

No. 612,609.

Patented Oct. 18, 1898.

D. E. HUNTER.  
MACHINE FOR OPERATING ON CARDS.

(Application filed Aug. 16, 1897.)

(No Model.)

6 Sheets—Sheet 1.

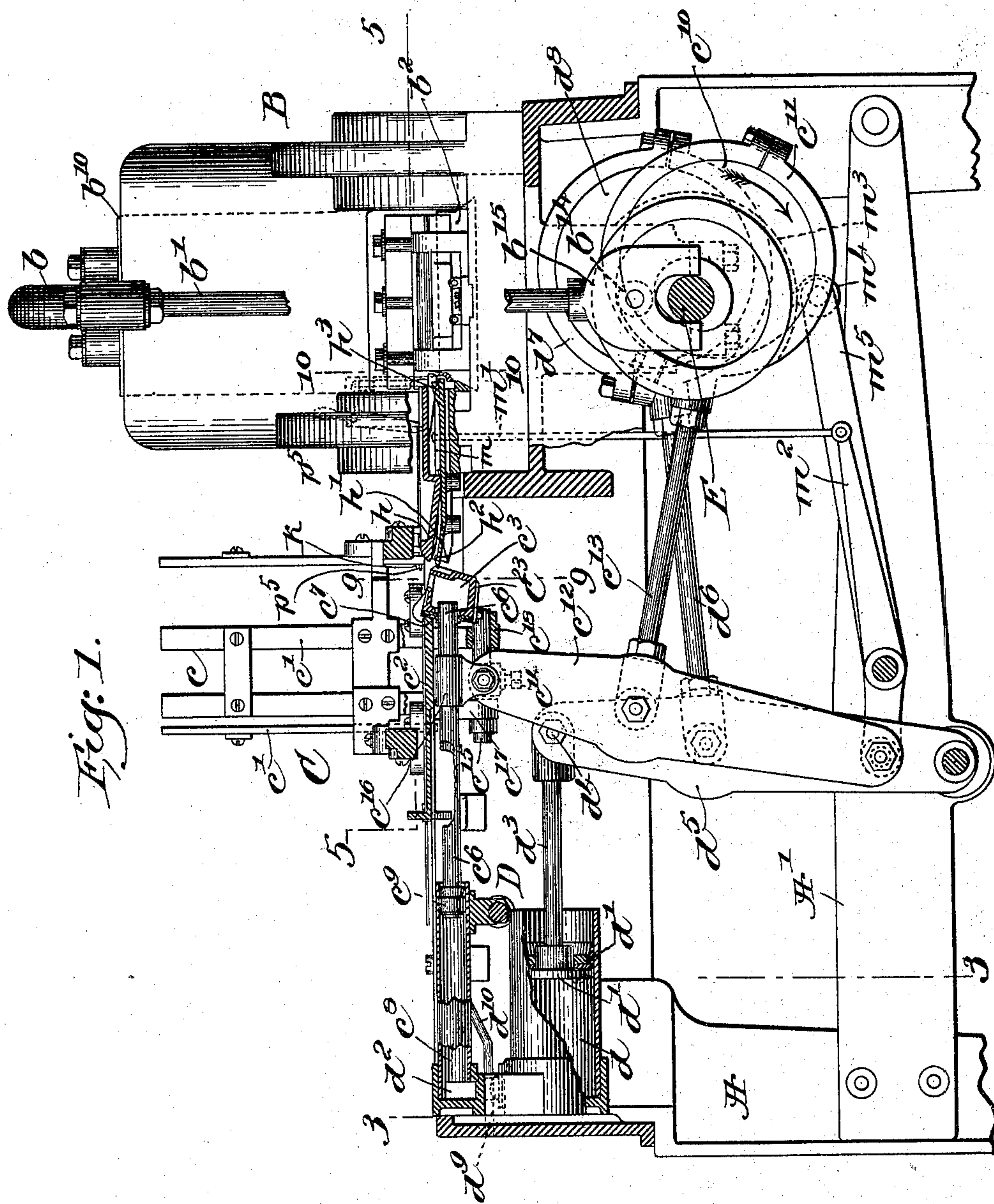


Fig. 1.

