

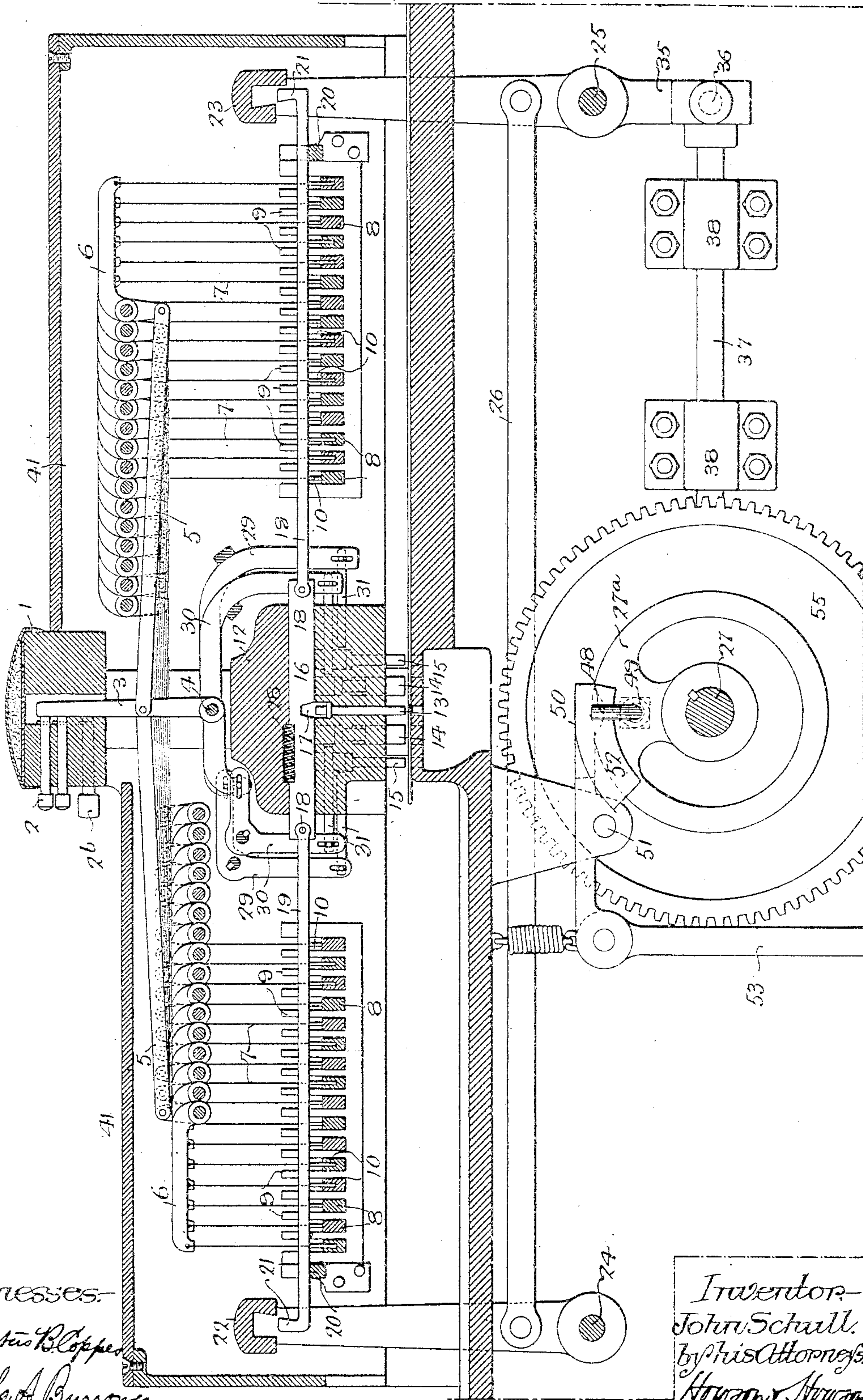
J. SCHULL,
JACQUARD CARD PUNCHING MACHINE,
APPLICATION FILED AUG. 8, 1908.

960,117.

Patented May 31, 1910.

