

J. A. GROEBLL.
JACQUARD CARD PUNCHING MACHINE.
APPLICATION FILED JULY 11, 1911.

1,037,472.

Patented Sept. 3, 1912.

3 SHEETS—SHEET 1.

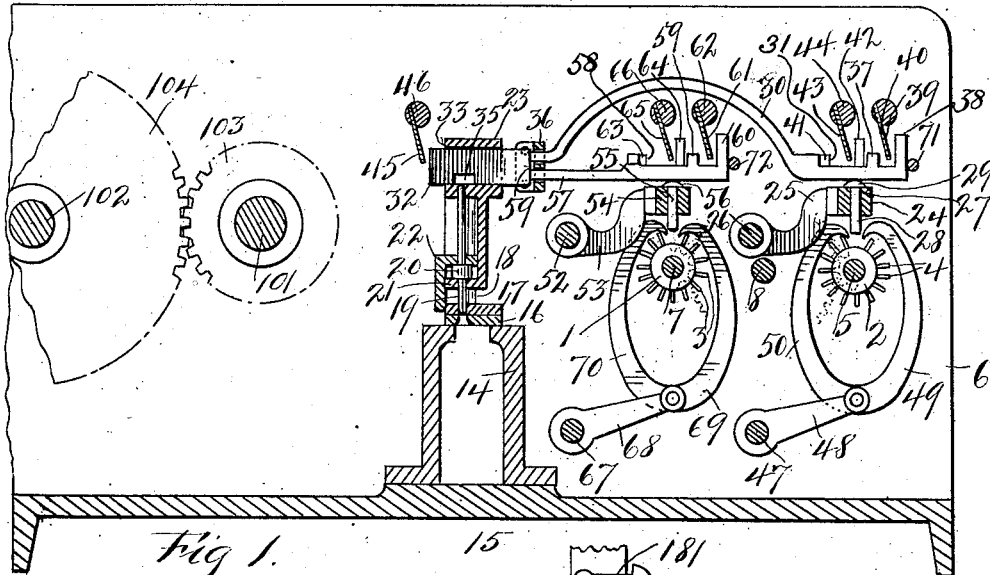


Fig. 1.

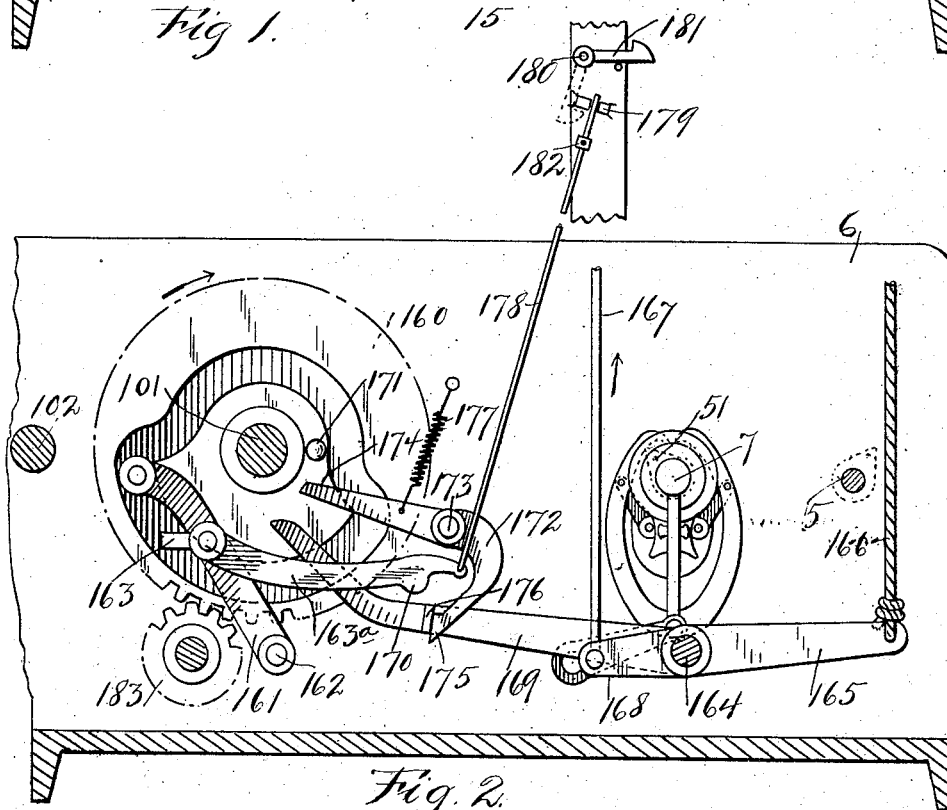


Fig. 2.

Witnesses:

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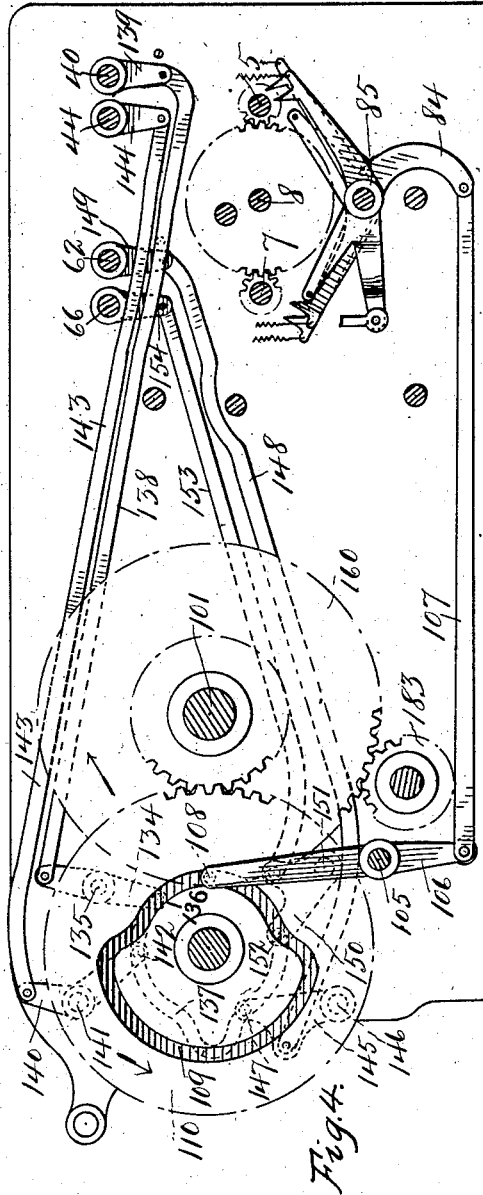
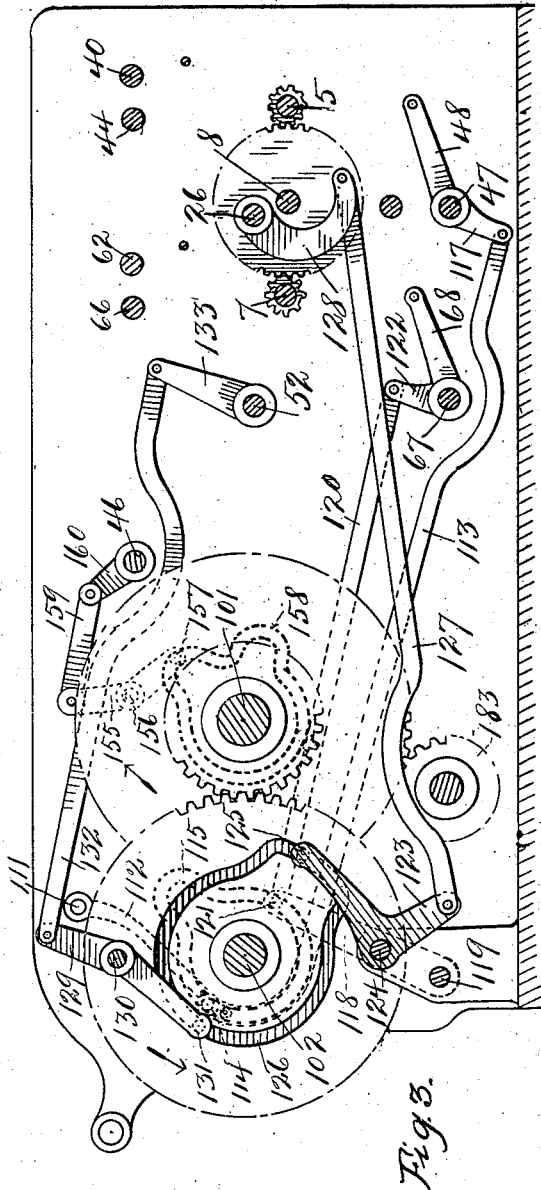
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By his Attorney
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J. M. Vachon