Witnesses.  
Edward F. Allen.

Thomas Drummond

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David E. Hunter.  
by Crosby & Gregory

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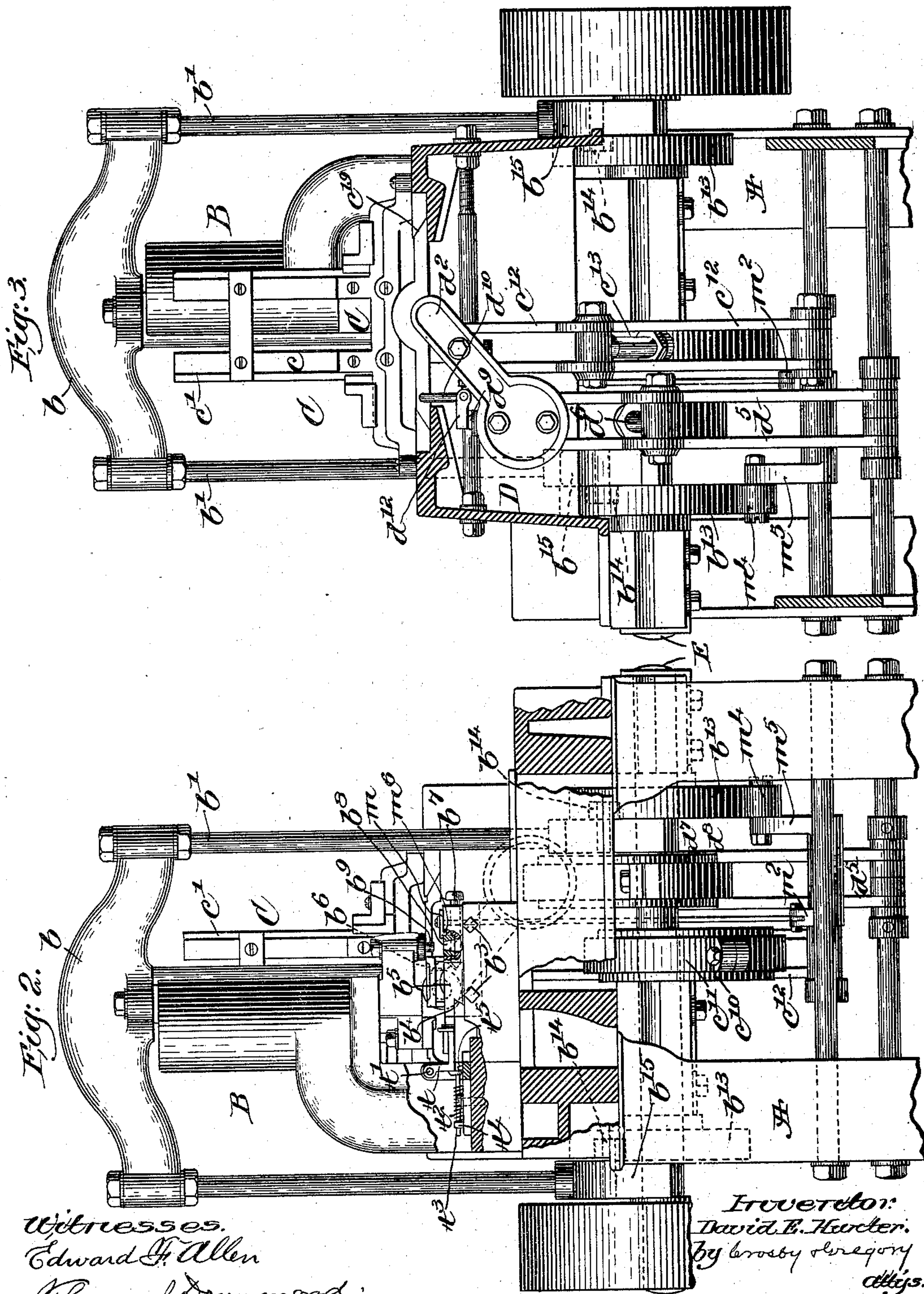
**D. E. HUNTER.**

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(Application filed Aug. 16, 1897.)

