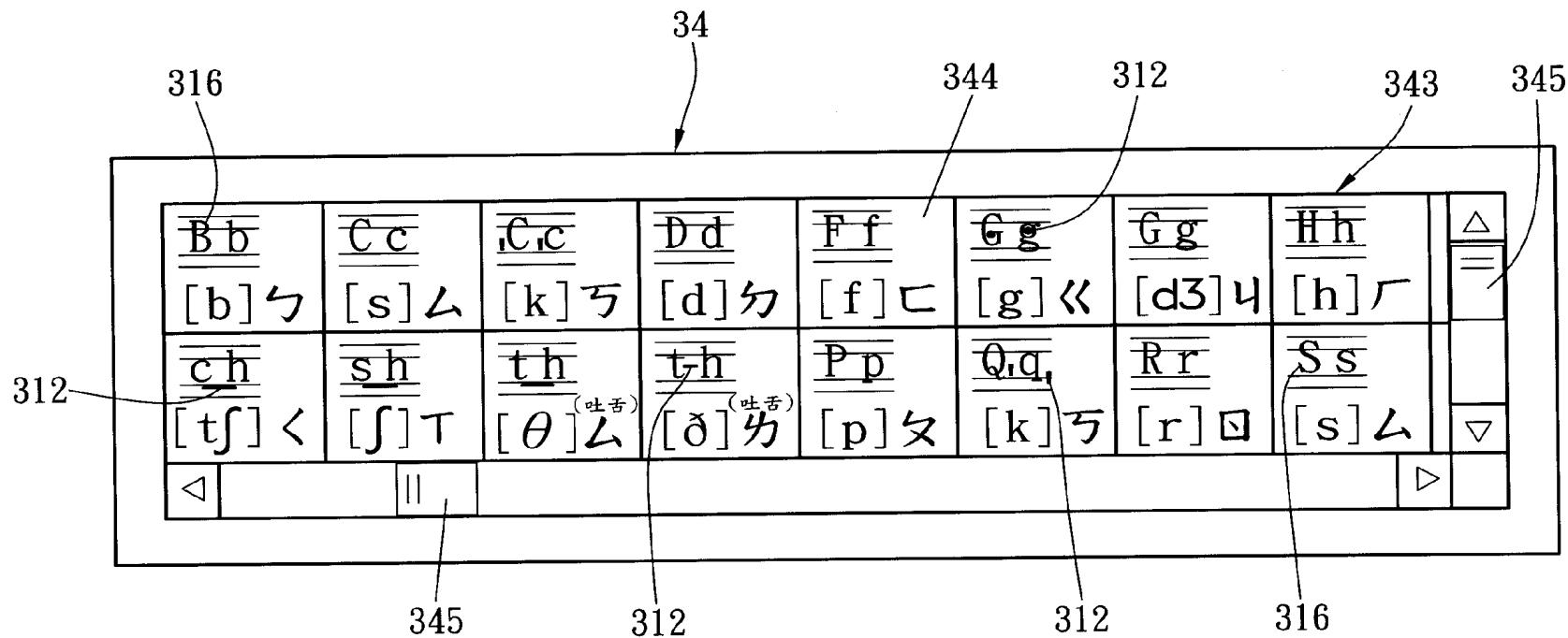
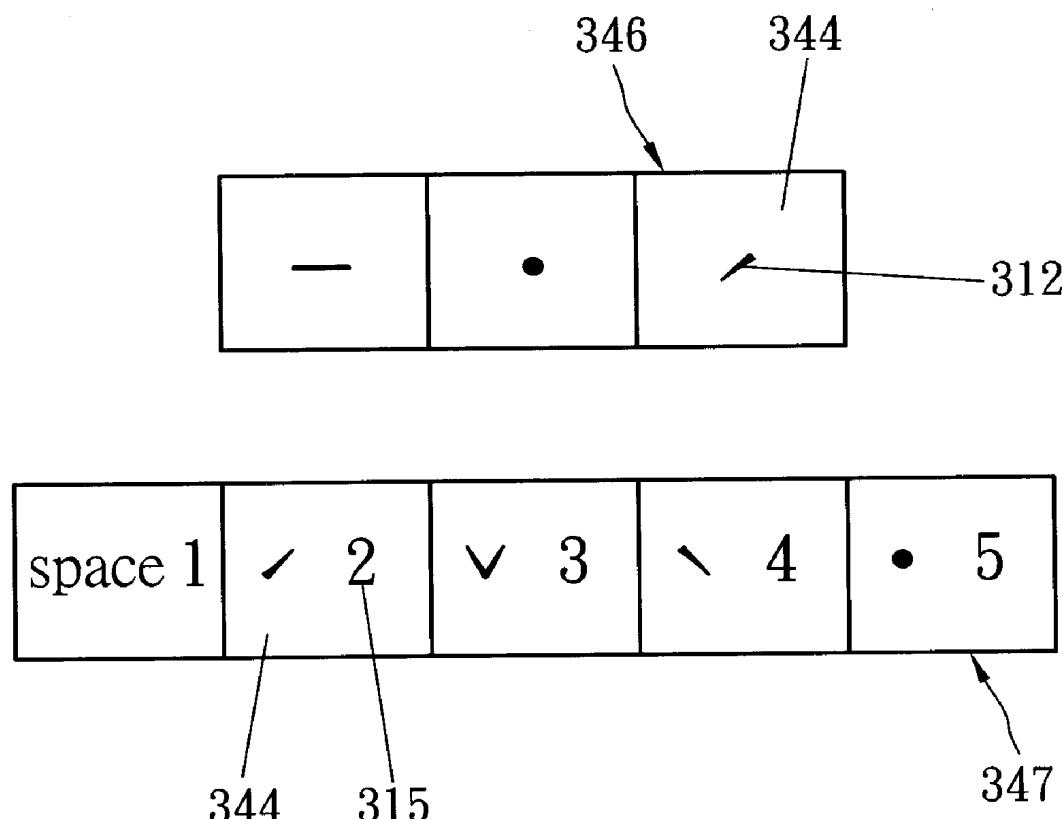


FIG.5



**FIG.6**

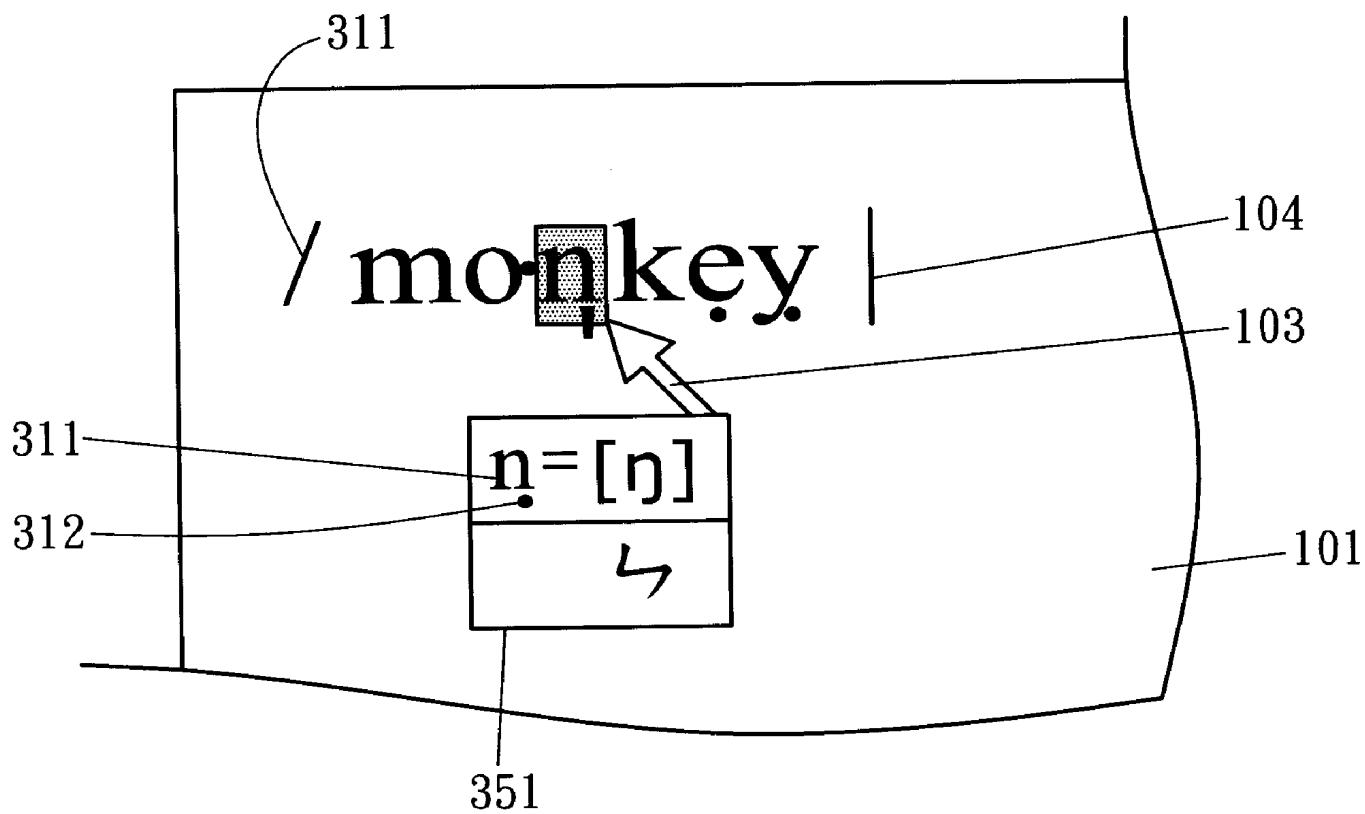


FIG. 7

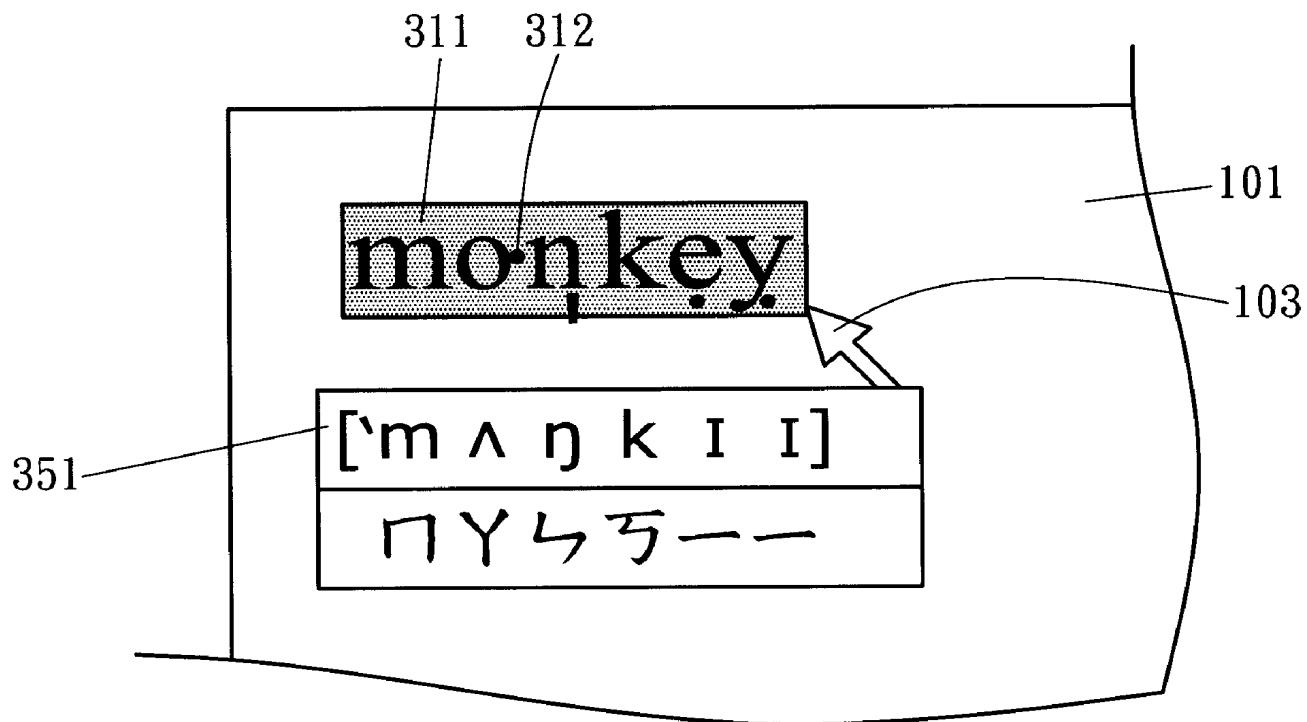
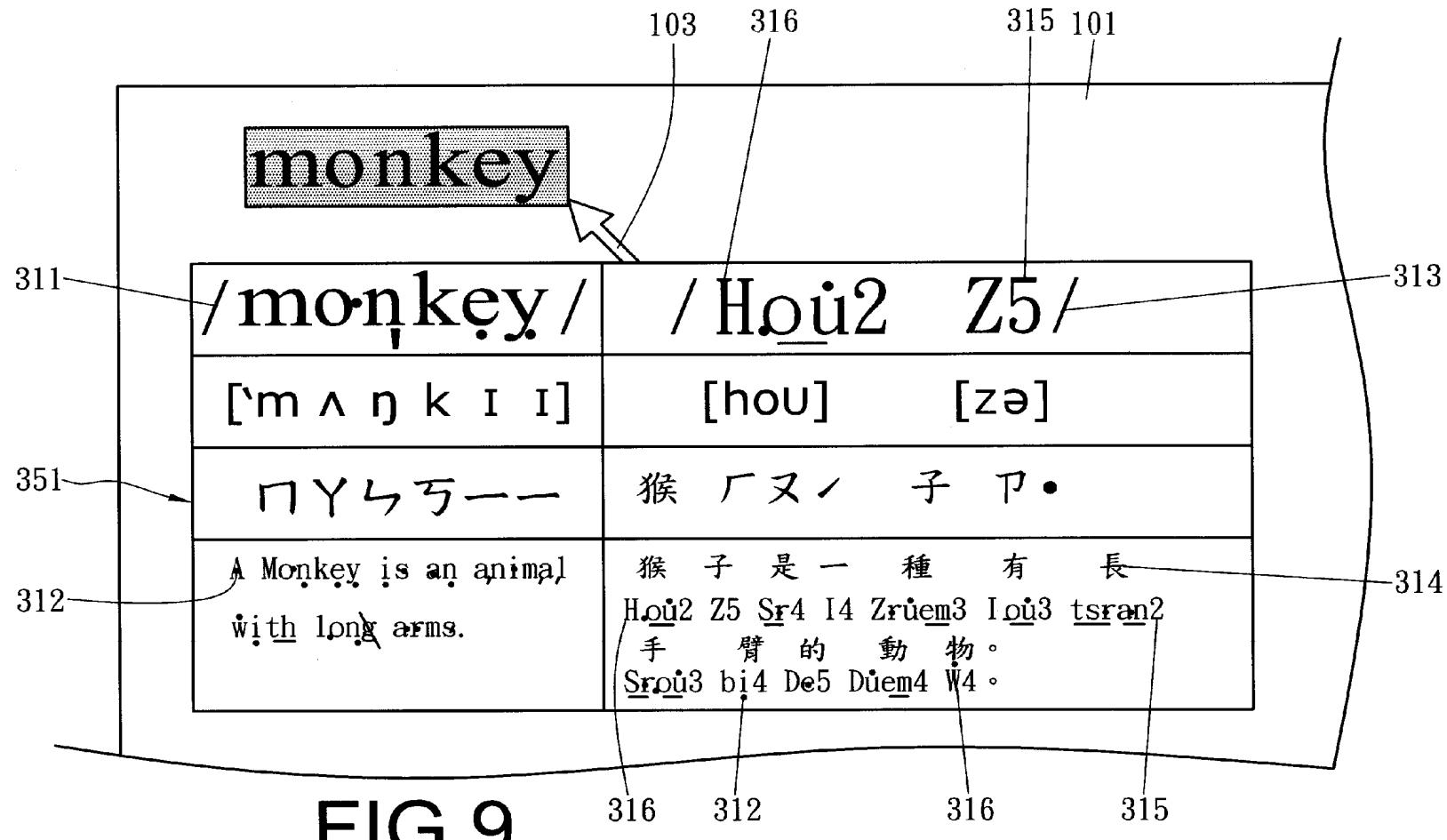


