

J. POWERS.

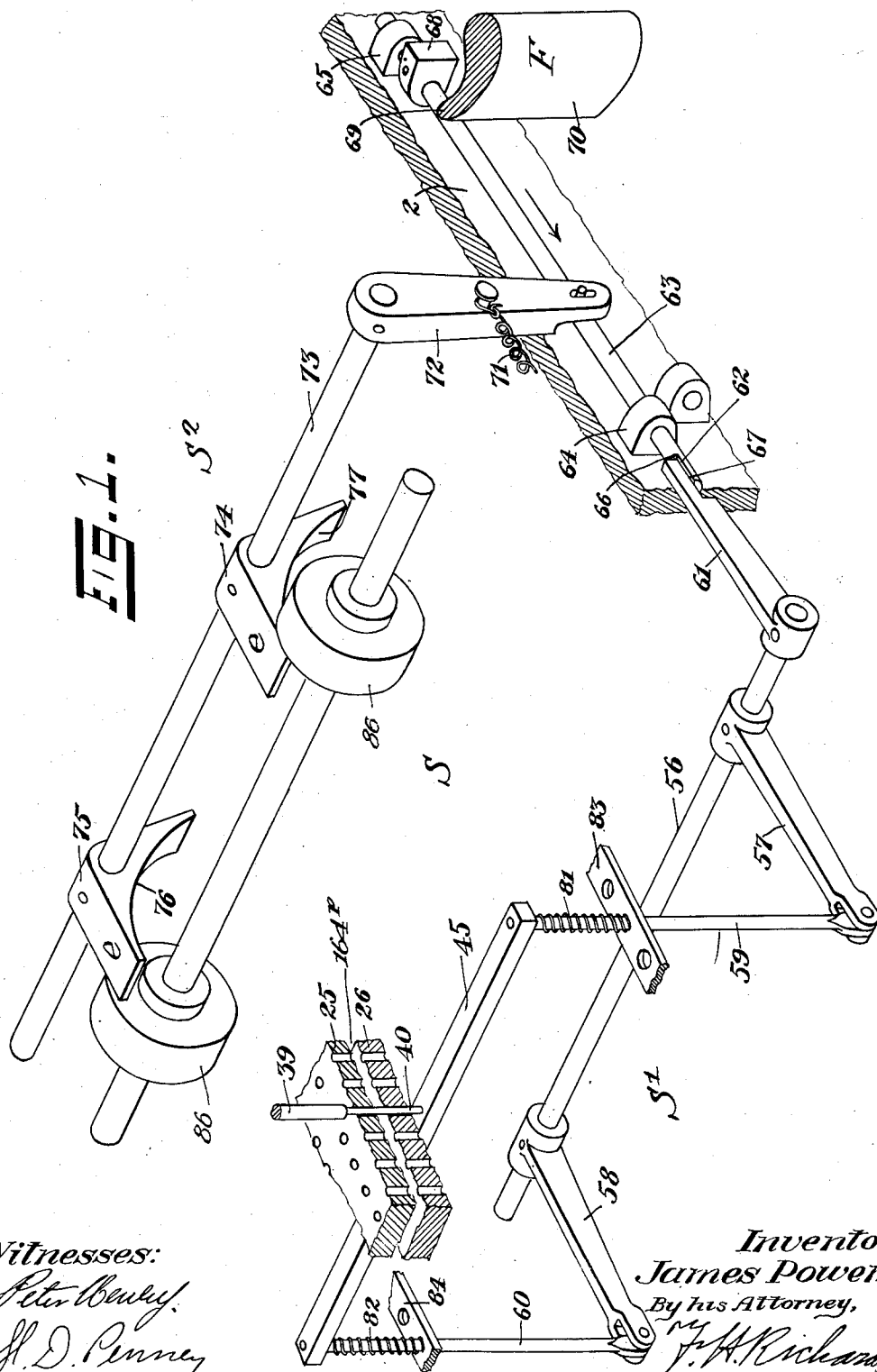
SELECTIVE CARD SORTING MACHINE FOR COMPILING STATISTICS.

APPLICATION FILED FEB. 15, 1912.

Patented Oct. 31, 1916.

10 SHEETS—SHEET 1.

1,203,261.



Witnesses:

Peter Bailey

H. D. Penney

Inventor:

James Powers

By his Attorney,

J. H. Richards

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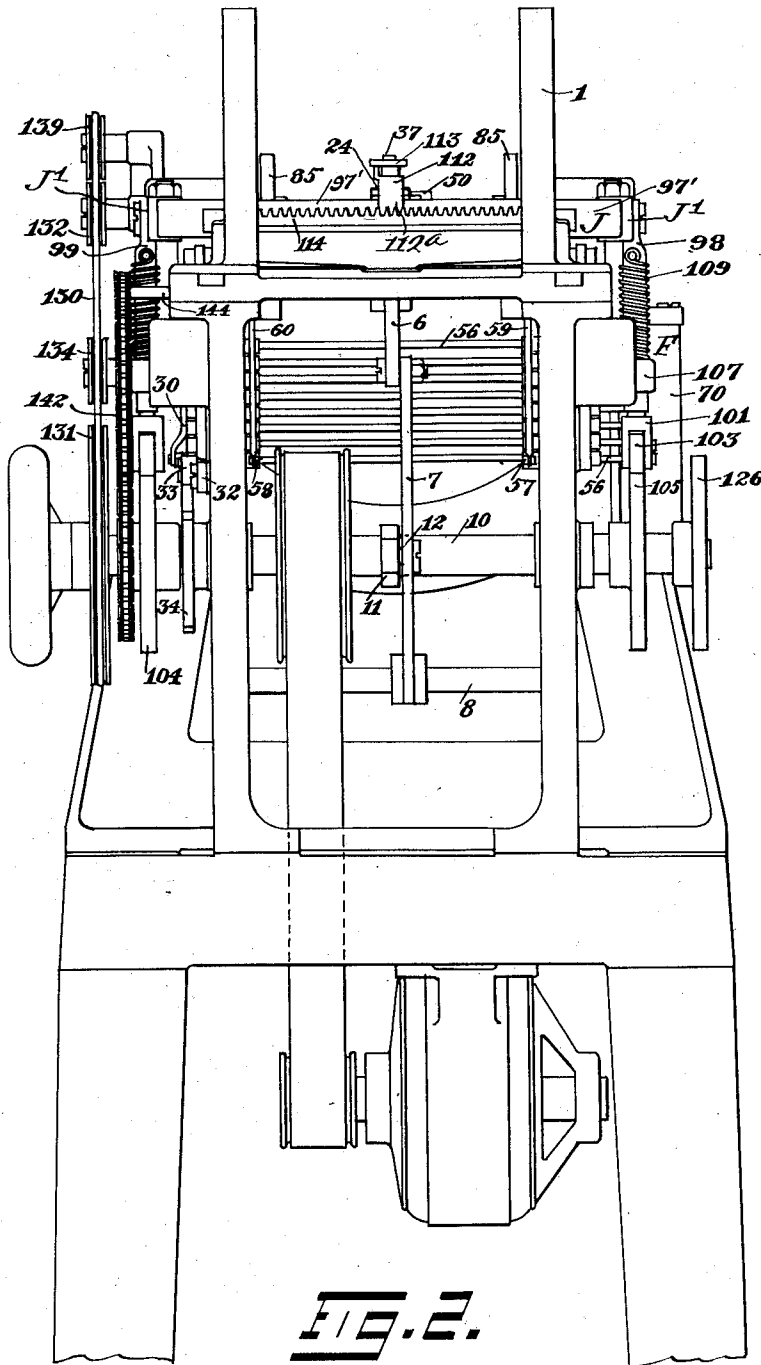
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1,203,261.

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10 SHEETS—SHEET 2.



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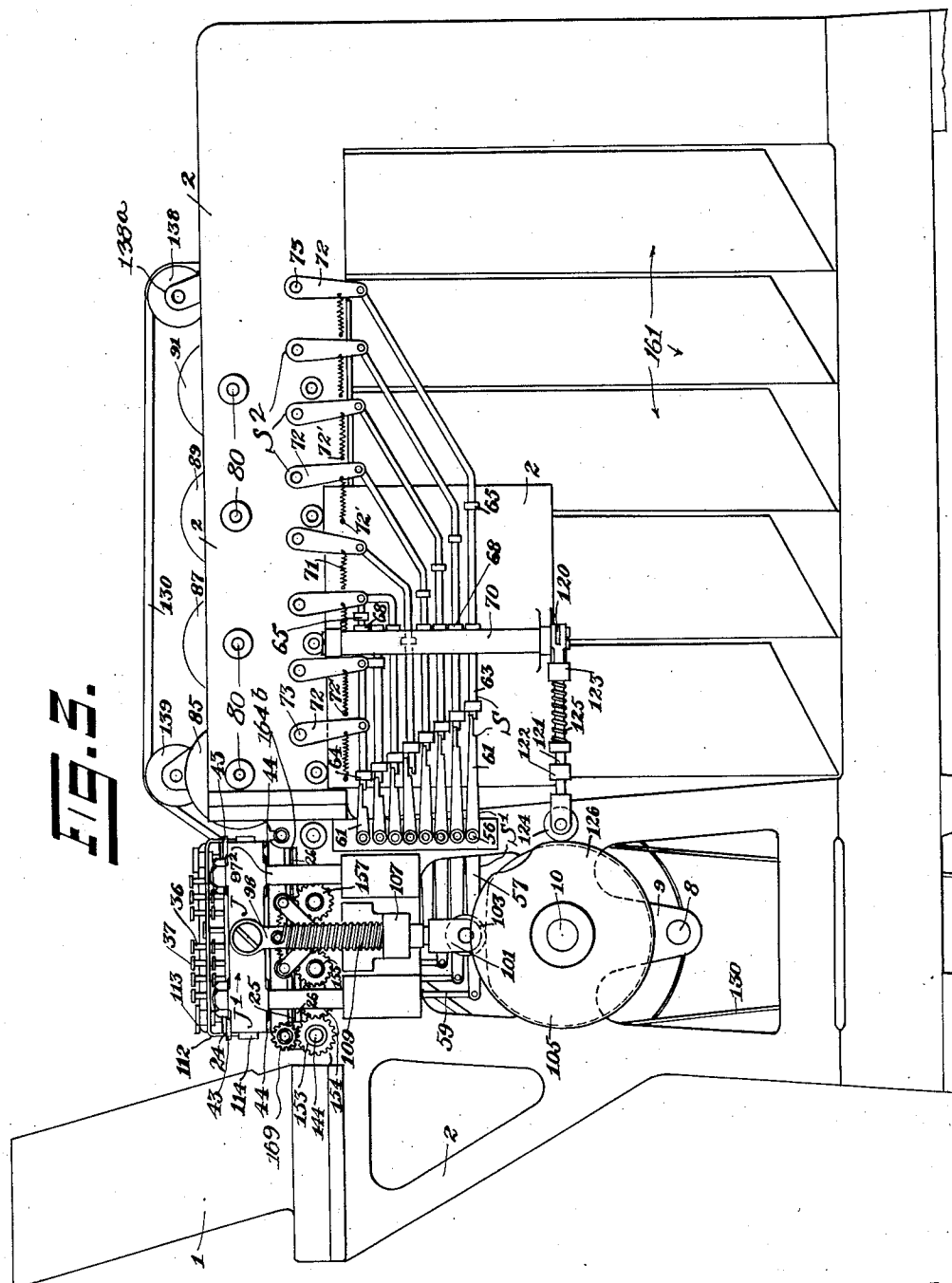
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10 SHEETS—SHEET 3.

1,203,261.



Witnesses:

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10 SHEETS—SHEET 4.