(No Model.)

**6 Sheets—Sheet 2.**



Witnesses.  
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**No. 612,609.**

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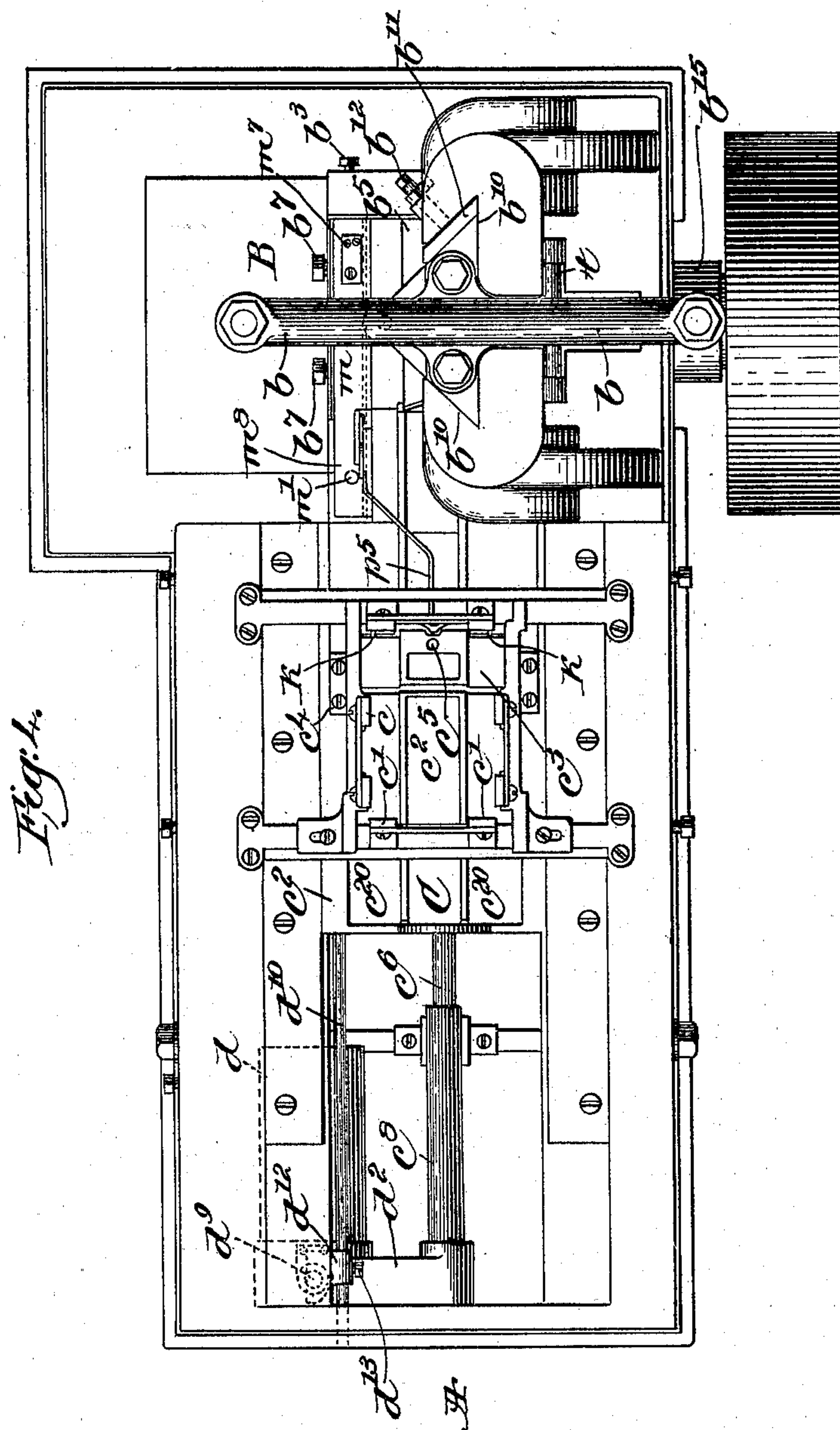
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(Application filed Aug. 16, 1897.)

