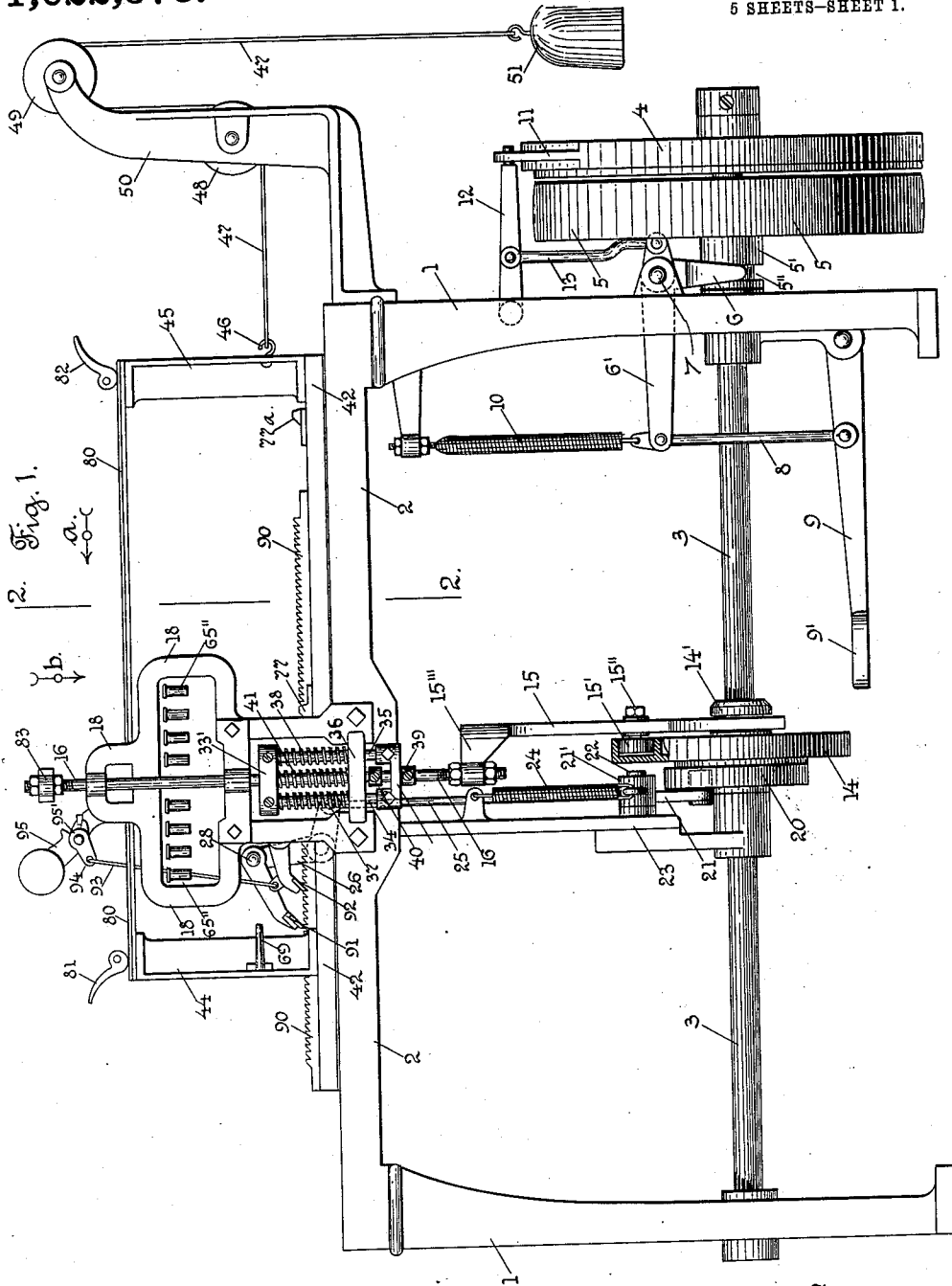


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JACQUARD CARD PUNCHING MACHINE.
APPLICATION FILED APR. 24, 1911.

Patented Apr. 9, 1912.

5 SHEETS—SHEET 1.

1,022,573.