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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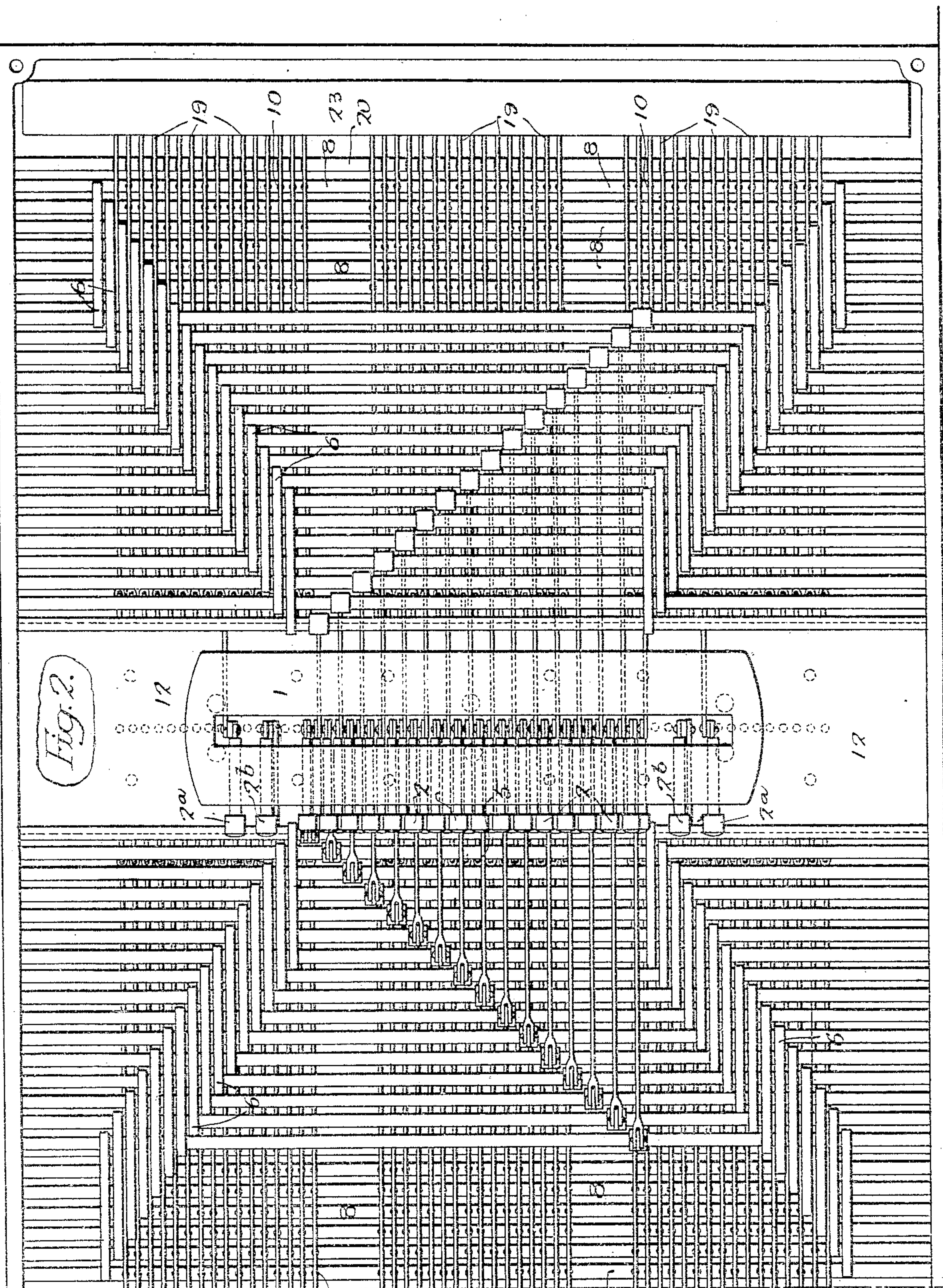
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John Schull.
by his Attorneys:
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5 SHEETS—SHEET 2.