FIG.8



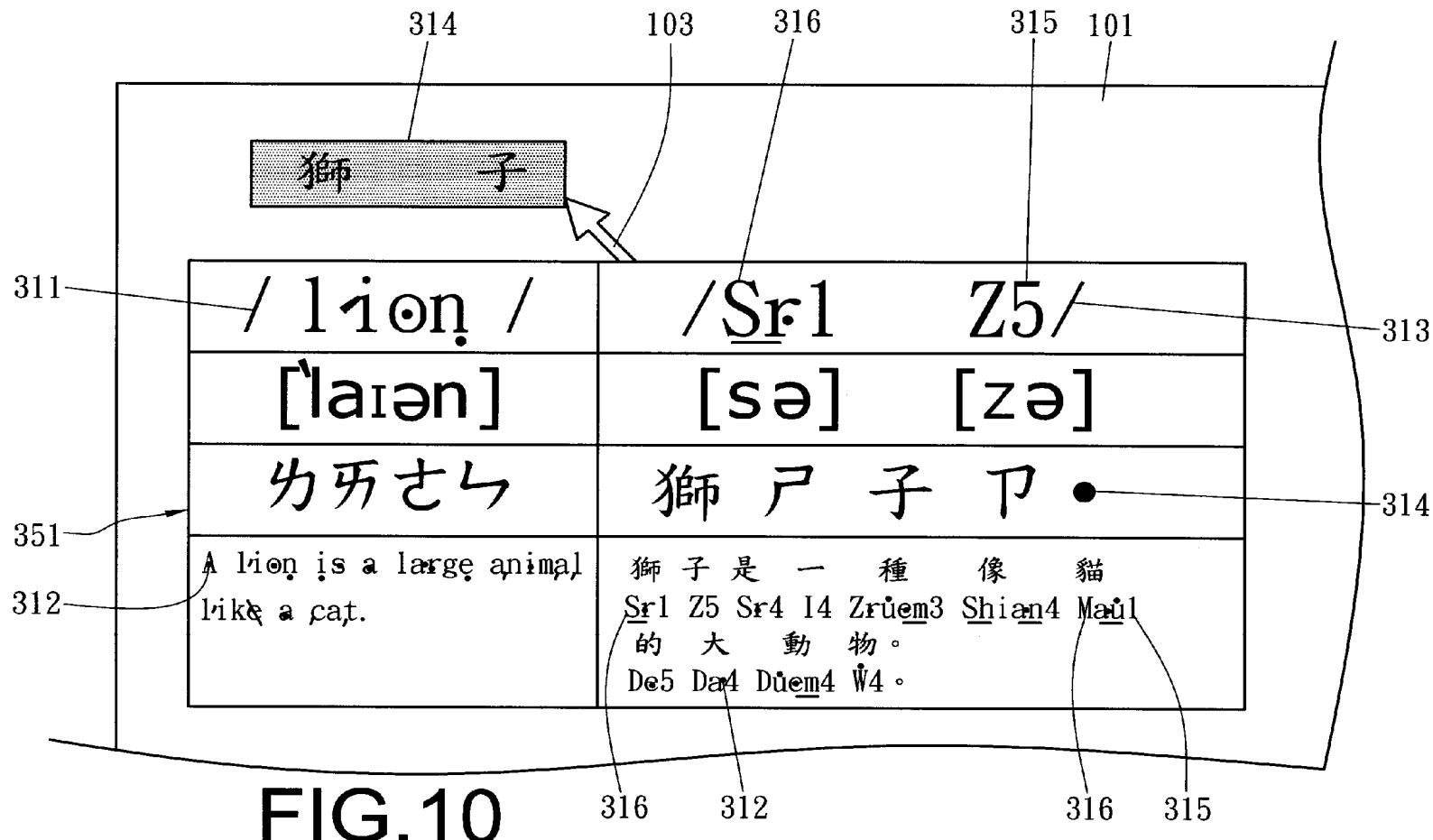


FIG. 10

## LANGUAGE TEACHING SYSTEM OF ORIENTATION PHONETIC SYMBOLS

[0001] The present invention is a continuation in part (CIP) of U.S. patent Ser. No. 11/650,598 which is assigned to and disclosed by the inventor of the present invention. Thus the contents of the U.S. patent Ser. No. 11/650,598 is incorporated into the present invention as a part of the invention.

### BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates to a language teaching system of orientation phonetic symbols, particularly to one by which English and Chinese language can be learned interchangeably.

[0004] 2. Description of the Prior Art

[0005] It is undeniable that speaking English with correct pronunciation is no easy work. At present, English teachers all over the world assist their students to pronounce a single English word by means of K.K. phonetic symbols of twenty-six letters in English alphabet and by ways of natural pronunciation. However, although understanding the meaning of an English word, most students are unable to pronounce the word correctly and hence dare not speak out the word directly because they cannot definitely identify the difference of pronunciation of a same letter in different English words. For example, the letter "a" in a single English word can be pronounced as "e", "a", "ɛ", "æ", "[text missing or illegible when filed]", "i" or "ð", and these varied phonetic symbols really puzzle English learners.

[0006] Different from English, the pronunciation of Chinese vocabulary is definitely composed of thirty-seven phonetic symbols and five marks of pronunciation intonations. By means of the interchanging English alphabets and the Chinese phonetic symbols, the inventor of this invention researched and developed a bearing phonetic symbols and language teaching system for facilitating learning of both English and Chinese language.

### SUMMARY OF THE INVENTION

[0007] A first objective of this invention is to offer a language teaching system of orientation phonetic symbols for helping people to learn English pronunciation.

[0008] A second objective of this invention is to offer a language teaching system of orientation phonetic symbols, helpful to learn Chinese pronunciation.

[0009] The language teaching system of orientation phonetic symbols in the present invention is possible to be built in an electronic computer that is formed with a screen. The language teaching system of orientation phonetic symbols includes a pronunciation teaching module consisting of a word bank unit and an identification-conversion unit. The word bank unit is built therein with lots of English single word data and English phonetic symbol word data. Arrangement of English letters of each English phonetic symbol word is completely the same as that of a definite English single word, and a pronunciation auxiliary mark representing the sound of the English letters is marked at a designated location on the periphery of the English phonetic symbol word. According to the sound of an English letter, the pronunciation auxiliary mark marked on the English letter, which serves as a vowel, of the English phonetic symbol word is correspondingly marked at one of the following spots of the English letter: a central

one, an exactly upper one, an exactly lower one, a left side one, a right side one, an upper left one, a lower left one, an upper right one and a lower right one. After a word input device is input therein with English letters, the identification-conversion unit can collate and display an English phonetic symbol word of the English single word from the word bank unit so as to enable a user to select the form of a letter he needs and display it on the screen.

[0010] The language teaching system of orientation phonetic symbols of this invention is possible to be built in an electronic computer formed with a screen. The orientation phonetic symbols and language teaching system consists of a pronunciation teaching module that contains a word bank unit and an identification-conversion unit. The word bank unit is built therein with many Chinese vocabulary data and lots of Chinese phonetic symbol words respectively corresponding with their Chinese vocabulary. The arrangement of the English letters representing each Chinese phonetic symbol completely corresponds to that of the Chinese phonetic symbols of the Chinese vocabulary, including one to several English letters arranged from the left to the right. The first English letter at the left side is a capital letter, and a numeral standing for a Chinese intonation is located at the right side of the last English letter, and the pronunciation auxiliary mark marked on the English letter, which serves as a vowel, of the Chinese phonetic symbol word is correspondingly marked at one of the following spots of the English letter: a central one, an exactly upper one, an exactly lower one, a left side one, a right side one, an upper left one, a lower left one, an upper right one and a lower right one. After the word input device is input with English letters, the identification-conversion unit can collate and display the Chinese vocabulary and a Chinese phonetic symbol from the word bank unit to enable a user to select the word he requires and display it on the screen.

[0011] The effect of this invention is that the language teaching system of orientation phonetic symbols invented by the inventor through newly designed orientation vowel phonetic symbols and orientation consonant phonetic symbols can not only help Chinese people to learn English pronunciation but also enable foreigners to learn Chinese, having great practicability.

### BRIEF DESCRIPTION OF DRAWINGS

[0012] This invention will be better understood by referring to the accompanying drawings, wherein:

[0013] FIG. 1 is a block diagram of the function of a language teaching system of orientation phonetic symbols in the present invention;

[0014] FIG. 2 is a schematic view in the present invention, illustrating a screen displaying plural English single words respectively marked with a pronunciation auxiliary mark after inputting characters;

[0015] FIG. 3 is a schematic view in the present invention, illustrating a screen displaying plural Chinese words respectively marked with a pronunciation auxiliary mark after inputting characters;

[0016] FIG. 4 is a schematic view of a phonetic symbol table of the sounds of nine vowels of a letter displayed on a screen, which are respectively located at the periphery and the center of the letter in nine orientation blocks and guided to pronounce by means of K.K. phonetic symbols and their corresponding Chinese phonetic symbols;

[0017] FIG. 5 is a schematic view illustrating a screen displaying English consonants and English phonetic symbol

letters respectively marked with pronunciation auxiliary marks, which are then guided pronounce by means of K.K. phonetic symbols and corresponding Chinese phonetic symbols;

[0018] FIG. 6 is a schematic view of a Chinese and English intonation table displayed on the screen in the present invention;

[0019] FIG. 7 is a schematic view in the present invention, illustrating that an auxiliary viewing window appears on the screen when a single letter of an English word marked with an orientation phonetic symbol word is pinpointed and selected;

[0020] FIG. 8 is a schematic view in the present invention, illustrating that an auxiliary viewing window appears on the screen when the letters of an English word, which are marked with orientation phonetic symbol, are totally pinpointed and selected;

[0021] FIG. 9 is a schematic view similar to FIG. 8 in the present invention, illustrating the contents displayed in the auxiliary viewing window when an English single word is pinpointed and selected; and

[0022] FIG. 10 is a schematic view similar to FIG. 9 in the present invention, illustrating the contents displayed in the auxiliary viewing window when a Chinese vocabulary is pinpointed and selected.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0023] A preferred embodiment of a language teaching system of orientation phonetic symbols in the present invention, as shown in FIGS. 1, 2 and 3, is possible to be built and carried in an electronic computer 100. The electronic computer 100 has a screen 101 employed for displaying images and a sound output device 102 for outputting sounds, a cursor 103 displayed on the screen 101 for pinpointing and selecting data and a character input device 104 for inputting English alphabets.