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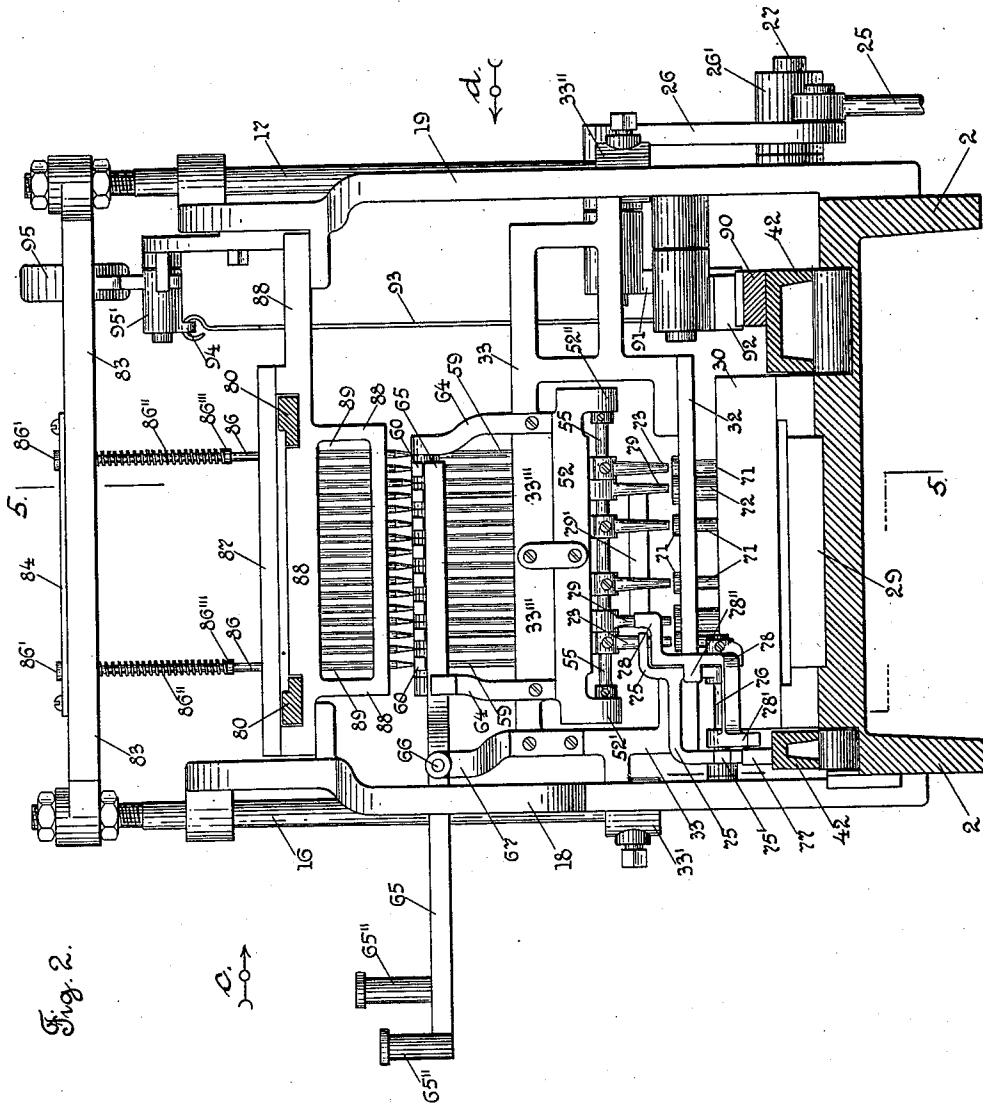


Fig. 2.

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5 SHEETS—SHEET 3.

