J. R. PEIRCE.

SORTING MACHINE.

APPLICATION FILED JULY 27, 1911.

1,219,767.

Patented Mar. 20, 1917.

11 SHEETS—SHEET 1.

Fig 15

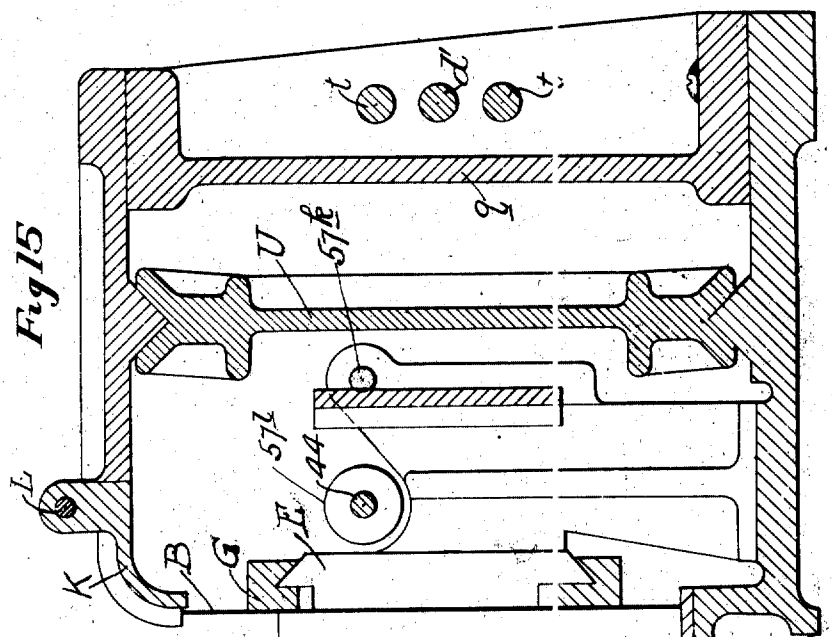


Fig 17

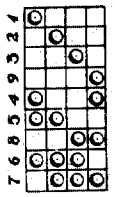


Fig 16

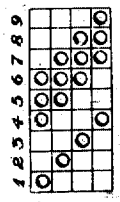
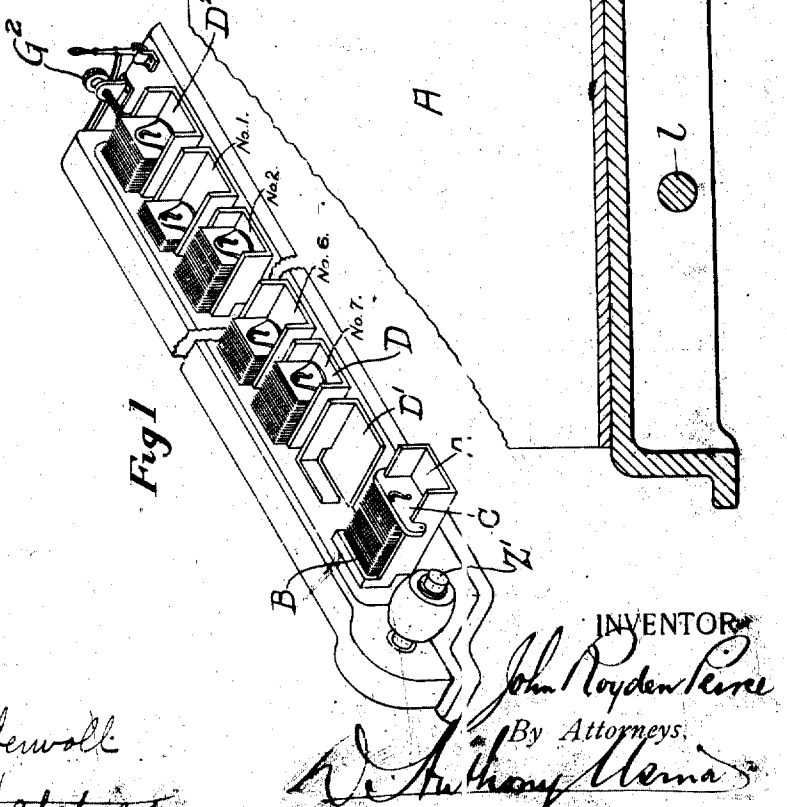


Fig 1



INVENTOR:

John Royden Peirce

By Attorneys,

Wm. Anthony Mann & Co.

WITNESSES:

Lulu Stubenvoll

Kenneth Hazlett

J. R. PEIRCE.

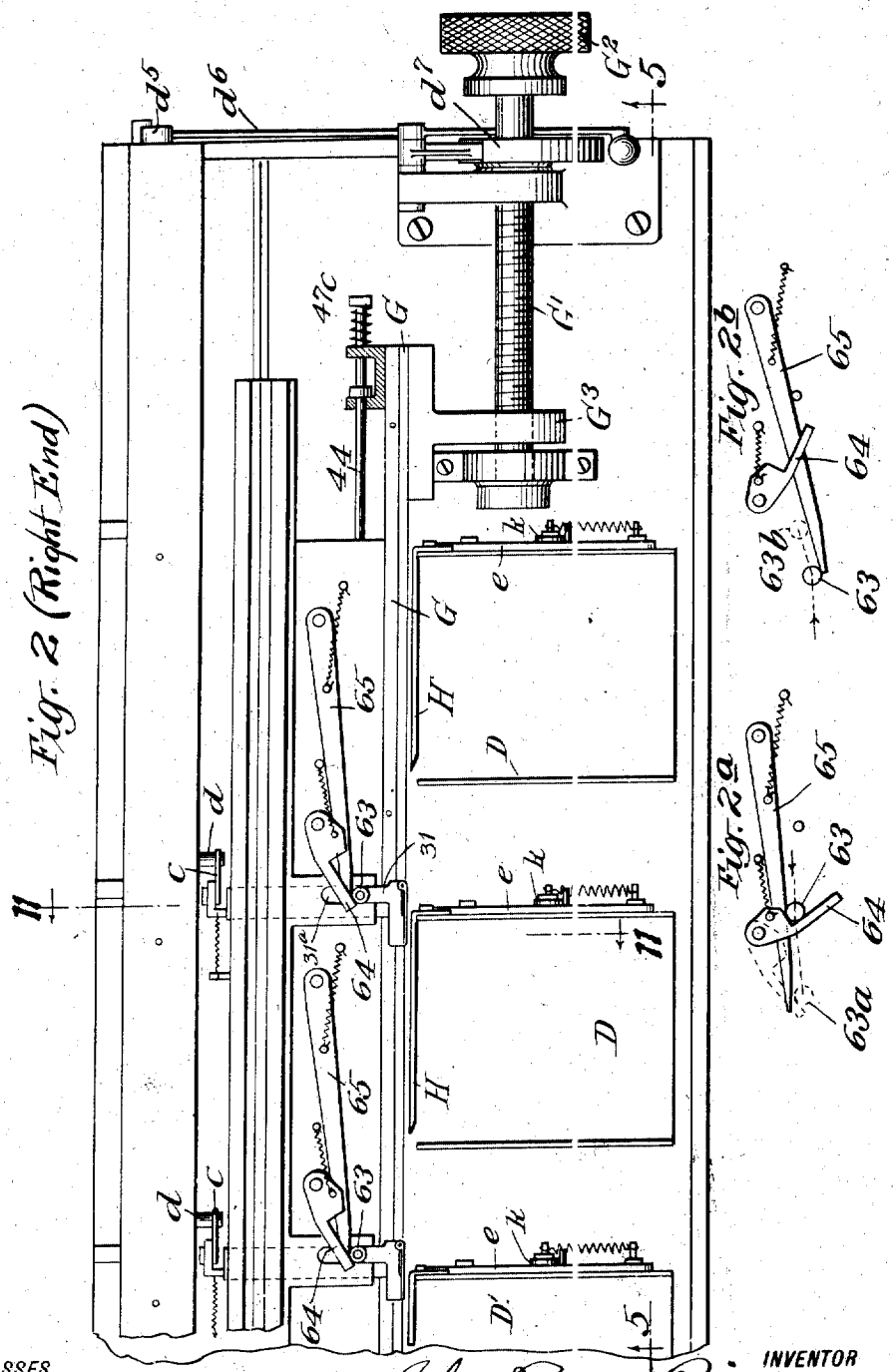
SORTING MACHINE.

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Patented Mar. 20, 1917.

