J. KRÜSI.

MULTIPLEX SHUTTLE EMBROIDERING MACHINE.

APPLICATION FILED FEB. 1, 1911.

1,017,421.

Patented Feb. 13, 1912.

4 SHEETS—SHEET 1.

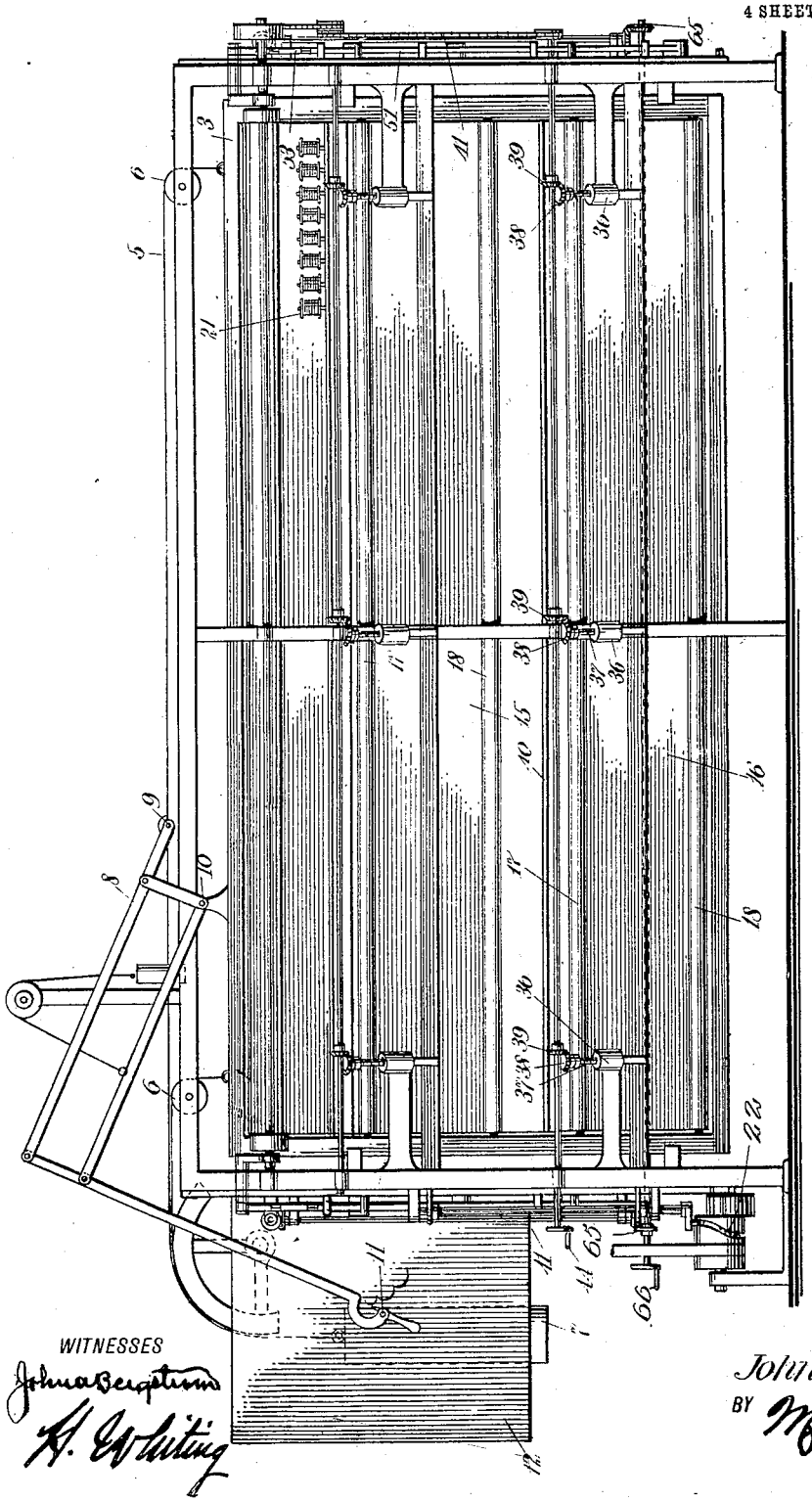

Fig. 1.