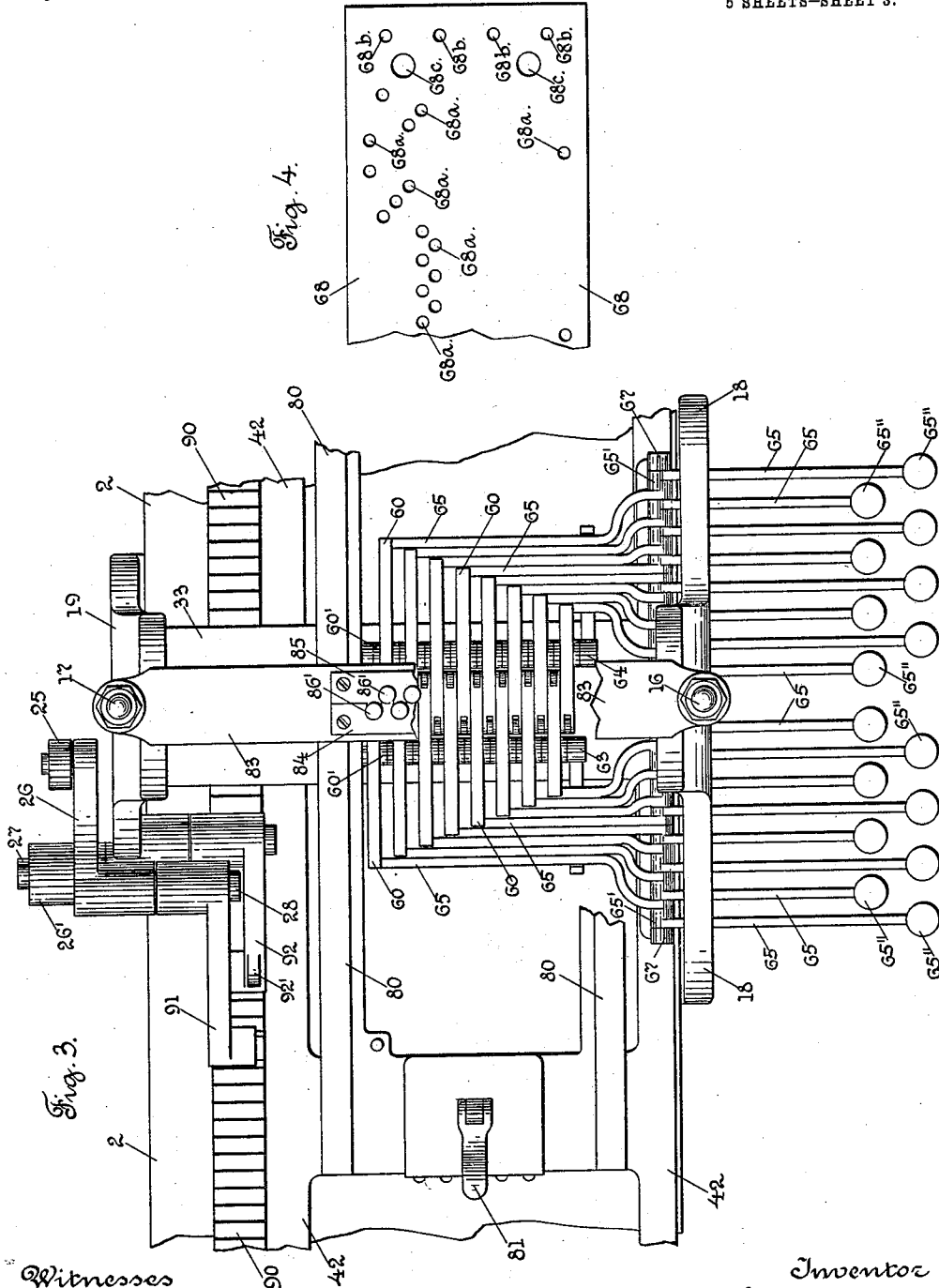


Fig. 3.

Fig. 4.

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5 SHEETS—SHEET 4.

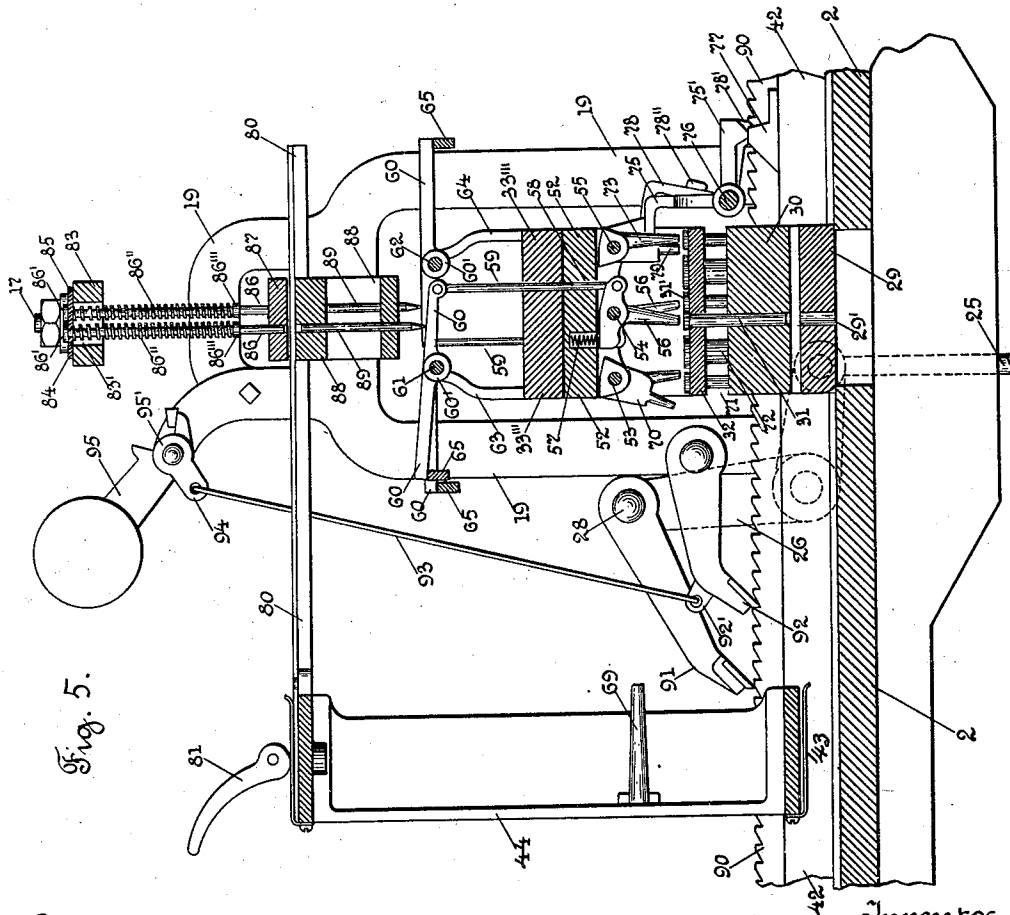


Fig. 5.