11 SHEETS—SHEET 2.



WITNESSES

William K. Seewagen

Lulu Stubenvoll

INVENTOR

John Royden Peirce

BY

D. Anthony Elsea

ATTORNEY

J. R. PEIRCE.

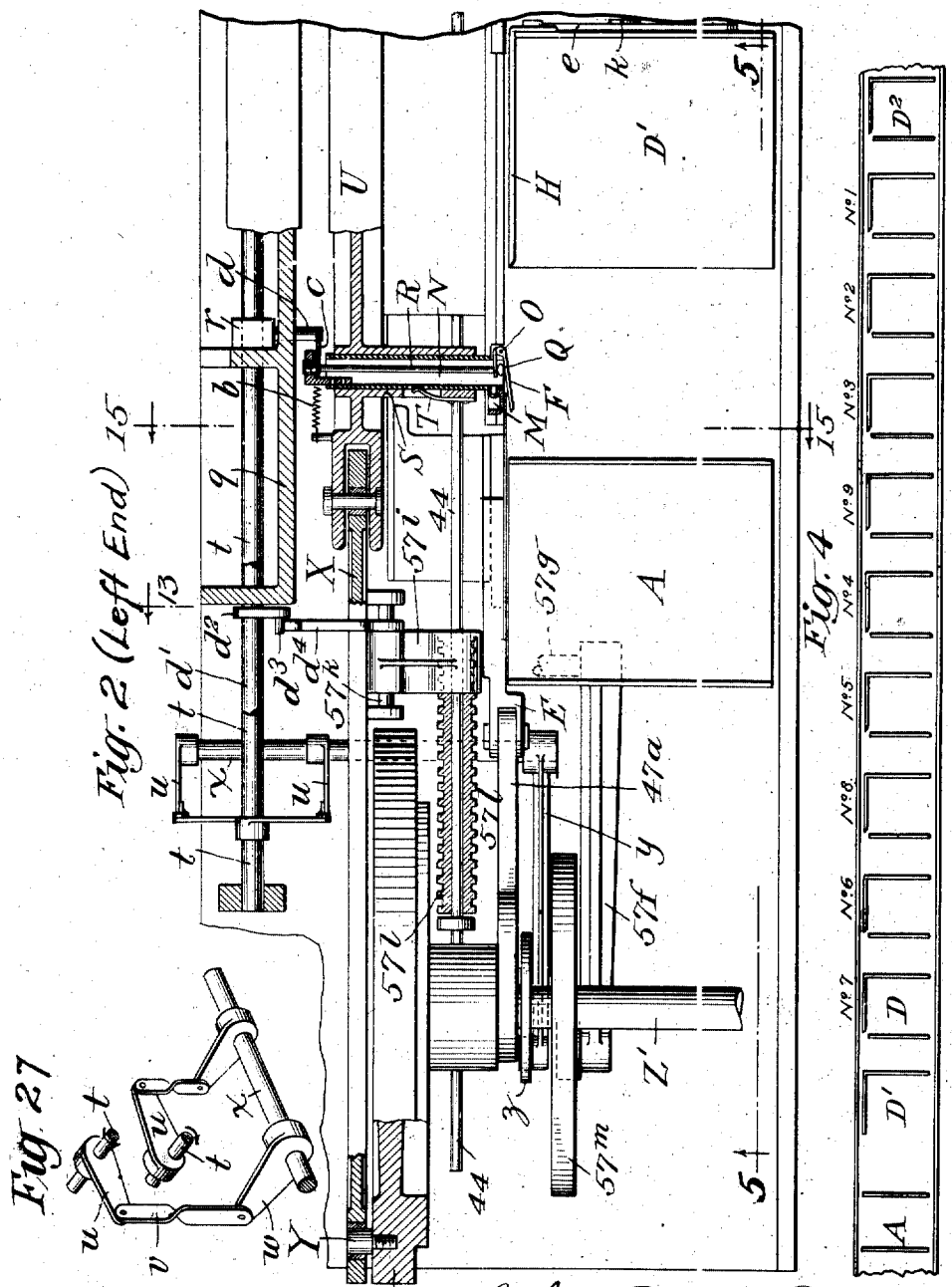
SORTING MACHINE.

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1,219,767.

Patented Mar. 20, 1917.

11 SHEETS—SHEET 3.



WITNESSES

William K. Brewagen

Lulu Stubenvoll

INVENTOR

John Royden Peirce

BY

W. Anthony Kuna

ATTORNEY

J. R. PEIRCE.

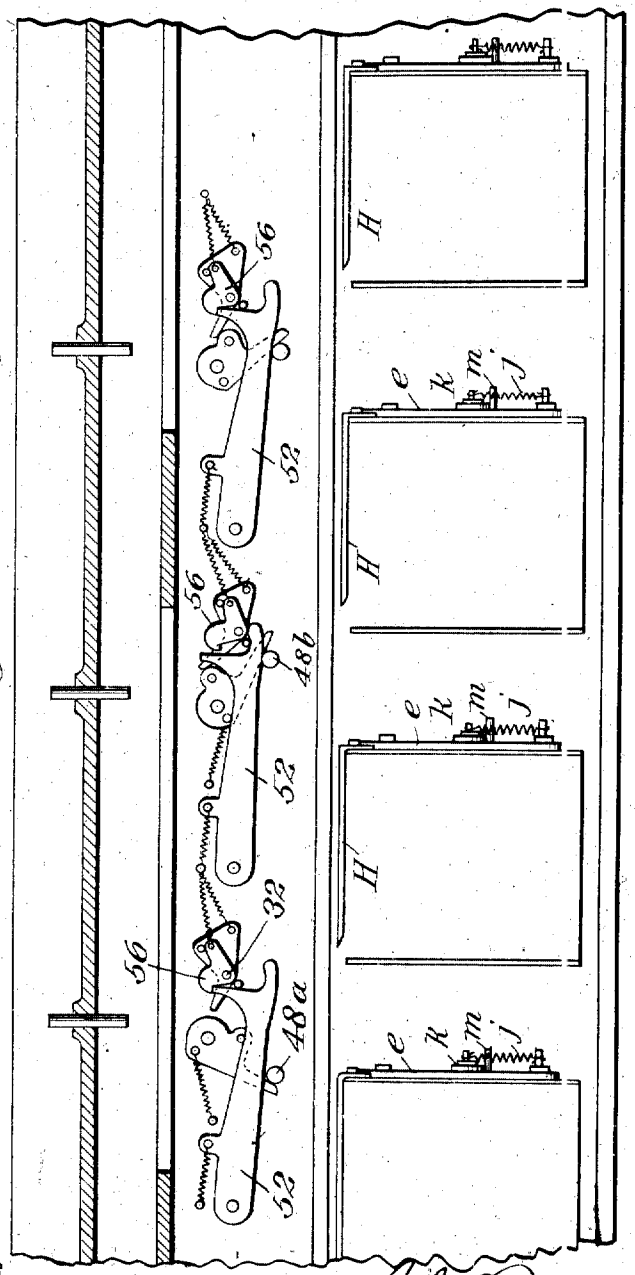
SORTING MACHINE.

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1,219,767. Patented Mar. 20, 1917.

11 SHEETS—SHEET 4.

Fig. 3



WITNESSES

William K. Seewagen

Lulu Stubenvoll

INVENTOR

John Royden Peirce

BY

W. Anthony Usina

ATTORNEY

J. R. PEIRCE.

SORTING MACHINE.

APPLICATION FILED JULY 27, 1911.

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11 SHEETS—SHEET 5.

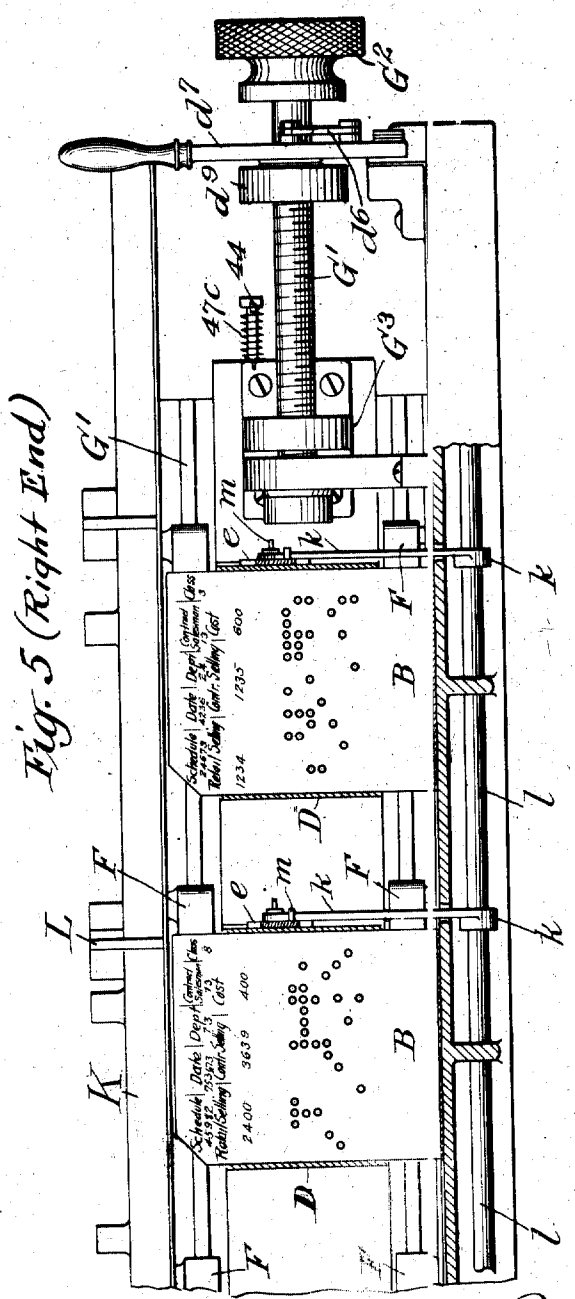


Fig. 5 (Right End)