WITNESSES

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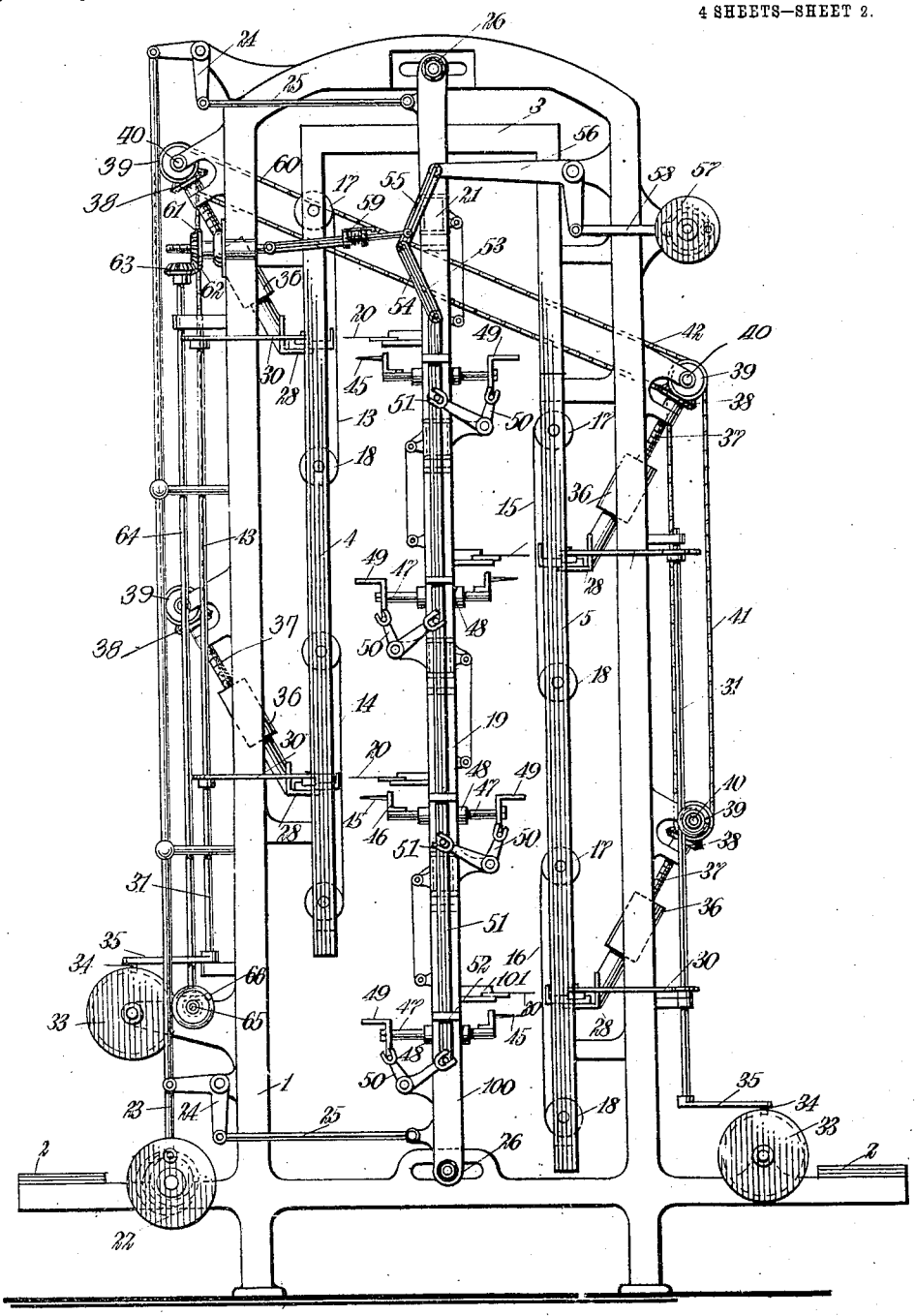

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Fig. 2

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4 SHEETS—SHEET 3.