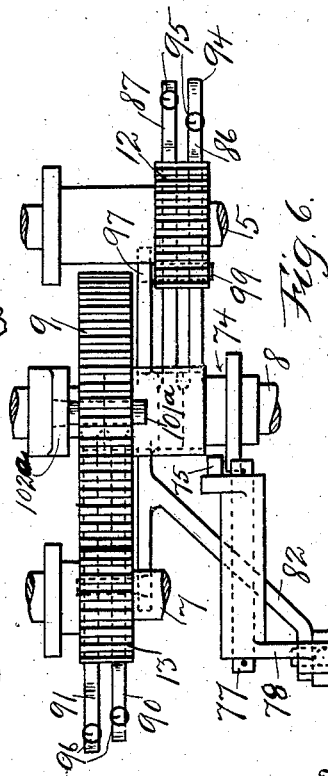
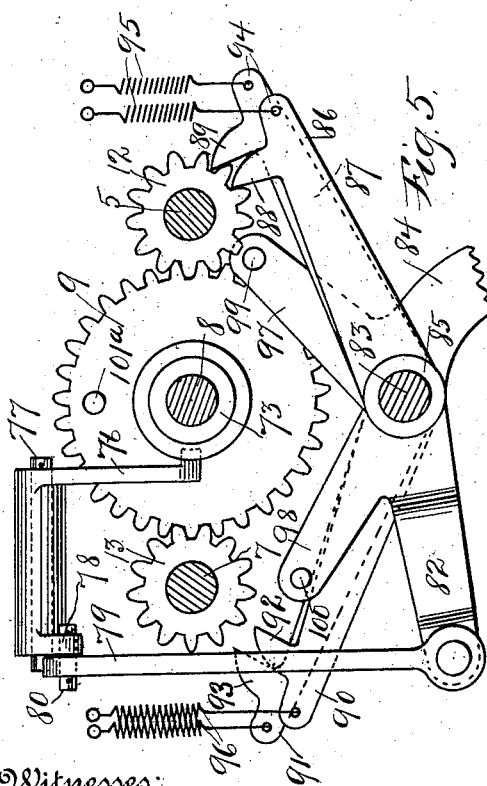
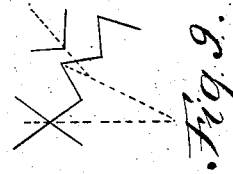
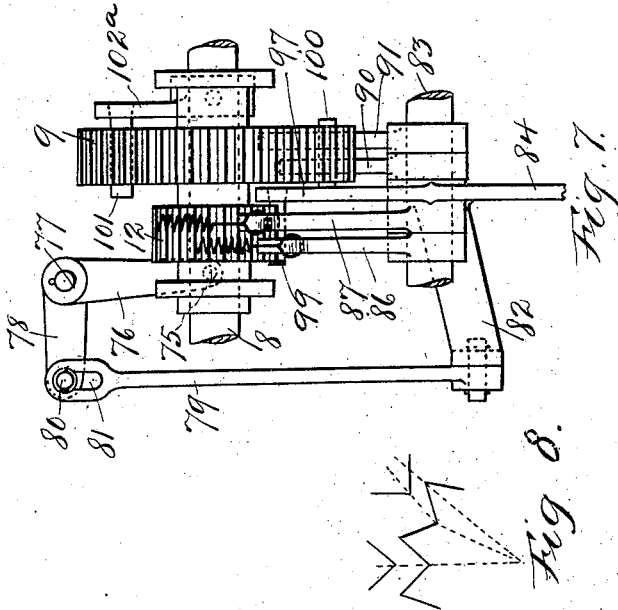
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3 SHEETS--SHEET 3.



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UNITED STATES PATENT OFFICE.

JOSEPH A. GROEBLI, OF NEW YORK, N. Y.

JACQUARD-CARD-PUNCHING MACHINE.

1,037,472.

Specification of Letters Patent.

Patented Sept. 3, 1912.

Application filed July 11, 1911. Serial No. 638,009.

To all whom it may concern:

Be it known that I, JOSEPH A. GROEBLI, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Jacquard-Card-Punching Machines, of which the following is a specification.

My invention relates to improvements in punching machines for perforating jacquard cards and my invention is more closely related to machines for punching cards to be used in jacquards which operate embroidering machines.

The principal object of an embroidering machine jacquard is to position the tambour frame, upon which the fabric is supported, and it has to move the tambour frame after each stitching operation of the needles in order to produce the desired design upon the fabric. In the machines so far used for such purposes, certain combinations of mechanisms are operated to produce a substantially universal movement of the tambour frame within its limit of movement; and in order to operate the tambour frame, the jacquard embodies devices for producing movements of certain units in extent and by various combinations of the units, the many positions of the tambour frame are controlled. The jacquard itself is controlled by means of a card or pattern roll in the form of a strip of paper, in which are provided various perforations, the positions and relations of which control the operations of the jacquard. The perforations for controlling the jacquard movements have generally been formed in transverse rows across the card or pattern roll. It is with machines for providing the jacquard card with the perforations, whether they are for the above purpose, or for operating special function mechanism in the jacquard, that my present invention has to do.

In U. S. Letters Patent issued to me, and numbered 627,256, I have shown one form of complete mechanism for perforating jacquard cards. In that machine I showed certain elements for perforating the card, slides for selecting and locking the punches, means for moving the slides, and certain devices for determining the stitching position, which latter mechanism served at each operation of the machine to control the movements of the slides which made the punching elements

operative, and through such control the positions of the perforations on the jacquard card were determined. In that machine certain operations must take place in a fixed relative order. That is, the operator first positions what I prefer to call the stitch determining mechanism, after which he initiates the operation of the main shaft of the punching machine, to set the punching mechanism into operation, by pulling a starting rope. When the punching mechanism is initiated, the stitch determining mechanism is automatically locked so that no change can take place therein until the punching operation is completed, when the stitch determining mechanism is unlocked to permit of its repositioning for the next punching operation. It will therefore be apparent that the work of the operator consists, principally, in positioning the stitch determining mechanism and initiating the operation of the punching mechanism, after which he can not proceed upon the next operation until the punching mechanism has completed its operations and the stitch determining mechanism has been released; and in this way the operator is more or less restrained in the speed of his work.

The object of my present invention is to increase the speed of operation of the punching machine, by making it possible for the operator to work continuously, that is, without having to wait, after setting the stitch determining mechanism in proper position, for the punching operation to be completed. But instead, permit the operator to position the stitch determining mechanism as fast as his ability will permit, and without any inactive interim. I therefore increase the output of the machine and increase the amount of work which the operator performs. I accomplish this by providing plural mechanisms for selecting and locking the punching elements, only one of which can operate at a time; and I preferably operate both sets of selecting mechanisms from the same stitch determining mechanism, thereby making the whole machine simple in its construction and operation. I employ means for automatically and alternately connecting the stitch determining mechanism with the punch selecting and locking mechanisms, so that they operate alternately to produce the desired result.