[0024] The language teaching system of orientation phonetic symbols in the present invention includes a pronunciation teaching module 3, which consists of a word bank unit 31, a sound data bank unit 32, an identification-conversion unit 33, a phonetic symbols display unit 34, an immediate reminding unit 35 and an immediate pronunciation auxiliary unit 36.

[0025] The word bank unit 31 is built therein with many English words, many English phonetic symbol words 311 respectively corresponding with the English words, many Chinese words, many Chinese phonetic symbol words 313 respectively corresponding with the Chinese words, many pronunciation auxiliary marks 312 respectively corresponding with the English phonetic symbol words 311, many pronunciation auxiliary marks 312 respectively corresponding with the Chinese phonetic symbol words 313 and further many sound data added to the pronunciation auxiliary marks 312 and marked with conventional Chinese phonetic symbols and K.K. phonetic symbols.

[0026] After English letters are input in the character input device 104, the English letters will be collated by the word bank unit 31 and their English phonetic symbol words 311 will be displayed on the screen 101 of the electronic computer 100, as shown in FIG. 2, and the arrangement of the letters of the English phonetic symbol words 311 is completely the same as that of the input English word. The specified English letter 348 of the English phonetic symbol words 311 are respectively marked with a pronunciation auxiliary mark 312

at a predetermined location on its periphery for representing the sound of the specified English letters.

[0027] After an English letter is input in the character input device 104 and collated by the word bank unit 31, the Chinese phonetic symbols 313 and the Chinese vocabulary 314 will be displayed on the screen 101, as shown in FIG. 3, and the arrangement of the English letters of each Chinese phonetic symbol word is completely corresponding to the phonetic symbol of the Chinese vocabulary, including one to several English letters arranged from the left to the right. The first English letter at the left side is a capital letter 316, and a numeral 315 representing a Chinese intonation is located at the right side of the last English letter. Further, the specified English letter 348 tantamount to the Chinese phonetic symbol word 313 is respectively marked with a pronunciation auxiliary mark 312 at a predetermined location on the periphery for representing the sound of the English word.

[0028] In this preferred embodiment, the pronunciation auxiliary mark 312 ("\*", "-", "/") of the English phonetic word 311 and the Chinese phonetic symbol word 313 is marked at the periphery and the central portion of the English letter 348. As shown in FIG. 4, the English vowels are arranged and delimited into nine orientation blocks arranged in matrixes, and the nine orientation blocks for the English vowels are laid from the left to the right and from the above to the below, namely an upper left side one, an upper intermediate one, an upper right side one, a left intermediate one, a central one, a right intermediate one, a lower left side one, a lower intermediate one and a lower right side one. The pronunciation auxiliary marks 312 are written in one of the orientation blocks in accordance with the sound of the English vowel, and there are three kinds of the pronunciation auxiliary marks 312 put on the English letter, as shown in FIG. 6, one being a dot "·" representing a short sound, another one is a dash "-" representing a long sound, and the third one is a slanting stroke "/" representing an accent pronounced with force. Pertaining to the locations of the pronunciation auxiliary marks 312 and their corresponding sounds will be described subsequently.

[0029] The whole pronunciation data is composed of many Chinese phonetic symbols and K.K. phonetic symbols arranged from the left to the right and respectively able to be employed for pronouncing the English phonetic symbol word 311, and the sound data are composed of Chinese phonetic symbols and K.K. phonetic symbols, which are similar or the same in pronunciation.

[0030] The sound data bank unit 32 is built therein with many sound data regarding the pronunciation of the English phonetic symbol words 311, many sound data regarding the pronunciation of the Chinese vocabulary of the Chinese phonetic symbol words 313 and many sound data pertaining to the pronunciation of the English letters marked with the pronunciation auxiliary marks 312.

[0031] From the word bank unit 31, the identification-conversion unit 33 can collate and identify the corresponding English phonetic symbol words 311 and the corresponding Chinese phonetic symbol words 313 of the English letters and the Chinese vocabulary 314 displayed on the screen 101, and the Chinese vocabulary 314, enabling a user to select the form of characters he needs and display it on the screen.

[0032] Referring to FIGS. 1, 4~6, the phonetic symbol display unit 34 can be operated by the electronic computer 100, and the screen 101 can display a vowel orientation phonetic symbol table 341, a consonant orientation phonetic symbol

table 343, an English pronunciation-intonation table 346 and a Chinese pronunciation-intonation table 347.

[0033] The vowel orientation phonetic symbol table 341 shown in FIG. 4 is formed with nine matrix-arranged orientation blocks 342 corresponding with the nine orientation blocks of foresaid English letter 348 marked with the pronunciation auxiliary marks. Each orientation block 342 of the vowel orientation phonetic symbol table 341 is respectively defined to represent a sound of a specific English vowel and is respectively marked with a sound symbol standing for the sound of the vowel. In this preferred embodiment, the sound symbol marked in each orientation block 342 is composed of a Chinese phonetic symbol and a K.K. phonetic symbol, which are the same or similar in pronunciation. Therefore, in the English phonetic symbol words 311 shown in FIG. 2 and the Chinese phonetic symbol words 313 shown in FIG. 3, built in the word bank unit 31, the pronunciation auxiliary marks 312 of the English letter that represents a vowel will be marked according to the sound of the vowel and contrasting the location of the vowel sound of the vowel orientation phonetic symbol table 341. For instance, referring to FIG. 2, in the English word "monkey", when the letter "o" is pronounced as "A", the pronunciation auxiliary mark 312 is a round dot "•" marked at a right side of the letter "O" to form a mark "O•".

[0034] The English pronunciation intonation table 346 shown in FIG. 6 is formed with several matrix-arranged square blocks 344 respectively marked therein with a symbol representing a specific intonation. In this preferred embodiment, the intonations are those of English pronunciation. For instance, referring to FIG. 6, when the letter is pronounced as "e", "ε" or "ae", the pronunciation auxiliary marks 312 will be respectively a dash "-", a dot "•" or a slanting stroke "/" marked at a specified lower right side of the letter.

[0035] The consonant orientation phonetic symbol table 343 shown in FIG. 5 is formed with several matrix-arranged square blocks 344 and an adjusting key 345 for adjusting and changing the square blocks 344 appearing in the consonant orientation phonetic symbol table 343 to move up and down, and also left and right. Each square block 344 is marked therein with English letters used to serve as the capital or the lower case of a consonant, or marked with English letters used to serve as the capital or the lower case of consonants that are marked with the pronunciation auxiliary marks 312, or marked with two different English letters arranged at the left and the right side and having a pronunciation auxiliary mark 312 placed under or between the two English letters. For example, a line extends across the lower side of the two English letters, or lies between the two letters. In addition, the lower side of the capital and the lower case of English letters, or the lower side of the two side-by-side arranged English letters are respectively marked with a pronunciation symbol for representing the English letter or representing the consonant sound of the English letter. In this preferred embodiment, the sound symbols are composed of K.K. phonetic symbols and Chinese phonetic symbols, which are similar or the same in pronunciation.

[0036] The Chinese pronunciation intonation table 347 shown in FIG. 6 is formed with several matrix-arranged square blocks 344 respectively marked with a symbol standing for specified intonation and a numeral corresponding with the intonation. In this preferred embodiment, the intonations are Chinese pronunciation ones, which are classified into a

first one (a level tone, symbol: no but by striking space key), a second one (a rising tone, symbol: "↗", a third one (a falling-rising one, symbol: "↘", a fourth one (a falling intonation, symbol: "↖", and a neutral one (a soft intonation, symbol: "↔". The Chinese intonation numerals 315 representing the level one, the rising one, the falling-rising one, the falling one and neutral one are "1 or space", "2", "3", "4" and "5" respectively.

[0037] Referring to FIGS. 1, 7 and 8, when the immediate reminding unit 35 is operated by the electronic computer 100 and when the electronic computer 100 moves the cursor 103 on the screen 101 to pinpoint and select a complete English phonetic symbol word 311, or a single English phonetic symbol word 311 and a Chinese phonetic symbol word 313 in which the English letter is marked with the pronunciation auxiliary marks 312, an auxiliary viewing window 351 will immediately appear at the location of the English phonetic symbol word or the English letter on the screen 101 according to the complete pronunciation data and sound data built in the word bank unit 31. In the auxiliary viewing window 351, the complete pronunciation data corresponding with the English phonetic symbol word 311, or the sound data corresponding with the English letter will be displayed to let a user observe and understand how to read the Chinese and the English phonetic symbol words or the Chinese and the English words.

[0038] In this preferred embodiment, the immediate reminding unit 35 is designed to have the auxiliary viewing window 351 displayed immediately when the English phonetic symbol word or the English letter to be pinpointed and selected by the cursor 103 becomes reverse video, but the immediate reminding unit 35 can display the auxiliary viewing window 351 in other modes.

[0039] When the immediate pronunciation auxiliary unit 36 is operated by the electronic computer 100 and when an English phonetic symbol word 311, a Chinese phonetic symbol word 313 or an English letter marked with a pronunciation auxiliary mark 312 is pinpointed and is selected by the cursor, the sound data bank unit 32 will collate and pick out the sound data corresponding with the selected English phonetic symbol word 311, the Chinese phonetic symbol word 313 or the English letter and transmit the sound data to the sound output device 102 to be amplified and output so that a user can hear the sounds.

[0040] In use of the language teaching system of orientation phonetic symbols, when Chinese characters, English characters, or an article mixed with Chinese and English words displayed on the screen 101 are input in the word input device 104 by means of the electronic computer 100, if a user is unable to understand the pronunciation of the Chinese or English words in the article, all the Chinese and English words can be converted into Chinese phonetic symbol words 313, English phonetic symbol words 311 and pronunciation auxiliary marks 312 to enable the user to know how to read the words by using the pronunciation teaching module 3. In addition, by handling the phonetic symbol display unit 34, the vowel orientation phonetic symbol table 341 and the consonant orientation phonetic symbol table 343 can be displayed on the screen 101, convenient to contrast the pronunciation auxiliary marks 312 marked on the English phonetic symbol words 311.

[0041] Moreover, when the cursor 103 is employed to pinpoint and select specified English phonetic symbol words 311 or enquire the English letters marked with pronunciation auxiliary marks 312 by operating the immediate reminding

unit 35, the complete pronunciation data of the English phonetic symbol word 311 or the sound data of the English letter will be displayed at once. When a user wants to know the correct pronunciation of a certain English phonetic symbol word 311 or an English letter marked with a pronunciation auxiliary mark 312, simply operate the immediate pronunciation auxiliary unit 36 and the pronunciation of the English phonetic symbol words 311 or the English letters selected by the cursor 103 will be sounded out immediately for the user to listen to and imitate.

[0042] When a user, such as a foreigner, does not know the pronunciation of the Chinese vocabulary 314 displayed on the screen 101, the Chinese vocabulary 314 can be converted into Chinese phonetic symbol word 313 and displayed on the screen 101 by means of the identification-conversion unit 33. Thus, the user can read out the pronunciation of the Chinese vocabulary 314 through the English letter marked with the pronunciation auxiliary mark 312 and the numeral. If necessary, the phonetic symbol display unit 34 can also be used to have the vowel orientation phonetic symbol table 341, the consonant orientation phonetic symbol table 343, the English pronunciation tone table 346 and the Chinese pronunciation tone table 347 displayed on the screen 101 for facilitating contrast. Of course, through the immediate pronunciation auxiliary unit 36, the pronunciation of the selected Chinese phonetic symbol word 313 can also be output immediately for a user to listen to and imitate.

[0043] Referring to FIGS. 9 and 10, when this invention is put into effect and when a complete English phonetic symbol word 11 is pinpointed and selected by the cursor 103, the immediate reminding unit 5 will have the auxiliary viewing window 351 not only to display the complete pronunciation data of the English phonetic symbol word 311 in the auxiliary viewing window 351 but also display a corresponding Chinese phonetic symbol word 313, an English sentence composed of the English phonetic symbol word 311 and other English phonetic symbol words 311 and Chinese vocabularies translated from the English sentence and consisting of its Chinese phonetic symbol words 313. When a Chinese word or a Chinese phonetic symbol word is pinpointed and selected by the cursor 103, the auxiliary viewing window 351 will not only display the Chinese phonetic symbol word 313 and its corresponding English phonetic symbol word 311 constituted of K.K. phonetic symbols and Chinese phonetic symbols, but will also display a sentence made of Chinese vocabulary 314 and a sentence made of Chinese phonetic symbol words 313 of the Chinese vocabulary 314 and a sentence corresponding with the English phonetic symbol words translated from the Chinese sentence into English. Nevertheless, the function of the immediate reminding unit 35 can be designed beyond what is mentioned above.