WITNESSES

William K. Seewagen

Julia Stubenvoll

John Royden Peirce, INVENTOR

BY

W. Anthony Mena ATTORNEY

J. R. PEIRCE.

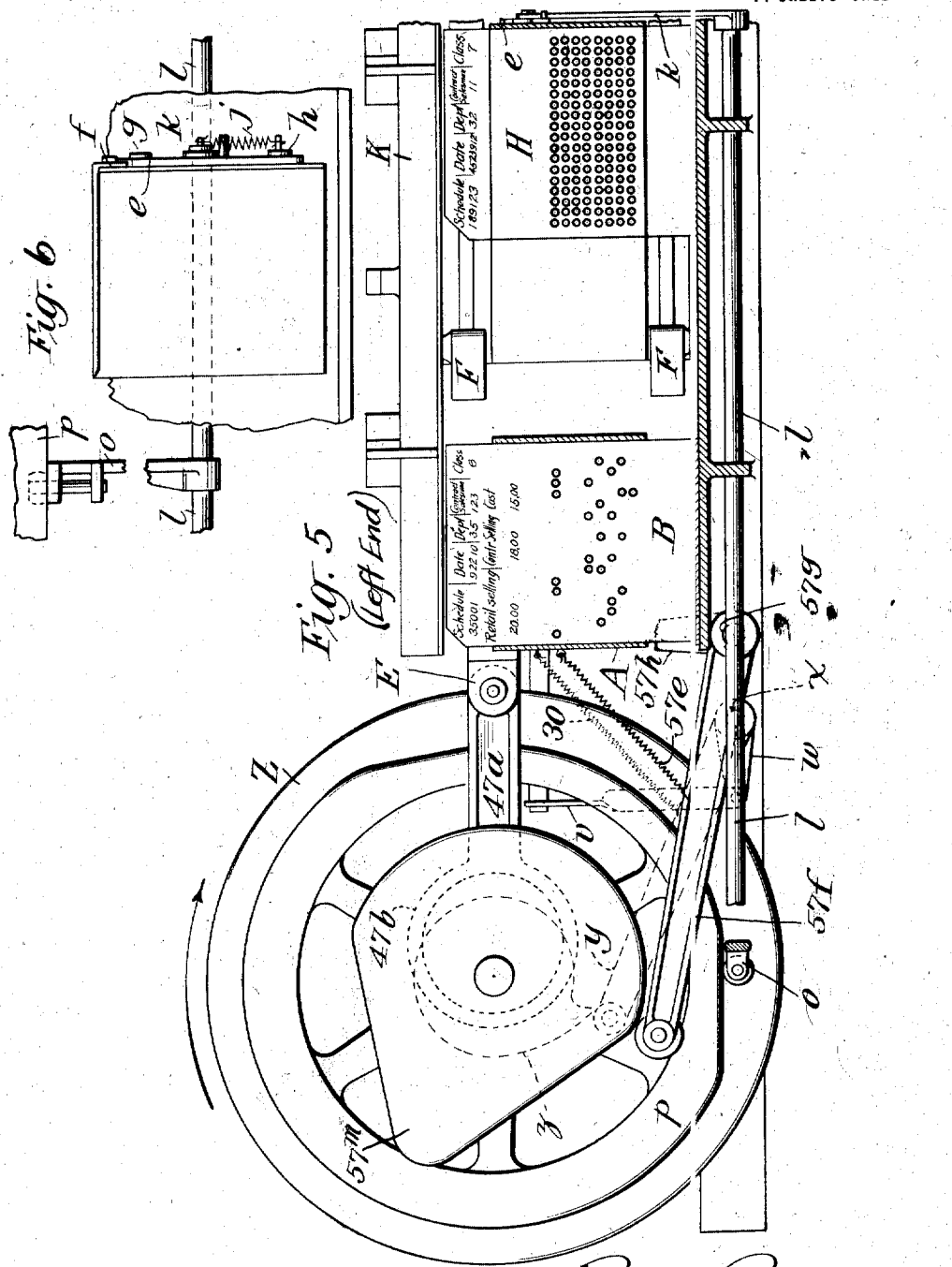
SORTING MACHINE.

APPLICATION FILED JULY 27, 1911.

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Patented Mar. 20, 1917.

11 SHEETS—SHEET 6.



WITNESSES

William H. Beenagen

Lulu Stubenvoll

INVENTOR

John Royden Peirce

BY

W. Anthony Visina

ATTORNEY

J. R. PEIRCE.

SORTING MACHINE.

APPLICATION FILED JULY 27, 1911.

1,219,767.

Patented Mar. 20, 1917.

11 SHEETS—SHEET 7.

Fig 7

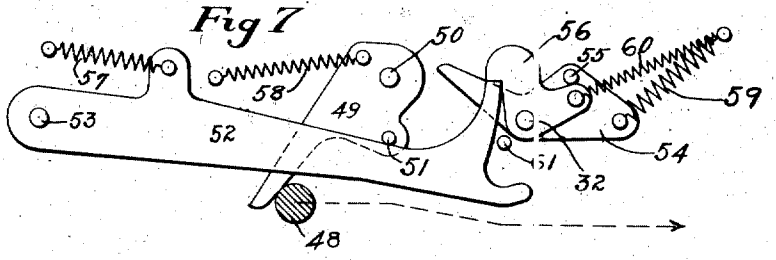


Fig 8

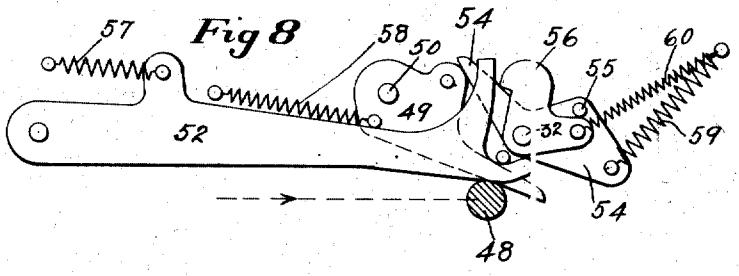


Fig 9

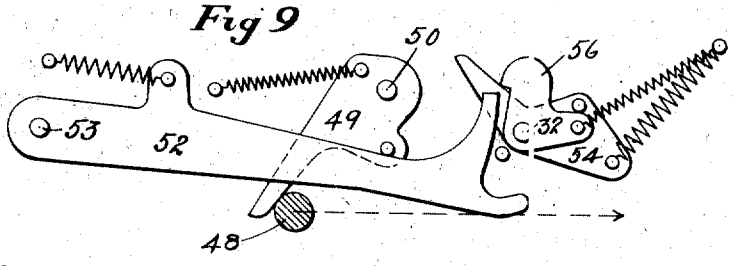
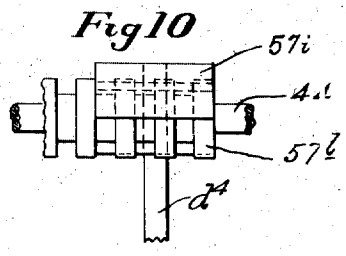


Fig 10



WITNESSES

Lulu Stubenvoll

Kenneth B. Hallead

INVENTOR

John Royden Peirce,

BY

D. Anthony Usina

ATTORNEY

J. R. PEIRCE.

SORTING MACHINE.

APPLICATION FILED JULY 27, 1911.

1,219,767.

Patented Mar. 20, 1917.

11 SHEETS—SHEET 8.

Fig 11

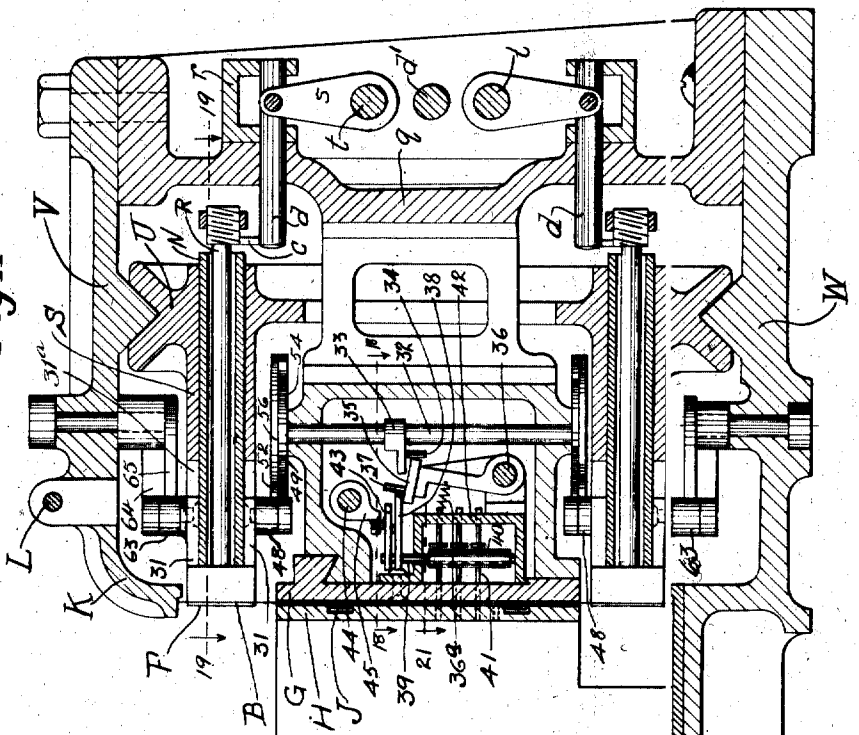
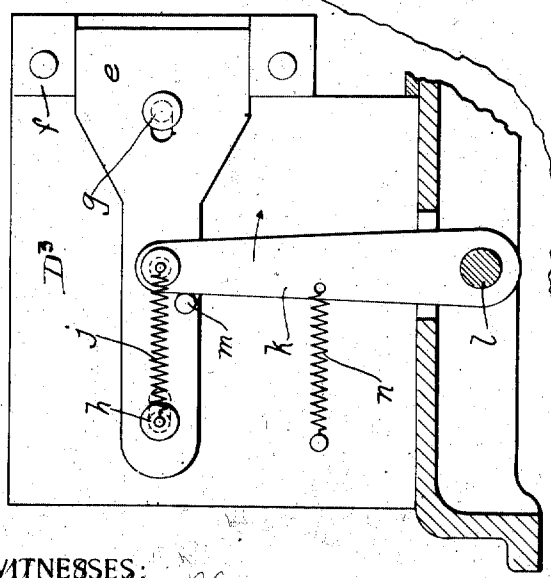


Fig 26



WITNESSES:

John Stubergoll

Howard B. Halstead

John Royden Peirce,

INVENTOR

By Anthony Wilma

Attorney

J. R. PEIRCE.

SORTING MACHINE.