(No Model.)

**6 Sheets—Sheet 3.**



*Witnesses.*

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No. 612,609.

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6 Sheets—Sheet 4.

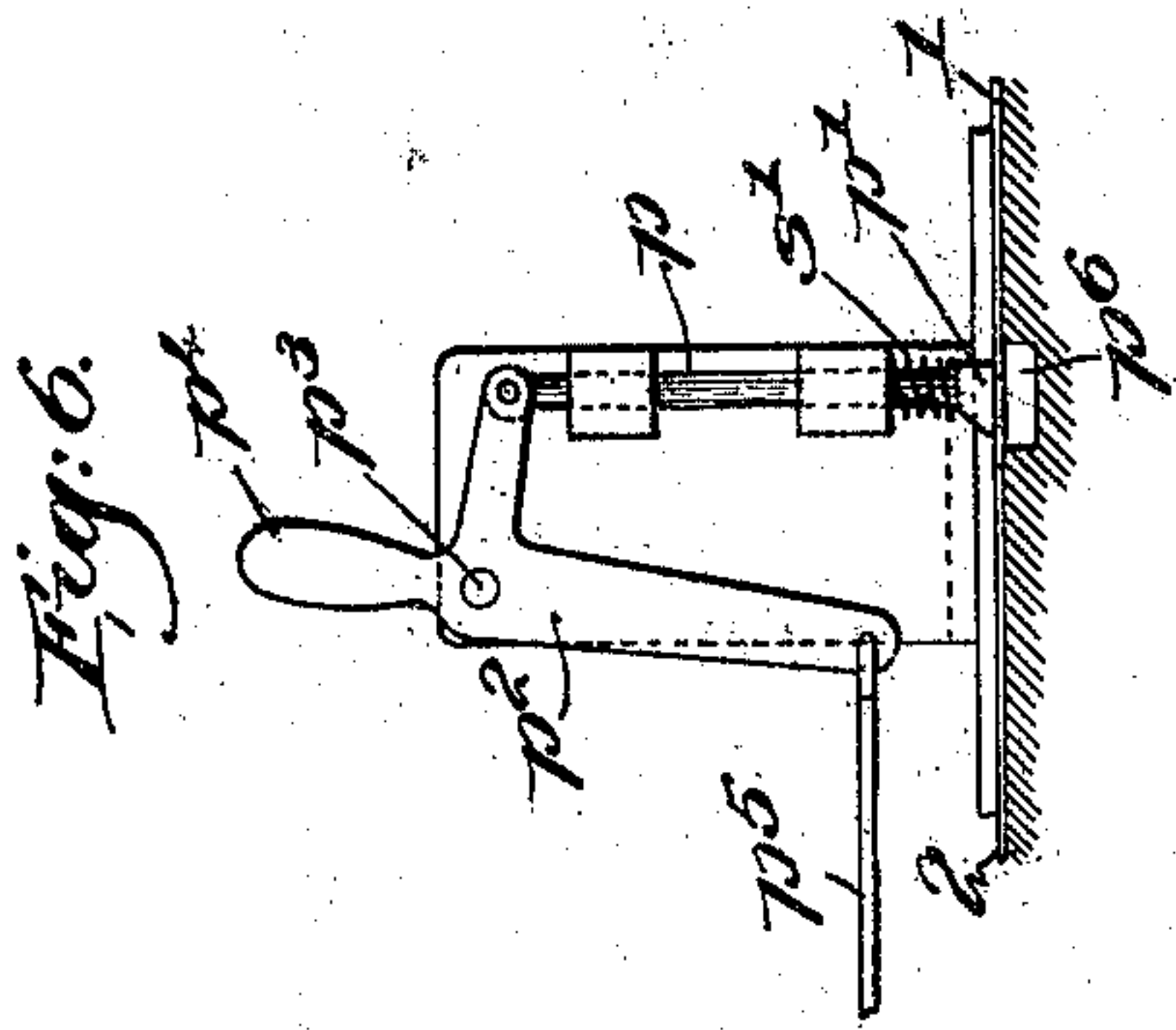
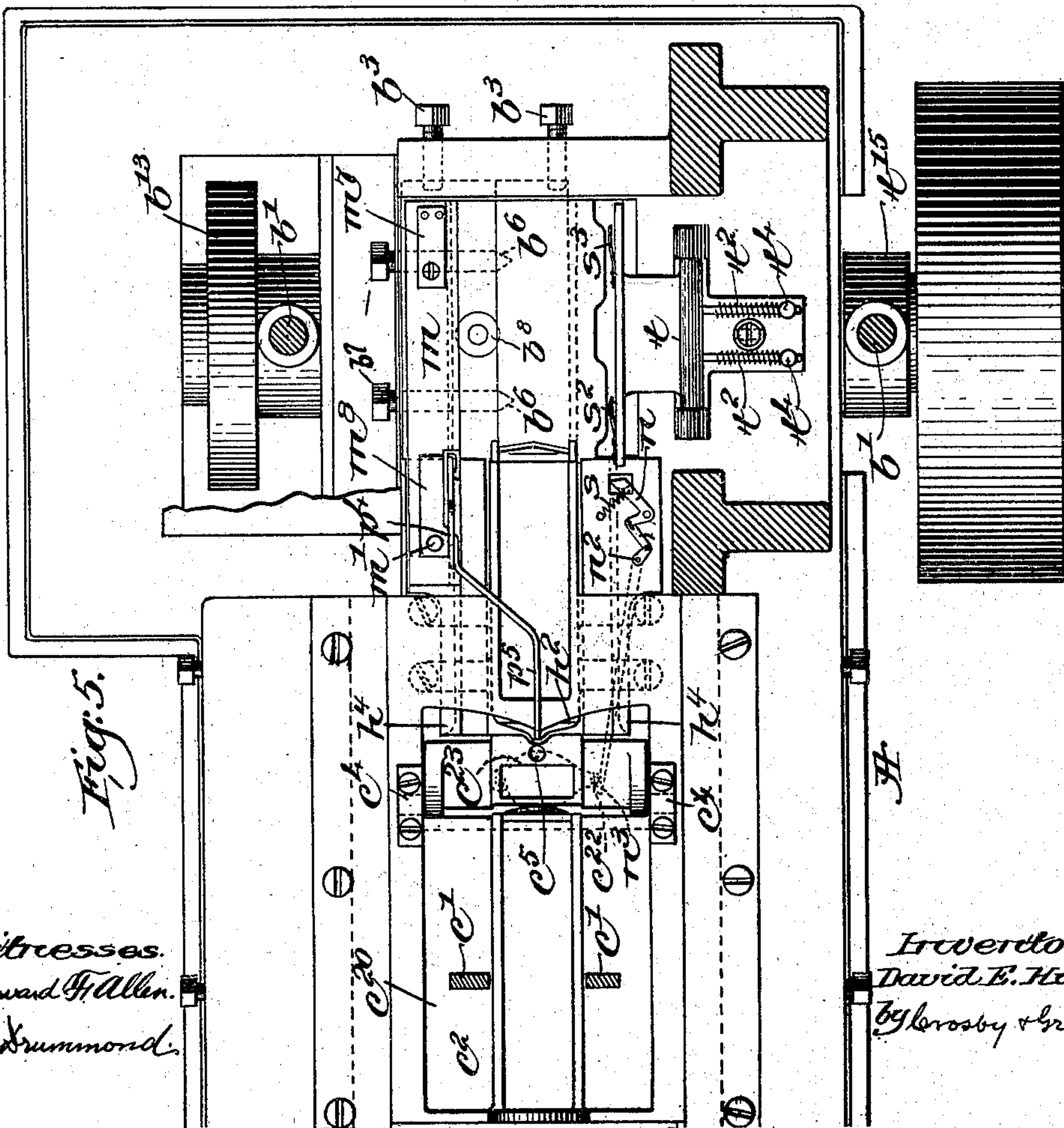
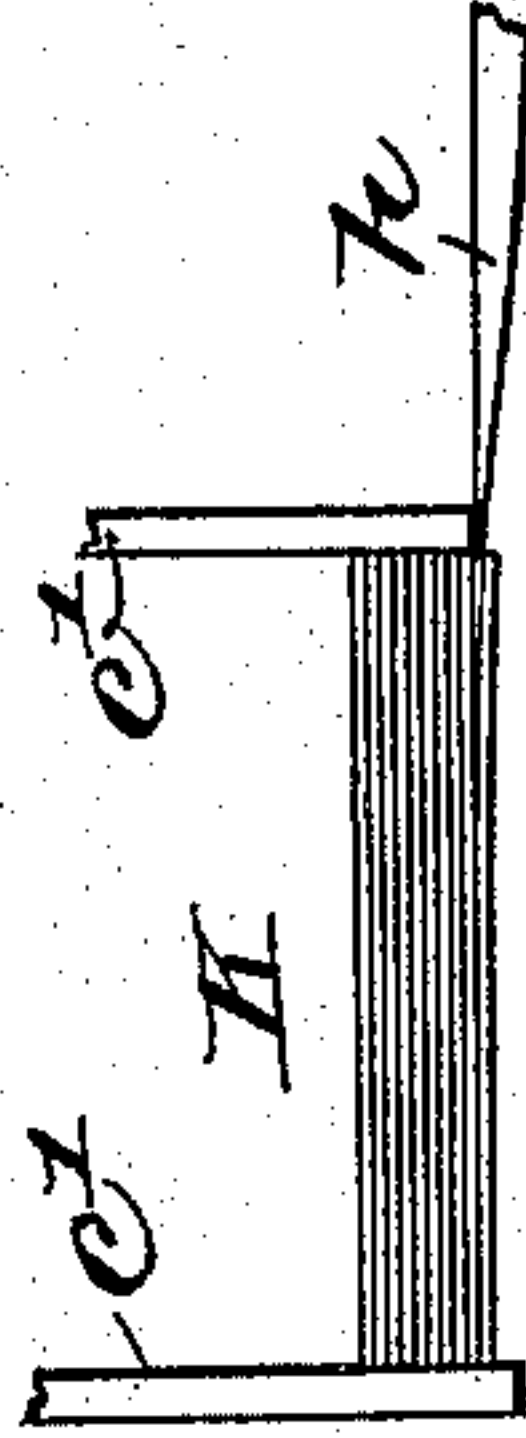