[0044] To sum up, with the pronunciation teaching module 3 designed by the inventor of this invention, the language teaching system of orientation phonetic symbols in the present invention not only helps Chinese people to learn English pronunciation but also enable foreigners to learn Chinese language with convenience, having great practicability.

[0045] While the preferred embodiment of the invention has been described above, it will be recognized and understood that various modifications may be made therein and the appended claims are intended to cover all such modifications that may fall within the spirit and scope of the invention.

What is claimed is:

1. A language teaching system of orientation phonetic symbols possible to be built in an electronic computer formed with a screen, said orientation phonetic symbol and language teaching system provided with a pronunciation teaching module, said pronunciation teaching module comprising:

a word bank unit built therein with many English single word data and many English phonetic symbol word data, English letters of each said English phonetic symbol word completely the same as a specified English single word in arrangement, a pronunciation auxiliary mark representing pronunciation of said English letter respectively marked at a specified location of a periphery of said English phonetic symbol word, in said English phonetic symbol word said pronunciation auxiliary mark on English letters serving as vowels, being correspondingly marked at a central spot, an exactly upper spot, an exactly lower spot, a left side spot, a right side spot, an upper left spot, a lower left spot, an upper right spot and a lower right spot of said English letter according to the sound of said English letter; and

a character input device, after letters are input in said character input device, an identification-conversion unit able to collate and pick out English phonetic symbol word of said English single word from said word bank unit to enable a user to select a needed character and display it on a screen.

2. A language teaching system of orientation phonetic symbols as claimed in claim 1, wherein said pronunciation module also comprises a phonetic symbol display unit, said phonetic symbol display unit able to display a vowel orientation phonetic symbol table on a screen, said vowel orientation phonetic symbol table formed with nine matrix-arranged orientation blocks respectively defined to show a specific vowel.

3. A language teaching system of orientation phonetic symbols as claimed in claim 2, wherein said phonetic symbol display unit can also display a consonant orientation phonetic symbol table formed with several matrix-arranged square blocks, said square blocks respectively showing at least one English letter serving as a consonant, or an English letter serving as a consonant and marked with a definite pronunciation auxiliary mark at a predetermined location, a sound symbol representing a sound of consonant of said English letter respectively marked at a location adjacent to each English letter.

4. A language teaching system of orientation phonetic symbols as claimed in claim 1, wherein said electric computer is provided with a cursor able to move on a screen, pinpoint and select letters displayed on the screen, said word bank unit also built therein with many complete pronunciation data respectively corresponding with a specified English phonetic symbol word, and many sound data respectively corresponding with a specified English letter marked with a pronunciation auxiliary mark, said pronunciation teaching module also comprising an immediate reminding unit, said immediate reminding unit able to collate and select corresponding complete pronunciation data or sound data from said word bank unit and display on the screen an auxiliary viewing window with said complete pronunciation data or with said sound data when said cursor is pinpointed to select an English phonetic symbol word or one English letter in an English phonetic symbol word.

5. A language teaching system of orientation phonetic symbols as claimed in claim 4, wherein said complete pronuncia-

tion data built in said word bank unit are composed of many Chinese phonetic symbols arranged from the left to the right.

**6.** A language teaching system of orientation phonetic symbols as claimed in claim **4**, wherein said electronic computer is further provided with a sound output device for outputting sounds, said pronunciation teaching module also comprising a sound data bank unit and an immediate pronunciation auxiliary unit, said sound data bank unit built therein with sound data with correct pronunciation for said English letters that are respectively marked with pronunciation auxiliary marks, and sound data with correct pronunciation for said English phonetic symbol words, said immediate pronunciation auxiliary unit able to collate and select sound data of said English phonetic symbol words or said English letters from said sound data bank unit and output said sound data through said sound output device when said cursor is pinpointed to select an English phonetic symbol word or one English letter of an English phonetic symbol word.

**7.** A language teaching system of orientation phonetic symbols as claimed in claim **1**, wherein there are three kinds of pronunciation auxiliary marks to be marked on English letters of English phonetic symbol words built in said word bank unit, a dot mark representing a short sound, a dash mark representing a long sound and a slanting stroke representing an accent pronounced with force.

**8.** A language teaching system of orientation phonetic symbols as claimed in claim **2**, wherein the sound symbols in said vowel orientation phonetic symbol table are composed of Chinese phonetic symbols and K.K. phonetic symbols, which are similar or the same in pronunciation.

**9.** A language teaching system of orientation phonetic symbols as claimed in claim **3**, wherein the sound symbols in said consonant orientation phonetic symbol table are composed of Chinese phonetic symbols and K.K. phonetic symbols, which are similar or the same in pronunciation.

**10.** A language teaching system of orientation phonetic symbols possible to be built in an electronic computer with a screen, said orientation phonetic symbols and language teaching system provided with a pronunciation teaching module, said pronunciation teaching module comprising:

a word bank unit built therein with many Chinese vocabulary data and many Chinese phonetic symbol words respectively corresponding with said Chinese vocabulary, arrangement of English letter of each said Chinese phonetic symbol word completely corresponding to the Chinese phonetic symbols of said Chinese vocabulary, comprising one English letter to several English letters arranged from the left to the right, the first English letter at the left side being a capital letter and a numeral located at a right side of the last English letter for standing for a Chinese intonation, a pronunciation auxiliary mark representing a sound of said English letter being marked at a specified orientation of the periphery of a Chinese phonetic symbol word, according to the sound of said English letter, said pronunciation auxiliary mark placed on said English letter, which serves as a vowel, of said Chinese phonetic symbol word correspondingly put at one of the following spots of said English letter: a central one, an exactly upper one, an exactly lower one, a left side one, a right side one, an upper left one, a lower left one, an upper right one and an upper lower one; and

a character input device, an identification-conversion unit collating and picking out Chinese phonetic symbol

words of said Chinese vocabulary from said word bank unit so as to enable a user to select a word he needs and display it on a screen.

**11.** A language teaching system of orientation phonetic symbols as claimed in claim **10**, wherein the phonetic symbol portion of Chinese phonetic symbol words built in said word bank unit consists of several English letters arranged from the left to the right and a numeral arranged at the right side of said English letter, and a pronunciation auxiliary mark representing the sound of said English letter is marked at a predetermined position of one English letter.

**12.** A language teaching system of orientation phonetic symbols as claimed in claim **11**, wherein said pronunciation teaching module also comprises a phonetic symbol display unit able to display a vowel orientation phonetic symbol table on the screen, said vowel orientation phonetic symbol table formed with nine matrix-arranged orientation blocks respectively defined to show a specified vowel sound, each said orientation block displayed therein with a sound symbol standing for said vowel sound, in accordance with the vowel sound of said English letter, said pronunciation auxiliary mark marked on an English letter that severs as a vowel, in the phonetic symbol portion of said Chinese phonetic symbol word said pronunciation auxiliary mark being correspondingly placed at a central spot, at an exactly upper spot, at an exactly lower spot, at a left side spot, at a right side spot, at an upper left spot, at a lower left spot, at an upper right spot or at a lower right spot.

**13.** A language teaching system of orientation phonetic symbols as claimed in claim **12**, wherein said phonetic symbol display unit can also display a consonant orientation phonetic symbol table on the screen, said consonant orientation phonetic symbol table formed with several matrix-arranged square blocks, said square blocks respectively showing at least one English letter used to serve as a consonant, or one English letter used to serve as a consonant and marked with a pronunciation auxiliary mark at a predetermined location, a sound symbol representing a consonant sound of said English letter marked at a location adjacent to said English letter.

**14.** A language teaching system of orientation phonetic symbols as claimed in claim **13**, wherein said phonetic symbol display unit can also display a pronunciation intonation table on the screen, said pronunciation intonation table formed with several square blocks, each said square block marked therein with an intonation symbol representing a specified intonation, and a numeral corresponding with said intonation symbol.

**15.** A language teaching system of orientation phonetic symbols as claimed in claim **10**, wherein said electronic computer is formed with a cursor able to move on the screen and be pinpointed to select English letters displayed on the screen, said word bank unit also built therein with lots of sound data respectively corresponding with a specified English letter marked with pronunciation auxiliary marks, said pronunciation teaching module also comprising an immediate reminding unit, said immediate reminding unit able to collate and select sound data of said English letter from said word bank unit and display an auxiliary viewing window with said sound data on the screen when said cursor pinpoints and picks out an English letter in the phonetic symbol portion of Chinese phonetic symbol words.

**16.** A language teaching system of orientation phonetic symbols as claimed in claim **15**, wherein said electronic com-

puter is further provided with a sound output device for outputting sounds, and said pronunciation teaching module further contains a sound data bank unit and an immediate pronunciation auxiliary unit, said sound data bank unit built therein with sound data with correct pronunciation of the English letter marked with pronunciation auxiliary marks, and sound data with correct pronunciation of the phonetic symbol portion of said Chinese phonetic symbol words, said immediate pronunciation auxiliary unit able to collate and select said phonetic portion or said sound data of said English letter from said sound data bank and outputting said sound data through said sound output device when said cursor pinpoints and picks out Chinese phonetic symbol words or one English letter from the phonetic symbol portion of Chinese phonetic symbol words.

**17.** A language teaching system of orientation phonetic symbols as claimed in claim **10**, wherein there are three kinds

of pronunciation auxiliary marks marked on English letters of the Chinese phonetic symbol words built in said word bank unit: a dot symbol representing a short sound, a dash symbol representing a long sound and a slanting stroke symbol representing an accent pronounced with force.

**18.** A language teaching system orientation phonetic symbols as claimed in claim **12**, wherein said sound symbols in said vowel orientation phonetic symbol table are composed of Chinese phonetic symbols and K.K. phonetic symbols, which are similar or the same in pronunciation.

**19.** A language teaching system of orientation phonetic symbols as claimed in claim **13**, wherein said sound symbols in said consonant orientation phonetic symbol table are composed of Chinese phonetic symbols and K.K. phonetic symbols, which are similar or the same in pronunciation.

\* \* \* \* \*

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## DESCRIPTION CN202422446U

*10* Sound spelling and counting learning machine

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*12* 有声拼字算数学习机

[0001]

*18* Technical field

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*20* 技术领域

[0002]

*26* The utility model relates to the field of children's learning appliances and kindergarten teaching appliances.

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*28* 本实用新型涉及儿童学习器具及幼儿园教学器具领域。

[0003]

*34* Background technique

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*36* 背景技术

## [0004]

42 Traditional spelling blocks or spelling cards and counting methods have no voice effect and the ability to automatically distinguish right from wrong, so children cannot use them correctly independently.

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45 传统的拼字积木或拼字卡片以及算数方法由于没有语音效果和自动鉴别对错的能力，儿童无法独立正确使用。

49 However, computer literacy and mathematical operation software require computers as a carrier, which is difficult to popularize.

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52 而电脑识字和数学运算软件需要电脑作为载体，难以普及。

## [0005]

58 Utility model content

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60 实用新型内容

## [0006]

66 In order to solve the deficiencies in the prior art, the utility model provides a children's learning product that has sound and can automatically determine the correctness of spelling and arithmetic.

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69 本实用新型为了解决现有技术中的不足，提供了一种有声，能自动判断拼字和算数正误的儿童学习产品。

## [0007]

76 The purpose of the utility model is to achieve through the following technical solutions:

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78 本实用新型的目的是通过以下技术方案来实现：

## [0008]

84 An arithmetic learning machine for spelling and arithmetic with sound.

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86 一种有声拼字算数学习机。

89 The utility model is characterized in that it is composed of a module installed with a resistor and a hardware shaft, and a bottom board installed with an electronic circuit.

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92 其特征在于由安装有电阻以及五金轴的模块和安装有电子线路的底板所组成。

## [0009]

98 The learning machine is characterized in that there are conductive contact points corresponding to the conductive contact points of the module and a buckle device with certain elasticity on the bottom plate.

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101 所述的学习机，其特征是底板上有与模块导电接触点对应的导电接触点以及具有一定弹性的卡扣装置。

## [0010]

108 Using the above technical solution, the module is put into a learning machine with a recognition circuit and a speech circuit, the text or number represented by the module is recognized by judging the resistance value in the module, and then the learning machine emits text or number speech to achieve literacy and The purpose of arithmetic.

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113 采用上述技术方案，将模块放入有识别电路和语音电路的学习机中，通过判断模块内的阻值来识别该模块代表的文字或数字，然后学习机发出文字或数字的语音，达到识字和算数的目的。

## [0011]

120 The learning machine according to the present invention is composed of a plurality of plastic modules printed with radicals of Chinese characters, English letters, numbers and arithmetic symbols, and circuits and voice

integrated circuits for identifying the plastic modules.

