

Nov. 6, 1923.

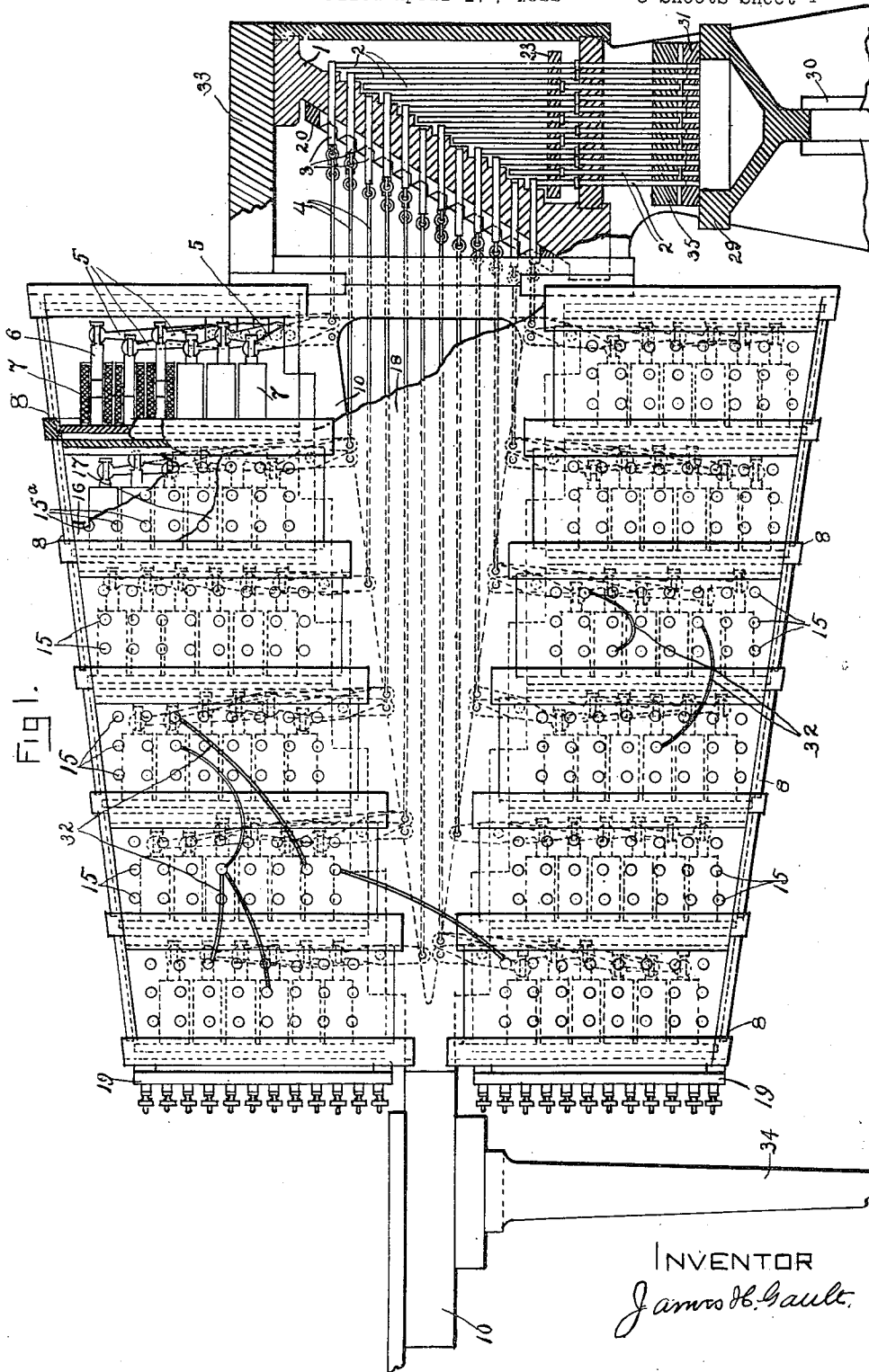
J. H. GAULT

1,472,829

CARD PERFORATING MACHINE

Filed April 17, 1922

3 Sheets-Sheet 1



INVENTOR

James H. Gault.