APPLICATION FILED JULY 27, 1911.

Patented Mar. 20, 1917.

11 SHEETS—SHEET 9.

1,219,767.

Fig 12

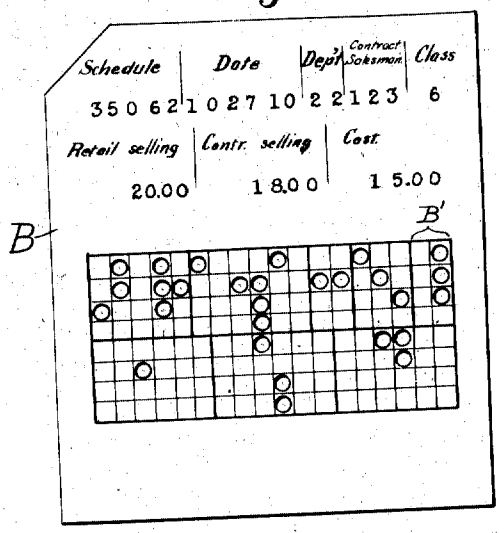


Fig 13a

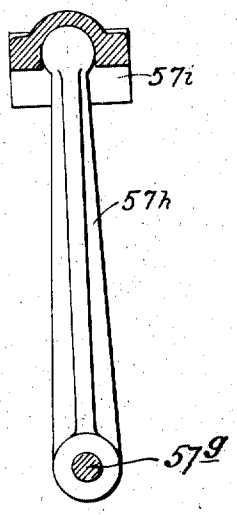


Fig 13

INVENTOR

John Royden Peirce

By Attorneys,

Thomas Prince

WITNESSES:

Lyle Stubenvoll

Kenneth Whitesell

J. R. PEIRCE.

SORTING MACHINE.

APPLICATION FILED JULY 27, 1911.

1,219,767.

Patented Mar. 20, 1917.

11 SHEETS—SHEET 10.

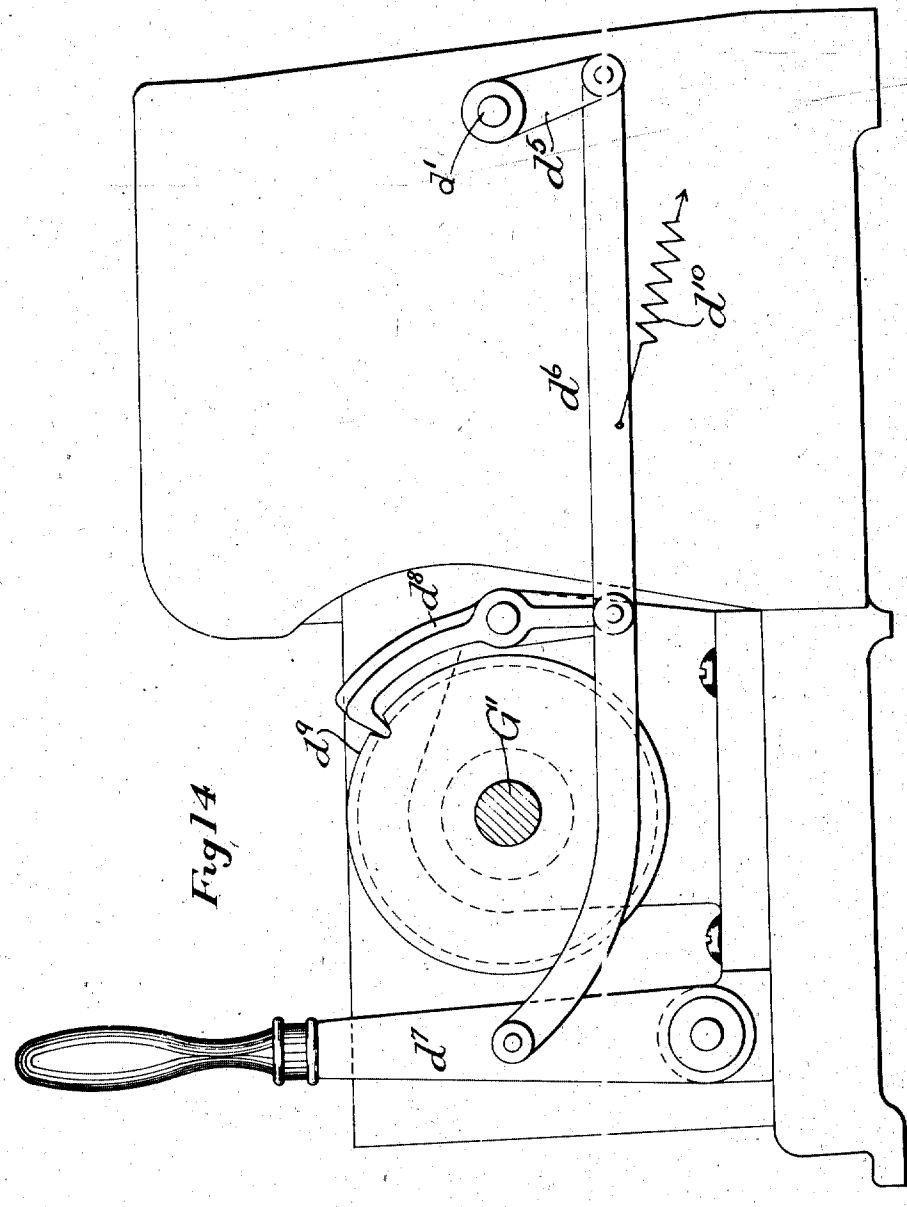


Fig. 14

INVENTOR:

John Royden Peirce

By Attorneys,

Dyer Tholen & Dyer

WITNESSES:

Jean Stubenvoll

Kenneth Whitehead

J. R. PEIRCE.

SORTING MACHINE.

APPLICATION FILED JULY 27, 1911.

1,219,767.

Patented Mar. 20, 1917

11 SHEETS—SHEET 11.

Fig 20

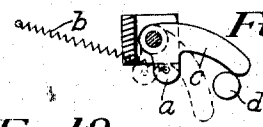


Fig 21

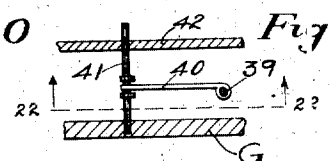


Fig 19

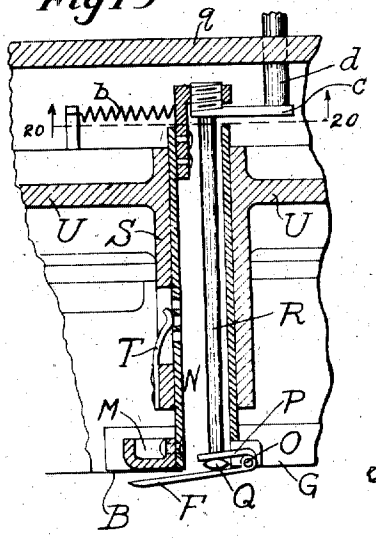


Fig 22

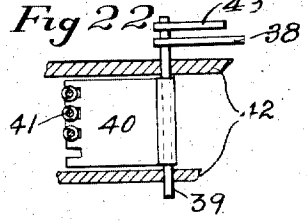


Fig 18

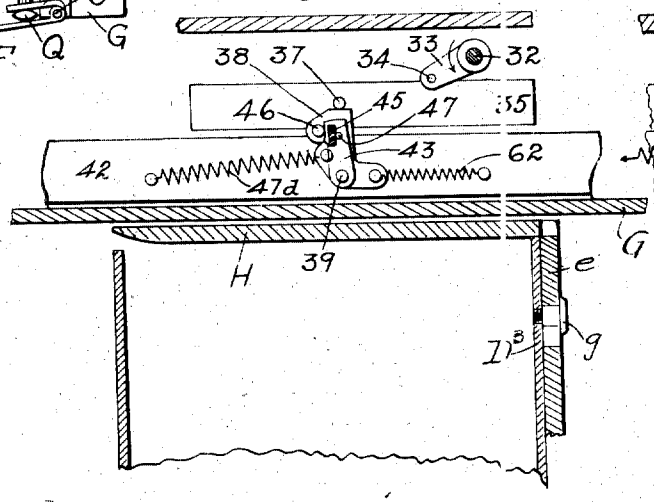


Fig 18a

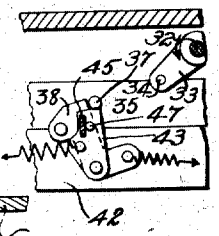


Fig 23

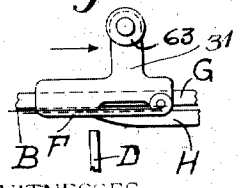


Fig 24

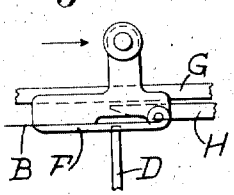
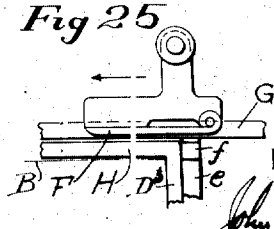


Fig 25



WITNESSES:

Wm. Stubenvoll

Kenneth B. Watson

INVENTOR

John Royden Peirce

By Attorneys,

Wm. Anthony Usina

UNITED STATES PATENT OFFICE.