When one set of punch selecting and locking devices has been actuated by the stitch determining mechanism, the machine proceeds to perform the punching operations; and while so doing the operator can proceed to lay out the next succeeding stitch by setting the stitch determining mechanism and thereby selecting the necessary slides in the second or inactive punch locking devices. Then, when the first punching operation has been completed and the first set of locking slides have been returned, the second set will be ready to perform another selecting and locking operation without any delay, and the first set will be in condition to be selected by the stitch determining mechanism. By means of this alternate operation the work of the operator can be continuous, as he will not have to wait for the machine to complete one of its operations, and he can set the stitch determining mechanism as fast as his ability will permit.

I also provide means whereby the punching mechanism may be set to operate continuously instead of stopping after each complete punching operation, as is the case in the machine of my said Letters Patent.

I also provide a novel arrangement for locking the devices which select the locking slides, so that they will be properly locked during the punching operation and in a proper position to insure the proper operation of the machine. This latter arrangement not only forms a part of the complete combination, but it is also susceptible of separate use, either on machines now in use, or on machines which embody all the features of the present invention.

In the drawings, forming a part of this application, Figure 1, is a sectional view of the punching machine showing the pin rollers for selecting the slides, the slides, and the punching elements, Fig. 2, is a sectional view showing the controlling device, Fig. 3, is a sectional view showing the various shafts, cams, and levers, by which the several devices are operated, Fig. 4, is a sectional view showing other cams and levers, Fig. 5, is a vertical sectional view showing the mechanism for connecting the stitch determining mechanism alternately with the two sets of selecting devices; and the locking mechanism, Fig. 6, is a plan view thereof, Fig. 7, is an elevation thereof, Fig. 8, is a diagrammatic view showing the operation of the locking devices on the gear, and Fig. 9, is a similar view further illustrating such operation.

I prefer to embody the present invention in a machine of the type shown in my said Letters Patent, #627,256, as most of the mechanism in that patent can be used in the machine of my present invention. Inasmuch as it will simplify this case to refer to that patent and the machine therein de-

scribed, I will make cross reference herein to such patent. It is to be understood that the punching machine may be and preferably is, constructed in accordance with that patent except wherein the elements shown in the present drawings are intended to supersede corresponding elements in said patent. I do not wish it to be inferred, however, that my present invention is limited to use in a machine of the type referred to.

In the Letters Patent referred to, I have shown a complete mechanism for punching jacquard cards, including a pointer for movement over the design, placed upon the board, mechanism which positions the pointer, and transmits its movements to certain mechanism, which latter I shall call the stitch determining mechanism, and selecting and punching devices. The stitch determining mechanism determines the location of the perforations on the jacquard card by selecting certain slides, at each operation, which slides make their corresponding punching elements operative. The entire mechanism of that patent may be used down as far as, but not including, the drums which select the locking slides and from there on various new mechanisms are employed to produce the new results. In said patent I have shown the stitch determining elements as consisting of revoluble drums, e , e' , e^2 , and e^3 , each mounted on a separate shaft or sleeve and independently revoluble about their axes; and these drums respond to the operations of the mechanisms operated by the operator in connection with the pointer. These drums are normally retained in an intermediate or inactive position, and are independently revoluble in either direction from the normal position. These drums each have pins projecting radially from their peripheries, and the pins are arranged spirally on the drums, they being arranged in reverse spirals on either side of the normal or inactive point of the drums. The punch selecting slides are adapted to be positioned by these pins, and the particular slide of a group to be selected, will depend upon the position in which the pin drums e , e' , e^2 , and e^3 , are placed. These pin drums are utilized in the present mechanism, but instead of four (in this form of machine) I employ say eight, arranged in pairs of two each.

In the drawings herein I have shown the drums 1, and 2, which have pins 3, 4, projecting from their periphery and these pins are preferably arranged in all respects like the pins on the drums e , e' , e^2 , and e^3 , of said patent. The drum 2 is mounted on a shaft 5, which is journaled in the side plates 6, of the jacquard box, in any suitable manner; and the drum 1 is mounted on a shaft 7, preferably on a horizontal line with the

shaft 5. These two drums are duplicated as many times as may be necessary for the punching machine construction to which they are applied. In a construction such as that shown in my said patent, there will be four of the drums 1, mounted side by side, and there will be four drums 2, arranged side by side. These pin drums are not operated directly, but through means with which the drums 1 and 2, may be alternately connected. I provide on a shaft 8, a gear 9, which is duplicated as many times as may be necessary, and in a machine of the type herein referred to there will be two such gears 9, which are mounted on the same shafts and sleeves as the gears C²³, of my said patent; and are operated in the same manner.

The gear 9, is adapted to slide on the shaft 8, and I provide a stud 101^a, in an arm 102^a, secured to the shaft, which engages with a hole in the gear 9, so that the gear will have a longitudinal movement on the shaft, but will be revolved therewith. The gear 9, is so located that it can be moved on the shaft 8, for the purpose of throwing it into mesh with either the gear 12, on shaft 5, or with gear 13, on the shaft 7, being the same shafts on which the pin drums are carried. The gears 12, and 13, are preferably arranged in staggered relation, that is, the two sets are not in line with each other. The several gears 9, are revolved to the right or left, the same manner in which the gears C²³, are revolved in said patent, and through this movement the selection of the particular punches is controlled, and therefore the movement to be imparted to the tambour frame by the jacquard in which the pattern roll is afterward used. That is to say, the location of the several perforations on the jacquard card is determined by the rotation which is given to the gears 9, as will be apparent herein-after; and I therefore prefer to refer to the gears 9, and the mechanism for controlling their operation, as the stitch determining mechanism.

I have shown a punching block 14, which is mounted on the base 15, of the punching machine, and this block is preferably the same in all respects as the punching block in my said patent. Likewise the plates 16, and 17 between which the pattern roll or card is intermittently fed, are the same; I prefer to employ the two rows of punches 18, and 19 arranged in staggered relation, one row slightly to the rear of the other, as in my said patent; and I prefer to provide the same power means for the punches as in my said patent, but the devices for locking them are different. The punch rods 18 and 19 are provided with enlargements 20, which are engaged by the supporting plate 21, and above these enlargements I provide a bar

22; the rods 18, 19 passing through both bars the same as in the said patent. The bar 23, which carries the bar 21, is reciprocated twice, for each complete operation of the machine, preferably by the same mechanism as that used to operate the punch block 1, in my said patent. In fact, the arrangement of the punches and their operation are the same as before, but the devices for selecting and locking are differently constructed and operated.

The devices for selecting and locking the punches are as follows: As previously stated, the drums 1, and 2, are provided with peripheral pins 3, 4, arranged in the manner shown in said patent. For the drums 2, there is a rocking plate or bar 24, which is carried on the ends of arms 25, the latter being mounted on a shaft 26. The bar 24, is provided with as many apertures 27, in a row, as there are pins 4 on each half of the drum 2, and therefore they are the same in number as the punches 18 and 19. Through each aperture 27, in the bar 24, extends a pin 28, having an enlarged head 29, to prevent it from falling, and these pins 28, are adapted to move up and down in their apertures, or rather the bar 24, is adapted to move up and down relative to the pins. This arrangement is somewhat similar to the bar 1 and pins 4, of my said patent. There is a reciprocable slide for each pin 28, arranged preferably above the latter, which slides are adapted to be selected by the pins 28, and therefore by the drums 2. The slides 30, are engaged by certain of the pins 28, while the slides 31, which are arranged side by side, and alternating with the slides 30, are engaged by pins 28, alternating with those which engage the slides 30.

The slides 30 and 31, are adapted to operate certain punch rod locking members in such a manner that the selected punches will be made operative, but in such a manner that other selecting mechanism can operate upon the punch locking elements, as will be apparent. For each slide 30, there is a locking element, consisting of a plate 32, which is adapted to be reciprocated horizontally in the slots 33, of the punching frame 23, while for each slide 31, there is a similar locking plate 32, in line therewith. The plates 32 have a recess 35, in their lower edge. The plates are adapted to cooperate with the punches 18, 19, by locking them, and the plates 32 with which slides 31 cooperate, are likewise adapted to lock the punch rods 19.