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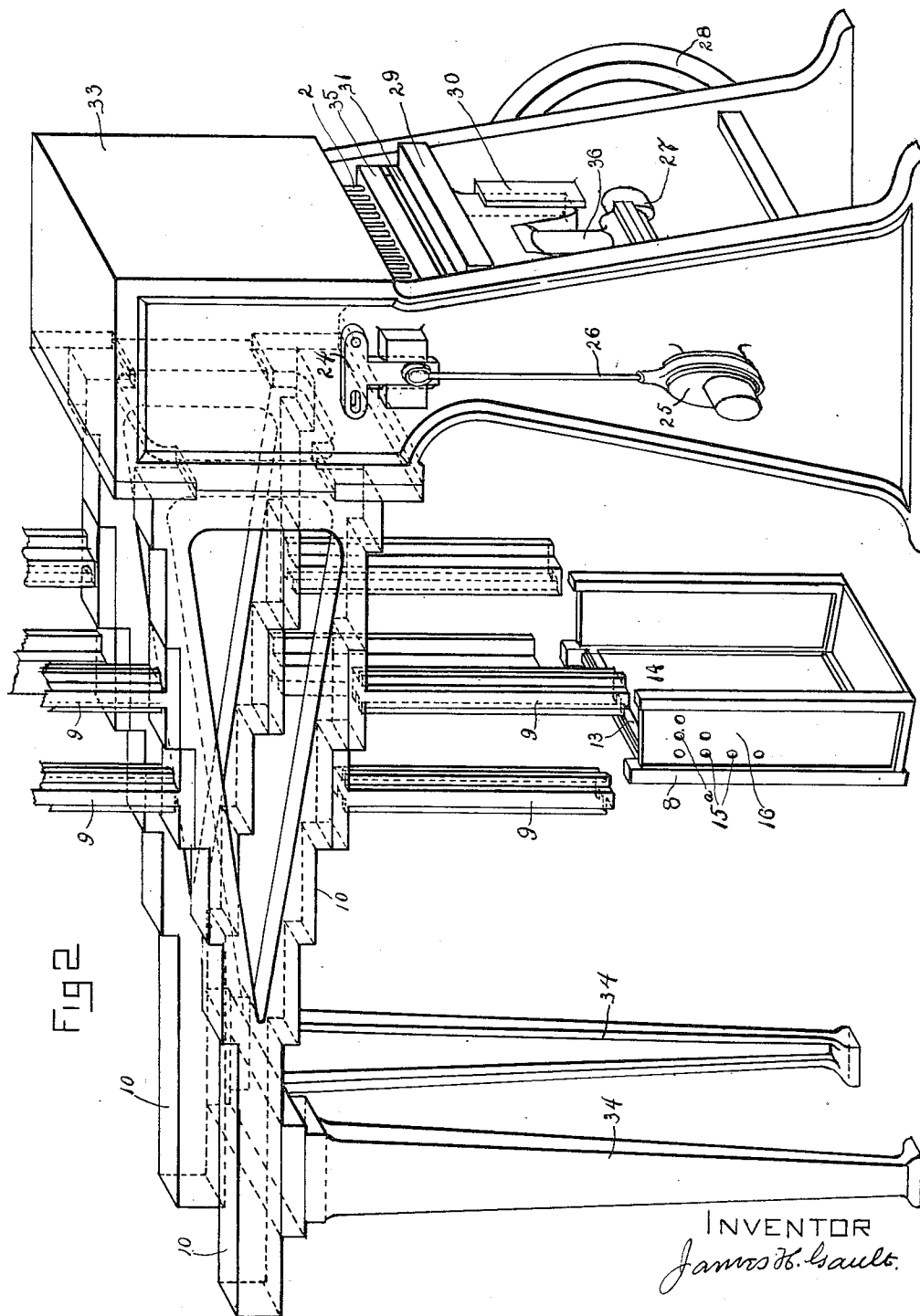
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