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124 按照本实用新型的学习机，由多个印有汉字的偏旁部首、英文字母、数字和运算符号的塑料模块以及识别塑料模块的电路和语音集成电路组成。

## [0012]

131 According to the learning machine of the present invention, each module represents different radicals, English letters, numbers and operation symbols.

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134 按照本实用新型的学习机，每个模块分别代表不同的偏旁部首、英文字母、数字和运算符号。

137 Each module is composed of a resistor 1, a welding piece 2, a hardware shaft 3, different radicals, English letters, numbers and arithmetic symbols 4, and a plastic part module 5 of different resistances welded in the module.

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141 每个模块由模块内焊接的不同阻值的电阻1，焊接片2，五金轴3和不同的偏旁部首、英文字母、数字和运算符号4以及塑料件模块5组成。

## [0013]

148 According to the learning machine of the present invention, the three conductive contact points on the module are contacted with the corresponding three conductive contact points on the machine to form a circuit loop. Using the principle of charge and discharge of resistance and capacitance, RC oscillation is generated on the corresponding port of the IC , Use the counting input port to read the number of pulses within a certain period of time, or the time required for a certain number of pulses. After calculating the oscillation frequency, compare the oscillation frequency with the standard resistance to obtain the resistance of the module, that is, the learning machine The radicals, English letters, numbers and operation symbols corresponding to the module are recognized, and the learning machine emits a voice representing the module.

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158 按照本实用新型的学习机，模块上的3个导电接触点与机器上相对应的3个导电接触点接触后形成电路回路，利用电阻电容的充放电原理，在IC的相应端口上产生RC振荡，用计数输入口读得一定时间内的脉冲数量，或是一定数量脉冲所需时间，计算出振荡频率后，透过和标准电阻下振荡频率的对比，获得该模块的阻值，即学习机识别到该模块对应的偏旁部首、英文字母、数字和运算符号，学习机发出代表该模块的语音。

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## DESCRIPTION FR2499267A1

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13 The invention relates to a set of educational cubes for teaching letters and their consonances  
The invention lies in the field of electronics The technical problem that this invention claims to solve is the impossibility of setting available to young children, the technology at our disposal.

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17 Jeu de cubes pédagogiquesDescription L'invention concerne un jeu de cubes pédagogiques pour l'enseignement des lettres et de leurs consonnances L'invention se situe dans le domaine de l'électronique Le problème technique que cette invention prétend résoudre est l'impossibilité de mettre à la disposition d'enfants en bas-age , la technologie dont nous disposons .

23 The invention will allow children to learn the letters of the alphabet and their consonances, in their mother tongue, as well as those of the words that they can form at leisure during their game The invention is composed, by referring in the figure, a black box or central unit provided with a power supply system 3, a control organ & ommat ;, a voice synthesizer had several cubes & ommat; (each provided with own power supply system 5) or peripheral units. On 4 of the 6 sides of each pst cube, a different letter is written. All the letters written on the cubes cover the alphabet of the chosen language The widely used letters reappear more often on the faces of the cubes The left face of a cube is placed against the reading face 7 of the black box. A means of attraction (for example a permanent magnet) strengthens the bond between the two faces. A means of information @ (for example a system of switches closing when entering a magnetic field) informs the cube of its spatial situation.

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35 L'invention permettra aux enfants d'apprendre les lettres de l'alphabet et leurs consonnances , dans leur langue maternelle , ainsi que celles des mots qu'ils pourront former à loisir au cours de leur jeu L'invention se compose , en se référant à la figure ,d'une boite noire ou unité

centrale munie d'un système d'alimentation 3, d'un organe de commande & ommat; d'un synthétiseur de voix eut de plusieurs cubes & ommat;( munis chacuns d'un système d'alimentation propre 5) ou unités périphériques . Sur 4 des 6 faces de chaque cube pst inscrite une lettre différente. L'ensemble des lettres inscrites sur les cubes couvre l'alphabet de la langue choisieLes lettres très utilisées réapparaissent plus souvent sur les faces des cubesOn dispose la face gauche d'un cube contre la face de lecture 7 de la boite noire . Un moyen d'attraction(par exemple un aimant permanent ) renforce le lien entre les deux faces . Un moyen d'information @ (par exemple un système d'interrupteurs se fermant lors de l'entrée dans un champ magnétique ) informe le cube de sa situation spatiale .

<sup>49</sup> Informed, the cube by another information system (for example a low frequency oscillator) will communicate to the black box the letter it displays A transmission control and information collection system 11 directed by a sequence pre-recorded in a read only memory, acts according to these main steps - once received by a receiver 12 (for example a low frequency oscillation filter) the information coming from a cube, the sequence blocks the information on its path (for example el. by switching off the power supply to the oscillator at low frequency by a relay) and allows (by the same relay system) another cube to give its own information whose transmission had been blocked (by the same relay system). A system (for example a combination of relays) allows the information to be spread over time and to know its origin - the information received is stored in a memory - then it orders and analyzes the information according to the phonetic rules of 19 Ipngue chosen - the result of this integration work is communicated to the voice synthesizer and other peripheral output units which are used to sound and visualize the learning information The black box is equipped with control device allowing a variety of use of the equipment (for example the repetition of a word, letters taken separately) The device can be placed on a horizontal plane or fixed on a vertical plane All technical means to achieve the invention, both in manufacture and in operation, is protected by said invention

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<sup>67</sup> Informé , le cube par un autre système d'information ( par exemple un oscillateur à basse fréquence ) va communiquer à la boite noire la lettre qu'il afficheUn système de contrôle de transmission et de recueil d'information 11 dirigé par une séquence préenregistrée dans une mémoire morte , agit suivant ces principales étapes - une fois reçue par un récepteur 12 (par exemple un filtre à oscillation de basse fréquence ) l'information en provenance d'un cube , la séquence bloque l'information sur son parcours ( par exemple el. coupant par un relais l'alimentation de l'oscillateur à basse fréquence ) et permet (par même système de relais ) à un autre cube de donner son information propre dont la transmission avait ébi bloqué ( par le même système de relais ) . Un système ( par exemple une combi- -naison de relais ) permet de repartir l'information dans le temps et d'en savoir l'origine - l'information reçue est stockée dans une mémoire - ensuite elle ordonne et analyse l'information selon les règles phonétiques de 19 Ipngue choisie - le résultat de ce travail d'intégration est communiqué au synthétiseur de voix et autres unités périphériques de sortie qui pero;ettraient de sonoriser et de visualiser

l'information d'apprentissage La boite noire est équipée d'organe de commande permettant une utilisation variée de l'équipement ( par exemple la répétition d'un mot , des lettres prises séparément )Le dispositif peut être posé sur un plan horizontal ou fixé sur un plan verticalTous moyens techniques permettant de réaliser l'invention ,tant dans la fabrication que dans le fonctionnement , est protégé par la dite invention

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## DESCRIPTION KR101216197B1

11 Wood - based puzzle for learning {WOOD SUBSTANCE TYPE PUZZEL FOR LEARNING}

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14 {WOOD SUBSTANCE TYPE PUZZEL FOR LEARNING}

### [0001]

20 The present invention relates to language or other learning puzzles. More specifically, in order for children to learn English easily and fun, it relates to a package of learning puzzles in which learning can be performed while matching puzzles.

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24 ,

### [0002]

32 As the early education craze for English has arisen, research on various learning methods for younger learners has been widely conducted. In particular, research is being conducted on technologies that enable young learners to learn through content that may be of interest to them.

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37 , 가

가 . , 가 .  
가

### [0003]

45 A typical tool for learning through content is a game.

---

47

50 It is to arouse interest in learners by manipulating games that appear on video devices such as computers, and to include educational effects in game contents as well as learning effects.

---

54

### [0004]

61 As a learning method using a game, in addition to the development of a learning game through a video medium such as a computer, there is one that maximizes the learning effect by directly experiencing the game to the learner using a commonly encountered offline game such as a puzzle.

---

66

### [0005]

74 Puzzles are being used as a very effective educational tool for young learners who have a fast learning ability and have a very effective intuitive learning effect.

---

77

가

*81* As the user directly touches and assembles the puzzle, the corresponding educational content is also directly touched and learned, showing a very high effect compared to other devices in terms of learning effect.

---

*85* 가 ,

,

## [0006]

*92* The most widely known educational puzzle is the jigsaw puzzle.

---

*94* 가 .

*97* The jigsaw puzzle refers to a type of puzzle in which puzzle pieces are put together on a base in which grooves are formed in a certain shape.

---

*100* ,

.

## [0007]

*107* Recently, in the development of learning content using a jigsaw puzzle, a learning puzzle supporting audio and video has been commercialized.

---

*110* ,

*114* However, the learning puzzle has a disadvantage in that the number of supported audio and video content is very limited.

---

*117* , 가

.

*120* In order to learn through different kinds of puzzles, learners have to buy new products and learn new usage tips.

,

[0008]

<sup>130</sup> In addition, since young learners use the puzzle while directly touching it, there is a possibility that the learner may receive an electric shock due to the electrical connection required for audio and video support.

134

가 가 가 .

<sup>138</sup> In addition, there has been a problem in that the countermeasures are weak for the youth class learners who are vulnerable to germs when using them directly by touching them.

142

1

<sup>149</sup> Accordingly, an object of the present invention is to provide an efficient and safe learning puzzle by solving the above - mentioned problems.

152

<sup>156</sup> More specifically, the purpose is to improve the texture that the learner can feel while touching the puzzle while being electrically and biologically safe even when the young learner directly touches it.

160

가 , ,

<sup>164</sup> In addition, the purpose is to maximize the cost and efficiency of learning by experiencing various contents and puzzles with the same usage tips.

167 ,

171 In order to achieve the above object, a wooden puzzle for learning according to an embodiment of the present invention is a main having a first space surrounded by a partition wall and having an open top, and a second space having an opening formed on the side and the rest is surrounded by the partition wall. frame; a base portion seated in the first space; a circuit part insertable through the opening of the second space; and a connection pad installed on the main frame to separate the first space and the second space, the base part having a groove into which each of a plurality of puzzle pieces having a predetermined shape can be inserted, the height of the puzzle piece It has a lower height, and the circuit unit has a switch formed at a position corresponding to the groove of the base unit, and when the puzzle piece is inserted into the groove corresponding to the puzzle piece, the switch is turned on to output a voice related to the puzzle piece for a predetermined time, , The connection pad is characterized in that while the circuit portion and the base portion are electrically insulated, a switch connection means for turning on the switch by the insertion pressure of the puzzle piece is installed on the surface of the circuit portion of the connection pad.

<sup>200</sup> A plurality of puzzle pieces, a base unit corresponding to the plurality of puzzle pieces, and a plurality of circuit units corresponding to the base unit may exist in one package.

204

<sup>208</sup> Accordingly, depending on the package, it becomes a different puzzle through attachment and detachment with the main frame.

---

<sup>211</sup> , .

<sup>214</sup> The wooden puzzle for learning is formed in the circuit part, and electrically connects the circuit part and an external electronic device including an external video device and an audio device to convert at least one of audio information and image information about the puzzle piece to an external electronic device. It may further include a plurality of ports capable of outputting.

---

<sup>220</sup> , , .

<sup>225</sup> The circuit unit is characterized in that it outputs a voice related to the name of the character corresponding to the puzzle piece.

---

<sup>228</sup> , .

<sup>231</sup> External materials of the main frame, the base part and the circuit part are made of wood.

---

<sup>234</sup> , .

<sup>237</sup> The circuit unit may receive power from an external power source to drive the circuit, or receive power from a battery accommodated in an internal battery accommodating unit to drive the circuit.

---

<sup>241</sup> , .

<sup>245</sup> The switch connection means is a contact hot wire formed on one side of the circuit part side of the connection pad, and when the puzzle piece is inserted into the connection pad, the switch is electrically connected by stimulation to the contact hot

wire.

---

250

255 The connection pad is a flexible pad spaced apart from the switch by a predetermined distance, and the switch connection means may be a conductive material coated on one surface of the circuit unit side of the connection pad.

---

259

263 At this time, the switch is connected when the switch connecting means, which is a conductive material, comes into contact with the switch by the insertion pressure of the puzzle piece.

---

267

271 Specifically, the circuit unit includes: a plurality of switches installed corresponding to the position where the character - shaped groove is formed; a processor for selecting a voice file corresponding to the connected switch according to the connection of the switch; and an audio output unit that converts the selected audio file into audio information and outputs the converted audio information.

---

277

282 The circuit part may be inserted through an opening formed on one side of the main frame and attached to the main frame, or inserted into a cavity formed in the lower part of the main frame by a connection pad and an outer wall of the main frame, and attached by a fixing means. have.

---

287

292 According to the present invention mentioned above, the learner can feel a sense of stability and good texture while touching the wooden puzzle piece and the outer wall of the learning puzzle, and because the wooden system wraps the outside, an electrically safe product can be provided. .

---

297 , , ,

302 In addition, various types of puzzles can be used in the same learning method by buying one product and replacing the package consisting of the base part and the circuit part including the puzzle pieces for another puzzle, thereby maximizing cost and learning effect.