JOHN ROYDEN PEIRCE, OF NEW YORK, N. Y.

SORTING-MACHINE.

1,219,767. Specification of Letters Patent. Patented Mar. 20, 1917.

Application filed July 27, 1911. Serial No. 640,937.

To all whom it may concern:

Be it known that I, JOHN ROYDEN PEIRCE, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Sorting-Machines, of which the following is a specification.

This invention aims to provide a machine for distributing rapidly and surely perforated cards of different classes. The classification may be of any character, such as by departments in department stores or other commercial accounting, by ages or years in keeping life insurance statistics, or by kinds of work in keeping factory costs. Each card represents an item or set of items to be accounted for and each card is classified and is punched in one way or another according to the class in which it belongs. Preferably the classes are distinguished by perforating the cards in various combinations of the perforation-spaces provided.

The cards are placed in indiscriminate order in a receiving pocket or magazine. A line of sorting pockets is provided, one for each class of cards, (and preferably a supplementary one for cards which do not fit any of the classes provided for). The machine takes the cards in succession from the magazine and passes them along the line. As each card reaches its pocket it is slipped into the same. Each sorting pocket, (except the supplementary one) has a sorting mechanism which selects and slips into the pocket such cards as belong there but which is without action on other cards, allowing these to pass freely to the next pocket. Thus the machine takes one card from the magazine at each operation and the cards are sorted at the same rate (except for a few which may have to take additional steps along the line after the magazine is exhausted).

Figure 1, is a perspective of a complete machine, duplicate parts in the center being omitted.

Fig. 2, a similar plan, partly in section, with the casing removed and on a larger scale.

Figs. 2^a and 2^b, are details of Fig. 2 in different positions.

Fig. 3, a horizontal section of a portion of Fig. 2, on a lower plane.

Fig. 4, a diagrammatic plan of a machine having ten sorting pockets.

Fig. 5, a vertical section on the line 5—5 of Fig. 2.

Fig. 6, a plan of a detail of Fig. 5.

Figs. 7, 8 and 9, plan views, enlarged, of the escapement mechanism of Fig. 3, in different positions.

Fig. 10, a front elevation of the adjustable connection of Fig. 13.

Fig. 11, a transverse vertical section, on a larger scale, approximately on the line 11—11 of Fig. 2.

Fig. 12, a face view of a style of card which may be sorted by the machine.

Fig. 13, a transverse vertical section, on a larger scale, approximately on the line 13, Fig. 2.

Fig. 13^a, a detail in transverse section, of Fig. 13.

Fig. 14, an elevation of the right hand end of the machine, omitting the adjusting knob.

Fig. 15, a transverse vertical section, on a larger scale, approximately on the line 15—15 of Fig. 2.

Fig. 16, a table of suitable combinations of perforated spaces.

Fig. 17, a table explaining the order of arrangement of the pockets.

Fig. 18, a horizontal section approximately on the line 18—18 of Fig. 11.

Fig. 18^a, is a detail of Fig. 18 in another position of the parts.

Fig. 19, a horizontal section approximately on the line 19—19 of Fig. 11.

Fig. 20, a vertical section on the line 20—20 of Fig. 19.

Fig. 21, a horizontal section on the line 21 of Fig. 11.

Fig. 22, a vertical section on the line 22—22 of Fig. 21.

Figs. 23, 24 and 25, are diagrammatic views of the clip of Fig. 19 in different positions.

Fig. 26, a side elevation of a pocket showing the mechanism for stopping the cards which do not enter the pocket.

Fig. 27, a perspective view of a detail of Fig. 2.

Referring now to the embodiment of the invention illustrated, A is the magazine in which the cards B to be sorted are placed. It is simply a horizontal trough or guide in which the cards are placed upright, with a slide C pulled forward by cords and weights to press the foremost card always into position for engagement by the mechanism. The cards may be oblong and have

one beveled corner as shown in Fig. 12 to insure their being placed upright and properly faced in the magazine. The pockets D receive the sorted cards and are numbered 1, 2, 3, 9, 4, 5, 8, 6, 7 and blank according to the classifications of the cards they are to receive.

The cards project above the sides of their pockets and preferably their lower corners are also exposed, a space being left at the inner parts of the pockets between the bottoms and the lower edges of the sides of the pockets, as shown in Figs. 1, 5 and 11. The foremost card in the magazine A is shifted slightly to the right by the shouldered reciprocating part E, Figs. 2 and 5, which is connected by a link 47^a to an eccentric 47^b. Clips F move backward as the part E moves forward. The card advanced by the part E is seized at the top and bottom of its forward edge by the first set of clips F and carried to the first selecting position, back of the dummy pocket D'. On the next backward movement the second pair of clips F seizes the same card. As these clips advance to the right they are controlled by the selecting mechanism for the first sorting pocket (No. 7) and are either shifted laterally or held in line, so that when the clips advance to the right the card is either sorted in the first sorting pocket or carried to sorting position for the next pocket; where the same selecting process is repeated; all the clips F being advanced to shift the card, farther advanced to slip off the card, shifted laterally out of the plane of the card, opened and retracted to position to engage the next card and closed to grip the same, and each forward movement being sufficiently long to carry the card into position for engagement by the next clip when the latter is retracted. The card B runs normally between a fixed front wall G of the machine (Fig. 11) and fixed inner walls H of the several pockets which are perforated at all spaces, see Fig. 5, to permit the passage of any combination of pins; the pockets being provided with grooves in which are friction springs J (Fig. 11) pressing the card against the wall G to prevent the card from bounding backward when the machine is operated rapidly. The card rests on a bottom plate of the several pockets and its upper edge is guided by a plate K which is hinged at L so that it may be raised to admit the operator's fingers for lifting out a stack of cards or adjusting a single card.

The mechanism of the clips is best illustrated in Figs. 11, 19 and 20. The clip F grips the edge of the card B against an abutment M, being a flange on the end of a tube N. The clip is pivoted at O and has an arm P. Between the arm P and the clip is the oval-head Q of a shaft R, the opposite end of which is screw-threaded in an extension of the tube so that a slight turn of the shaft opens or closes the clip. The tube N slides inward or outward in the fixed outer tube S and is impositively held in any one of its three positions by a light spring T fastened on the outer tube and engaging holes in the inner tube. In the middle position of the tube (Fig. 23) the clip drags the card forward between the walls G and H to pass it on to the next pocket. In the outer position of the tube (Fig. 24) the clip drags the card forward at the same time holding its edge outward sufficiently to cause it to pass through the vertical slit in the corner of the pocket D and outside of the wall H so as to enter the pocket. In the inner position of the tube (Fig. 25) the clip has released the card and is moving backward in a path at the rear of the edge of the wall G so as not to interfere with the card B. The clips therefore have three kinds of movement, a longitudinal reciprocation, a transverse movement, and an opening or closing movement.

For effecting their longitudinal movement a carriage U is provided, to which the several tubes S are connected, being in fact integral therewith; this carriage being held between guides V and W at top and bottom and being connected to a link X (Fig. 2) which is connected at its opposite end to a crank pin Y on a continuously rotating wheel Z.

The opening and closing of the clip is effected by turning the shaft R, as previously stated. Each shaft is provided at its rear end with two arms (Fig. 20). The short arm *a* is connected to a spring *b* attached to a part of the carriage U and tending always to turn the shaft R in a direction to close the clip. A second, longer arm *c* serves by striking a pin *d* in the last part of the retractile movement of the carriage to turn the shaft R in the opposite direction so as to open the clip and permit the edge of the card to enter it; after which the arm *c* passes over the pin *d* and the spring again closes the clip. The position of the arm *c* before it strikes the pin *d* is indicated in dotted lines. To permit the following forward movement of the clip the pin *d* is drawn back out of the path of the arm *c*. Thus the clip is closed at the beginning of its advance and during the greater part of its retractile movement until it has nearly reached the forward edge of the succeeding card.

The release of the card after it has been advanced the desired distance is effected as follows: If a card enters a sorting pocket it is carried along until it strikes the forward side D^3 of the pocket, by which it is stopped. The clip is moved farther a sufficient distance to pull it off the edge of the card, its grip on the card being slight. Where a card does not enter a pocket it is stopped at a corresponding point by means of a slide *e* (Figs.

18, 25 and 26) which is interposed in front of its edge. The inner wall H of the pocket is fastened to the forward side D^2 of the pocket by overlapping ears *f*, Fig. 26, between which the slide *e* is located. A headed pin *g* projects from the side of the pocket, passing through a slot in the slide *e* and thus holding the slide in place and aiding to guide it. The rear end of the slide carries a pin *h* which projects through a similar slot in the side wall of the pocket, forming a second guide. A spring *j* connects the pin *h* with the end of an arm *k* on a shaft *l* running the length of the machine. When the arm *k* swings to the right from the position of Fig. 26 it pulls on the spring *j* and presses the stop *e* toward the front wall G of the machine so as to stop the next card. When the arm *k* swings back it strikes a pin *m* on the slide and withdraws the latter. The arms *k* are all mounted on the shaft *l* and are swung forward by a cam acting to rock the shaft and are pulled backward by springs *n*. The shaft *l* (Figs. 5, 6 and 13) is provided with an arm *o* having a roller on its end running against the edge of a rotating cam *p*; being held up against the cam by the several springs *n*.