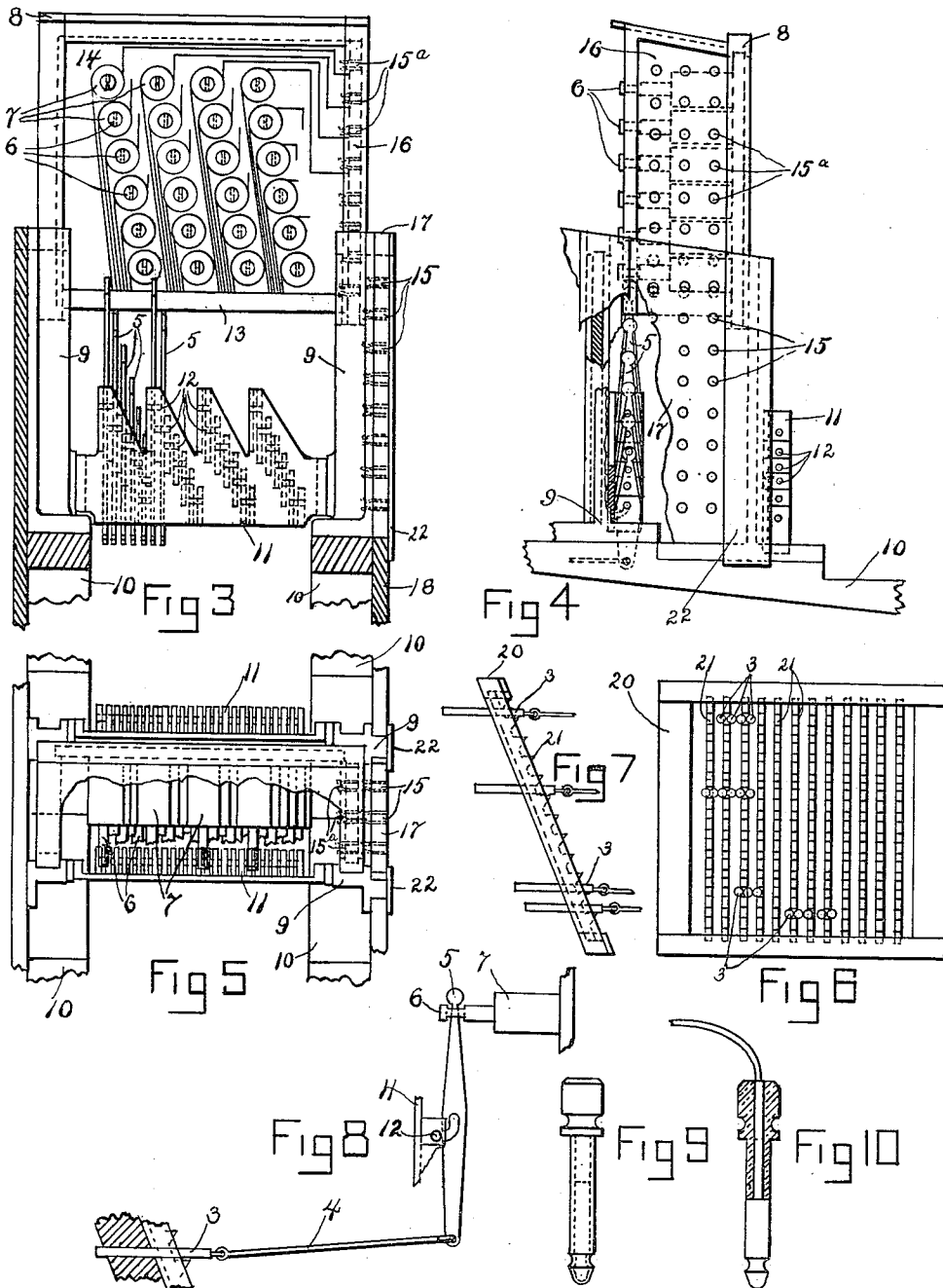
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3 Sheets-Sheet 3