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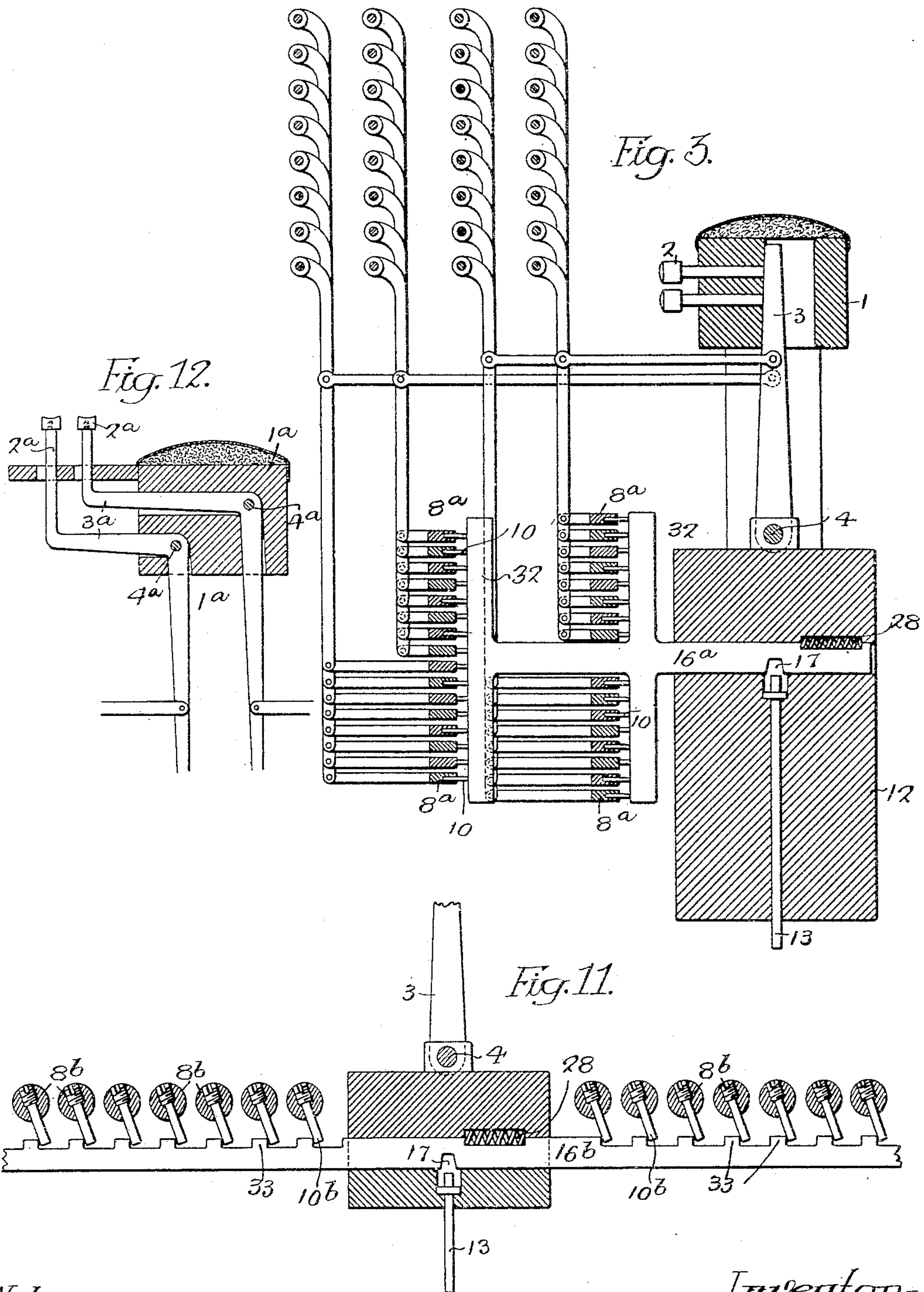
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5 SHEETS—SHEET 3.



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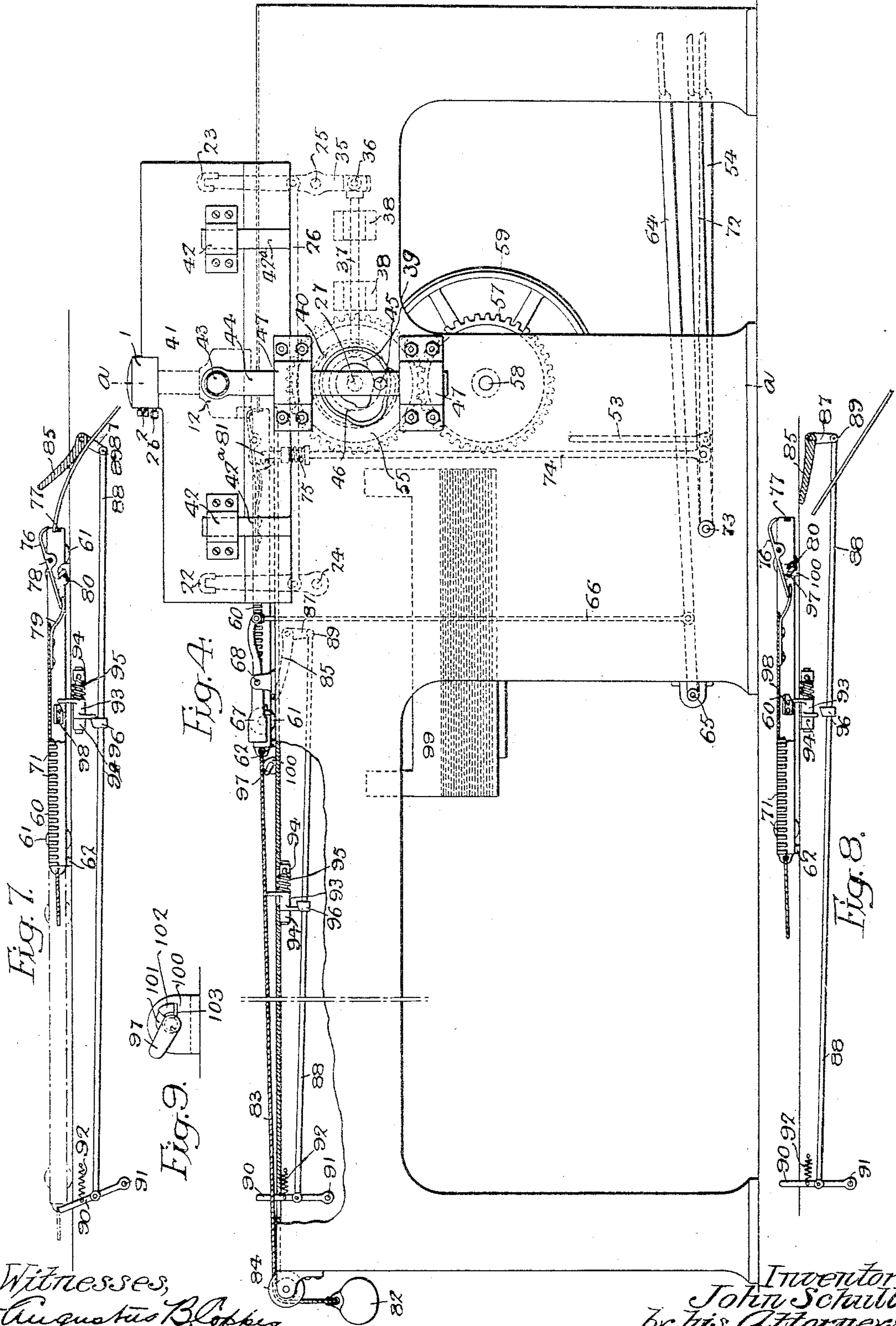
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5 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