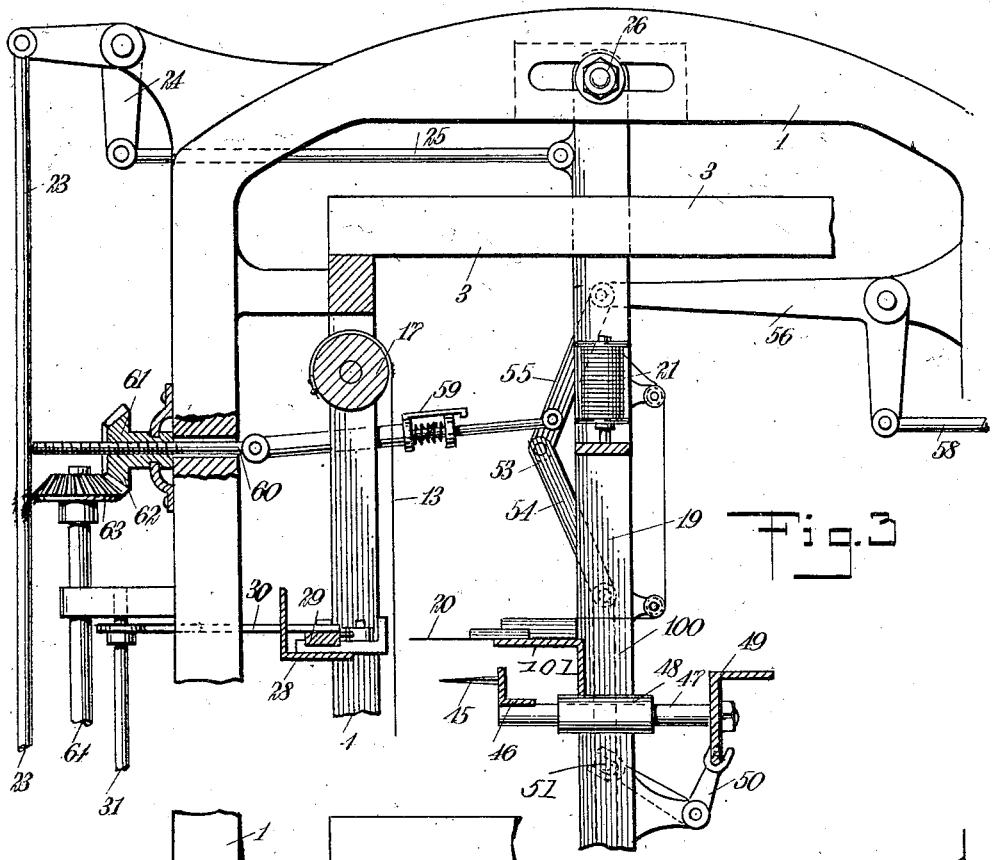

Fig. 3

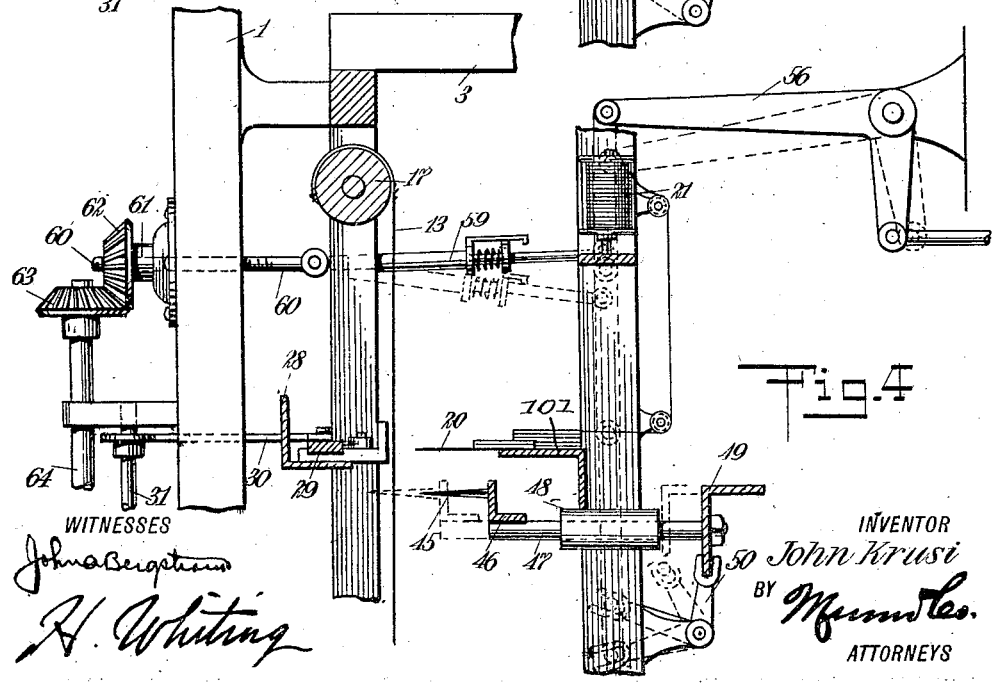

Fig. 4

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