INVENTOR
James H. Gault

UNITED STATES PATENT OFFICE.

JAMES H. GAULT, OF PHILADELPHIA, PENNSYLVANIA.

CARD-PERFORATING MACHINE.

Application filed April 17, 1922. Serial No. 553,356.

To all whom it may concern:

Be it known that I, JAMES H. GAULT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Card-Perforating Machines, of which the following is a specification.

The invention relates to machines for making a plurality of perforations in a card or other blank and is a preferable embodiment of the principles of my former invention as set forth in my application No. 387,596, filed June 9, 1920 and at present pending. The embodiment herein set forth embraces the same principles but possesses many new and ingenious structural features which experiment and investigation have shown to be of great practical and economical value by simplifying construction and operation and increasing accessibility of parts. It is these structural improvements together with certain other original features correlated with them that I desire to protect.

Specifically the objects of the present invention are: to provide means for connecting the magnets-armatures, levers and keys in such a way as to allow for a compact and accessible design of machine, to provide means for mounting each gang of magnets in a separate sliding drawer so that it may be removed from the machine in the easiest possible manner, thus greatly promoting accessibility, to provide certain peculiarities of electric wiring correlated with the aforementioned improvements, to provide means for supporting the levers so that they may remain in position when their controlling magnets are removed from the machine, to provide means for simply and easily reconnecting levers and armatures when magnets are returned to machine after removal, to provide means for easily removing intact the entire wiring system from the main body of the machine when desirable, thus making repairs very easy as well as forming a very economical original design, to provide means for shifting the control from any given magnet to any other magnet or magnets, to provide means for rendering any magnet or magnets inoperative, to provide means for withdrawing the keys from the locking position after each perforation.

A practical embodiment of my invention is represented in the accompanying drawings in which Figure 1 is a side view of the

machine partly in section. Figure 2 is a perspective view of a general outline of the skeleton structure of the machine but showing the grooved standards of only one section or bay. The others which are mere repetitions being removed for clearness. Figure 3, Figure 4 and Figure 5 are front, side and plan views respectively of one section of the machine consisting of one of the compartments or bays embracing a drawer containing a complete group of magnets, said drawer being shown partly withdrawn out of the normal position in its slide or support. These three views fully illustrate in detail the method of grouping and wiring the magnets as well as that of supporting the levers. Figure 6 and Figure 7 are a front and edge elevation, respectively, of the grid frame for withdrawing the keys to unlock the punchers after each perforation. Figure 8 shows a locking key, its lever connecting rod and controlling magnet and illustrates the action of connecting or threading the lever through the armature. Figure 9 shows on a larger scale one of the plugs for completing the circuit on the switch board. Figure 10 also on a larger scale shows a special form of plug which under certain requirements is useful for jumping the control from one magnet to another. Similar characters of reference indicate corresponding parts throughout the different figures of the drawing.

In Figure 1 the punch head 1 supports the gang of punchers 2, together with the locking keys 3, said keys being controlled through the medium of key rods 4 and levers 5 by the magnets 7, the circular headed end of each lever 5 fitting easily into a suitable slot or eye in its particular armature 6. These magnets are mounted in groups or gangs in drawers 8, which are slidable in grooves formed in the standards 9 which support them, as is shown in Figure 2, Figure 3, Figure 4 and Figure 5. Each group of magnets being connected with and controlling the keys of its particular horizontal layer of keys 3, as illustrated. The foremost upper compartment as shown in Figure 1 contains the magnets controlling the upper layer of keys 3, while the foremost lower compartment vertically beneath controls the lowest layer of keys. The second upper drawer 8 holds the magnets controlling the second highest row of keys 3, and the drawer vertically beneath it

contains the magnet controlling the second lowest layer of keys 3, and so on back for the succeeding groups of magnets, the upper row of groups converging towards the lower row. The step formed side beams 10, Figure 2, each step of which supports a standard 9, shows this convergence towards the rear of the machine, the vertical distance of each step being equal to the distance between any two successive layers of keys 3. By this plan of construction the advantage of having each set of levers 5 a duplicate of every other set is secured, the danger of any lever interfering with the rod controlled by any other lever is avoided, and compactness of design is also obtained. In Figure 2 it is seen that the entire system of magnets is supported upon a pair of parallel beams 10 secured at the front to the punching press 33 and at the rear resting on a pair of legs 34, this construction allowing perfect accessibility to the drawers 8 and plenty of space to remove them from the machine.

In Figure 3, Figure 4 and Figure 5 is shown a method of mounting the levers 5 on the lever supports 11 which extend across, between and are secured to each corresponding pair of standards 9. The slots between the projecting guides on 11 being suitably spaced to bring the levers 5 in alignment with the slots or eyes in the armature 6, the pivots 12 in the guides being suitably located so that all the various lengthed levers in the set have the same throw, while the guides are of sufficient dimensions to maintain the levers in correct alignment.

In Figure 3 is also shown the method of wiring the magnets in their containing drawers, so that the latter may be readily withdrawn from the machine. Each set of magnets is mounted on the division of its compartment which separates it from the other compartments. This division should be a panel 14 of wood or other non-conducting material held in a metal frame 13, one end of the winding of each magnet is connected to this conducting frame as shown in Figure 3, and the other end carried over to and connected with a contact piece or terminal 15^a, located in a hole in one side 16 of the drawer 8. This side 16 must be of non-conducting material and contains as many holes, each fitted with electrical contact means 15^a as there are magnets in the drawer. One end of the winding of a magnet is connected to each contact 15^a.