The advance and withdrawal of the pins *d* which open the clips is effected as follows. The pins are guided in the fixed rear wall *q* (Fig. 11) and extensions *r* thereof and are pivotally connected with the ends of arms *s* on rock shafts *t* running longitudinally. The shafts *t* are rocked (Figs. 2, 27 and 5) by means of arms *u*, that on the upper shaft *t* projecting forward and that on the lower shaft rearward, connected by links *v* with arms *w* on a cross shaft *x* having an arm *y* the end of which is held up against a cam *z* by means of a spring 30. (See dotted lines Fig. 5.) The cam *z* at each revolution presses the arm *y* down to rock the shafts *t* in the directions to throw the pins *d* in the paths of the arms *c* to cause the opening of the clips, and then (as soon as the arms *c* have ridden over the pins and the clips have caught the cards) releases the arm *y* which is drawn upward by its spring and causes the withdrawal of the pins *d* to permit the forward passage of the arms *c*.

The movement of each closed clip transversely of the machine to the outer position, Fig. 24, is controlled by the selecting perforations of the card. If these perforations, for any card, correspond to the selecting mechanism the clip and the forward edge of the card are shifted outward to cause the card to enter the pocket, as explained in connection with Figs. 23, 24 and 25. Each of the tubes N has bosses 31 on top and bottom, formed as parts of the abutment or fixed jaw M which is fastened on the end of the tube N, said bosses sliding in corresponding slots 31^a in the outer tube S, extending lengthwise of said tube, and on these bosses are carried antifriction rollers 48 and 63 hereinbelow referred to which are engaged by cams during the longitudinal reciprocation of the tubes, so that by modifying the positions of the cams the desired transverse movements are given to the tubes N and the clips carried thereby.

The inner sets of cams cause the selecting movement of the clips to the position of Fig. 24 and are controlled by stops located on the opposite ends of vertical shafts 32 (Figs. 7, 8, 9, 11 and 18) provided with oblique arms 33 on which are pins 34 engaged by the edges of plates 35 mounted on arms loose on a shaft 36 and pressed backward by a light spring 36^a. Each plate 35 also carries a pin 37 which bears against a plate or arm 38 which is loose on the end of a shaft 39 which, as shown in Figs. 21 and 22, carries a plate 40 with slots in its free edge embracing feeling pins 41 which have collars on opposite sides of the plate so as to move with the plate. The pins project through the front wall G of the machine and are carried in a box 42 which is mounted on said front wall. On the upper end of each shaft is fixedly mounted also an arm 43. The shaft 36 is mounted on the box 42, and the box is fixed on the front wall G so that the box and the pins, plates 35 and other movable parts connected thereto are adjustable lengthwise with the front wall G as hereinafter described to cause the selecting mechanism to register with any desired part of the card. A rod 44 carries a releasing and resetting device 45, consisting of a simple lateral projection, as shown in Fig. 11, for each of the selecting mechanisms and is arranged for adjustment along with the front wall G and connected parts. In the regular operation of the machine the resetting devices 45 are given a slight reciprocating movement; being shifted to the left to permit the selecting pins to feel for openings in the card; shortly before the clips take hold of the cards and being shifted back to the right immediately thereafter to withdraw any pins from the card before the clips are advanced. When the pins find corresponding perforations in the card the loose arm 38 is swung to the left and releases the pin 37 and allows the plate 35 to swing forward and this allows the arm 33 to swing forward and the shaft 32 to turn accordingly, which determines the selecting movement of the clips, as hereinafter described.

The movements of the arm 38 are controlled by the arm 43 and the pin 37. The arm 43 is pulled to the left by a spring 47^a and bears against a pin 46 on the loose arm 38. The pin 46 is below the resetter 45 so as not to be affected directly thereby. The arm 43 carries a pin 47 bearing against the right hand face of the resetter 45 and holding the

arm 43 normally in the position of Fig. 18. When the resetter 45 moves to the left the arm 43 is released. If the feeling pins do not find proper holes in the card, however, the shaft 39 and the arm 43 fixed thereon cannot turn and the loose arm 38 is unmoved and there is no action by these selecting pins.

If the selecting pins find proper perforations in the card then the arm 43 moves carrying the pin 46 and arm 38 with it to the left (Fig. 18ª). The pin 34 by reason of a spring pressure on the shaft 32 hereinafter referred to swings in the direction of the arrow in Fig. 18, the pin 37 and plate 35' being forced to the position of Fig. 18ª. The return of the resetter to the position of Fig. 18 restores the arm 43 and pins to their original position. The pin 37, however, prevents the return of the loose arm 38 and the shaft 32 remains as in Fig. 18ª in position to cause an outward movement of the clip, this position continuing after the resetting of the arm 43 and until nearly the end of the forward stroke of the clip. The interposed arm 43 therefore acts only momentarily on the loose arm 38, while the latter acts on the clips during substantially the whole of their forward movement. Near the end of the forward movement of the clip the shaft 32 is turned back, withdrawing the pin 37 from the path of the loose arm 38 so that the spring 62 restores the latter to its normal position, all as hereinafter described in connection with Figs. 7, 8 and 9.

The movement of the rod 44 to the right is effected by means of a strong spring 57^e (Fig. 5) pulling upward on an arm 57^f on a short cross shaft 57^g which has an arm 57^h, the upper end of which transmits movement to the rod 44. The connection between the arm 57^h and the rod 44 is shown in Figs. 2, 10, 13 and 13ª. A cross bar 57^i slides on a supporting shaft 57^k and has a notched end engaging one of the grooves in a long collar 57^l fixed on the left hand end of the rod 44. The arm 57^f bears upward on a cam 57^m, the larger radius of which moves the arm 57^h backward, and with it the rod 44, the distance necessary to effect the release of the selecting pins. The smaller radius of the cam allows the spring 57^e to shift the rod 44 to the right, this smaller radius of the cam continuing operative until near the end of the forward movement of the cards.

The front wall G of the machine carrying the boxes of feeling pins and connected parts is adjusted longitudinally so that the position of the pins relatively to the width of the card may be adjusted; so that, for example, the selecting section of the card may be either at the right, as in Fig. 12, or at any other point in its width. The adjustment of the wall is effected by means of a screw G' (Figs. 2 and 5) fixed at its end against longitudinal movement but rotatable by means of a button G^2 and threaded through a nut G^3 attached to the right hand end of the sliding wall G.

In order to preserve the proper relation of the resetting devices 45, the rod 44 on which they are mounted is adjusted with the front wall G, being fastened thereto as shown at the right of Fig. 2 with a spring 47^c for permitting the necessary releasing and resetting movements.

When the front wall G and rod 44 are to be adjusted the movement must correspond to the distance between successive columns on the card, or to a multiple of this distance. For this purpose the collar 57^l on the rod 44 is provided with transverse grooves which are spaced apart a distance corresponding to that between columns on the card. For this adjustment the cross bar 57^i must be lifted out of its notch on the collar 57^l. On the right hand end of the machine there is provided means for controlling the adjustment. See Figs. 10, 13 and 14. The rock-shaft d' runs along the back of the machine and carries at its left hand end an arm d^2 at the lower end of which is a pin d^3 bearing on the end of an arm d^4 which is in one piece with the cross bar 57^i. The rock-shaft d' at the right hand end of the machine is connected by an arm d^5 and link d^6 with a controlling lever d^7. The link d^6 is also connected with a pawl d^8 adapted to engage a notch in a disk d^9 fixed on the screw G'. Now, in order to turn the screw G' for effecting the desired adjustment the lever d^7 must be pulled forward. This releases the screw G' and releases the connection of the cross bar 57^i with the rod 44. The screw G' may then be turned to adjust the pin boxes and the rod 44 one, two or more steps, each revolution of the screw corresponding to one step. When the desired amount of adjustment has been effected the pawl d^8 slips into the notch of the disk d^9, the spring d^{10} holding it there and also swinging the rock-shaft d' in the proper direction to permit reëngagement of the cross bar 57^i with the notched collar on the rod 44.

Of the stops on the ends of the shaft 32, the upper set is shown, together with the corresponding cams in Figs. 3, 7, 8 and 9. The lower stops and cams are identical with the upper ones. The cam roller or projection on the inner side of the boss 31 of the sliding tube of the clip is indicated at 48. The limits of its backward and forward movements respectively are indicated at 48ª and 48ᵇ in Fig. 3. Thus in each movement it passes over parts of two adjacent groups of cams.

Fig. 7 shows the roller 48 at the rear end of its movement. On striking the end of the lever 49 which is pivoted at 50, it has turned this lever till its pin 51 has struck the rear edge of the cam lever 52, pivoted at

53, and has swung the cam lever outward into the path of the roller. If the cam 52 is locked in this position (as in Fig. 7) then on the return of the roller it is shifted transversely and follows the path indicated by the dotted line, thus shifting the clip and the forward edge of the card to cause the latter to enter its pocket. This locking of the cam 52 takes place only when a card has been selected by the mechanism of a particular pocket. If, however, (as in Fig. 9) the cam 52 is not locked then the forward movement of the roller 48 first releases the lever 49 and then presses the cam 52 back, the roller following a straight path as indicated by the dotted line.

At the end of a forward movement (Fig. 8) the roller is passing the cam 52 of the next forward pocket and is made to restore the same to its inner position (if it is found in the locked position of Fig. 7) by striking the lever 49 and turning it to the right. This movement causes the lever 49 to strike the tail of the plate 54, which is fixed on shaft 32, and to turn this plate until its pin 55 engages the tail of the locking pawl 56 (loose on the shaft 32) and swings the latter out of the way, allowing the cam 52 to be swung back to inoperative position by its spring 57. The spring 58 of the plate 49 holds the plate normally between the positions of Figs. 7 and 8 so that it may be engaged by a roller 48 coming from either direction.