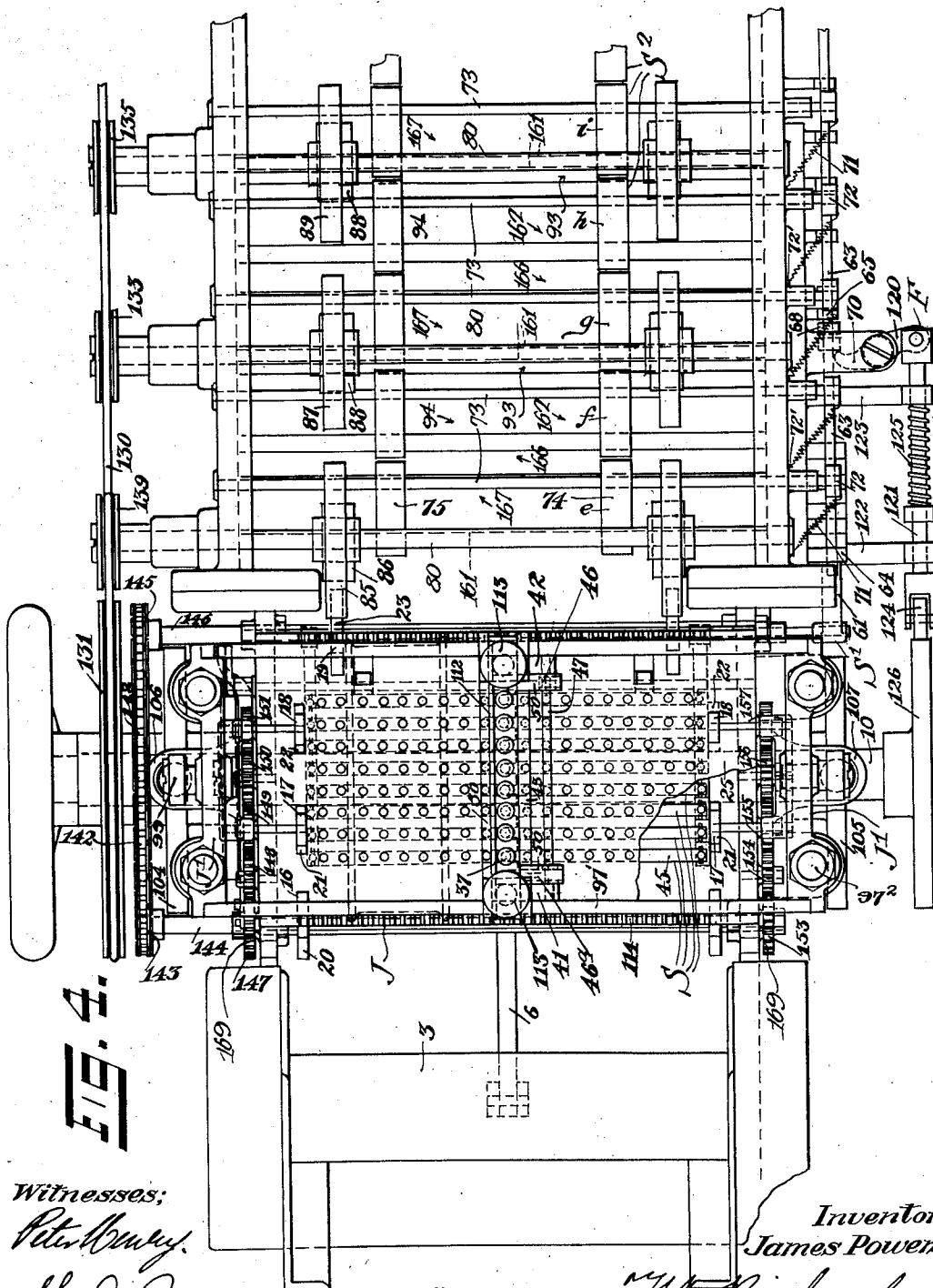


FIG. 4.

Witnesses;

Peter M. Wray.

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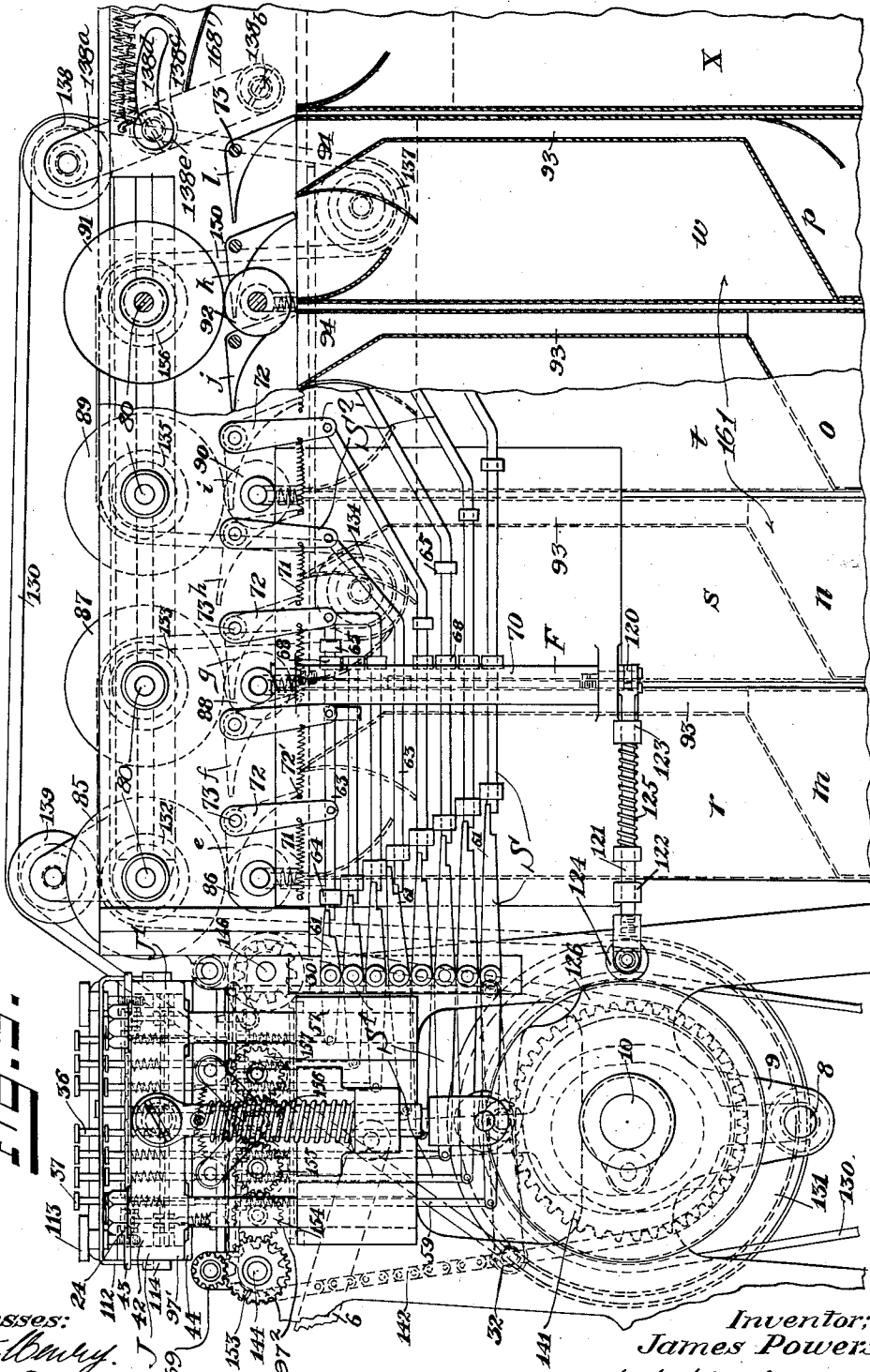
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SELECTIVE CARD SORTING MACHINE FOR COMPILING STATISTICS.

Patented Oct. 31, 1916.

10 SHEETS—SHEET 5.

1,203,261.



Witnesses:

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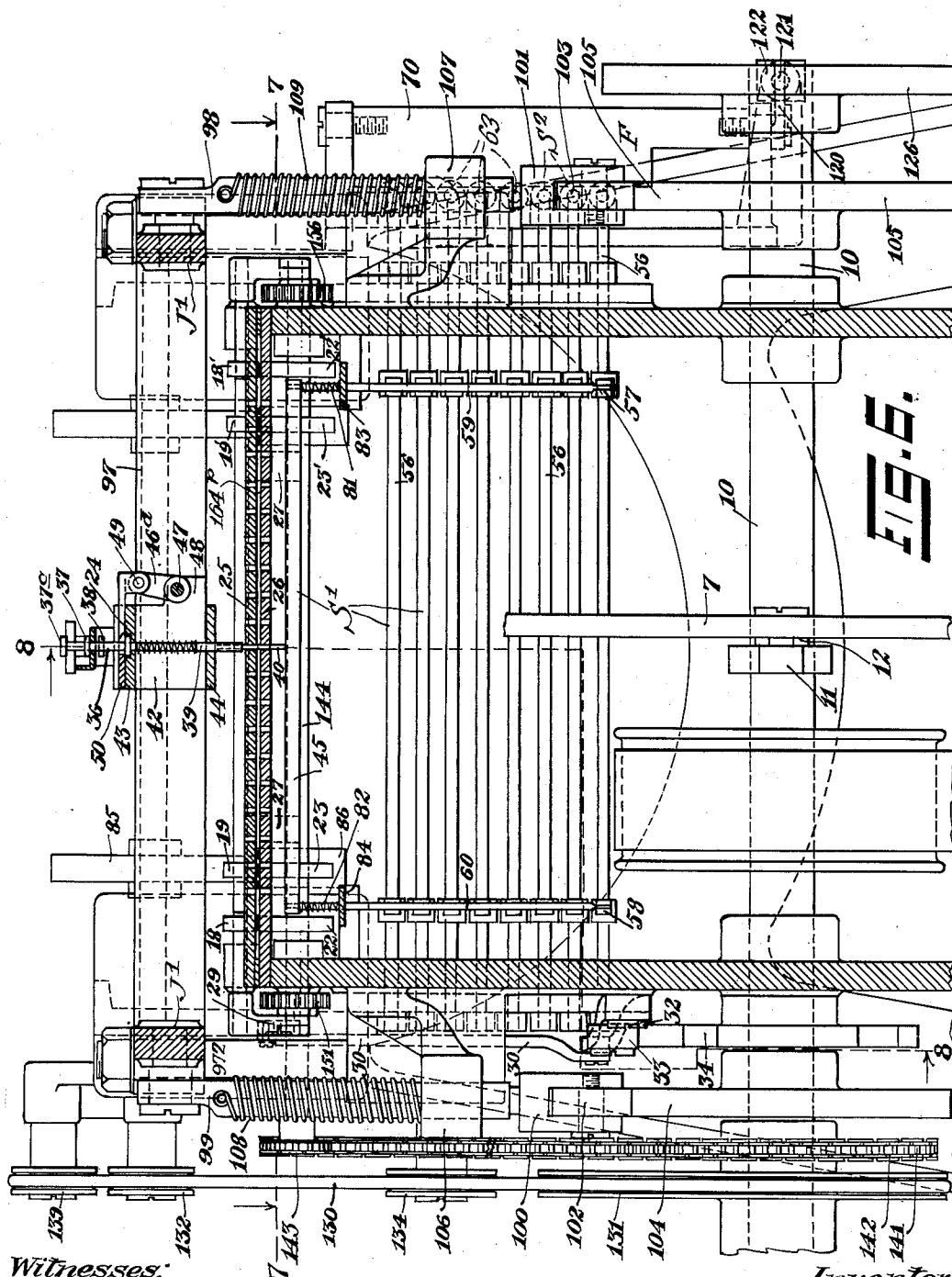
SELECTIVE CARD SORTING MACHINE FOR COMPILING STATISTICS.

APPLICATION FILED FEB. 15, 1912.

1,203,261.

Patented Oct. 31, 1916.

10 SHEETS—SHEET 6.



Witnesses:

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SELECTIVE CARD SORTING MACHINE FOR COMPILING STATISTICS.

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1,203,261.

Patented Oct. 31, 1916.