When the drawer 8 is completely home in its normal position in the ways of standards 9, the contact holes 15^a are exactly in line with a similar set of contact holes 15, in a non-conducting panel 17, loosely fitted in recesses in standards 9, so that contact "plugs" as shown in Figures 9 and 10 enlarged, may be inserted through these contact holes to close a circuit through them. The contact

holes 15 in panels 17 are connected each with a conducting wire, said wires passing along the inside of said panel to the middle of the side or cover 18 of the key rod space where they are twisted together into a cable and attached to 18 and carried horizontally rearward along the middle of 18 until they reach and are properly distributed among the individuals of the groups of binding posts 19 at the rear of the machine. These panels 17 are held loosely in position, (a floating fit), by cleats 22 or other suitable means, the end and side looseness in fit being to allow either a pair of removable dowel pins or the "plugs" themselves to bring the holes 15 and 15^a into alignment, if necessary.

If it is desired to remove the wiring system intact from the machine the panels 17, side 18 and post groups 19 may all be held in their proper relative positions during and after removal by means of an auxiliary frame or "cradle", and after the necessary disconnections, may be removed as a whole from the machine, when the intact wiring system will be in plain view and very accessible condition.

Figure 6 and Figure 7 show the grid device for withdrawing the keys 3 from the locking position. It is also shown in its proper position, in Figure 1, located on the back of the punch head 1, where it is capable of oscillating up and down in its inclined position. This device consists of a frame 20 supporting in proper position a series of serrated bars; each of these bars 21 acts on two adjacent vertical rows of keys 3, each key having a recess milled half way through it so that there is a head or edge on the key that may engage with one of the inclined planes or serrated faces on the bars 21. When the keys 3 are in their normal or unlocked position the grid has no effect on them, but when pushed forward into the locked position, the edge of the recess in the key is pushed up against the lower face of one of the inclined planes or serrations on the bar 21, so that when the frame 20 next carries down the bar the serration acting on the edge of the key head withdraws the keys to the unlocked position.

The grid frame 20 and the plate 23, Figure 1, for restoring the punches 2 to their normal position are operated simultaneously through the medium of the slide 24, Figure 2, which is actuated through an eccentric or cam 25 and connecting rod 26 mounted on the crank shaft 27, driven by a pulley 28. This same crank shaft, by means of a connecting rod 36, oscillates the ram 29 up and down in the ways 30 to carry the die 31 up against the punches to perforate the cards.

When it is desired to operate all the magnets, "plugs," Figure 9, must be placed in each of the holes 15, thus bridging the space between 15 and 15^a and continuing the cir-

cuit between the wiring in the drawers 8 and the part of the circuit outside the compartment. If it is desired to leave any magnet or number of magnets inoperative, the "plugs" corresponding to these magnets must be withdrawn from the machine. These "plugs" may be either solid or made of tubing, or drawn from thin sheet metal and be fitted with non-conducting handles as indicated in Figure 9.

When it is desired to jump the circuit normally controlling any given magnet to any other magnet or magnets, two or more "plugs" are connected by flexible conductors as illustrated by 32, Figure 1. Two or more "plugs" thus connected by flexible conductors are called "jumpers." If it is desired in any given case to cut out the magnet normally controlled by any given hole 15 while jumping its regularly controlling circuit to other magnets, the jumper "plug" placed in the given hole should not be inserted in 15 deep enough to reach through to 15^a. If it is desired to shift the control from any hole 15 to another hole or holes so that the hole shifted from shall be the sole control and the circuits normally controlling the holes jumped to, shall be cut off, then the "plugs" of the jumper inserted in the holes jumped to should be of the special form shown in Figure 10, where the "plug" is of such form as to be insulated where it makes contact with 15 as it passes through to 15^a, but makes electrical contact with the latter and carries the current through the center of the insulated part from the flexible conductor, as indicated.