---

307 , ,

312 In addition, since it can be connected to an external electronic device, it is possible to expect an expansion effect of using various learning methods, for example, learning methods using IPTV, smart phones, etc. as a touch puzzle using interactive communication in the future.

---

317 가 , , ,  
IPTV,

## [0023]

325 1 is a block diagram of a wood - based puzzle for learning according to an embodiment of the present invention.

---

328 1

331 2 illustrates a first coupling structure of a base unit, a main frame, and a circuit unit

in an embodiment of the present invention.

---

334 2

,

1

---

338 3 illustrates a second coupling structure of a base unit, a main frame, and a circuit unit in an embodiment of the present invention.

---

341 3

,

2

---

345 4 is a comparison of the height of the puzzle piece and the base unit in the embodiment of the present invention.

---

348 4

,

---

351 5 is a perspective view of a connection pad according to an embodiment of the present invention.

---

354 5

,

---

357 6 is a side cross - sectional view of a wooden puzzle for learning according to an embodiment of the present invention.

---

360 6

,

---

363 7 is a side cross - sectional view of a wooden puzzle for learning according to another embodiment of the present invention.

---

366 7

,

---

369 8 is a diagram illustrating a connection example of a wood - based puzzle for learning and an external device according to an embodiment of the present invention.

---

372 8

<sup>375</sup> 9 shows an example of a package type of a puzzle piece, a base part, and a circuit part.

---

<sup>378</sup> 9 , .

## [0024]

<sup>384</sup> Hereinafter, a wood - based puzzle for learning according to various embodiments of the present invention will be described with reference to the accompanying drawings.

---

<sup>388</sup> , .

<sup>392</sup> In the description of the drawings, the same reference numerals will mean the same components.

---

<sup>395</sup> , .

## [0025]

<sup>401</sup> 1 is a block diagram of a wood - based puzzle for learning according to an embodiment of the present invention.

---

<sup>404</sup> 1 , .

## [0026]

<sup>410</sup> Referring to FIG. 1 , a wood - based puzzle 1 for learning according to an embodiment of the present invention includes a puzzle piece 10 , a base unit 20 , a circuit unit 30 , and a connection pad 40 . do.

---

<sup>414</sup> 1 , (1) , (10),  
(20), (30) (40)

418 The connection pad 40 may be fixed to the main frame 50 , and the base unit 20 and the circuit unit 30 may be detachably installed on the main frame 50 .

---

421 (40) (50) , (50)  
(20) (30) 가 가 .

## [0027]

428 As shown in FIG. 1 , the main frame 50 has a first space (no identification number) that is surrounded by partition walls and has an open top, and a second space (no identification number) that has an opening on the side and is surrounded by partition walls. is formed to have

---

433 (50) 1 , 가 1  
( ) , 2 ( )  
) .

438 The first space and the second space are divided through the connection pad 40 .

---

440 1 2 , (40) .

## [0028]

446 First, the puzzle piece 10 may have a shape of a predetermined character and have a size of a first height.

---

449 (10) , , 1 가 .

452 The puzzle piece 10 may have a predetermined shape recognizable by a learner, and may be, for example, simple objects such as stars, apples, and snowmen, or animals such as dogs, cats, and butterflies.

---

456 (10) 가 가 , , , , ,

460 Since one object of the present invention is a wooden puzzle for learning English, in the present invention, any simple substance or creature that can be expressed in basic English words may be used in the form of the puzzle piece 10 .

---

464 ,  
(10)

[0029]

472 The puzzle piece 10 contains a wood - based material.

---

474 (10)

477 Any material is possible as long as it allows you to feel the material of wood, such as pulp and wood chips.

---

480 ,

가

483 Preferably, since the puzzle piece 10 may fall on the floor or be dangerous to the learner depending on the learner's age, it will be preferable to be made of a soft and elastic material.

---

487 (10)

[0030]

494 In the base unit 20 , a groove 21 having a character shape corresponding to the puzzle piece 10 may be formed in accordance with the purpose of the jigsaw puzzle so that each of the plurality of puzzle pieces 10 can be inserted thereinto.

---

498 (20) , (10)  
(10) (21)

502 In addition, in the present invention, the height of the base portion 20 will have a second height lower than the first height, which is the height of the puzzle piece 10 .

---

505 , (20) (10) 1 2

### [0031]

512 Due to the nature of the jigsaw puzzle, when the puzzle piece 10 is inserted into the groove 21 , if the height of the puzzle piece 10 and the base part 20 are the same, the puzzle piece 10 is removed from the groove 21 again. The learner may feel uncomfortable in taking it out.

---

517 , (10) (21) , (10) (21) , (10) 가

522 In particular, since providing convenience in inserting and separating puzzles to the main learner of the present invention, the younger learners, greatly affects the learner's interest, the insertion and separation of the puzzle piece 10 and the groove 21 is it should be easy

---

527 , , (10) (21)  
가 .

### [0032]

535 The difference between the first height, which is the height of the puzzle piece 10 , and the second height, which is the height of the base unit 20 , may be any height as long as the learner can take the puzzle piece 10 out of the groove 21 ..

---

539 (10) 1 (20) 2 가  
(10) (21) .

### [0033]

546 The base part 20 will have a structure detachable from the main frame 50 .

---

548 (20) (50) 가 .

551 Although not shown in FIG. 1 , a fixing means for fixing the base part 20 or the main frame 50 when the base part 20 and the main frame 50 are attached or detached may be formed on the base part 20 or the main frame 50 .

---

555 1 , (20) (50) (50) (20) .

559 Preferably, it will be installed in such a way that the base portion 20 is seated in the first space.

---

562 , 1 (20) 가 .

### [0034]

568 In FIG. 1 , a cavity surrounded by a partition wall exists in the upper portion of the main frame 50 , and the base unit 20 is installed in the main frame 50 by seating the base unit 20 in the cavity.

---

572 1 (50) (20) (20) 가 (50) .

576 However, similar to the connection example of the circuit unit 30 and the main frame 50 to be described below, the base unit 20 is inserted into the box - shaped main frame (not shown) in which a space exists and a certain opening is formed in the outer wall. method could also be used.

---

581 , (30) (50) 가 ( ) (20) .

[0035]

589 In the present invention, the outer wall of the base portion 20 includes a wood - based material.

---

592

(20)

595 In addition to the outer wall, the base portion 20 itself may be made of a wood - based material, and the base portion 20 and the puzzle piece 10 may be made of the same or different wood - based materials.

---

599 ,

(20) 가

,

(20)

(10)

[0036]

606 There will be no electrical components in the base 20 and the puzzle piece 10 .

---

608 (20)

(10)

611 Through this, it will be possible to safely protect the learner from electrical hazards such as electric shock.

---

614 ,

[0037]

620 The circuit part 30 may be located below the base part 20 .

---

622 (30) ,

(20)

625 In addition, like the base portion 20, it has a feature that is detachable from the main

frame 50.

---

628 , (20) 가 (50) 가 가

631 In detail, the circuit unit 30 may be inserted through the opening 51 of the second space.

---

634 , 2 (51) (30)가 가

### [0038]

640 Basically, a plurality of switches 31 are formed in the circuit unit 30 at positions corresponding to the grooves 21 of the base unit 20, so that when the switch 30 is connected, voice information corresponding to the switch is output. do.

---

644 (30) , (20) (21)  
(31)가 , (30)가

### [0039]

652 In more detail, each of the above - mentioned puzzle pieces 10 having a specific shape may be inserted into each groove 21 .

---

655 , (21) (10)

659 A unique identification number is assigned to the switch 30 installed at the position of the circuit unit 30 corresponding to each groove 21 , and data corresponding to the identification number corresponding to the switch 30 is inserted into the groove 21 . It is voice information about the puzzle piece (10).

---

664 (21) (30) (30) (21)  
, (30) (10)

[0040]

672 For example, when a star - shaped puzzle piece is inserted into a star - shaped groove, and a switch installed at a position corresponding to the star - shaped groove is connected, the voice information related to the star, for example, "star" that translates the star into English of voice information can be output.

677 , 가 , “ star ”  
가 .

[0041]

685 The voice information may be output for a predetermined time.

690 Using the above - mentioned example, when a star is inserted into the puzzle, the voice information of “ star ” may be output three times.

<sup>697</sup> The output voice information may be adjusted and output in various intonations, voices, and sizes according to the type of learning, which may be adjusted through control buttons (not shown) formed in the circuit unit 30 or the main frame 50 . will be.

702 , (30) (50) , ( )

*707 A predetermined time for outputting voice information may also be adjusted.*

709 가

[0042]

715 The circuit unit 30 may receive power from an external power source (not shown) to drive the circuit, or receive power from a battery (not shown) accommodated in an internal battery accommodating unit (not shown) to drive the circuit. .

---

719 (30) ( ) ,  
( ) ( )

724 When power is supplied from an external power source, an adapter capable of receiving power may be sold together.

---

727 ,

[0043]

734 The circuit unit 30 may be manufactured in a structure in which the main frame 50 is detachable.

---

737 (30) (50) 가

740 In the example of FIG. 1 , an opening 51 is formed in the main frame 50 so that the circuit unit 30 can be inserted in the remaining area except for the receiving area of the base unit 20 , and the circuit unit 30 has an insertion and A handle (not shown) or the like may be formed to enable separation.

---

745 1 , (50) (20)  
(30)가 (51)가 , (30) 가  
가 ( ) .

[0044]

753 In addition, a connector pair capable of mechanically or electrically connecting the circuit unit 30 and the main frame 50 may be formed in each of the circuit unit 30 and the main frame 50 at positions corresponding to each other.

---

757                   (30)                   (50)                   (30)  
                        (50)

761 Since the main frame 50 is provided with ports 35 to be described below, an electrical connection may be required.

---

764                   (50)                   (35)

[0045]

771 In another embodiment, the circuit unit 30 may have a structure inserted into a cavity formed under the main frame 50 by an outer wall of the main frame 50 and a connection pad 40 to be described below.

---

775                   ,                   (30)                   (50)  
                        (40)                   (50)                   가

780 At this time, means (not shown) for fixing the circuit unit 30 and the main frame 50 may be formed in the circuit unit 30 or the main frame 50 .

---

783                   ,                   (30)                   (50)                   (30)                   (50)  
                        (         )                   .

[0046]

790 At this time, also, a connector pair capable of mechanically or electrically connecting the circuit unit 30 and the main frame 50 may be formed in each of the circuit unit 30 and the main frame 50 at positions corresponding to each other.

---

794 , (30) (50)  
                 (30) (50)

[0047]

*802 The circuit unit 30 may include a switch 31 , a processor 32 , and audio output units 33 and 34 according to their functions.*

$$805 \quad (30) , \quad (31), \quad (32) \quad (33, 34)$$

[0048]

812 The switch 31 will function as mentioned above, and when the switch 31 is electrically connected by the insertion of the puzzle piece 10, the identification of the switch 31 from the switch 31 to the processor 32 Data containing the number is transmitted.

[0049]

825 When data including the identification number of the switch 31 is transmitted from the switch 31 , the processor 32 selects voice information corresponding to the identification number of each switch 31 .

829 (32) (31) (31) 가 가 .

833 The voice information corresponding to the identification number of the switch 31 means voice information related to the puzzle piece 10 fitted into the groove 21 corresponding to the installation position of the switch 31 as described above.

---

837 (31) (21) (10) (31) .

[0050]

844 The audio information selected by the processor 32 is transmitted to the audio output units 33 and 34 .

---

847 (32)가 , (33, 34) .

850 The audio output units 33 and 34 include a chip 33 that converts audio information into actual audio and a speaker 34 .

---

853 (33, 34) (33) (34)

[0051]

860 Typically, the voice information related to the puzzle piece 10 may be voice information regarding the name of a character corresponding to the shape of the puzzle piece 10 .

---

864 (10) , (10)

868 For example, with respect to the star - shaped puzzle piece 10, the pronunciation of " star " may be included in the voice information.

---

871 , (10) " star "

875 However, in addition to this, a learning effect may be obtained and various voice information related to the character may be included.

---

## [0052]

885 In the circuit unit 30, the circuit unit 30 and an external electronic device including an external video device and an audio device (not shown) are electrically connected to transmit one or more of audio and image information about the puzzle piece to an external electronic device. A plurality of ports 35 capable of outputting .

---

890 (30) , (30) ( )

(35)

895 The plurality of ports 35 may be formed on the main frame 50 in another embodiment of the present invention, and in this case, the circuit unit 30 and the main frame 50 may be electrically connected.

---

899 (35) (50)  
, (30) (50)

903 An adapter for supplying external power may be connected to the plurality of ports 35 .

---

906 (35) 가

## [0053]

912 The circuit unit 30 and the outer wall of the main frame 50 may have a wood - based material like the base unit 20 and the puzzle piece 10 in an embodiment of the present invention.

---

916 (30) (50) , (20)  
(10) 가 .

[0054]

923 The connection pad 40 is fixed to the main frame 50 , and has an insulating layer to electrically insulate the circuit part 30 and the base part 20 between the circuit part 30 and the base part 20 . It can be formed to be positioned.