JOHN SCHULL, OF PHILADELPHIA, PENNSYLVANIA.

JACQUARD-CARD-PUNCHING MACHINE.

960,117.

Specification of Letters Patent.

Patented May 31, 1910.

Application filed August 8, 1908. Serial No. 447,549.

To all whom it may concern:

Be it known that I, JOHN SCHULL, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Jacquard-Card-Punching Machines, of which the following is a specification.

My invention relates to means for cutting or punching jacquard cards; and the object of
10 my invention is to facilitate such operation by the use of automatic machinery, and also to provide a structure that will permit the cutting of a number of cards to reproduce the same design where the pattern or design
15 requires multiplication in order that a number of looms may be equipped with such cards; the cutting of a number of cards of a different design, or the cutting of a series of cards, each part of a different design, depending entirely upon the way the machine
20 is set. In the ordinary practice of cutting jacquard cards, the work has been principally done upon machines operated by hand and foot, and where the combination of
25 holes representing one color had to be formed by pressing several selecting keys, the process was not only laborious but absolutely dependent upon the skill of the operator in reading the colors of the design and
30 operating the respective keys to insure the punching of cards to effect the proper use of said colors. Each key of my apparatus controls one color.

My invention is fully shown in the accompanying drawings, in which:

Figure 1, is a sectional elevation of punching mechanism constructed in accordance with my invention; Fig. 2, is a plan view of the same; Fig. 3, is a sectional elevation
40 illustrating a modification of my invention; Fig. 4, is an elevation of mechanism with which my card punching mechanism is combined for automatically feeding the cards to such mechanism; Fig. 5, is a sectional elevation, taken on the line *a-a*, Fig. 4; Fig.
45 6, is a plan view of a part of the feeding mechanism illustrated in Fig. 4; Figs. 7, 8, 9 and 10, are views illustrating details of the card feeding mechanism; Fig. 11, is a
50 view illustrating a modified form of selective means for the card punching mechanism; Fig. 12, illustrates a modified form of key block, and Fig. 13, is a perspective view of a detail of my invention.

As noted above, the ordinary method of
55 punching cards is to provide a machine operated by hand, the respective keys of which are pressed by the operator in accordance with the color indicated on the design; certain keys representing certain colors, and
60 the use of such machine depends upon the skill of the operator in pressing the key corresponding with the proper color designed to be controlled by the card. In the use of my improved structure, I propose to do
65 away with the necessity of a high degree of skill and to operate the structure by means of selective mechanism that is set beforehand and hence is wholly accurate and positive in its action. 70

In the sectional elevation shown in Fig. 1, 1 represents a block carrying a series of keys 2, which keys are arranged to react upon levers 3 pivoted to a bar 4 and control, by means of links 5, a series of levers 6 which
75 operate a series of selectors. The selectors, which are operatively connected by cords 7 or other means to the levers 6, are indicated at 8, and consist of bars vertically movable in guides 9 at the side of the structure; said
80 bars having pins 10 set in recesses 11 formed in the upper side of the same, as shown in Fig. 13, the presence or absence of such pins in any selector bar determining the character of the punching operation controlled by the
85 same.