The slides 30 and 31, extend through a guiding support 36 and are adapted to engage the ends of plates 32, for the purpose of moving the plates to the left in Fig. 1; but their return is preferably effected by a separate element, so that the plates 32, may

be operated when the slides 30 and 31 are at rest, by a second set of slides.

The slides 30 are provided with projections 37 and 38 and with these projections the oscillating plate 39, on the shaft 40 is adapted to engage for the purpose of reciprocating the slides 30 back and forth to move the locking plates 32. The slides 31 are likewise provided with projections 41 and 42, with which the oscillating plate 43, on the shaft 44 engages, to reciprocate the slides 31 back and forth. The slides 30 and 31 each have their separate reciprocating devices because their time of movement is not the same. The plate 39 is so arranged that it will engage the projections 37 and 38 on the slides 30, but will not operate upon the slides 31: while the plate 43, will only operate on the projections 41 and 42, of slides 31 and will not operate on the slides 30.

In front of the plates 32, I have arranged a plate 45, which is carried on a shaft 46, and the oscillatory movement of this plate serves to return the slides 32, periodically, after each operation: and this will occur twice for each row of perforations placed upon the card, as only half the row of perforations is made at one time, by the selected punches of one row.

After each operation of the drum 2, it is returned to its normal or intermediate position by mechanism similar to that used to return the drums e , e' , e^2 , and e^3 , of my said patent, but the time of operation will be changed, as will be apparent from the subsequent description. On the shaft 47, I provide an arm 48, on which is fulcrumed the upwardly extending tongs 49 and 50, which straddle the shaft 5 of the drum 2. After each operation of the drum 2, in either direction from the normal, the tongs 49, 50 are reciprocated, and upon their downward movement either the tong 49 or the tong 50 engages with a member 51 (see Fig. 2) carried by the shaft 5 or sleeve, (as the case may be) according to which direction the shaft 5, (or sleeve) was revolved from the normal: and causes the shaft 5 (or sleeve) and drum 2, to be returned to their normal or inactive position. The tongs 49, 50 will be reciprocated at each alternate operation of the punching machine.

I provide a second set of slides for operating the locking plates 32, which can be operated independently of the first set and which are in fact operated alternately thereof.

On the shaft 7, is arranged the drum 1, which is in all respects similar to the drum 2, and it has pins extending outwardly therefrom, in the same order or arrangement.

I have provided an oscillating shaft 52, on which are carried the arms 53, and between these there is carried a bar 54, which is in all respects like the bar 24. It has ap-

ertures 56, and pins 55 extending there-through, with enlarged heads. Above each pin 55, I arrange slides 57, 58 which cooperate with the locking plates 32. The slides 57 are similar to the slides 30, but are preferably straight. The free ends of these slides pass through the apertures 59 in the guiding plate 36, and are adapted to engage the plates 32, below the slides 30, 31. These slides 57, 58 preferably are not connected with the plates 32, but are only adapted to move the latter, to the left in Fig. 1. The slides 57 have upward projections 59 and 60 which are adapted to be operated upon by the oscillating plate 61, carried upon a shaft 62, whereby the slides may be reciprocated in a similar manner to the previously mentioned slides 30. The slides 58 are arranged beside the slides 57 and alternate therewith, and they also pass through the guiding plate 36, and engage the alternate locking slides 32. These last slides are provided with projections 63 and 64, with which the oscillating plate 65, carried upon a shaft 66, engages; and by means of the oscillating plate the slides 58, are reciprocated at certain periods, to move the locking plates with which they engage. These slides 58 are preferably straight.

The slides 30 and 57 each operate the same locking plates 32, while the slides 58 and 31, both operate the same plates 32, but the slides 30, and 31 and the slides 57 and 58 are operated at different times, as will be apparent hereinafter.

On the shaft 67 I have mounted an arm 68, which carries the tongs 69 and 70, and these tongs straddle the shaft 7, and operate upon the engaging member 51 of the shaft, to return the latter and the pin drum 1, back to its normal position after each operation: but the tongs 69, 70 operate at a different time to the tongs 49: that is, they are alternating in their movements. These tongs and their operation may be fully understood by referring to my Patent 786,890, dated April 11, 1905. I have provided bars 71 and 72, as stops for the slides 30, 31 and 57, 58, respectively.

When the pin drums 2, are operated, certain of the slides 30 and 31 will be selected by the pins 4, on the several drums, according to the positions to which the drums are moved, while certain of the slides 57, and 58 will be selected, when the drums 1 are operated, according to the positions of the latter. These drums 1, and 2, are therefore adapted to produce the same results in regard to the locking of the punch rods. They are adapted to be operated alternately however, and to bring this about I preferably connect the drums 1 and 2, with the stitch determining mechanism alternately.

On the shaft 5, I have provided a pinion 12, while on the shaft 7, I have provided

a similar pinion 13, which is adapted to be singly and alternately operated by the gear 9, on the shaft 8. It is to be understood that there will be a gear 12, for each pair of pin drums 2, and a gear 13 for each pair of pin drums 1, mounted on the shafts, or sleeves which carry the drums, as will be understood. Also there will be a gear 9, on the shaft 8, for each pair of pinions 12 and 13.

In the hub 73 of the gear 9, I provide a groove 74, in which engages the pin 75 on the arm 76 of a shifting lever. This lever fulcrums on a shaft 77, and has an arm 78 which is connected with a link 79 by a pin 80 which has play in the slot 81 in the link. The rocking of the lever 76, 78 73 causes the gear 9 to be shifted longitudinally on the shaft 8, for the purpose of throwing the gear 9 into mesh with either the pinion 12, or the pinion 13, but not both; and the lever is operated to shift the sleeve and gear after each setting of the stitch determining mechanism. It will be noted that the pinions 12 and 13 are not in line with each other, (see Fig. 7), and therefore the gear 9 will mesh with only one of the pinions at any time.

The link 79 is fulcrumed to an arm 82, of a lever which journals on the shaft 83, and the power for operating the shifting mechanism is preferably transmitted to an arm 84, on the same hub 85 as the arm 84.

I prefer to provide the mechanism for alternately locking the stitch determining drums where it will act upon the pinions 12 and 13. On the shaft 83, I have arranged the arms 86 and 87 which extend toward the pinion 12 and on the ends of these I provide the dogs 88 and 89 respectively, which are adapted to engage between the teeth of the pinion 12.

The dogs 88 and 89 are arranged to travel in different arcs, and I preferably cause this by arranging the dogs 88, and 89 on the arms 86 and 87 at different radial distances from the shaft 83, where the arms fulcrum. Extending in the opposite direction from the first mentioned arms, I provide arms 90 and 91 which fulcrum from the shaft 83, and which carry dogs 92 and 93 respectively; and these dogs are caused to travel in different arcs preferably by arranging them at different radial distances from the shaft 83. The dogs 92 and 93 are so arranged as to enter between the teeth of the pinion 13 for the purpose of locking the latter. On the ears 94 of each of the arms 86, 87 I connect spiral springs 95, 96 which tend to draw the arms 86, 87, 90 and 91 and their dogs toward their pinions. This movement caused by the springs is a resistable one, while the movement of the arms away from the pinions is caused by positive means. On the shaft 83, I also provide on the sleeve 85,

angularly disposed arms 97 and 98 each of which has a contact pin 99, 100, the former being arranged to engage the arms 86, 87, while the latter is arranged to engage and move the arms 90, 91. These arms are adapted to rock with the sleeve 85.

There are various cams, shafts and levers provided for operating the several devices previously described, at various predetermined periods and they consist of the following: The shaft 101 is the main shaft of the punching machine and corresponds with, and is operated by, the same mechanism as the shaft H of my said Patent Number 627,256, but for convenience I have omitted part of the device for operating this main shaft.