10 SHEETS—SHEET 7.

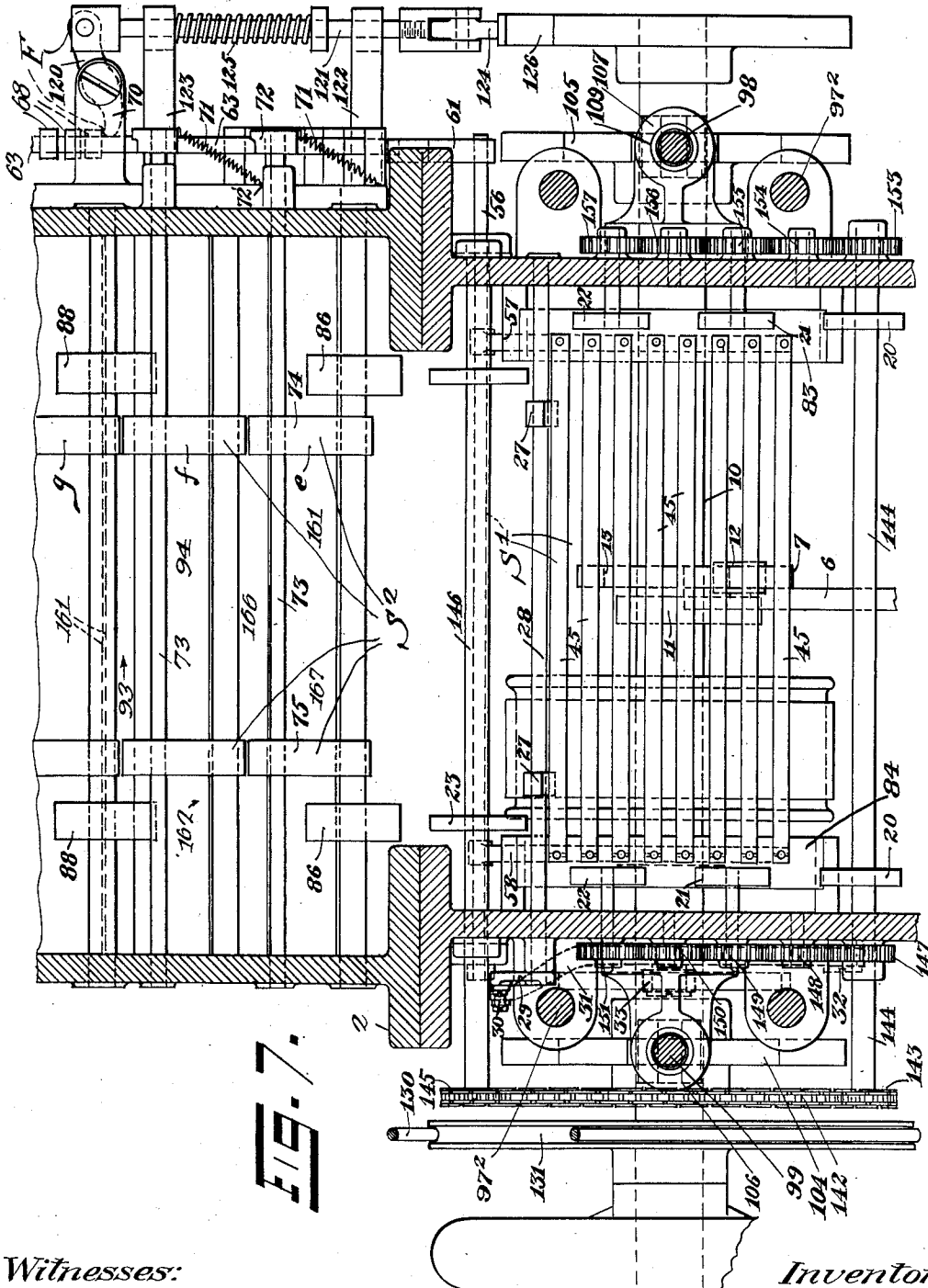


FIG. 7.

Witnesses:

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SELECTIVE CARD SORTING MACHINE FOR COMPILING STATISTICS.

APPLICATION FILED FEB. 15, 1912.

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10 SHEETS—SHEET 8.

1,203,261.

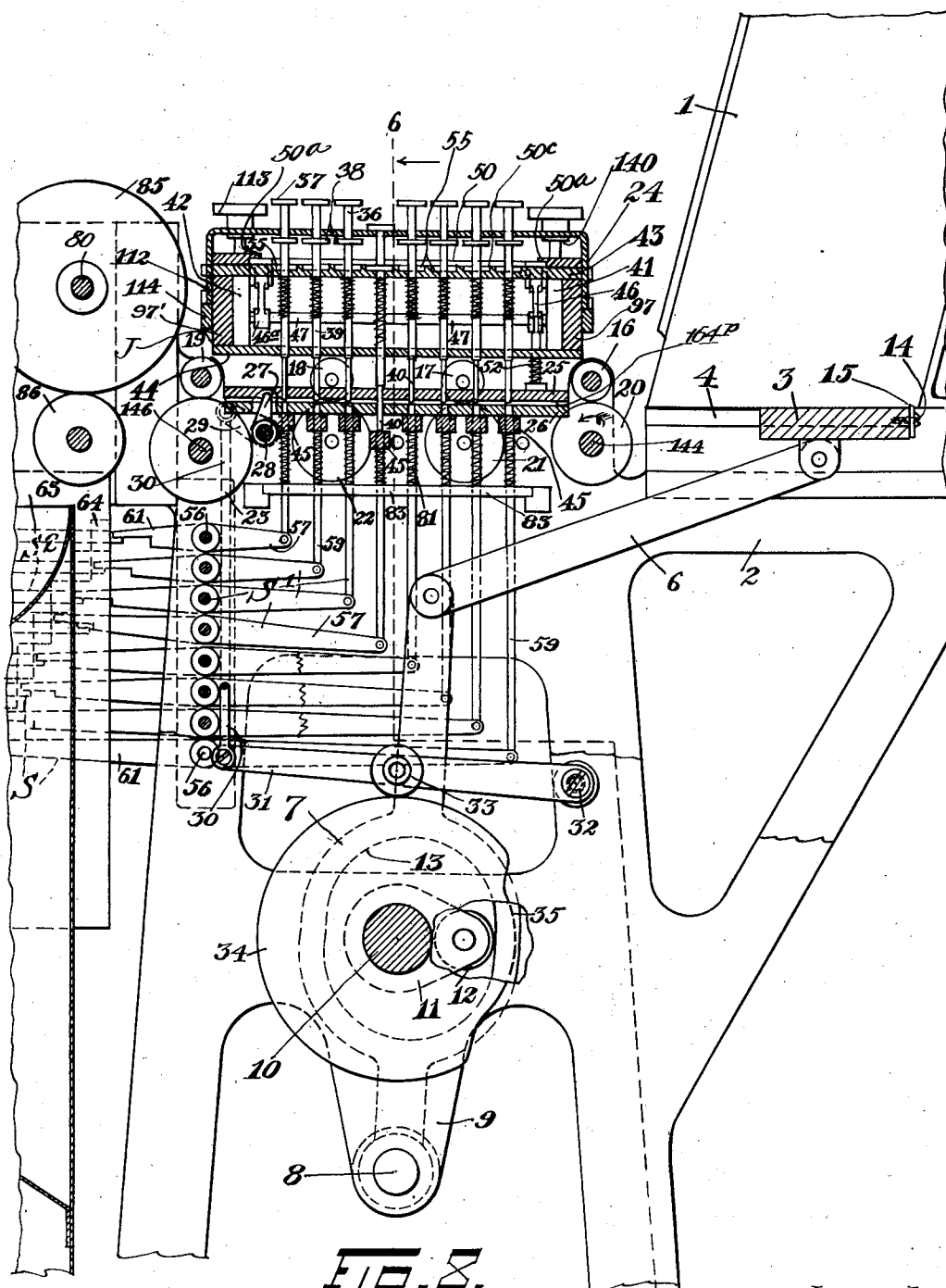


FIG. 2.

Witnesses:

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J. H. Richards

SELECTIVE CARD SORTING MACHINE FOR COMPILING STATISTICS.

Patented Oct. 31, 1916.

10 SHEETS—SHEET 9.

1,203,261.

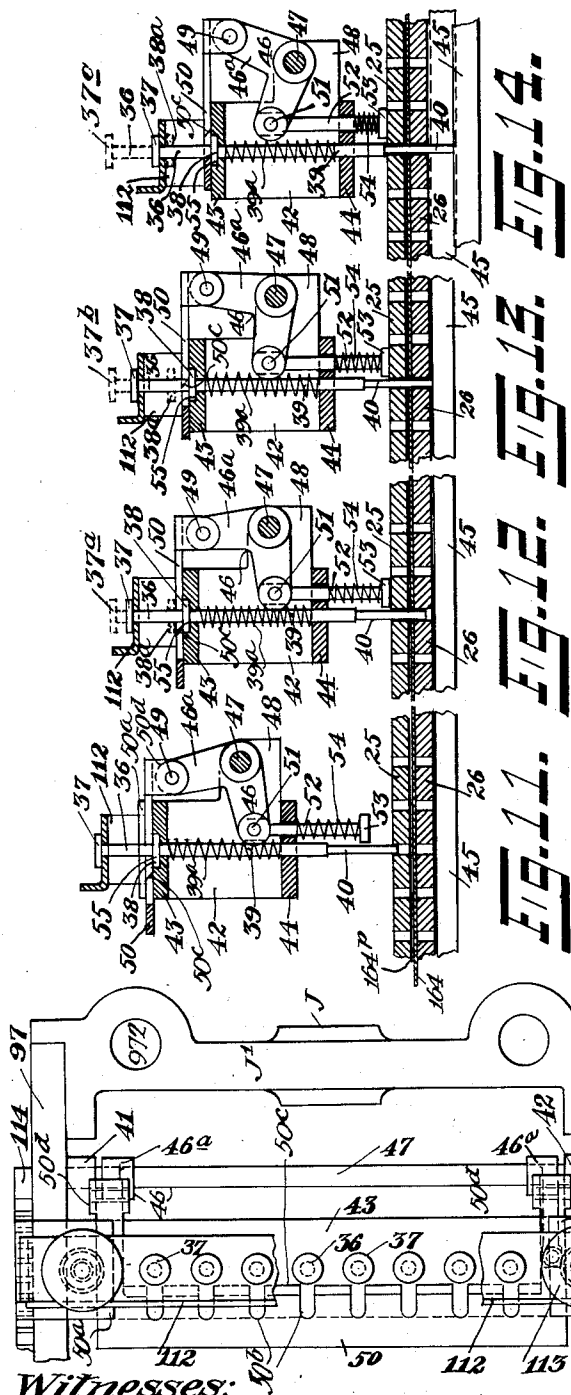
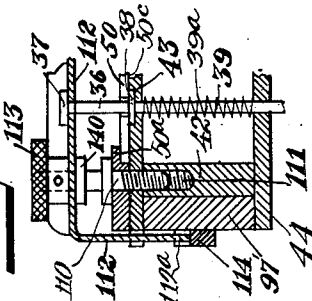


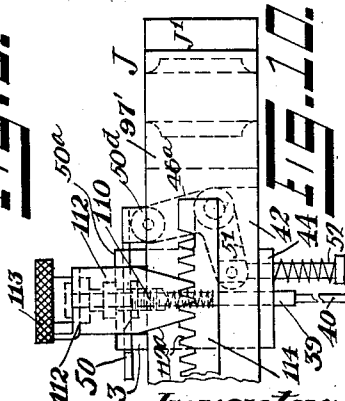
Fig. 11. Fig. 12. Fig. 13. Fig. 14.



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19.75.



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07-10-10

Witnesses:

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H. O. Penney

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Inventor:
James Powers,

Wm. H. Richards.