4 SHEETS—SHEET 4.

Fig. 5

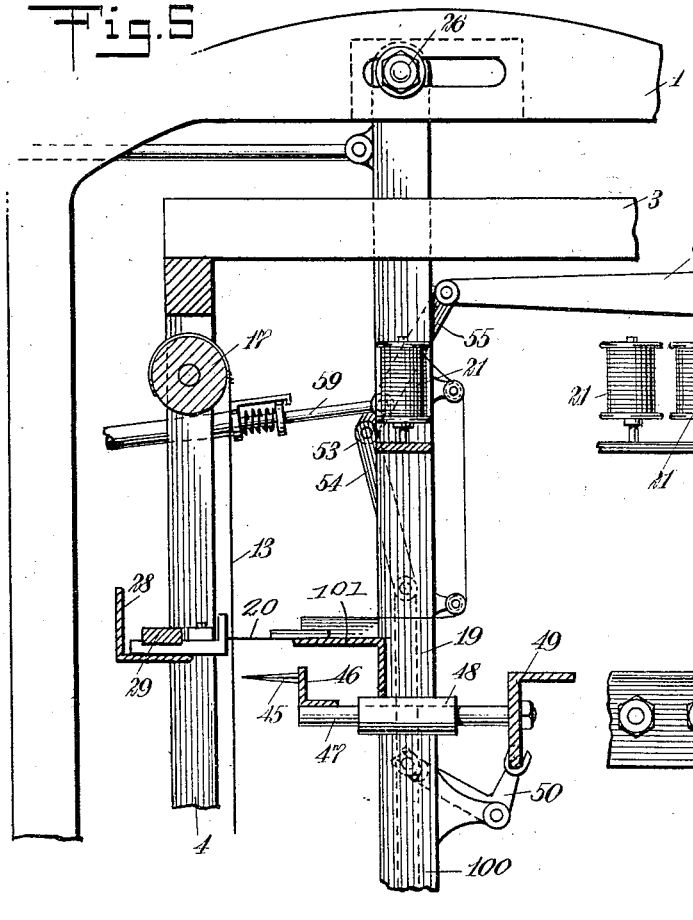
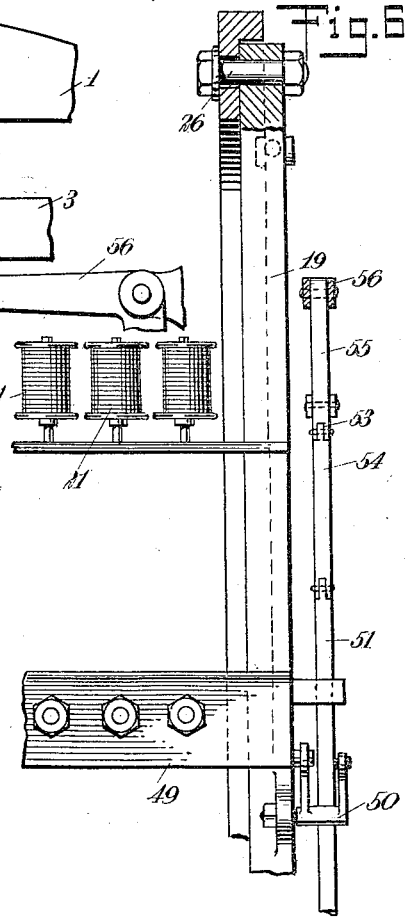