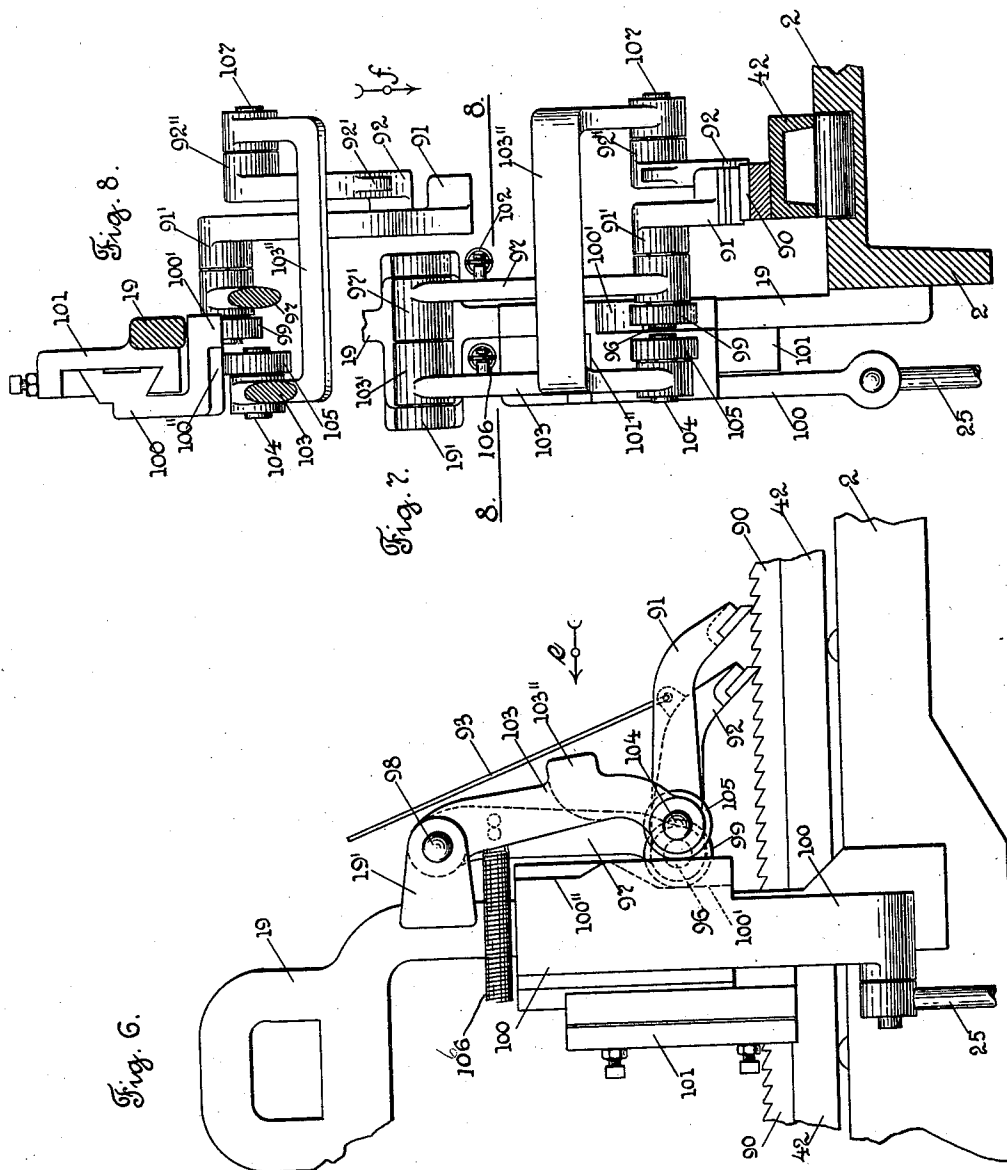
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APPLICATION FILED APR. 24, 1911.

1,022,573.

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5 SHEETS-SHEET 5.



UNITED STATES PATENT OFFICE.

HORACE WYMAN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, A CORPORATION OF MASSACHUSETTS.

JACQUARD-CARD-PUNCHING MACHINE.

1,022,573.

Specification of Letters Patent.

Patented Apr. 9, 1912.

Application filed April 24, 1911. Serial No. 622,969.

To all whom it may concern:

Be it known that I, HORACE WYMAN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Jacquard-Card-Punching Machines, of which the following is a specification.

My invention relates to a jacquard card punching machine, and particularly to a punching machine for jacquard cards, in which is combined a repeating mechanism for the purpose of repeating a punched card without manipulating the keys.

The object of my invention is to improve upon a jacquard punching machine of the type referred to.

In my improvements I have a main frame with a die or punch plate, and one or more rows of holes for punches crosswise, on the frame. Instead of making the punch plate with punch holes, and punches therein for all of the holes, the whole length of the card, as has heretofore been done, I provide a punch plate having only one or two rows or series of punch holes, with punches therein, crosswise of the plate, and I provide the same number of keys as there are punches in the plate, each punch coöperating with its individual key. Above the die plate, and with a space between, is a guide plate, which has punch holes through it, which register with the holes in the die plate. A vertically movable punch carrier plate, above the guide plate, is provided with punches, which are loosely fitted in holes therein. Said punches have their enlarged heads above the carrier plate, and extend with their lower ends through holes in the guide plate; when the punch carrier plate is raised to its highest position, the lower ends of the punches are held above the space between the guide plate and the die plate, to allow a blank card to enter below the punches. The die plate, the guide plate, and the carrier plate, all constitute a set of punch plates for rows of punches.