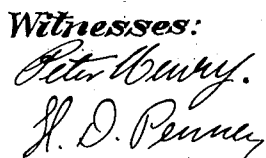
AGENCY	COM.	PR.	RATE
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2 2 2 2	2 2 2 2	2 2 2 2	2 2 2 2
3 3 3 3	3 3 3 3	3 3 3 3	3 3 3 3
4 4 4 4	4 4 4 4	4 4 4 4	4 4 4 4
5 5 5 5	5 5 5 5	5 5 5 5	5 5 5 5
6 6 6 6	6 6 6 6	6 6 6 6	6 6 6 6
7 7 7 7	7 7 7 7	7 7 7 7	7 7 7 7

SELECTIVE CARD SORTING MACHINE FOR COMPILING STATISTICS.

Patented Oct. 31, 1916.

10 SHEETS—SHEET 10.

Fig. 17.



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UNITED STATES PATENT OFFICE.

JAMES POWERS, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO POWERS ACCOUNTING MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

SELECTIVE CARD-SORTING MACHINE FOR COMPILING STATISTICS.

1,203,261.

Specification of Letters Patent.

Patented Oct. 31, 1916.

Application filed February 15, 1912. Serial No. 677,771.

To all whom it may concern:

Be it known that I, JAMES POWERS, a citizen of the United States, residing in New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Selective Card-Sorting Machines for Compiling Statistics, of which the following is a specification.

My present invention relates to an improvement in selective mechanical record card sorting machines and is designed to sort cards in a mode and with mechanism which are simpler and better adapted to general accounting and commercial uses than those set forth in my Patent No. 1061118 of March 6, 1913; which embodies apparatus especially designed to topically analyze and compile all the statistical data recorded in sequences of record cards and to simultaneously sort them. Such machines are very broad in their scope and suitable for census and other statistical work; but are more complicated than is necessary or desirable in machines for general accounting and commercial uses. To adapt my apparatus to such uses, I have separated the sorting and compiling functions and invented simple, compact cheap machines for doing each. Such a sorting machine is herein described. One of its greatest advantages is that it embodies a simple selective, analyzing and controlling member or pin box, comprising the minimum number of parts and manually adjustable to sort the cards topically as desired, in accordance with data recorded in their different zones, or record-series, or groups of series, and to cull out of a sequence of cards those only which record data of a particular nature. Other advantages are the simplicity and directness of its actions; of the means for locking the analyzing and controlling pins after they are positioned in accordance with the card-record, preparatory to their operation of the sorting actions; and the compactness and convenience of the bins for sorted cards.

In the accompanying drawings, Figure 1 is a perspective view of one of the sorting elements. Fig. 2 is a front elevation of my device. Fig. 3 is a side elevation. Fig. 4 is a plan view enlarged. Fig. 5 is a side eleva-

tion of a portion of the machine enlarged. Fig. 6 is an enlarged sectional view on line 6—6, Fig. 8. Fig. 7 is an enlarged sectional view on line 7—7, Fig. 6. Fig. 8 is an enlarged side view in section, on line 8—8, Fig. 6. Fig. 9 is an enlarged plan view of the selective analyzing pin box. Fig. 10 is a side elevation of the same. Figs. 11, 12, 13 and 14, are sectional views showing successive positions of the pins. Fig. 15 is a section, corresponding with Figs. 9 to 14, of one end of the pin box. Fig. 16 is a view of one form of card; and Fig. 17 is an enlarged section of two of the double bins for sorted cards, showing how they automatically stack therein.

As in my patented apparatus pertaining to this art, I provide a frame 2, and mounted therein a main shaft 10 adapted to be connected with a source of power and provided with transmission members suitable to operate the moving parts of the apparatus; a pair of card plates 25 and 26 spaced to form a card path 164^a and perforated in series corresponding with the record-point series of record cards 164 which are to be sorted; a card hopper 1, for stacks of cards; a card picking organization (Fig. 8) adapted to pick cards one at a time from the bottom of the stack in the hopper and advance them to the feed-rolls and comprising a plate 3 reciprocated in guides 4 by a slotted rocking lever 7, connected by a link 6 with said plate and pivoted at 8 on an extension 9 of the frame and rocked by a crank 11 fixed to the main shaft and pivotally mounting a roller 12, which engages the inner surface 13 of the slot in and rocks said lever and reciprocates and properly times the motion of the plate 3. The blade 14 of the picker is adjustably secured to the plate 3 so that its edge 15 may be properly set.

Properly located transversely of the card path is a card stop (Figs. 7 and 8) adapted to arrest cards and locate them in operative position, with their record points (perforated and unperforated) registering with the series holes in the card plates 25, 26, and with the pins, and comprising twin detents 27, fixed to a rock shaft 28 which bears an arm 29 linked by a link 30 to the free end of a lever 31, pivoted on the main frame at 32 and medially mounting a roller

33 in contact with a cam face 35 formed on a discoid 34 fixed to the main shaft and adapted to rock and properly time the card stop.

5 Mounted on the frame is a positively driven feed-roll organization whose feed-plane coincides with the card path 164^a between the card plates 25 and 26, and which is generally similar to that described in my
10 said patents, but invented and adapted to receive cards advanced by the card picker, to further advance them to contact with the card stop and analyzing position in the card path, and subsequent thereto to remove them
15 therefrom and comprising pairs of twin primary rolls 20 and 16, delivery rolls 23 and 19 and intermediate pairs 21 and 17, and 22 and 18, the larger members indicating the lower twin rolls and the smaller members
20 the upper.

All the lower rolls and the upper primary rolls 16 are positively driven by a gear train comprising sprocket wheels respectively 141 on the main shaft, 143 on the shaft 144 of
25 the primary rolls 20, and 145 on the shaft 146 of the delivery rolls 23, and a link-and-pin chain 142 meshing with said sprockets; and gear trains respectively connecting the lower primary shaft 144 with the shafts of
30 the upper primary and lower intermediate rolls, as follows: gears 147 and 153 on the ends of the shaft 144, and gears 169 meshing therewith on the shaft of and driving the upper primary rolls 16; gears 149 and 155
35 on the shaft of the first intermediate rolls 21; gears 151 and 157 on that of the second intermediate rolls 22; and idlers respectively 148, 154 connecting the lower primary and first lower intermediate and 150, 156 connecting the lower intermediates. The upper
40 upper intermediate and delivery rolls are mere pressure rolls.

The lower rolls all revolve on fixed axes and the upper are lightly spring-pressed
45 against them; and the upper intermediate roll shafts are mounted in pivoted spring-pressed links, as the lower intermediates are in said patent. The above described organization differs from that described in my
50 aforesaid patent in that it is inverted, contains an additional pair of rolls and its connection with the main shaft is by chain gearing in lieu of a bevel-gear train.

Because the locating of cards in position
55 for analysis must be accurately timed to the motions of the pin-box, no slip can be tolerated in the above-described feed-rolls while advancing a card and therefore they are positively driven. In my aforesaid
60 patent, the posterior rolls are also positively driven; but practical use has demonstrated that a frictional drive is at once cheaper and more satisfactory for the latter and I therefore use it in this apparatus for the
65 posterior rolls, which are adapted to receive

analyzed cards from the aforesaid positively-driven feed organization and advance them to the sorting members proper and sorted card bins, above which said rolls are located. They comprise (Fig. 5) four pairs of upper
70 and lower twin rolls respectively 85 and 86, 87 and 88, 89 and 90, and 91 and 92.

The lower twin rolls are severally mounted by their shafts in spring-supported bearings and thus lightly pressed against the upper
75 rolls, whose shafts 80 are mounted in fixed bearings and respectively bear belt pulleys 132, 133, 135 and 136, driven by a belt 130 which engages a pulley 131 on the main shaft and thence runs around an idler 139
80 (located for convenience above the initial roll 85), a tightener 138 posterior to the last roll 91, down to an idler 137, located below the rolls, up to and around the pulleys 136 and 135 of the rolls 91 and 89, down to a second
85 lower idler 134, up to and around the pulleys 133 and 132 of the rolls 87 and 85, to the driving pulley 131. The tightener, 138, is mounted by its shaft in the free end of an arm 138^a pivoted on the frame by a pivot
90 138^b and retracted by a spring 138^c strained between it and a fixed abutment on the frame and which gives the belt 130 the proper tension.

To prevent the overhung tightener pulley 95 from causing twisting strains on the pivot 138^b a slot 138^d is formed in the frame and a pin fixed in said arm passes through and engages the margin of said slot by its projecting head 138^e, and sustains the outward
100 component of the pull of the belt: which arrangement is much more convenient and cheaper than a forked arm and central bearing pivot and equally satisfactory.

The pin box 24 is manually-adjustably
105 mounted above the card plates, parallel with the card feed, on and reciprocated with an open table-like jig frame J, built of transverse bars 97 and 97' which constitute the slides for the pin box, and bear positioning
110 racks 114; laterals J¹; and downwardly-extending guide-arms 97², which engage parallel guides on the frame,—all the above members being rigidly connected,—and a pair of posts 98 and 99, which are pivoted
115 at their upper ends on the laterals J¹, extend through guides formed in bosses 106, 107 on the frame and terminate respectively in detachable forks 100 and 101 and rollers 102 and 103 revolubly mounted therein, by
120 means of which the jig frame J and pin box ride on and are reciprocated by cams 104 and 105, fixed to the main shaft.

Balancing springs 108, 109, interposed between the main frame 2 and the jig frame
125 J, substantially balance the reciprocated weights, are strained during their descent, assist in lifting them, and prevent waste of power. The reciprocation is so rapid that a gravity balance would be too slow and
130

therefore impracticable. For convenience, these springs are shown severally enveloping and attached at their upper ends to the posts 98 and 99 and strained between them and the guide-bosses, 106, 107, on the frame, through which said posts play.

The pin box 24 comprises upper and lower pin plates respectively 43 and 44, perforated with a single series of holes (illustrated as eight in number), spaced to register with the longitudinal or column series in the card plates 25, 26, and cards 164; inset end separators 41 and 42 which connect and space the pin plates and together with the extending ends of the latter form parallel guides by which the pin box is mounted on the jig-frame slides 97 and 97'; a pin-lifting U-shaped plate 112 perforated in register with the pin plates 43 and 44 and having down-turned arms terminating in racks 112^a corresponding with the positioning racks 114 attached to the jig frame slides 97, 97',—the rack teeth corresponding with the transverse spacing of the hole-series in the card-plates, so that the engagement of the racks accurately and adjustably positions the pin box; a pair of screws for lifting the U-shaped racks 112^a clear of the positioning racks 114, and whose shanks 110 extend through holes in the U-shaped plate 112 and engage it between collars 140 and milled heads 113, pinned to said shanks, whose threaded ends engage tapped holes 111, in the separators 41 and 42; a series of analyzing pins 36 corresponding with and mounted in the series-perforations of the pin-box, and U-plates, 43, 44 and 112; and a lock-plate 50 adapted to lock functioning pins to the pin-box and to leave non-functioning ones free to be axially moved.

The pins and their mode of operation are best illustrated in Figs. 9 to 15. Each pin 36 is formed with a shank, 40, adapted to pass through the series holes in the card plates 25—26 and cards 164; with a larger body 39; an exterior head 37, by which the U-shaped plates 112 can lift it; and a collar 38 adapted to be engaged by the lock plate 50 and normally located in a socket 55, formed about each series hole in the upper pin plate 43. Light springs, 39^a, attached at the lower end to the body 39 of the pin and strained against the upper pin plate 43 normally hold the pins extended, (Fig. 11). The lock plate 50 rests on the upper pin plate 43; is confined adjacent thereto by the engagement of its ends with parallel guides 50^a (Figs. 9 and 12); contains slots 50^b corresponding with pin bodies 39; its anterior edge 50^c is beveled so that it may easily slide under the collar 38 of a non-functioning pin; and has at its ends anteriorly-extending arms terminating in pin bosses 50^d for its operating connection. Its

operating mechanism consists in a forked bell crank lever 46 comprising a rock shaft 47 mounted in extensions 48 of the separators 41 and 42; a pair of arms 46^a thereon loosely connected to the lock plate 50 by pins 49 which engage the bosses 50^d thereof; a driving arm 51 fixed to said crank-lever, and a plunger 52 pivoted thereon, extending through and located by an opening in the lower pin plate 44, terminating in a head 53 and enveloped by a spring 54 strained between said head and pin plate. When the pin box is fully elevated the head 53 of the plunger 52 is separated by a considerable clearance (Fig. 11) from the upper card plate 25; and as it descends and the unperforated portion of the card supports holds stationary the non-functioning pins, the pin box recedes from them and leaves their collars 38 in free air, clear of the sockets 55, before the plunger contacts with the card plate, becomes stationary and causes the bell crank 46 to swing and advance the lock-plates 50 to lock down the functioning pin by engaging its collar 38. Thus I make sure that properly non-functioning pins are not accidentally locked and caused to function with the sorting actions.