A punch head is indicated at 12, directly below the block 1; carrying a row of punches 13 for cutting the usual apertures of a card, and punches 14 and 15 for cutting the peg
90 holes and lace holes, respectively. In order that the desired punches may act upon the card when the punch head is depressed, slidable blades 16 are mounted in said punch head, and means are provided to bring these
95 blades into coactive relation with the punches so as to react upon the same and cause said punches to cut through the card when the punch head is depressed. The blades 16 are notched at 17, and when it is
100 desired to render any particular punch inactive, the blade controlling the same will remain in the mid position as shown in Fig. 1, so that when the punch contacts with the card it will rise into said notch instead of
105 passing through the card. Connected at 18 to each of said blades 16, are rods 19, resting upon cross-bars 20 at their ends, and over-

lying the rows of pins 10 or recesses 11 in the selector bars 8.

The pins 10 are previously set in the selector bars in accordance with the pattern desired and by pressing on one of the keys 2 one of said selector bars will be raised through the action of the mechanism just described. This will effect a lift of one or more of the rods 19 connected to the blades 16, the number raised corresponding to the number of coacting pins set in the bars 8, and said rods 19 will have their hooked ends 21 brought into engagement with the grooved griff bars 22 or 23, as the case may be, which griff bars are pivotally connected at 24 and 25, to the frame of the machine; being also connected together by a link 26 so as to be moved in unison.

The griff bars are operatively connected to a driving shaft 27 suitably journaled in the frame of the machine, and when the rods 19 have been raised by the pins of the selectors, said griff bars are actuated by said shaft 27 so as to move said rods 19 and bring the blades 16 directly over the punches. Upon the subsequent lowering of the head 12 said punches will cut through the card or cards. The selector bars when raised are normally maintained in such position by the operator until the punching operation is completed, and hence serve to hold the hooked ends of the rods 19 in engagement with the griff bars until the operator releases the keys controlling said selectors. Said selector bars will then return to their normal position, and the rods 19 will be restored to their normal position by springs 28 in the punch head as soon as the griff-bars are released.

The mechanism shown in Fig. 1, is provided with two sets of selector bars, thirty-two in all, arranged on both sides of the block 1 and punch head 12, to take care of all possible combinations of colors employed in the design; such bars being controlled by thirty-two keys. The machine as shown in the drawings is arranged to cut three cards, each of which may be of the same design, or it may cut three cards, each of a wholly different design, depending entirely upon the arrangement of the pins in the selector bars.

In addition to providing the cards with punch holes for the usual pattern, it is necessary, of course, to provide them with lacing holes and peg holes, and punches are provided in my improved structure for such purpose. The peg hole punches are clearly shown in Figs. 1 and 2; being indicated at 14, while the lacing hole punches are also shown therein and indicated at 15. In the operation of cutting cards, the lacing holes and peg holes will be cut in each card when the first and last row of holes of the design is cut, and in addition lacing holes will be cut in substantially the center of the card.

The peg hole and lacing punches are controlled in the same manner as the main punches for cutting the holes representing pattern or design, but by different keys and levers. The keys are indicated at 2^a and 2^b and engage certain of the levers 3. Connected to said levers 3 are bell-crank levers 29 and 30, arranged on both sides of the punch head; said bell-cranks being in operative engagement with pins 31 that may be moved into coöperative relationship with the punches 14 and 15, when said keys 2^a and 2^b are pressed by the operator.

My improved machine is capable of taking care of and punching a series of cards at one operation, and while Fig. 2, herewith, shows means for simultaneously punching three cards at a time, it will be understood that it may be arranged to cut any number of cards by duplicating the selector bars and the punches; all of said sets of selector bars being controlled by the one bank of keys carried in the block 1. The several keys controlling the selector bars 8, are operated in precisely the same manner as the keys of the ordinary piano machines. Each set or bank of selector bars may have their pins set for cutting the same design in each of the three cards, or each card of the series going through the machine may be punched differently than the others; it being possible to arrange the pins of the selector bars in any desired relation or position.