Fig. 6



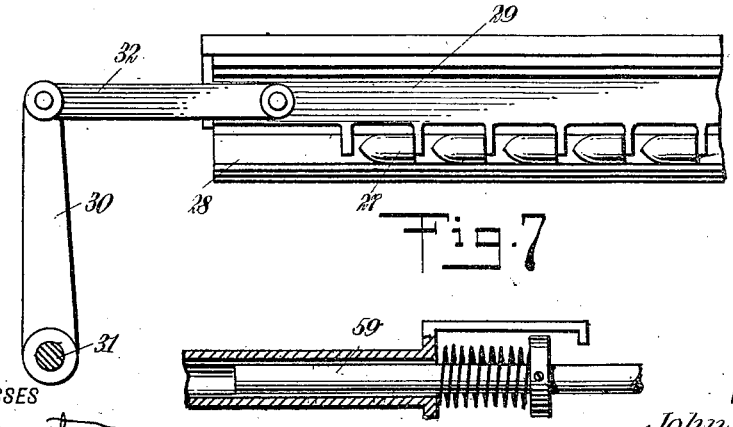


Fig. 7

Fig. 8

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UNITED STATES PATENT OFFICE.

JOHN KRUSI, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO MULTIPLEX SHUTTLE EMBROIDERING MACHINE COMPANY, A CORPORATION OF NEW YORK.

MULTIPLEX-SHUTTLE EMBROIDERING-MACHINE.

1,017,421. Specification of Letters Patent. **Patented Feb. 13, 1912.**

Application filed February 1, 1911. Serial No. 605,855.

To all whom it may concern:

Be it known that I, JOHN KRUSI, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Multiplex-Shuttle Embroidering-Machine, of which the following is a full, clear, and exact description.

This invention relates to that type of embroidering machines in which a frame provided with one or more strips of fabric is manipulated by means of a pantograph, so that an operator can follow an enlarged design which is reproduced on the fabric, by needles reciprocating through the fabric, because of the movement of the frame by the pantograph, but on a smaller scale than the original design. In such types of machine, while theoretically the design could be reproduced any number of times by simply lengthening the frame and the machine, practically, this is impossible, and yet it is desired to produce as many strips as is possible.

It is, therefore, an object of this invention to so construct an embroidering machine that a plurality of fabrics in the same and different planes can be simultaneously embroidered from a single pattern.

A further object of this invention is to so position the separate fabrics, in preferably staggered relation, so that access may be had to any of the fabrics without removing the operating mechanism, and without disturbing the other fabrics.

These and further objects, together with the construction and combination of parts, will be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a front view in elevation; Fig. 2 is a side view in elevation; Fig. 3 is a vertical transverse section, with parts broken away to show the underlying structure, and showing the needles in opposition to one of the strips of fabric but not piercing the same, and also showing the borers in their inoperative position; Fig. 4 is a view similar to Fig. 3, showing the mechanism for the bores in its operative position, and showing in full and dotted lines the different positions of one of the borers and the operating mechanism therefor; Fig. 5 is a view similar to Fig. 3, showing the needles in operation and piercing the fabric; Fig. 6 is a vertical section taken at right-angles to the view illustrated in Fig. 5; Fig. 7 is an enlarged detail of the shuttle rail and shuttles, with the operating means therefor; and Fig. 8 is an enlarged detail of the mechanism for straightening the toggle in the borer-operating mechanism.

Referring more particularly to the separate parts of this invention as embodied in the form shown in the drawings, 1 indicates the main frame, which may be provided with walks 2, whereby the operator may pass along the side of the machine and keep watch of the working of the machine.