Preferably parallel with the main shaft I provide a secondary shaft 102, which is arranged to be operated at half the speed of the main shaft, so that while the main shaft makes one complete revolution in one complete punching operation, this shaft 102, makes one half revolution, or one complete revolution for every two punching operations. I have provided a gear 103 on the main shaft 101 and a gear 104 on the shaft 102, of twice the size of gear 103, so that the shaft 102 is operated from the main shaft at half the speed of the latter. On a shaft 105, I have fulcrumed a lever 106, which is connected by a link 107, with the arm 84, which rocks the sleeve 85, and therefore operates the shifting and drum locking devices. The lever 106 carries a bowl 108 which travels in the cam groove 109, of a cam 110 on the secondary shaft 102. The arm 84, therefore, will be rocked to the left at one operation of the punching mechanism, and to the right at another, remaining in its extreme positions substantially the whole time of the punching operation.

The returning tongs 49 and 50 are operated as follows: On a shaft 111, I fulcrum a one arm lever 112, which carries a bowl 114, which travels in the cam groove 115 of a cam on the secondary shaft 102. To the stud of the bowl is fulcrumed a curved link 113. The link 113, is also fulcrumed to an arm 117 which is mounted on shaft 47, which also carries the arm 48. At each revolution of the shaft 102, therefore, the lever 48, 117 is rocked and the tongs 49, 50 are caused to fall, and return the pin drum 2, and rise again to the normal position. A one arm lever 118, is fulcrumed on a shaft 119, and carries a bowl 121 which travels in the same cam groove 115, as the bowl 114. To the stud of the bowl is fulcrumed a link 120. The link 120 connects with the arm 122, on shaft 67, which also carries the arm 68. At each revolution of the shaft 102, the lever 68, 122 will be rocked and the tongs 69, 70 will be caused to fall, and thereby return the pin drum 1, to its intermediate

or normal position, and then rise again to its own normal position. As the bowls 114 and 121 engage the cam groove 115, on opposite sides thereof, the levers 48, 117, 68, 122, will be caused to rock alternately and one at each complete operation of the punching mechanism.

The arms 25 and 33, which carry the bars 24 and 54, in which the pins 28, 55, are mounted, are operated as follows: I provide a lever 123, which fulcrums on the shaft 124, and on one end it has a bowl 125, which travels in the cam groove 126, of a cam on the shaft 102. To the other end of the lever 123, is fulcrumed a link 127 which extends over, and is fulcrumed to an arm 128 which is secured to the shaft 26, which carries the arm 25. The movement of the lever arms 128, 25 both of which are carried on the shaft 26 causes the bar 24, to be oscillated once for every two punching operations. A lever 129 is fulcrumed on a shaft 130 and one end has a bowl 131 which travels in the groove 126 of the same cam as the bowl 125, of lever 123. To one arm of this lever is fulcrumed a link 132 which is also fulcrumed to an arm 133, which is secured to shaft 52, which shaft carries arms 53. The rocking of the lever 133, and arm 53 on shaft 52, causes the bar 54, to be oscillated, once for every second punch-operation, and since the bowls 131 and 125 engage opposite each other in the cam, the bars 24 and 54, will be operated alternately.

The push plates 39, 43 are operated as follows:—I have provided a lever 134, fulcrumed to a shaft 135, and one arm carries a bowl 136 which travels in a groove 137 of a cam on the shaft 102. A link 138 fulcrumed to the lever is also connected to the arm 139, which is secured to and rocks the shaft 40, thus oscillating the plate 39, at every second punching operation of the machine. A lever 140, fulcrumed on the shaft 141, also has a bowl 142 which travels in the cam groove 137. A link 143, fulcrumed to one end of this lever is also fulcrumed to an arm 144 on the shaft 44, and the movement of the lever 140, causes the shaft 44, to oscillate, thereby moving the plate 43. As the bowl 142, is slightly in the lead of bowl 136, the shaft 40 will be oscillated slightly in advance of shaft 44. The other push plates are similarly operated and preferably from the same cam. A short lever 145 fulcrumed on the shaft 146, has a bowl 147 traveling in the cam groove 137. A link 148 is fulcrumed to the lever 145 and is also fulcrumed to an arm 149 on the shaft 62. The shaft 62 and its push plate 61 are therefore oscillated at every second punching operation of the machine. A lever 150 is fulcrumed on a shaft 151 and it has a bowl 152 which travels in the cam groove 137. A link 153 connected to the lever 150 is also ful-

crumed to an arm 154, on the shaft 66, whereby the latter and its push plate are oscillated at every second punching operation. As the bowl 147 travels in advance of the bowl 152, in the cam groove 137, the shaft 62, will be oscillated slightly in advance of the shaft 66. As the bowls 142, 136 engage the cam groove 137 on opposite portions to the bowls 147, 152, the shafts 40, 44, and 62, 66, will be operated in alternate relation, one pair at one punching operation and the other at the next, and so on. The push plate 45, has to be operated twice for each complete revolution of the main shaft or at every time the punch block has acted; and I therefore prefer to operate this from the main shaft. I have fulcrumed the lever 155, on a shaft 156, and one end carries a bowl 157, which travels in a cam groove 158 of a cam on the main shaft 101. This cam has two rises and therefore the lever 155 will be twice rocked for each revolution of the main shaft. A link 159 is fulcrumed to one end of lever 155 and the other end is fulcrumed to an arm 159 on the shaft 46. The operations of the lever 155, will cause the shaft 46 and its push plate 45 to oscillate twice for each complete punching operation of the machine, as it is necessary in this form of machine to return the locking slides twice.

The control.—The present mechanism can be initiated separately for each punching operation, or the initiating device can be locked in position whereby the machine will operate continuously, in which latter event the operator will have to lay out stitches as fast as the machine runs. That is, he must position one set of devices before the other completes its operations. On the main shaft 101, I have shown a cam 160, which is preferably the same as the gear wheel with cam groove *h* of my said patent. The lever 161, fulcrumed at 162, is similar to the lever *g*²⁰ of said patent, and the arm 163, on this lever preferably performs the same functions, by means of similar connected devices as the arm *g*⁶, in said patent. That is, it controls the starting and stopping of the main shaft. On a shaft 164, I have fulcrumed a three armed lever which is somewhat similar to *g*¹¹, *g*¹², *g*¹³, in said patent which is employed to initiate the operations of the machine by hand control. To the arm 165, of this lever is connected a rope 166, which is similar to the starting rope *g*¹⁵, of my said patent; and the latter passes up to a convenient position within reach of the operator. This rope, at its upper end is connected to a lever at the top of the machine and the other arm of this lever is connected with a rod 167, which latter is fulcrumed to the arm 168, all of which is described in said patent. The arm 169, forms another member of this lever, and is rocked when-

ever the arms 165 and 168 are rocked by the operator pulling the starting rope. The arm 169 lies under a lateral pin 170 on the arm 163^a of lever 163 and projects into the path of a pin 171 carried upon the cam 160 on the main shaft. A trigger 172, is fulcrumed on a stud 173, and the end 174, of this trigger also projects into the path of the pin 171. The nose 175 of this trigger is arranged to engage the abutment 176, of the arm 169, to hold the latter in certain positions, and the spring 177, connected with the trigger is adapted to hold the trigger and arm 169, in engagement when the lever 169, has been raised, and to rock the trigger when the arm is to be disengaged, as will appear in the description of the operation. To the arm 163^a is connected a rod 178 which runs upwardly and is guided by the socket 179, on the frame of the machine, near the operator's working position. Upon a stud 180, on the frame, I have fulcrumed a catch 181 which is adapted to be rocked by the operator, into and out of engagement with the block 182, on the rod 178, to hold the latter in its elevated position, whenever it is desired to operate the machine continuously.