The carriage, which is arranged to move lengthwise of the frame, is adapted to carry the blank card, which extends in the space between the guide plate and the die plate. Rows of keys are arranged, one key for each punch, which are located lengthwise of the main frame, and are adapted to make

the punches operative, through intermediate connections between the keys and the punches. Said intermediate connections consist of key levers, intermediate levers, and actuating dogs, which are normally held in their inoperative position above the punches, whereby any of said dogs may be put into operative position by its corresponding key, through manual indicating.

The punch carrier is moved up and down by means of a cam, and cam slide, and intermediate connections to said carrier. In addition to the indicating holes in the pattern cards, each card is also provided with lace holes at its ends, for lacing or tying the cards together, and each card also has larger holes at each end, into which pins or lugs on the jacquard cylinder may enter, over which cylinder the cards pass, to correctly aline the indicating holes with the needles of the jacquard.

To punch the lace holes, and the lug holes referred to, the machine is provided with suitable holes in the die plate and guide plate, and punches and dogs for the same. To automatically operate said punches at the proper time, for one end of the card, as the card is moved, the dogs for the lace holes are provided in this instance with an arm, and the dogs for the lug holes with another arm, which arms in this instance both extend horizontally along the frame, and are adapted to be engaged and operated by cams, which are adjustably secured to the blank card carriage. The engagement of said cams with said arms, causes the respective dogs to be put into operation. At the opposite end of the pattern card, the dogs are provided with one arm for both sizes of punches, by which they are put into operative position.

To repeat a punched card without manipulating the keys, there is combined with the vertically movable punch carrier, and blank card carriage, a pattern card carriage, attached to and movable with the blank card carriage above the punches; said punch carrier has detector needles which register with the intermediate levers of the keys, and co-operate with the holes of the punched pattern card on said carriage, to put into operation the punches which correspond with said indicating holes in the pattern card. The detector needles are each composed of a

primary part above the pattern card, and a secondary part between the card and an intermediate lever. The primary needles are carried on a bar on the vertically moving punch carrier, having heads thereon to limit their downward movement, caused by the action of an expansion spring. As the primary needles move downwardly, and a punched hole in a pattern card allows a primary needle to pass through, the pressure of its spring will be exerted upon the secondary needle, and move the intermediate lever to put the dog into operative position to punch a hole in the blank card, which card corresponds in position with the pattern card. The modified feed motion shown in the drawings, combines in this instance with the tooth rack of the card carriage, two pawls, which are each carried on one arm and are operated alternately by two reciprocating slide cam surfaces; the feeding pawl, which on its backward movement engages a tooth of the rack, moves the rack forward a step, the other pawl or hold pawl, which in this instance moves a less distance than one tooth, has not engaged a tooth on its backward movement, but engages on its extreme forward movement with a tooth, and holds the rack and card carriage against the action of a weight, while the first pawl disengages its tooth on the rack, and moves backwardly to take another tooth.

My invention consists in certain novel features of construction of my improvements as will be hereinafter fully described.

I have only shown in the drawings detached portions of a jacquard punching machine with my improvements combined therewith, sufficient to enable those skilled in the art to understand the construction and operation thereof.

Referring to the drawings:—Figure 1 is a front view of a card punching machine with my improvements applied thereto. Fig. 2 is, on an enlarged scale, a section, on line 2, 2, Fig. 1, looking in the direction of arrow *a*, same figure. Fig. 3 is a plan view of the punching portion of the machine, with the upper bar partially broken away, and looking in the direction of arrow *b*, Fig. 1. Fig. 4 shows one end of a pattern card, detached, with some holes punched. Fig. 5 is a section, on line 5, 5, Fig. 2, looking in the direction of arrow *c*, same figure. Fig. 6 shows a modified feed motion, detached, and located at the rear of the machine, looking in the direction of arrow *d*, Fig. 2. Fig. 7 shows the feed motion, looking in the direction of arrow *e*, Fig. 6, and, Fig. 8 is a section, on line 8, 8, Fig. 7, looking in the direction of arrow *f*, same figure.

In the accompanying drawings, 1 are the standards for the frame or table 2. The driving shaft 3, which is suitably journaled in the lower portion of the standards, has

secured thereon, on one end, the friction disk 4, adapted to be engaged and operated by the pulley 5, which is loosely mounted on the shaft 3. The pulley 5 has its hub 5' provided with an annular groove 5'' into which extend the ends of a forked or yoked shaped lever 6, which has its hub pivotally mounted on a stud 7. One arm 6' of the yoke shaped lever 6 extends inwardly, and has its end pivotally connected to the upper end of a rod or connector 8. The lower end of said connector 8 has pivotally connected thereto a foot lever or treadle 9 provided with the end 9', to be engaged and moved downwardly by the foot of the operator, to start the machine. A helically coiled contraction spring 10 acts to move upwardly the treadle 9, and to stop the machine on the release of said treadle. A brake shoe 11, connected to a lever 12, is pivotally mounted on the stands 1, and is forced toward the friction disk 4, through a connector 13, which has its lower end pivotally connected to an arm on the hub of the yoke shaped lever 6. The grooved cam 14 has its hub 14' secured upon the shaft 3, and is adapted to move up and down the cam slide 15, through a roll 15' mounted on a stud 15'' traveling in a groove in said cam 14. The lower end of the cam slide 15 is preferably made yoke shaped, and is guided by an annular groove in the hub 14' of the cam 14. The upper end of the cam slide 15 has its arms 15''' extending out therefrom in opposite directions on either side thereof. The arms 15''' have adjustably secured thereto the lower ends of the upwardly extending rods 16 and 17, which are suitably guided in the frame 18 and in the frame 19. The frames 18 and 19 have their lower portion secured to the table or frame 2. The driving shaft 3 has also mounted thereon a second cam 20, see Fig. 1, which is adapted to operate the angle lever 21, which has its hub 21' loosely pivoted on a stud 22 in a stand 23. A helically coiled contraction spring 24 acts to hold the lever 21 in engagement with the cam 20. A connector rod 25 extends upwardly from the lever 21, and has its upper end pivotally connected to one arm of an angle lever 26, see Figs. 2 and 5, which has its hub 26' pivotally mounted on a stud 27 on the frame 19. The other arm of the angle lever 26 carries a stud 28, on which is pivotally mounted the shifting pawl to be hereinafter described. All of the above mentioned parts may be of the usual and well known construction.