In Fig. 3, I have shown a series of horizontally movable selector bars 8^a, which may act directly upon sliding blades 16^a controlling the action of the punches; said blades having heads 32 for engagement by the pins 10. In Fig. 11, I have shown a series of selector bars 8^b arranged for rotative movement, and having pins 10^b which may engage teeth 33 carried by slidable blades 16^b, controlling the operation of the punches. These selectors will be operated by keys and coacting lever mechanism in the same manner as the structure shown in Figs. 1 and 2. In Fig. 12, I have shown a head 1^a for keys 2^a, in which such keys are vertically disposed and arranged to engage bell-crank levers 3^a pivoted at 4^a, the opposite end of said levers being operatively connected to the selector bar and punch controlling mechanism as in the structure shown in Figs. 1, 2 *et seq.*

With the machine forming the subject of my invention it is desirable to provide means for automatically feeding the cards through the same by a step-by-step motion into proper relation with respect to the punches, and also to carry the finished cards away from the punching mechanism, and for such purpose I provide the following means.

One of the arms carrying the griff-bar 23

has a depending portion 35, to which is pivoted at 36, a pair of rods or bars 37 arranged to slide in bearings 38 carried by the frame of the machine. The inner ends of these bars engage grooves 39 in cams 40; such cams being keyed to the shaft 27, and the engaging ends of said bars having rollers for contact with the groove. The key block, punch head and coöperative mechanism are disposed within a casing 41 which is vertically movable during the punching operation, and the upper portion of this casing has guides 42 to receive bars 42^a carried by the lower part, to insure registry of the mechanism.

Movement is imparted to the casing by the following means: Pivotaly connected at 43 to said casing, are bars 44 having pins 45 engaging grooves in cams 46 keyed to said shaft 27; said bars being guided by the housings 47. Keyed to said shaft 27 is a drum 27^a of clutch mechanism, having a hooked member 48 slidable within the same; a spring 49 tending at all times to draw the hooked end of said member toward the drum. Depending from the casing 41 is a shoe 50, pivoted at 51 to a bracket carried by said casing, and said shoe is provided with a cam 52. An operating rod 53 is connected to this shoe, the opposite end of the same being attached to a foot treadle 54 under the control of the operator.

A gear wheel 55 loosely mounted on the shaft 27, is provided with cam projections 56 for engagement with the end of the hooked member 48. Meshing with said wheel 55 is another wheel 57 keyed to a driving shaft 58, upon which is mounted a driving pulley 59. Fig. 5 shows the mechanism in the inactive position, with the wheel 55 revolving freely on the shaft 27. To start the mechanism, the operator presses down upon the foot treadle 54, which lowers the rod 53 and withdraws the cam 52 from the hooked member 48, permitting the latter to move in under the tension of the spring 49 and engage one of the cam projections 56 of the wheel 55, clutching the same and driving the shaft 27. The cams 40 react upon the rods 37 to cause the griff bars to move out and remain out, while the cams 46 operate to draw down the casing 41 and operate punching mechanism; continued movement of such cams causing said griff bars and punching mechanism to return to their normal positions.

As soon as the drum 27^a starts to revolve, the operator releases the foot lever 54 allowing the cam 52 to return to its normal position; then, as soon as one full revolution of said drum has taken place, said cam will operate to withdraw the hooked member, releasing the wheel 55 and stopping the shaft 27.

The cards to be cut are fed to the appa-

ratus by means of a carriage 60, which in the present instance is wide enough to carry three cards at a time. This carriage is mounted on wheels 61 and it is guided in its travel by depending lugs 62 engaging grooves 63 cut in the bed-plate of the machine. A foot lever 64 pivoted at 65 operates a rod 66 attached to a double ended lever 67 pivoted at 68. This lever is provided with a movable plate 69 and a fixed plate 70, which operate in a rack 71 on the carriage 60. It will thus be seen that said carriage may move the distance of one tooth of said rack equal to the distance between rows of holes to be punched in the cards, for every operation of said foot lever 64.

A foot treadle 72 pivoted at 73 controls a rod 74 hooked at its upper end, and a spring 75 tends to keep said rod 74 always in a raised position. The carriage 60 is provided with upper and lower jaws 76 and 77, the lower jaws being fixed, while the upper ones are pivoted at 78. Springs 79 tend to keep the jaws 76 pressing against the jaws 77 at all times. When the carriage 60 is in its innermost position, flanged projection 80 depending from the jaws 76 is directly under a hooked portion 81 of the rod 74. When in this position, if the foot treadle 72 is pressed, the hook on said rod 74 will pull on the flanged projection 80 and separate the jaws, and this is done when a new card is inserted. The carriage is moved by means of a weight 82, connected to a rope 83 passing over a pulley 84.