Suspended from the main frame 1 in any suitable manner, so as to have movement in any direction in a vertical plane, there is provided a fabric frame or yoke 3, which is shown in Fig. 2 to be in the form of an inverted U-shaped frame having vertical reaches 4 and 5 connected together so as to move in unison. The manner of suspending the yoke 3 may be of any suitable character, as for example, a plurality of flexible connections 5 passing over suitable pulleys 6 and connected to a suitable counterweight 7, whereby the weight of the fabric frame or yoke 3 can be counterbalanced, and thus permit the fabric frame to be readily manipulated. This fabric frame 3 is adapted to be moved in the usual manner, by means of a pantograph 8, which is fulcrumed at 9 to the main frame 1, and is connected to the fabric frame 3 at 10, so that the fabric frame 3 will move in synchronism with a pointer 11 on the long arm of the pantograph, but on a reduced scale, so as to reproduce a pattern on a chart 12, which the operator follows with the pointer 11.

In such machines as are now on the market, as far as is known, the frame 3 has but a single vertical reach, so that the number of strips which can be produced is practically limited. As shown in this case, there are provided a plurality of reaches 4 and 5 to the fabric frame, which are adapted to support in any well known manner strips of fabric 13, 14, 15 and 16, as for example by means of vertically spaced rollers 17 and 18, from one of which the fabric is adapted to

unwind, and onto the other of which the fabric is adapted to wind as it is embroidered.

It will be noted that the strips of fabric are preferably supported in staggered relation, that is to say, the fabric strips 15 and 16 are located in opposition to the spaces between the fabric strips 13 and 14. The purpose of this is to permit the operators to have access to the strips of fabric being embroidered, without disturbing the operating mechanism, and also without disturbing the other strips of fabric.

For the purpose of embroidering the strips of fabric 15 to 16, there is provided an operator 19, which may also be termed the needle operator, in that it is provided on opposite sides with rows of needles 20, in opposition to each strip of fabric, and further, in that it is adapted to operate the same. This operator may be of any suitable structure, such as comprising vertically-extending bars 100, connected together by needle bars 101, on which the needles 20 are supported. This forms an open structure, whereby access may be had to the needles and to the various strips of fabric. It will be noted that these rows of needles 20 are arranged in staggered spaced relation on opposite sides of the operator 19, so as to correspond with the staggered spaced relation of the strips of fabric 13 to 16. The thread for the needles 20 may be supplied from suitable bobbins 21, in any suitable manner. The operator 19 may be itself manipulated in any suitable manner, as for example, by a cam 22, operatively connected to the operator 19 in any suitable manner, as for example by the cam follower 23, which in turn is connected to the operator by means of bell crank levers 24 and links 25. To allow for this movement, the operator 19 has a pin-and-slot connection 26 with the main frame 1. For the purpose of securing the thread to the fabric when inserted through the same by means of the needles 20, there are provided shuttles 27, mounted on a shuttle rail 28 disposed in back of the strip of fabric; that is to say, on the opposite sides to the sides on which the needles are disposed. These shuttles may be operated in any conventional manner, as by means of a shuttle bar 29 connected to an arm 30 on a shaft 31 by means of a link 32, this shaft 31 being in turn operated by a cam 33 through a follower 34 on an arm 35 secured to the shaft 31. This mechanism for operating the shafts is duplicated in each tier, and on each side of the machine, so that the shuttles for each strip of fabric will be operated, that is to say, the shuttle bars 29 for each strip of fabric on one of the reaches 4 is connected to a shaft 31 operated by a cam 33, and similarly, the shuttle bars for the strips of fabric on the reach 5 are connected to a similar shaft and cam on the opposite side of the machine, which have been indicated by like numerals.

It will be noted that the shuttle rails 28 can be adjusted so as to adjust the shuttles to a nicety in opposition to the needles 20, and also for the purpose of removing the shuttles and shuttle rails out of coöperative relation with the strips of fabric, as may be desired when the needles are not in use, as when it is desired to bore or cut out the fabric to be inclosed by an edging of embroidery. For this purpose the shuttle rail may be supported by members 36, which have a screw-threaded opening, so as to adjustably engage screws 37 supported on the frame 1. These screws are provided with bevel gears 38, meshing with bevel gears 39 on horizontal longitudinally-extending shafts 40. These shafts are connected in driving relation, both on each side of the machine and to each other, by means of drive chains 41, 42 and 43, and one of the shafts is adapted to be rotated in any suitable manner, as by means of a hand crank 44, located in juxtaposition to the chart 12, so that the operator can readily manipulate the same and thus adjust the shuttles, without leaving his position.