The main frame 2 has secured thereon, see Figs. 2 and 5, in this instance the die plate 29, which is provided with two rows of holes 29'. Above the die plate 29 is mounted the guide plate 30, with a space between the two plates for the blank card which is to be punched. The guide plate 30 has

holes therethrough which register with the holes in the die plate 29, which are adapted to loosely guide the punches 31, which have enlarged heads 31' to rest upon the carrier plate 32. The carrier plate 32 is secured to the lower side of a frame 33, which extends outwardly on either side of the machine, and has the portions 33' and 33'', to be secured upon the upper ends of the two upwardly extending rods 34 and 35, (one side is shown in Fig. 1). The rods 34 and 35 are guided at their lower ends in a transverse portion 18' in the frame 18, and have their lower ends provided with a transverse bar 36. Helically coiled expansion springs 37 and 38 encircle the rods 34 and 35, and bear at their lower ends against the transverse bar 36, and at their upper ends against the frame portion 33', to yieldingly move upwardly the frame 33. The rod 16 has two collars 39 and 40 thereon, which, on the up and down movement of said rod, engage the transverse bar 36, to move up and down the frame 33. A helically coiled expansion spring 41 encircles the rod 16, and acts also to move upwardly the frame 33.

A blank card carriage 42 is movable lengthwise of the frame, and is adapted to carry the blank card, which is held therein by suitable clamp devices 43 at its end, see Fig. 5. The blank card is carried by the carriage 42 between the punch plates 29 and 30. The blank card carriage 42 has upright stands 44 and 45 thereon. The stand 45 has a hook 46 to which is fastened the cord 47, which passes over sheaves 48 and 49 on the stand 50, and extends downwardly, and has attached to its end a weight 51, which moves the blank card carriage 42 toward the right in Fig. 1. The frame 33 has in this instance secured thereon, above the carrier plate 32, a plate 52, which has ears 52' and 52'' thereon, see Fig. 2; the ears 52' and 52'' support rods 53, 54, and 55, see Fig. 5. The rod 54 has loosely mounted thereon the hubs of actuating dogs or levers 56, which consist, in this instance, of downwardly extending arms located above the heads 31' of the punches 31. Said arms are normally moved out of the path of the heads 31' of the punches 31, through the action of expansion springs 57, which are inserted in suitable recesses in the lower side of the plate 52, see Fig. 5, and cause, through the engaging of a side extension on the hubs of the actuating levers 56, said levers to move normally to one side of the heads 31' of the punches 31. An extension or arm on the opposite side of the hubs of the levers 56, has pivotally connected thereto the lower end of a wire 58, see Fig. 5. The wires 58 are guided in suitable holes in the plate 52. The upper ends of the wires 58 are adapted to be engaged by wires or rods 59, which extend downwardly from arms 60, and

through registering holes in the center portion 33''' on the frame 33. The arms 60 have their hubs 60' loosely mounted on the rods 61 and 62, on the stands 63 and 64 secured to the frame 33. Said arms 60, which form intermediate levers, have their opposite ends extending outwardly in the path of the key levers 65, which have their hubs 65' pivotally mounted on rods 66 in stands 67, see Fig. 3. The key levers 65 have engaging ends 65'', adapted to be manually operated.