[0055]

935 An important function of the connection pad 40 is to electrically connect the switch 31 when the puzzle piece 10 is inserted.

$$938 \quad (40) \quad , \quad (10) \quad (31)$$

<sup>942</sup> To this end, the connection pad 40 has a groove 21 into which the puzzle piece 10 is inserted, and a switch connection means (not shown) at a position corresponding to the installation position of the switch 31 corresponding to the groove 21 and the groove 21 . may be formed.

$$947 \quad , \quad (40) \quad , \quad (10) \quad (21) \quad (21)$$

$$(31) \quad , \quad (31)$$

952 The connection and disconnection of the switch is controlled by the switch connection means.

955

958 Accordingly, only when the puzzle piece 10 is completely inserted into the groove 21 and the switch connecting means is pressed, it will function so that the audio output regarding the puzzle piece 10 can be made.

962 , (10) (21)  
(10)

[0056]

969 According to various embodiments of the present disclosure, the switch connection means may be a contact hot wire formed on one surface of the circuit unit side of the connection pad 40 .

---

973 , (40)

977 In this case, the switch 30 may be a hot wire switch.

---

979 , (30)

982 When the puzzle piece 10 is inserted through the groove 21 and comes into contact with the connection pad 40, the heating wire switch is electrically connected by stimulation of the contact heating wire to output voice information.

---

986 (10) (21) (40)  
가

[0057]

993 In another embodiment, the connection pad 40 may be a flexible pad.

---

995 , (40)

998 That is, when the puzzle piece 10 is inserted through the groove 21 and pressure is applied to the connection pad 40 , the connection pad 40 may be bent in the pressure direction.

---

1002 , (10) (21) (40) 가 ,  
(40)

1006 In this case, the switch connection means may be a conductive material (eg, silver) formed by coating or the like on one surface of the circuit unit side of the connection pad 40 .

---

1010 , (40)  
( ) .

1014 At this time, for the correct operation of the switch connection means, the connection pad 40 and the switch 31 may have a structure spaced apart so that they can be electrically separated from each other.

---

1018 , (40) (31)  
가 .

## [0058]

1025 In this case, when the puzzle piece 10 is inserted, the connection pad 40 containing the conductive material, which is the switch connection means, is bent downward by the insertion pressure, so that the electrically blocked switch 31 and the conductive material come into contact with each other. do.

---

1030 , (10) ,  
(40)가 , (31)  
. .

1035 Through this process, the switch 31 is electrically connected to output audio information about the puzzle piece 10 .

---

1038 (31) , (10)  
. .

## [0059]

1045 2 illustrates a first coupling structure of a base unit, a main frame, and a circuit unit

in an embodiment of the present invention.

---

1048 2

,

1

## [0060]

1055 Referring to FIG. 2 , the circuit unit 30 may be manufactured in a structure in which the main frame 50 is detachable.

---

1058 2

, (30)

(50)

가

1061 In the example of FIG. 1 , an opening 51 is formed in the main frame 50 so that the circuit unit 30 can be inserted in the remaining area except for the receiving area of the base unit 20 .

---

1065 1

, (50)

(20)

(30)가

(51)가

1069 A handle (not shown) or the like may be formed in the circuit unit 30 to enable insertion and separation.

---

1072

(30)

가 가

( )

## [0061]

1078 That is, based on the main frame 50 , the receiving area of the base part 20 is separated from other areas by the connection pad 40 .

---

1081 ,

(50)

(20)

(40)

1085 In other regions, the region excluding the opening 51 will form a region closed by the main frame 50 and the connection pad 40 , and the closed region will be the region into which the circuit unit 30 is inserted.

---

1089 (51) (50) (40)  
, (30)가

1094 The circuit part 30 will be inserted into the main frame 50 through the opening 51 .

---

1096 (30) (51) (50)

## [0062]

1102 3 illustrates a second coupling structure of a base unit, a main frame, and a circuit unit in an embodiment of the present invention.

---

1105 3 , 2

## [0063]

1112 Referring to FIG. 3 , the circuit unit 30 may have a structure inserted into a cavity formed under the main frame 50 by an outer wall of the main frame 50 and a connection pad 40 to be described below.

---

1116 3 , (30) (50) (40)  
(50) 가

1120 At this time, means (not shown) for fixing the circuit unit 30 and the main frame 50 may be formed in the circuit unit 30 or the main frame 50 .

---

1123 , (30) (50) (30) (50)  
( )

## [0064]

*1130* That is, the main frame 50 may have a structure having only the outer wall of the side, the upper and lower portions are open, and the connection pad 40 is formed in the middle to accommodate the base portion 20 through the connection pad 40 . It can be divided into an area 54 and a circuit part 30 receiving area 53 .

---

*1135* , (50) 가 , 가  
          , (40) (40) (20)  
(54)      (30)      (53)

## [0065]

*1143* In this case, an opening 52 for exposing the ports 35 may be formed on a side surface of the main frame 50 corresponding to the positions of the plurality of ports 35 formed in the circuit unit 30 .

---

*1147* (30) (35) (50)  
          (35)      (52) 가

*1151* The opening 52 may be electrically connected to the ports 35 and may be other port connection means that take over the functions of the ports 35 .

---

*1154* (52) (35) (35)

## [0066]

*1161* 4 is a comparison of the height of the puzzle piece and the base unit in the embodiment of the present invention.

---

*1164* 4

## [0067]

*1170* As mentioned above, in the present invention, the height of the base portion 20 may have a second height h2 lower than the first height h1, which is the height of the

puzzle piece 10 .

---

1174 , (20) (10) 1  
(h1) 2 (h2) .

1178 When the puzzle piece 10 is inserted into the groove 21, it is possible to minimize the inconvenience that the learner may feel in taking the puzzle piece 10 back from the groove 21, and to make the puzzle piece 10 stand out. is to make

---

1182 (10) (21) , (10) (21)  
가 , (10)

## [0068]

1190 In particular, since providing convenience in inserting and separating puzzles to the main learner of the present invention, the younger learners, greatly affects the learner's interest, the insertion and separation of the puzzle piece 10 and the groove 21 is it should be easy

---

1195 , , (10) (21)  
가 .

## [0069]

1203 The difference ( $h_1 - h_2$ ) between the first height ( $h_1$ ), which is the height of the puzzle piece 10, and the second height ( $h_2$ ), which is the height of the base part 20, is the difference between the learner and the puzzle piece 10 from the groove (21). Any height would be possible as long as it was high enough to take it out.

---

1208 (10) 1 (h1) (20) 2 (h2) (h1  
- h2) 가 (10) (21)  
가 .

[0070]

1216 5 is a perspective view of the connection pad 40 in the embodiment of the present invention.

---

1219 5

(40)

.

[0071]

1225 The connection pad 40 may be fixed to the main frame 50 , but may have a detachable structure for replacement or the like.

---

1228

(40)

(50)

,

가

가

.

1232 Among the parts of the connection pad 40 , switch connection means 41 may be formed at positions corresponding to the grooves 21 of the base part 20 into which the puzzle piece 10 is inserted.

---

1236

(40)

,

(10)

(20)

(21)

,

(41)

.

[0072]

1243 6 is a side cross - sectional view of a wooden puzzle for learning according to an embodiment of the present invention.

---

1246 6

.

1249 In the following description, descriptions of parts overlapping with those of FIGS. 1 to 5 will be omitted.

---

1252

,

1

5

.

[0073]

1258 Referring to FIG. 6 , a connection pad 40 is formed in the middle of the main frame 50 .

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1261 6 , (50) (40)가 .

1264 A switch connection means 41 is formed on the connection pad 40 .

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1266 (40) (41) .

1269 In order to improve identification, FIG. 6 shows a switch connection means 41 having a button - like shape and a connection structure.

---

1272 6  
(41) .

1276 However, in the embodiment of the present invention, the switch connection means 41 may be a contact hot wire formed on the lower side of the connection pad 40 , that is, on the side surface of the circuit unit 30 .

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1280 , (41) (40) ,  
(30) .

[0074]

1287 Alternatively, the contact hot wire may be formed on the puzzle piece 10 itself.

---

1289 (10) .

1292 In this case, the switch connection means may be a puzzle piece 10, and the connection pad 40 may include any material as long as it is a thin film.

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1295 (10) , (40)

[0075]

1302 Referring back to FIG. 6 , a groove 21 having a specific character shape is formed in the base 20 .

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1305 6 , (20) (21)

1308 When the puzzle piece 10 having a shape matching the shape of the character formed in the groove 21 is inserted, the switch 31 formed in the circuit unit 30 may be electrically connected by the switch connecting means 41 .

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1312 (21) (10) , (30)  
(31) (41) 가

1316 Through this, voice information about the puzzle piece 10 may be reproduced.

---

1318 , (10) 가 .

[0076]

1324 7 is a side cross - sectional view of a wooden puzzle for learning according to another embodiment of the present invention.

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1327 7 .

[0077]

1333 In the embodiment of FIG. 7 , the connection pad 40 may be an elastic member made of a flexible material as described above, and the lower side of the connection pad 40 , that is, the side surface of the circuit unit 30 is a switch connection means. A conductive material 42 may be coated.

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1338 7 , (40)  
가 , (40) , (30)

(42)

1343 Through this, when the puzzle piece 10 is inserted along the groove 21 and pressure is applied to the connection pad 40, the conductive material 42 comes into contact with the switch 31 and the switch 31 is connected. .

---

1347 , (10) (21) , (40) 가 ,  
(42) (31) (31)가 .

1351 That is, the switch 31 may be, for example, a conductive wire in a blocked state, and may be connected by the conductive material 42 .

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1354 , (31) , (42)

[0078]

1361 8 is a diagram illustrating a connection example of a wood - based puzzle for learning and an external device according to an embodiment of the present invention.

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1364 8

1368 In the following description, descriptions of parts overlapping with those of FIGS. 1 to 7 will be omitted.

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1371 , 1 7

[0079]

1378 External electronic devices that can be connected to the wooden puzzle 1 for learning may include an image device 62 , an audio device 61 , and a power supply device 60 .

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1382 (1) , (62),  
(61) (60)가 .

1386 In FIG. 8, electrical connection parts (eg, ports 35) with external electronic devices are formed in the circuit unit 30, but in another embodiment of the present invention, they are formed in the main frame 50. there may be

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1390 8 ( ) (35))  
(30) , (50)

1395 At this time, a connector (not shown) for electrically connecting the ports 35 of the circuit unit 30 and the main frame 50 to a portion of the connection portion between the circuit unit 30 and the main frame 50 may be formed. have.

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1399 , (30) (50) (30)  
(50) (35) ( )가 .

## [0080]

1406 When the puzzle piece 10 is inserted into the base unit 20 , the imaging device 62 may output an image related to the puzzle piece 10 .

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1409 (62) (10) (20) , (10)

1413 The output image may include character information such as alphabets for the name of the puzzle piece 10 and image information having the same or similar shape as the puzzle piece 10 .

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1417 , (10) (10)

## [0081]

1424 The audio device 61 is a device that externally performs the function of the speaker 34 mentioned in the description of FIG. 1 .

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1427 (61) , 1 (34)

1431 That is, the speaker 34 does not operate when the voice device 61 is connected, and voice information can be output only from the voice device 61 .

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1434 , (34) (61)가 (61)  
가 .

1438 The voice device 61 may function to output voice information in a louder voice by amplifying the voice output when the wood - based puzzle 1 for learning is used in a large space such as a classroom.

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1442 (61) (1)

## [0082]

1449 The power supply device 60, for example, as an adapter, will perform a function of supplying power from the outside to the circuit unit 30 or the main frame 50 .

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1452 (60) , , (30) (50)

## [0083]

1459 9 shows an example of a package type of a puzzle piece, a base part, and a circuit part.

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1462 9 ,

[0084]

<sup>1468</sup> In order to reuse the main frame 50 and the connection pad 40 and provide various learning contents, the base unit 20 and the circuit unit 30 have a structure detachable from the main frame 50 in an embodiment of the present invention. It is as described above.

1473 (50) (40) (20) (30) (50) , 가

[0085]

1481 Therefore, in the present invention, the base unit 20 including the puzzle piece 10 and the circuit unit 30 are packaged and configured so that various learning contents can be used using one main frame 50 and the connection pad 40. and can be manufactured.

1486 , (50) (40)  
                 (10) (20) (30)

[0086]

<sup>1494</sup> For example, the learner may purchase only one main frame 50 on which the connection pad 40 is installed, and later, purchase various puzzle packages 1, 2, 3, 4 as shown in FIG. 9 . .

1498 , 가 (40)가 (50)  
, 9 (1, 2, 3, 4) .

[0087]

1505 In the object matching package 1, a puzzle piece 10 having a shape of a specific object, a base unit 20 corresponding thereto, and a circuit unit 30 including voice information and a switch related thereto may be sold.

1509 (1), 가 (10)  
(20), (30)가 .

[0088]

<sup>1516</sup> In addition, in the English alphabet package 3, a puzzle piece 10 - 1 having the shape of an English alphabet, a base portion 20 - 1 corresponding thereto, and audio information of the English alphabet and each puzzle piece 10 - 1 A circuit unit 30 - 1 having a switch corresponding to a position may be included.