Fig. 7, therefore, represents the selecting or operative position of the parts, and Fig. 9 the inoperative position; the difference being that in Fig. 7 the pawl 56 has sprung into position to hold the cam 52 outward and in Fig. 9 it has not done so. The pawl 56 being controlled by the plate 54 on the shaft 32, it follows that the release of the shaft is necessary in order to permit the spring 59 to swing the plate 54 to the position of Fig. 7 so as to permit the spring 60 to shift the pawl to its operative position and to cause the sorting of the card. The pin 61 is a stop to prevent the cam 52 and plate 49 from being thrown too far back when they are struck quickly by the roller 48, as in Fig. 8.

When the shaft 32 is turned back as in Fig. 8 the pressure of the pins 34 on the plate 35 is relieved and the plate is pressed back by its spring 36^a (Fig. 11), the loose arms 38 swinging back to the position of Fig. 18 and locking the shafts 32, the springs 62 tending to return the arms 38 to this position.

The rollers 48 are used therefore to secure an outward movement of the clips during their advance; and at the end of such advance the rollers strike the next forward plate 49 and restore the cams 52 to their rear positions to prevent them from interfering with the return movement of the clips and rollers 48. For securing a positive inward shift of the clips at the beginning of their return, rollers 63 are used as hereinbelow described.

The bosses 3 on the top of the upper clip tubes N carry cam rollers 63 which are acted on by cams in a plane above the clips, these cams being shown in Figs. 2, 2^a and 2^b. The same mechanism is repeated at the underside of the lower set of clips. The cams are pivoted to the fixed top and bottom walls of the casing and serve to throw the clips to their middle or non-sorting position just before they engage a card, and to their rearmost position just before their empty return movement. After being set in their middle position and engaging a card, the throwing of the clips farther forward to sort the card is effected by the cams 52 of Fig. 3 as previously explained. The cams for the middle and rearmost positions act on the rollers 63. In Fig. 2^a the extreme retracted position of a roller is shown at 63^a; and in Fig. 2^b the extreme advanced position of the same roller at 63^b. There are two types of cams, a short rocking cam 64 which pushes the roller (and its clip) forward and a long cam 65, stationary when in operation, which pulls the roller and its clip back to the rear. The movement of the clips is somewhat greater than the space between two successive clips (the range being indicated by 48^a and 48^b in Fig. 3) so that at the rearward end of its movement (Fig. 2^a) the roller is acted on by the short cam of one group, and at the forward end of its movement by the long cam of the next group to the right.

Near the end of the rearward movement the roller 63 strikes a shoulder on the cam 64 and turns the cam back which at the same time pushes the roller outward. The roller however does not pass beyond the end of the long cam 65 and the latter is without effect.

Near the end of the advancing movement the roller strikes the rear edge of the long cam 65, which is held by its spring against a stop pin, and the roller is thus forced to the rear. The roller does not pass beyond the end of the short cam 64 and the latter is without effect.

The operation of the several sub-combinations of mechanism having been described, the operation of the machine as a whole will now be described. The cards properly faced and in upright position are stacked in the magazine A and the innermost card is pressed against the reciprocating slide E by the weight-operated slide C. The shaft Z' carrying the wheel Z and various cams is rotated continuously in the direction indicated by the arrow in Fig. 5. The slide E is withdrawn from the position of Fig. 2 to-

ward the left until its shoulder passes the rear edge of the foremost card and is then returned to the position indicated, carrying the foremost card with it to a point where the right hand edge of the card may be engaged by the first of the clips F. While the card is being advanced by the slide E the clips are being retracted toward the left by means of the crank pin Y and link X. Just before reaching the card the shaft of each clip is rocked by its arm *c* striking its pin *d* so as to open the clip. At the same time the rollers 63 (Fig. 2ª) strike the rocking cams 64 and cause the clips to be moved from their innermost position transversely to their middle position. As the open clips embrace the edge of the card the arms *c* escape from the pins *d* and the clips close and hold the card. The clips are then moved longitudinally to the right by the continued rotation of the crank pin Y and carry the card B to the first selecting position. There is no selecting mechanism connected with the first pair of clips F so that there are no cards carried into the dummy pocket D′; they are merely carried forward and left stationary between the inner wall G of the pocket D′ and the fixed wall of the machine so as to be readily tested by the selecting mechanism corresponding to the next clips F. After the first pair of clips F has carried the card to its first selecting position the card is stopped by the stop *e* of the dummy pocket D′. The clips continue their movement to the right, sliding off the edge of the card, and their rollers 63 bearing against the rear edges of the long cams 65 so as to throw the clips inward (as in Fig. 25). The crank pin then carries the clips back in the left hand direction.

The second pair of clips F has partaken of the same movements as described for the first pair. Just before it reaches the edge of the card above referred to, in line with the dummy pocket D′, the clips are pushed out to the middle position and opened and by their continued backward movement forced to embrace the edge of the card. During the backward movement of the clips the cam 57ᵐ (Fig. 5) actuates the arm 57ᶠ to shift the rod 44 and the several resetting devices 45 to the left. Thus the vertical shaft 39 is released and the feeling pins 41 are freed in time to enter the selecting perforations (B′, Fig. 12) as soon as they come in register therewith, which is at the end of the rearward stroke. At the end of the rearward stroke also the cam 57ᵐ releases the resetters and the spring 57ᵉ returns the rod and resetters to their right hand position. The resetters 45 strike pins 47 (Fig. 18) on the arms 43 fixed on the ends of the shafts 39 which carry the plates 40 (Fig. 21), so that said plates are swung inward and withdraw the feeling pins if the latter have entered the holes in the card. If the feeling pins did not find corresponding holes in the card to enter then the plates 40 could not move outward and, notwithstanding the shaft 39 was released from the resetter, there was no rocking of the shaft 39 and no action upon the clip, and the card moves straight forward to selecting position for the next pocket, that is to say between the inner wall H of the first pocket D and the fixed front wall G of the machine.

If, however, the feeling pins found corresponding perforations in the card in question they were pulled into it by the spring 47ᵈ (Fig. 18) acting on the fixed arm 43 on the end of the shaft 39, and pulled the loose arm 38 to the left, allowing the plate 35 to swing into position in rear of the arm 38; the subsequent resetting of the arm 43 by the resetter 45 having no effect on the parts 38 and 35, but only releasing the arm 38 so as to permit it to swing backward when the plate 35 is restored to its normal position. The forward movement of the plate 35 releases the arm 33 and permits the shaft 32 to turn which it does under the influence of its spring 59 (Fig. 7). The spring 59, it will be remembered, acts on the plate 54 which is fixed on the end of the shaft 32. When the shaft 32 is held from swinging the plate 54 is in the position of Fig. 8. When the shaft 32 is released, as described, then the spring 59 pulls the plate 54 around to the position of Fig. 7, which permits a similar movement of the loose locking pawl 56 so that the long cam 52 is held in position of Fig. 7. The several actions just described take place while the clip is at or near the end of its rearward movement on the left so that when it commences to move to the right it finds the cam 52 locked forward so that the clip is deflected forward from its middle position. The card is thus guided into the slot in the corner of the first sorting box D, and its movement is stopped by the right hand wall of the box. The movement of the clip continues, sliding the latter off the edge of the card; after which the clip is engaged by the mechanism of Fig. 2ᵇ as previously described and shifted to its innermost position so as to pass the card on its return movement.

Each card passes in succession to the successive selecting positions, is tested by the feeling pins corresponding to its position and is sorted into the next pocket or passed along to the next selecting position until it does finally find its appropriate pocket. If the cards are of a greater number of classifications than are to be sorted by the machine then the unsorted cards all find themselves in the final pocket D² (Fig. 4). For example, the machine illustrated is designed for nine classes. If the cards are of ten

classifications then the zero or tenth class of cards would all go into the pocket D^2. If the cards are of a dozen different classifications the three classes not provided for by the machine would all go into the pocket D^2. For this pocket there are no feeling pins and the cam 52 is fixed.

Various arrangements of the perforation spaces in the card and of the feeling pins in the machine may be used. For the machine illustrated a suitable table of combinations is shown in Fig. 16. For each number or class there is a column of four perforation spaces. Each column is perforated in one, two or three spaces, a different combination being used, of course, for each number.

If the first selecting mechanism encountered by the card in its successive steps had only a single feeling pin such pin might find a corresponding perforation in any one of four different classes of cards. Similarly, if the first selecting mechanism had only two feeling pins it might also find corresponding perforations in two different classes of cards. It is necessary, therefore, with this system, that the selecting mechanism having the smaller number of feeling pins be arranged to meet the card after the selecting mechanism having a larger number of feeling pins. Therefore, the selecting mechanisms for the several numbers should be arranged in the order indicated in Fig. 17 and in the diagram, Fig. 4, or in some other arrangement in which the selecting mechanisms having the smaller number of pins come after those having the larger number.

The construction and location of the pockets are advantageous. The pockets are open-topped and are located at points which are entirely clear of the mechanism and the cards, being upright therein, can be readily inspected while in the pockets and readily removed therefrom. The machine is also adapted to accommodate cards of different widths and heights and with tabs on their edges. The cards being seized only at their forward edges, their rear edges are free so that they may be of any desired width. By raising the swinging part K of the cover cards of any desired height may be operated on. For the same reasons the rear and upper edges of the cards may be of any desired shape, for example with classification tabs at various points along the edges of different cards. Instead of actual pockets the cards may be delivered merely to different parts of a table which may be called delivering stations. The fact that these stations are substantially or approximately at the same level and that the cards are distributed thereto in upright positions makes the work of the operator or attendant as easy and simple as possible.

Economy of construction and accuracy of operation is secured by mounting the clips and the mechanism immediately connected therewith, which may be called the distributing mechanism, upon a single reciprocating carriage, as described, the movement of which transmits to the clips the control of the selecting mechanisms.