The operation of my invention, when embodied in a machine of the character herein referred to, will be as follows: Assuming the machine embodies all the features shown in said letters patent, except wherein they are superceded by devices shown herein, and the parts to be in the normal or inactive position, the operations will be as follows: The operator will move the cross frames shown in said patent, to bring the pointer to the position on the pattern, corresponding with a stitch to be made by the embroidering machine. The movement of the cross frames has moved, by means of the mechanism described in said patent, the several shafts or sleeves (as the case may be on which the gears 9, are carried). This will rotate the gears 9 to an extent corresponding with the movement of the cross frames and the drums have been rotated to the position corresponding with the several units of movement to be combined in the jacquard and transmitted to the tambour frame of the embroidering machine. This operation positions the gears 9, the same as the gears 9²³, were positioned in my said patent. It will only be necessary to follow the operation of one chain of elements, as the others will be all similar. Let it be assumed that in the operation now being considered the gear 9 is in position to mesh with pinion 12. The stitch having been determined and the gear 9, having been revolved to the right or left, as the case may be, the pinion 12, was likewise revolved in accordance therewith. Since the pinion 12, connects with one pair of drums 2, the latter will have been moved to the right or left, from their normal or in-

termediate position, thereby bringing one of the pins 4, on each of the drums, under its corresponding pin 28, of the slide selecting device. The particular pins 4, thus brought under a pin 28, will depend upon the direction and extent of rotation, of the drums 2, the same as in the case of the drum *e*, *e'*, *e''*, and *e'''*, of my said patent. During this positioning of the drums 2, the drums 1, lie idle because the pinion 13 is not in mesh with the gear 9. The positioning having taken place, the operator pulls the rope 166, to set the punching mechanism into operation, to make the necessary perforation representing such stitch. This rocks the lever 169, trips the lever 163 and, through the mechanism shown in my said patent, engages the friction clutch *g*¹, with the driving pulley *g* of said patent, and the main shaft then begins to revolve, to the right in Fig. 2. The movement of the main shaft will be transmitted through gears 103 and 104, and the shaft 102 will be revolved at half the speed of the main shaft. The first action will be to rock lever 106, push the bar 107 to the right, by which action the pinion 12, will be positioned, pinion 13, will be released and gear 9 will be shifted to disengage from pinion 12, and engage with pinion 13. As soon as this movement is completed the operator can again move the cross frame and thereby position the pinion 13 and the drums connected thereto. In the meantime the rotation of the main shaft continues and the cam groove 126 will cause the lever 123 to rock, and consequently the shaft 26, will be oscillated to move the bar 24, which carries the pins 28, toward and from the pin drum 2. When the bar 24, goes down, the pins 28, which are not opposed by a pin 4, on the pin drum 2, will go down with the bar; while the one which strikes a pin 4, on the drum 2, will be held up. The ones so held up will retain the corresponding slides 30, 31, in raised position until the push plates act thereon. The cam groove 137 will now cause the lever 134, to rock, whereby the shaft 40 will be oscillated, and with it the push plate 39. The slides 30 which are in the raised position, held there by the pins 28, will be caused to move to the left in Fig. 1, by the push plate and they will move their corresponding locking plates 32, forward, until they come in such a position as to lock certain of the first row of punches 18. The punch bar 23, will now be lowered by the mechanism shown in my said patent, and the punches which are locked by the slides 32, will perforate the paper pattern; while those which are not locked, will have no action on the paper, but will simply rest upon the surface. After the punch bar 23, returns and the punching rods have been withdrawn from the card, the push plate 39, will return the slides 30,

which were advanced, to their former position; and the push plate 45, will return the locking plates 32, to their former, or inactive position. The paper card will now be advanced by the mechanism shown in said patent, the distance between the two rows of punches 18 and 19, to bring the perforations just made, in line with the advanced punches 19. The slides 31, which are held up by pins 28, comprising part of the first set of slides, will now be advanced by the push plate 43, in consequence of the rocking of the lever 140. The advancing of the slides 31, will move their corresponding locking plates 32, forward to lock their punch rods 19. The punch bar 23, is now again depressed and punch rods of the forward row 19, which have been locked, will perforate the paper card; and these perforations will come in the same transverse line as the first perforations made by rods 18. After the punch bar is raised, the push plate 43, will return the slides 31, which were previously advanced, to their former position and the push plate 45, will again rock, to return the plates 32, which were last active. The machine has now completed one punching operation, the main shaft 101, has made one complete revolution and the shaft 102, has made one half a revolution.

When the arm 165 was tripped by the pulling of the rope the trigger nose 175 engaged under the projection 176 on the arm 169, and the trigger continued to hold up the arm 169. Shortly after the shaft commenced its revolution the pin 171 on the cam will trip the trigger arm 175 to release the trigger from engagement with the arm 169, and it will also engage the arm 169 and return it to its first or lower position, so that the lever 163, and 163^a, and its stopping mechanism will disconnect the clutch mechanism, so that the main shaft will be stopped after its complete revolution. Should however the operator have repositioned the cross frames and pulled the rope again before the shaft has completed its revolution, then the trigger will hold the lever 169 during the period when the clutch mechanism would be disengaged and such disengagement cannot take place, but the machine will continue to run another stitch or until the operator fails to be on time in pulling the rope. After the gear 12, and the drum 2, had been positioned preparatory to the last operation, the gear or pinion 12, and the drums connected thereto, were being locked by the dogs 88, 89 as shown in Fig. 5, by the cam groove 109, causing the lever 106 and by means of the bar 107, the arm 84 to rock to the position shown in Fig. 4. This rocked the sleeve 85, and with it the arms 97, 98. The rocking of the arms 97 and 98 and their pins 99 and 100 permitted the springs 96, to rock the arms, 86, and 87,

toward the gear 12, and the dogs 88, 89, thereof, enter the teeth of the gear 12, and lock it against any movement; and this gear remained locked until the punching operation just described was completed. The rocking of the arms 97 98, also caused the arms 90, 91 to be rocked and their dogs 92, and 93, were moved out of the teeth of the gear 13. When the sleeve 85, was rocked, the arm 82, also rocked, causing the link 79, to rock the lever 78, 76. This in turn acted on the hub 73, of the gear 9, and the latter was moved out of mesh with the gear 12, and into mesh with the gear 13. This shifting of the gear 9, is delayed long enough to allow the dogs 88, 89 to be released from the gear 12, and the dogs 92, 93, to be engaged with the gear 13, in order that no change will take place in the position of the gear 13, while the gear 12, is being shifted; and this slight delay is caused by the slot 81, in the bar which permits the bar to move to some extent before it acts on the pin 80 and causes the lever 78, 76 to rock. This shifting operation took place just after the gear 12, and its pin drum were positioned in the beginning of the operation just described. That left the gear 13, and its pin drum free to be positioned by the operator as soon as the first punching operation was initiated. The operator, as soon as he pulled the rope 166, as previously described, may proceed to lay out the next stitch while the punching operation is going on. To do this he operates the cross frames in the upper part of the machine, above referred to, and lays out the next stitch. As the gear 9, is now disconnected from the pinion 12, this can be done; and the operator, if quick, can perform this operation by the time the first punching operation is completed. As soon as he succeeds in so positioning the gear 13 and its drums he again pulls the rope 166, and if the first operation has been completed, the following will result: The positioning of the gear 13 and its drums brought certain of their pins 3, under certain of the pins 55, according to the directions and extent of rotations of the drums, the same as was the case in the action of the drums 2. Through the cam groove 126, the lever 129 and link 132 and arm 133 on the shaft 52, and the arms 53, thereon, will be oscillated, and the bar 54, as well. This moves the bar 54, toward the drum 1, and those pins 55, which do not strike pins 3, will fall, while those which meet the pins 3, on the drums 1, will be held up and consequently the slides 57, 58, with which they engage. The slides 57, thus held up, which have the projections 59, 60 will be moved forward by the push plate 61, which is caused to rock at this moment by the cam grooves 137 lever 145, link 148, and arm 149. In moving forward, the slides 57 will carry their respective lock-

ing plates 32, forward, and into locking engagement with their respective punch bars of the front row 19. The punch bar 23, is now lowered, and raised as before, and the punch rods which are locked will perforate the card. The return movement of the push plate 61, will return the slides 57, which were advanced, back to their starting position, and the push plate 45, will return the locking plates 32, back to their inactive position. The jacquard card will now be fed by the mechanism shown in my said patent for that purpose equal to the distance between the two rows of punches 18, 19, to bring the perforations just made, in line with the forward row of punches 19. The push plate 65, is now oscillated, by reason of the cam groove 137, lever 150, link 153, and arm 154 and it will move the slides 58, which have the projections 63, 64 and which are held up by the pins 55, forward. They will carry with them their respective locking plates 34, which will be moved into locking engagement with their respective punch rods 19, in the rear row. The punch bar 23, will now go down again to force the locked punch rods through the card, and will then be raised. The push plate 65, will now return the slides 58, which were advanced, back to their starting position. The push plate 45, will also return the plates 34, back to their inactive position. Before the punching operation, just described, has been completed, and in fact, immediately after it has been initiated, the lever 106 is again rocked, and the link 107 lever 84, 82, link 79 and lever 78, 76 will cause the gear 9, to be shifted from its engagement with gear 13, to engagement with gear 12.