To deliver the punched cards a shutter trap 85 is pivoted at 86 directly below the upper surface of the bed plate, and this trap is provided with an arm 87 to which a rod 88 is attached at 89; such rod extending nearly to the end of the machine where it is connected to a trip lever 90, which is pivoted at 91, and extends through the upper surface of the bed plate. A spring 92 tends to keep the lever 90 in a vertical position. A double ended lever 93 is mounted in suitable bearings 94 on the frame, and a torsion spring 95 is connected therewith so as to normally keep the ends or arms of said lever in a vertical position, the upper one projecting through the bed plate of the machine, while the lower one is in engagement with a cam 96 fixed to the rod 88.

When the punching of a series of cards has been completed, the carriage is drawn by the weight 82 toward the rear of the bed plate, where it strikes the lever 90, which raises the shutter trap 85, and at the same time causes the cam 96 to be pulled from under the lower end of the lever 93, which immediately assumes a vertical position forming a stop to prevent the return to normal position of the shutter trap 85, after which the carriage may be moved back by hand.

When the carriage comes into engagement

with said lever 90, it still has the punched cards between its jaws, carrying the ends of the same past the trap 85, which at the time is down and flush with the upper surface of the bed plate. After the carriage engages said lever 90 said trap is raised and locked in its raised position by the lever 93 dropping behind the cam 96. As the carriage is returned, the cards strike said trap 85 and are deflected by the same through openings cut in the bed of the machine. Before the whole card has passed under the trap, the flanged projection 80 of the upper jaws 76 strikes a swivel spring cam 97 which turns on its pivot and opens said jaws; freeing the cards. Immediately after this action takes place, a cam 98 on the interior of the carriage 60 depresses the upwardly extending arm of the lever 93, which turns the lower end of the same out of the path of the cam 96, and the spring 92 returns the lever 90 to its normal position, which action causes the trap 85 to be closed; thus pressing the cards clear of the carriage.

A box 99 is arranged under the bed plate of the machine and this box is so positioned that when the trap 85 closes, the cards will fall and stack themselves in said box. The blank cards are fed singly at the forward end of the machine. The cam 97 is pivotally mounted in a pedestal 100 fixed to the bed plate of the machine and is provided with a projection 101 which normally abuts a projection 102 on said pedestal under tension of a torsion spring 103. It will thus be seen that the projections 80 of the jaws in passing toward the rear of the machine will strike the top of said cam 97, press it down and pass over it undisturbed, but as said jaws return, said projections will pass under and be pulled down by said cam.

I claim:

1. In jacquard card punching mechanism, the combination of a series of keys, a series of punches, slidable members coöperating with said punches, pivoted rods attached to said slidable members, means for raising said rods upon the operation of the keys, and means independent of the keys for moving said rods and slidable members longitudinally to bring the punches into action.

2. In jacquard card punching mechanism, the combination of a series of keys, a series of punches, slidable members coöperating with said punches, pivoted rods connected to the same, means for raising said rods by the action of the keys, said rods having hooked ends, means independent of the keys for engaging said hooked ends to move the rods and slidable members longitudinally to render the punches active, and means for depressing said punches.

3. In jacquard card punching mechanism, the combination of a block, a series of keys movable therein, a head, a series of punches

mounted therein, slidable members mounted in said head coöperating with said punches, pivoted rods connected to said slidable members, vertically movable selector bars controlled by said keys, means carried by said bars for coöperation with the pivoted rods whereby the bars may be actuated, and means for moving said rods and slidable members to render said punches active.

4. In jacquard card punching mechanism, the combination of a series of keys, a series of punches, slidable members coöperating with said punches, and means independent of the keys for moving said slidable members longitudinally upon the operation of the keys to render the punches active.

5. In a jacquard card punching machine, the combination of a series of punches, a series of selector bars, means for raising said selector bars by the operation of said keys, sliding members in line with said punches, pivoted bars connected to said sliding members and disposed for engagement by said selector bars, means for moving said pivoted bars and sliding members to render the punches active, and means for operating said punches.

6. In a jacquard card punching machine, the combination of a head, a series of keys therein, levers engaged by said keys, a series of punches, a series of selector bars, a second set of levers operated by the first set for raising said selector bars, sliding members for coaction with the punches whereby the latter may act, means independent of keys for moving said sliding members, and means for depressing the engaged punches.

7. In a jacquard card punching machine, the combination of a head, a series of keys movable therein, a series of levers extending into said head for engagement by the keys, a series of selector bars, a series of levers to which said selector bars are connected, a connection between said levers and the levers operated directly by the keys, a series of slidable members, punches arranged for coaction with said slidable members, rods pivoted to said slidable members and having hooked ends, and griffs for engagement with said hooked ends whereby when the pivoted rods are in the raised position they may be drawn by the griffs and bring their respective slidable members into position to co-act with certain punches and render the latter active.