The operation of this apparatus is as illustrated in Figs. 9 to 15. When the pin box is fully elevated (Fig. 11) the shanks 40 of the pins 36 slightly engage the series holes in the upper pin plate 25. When it is desired to adjust the location of the pin box 24 so that its pins 36 may coact with a different series of perforations in the card plates and record-points of cards, the screws 110 are backed out and their collars 140 lift the U-plate 112 so that the racks 112^a and 114 clear one another and the pins clear the card plate 25; the pin box is shifted until its pins approximate their desired position; and as the screws 110 are driven home, the U-plate is lowered, its rack teeth engage those of the positioning rack 114 and precisely set the pin box, so that its pins enter the corresponding series of holes in the card plate 25. When the main shaft 10 is revolved, the card picker 3 picks a card from the bottom of the card-stack in the hopper 1 and advances it to the positively-driven primary feed rolls 20—16, which advance it, in proper time, to its proper position for analysis, as determined by its contact with the card stop 27 set for that purpose by the cam 34. In proper sequence the pin box cams 104, 105 permit the descent of the pin box and pins from the position of Fig. 11 to that of Fig. 14. Such pins as find no registering perforations in the card 164 are thereby supported and positioned with their heads separated from the U-plate 112 (as indicated by the dotted heads 37^a, 37^b and 37^c in Figs. 12, 13 and 14) with their

collars above and clear of the lock plate 50 (as indicated by the dotted collars 38^a in said figures); the motion of the lock plate being so timed as aforesaid that the pin plate 43 retires from and leaves the collars 38 of such non-functioning pins clear, in air, before the beveled anterior edge of said plate can foul them; and beveling said edge enables the plate to enter under the collars; and if necessary to slightly retract the non-functioning pins, so that it is impossible for the machine to be stopped by contact of said plate with the collar of a pin which is accidentally slightly lower than it should be, at such a period in the motion cycle, as illustrated in dotted lines, 38^a, in Fig. 12. The action of the pin which, during the descent of the pin box, finds and passes through a record perforation in the card, is illustrated in full lines in said figures. Starting with the tip of its shank 40 slightly entered into the hole in the upper card plate 25, it is held extended by its spring 39^a and passes through the hole in the card and into that in the lower card plate 26 before the sharp edge of the advancing lock plate 50 engages its collar 38; this relative motion making it sure that non-functioning pins will be left clear and free of the lock plate as above set forth. The pin box continuing to descend, the prongs of the lock plate advance between the pin bodies 39 beneath the collars of non-functioning pins (thus left free) but above the collar 38 of the functioning pin (which collar remains in its recess 55) thereby locking it in fully advanced position before it contacts with the actuator 45 of the sorting action, as illustrated in Fig. 13. During the conclusion of the descent, the functioning pin remains securely locked by the lock plate 50 and moves said actuator and causes the sorting action to function, as will be hereinafter described. The initial descent of the pin box moves the head 53 of the plunger 54 through free air into contact with the card plate 25 and thereafter said plunger, being stationary, causes the bell crank to swing and advance the lock plate. During the ascent of the pin box, the spring 54 swings the bell crank, and retracts the lock plate, so that the non-functioning pins can be extended by their springs 39^a and their collars 38 enter their sockets 55 and the pin box be ready to function with another card.

Cards recording statements by means of holes arranged in certain orders convey ideas to experts only. Their value inheres in their capacity to control the functions of machines adapted to topically sort them, and to analyze their statements and to translate them into common terms. The general characteristics of such machines are series of pins adapted to analyze and reproduce such statements by being extended through

record-perforations into operative planes of the machine to initiate the operation of suitable actions. The above described modifications and improvements of apparatus of such general character adapt it to control a series of actions S, of novel construction, and cause them to topically sort sequences of cards suitable for ordinary accounting and commercial uses, such, for example, as that illustrated in Fig. 16. Such cards are conveniently arranged in divisions or zones each relating to a certain topic and containing one or more series or columns of record points generally designated, for convenience, by characters, preferably numerals, and each, by its location, signifying a definite fact.

The card illustrated is used by insurance companies for tabulating the business of their agencies. It contains four zones respectively headed "Agency," "Com." (commission), "Pr." (premium), and "Rate"; and each zone contains a plurality of series (columns) of eight record-points designated in order by "0" and succeeding digits. In the use of such cards, the selective pin box 24 of the machine is transversely adjusted upon the slides 97, 97' and set by means of the racks 112^a, 114 to coact with a selected series or column of record-points when a card is properly positioned in the card-path 164^b; and a sequence of such cards fed through the machine controls it, and causes it to topically sort said card-sequence in accordance with the location or lack of a record-perforation in the selected series of each card. In such operations the pins 36, where shanks 40 find no perforations in a card, are upheld thereby and rendered non-functioning, but those which find perforations extend their ends through them and through and below the lower card plate 26, there reproduce the statement recorded in the card, and cause the operation of a corresponding sorting action, S, and the deflection of the card thereby into a corresponding path and receptacle; and, each card controlling its own path and distribution, the sequence is topically sorted.

My improved action S (Fig. 1) consists in two essential elements, viz., an initiating member S¹ adapted to be operatively positioned by a functioning pin shank 40; and a deflecting member S² normally positioned to permit free passage of cards, but adapted to be positioned in consonance with a card-controlled position of said initiating member S¹ to deflect them into a certain receptacle. The arrangement of said receptacles or bins will be later described. In its preferred form the initiating member S¹ is a forked lever comprising a rock shaft, 56, by which it is pivoted in the frame 2, a pair of actuating arms 57, 58 whose free ends play substantially in the same vertical plane

with a transverse row of holes in the card-plates 25, 26, and an oppositely extending release arm 61, adapted to confine the deflecting member S^2 in non-operative position and to release it so that it may be spring-oscillated into deflecting position. For lightness, and in order that a plurality of such actions may be conveniently assembled and compact, the shaft 56 is located some distance below the card plates and the free ends of its actuating arms 57, 58 are provided with a light and open head which comprises an actuator bar 45 which is illustrated as extending transversely of the machine and card-path 164^a across the latter and normally in contact with the under side of the card plate 26 and covering a transverse row of holes therein, and pivotally connected with the arms 57, 58 by rods 59, 60, which play in guide-bores formed in bars 83, 84, attached to the frame 2. It will be noted that the upward extension or head of the arms 57, 58 formed by the actuator 45 and rods 59, 60, together with said arms, constitute a parallel motion apparatus. The initiating member S^1 is normally spring-positioned with the actuator 45 in contact with the card plate 26 and its release lever 61 inoperatively positioning the deflector S^2 . As illustrated, this is done by a pair of springs 81, 82, strained between the actuator 45 and the fixed bars 83, 84. The release lever 61 is tapered in order that adjacent ones may not foul, and it has a positioning rabbet 67 in the under side of its free end for contact with a corresponding rabbet 62 in the deflecting member S^2 . The deflecting member S^2 is also preferably a forked (bell-crank) lever comprising a rock shaft 73 by which it is pivoted in the frame 2; a pair of deflectors 74 and 75 fixed to said shaft and formed with deflecting faces 76, 77 which are preferably concavo-cylindro quadrants substantially tangent, at their upper and lower extremities respectively, to the horizontal and vertical, or rather to the path of an approaching card and to the direction of the bin into which the deflector deflects it; and a depending operating arm 72, adapted to be operably connected with and controlled by the release arm 61 of the initiating member S^1 , to confine and release the deflecting member S^2 . A spring, 71, strained between the arm 72 and a fixed abutment 72' on the frame 2, deflectingly positions said member when it is released. In order that a plurality of such actions may be conveniently and compactly assembled and their respective actuating and deflecting members S^1 and S^2 conveniently operably connected, the operating arm 72 of the deflecting member is provided with an extending head 63 to which it is flexibly connected, preferably by a pin-and-slot connection, and which comprises an extension

or thrust rod connected thereto as aforesaid, slidably mounted in bearings formed in bosses 64, 65 on the frame 2 and provided with a retracting tappet, 68, conveniently located, and a rabbet 62 terminating in a shoulder 66, in the upper side of its near end. As best illustrated in Figs. 3, 4, 5 and 8, I provide (in this instance eight) a plurality of such actions S , corresponding and severally coacting with a like plurality of longitudinal rows of holes in the card-plates 25 and 26. The rock shafts 56 of the initiating members necessarily extend transversely across the machine and in order that they may clear the transmission and moving members, they are arranged in a vertical plane (Fig. 8) and the actuating arms 57, 58 of the several actions are of graduated lengths in order that they may extend to the planes of the hole-series (in the card plates) with which they co-act. Therefore their release arms 61 are correspondingly graduated in length to the end that the equal motions imparted to their actuators 45 and actuating arms by functioning pin shanks 40 shall cause equal motions of the free ends of their release arms 61. Therefore the inner bearing bosses 64 and near ends of the lever-heads 63 thereby supported are correspondingly located and stepped (Figs. 3 and 5); and because the distances of the several deflectors from the pin plates are necessarily graduated to correspond with the locations of the bins into which they deflect cards, the heads 63 which extend the lever arm 72 are of correspondingly graduated lengths.

The deflecting members or deflectors are designated e, f, g, h, i, j, k and l in the order of their distances from the card-plates; the operating arms 72 of all the actions are equal in length, in order that they may all have equal motions and be retracted by a common retractor F ; and because their several extension heads 63 are most conveniently arranged horizontally, in a vertical series, corresponding with the shafts 56 and release arms 61 of the initiating members S^1 (which could not be conveniently arranged in other than vertical series) the said heads 63 must not only extend the lever arm 72 horizontally, but also vertically; and in order to support the far ends of said heads, the far bearing bosses 65 should be and are outwardly stepped, (Figs. 3 and 5).

The extension heads 63 being in vertical series and the actuating arms 72 in a horizontal line, substantially coinciding with the upper head 63, the remaining heads are necessarily extended vertically, which is done by fixing a vertical arm to the second highest head, interior to its far bearing-boss 65 and by bending up the ends of the remaining ones, exterior to their far bosses. It will be observed that each arm 72 forms with its

head 63 a parallel motion horizontally extending the motions of said arm. The tappets, 68, of all the heads 63 are in one vertical plane when retracted and when advanced to coact with the retractor F, as will be set forth.

In my aforesaid patent I provide for and above each sorted-card receptacle, a pair of distributing rolls and a hood-shaped deflector mounted co-axially with and above the upper roll and provided with depending deflector arms on which the deflecting surfaces were formed. This arrangement of the deflectors necessitated giving them a large angular movement and made them costly and inconvenient to mount and maintain, besides requiring an unnecessary number of distributing rolls. In the present invention I provide less than half the number of rolls for an equal duty and greatly reduce the angular movement of the deflectors. To these ends I separate the roll and deflector mountings (Fig. 5), locate two independently mounted deflectors between adjacent roll-pairs and posterior to the final pair, and locate the axes of the deflectors in a horizontal plane slightly below the feed plane of the rolls so that while cards will nicely clear inactive deflectors, a slight angular movement thereof will locate their deflecting surfaces 76, 77 across, and the anterior margins thereof slightly above, and tangent to the path of approaching cards and cause them to be intercepted without shock and deflected without injury.