When the second punching operation has been completed the main shaft will have made its second revolution, and the shaft 102 will have made one complete revolution and the parts will be brought to a stop, as before.

After the first punching operation was over, and the slides 30 and 31 were returned, and the bar 24, raised to its upper position, the pin drum 2, was returned to its normal or intermediate position. This was caused by the cam groove 115, link 113, and arm 117, moving the shaft 47, so that the tongs 49, 50, which are normally in their high position are lowered and in their downward movement either one or the other meets the projection 51, on the shaft 5, and returns the latter and associated parts back to their intermediate position ready for a subsequent operation; and then the tongs are raised again to the high position. Also, after the second punching operation, the cam groove 115, lever 118, link 120, arm 122, shaft 67, and arm 68, caused the tongs 69, 70, to fall, and to return the drums in similar manner to the first tongs and then rise again. These

tongs are preferably arranged to operate similar to the tongs 1 and 2, of Patent 786,890.

If the operator is very adept in laying out new stitches, it may be desirable to have the main shaft run continuously, if the operator can lay out a new stitch each time, before the last punching operation is completed. To do this, the trigger 181 is thrown over to the dotted line position shown in Fig. 2, where it will engage the block 182, and retain the rod 178 in its raised position. This will keep the arm 163^a raised and the stop mechanism will not operate, so that the main shaft will remain connected with the source of power, and will operate continuously. In that event, the operator will pay no attention to the starting or initiating device, but will simply lay out new stitches as fast as, and slightly in lead of, the punching operations. Avoiding the stopping of the machine after each operation, saves time, and wear and tear on the machine.

It may be stated again that between the two punching actions of each complete punching operation the card is advanced one position by the feeding mechanism shown in my said patent.

As has been said, the dogs 88, and 89, and likewise the dogs 92, 93, are arranged to enter the spaces in the pinions at different angles relative to the radii, and I prefer to cause this by arranging them at different radial distances from a common center, rather than to strike their arcs from different centers. In previous punching machines it has been found that after the gears were rotated they might be in such a position that the locking dogs would engage the top of a tooth thereof, and the locking would not properly take place, as the dog would not enter between the teeth. In the present arrangement the dogs 88, 89, in approaching the teeth of gear 12, and likewise the dogs 92, 93, in approaching the teeth of gear 13, do so at different angles relative to the radii of the gear and one after the other. If the first one should enter properly in the gear it will be drawn down to the full extent between the teeth and the gear is properly locked and the second dog would follow idly without affecting the position of the gear. But if the first dog of a pair should strike the top of a tooth, the other of the pair on account of the different angular direction of its movement could not strike the top of a tooth, but would enter from the side and be drawn in between the teeth by the spring and the gear and pinion moved by the dog to its proper position and locked. As the gear is being shifted by the second dog, the first one will then also escape the top of the tooth and enter its proper space. From the above it will be apparent that

a jacquard card may be produced which will be similar in all respects to cards produced on previous machines.

Instead of laying out a stitch and then initiating the punching operation and having to wait until the latter is completed and the parts restored, before proceeding to lay out a second stitch, the delay is avoided and the operator can lay out stitches as fast as his ability will permit and he need not wait for any appreciable length of time.

Just as soon as a stitch has been laid out by positioning the first set of pin drums, and the machine is initiated, he immediately proceeds to lay out a second stitch by positioning a second set of drums, which have in the meantime been connected up with the controlling mechanism. This second positioning of the second set of drums selects from a second set of slides, which are ready to advance just as soon as the first set of slides have been returned, and so on. It is therefore apparent that in permitting the operator to lay out a new stitch as soon as a punching operation has been initiated, under my present invention, the punching operations of my machine are not made slower, but in fact are made faster, because of the double arrangement of slides, both of which perform the same function, in rapid succession. When one set of slides performs its function and is returned, the second set is already selected and is ready to perform its function at once.

It will also be apparent that the machine is positive in its operation and that there can be no conflict in its several devices.

Many changes may be made in the numbers of parts their arrangement and construction without departing from the scope of my invention as set forth in the annexed claims. Furthermore, my present invention is not limited in use to the particular form of punching machine herein described; and parts of my invention may be segregated and used for their individual advantages.

Having described my invention, what I claim is:

1. In a punching machine, measuring mechanism, adapted to measure distances on a pattern, perforating mechanism for perforating a card, a plurality of selecting devices adapted to control the perforating elements to determine the location of the perforations, said selecting devices being adapted to operate alternately upon the same perforating elements, and intermediate mechanism adapted to transfer the motion of the measuring mechanism alternately to the different selecting devices upon different operations of the machine.

2. In a jacquard card punching machine measuring mechanism adapted to measure distances on a pattern, perforating mechanism, a plurality of selecting mechanisms,

controlling the perforating mechanism, intermediate mechanism adapted to transfer the movement of the measuring mechanism alternately to the different selecting mechanisms upon different operations of the machine, whereby the selecting mechanisms will select the perforating elements corresponding to the movement of the measuring mechanism upon different operations of the machine.

3. In a punching machine, a plurality of measuring mechanisms, adapted to measure distances in two different directions on a pattern, a plurality of selecting mechanisms for each of the measuring mechanisms, perforating mechanism controlled by said selecting mechanisms and intervening mechanism between the measuring mechanisms and their selecting mechanisms, adapted to cause each measuring mechanism to operate alternately their respective selecting mechanisms upon different operations of the machine.

4. In a jacquard card punching machine, perforating mechanism, a plurality of sets of selecting devices for determining the location of the perforations, by controlling the operation of the perforating elements, each set of selecting devices being adapted to affect the same perforating elements, stitch determining mechanism for actuating said selecting devices, and means for causing the different sets of selecting devices to be operated upon different operations of the punching machine.

5. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of devices adapted to select the perforating elements to determine the locations of the perforations in the jacquard card, said series of selecting devices being adapted to perform the same functions, means for operating said selecting devices and means for causing said separate series of selecting devices to operate in alternate relation.

6. In a jacquard card punching machine embodying means for perforating a jacquard card, a plurality of series of devices adapted to select the perforating elements to determine the locations of the perforations to be made in the jacquard card, the elements of each series of selecting devices being adapted to perform the same functions and acting upon the same perforating elements, means for operating said selecting devices, and means for causing said separate series of selecting devices to be operated in alternate relation.

7. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of devices adapted to control the operation of the perforating elements, to determine the locations of the perforations to be made in the

jacquard card, said series of selecting devices being adapted to perform the same functions, means for operating each of the series of selecting devices, and means for causing said series of selecting devices to be separately operated by said operating means.

8. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of devices adapted to select the perforating elements to determine the locations of the perforations to be made in the jacquard card, the elements of the different series of selecting devices being adapted to perform the same functions and controlling the same perforating elements, means for operating said selecting devices and automatically operated means for causing said several series of selecting devices to be alternately operated by the said operating means.

9. In a jacquard card punching machine, embodying means for perforating a jacquard card, locking elements for locking the perforating elements, a plurality of series of devices each of which series is adapted to independently select from the same locking elements, means for operating said selecting devices, and means for causing said series of selecting devices to be operated upon different operations of the punching machine.