The pressing of a key lever 65, causes, through intermediate levers 60 and connections to an actuating dog 56, said dog to move into the path of a head 31' on a punch 31, which punch, on the downward movement of the frame 33, will punch an indicating hole 68^a in the pattern card 68, as shown in Fig. 4. In addition to the indicating holes 68^a, each card 68 is also provided with holes 68^b at its ends for the lacing for the cards, and with larger holes 68^c, at each end for the lugs on the jacquard cylinder. To punch the lace holes 68^b and the larger holes 68^c, when the punching commences, a dagger 69 is secured to the stand 44 on the card carriage 42, see Fig. 5, said dagger is adapted to engage an actuating dog 70 on the rod 53, to move said actuating dog 70, see Fig. 5, to its operative position above the punches 71 for the lace holes 68^b, and the punches 72 for the lug holes 68^c. The bolt 55, on the opposite side of the plate 52, carries the hubs of the actuating levers or dogs 73, which in this instance are secured on the rod 55, and are automatically moved to their operative position by the punches 74 for the lace holes, by an indicating lever 75, which has its hub loosely mounted on a bolt 76. Said lever 75 has an arm 75', which extends horizontally from its hub, which arm is adapted to engage with and be operated by a cam shaped projection 77, which is adjustably secured on the blank card carriage 42, see Fig. 5. A second lever 78, which is pivotally mounted on the stud 76, has an arm 78', which extends out horizontally, and is adapted to engage with and be operated by a cam shaped projection 77^a, see Fig. 1, similar to the cam shaped projection 77 secured to the blank card carriage 42 at its end, and which acts to operate said lever 78, to put into operative position the actuating levers or dogs 79, which have their hubs loosely mounted on a rod 55, and are rigidly connected by a bar 79'. The lever 78 has a lug or extension 78'', which on the operation of said lever 78, engages the lever 75, to cause at the end of a card, both kinds of levers 73 and 79 to be put into operative position at once, to punch the lace holes 68^b and lug 68^c at the end of the card. A frame 80 is in this instance secured to the upper ends of the stands 44

and 45 on the blank card carriage 42; said frame 80 forms a guide or carriage for a punched or pattern card, which is held thereon by clamping devices 81 and 82, for the purpose of being repeated.

The upper ends of the vertically moving rods 16 and 17 have secured thereon a bar 83, which has an opening 83' through its central portion, which is covered by the plates 84 and 85, which plates act as retaining plates, and are adapted to hold the enlarged heads 86' on the downwardly extending detector needles 86, which have their lower ends guided on the guide plates 87. Said guide plate 87 is secured upon a frame 88, which has its ends mounted on the side frames 18 and 19 on the machine. Helically coiled expansion spring 86'' encircle the needles 86, and bear with their upper ends against the plates 84 and 85, and with their lower ends against the enlarged portion 86''' on the needles 86. The springs 86'' act to yieldingly hold down the detector needles 86, which in this instance register with the intermediate levers of the punch keys, and are adapted to cooperate with the holes of the punched pattern card. The detector needles for the repeating device are each composed in this instance of a primary part, the needles 86, above the pattern card, and a secondary part 89, below the pattern card, and above the intermediate levers 60. The secondary part 89 consists of needles which are suitably guided at their upper and lower ends in the frame 88. The lower and preferably pointed ends of the needles 89 rest upon the intermediate levers 60.

A punched hole in the pattern card allows a needle 86 to pass through, and on the downward movement of the bar 83, said needle is adapted to engage a needle 89, and acts, through the pressure of the coiled expansion spring 86'', to move downwardly the needle 89 and operate an intermediate lever 60, which, through the intermediate connections to an actuating dog or lever 56, moves said dog 56 to its operative position, and above the corresponding punch 31 for a blank card to be punched, according to the indicating of the pattern card above.

The card carriage 42 is provided with a tooth rack 90, which is adapted to be engaged by a feed pawl 91, which has its hub pivotally mounted on the stud 28 on the angle lever 26. The angle lever 26 is operated, as above described, by a cam 20 on the driving shaft 3. The feed pawl 91 moves the rack 90 and the card carriage 42 toward the left, against the action of the weight 51. On the backward movement of the pawl 91, a hold pawl 92 is adapted to retain and hold the card carriage in its position. The hold pawl 92 has a lug 92', to which is connected the lower end of a wire 93. The upper end of the wire 93 is connected to a lug 94 on the

hub 95' of a weighted lever 95, which on its upper movement is adapted to disengage the pawls 92 and 91 from the rack 90.

In Figs. 6, 7, and 8 are shown a modified construction of the feed motion above described, for moving the blank card carriage 42. The feed pawl 91 has its hub 91' in this instance pivotally mounted on a stud 96, on the lower end of a downwardly extending arm 97, which has its hub 97' loosely mounted on a bolt 98 in the ears 19' on the frame 19. A roll 99 is mounted on the lower end of the arm 97, and is adapted to engage with and travel on a cam surface 100' on a reciprocating slide 100, to which is communicated an up and down movement by the operation of the cam 20 on the main driving shaft 3, and intermediate connections from said shaft to said slide. The slide 100 is in this instance suitably supported and guided on the portion 101 on the frame 19. A helically coiled contraction spring 102 Fig. 7 acts to yieldingly hold the roll 99 in engagement with the cam surface 100'. A second arm 103, which has its hub 103' mounted on the bolt 98, extends downwardly, and has a stud 104 on its lower end, which carries a roll 105; said roll 105 is adapted to engage the cam surface 100' on the reciprocating slide 100. A helically coiled contraction spring 106 Figs. 6 and 7, acts to hold the roll 105 in engagement with the cam surface 100''. An arm 103'' extends out from one side of the arm 103, and has a stud 107 thereon, on which is pivotally mounted the hub 92'' of the hold or retaining pawl 92.