In my aforesaid patent I provided a common retractor adapted to retract all the operative deflectors simultaneously and a supplemental action extending from each deflector to an operable location relatively to said retractor. The duty of such apparatus is found in the speed at which it is practicable to advance cards by the feed organizations and therefore I make maximum duty machines by so timing their several functions that a card is being translated during almost the entire duration of the motion cycle and accelerate as rapidly as possible the reciprocation of the pin box, during which the card is necessarily at rest. To accomplish this I make the action S with its initiating member S^1 self-retracting by springs so that it can follow the return motion of the pin box and not positively connected with, but only operatively positioned relatively to the deflecting member S^2 ; I make the latter merely confinable and releasable by the former, and elastically self-settable; and secure its reliable and perfectly-timed return to inoperative position by an independent connection with the main shaft; and for economy I so return the deflecting members S^2 of all the actions S by a common retractor. In this case I provide a retractor F of similar functions but greatly simplified and im-

proved, and adapted not only to retract but also to operatively position active deflectors. Its functioning member is a prismatic rocker or action stop 70, of gourd-shaped section (Fig. 1) mounted on the frame 2 to rock on a vertical axis, with its nose 69 adjacent to the deflector extension heads 63, in the motion-plane of their tappets 68 and adapted when moved to the near limit of its arc of motion, to arrest released, spring-advanced deflectors by contact with their said tappets and thereby operatively position their deflecting surfaces 76, 77; and when moving to its far limit, to retract advanced deflectors and their extension heads 63, so that the shoulders 66 thereof may be engaged by the ends of the release arms 61 of the initiating members S^1 .

The rocker or action stop 70 is rocked by means of a crank 120 fixed to it and a crank rod 121 pinned thereto, slidably mounted in bearings formed in brackets 122, 123 on the frame 2, and terminating in a roller 124, held in operative contact with a cam 126 fixed to the main shaft 10 by means of a spring 125 enveloping said rod and strained between a collar thereon and the bracket 123.

I have stated that the duty-limit of the machine inheres in the practicable linear speed of moving cards. Obviously, therefore, if the distance necessarily traveled by them be decreased, the number handled, and the duty of the machine, can be correspondingly increased: to this end I practically halve the space necessary for sorted card bins, such as shown in the aforesaid patent, by arranging them in a plurality of vertical tiers, illustrated as two, as best shown in Figs. 3, 5 and 17. This is practicable because the height above the floor at which the card path 164^p is located, in order to be comfortable for the operator, is so great relatively to the height of convenient stacks of sorted cards, that the space beneath the distributing rolls 80—92 and deflectors $e \dots z$, will contain several tiers of sorted card bins of conveniently large capacity. It saves time and trouble to make such bins removable, with their contents undisturbed, in lieu of having to pick stacks of cards out of a narrow space. I therefore provide sets (five) of boxes 161 adapted to be slid into their proper places and removed. The posterior undivided box X is for rejected cards. The remainder have parallel inclined bottoms 160^a and medial partitions 160 which divide them into lower and upper tiers of bins respectively m, n, o, p , and r, s, t, w . Chutes 93, with flared mouths 94, communicating with the lower bins, are formed to the posterior side of the boxes by transverse partitions 162 extending vertically from the high edges of the medial partitions 160 and anteriorly at their tops. The bases on which the boxes stand are formed by terminating

their lateral walls 161^a in horizontal planes, (Fig. 17).

In practical use it has been found convenient that the faces of cards shall be uppermost when they are in the hopper 1 and passing between the card plates 25, 26, but reversed when stacked in the sorting bins; and to insure their reversal and make sure that they will stack properly in said bins, I provide a curved guide plate, 165, fixed tangent to and diverging from the posterior wall of each lower bin, just below the chutes 93, and adapted to anteriorly deflect descending cards 164 and cause them to fall and stack properly, as illustrated in dotted lines to the left of Fig. 17; and to secure a similar result in the upper bins, I provide curved, anteriorly-diverging plates 166, secured to the top of flared partitions 162, and shorter, curved, posteriorly-diverging plates 167, secured to the tops of the anterior walls, the lower edges of said oppositely-curved plates being separated by a space proper for the passage of cards.

As indicated in Fig. 5, a fixed deflecting plate, 168, terminates the card way and deflects rejected cards into the posterior bin X, which, like the upper sorted card bins *r*, etc., is equipped with deflecting plates 166, 167, of functions such as above described.

The operation of my apparatus is as follows: Cards stacked in the hopper 1, with their column-series parallel with the feed and the adjusted pin-series of the pin-box 24, and preferably with their trimmed edge and naught row and headings in advance, are singly picked from the bottom of the stack by the card picker 3 and thereby advanced to the positively driven primary feed rolls 20—16, which advance them to the intermediate rolls 21—17, 22—18, contact with the card stop 27 and analyzing position in the card-path 164^a between the card plates 25, 26; the pin box 24 and pins 36 descend and the pin shanks 40 register with the record points of the selected card-series. If there be no perforation the card supports and renders all the pins non-functioning; the actions S are unaffected; and in due course such cards are advanced to the reject bin X. But if a record point in the card be perforated, a corresponding pin 36 extends its shank 40 therethrough, continues to descend with the pin box, is locked and rendered functioning by the lock-plate 50 (other pins becoming non-functioning, as above set forth), and initiates the operation of the corresponding action S by actuating its initiating member S¹ to release the deflecting member S² and cause it to be shifted from non-operative to operative position and to deflect to the associated bin, the card which controlled its setting.

In precise terms, when the pin box descends the functioning pin initiates the oper-

ation of the corresponding action S by depressing the extended head or actuator, 45, of its initiating lever and its thereby-extended lever arms 57, 58 and lifting its release arm 61; and thus releases the extension head 63 of the deflecting lever (*h*, as illustrated in Fig. 5) of the action, whose spring, 71, rocks it, advances said head until its tappet 68 contacts with the retired nose 69 of the retractor F and correspondingly tilts the deflectors 74, 75, so that their faces 76, 77 lie athwart the card way, ready to intercept the card which caused such movements, when it is further advanced, and deflect it into the associated bin.

The reciprocation of the pin box 24, the oscillation of the initiating member S¹ and the repose of the functioning card between the card plates, occupy the briefest possible period; and the functioning deflecting member S² remains operatively set during the remainder of the motion cycle. This is possible because the initiating member S¹ and deflecting members S² of each action are not positively connected, but merely operatively positioned; and this mode results in maximum duty machines in which the linear speed of cards is not great enough to cause their injury. Superposing the sorted card bins in a plurality of tiers shortens the distance traveled by cards and correspondingly increases the duty of the machine with a certain card-speed. The deflecting plates connected with the bins cause the cards to stack in the desired arrangement, convenient for removal and subsequent uses. At the completion of the motion-cycle the retractor F quickly returns the functioning deflector-lever to non-operative position and the machine is ready to repeat its cycle of operations.

Having thus described my invention, I claim:—

1. The combination of a frame carrying a card support having rows of perforations therein, a pin-box having a row of pins thereon that are placed corresponding to the perforations in the rows, the pin-box being arranged to be supported in different positions adjacent the support to register with the different rows of perforations permitting the pins to coöperate therewith, and a set of members operatively connected with the pins of the pin-box to be separately operated thereby according to the pins.

2. The combination of a frame carrying a card support having rows of perforations therein, a pin-box having a row of pins thereon that are placed corresponding to the perforations in the rows, the pin-box being arranged to be supported in different positions adjacent the support to register with the rows of perforations permitting the pins to coöperate therewith, and a set of members operatively connected with the

pins of the pin-box to be separately operated thereby, one for each of the individual pins in the pin-box.

3. The combination of a frame carrying
5 a card support having rows of perforations therein, a pin-box having a row of pins thereon that are placed corresponding to the perforations in the rows, the pin-box being arranged to be supported in different positions
10 adjacent the support to register with the rows of perforations permitting the pins to cooperate therewith, and a set of members operatively connected with the pins of the pin-box to be separately operated there-
15 by, each of the pins in the pin-box serving to actuate the same member in any of the said positions of adjustment of the pin-box relatively to the said support.

4. The combination of a support for a
20 record card having a series of sets of perforations therein, a pin-box having a set of pins carried thereby, the pin-box being adjustably supported to bring its set of pins in position to cooperate with the different
25 sets of the said series of perforations in the plates.

5. The combination of a support for a record card having a series of sets of perforations therein, a pin-box having a set
30 of pins carried thereby, the pin-box being adjustably supported to bring its set of pins in position to cooperate with the different sets of the said series of perforations in the plates, a series of card deflectors, and an
35 individual member connected with each of said deflectors, each of which members co-operates with one of said series of sets of perforations in the card support to cause the operation of a deflector.

6. The combination of a card support hav-
40 ing a series of sets of perforations therein, a pin-box arranged adjacent the support and carrying a set of pin members, the pin-box being arranged to be held in different positions
45 adjacent the support to register with the several sets of perforations to cooperate therewith, a set of movable bars arranged adjacent the support transversely to the said rows of perforations and arranged to
50 be engaged by the said pin members, and a series of movable members each connected with one of said bars to be operated therefrom through the operation of the pin members.

7. The combination of a card support hav-
55 ing a series of sets of perforations therein, a pin-box arranged adjacent the support and carrying a set of pin members, the pin-box being arranged to be held in different positions
60 adjacent the support to register with the several sets of perforations to cooperate therewith, a set of movable bars arranged adjacent the support transversely with the said rows of perforations and arranged to

be engaged by the said pin members, and a
65 set of deflectors, one operatively connected with each of said bars and controlled thereby from the operation of the pin members.

8. The combination of a card support hav-
70 ing a series of sets of perforations therein, a pin-box arranged adjacent the support and carrying a set of pin members, the pin-box being arranged to be held in different positions
75 adjacent the support to register with the several sets of perforations to cooperate therewith, a set of movable bars arranged adjacent the support transversely to the said sets of perforations and arranged to be each engaged by a separate one of the said pins,
80 and a series of movable members each connected with one of said bars to be operated therefrom through the operation of the pin members.

9. The combination of a card support hav-
85 ing a series of sets of perforations therein, a pin-box arranged adjacent the support and carrying a set of pin members, the pin-box being arranged to be held in different positions
90 adjacent the support to register with the several sets of perforations to cooperate therewith, a set of movable bars arranged adjacent the support transversely to the said sets of perforations and arranged to be each engaged by a separate one of the said pin
95 members, and a set of deflectors, one operatively connected with each of said bars and controlled thereby from the operation of the pin members.

10. The combination of a card support
100 having rows of perforations therein, a pin-box carrying pin members arranged to pass through the perforations of the support, a series of movable bars arranged beyond the support for engagement with the said pin
105 members, a rock-shaft connected with each bar and swung thereby, thrust-rods slidable in guides, deflector members mounted to rock into and out of engaging position, the
110 deflectors being each connected with one of said thrust rods, an arm on said rock shaft normally engaging one of said thrust rods to retain the deflectors out of engaging positions, and means arranged to shift the thrust
115 rods and deflectors to bring the latter to deflecting position when any arm has been shifted through the rock shaft and pin-engaged bar to release the thrust rod, whereby the deflectors are brought to engaging position.

11. The combination of a card support
120 having rows of perforations therein, a pin-box carrying pin members arranged to pass through the perforations of the support, a series of movable bars arranged beyond the support for engagement with the said pin
125 members, a rock-shaft connected with each bar and swung thereby, thrust-rods slidable in guides, deflector members mounted to

rock into and out of engaging position, the defectors being each connected with one of said thrust rods, an arm on each said rock shaft normally engaging the corresponding thrust rod to retain the deflector out of engaging position, a projection on each of the thrust-rods, and a common member arranged to engage all of said projections on the thrust rods to shift them and the defectors away from the operative position of the defectors to be again engaged by said arms and retained out of engaging position.