Though I have described with great particularity of detail a specific embodiment of the invention yet it is not to be understood therefrom that the invention is restricted to the particular embodiment described. Various modifications therefore in detail and in the arrangement and in the combination of the parts may be made by those skilled in the art without departure from the invention. Other schemes, for example may be provided for causing a selected card to enter its pocket, such as the shifting of the back of the pocket to a point behind the card, instead of shifting the card to a point forward of the back of the pocket.

What I claim is:

1. A machine of the class described including in combination, a clip, means for causing said clip to engage and forward cards along a line and means for shifting said clip laterally to throw selected cards out of said line.

2. A machine of the class described including in combination, a series of clips, means for causing said clips to engage and forward cards along a line and means for shifting said clips laterally to throw selected cards out of said line, and pockets adjacent to said line adapted to receive the cards which are so thrown out.

3. A machine of the class described including in combination, a series of clips arranged along a line, means for advancing and retracting said clips, means for causing said clips in their retracted positions to engage cards, means for shifting said clips outward on their advance movement when cards are to be sorted and in order to throw out the selected cards and means for shifting said clips inward on their retractile movement to pass the cards without interference.

4. A machine of the class described including in combination, a series of clips arranged along a line means for advancing and retracting said clips, means for causing said clips in their retracted positions to engage cards, means acting at each operation to move the clips outward to the normal line before an advance movement and inward to the rear of said line before a retractile movement and means acting when a card is to be sorted to shift the clip holding said card outward beyond said normal line.

5. A machine of the class described including in combination, a series of clips arranged along a line, means for advancing and retracting said clips, means for causing said clips in their retracted positions to en-

gage cards, means acting at each operation to move the clips outward to the normal line before an advance movement and inward to the rear of said line before a retractile movement, means acting when a card is to be sorted to shift the clip holding said card outward beyond said normal line, and a series of pockets arranged alongside of said normal line to receive cards which are shifted outward beyond their normal line of advance.

6. A machine of the class described including in combination a clip, means for causing said clip to engage and forward cards along a line, and means controlled by perforations in a card for shifting said clip laterally to throw selected cards out of line.

7. A machine of the class described including in combination a clip, means for advancing and retracting said clip, means for causing said clip in its retracted position to engage a card, means controlled by perforations in a card for shifting said clip outward in its advance movement when said card is to be sorted and means for shifting said clip inward before its retractile movement.

8. A machine of the class described including in combination a clip, means for advancing and retracting said clip, means for causing said clip in its retracted position to engage a card, means acting at each operation to shift said clip outward to the normal line before an advance movement and inward to the rear of said line before a retractile movement and means controlled by perforations in a card to shift said clip outward beyond said normal line.

9. A machine of the class described including in combination means for holding a card with its forward edge exposed, traveling grippers adapted to grip such exposed edge and pull the card to either of two determined points, and means controlled by perforations in the card for determining the point to which it is to be conveyed.

10. A machine of the class described including in combination sorting pockets, individual selector mechanism for each of a plurality of said pockets and positioned at said pockets, means for advancing all cards first to selecting position for the first of said pockets and then advancing them in upright position in succession along a single line past successive selecting positions and pockets and means located at said selecting positions for deflecting cards of appropriate classifications detected by the selector mechanism before reaching their sorting pockets and causing them to enter said pockets.

11. A machine of the class described including in combination sorting pockets, individual selectors for each of a plurality of said pockets, means for advancing cards in upright position in succession in a single line past successive selecting positions and pockets, said selectors being located each in advance of a pocket, and means located at each selecting station for deflecting cards of appropriate classification detected by the selectors and causing them to enter the corresponding pocket.

12. A machine of the class described having a receiving station and delivering stations at substantially or approximately the same level in combination with means for receiving cards and distributing them in upright position at said stations.

13. A machine of the class described having a series of sorting pockets and mechanism for distributing the cards in said pockets in upright position, said pockets being open-topped and located at points clear of said mechanism so that the cards can be readily inspected while in said pockets and readily removed therefrom.

14. A machine of the class described including means for advancing cards edgewise and means for distributing said cards, said advancing and distributing means engaging only the forward edge of the card and leaving the top and rear edge free so as to accommodate cards of different widths and heights or with tabs on their edges.

15. A machine of the class described including in combination a clip, a rod for opening and closing said clip and mechanism for actuating said rod comprising a part threaded thereon and means for causing a relative rotary movement between said rod and said part threaded thereon.

16. A machine of the class described including in combination a clip F, a rod R for opening and closing said clip and means for shifting said rod R longitudinally comprising a nut engaging the same and an arm *c* for rotating said rod in said nut, a stop *d* in the path of said arm, a spring for pulling said arm in a direction to close the clip and means for shifting said rod transversely to bring said arm against said stop in a direction to open the clip.

17. A machine of the class described including in combination a clip F, a rod R for opening and closing said clip and means for shifting said rod R longitudinally comprising a nut engaging the same and an arm *c* for rotating said rod in said nut, a stop *d* in the path of said arm, a spring for pulling said arm in a direction to close the clip and means for shifting said rod transversely to bring said arm against said stop in a direction to open the clip, and means for withdrawing said stop *d* during the forward movement of said clip.

18. A machine of the class described including a clip, means for opening and closing the same, a shell N carrying said clip, means for adjusting said shell laterally and means for impositively holding said shell in its position of lateral adjustment.

19. A machine of the class described including a clip, means for opening and closing the same, a shell N carrying said clip, means for reciprocating said shell longitudinally of the machine and means operated by the longitudinal movement for shifting said shell laterally of the machine.

20. A machine of the class described, including in combination, means for gripping the forward edge of a card and pulling it forward, a stop and means for interposing said stop in advance of the card toward the end of a forward movement of the card to stop the same and then withdrawing the stop to permit a succeeding forward movement.

21. A machine of the class described including in combination longitudinally reciprocating clips, a cam, a locking pawl holding said cam in operative position to deflect a clip outward on the forward movement of the latter, and means actuated by a clip on its rearward movement for throwing said cam into operative position and actuated by a clip on its forward movement for releasing said cam from its locking pawl.

22. A machine of the class described including in combination longitudinally reciprocating clips, a cam 52, a locking pawl 56 holding said cam in operative position to deflect a clip outward on the forward movement of the latter and a plate 49 engaged by a part of a clip and swung backward thereby and having a pin 51 engaging said cam 52 and throwing the same into operative position, and means whereby the movement of said plate 49 when struck by a part of a clip moving in an advancing direction releases said cam 52 from its locking pawl.

23. A machine of the class described including in combination longitudinally reciprocating clips, a cam 52, a locking pawl 56 holding said cam in operative position to deflect a clip outward on the forward movement of the latter and a plate 49 engaged by a part of a clip and swung backward thereby and having a pin 51 engaging said cam 52 and throwing the same into operative position, and means whereby the movement of said plate 49 when struck by a part of a clip moving in an advancing direction releases said cam 52 from its locking pawl, and means controlled by perforations in the card for holding the locking pawl 56 inoperative or for releasing said pawl to permit it to engage and hold the cam 52.

24. A machine of the class described including a clip, means for reciprocating the same, a shouldered rocking cam 64 engaged by a part of said clip near the end of its rearward movement and deflecting the clip outward, and a cam 65 engaged by a part of said clip near the end of its forward movement and deflecting the clip inwardly.

25. A machine of the class described, including in combination a set of feeling pins, springs for operating the same and a resetter normally holding said pins inoperative against the strain of said springs, means for causing a relative movement between said pins and a perforated card and means for withdrawing said resetters as said pins approach the perforations in said cards and promptly restoring said resetter to withdraw the pins from the perforations in the card.

26. A machine of the class described, including in combination a set of feeling pins, springs for operating the same and a resetter normally holding said pins inoperative against the strain of said springs, means for causing a relative movement between said pins and a perforated card and means for withdrawing said resetters as said pins approach the perforations in said cards and promptly restoring said resetter to withdraw the pins from the perforations in the card, and means for sorting out a card rendered operative by the entrance of said pins into said perforations and remaining in operative position after the withdrawal of the pins.

27. A machine of the class described including in combination a shaft 39 carrying feeling pins, a fixed arm 43 thereon, a spring tending to cause said pins to enter perforations in a card, a loose arm 38 on said shaft 39, a plate 35 bearing against the end of said loose arm 38, a shaft 32 held from rocking by said plate 35 when the latter is in its outer position, said fixed arm 43 engaging said loose arm 38 and tending to throw the latter into inoperative position to permit the plate 35 to yield, and sorting out mechanism restrained from operation through said shaft 32 when the latter is held from rocking by said plate 35.

28. A machine of the class described, including in combination selecting mechanisms, means for shifting a card to said mechanisms in succession and means for adjusting said mechanisms to bring them into register with different parts of said card.

29. A machine of the class described including in combination a wall, selecting mechanisms comprising feeling pins at intervals thereon, means for feeding the card along said wall, and means for adjusting the position of said wall so as to cause said pins to register with different parts of the card.

30. A machine of the class described including in combination a wall, selecting mechanisms comprising feeling pins at intervals thereon, means for feeding a card along said wall, and means for adjusting the position of said wall so as to cause said pins to register with different parts of the card.

and means for insuring that the adjustment shall be of a determined distance or multiples of such determined distance.

31. A machine of the class described including selecting mechanisms, distributing mechanisms controlled thereby and a single reciprocating carriage carrying said distributing mechanisms.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN ROYDEN PEIRCE.

Witnesses:
D. ANTHONY USINA,
KENNETH B. HALSTEAD.