When it is necessary for any reason to remove any gang or group of magnets from the machine, all that is necessary is to pull out all of its corresponding "plugs" a sufficient distance to clear its side 16, and then to remove it from the machine like a vertical drawer. To replace it all of the armatures 6 should be pushed into their magnets as far as they will go, while all the corresponding levers 5 should be pushed back to their normal (vertical) position, so that when the drawer is replaced the armatures 50 and levers will clear each other during the movement; then each lever 5 is lifted from its pivot 12, carried down under its particular armature 6, inserted in the eye or slot of the armature, as shown in Figure 8, and replaced on its pivot. The ends of drawers 8 should be easily removable to allow access for this re-connection of armatures and levers.

In the present embodiment of my invention no means of automatically feeding either the master or blank cards is indicated, nor is there any provision here shown for the controlling contact points which are acted upon at the rear of the machine by the master cards, as the improvements I

wish to protect do not involve any of these features and their introduction was not necessary to illustrate these improvements. It is evident that the machine as shown is capable of having applied to it either the feeding and contact means shown in my original invention hereinbefore mentioned, or in fact, any of the numerous card-feeding and contact-making means now in general use which may vary according to the particular phase of the art in which the machine is to be employed. In cases where contact means are of suitable type and where it is not desired to frequently change from one contact means to another, the binding posts 19 may be omitted, the wires passing through and being held directly in the contact device.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a card punching machine the combination of a gang of punches and cooperating perforating mechanism, keys for locking the punches, a plurality of groups of electro-magnets, each group being specially mounted in a removable drawer, a plurality of similar groups of levers, means for mounting and pivoting said levers, a plurality of sets of connecting rods, each set corresponding to a group of levers and keys, means for easily connecting said levers to armatures of said magnets, electric wiring means specially adapted for easy removal of magnets, all substantially as specified.

2. In a card punching machine the combination of a gang of punches and cooperating perforating mechanism, means for individually locking said punches in operative condition, a plurality of groups of electro-magnets for actuating the locking means, each group of magnets being mounted in a removable drawer suitably supported in a bay or compartment, means for grouping said bays or compartments in the most compact and accessible form, electric circuit means adapted to easy removal or insertion of magnet-holding drawers, means for shifting or jumping the control of any magnet from one circuit to any other circuit, means for cutting out or rendering any magnet or magnets inoperative, all substantially as described.

3. In a card punching machine, the combination of a gang of punches, a plurality of keys for locking the punches in operative condition individually, a plurality of groups of levers, each group being similar to every other group, a plurality of sets of connecting rods, the rods of each set being of equal length but differing from the length of any other set, a plurality of groups of electro-magnets each so mounted and arranged as to be easily withdrawn from the machine, means for supporting said groups so as to allow their easy removal, means for sup-

porting the levers so they may remain in position when their controlling magnets are removed, means for easily connecting the levers with the magnets, electric wiring
 5 means conforming to the condition of easy removal of the magnets from the machine, means for unlocking punches, all substantially as specified.

4. In a card punching machine, the combination of a gang of punches with cooperating punching mechanism, means for locking the punches, means for unlocking the punches, a plurality of similar groups of magnets for actuating the locking means,
 10 means for easily removing the groups of magnets, means for supporting and arranging the groups of magnets in the most compact and accessible form, electric wiring means suitable for the quick and easy removal of groups of magnets, means for
 20 shifting or jumping the control of any magnet from one circuit to another, means for adding one or more magnets to any circuit, means for rendering any magnet or magnets inoperative, all substantially as described.

5. In a card perforating machine the combination of a gang of punches, a plurality of keys for locking the punches in operative
 30 condition individually, a plurality of groups of levers, each group being similar to every

other group, a plurality of sets of connecting rods, the rods of any set being all of the same length, but the lengths of the various sets being different from each other, a
 35 plurality of groups of electro-magnets, each group being mounted removably in a separate bay or compartment, standards supporting said groups in proper operative position and in such manner as to allow their
 40 easy removal from the machine, means for supporting and pivoting levers so that they may remain undisturbed in operative position when their controlling magnets are removed, means for reconnecting the levers
 45 with their armatures when the magnets are returned, electric wiring means conforming to condition of easy removal of magnets, means for supporting the standards and entire electric system between the
 50 punching head and rear support, means for withdrawing the keys from a locking position, means for cutting out or rendering inoperative any magnet or a group of magnets, means for jumping or shifting a circuit
 55 from any given magnet to any other magnet, means for removing the entire wiring system intact from the machine, all substantially as specified.

In testimony whereof I affix my signature.

JAMES H. GAULT.