12. The combination of a card support having perforations therein, a pin-box movable relatively to and from the card support, a series of pins carried by the pin-box and arranged to enter the perforations in the card support and also the perforations in a card supported thereon, whereby upon approach of the said two members pins will be arrested by the non-perforated portions of the card at the said openings in the card support, a lock-plate arranged to engage the pins not arrested by the card on the said support, actuating means for the lock-plate arranged to engage the card support upon approach of the pin-box and card support whereby the lock-plate is moved to locking position, and means for retracting the lock-plate.

13. The combination with a card support and a pin-box that are relatively movable to and from each other, and a number of pin members slidable in the box to engage perforations in the card support when the members are brought together, of a locking-plate carried by the pin-box for locking the pins in advanced positions, a rock-shaft carried by the pin-box, an arm on the rock shaft engaging the lock-plate to move it into and out of pin-engaging position, a plunger carried by the pin-box, an arm on the rock shaft engaging said plunger to cause it to swing the rock shaft, said plunger being arranged to engage the card support after the beginning of the advance movement of the pin-box toward the card support to shift the lock-plate.

14. The combination with a card support and a pin-box that are relatively movable to and from each other, of a number of pin members slidable in the box and engaging perforations in the card support when the members are brought together, of a locking-plate carried by the pin-box for locking the pins in advanced positions, a rock shaft carried by the pin-box, an arm on the rock shaft engaging the lock-plate to move it into and out of pin-engaging position, a plunger carried by the pin-box, an arm on the rock shaft engaging said plunger to cause it to swing the rock shaft, said plunger being arranged to engage the card support after the beginning of the advance movement of

the pin-box toward the card support to shift the lock-plate, and means for retracting the plunger and connected parts upon separation of the pin-box and card support.

15. The combination of a card-support provided with sets of perforations therein; a carrier adjacent the card-support, a pin-box slidable on the carrier to register with the different sets of perforations of the card-support, means for moving the carrier to bring the pin-box to engage the card-support in any of its different positions of adjustment, by a step by step movement; and means for locking same in the desired positions.

16. The combination of a card support provided with sets of perforations therein, a carrier adjacent the card support, a pin-box slidable of the carrier to register with the different sets of perforations of the card support, means for moving the carrier to bring the pin-box to engage the card support in any of its different positions of adjustment, a lock plate for the pins of the pin-box, and means for actuating the lock-plate in all of the different positions of adjustment of the pin-box on the carrier.

17. The combination of a card support provided with sets of perforations therein, a carrier adjacent the card support, a pin-box slidable on the carrier to register with the different sets of perforations of the card support, means for moving the carrier to bring the pin-box to engage the card support in any of its different positions of adjustment, a lock-plate for the pins carried by the slidable pin-box, and means carried by the pin-box for operating the lock-plate from engagement with the card support when the pin-box is moved by its carrier toward and from the card support.

18. The combination of a card support having perforations therein, a pin-box movable relatively to and from the card support, a series of pins carried by the pin-box and arranged to enter the perforations in the card support and also the perforations in a card supported thereon, whereby upon approach of the said two members pins will be arrested by the non-perforated portions of the card at the said openings in the card support, a lock-plate on the pin-box arranged to engage the pins not arrested by the card on the said support, and actuating means on the pin-box for the lock-plate arranged to engage the card support upon approach of the pin-box and card support whereby the lock-plate is moved to locking position, and means for retracting the lock-plate.

19. In a sorting machine the combination with the substantially horizontal guideway and the defectors, of a series of card boxes located one below each deflector, each box

having means arranged to engage the card and cause it to turn over and fall in reverse position to that in the guideway.

20. In a sorting machine the combination with the substantially horizontal guideway and the deflectors, of a card box located one below each deflector, and a curved guide plate located at the entrance of the box and arranged in a substantially horizontal position to receive the card from the deflector and cause it to turn over and fall in a reverse position to that in the guideway.

21. In a sorting machine the combination with the substantially horizontal guideway and the deflectors, of a card box located one below each deflector, and a curved guide plate located at the entrance of the box and arranged in a substantially horizontal position to receive the card from the deflector and cause it to turn over and fall in a reverse position to that in the guideway, the box also having a guide plate at the top on the opposite side from said guide plate.

22. In a sorting machine the combination with the substantially horizontal guideway and the deflectors, of a series of card boxes located one below each deflector, each box having means arranged to engage cards and cause them to turn over and fall in reverse position to that in the guideway, the box having an upright partition on the far side in the direction in which the cards travel through the said horizontal guideway and also having a transverse partition at the intermediate portion of the box extending from the bottom of said partition across and dividing the box into compartments, one of said deflectors being arranged to cause cards to enter the box to engage the first mentioned guideway, another of said deflectors being arranged to cause cards to pass into the box between said partition and the adjacent side and thereby pass down into the box below the said transverse member.

23. In a sorting machine the combination with the substantially horizontal guideway and the deflectors, of a series of card boxes located one below each deflector, each box having means arranged to engage cards and cause them to turn over and fall in reverse position to that in the guideway, the box having an upright partition on the far side in the direction in which the cards travel through the said horizontal guideway and also having a transverse partition at the intermediate portion of the box extending from the bottom of said partition across and dividing the box into compartments, one of said deflectors being arranged to cause cards to enter the box to engage the first mentioned guideway, another of said deflectors being arranged to cause cards to pass into the box between said partition and the adjacent side and thereby pass down into the box below the said transverse member, and means at

the bottom of said guideway formed by the vertical wall for causing cards to turn over and fall in a reverse position to that in the horizontal guideway.

24. In a sorting machine, the combination with a substantially horizontal guideway, and a pair of deflectors, of a box arranged below two of said deflectors to receive cards therefrom at different portions of the top of the box, the box being provided with an upright partition adjacent the far side of the box in the direction of travel of the cards through the guideway, said partition extending part way down into the box and provided with a wall extending transversely across and dividing the box into compartments, said upright partition at the top being inclined toward the middle portion of the box to form a chute in position to receive a card from one of said deflectors, the box having a deflector plate at the bottom of the guideway formed by the upright plate whereby cards are caused to turn over and fall in a reverse position upon the bottom of the box, the deflector plate extending down into the upper compartment of the box from the upper part of the said chute and arranged to receive cards from the other deflector and cause it to turn over and fall upon the bottom of this compartment in a reverse position to that in the horizontal guideway.

25. In a sorting machine, the combination with the substantially horizontal guideway and a pair of deflectors, of a box located below said deflectors, the box being divided into an upper and a lower compartment, guiding means to receive cards from one of said deflectors and lead them into one of said compartments of the box, and guide means arranged to receive cards from the other said deflector and lead them into the other compartment of the box.

26. In a sorting machine, the combination with the substantially horizontal guideway and a pair of deflectors, of a box located below said deflectors, the box being divided into an upper and a lower compartment, guiding means to receive cards from one of said deflectors and lead them into one of said compartments of the box, and guide means arranged to receive cards from the other said deflector and lead them into the other compartment of the box, means in one of the compartments to engage cards and cause them to turn over and fall in a reverse position to that in the horizontal guideway, and means in the other compartment to engage cards deflected therein and cause them to turn over and fall in a reverse position to that in the horizontal guideway.

27. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members record bodies having a se-

ries of fact recording conformations in accordance with which said analyzing members are functioningly positioned, and a series of controlling members coacting with
 5 said analyzing members, of a deflecting member and an initiating member directly coacting with said controlling members, an action stop, the deflecting member normally non-deflectingly set and adapted to be de-
 10 flectingly set against said stop relatively to a record body coacting with such controlling members, and means for actuating said action stop to restore a deflectingly set de-
 15 flecting member to non-deflecting position, the construction and arrangement being such that each single deflecting member and its associated initiating member coact with only one single controlling member.

28. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members record bodies having a series of fact recording conformations in accordance with which such analyzing mem-
 20 bers are functioningly positioned, and a series of controlling members directly coacting with said analyzing members, of a deflecting member and an initiating member directly coacting with said controlling mem-
 25 bers, the initiating member adapted to be operated at the beginning of a motion cycle by a controlling member positioned as aforesaid, and when so operated to initiate the motion of the deflecting member to its de-
 30 flecting position, said deflecting member being normally non-deflectingly set, and elastic means for moving said deflecting member, the motion of which has been initiated, during the remainder of the motion
 35 cycle to its deflecting position and there retaining the same to deflect the record body which caused it to be so set, the construction and arrangement being such that each single deflecting member and its associated ini-
 40 tiating member coact with only one single controlling member.

29. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members record bodies having a series of fact recording conformations in accordance with which said analyzing mem-
 50 bers are functioningly positioned, and a series of controlling members coacting with said analyzing members, of a deflecting member and an initiating member directly coacting with said controlling members, the
 55 initiating member adapted to coact with a controlling member positioned as aforesaid in any one of a series of record locations at the beginning of a motion cycle to be thereby operated and caused to initiate the motion of a deflecting member to its
 60 deflecting position, said deflecting member being normally non-deflectingly set, and

elastic means for moving such deflecting members, the motion of which has been initiated, during the remainder of the motion cycle to its deflecting position and there retaining the same to deflect the record body
 70 which caused it to be so set, the construction and arrangement being such that each single deflecting member and its associated initiating member coact with only one single controlling member.

30. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members record bodies having a series of fact recording conformations in accordance with which said analyzing mem-
 80 bers are functioningly positioned, and a series of controlling members coacting with said analyzing members, of a plurality of sorting actions each comprising a deflecting
 85 member and an initiating member directly coacting with said controlling members, the initiating member adapted to be operated at the beginning of a motion cycle by a controlling member positioned as aforesaid and
 90 when so operated to initiate the motion of a deflecting member to its deflecting position, said deflecting member being adapted to be non-deflectingly set, and elastic means for moving such deflecting member, the motion
 95 of which has been initiated, during the remainder of a motion cycle in which its motion has been initiated as aforesaid to deflect the record body which caused it to be so set, and a positive retractor common to
 100 all the actions and adapted at the completion of the motion cycle to return to non-deflecting position such of said deflecting members as have been operatively set, the construction and arrangement being such
 105 that each single deflecting member and its associated initiating member coact with only one single controlling member.

31. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members, record bodies having a series of fact recording conformations in accordance with which said analyzing mem-
 110 bers are functioningly positioned, and a series of controlling members coacting with said analyzing member, a plurality of sorting actions each comprising a deflecting member and an initiating member directly
 115 coacting with said controlling member, the initiating member adapted to be operated at the beginning of a motion cycle by a controlling member positioned as aforesaid and when so operated to initiate the motion of the
 120 deflecting member to its deflecting position, said deflecting member adapted to be non-deflectingly set and to be elastically set during the remainder of a motion cycle in which its motion has been initiated as aforesaid to deflect the record body which caused
 130

it to be so set; and a retractor adapted to stop and position said deflecting members when operatively set and at the completion of the motion cycle to return to non-deflecting position such deflecting members as have been operatively set.

32. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members record bodies having a series of fact recording conformations in accordance with which said analyzing members are functioningly positioned, a series of controlling members coacting with said analyzing members, and a deflecting lever and a positioning and releasing lever directly coacting with said controlling members, the deflecting lever provided with deflecting surfaces normally non-deflectingly set and adapted upon its release by said release lever to be deflectingly set relatively to the record body coacting with such controlling members, said positioning and releasing lever being adapted to be operated by a controlling member positioned as aforesaid and when so operated to release a deflecting member so that the same may be deflectingly set.

33. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members record bodies having a series of fact recording conformations in accordance with which said analyzing members are functioningly positioned, a series of controlling members coacting with said analyzing members and a deflecting lever and a positioning and releasing lever directly coacting with said controlling members, the deflecting member provided with deflecting surfaces normally non-deflectingly set and adapted upon release by said release lever to be elastically deflectingly set relatively to a record body coacting with such controlling members, said positioning and releasing lever being elastically supported independently of the deflecting lever and adapted to be operated by a controlling member positioned as aforesaid and when so operated to release the deflecting member so that the same may be deflectingly set.

34. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members record bodies having a series of fact recording conformations in accordance with which said analyzing members are functioningly positioned, a series of controlling members coacting with said analyzing members, and a deflecting lever and a positioning and releasing lever, the deflecting lever provided with an arm coacting with the positioning and releasing lever and with deflecting surfaces normally non-deflectingly set and adapted upon release

by said release lever to be elastically deflectingly set relatively to a record body coacting with controlling members, and the releasing lever elastically supported independently of the deflecting lever and provided with an arm coacting with the arm of the deflecting lever and with an extension normally located in the line of action of controlling members, and adapted to be operated by a controlling member positioned as aforesaid and when so operated to release the deflecting lever so that the same may be deflectingly set.

35. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members record bodies having a series of fact recording conformations in accordance with which said analyzing members are functioningly positioned, a series of controlling members coacting with said analyzing members, a deflecting lever and a release lever directly coacting with said controlling members, the deflecting lever provided with an arm adapted to be engaged and disengaged by the release lever and with deflecting surfaces normally non-deflectingly set and adapted, upon release by said release lever, to be elastically deflectingly set relatively to a record body coacting with controlling members, said releasing lever elastically supported independently of the deflecting lever and provided with an arm adapted to retain the deflecting lever in non-deflecting and release it for movement to deflecting position, and with an extension normally located in the lines of action of controlling members and adapted to be operated by a controlling member positioned as aforesaid and caused to release said deflecting lever.

36. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to said analyzing members record bodies having a series of fact recording conformations in accordance with which said analyzing members are functioningly positioned, a series of controlling members coacting with said analyzing members, of bins for sorted record bodies, a plurality of sorting actions each comprising a normally inoperably positioned deflecting lever elastically settable, when released, in operable relation with one of said bins, and an independently elastically returned release lever adapted to position and release said deflecting lever; and a retractor adapted to return deflectingly set deflecting levers to non-deflecting position and engagement with said release levers; said deflecting levers fulcrumed in series receding from the controlling members and parallel with the feed plane and provided with deflecting surfaces normally out of but settable across said plane, with operating arms of equal functioning lengths

and, severally flexibly connected with said deflecting levers, extensions slidably mounted on the machine-frame with their terminals in a diagonally receding series; and said release levers fulcrumed in a vertical series between the controlling members and bins and constituting an equal-motion series and to that end provided with proportionally extending release arms which severally position and release said deflecting levers, and actuating arms which severally extend to coact with successive record-position series and controlling members which function therewith.

37. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to said analyzing members record bodies having a series of fact recording conformations in accordance with which said analyzing members are functioningly positioned, a series of controlling members coacting with said analyzing members, of bins for sorted record bodies, a plurality of sorting actions each comprising a normally inoperably positioned deflecting lever elastically settable, when released, in operable relation with one of said bins, and an independently elastically returned release lever adapted to position and release said deflecting lever; tappets operably connected to said deflecting lever, and a retractor adapted to serve as a limit stop for said tappets and the setting strokes of released deflecting levers and to return such deflecting levers to non-deflecting position and engagement with said release levers; said deflecting levers fulcrumed in series receding from the controlling members and parallel with the feed plane and provided with deflecting surfaces normally out of but settable across said plane, with operating arms of equal functioning lengths and, severally flexibly connected with said deflecting levers, extensions provided on all said tappets and slidably mounted on the machine frame with their terminals in a diagonally receding series; and said release levers fulcrumed in a vertical series between the controlling members and bins and constituting an equal-motion series and to that end provided with proportionally extending release arms, which severally position and release said deflecting levers and actuating arms which severally extend to coact with successive record-position series and controlling members which function therewith.

38. In an accounting machine, the combination with a series of analyzing members, feed mechanism for advancing to such analyzing members record bodies having a series of fact recording conformations in accordance with which said analyzing members are functioningly positioned, a series of controlling members coacting with said

analyzing members, of bins for sorted record bodies, a plurality of sorting actions, each comprising a deflecting lever and a release lever, the release lever elastically supported and provided with an actuating arm, a parallel motion head extending the same to the record support and extending across a series of record-positions thereof and adapted to be operated at the beginning of a motion cycle by a controlling member positioned as aforesaid and a release arm adapted to normally retain the deflecting lever in non-deflecting position but, when operated as aforesaid to release it, the deflecting lever provided with an arm, a parallel motion extension thereof adapted to engage and be released by said release arm, with a tappet on said extension, and with deflecting surfaces and adapted to be non-deflectingly set and to be elastically deflectingly set, during the remainder of the motion-cycle when released as aforesaid; and a retractor adapted to limit the setting stroke of said deflecting levers by contact therewith of said tappets and at the close of their motion cycle, to return deflectingly-set deflecting levers to non-deflecting position and engagement with said release arms.

39. In a record card sorting machine comprising a frame, transmission elements, analyzing and controlling members and a card feed mechanism adapted to advance cards in substantially a horizontal plane, the combination therewith of bins for sorted cards located beneath and adapted to receive cards from such feed mechanism and arranged in a horizontal series, each bin comprising a plurality of tiers one disposed above the other, and deflectors one for each tier, controlled by the controlling members and movable across the primary path of feed of the cards for directing the same to the said tiers.

40. In a record card sorting machine comprising a frame, transmission elements, analyzing and controlling members and a card feed mechanism adapted to advance cards in substantially a horizontal plane, the combination therewith of removable bins for sorted cards arranged in horizontal series and located beneath and adapted to receive cards from such feed mechanism and each comprising a plurality of vertical tiers one disposed above the other, there being a guideway alongside of an upper tier to permit the passage of the cards intended for the tier below such upper tier, and deflectors one for each tier, controlled by the controlling members and movable across the primary path of feed of the cards for directing the same to the said tiers.

41. In a record card sorting machine comprising a frame, transmission elements, analyzing and controlling members and a card feed mechanism adapted to advance cards in

substantially a horizontal plane, the combination therewith of a plurality of removable boxes arranged in a horizontal series and each comprising a plurality of tiers one disposed above the other, each tier comprising an inclined base member, and a deflecting member at its entrance against which the cards strike when entering a certain tier to be deflected to proper position on said base member.

42. In a record-card sorting machine comprising a card support perforated in series, a card feed adapted to supply cards thereto and remove them therefrom, a pin box reciprocated adjacent thereto and operably mounting a series of pins adapted to coact with perforations of the support, the combination therewith of a collar on each pin normally located in and retractable from a socket in the pin box and a lock plate formed with a beveled edge adapted, during the approach of the pin box to lock thereto unretracted pins by engaging their said collars and to slide between said sockets and the collars of retracted pins and leave them free to be farther retracted.

43. In a record card sorting machine comprising a card support perforated in series, a card feed adapted to supply cards thereto and remove them therefrom and a carrier reciprocated adjacent thereto, the combination therewith of a pin box operably mounting a series of pins adapted to coact with different perforation series of the support and slidably mounted on the carrier, positioning members fixed on the carrier and a positioning member on the pin box adapted to be disengaged from and engaged with the former, to permit adjustment of and exactly position the pin box on the carrier.

44. In a record card sorting machine comprising a card support perforated in series, a card feed adapted to supply cards thereto and remove them therefrom, and a carrier reciprocated adjacent thereto, the combination therewith of a pin box operably mounting a series of pins adapted to coact with different perforation series of the support and slidably mounted on the carrier, positioning means on the carrier and retracting-and-positioning means on the pin box adapted to be retracted from the first-named positioning means and to retract the pins from engagement with the support, and to be engaged with the first named positioning means and to thereby exactly position the pin box and the pins for engagement with different perforation series of the support.

45. In a record card sorting machine comprising a card support perforated in series, a card feed adapted to supply cards thereto and remove them therefrom, and a carrier reciprocated adjacent thereto, the combination therewith of a positioning rack on the carrier, a pin box slidably mounted thereon,

a plate provided with a rack, mounted on said pin box, a series of pins slidably mounted in said pin box and plate, terminating in heads exterior to the latter and adapted to coact with different perforation series of the support and means adapted to recede said plate from said pin box and carrier and thereby lift its rack clear of said carrier rack and the pins clear of the card support, so that the pin box may be adjusted on the carrier; and to approach it thereto, and engage said racks and thereby exactly position the pin box with the pins coacting with a selected perforation-series of the support.

46. In a card-accounting machine comprising a main frame, a main shaft adapted to be connected with a source of power and operably mounting transmission members adapted to operate the movable machine-members, a card support perforated in series, a carrier reciprocated adjacent thereto, a pin box mounted on the carrier and operably mounting series of pins adapted to coact with perforation series of the support, a card hopper for supply cards and bins for used cards, the combination therewith of a positively-driven card feed adapted to supply cards to, locate them on, and remove them from the support and a belt-driven card-feed adapted to receive cards from said positively-driven feed and advance them to their destination and comprising a plurality of pairs of rolls operably mounted in the frame, a driving pulley on the main shaft, a belt pulley connected with the roll of each pair to one side of the feed plane, said pulleys being arranged in belt-couples, an idler-sheave between each such couple and posterior to the last couple, said idlers revolvably mounted in a different plane from said belt pulleys, a spring-actuated tightener sheave, and a belt connecting the driving pulley with the couples of roll-pulleys, the intermediate and final sheaves and the tightener sheave.

47. In a card-accounting machine comprising a main frame, a main shaft adapted to be connected with a source of power and operably mounting transmission members adapted to operate the movable machine-members, a card support perforated in series, a carrier reciprocated adjacent thereto, a pin box mounted on the carrier and operably mounting series of pins adapted to coact with perforation series of the support, a card hopper for supply cards and bins for used cards, the combination therewith of a positively-driven card feed adapted to supply cards to, locate them on, and remove them from the support and a belt-driven card-feed adapted to receive cards from said positively-driven feed and advance them to their destination and comprising a plurality of pairs of rolls operably mounted

in the frame, a driving pulley on the main shaft, a belt pulley connected with the roll of each pair to one side of the feed plane, said pulleys being arranged in belt-couples, an idle-sheave between each such couple and posterior to the last couple, said idlers revolvably mounted in a different plane from said belt pulleys, a tightener sheave, a belt connecting the driving pulley with the couples of roll pulleys, the intermediate and final sheaves and the tightener sheave, an arm mounting said tightener sheave and pivoted on the frame, a slot in the frame concentric with the pivot of said arm and a pin fixed to said arm, playing in said slot and provided with a head engaging the margin thereof and relieving the pivot of said arm from twisting strains due to the pull of the belt.

48. In combination with a card manipulating machine, of rolls for receiving the cards from such machine, receivers into which the cards are fed by such rolls, and directing and positioning means in said receivers to engage the cards and cause them to turn over and fall in reverse position to that between the rolls.

49. In combination with a card manipulating machine, of rolls for receiving the cards from such machine, receivers into which the cards are fed by such rolls, directing and positioning means in said receivers to engage the cards and cause them to turn over and fall in reverse position to that between the rolls, and receiving means in said receivers coöperating with said directing means to pile up the cards in said receivers in the sequence in which they are received.

50. In combination with a card manipu-

lating machine, of a plurality of tiers of compartments disposed one adjacent to the other and alongside of said card manipulating machine into which the cards are discharged from said card manipulating machine, each tier having two compartments one above the other, there being a passage alongside of the upper compartment to permit the passage of cards therethrough into a lower compartment, and deflecting guards disposed at the mouth of each upper compartment curving inwardly to form a constricted entranceway and prevent the outward bounding of a card after it once has been discharged into such upper compartment.

51. In combination with a card manipulating machine, of a plurality of tiers of compartments disposed one adjacent to the other and alongside of said card manipulating machine into which the cards are discharged from said card manipulating machine, each tier having two compartments one above the other, there being a passage alongside of the upper compartment to permit the passage of cards therethrough into a lower compartment, deflecting guards disposed at the mouth of each upper compartment curving inwardly to form a constricted entranceway and prevent the outward bounding of a card after it once has been discharged into such upper compartment, and a deflecting guard at the bottom of the passage to the lower compartment for deflecting a card over into the lower compartment from such passage.

JAMES POWERS.

Witnesses:

H. D. PENNEY,
JOHN MORRIS.