When it is desired to cut an opening to be subsequently bordered by an edging of embroidery, it is necessary to bring in play borers 45, which are arranged in rows in juxtaposition to the needles 20. These borers may be supported on the operator 19 in any suitable manner, as by being connected to transversely-extending angle bars 46, secured to plungers 47, slidingly mounted so as to move transversely in bearings 48 in the operator 19. These plungers are connected on the opposite side of the operator 19 by means of an angle-iron 49, which is engaged by a plurality of bell-crank-levers 50, pivotally secured to the operator 19. The other arms of the bell-crank lever 50 are pivotally connected to rods 51 mounted so as to reciprocate vertically in guides 52 on the sides of the operator 19. Connected to the top end of each of these sliding rods 51, there is provided a toggle 53, comprising links 54 and 55, the latter of which is pivotally connected to a bell-crank-lever 56. The bell-crank-lever 56 may be operated from a cam 57 by means of a follower, which engages the cam 57 and is connected to the bell-crank-lever 56 by means of a link 58. The driven cam 57 (see Fig. 2) is provided in one face with a cam groove engaged by a follower carried by the link 58, and the latter is pivotally connected with an arm of the bell crank lever 56 so that when the machine is running the said cam 57, its follower and the link 58 impart a continuous swinging motion to the bell crank lever 56. It will be noted that when the toggles 53 are

in the position illustrated in Figs. 2, 3 and 5, the motion of the bell-crank-lever 56 will not operate the rods 51, so that the borers 45 will remain motionless relative to the operator 19. However, when the links of the toggles 53 are forced into alinement with each other, as illustrated in Fig. 4, any movement of the bell-crank-lever 56 due to the cam 57 will reciprocate the rod 51, and thus reciprocate the plungers 47 and the borers 45, so that the latter will pierce the strips of fabric and cut out the material desired.

It is to be understood that the fabric can be shifted by means of the pantograph, with the borers positioned in opposition to the desired point on the strips of fabric. The means for straightening the toggles 53 may be of any suitable character, and in this case it is shown in the form of a telescopic link 59 (see Fig. 8), having a limited resilient movement when being pivotally connected to each of the toggles. The opposite end of each of these links is pivotally connected to an adjusting screw rod 60, passing through a screw-nut 61 having a bevel gear 62 thereon. The bevel gears 62 mesh with corresponding bevel gears 63 on vertically-extending shafts 64. These shafts 64 are driven from a common shaft 65, extending longitudinally along the bottom of the frame by means of bevel gear connections, and this shaft 65 is itself adapted to be operated by a hand-crank 66 arranged in juxtaposition to the hand crank 44 and the chart 12, whereby the operator can readily reach it.

The operation of the device will be readily understood when taken in connection with the above description. With the needles 20 properly threaded and the separate strips of fabric in place, the attendant starts the machine, so that the operator 19 is driven or reciprocated back and forth, so that the needles 20 will pierce the fabric and coöperate with the shuttles 27 in back of the fabric at the same time that the operator manipulates the pointer 11 over a design on the chart 12, so that the fabric yoke or frame 3 will be moved back and forth in front of the needles corresponding to the stitches on the chart, thereby reproducing the design on the chart, on a smaller scale. When it is desired to cut out portions of the fabric to be inclosed by a bordered design, the cam driving the operator 19 may be stopped, and the toggle 53 brought into alinement with the rod 51, and the cams 57 started, so as to reciprocate the rod 51, and thus actuate the borers 45, the attendant meanwhile manipulating the pointer 11 to the desired position, so as to bring the borers in proper opposition to the several strips of fabric.

It will thus be seen that a single machine can be used to embroider and operate on a plurality of strips of fabric arranged both in different elevations in the same plane and in different vertical planes, without interfering with each other, and all producing the same design as many times as desired. The particular staggered relation of the strips of fabric permits the operators to have access to the needles and fabric being embroidered, without any trouble whatsoever.