10. In a jacquard punching machine, embodying means for perforating a jacquard card, a plurality of series of devices adapted to select the perforating elements, to determine the locations of the perforations in the jacquard card, each of said series of selecting devices being adapted to perform the same functions, stitch determining mechanism for operating said selecting devices, and means for connecting the stitch determining mechanism alternately with the different series of selecting devices.

11. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of devices adapted to control the perforating elements to determine the locations of the perforations in the jacquard card, each series of selecting devices being adapted to perform the same functions, stitch determining mechanism, toothed members operated by the stitch determining mechanism, toothed members through which each set of said selecting elements are adapted to be operated, and means for throwing said first toothed members alternately into operative relation with said last mentioned toothed members, whereby the different series of selecting devices will be operated alternately.

12. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of selecting devices adapted to affect the punching elements to determine the locations of the perforations in the jacquard card, stitch deter-

mining mechanism, devices for operating each series of selecting devices, and means for causing the same to be operated alternately by the stitch determining mechanism, and means for alternately locking said devices which operate the selecting devices.

13. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of selecting devices, adapted to affect the punching elements, to determine the locations of the perforations in the jacquard card, said series each being adapted to perform similar functions, devices for operating each series of selecting devices, stitch determining mechanism and means for connecting said stitch determining mechanism alternately with said selecting device operating means, whereby said series of selecting devices will be operated alternately, and means for locking each of said selecting device operating means, preceding the connection of the stitch determining mechanism with the other of said selecting device operating means.

14. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of selecting devices, each series being adapted to perform the same functions in selecting the perforating elements, means for operating said selecting devices, embodying a gear for each series, stitch determining mechanism embodying a gear for operating the said first gears, means for shifting said stitch determining gear from one to the other of said selecting device operating gears, and means for alternately locking said latter gears previous to the shifting of said stitch determining gear from the one locked to the other of said selecting device operating gears.

15. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of selecting devices for determining the positions of the perforations, a gear for each of said series, through which the selecting devices are adapted to be operated, the gears of the different series being arranged in staggered relation, stitch determining mechanism for operating the selecting devices, embodying a gear, and means for shifting said gear on its axis, to cause it to alternately mesh with the said first gears, said gears being arranged whereby only one of said first gears can mesh with the stitch determining gear at a time.

16. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of selecting devices for determining the positions of the perforations, operating means for each series of selecting devices, stitch determining mechanism for controlling said operating means, means for causing said stitch determining means to be alternately connected

with said several operating means and means for returning said several operating means alternately.

17. In a jacquard card punching machine, embodying perforating elements for perforating a jacquard card, locking elements for locking the perforating elements, a plurality of series of selecting slides each of which series is adapted to operate the said locking elements, stitch determining mechanism, means for causing the different series of slides to be actuated by said stitch determining mechanism upon different operations of the punching machine, means for returning said series of slides separately and means for returning said locking elements after each operation thereof.

18. In a jacquard card punching machine, embodying perforating elements for perforating a jacquard card, a plurality of series of selecting slides, each of which series is adapted to select from the same perforating elements, to determine the location of the perforations, means for selecting said slides for operation, and means for advancing said slides to cause the selection of the perforating elements, and adapted to advance the different series of slides, upon different operations of the punching machine.

19. In a jacquard card punching machine, embodying means for perforating a jacquard card, a plurality of series of selecting devices for determining the location of the perforations, means for causing the operation of each of said series of selecting devices, stitch determining mechanism, means for coupling said stitch determining mechanism alternately with the several devices for causing the operation of the several series of selecting devices, and locking devices, and locking and unlocking mechanism adapted to lock the selecting device actuating means which is being thrown out of connection with the stitch determining mechanism, and unlock the one which is thrown into connection therewith.

20. In a jacquard card punching machine, means for perforating a jacquard card, a main shaft for operating said perforating means, a plurality of series of slides for selecting said perforating devices, to determine the location of the perforations, means for causing the selection of said slides, a secondary shaft operated from said main shaft at reduced speed, and means operated by said second shaft adapted to reciprocate said slides to affect the selection of the perforating elements, and adapted to operate the different series of slides upon different operations of the perforating mechanism.

21. In a jacquard card punching machine, embodying means for perforating a jacquard card, a main shaft for operating the perforating means, a plurality of series of select-

ing slides for selecting the perforating elements, means for causing the operation of the several series of slides, stitch determining mechanism adapted to operate the same alternately a secondary shaft operated from the main shaft, at reduced speed, means for reciprocating said series of slides alternately, and operated from said secondary shaft, and means for alternately returning said devices which cause the operation of the several series of slides, and operated from said second shaft.

22. In a jacquard card punching machine, embodying perforating elements for perforating a jacquard card, a series of selecting slides adapted to affect a selection of perforating elements, to determine the location of the perforating elements, means for operating said slides, embodying a pin drum, a second series of slides adapted to select from the same perforating elements as said first series, means for operating said second series, including a pin drum, stitch determining mechanism, and means for causing said pin drums to be operated alternately by said stitch determining mechanism.

23. In a jacquard card punching machine, embodying means for feeding a jacquard card, perforating elements arranged in separate rows, a series of selecting slides comprising separate groups adapted to select said separate rows of perforating elements to determine the location of the perforations, means for selecting said slides, embodying a pin drum, means for causing selected slides of one group to be operated in advance of those of the other group, a second series of slides, comprising separate groups adapted to select said separate rows of perforating elements, means for selecting said slides, embodying a pin drum, means for causing selected slides of one group in said second series to be operated in advance of the other group, stitch determining mechanism, and means for causing said pin drums to be alternately operated, whereby the said series of slides will be operated alternately.

24. A revoluble toothed member and means for positioning the same, comprising a plurality of pawls movable in different directions toward the toothed member to position the latter, each of which pawls is adapted to bring the toothed member to the same position, and means for operating the pawls.

25. In a jacquard card punching machine, embodying perforating mechanism, selecting mechanism, and means for operating the same embodying a toothed member and means for locking the toothed member, comprising a plurality of pawls adapted to engage between the teeth of the toothed member, the ends of said pawls being arranged to travel in different directions whereby

they will approach the toothed member at different angles relative to the teeth thereof.

26. In a jacquard card punching machine, embodying perforating mechanism, selecting mechanism and means for operating the same, embodying a toothed member, and means comprising a plurality of pawls adapted to engage between the teeth of the toothed member, said pawls being arranged to travel in different directions whereby the pawls will approach the toothed member at different angles relative to the radii thereof.

27. In a jacquard card punching machine, embodying perforating mechanism, selecting mechanism, and means for operating the same, embodying a toothed member, and means for locking the toothed member, comprising a plurality of pawls adapted to engage between the teeth of the toothed member, said pawls being arranged to travel in different directions, whereby said pawls will approach the said teeth at different angles, and both will be adapted to successively engage between teeth of the said toothed member.

28. In a jacquard card punching machine, embodying perforating mechanism, selecting mechanism, and means for operating the same, embodying a toothed member, and means for locking the toothed member, comprising a plurality of pawls adapted to engage between the teeth of the toothed mem-

ber, said pawls being arranged to travel in different directions, each of which directions, intercepts the radii of the toothed member at the base of the teeth thereof, whereby said pawls will approach the said teeth at different angles to the periphery of the toothed member, springs for throwing said pawls into engagement with the toothed member, and positive means for throwing said pawls out.

29. A punching machine comprising means for perforating a card, means for controlling the perforating operation, means for operating the perforating means, means for manually initiating the operation of the perforating means, means for automatically stopping the same, and means for holding the initiating means in an operative position until the machine has proceeded beyond the place where the automatic means becomes active whereby the machine will continue its operation, so long as the initiating device is manually repositioned in advance of the time when the automatic stopping device becomes effective.

Signed this 30th day of June 1911, at the city, county and State of New York.

JOSEPH A. GROEBLI.

Witnesses:

A. H. KRUSHULL,
HENRY EGLI,