The up and down movement of the slide 100, and the reciprocating cams 100' and 100'' thereon, causes an alternate movement to the arms 97 and 103, and the pawls 91 and 92 thereon. On the movement of the slide 100, as shown in Fig. 6, the roll 99 on the arm 97 engages the lower portion of the cam surface 100', and the feed pawl 91 moves backward in order to engage another tooth, while the hold pawl 92 on the arm 103, through the engagement of the roll 105, with the extended portion on the cam surface 100'' engages a tooth on the rack 90, and causes the card carriage 42 to be held against the pull of the weight 51. The downward movement of the slide 100 causes the roll 99 on the arm 97 to engage the extended portion of the cam surface 100', and the feed pawl 91 moves forwardly to engage a tooth on the rack 90, and move said rack forwardly a distance of one tooth, while the hold pawl 92 moves backwardly a less distance than one tooth, and therefore engages a tooth on the next forward movement.

The holes in the plates, and in the punches are shown in this instance in two rows, crosswise of the frame. The holes of one of the rows are not in the same horizontal plane lengthwise of the frame as the holes of the

other row, and corresponding keys 65 are also arranged in two rows longitudinally of the frame, but the machine described is equally well adapted to be used with a single row of holes and punches crosswise of the frame, to control the punches. The keys 65 may also be grouped in any convenient position other than that shown in the drawings, provided that they are located at one side of the movable blank card carriage 42, and have intermediate connections to the row of punches crosswise of the frame.

It will be understood that the details of construction of my improvements may be varied if desired.

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

1. In a card punching machine, a blank card carriage movable lengthwise of the frame, punch plates having one or more rows of holes crosswise of the frame, a row of punches for said holes, a row of keys arranged lengthwise of the frame, each punch having its cooperating key and pivoted dogs in inoperative position above said punches, and adapted to be made operative by said keys.

2. In a card punching machine, a blank card carriage movable lengthwise of the frame, a set of punch plates adapted for a row of punches crosswise of the frame, keys, at one side of the blank card carriage each punch having a cooperating key, dogs in inoperative position above the row of punches, and intermediate levers by which said dogs may be made operative.

3. In a card punching machine, a blank card carriage movable lengthwise of the frame, a die plate having a row of holes crosswise of the frame, a row of punches adapted for said holes, keys, at one side of the blank card carriage, each key being adapted to cooperate with an independent punch actuating dogs in inoperative position above the punches, and intermediate levers between the keys and actuating dogs.

4. In a card punching machine, a blank card carriage movable horizontally on the frame, a pattern card carriage movable with the blank card carriage, a vertically movable punch carriage having a limit bar with detector needles thereon above the pattern card carriage, with limiting heads above the bar, said needles adapted to cooperate with a punched pattern card on its carriage, to repeat similar holes on a blank card on its carriage.

5. In a card punching machine, a movable blank card supporting carriage having a toothed rack thereon, a set of punch plates, a series of punches above and across the movable blank card carriage, a series of keys at one side of said carriage, and parallel with its movement, means to move the

punches up and down intermittingly, with means including a lever moved by a cam, and a ratchet pawl carried on said lever to move said carriage forward during such intermitted movement.

6. In a card punching machine, having a blank card supporting carriage on the main frame, and a punch supporting frame, a series of punches on said supporting frame, crosswise above the card supporting carriage, means to move said punch supporting frame up and down intermittingly, means to move said card supporting carriage forward during such intermittent movement, an indicating pattern card carriage, connected and moving with the blank card carriage, a series of indicating needles above the punches, one for each punch, each needle composed of a primary and a secondary part, having between the two parts a pattern card carried on its carriage, means to raise the primary detector needles at each intermittent movement of the carriage above the pattern card, and then release the needles to contact with blank portions, and through punched portion of the pattern card, move the secondary needles.

7. In a card punching machine having means to repeat on a blank card the punching of a card, a set of indicating needles, each needle composed of a primary part, movable to and from a pattern card, and a secondary part on the opposite side of the pattern card, adapted to be moved from it by the primary part, when said pattern card has a punched hole moved into position under the primary part of the needle.

8. In a card punching machine having a longitudinally moving blank card carriage, and a set of die plates crosswise of the frame above the carriage, and a set of die plates for punch lace holes, and cylinder lug holes, in a blank card, actuating dogs for the punches having a horizontal arm projecting therefrom, and cams attached to the frame, to put said dogs in actuating position as the carriage moves the arm into contact with the cam.

9. In a card punching machine having a blank card carriage, two pawls, each carried on its pivoted arm, a reciprocating surface for each pawl, to move it, one surface operating alternately with the other, whereby one of the surfaces will act to move its pawl, to intermittingly engage a tooth to move a rack a step, and the other surface will act with less movement to its pawl, to cause it to engage a tooth and retain the rack in its most forward position before the first mentioned pawl leaves it to engage another tooth.

10. In a card punching machine, a blank card carriage having a toothed rack thereon, two pawls, each on a pivoted arm, two reciprocating cam surfaces, one surface to

move one pawl in one direction and engage a tooth of a rack, and move it forward in the other direction, and another surface to move the other pawl in one direction without engaging a tooth of the rack, and then
5 to move it in the other direction to engage and retain a tooth, against the action of a weight, in the opposite direction, during the time one pawl has released its tooth to engage another tooth.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents.
Washington, D. C."