While I have shown one embodiment of my invention, I do not wish to be limited to the specific details thereof, but desire to be protected in various changes, alterations and modifications which may come within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In an embroidering machine, the combination with a frame, of a floating fabric frame movably mounted on said first-mentioned frame, said floating fabric frame having a plurality of reaches extending in different vertical planes and each adapted to support one or more strips of fabric to be embroidered, an operator interposed between said reaches, and needles extending from opposite sides of said operator and adapted to alternately engage strips of fabric on said reaches, located on opposite sides of said operator.

2. In an embroidering machine, the combination with a frame, of a floating fabric frame movably mounted on said first-mentioned frame, said floating fabric frame having a plurality of reaches extending in different vertical planes and each adapted to support one or more strips of fabric to be embroidered, an operator interposed between said reaches, needles extending from opposite sides of said operator and adapted to alternately engage strips of fabric on said reaches, located on opposite sides of said operator, borers movably mounted in said operator and directed in opposite directions on opposite sides of said operator so as to engage strips of fabric on said reaches located on opposite sides of said operator, and means for manipulating said borers.

3. In an embroidering machine, the combination with a frame, of a floating fabric frame movably mounted on said first-mentioned frame, said floating fabric frame having a plurality of reaches extending in different vertical planes and each adapted to support one or more strips of fabric to be embroidered, an operator interposed between said reaches, needles extending from opposite sides of said operator and adapted to alternately engage strips of fabric on said reaches, located on opposite sides of said operator, and means for reciprocating said operator.

4. In an embroidering machine, the com-

bination with a frame, of a floating fabric frame movably mounted on said main frame, means for manipulating said floating fabric frame, said fabric frame having a plurality of vertically-extending reaches adapted to support a plurality of strips of fabric in different vertical planes, an operator interposed between said reaches, and needles disposed in opposite sides of said operator, the needles on one side being staggered relative to the needles on the other side.

5. In an embroidering machine, the combination with a frame, of a single integral fabric frame movably mounted on said first-mentioned frame and comprising a plurality of reaches extending in different vertical planes, and members arranged in pairs on each of said reaches, for supporting one or more strips of fabric on said reaches, the pairs of said members on one reach being out of horizontal alinement with the pairs on the other reach, so that the strips of fabric on one of said reaches supported thereby will be staggered relative to the strips of fabric supported thereby on the other of said reaches.

6. In an embroidering machine, the combination with a frame, of a floating fabric frame movably mounted on said first-mentioned frame and comprising a plurality of reaches extending in different vertical planes and rigidly secured to each other, and rollers arranged in pairs on each of said reaches, for supporting separate strips of fabric, the pairs of rollers on one reach being staggered relative to the pairs of rollers on the other reach, so that the strips of fabric supported thereby in different vertical planes will be out alinement with each other.

7. In an embroidering machine, the combination with a main frame, of a floating frame adapted to support a plurality of strips of fabric to be embroidered in different planes, a shuttle rail for each of said strips of fabric, a plurality of needles for each of said strips of fabric, arranged in juxtaposition to said shuttle rail, and means for simultaneously adjusting all of said shuttle rails.

8. In an embroidering machine, the combination with a main frame, of a floating frame movably mounted on said main frame and adapted to support a plurality of strips of fabric to be embroidered in different planes, an operator interposed between said strips of fabric, needles arranged on opposite sides of said operator, borers arranged on opposite sides of said operator, means for manipulating said operator, mechanism for reciprocating said borers relative to said operator, and a controlling device adapted to render said mechanism inoperative.

9. In an embroidery machine, the combination with a main frame, of a fabric frame movably mounted on the main frame and having a plurality of reaches extending in different vertical planes, fabric supporting means on the said reaches for supporting on each reach one or more strips of fabric, the said fabric-supporting means on one reach being staggered relative to the fabric supporting means on the other reach so that the strips of fabric supported by the said means in different vertical planes are staggered, and needle and shuttle mechanisms on opposite sides of the said reaches and adapted to be brought into coöperative relation with the strips of fabric to effect an embroidering action on the said strips of fabric.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN KRUSI.

Witnesses:
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PHILIP D. ROLLHAUS.