8. In a jacquard card punching machine, the combination of a head, a series of keys therein, levers engaged by said keys, a series of selector bars, pins carried thereby, slidable members having pivoted portions to be raised by said pins, means for raising the selector bars to cause their pins to lift the pivoted portion of the slidable members, punches for coaction with said slidable members when the latter are moved, griffs for

moving said slidable members, and automatically operated mechanism for actuating said griffs.

5 9. In jacquard card punching mechanism, the combination of a series of keys, a series of punches, a series of selector bars, said bars being recessed, pins arranged in said
10 recesses to indicate the design, means for raising said selector bars by the operation of said keys, sliding members in line with said punches, rods pivoted to said sliding members for engagement by the pins of said selector bars, means for moving said pivoted rods and sliding members so as to place
15 the punches in operative position, and means for operating said punches.

10. In a jacquard card punching machine, the combination of a head, a series of keys therein, levers engaged by said keys, a series
20 of punches, a series of selector bars, said bars being recessed, pins arranged in said recesses to indicate the design, a second set of levers operated by the first set for raising said selector bars, sliding members for co-
25 action with the punches whereby the latter may act, bars pivoted to the sliding members, means for moving said pivoted bars after engagement by said pins, and means for depressing the engaged punches.

30 11. In a jacquard card punching machine, the combination of a head, a series of keys movable therein, a series of levers extending into said head for engagement by the keys, a series of selector bars, said bars be-
35 ing recessed, pins arranged in said recesses to indicate the design, a series of levers to which said selector bars are connected, a connection between said levers and the levers operated directly by the keys, a series of
40 slidable members having pivoted portions movable by said pins, punches arranged for coaction with said slidable members, said pivoted portions of the slidable members having hooked ends, and griffs for engage-
45 ment with said hooked ends whereby the pivoted portions of the slidable members when in the raised position may be drawn by the griffs and thereby move the slidable members into position to render certain
50 punches active.

12. In jacquard card punching mechanism, the combination of a head, a series of keys therein, levers engaged by said keys, a series of selector bars, removable pins car-
55 ried thereby to indicate the design, slidable members having pivoted portions to be raised by said pins, means for raising the selector bars to cause their pins to lift the pivoted portions of the slidable members,
60 punches for coaction with said slidable members when the latter are moved, griffs for moving said pivoted portions with the slidable members, mechanism for actuating said griffs, and means for actuating the punches.

65 13. In jacquard card punching mechanism,

the combination of a series of punches, a series of keys controlling said punches, and mechanism for rendering all or any of said punches active, said mechanism including bars having punch selecting means, 70 said latter means being adjustable and removable and controlling the pattern when actuated by said keys.

14. In jacquard card punching mechanism, a series of punches, bars having remov- 75 able selective means to render any or all of said punches active, and means for actuating said bars.

15. In jacquard card punching mechanism, a series of keys, a series of punches, 80 slidable members arranged to render any or all of said punches active, mechanism controlled by the keys to place said slidable members in an operative position, and means independent of the keys for moving said 85 slidable members into position to render the punches active.

16. In jacquard card punching mechanism, a series of punches, a series of keys, and means controlled by said keys for render- 90 ing any or all of said punches active, said means including bars having adjustable selectors controlling the means for rendering said punches active.

17. In jacquard card punching mechanism, a series of keys, a series of levers actu- 95 ated by said keys, selector bars operated by said levers, and punches controlled by said selector bars and rendered active through the operation of the same, said bars having 100 adjustable means regulating the action of said punches.

18. In jacquard card punching mechanism, the combination of a series of punches, 105 slidable members for rendering the same active or inactive, adjustable means controlling the movement of said slidable members, keys for actuating said adjustable means, means for actuating the punches, and means 110 for feeding cards thereto.

19. In jacquard card punching mechanism, the combination of a series of punches, 115 slidable members for rendering the same active or inactive, adjustable selective means controlling the movement of said slidable members, means for moving said members to place any or all of said punches in the active position, means for actuating the punches, and automatically operated means 120 for feeding cards thereto.

20. In jacquard card punching mechanism, means for punching the cards, a carriage for feeding the cards past the punch- 125 ing point, a receptacle to receive the cards, a trap door closing said receptacle, a lever, a rod connected to said trap door and lever whereby upon the operation of said lever the trap door may be opened, and a cam for releasing said rod when acted upon by the 130

carriage, the latter engaging said lever at the end of its rearward travel.

21. In jacquard card punching mechanism, a series of punches, selective means
5 therefor, automatic means for operating said punches, automatic means for placing the punches in the active position, and treadles for controlling the operation of said automatic means.

In testimony whereof, I have signed my 10 name to this specification, in the presence of two subscribing witnesses.

JOHN SCHULL.

Witnesses:

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JOS. H. KLEIN.