1521 (3) , 가 (10 - 1)  
 (20 - 1), (10 - 1)  
 (30 - 1) 가 .

[0089]

1529 Through this, the learner has only one main frame 50, and can maximize the learning efficiency by using various wood - based puzzles for learning through the same method of use, allowing the learner to use various learning contents, and By allowing different learning content to be used according to interest, it may be possible to maximize the sales volume for the product manufactured by the present invention.

[0090]

1545 The description of the wood - based puzzle 1 for learning according to the embodiment of the present invention mentioned above does not limit the claims.

1548 (1)

1552 In addition, in addition to the embodiments of the present invention, it will be natural that equivalent inventions performing the same functions as the present invention will also fall within the scope of the present invention.

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1556 ,

## Notice

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## DESCRIPTION KR20100002380A

11 Transparent textbook for early childhood learning {a Transparency Education and training board used child}

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14 {a Transparency Education and training board used child}

[ ]

20 The present invention relates to a transparent teaching material for children's learning, and more particularly, to improve intelligence development and educational effect by enabling children to visually easily recognize changes according to color combinations as well as character education such as Korean or English. it was invented

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26 ,

31 In general, infancy and childhood are periods of intense curiosity, and recently, many learning materials for nurturing logical thinking and judgment in children have been released. Many textbooks are distributed in the market, such as text learning materials that use pictures as teaching materials for children's education, and mathematics gifted learning materials. Among them, learning materials that teach children the names or quantities of objects through pictures are widely used. Conventional learning materials are a method of recognizing the relevant item or

number by printing the corresponding name or number together with the drawing paper, in many cases to develop thinking and judgment through learning. In addition, learning is also carried out by purchasing numbers or characters in Korean and English in the form of blocks made of synthetic resin, and combining these block-type textbooks.

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44

가

가

가

가

<sup>56</sup> However, if the educational materials that combine the blocks of the corresponding characters are compared and learned several times repeatedly, children easily lose interest, and as a result, they quickly get tired of learning and the learning effect is lowered. . In addition, the biggest problem is that there were problems such as not only greatly increasing the production cost by having to produce blocks of numbers and various characters one by one, but also making the parents who had to purchase them feel financially burdened. And, as a learning method by block body combination, art education such as color change according to color combination, for example, could not be achieved. The present invention has been devised to solve the above problems, and it is to provide a transparent teaching material for children's learning so that numbers, Hangul and English education can be learned more effectively. Another object of the present invention is to provide a transparent teaching material for early childhood learning that can give economic benefits by enabling production and consumer purchase at a lower price. Another object of the present invention is to provide a transparent teaching material for early childhood learning that can visually and variously recognize a change in color according to a color combination. In order to achieve this object, in the present invention, various teaching materials 20 are displayed on a transparent plate 10 having a plate shape of a certain thickness, the teaching materials 20 are each other on all the transparent plates 10 Educational materials are completed by being displayed in different positions and combined to overlap each other. Here, the teaching material 20 includes Korean consonants and vowels and English. In addition, the teaching material 20 includes figures in which numbers or colors appear. According to this configuration of the present invention, it is possible to improve the learning effect on the combination of Korean or English

sentence completion and number combination. In addition, it is possible to teach the color of the line, which is changed by color combination. Since various teaching materials 20 are displayed on the transparent plate 10 of the same size by printing, it is easy to manufacture, so that not only the manufacturer but also the consumer can give economic benefits. In addition, there is an advantage in that the volume is small and storage and distribution are convenient.

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<sup>109</sup> Hereinafter, preferred embodiments of the present invention will be described in detail based on the accompanying drawings. 1 is a perspective view showing a state in which Hangul is combined by overlapping a transparent plate 10 on which teaching materials 20 are displayed according to the present invention. FIG. 2 is a plan view of FIG. 1. 3 is a perspective view showing a state in which a three - digit number concept is completed as an example by superimposing a transparent plate 10 with a number displayed as a teaching material 20 according to the present invention. FIG. 4 is a plan view of FIG. 3. 5 is a plan view showing an embodiment of a state in which one word is combined by superimposing a transparent plate 10 on which teaching materials 20 of English characters are printed. 6 is a plan view showing an embodiment of a state in which one sentence is combined by overlapping the transparent plate 10 on which the teaching material 20 is printed so that different English words are located at each position. 7 is a plan view showing a color

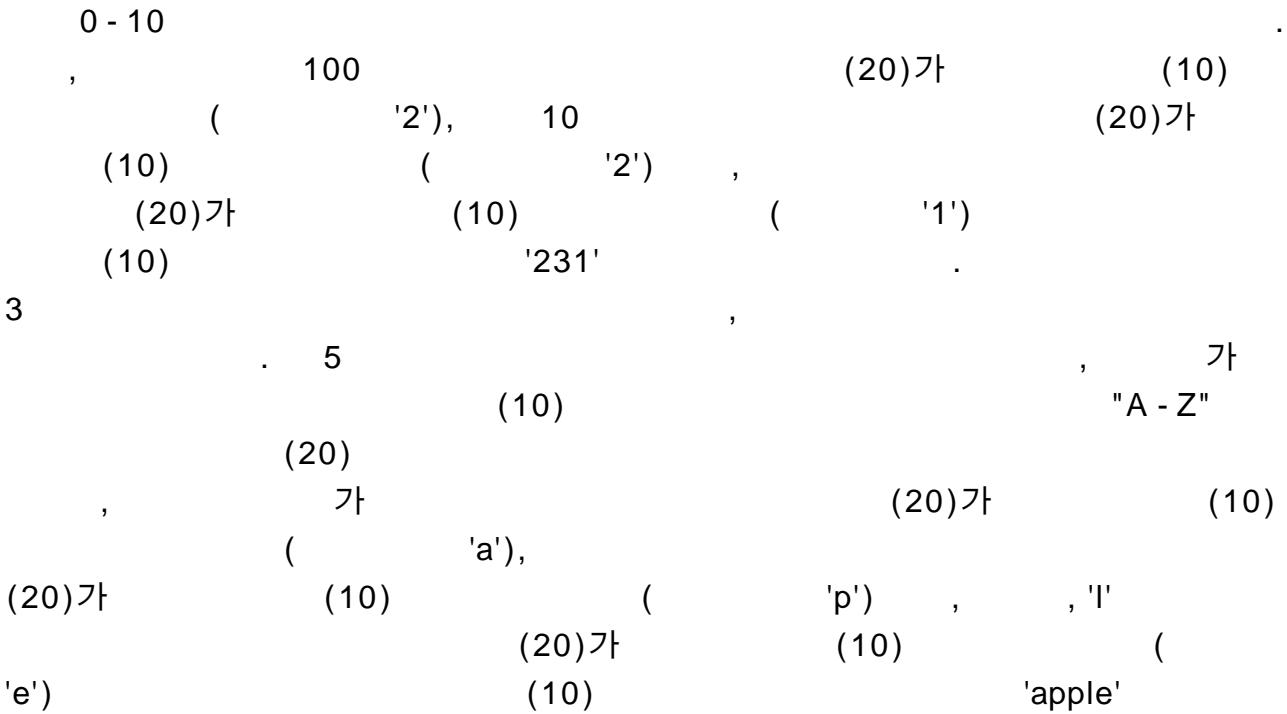
combination in which different colors are displayed by overlapping teaching materials 20 printed on figures in different colors. In the present invention, various teaching materials 20 are displayed on a transparent plate 10 having a plate shape of a certain thickness. By combining them so well, it is completed as text education including Korean or English words, as well as art education materials according to the concept of number or color combination. Here, the teaching material 20 includes Korean consonants and vowels and English. In addition, the teaching material 20 includes figures in which numbers or colors appear. When the transparent plate 10 is made of a transparent synthetic resin material including transparent acrylic or thick vinyl of a certain thickness and size for the same learning purpose, its outer dimensions are made the same. 1 and 2 show that according to an embodiment of the present invention, learning materials for Hangeul education are completed by combining Chinese characters of Hangul. That is, for example, the consonants, vowels, and batchim are printed and produced at the positions of the initial, middle, and final consonants on the transparent plate 10 having a square shape and provided to the consumer as a set. Therefore, the child selects one of the transparent plates 10 on which the teaching material 20 corresponding to the initial consonant of Hangul is printed ('a' in the drawing), and the teaching material 20 corresponding to the neutral is printed again. After selecting one of the transparent plates 10 ('a' in the drawing), finally select one of the transparent plates 10 on which the teaching material 20 corresponding to the last name is printed ('o' in the drawing) and overlapping the transparent plates 10 having the outer size of the copper, for example, the Hangul character 'Kang' appears completed.

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(20)가 (10) ( ) 'ㄱ'),  
 (20)가 (10) ( ) 'ㅏ') ,  
 (20)가 (10) ( )  
 'ㅇ') (10)

172 By allowing various combinations of Hangeul to be created in this way, it is possible to increase the effect of learning Hangul while generating interest. 3 and 4 show an embodiment related to a number concept and a number combination, for example, a position corresponding to a hundred digits on the left side of a transparent plate 10 having a horizontally long rectangular shape with 3 digits, and 10 in the middle. The numbers 0 - 10 are printed and produced at the position corresponding to the digit and the position of the rightmost last digit, respectively, and provided to the consumer as a set. Therefore, the child selects one of the transparent plates 10 on which the teaching material 20 of the number corresponding to 100 digits is printed ('2' in the drawing), and the teaching material of the number corresponding to 10 digits (After selecting one of the transparent plates 10 on which 20) is printed ('2' in the drawing), finally one of the transparent plates 10 on which the teaching material 20 of the number corresponding to the last digit is printed. By selecting ('1' in the drawing) and overlapping the transparent plates 10 having the outer size of the copper, for example, '231' is displayed as complete. By combining various 3-digit numbers in this way, it is possible to increase the effect of learning mathematics while stimulating interest. 5 shows an embodiment of a combination of English words, for example, English teaching materials 20 corresponding to the English alphabet "AZ" at different positions on a transparent plate 10 having a long rectangular shape in the horizontal direction. It is printed and produced and provided to consumers as a set. Accordingly, the infant selects one of the transparent plates 10 on which the English teaching material 20 corresponding to the frontmost digit is printed ('a' in the drawing), and again teaches English corresponding to the second and third positions. After selecting one of the transparent plates 10 on which the material 20 is printed ('p' in the drawing), and then, 'l' and the last digit of the English teaching material 20 corresponding to the last digit are printed transparent. If one of the plates 10 is selected ('e' in the drawing) and the transparent plates 10 having the same outer size are overlapped, for example, the word 'apple' is completed.



<sup>224</sup> In this way, by combining the alphabets printed in various places to make English words, it is possible to increase the effect of learning Korean while stimulating interest. 6 shows an embodiment of a combination of English sentences. For example, English teaching materials corresponding to subjects, verbs, articles, adjectives, and objects at different positions on a transparent plate 10 having a long rectangular shape in the horizontal direction. (20) are printed and produced and provided to consumers as one set. Therefore, the infant selects one of the transparent plates 10 on which the English word teaching material 20 corresponding to the frontmost digit is printed ('I' in the drawing), and again to the English verb corresponding to the second position. After selecting one of the transparent plates 10 on which the corresponding teaching material 20 is printed ('like' in the drawing), the teaching material 20 corresponding to the English article corresponding to the third position is printed. After selecting one of the plates 10 ('an' in the drawing), and selecting one of the transparent plates 10 on which the noun teaching material 20 corresponding to the English object corresponding to the last digit is printed ( When the transparent plates 10 of the same outer size are overlapped by 'apple' in the drawing, for example, the word 'apple' is displayed as complete. In this way, by combining words printed in various places to make English sentences, it is possible to increase the effect of learning English while stimulating interest. 7 shows an embodiment of art education related to discoloration according to color mixing of art. For example, teaching materials 20 of circular shapes in which different colors are painted at different positions on the transparent plate 10 are shown. It is printed and produced and provided to consumers as a set. Therefore, the child selects one of the transparent plates 10 printed on the circular figure teaching material 20 in which any

one color is biased to the left ('red or yellow' in the figure), and again on the right A transparent plate 10 of the same outer size by selecting one of the transparent plates 10 ('yellow or blue' in the drawing) in which a certain color is printed on the circular figure teaching material 20 in the biased circular shape By overlapping them, it can be visually recognized that red + yellow = orange appears in the upper part of the two embodiments, for example.

255

6  
가 (10)  
가 (20)  
가 (10)  
'I'), (20)가 (10)  
'like') (10), (20)가 (10)  
'an') (20)가 (10)  
'apple') (10)  
'apple'  
  
7  
(異色)  
(10)  
(20)  
(10)  
(20)  
(10)  
(10)  
(10)  
+ =

<sup>278</sup> In addition, it is possible to visually recognize that yellow + blue = green appears in the lower part of the two embodiments shown in FIG. 7 . In this way, by combining figures printed with various colors to create a tonal color, it is possible to increase the effect of art learning while stimulating interest.

283 . 7 + =

1