Fig. 7.



Witnesses.  
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No. 612,609.

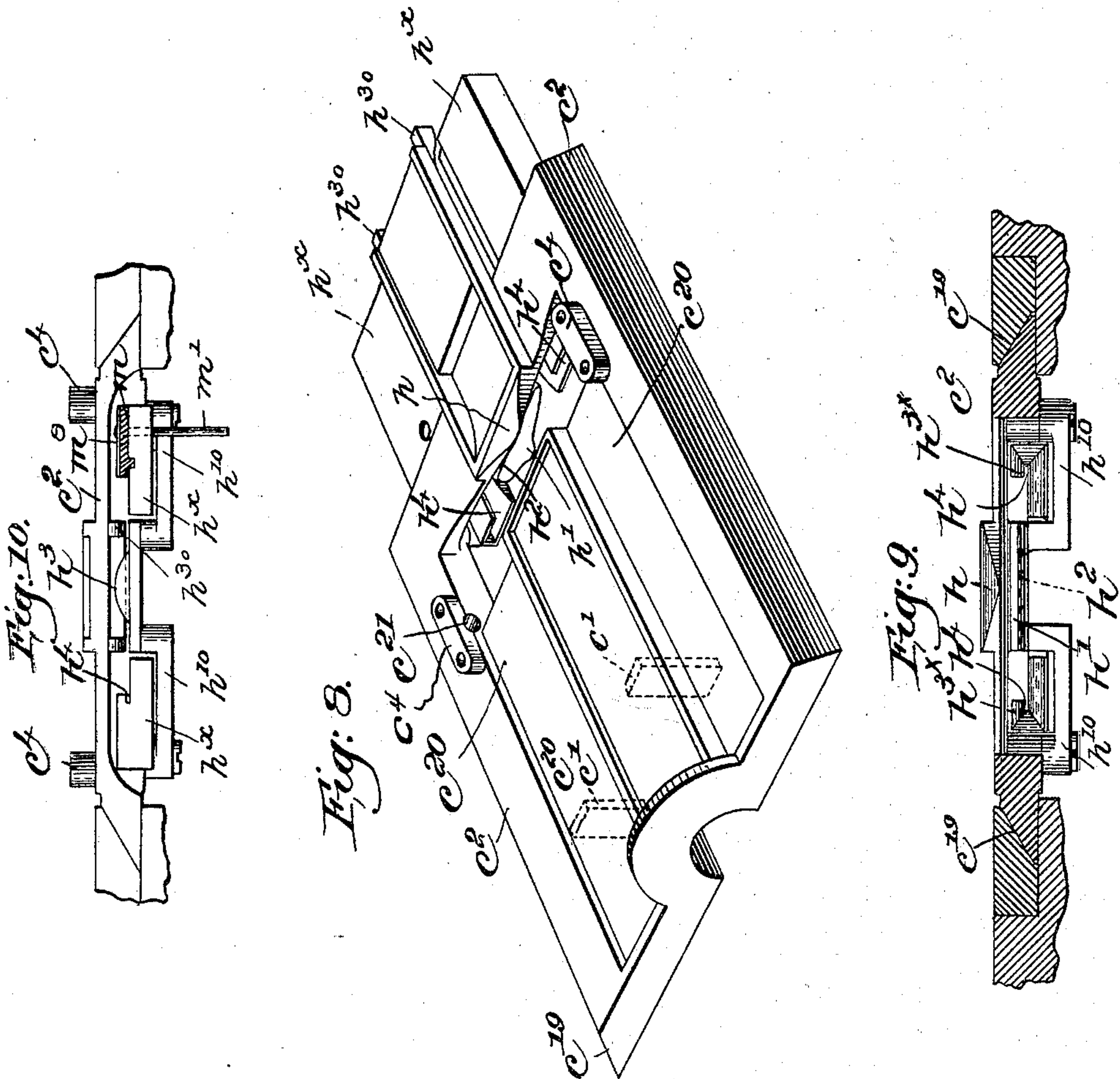
Patented Oct. 18, 1898.

D. E. HUNTER.  
MACHINE FOR OPERATING ON CARDS.

(Application filed Aug. 16, 1897.)

(No Model.)

6 Sheets—Sheet 5.



Witnesses.  
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No. 612,609.

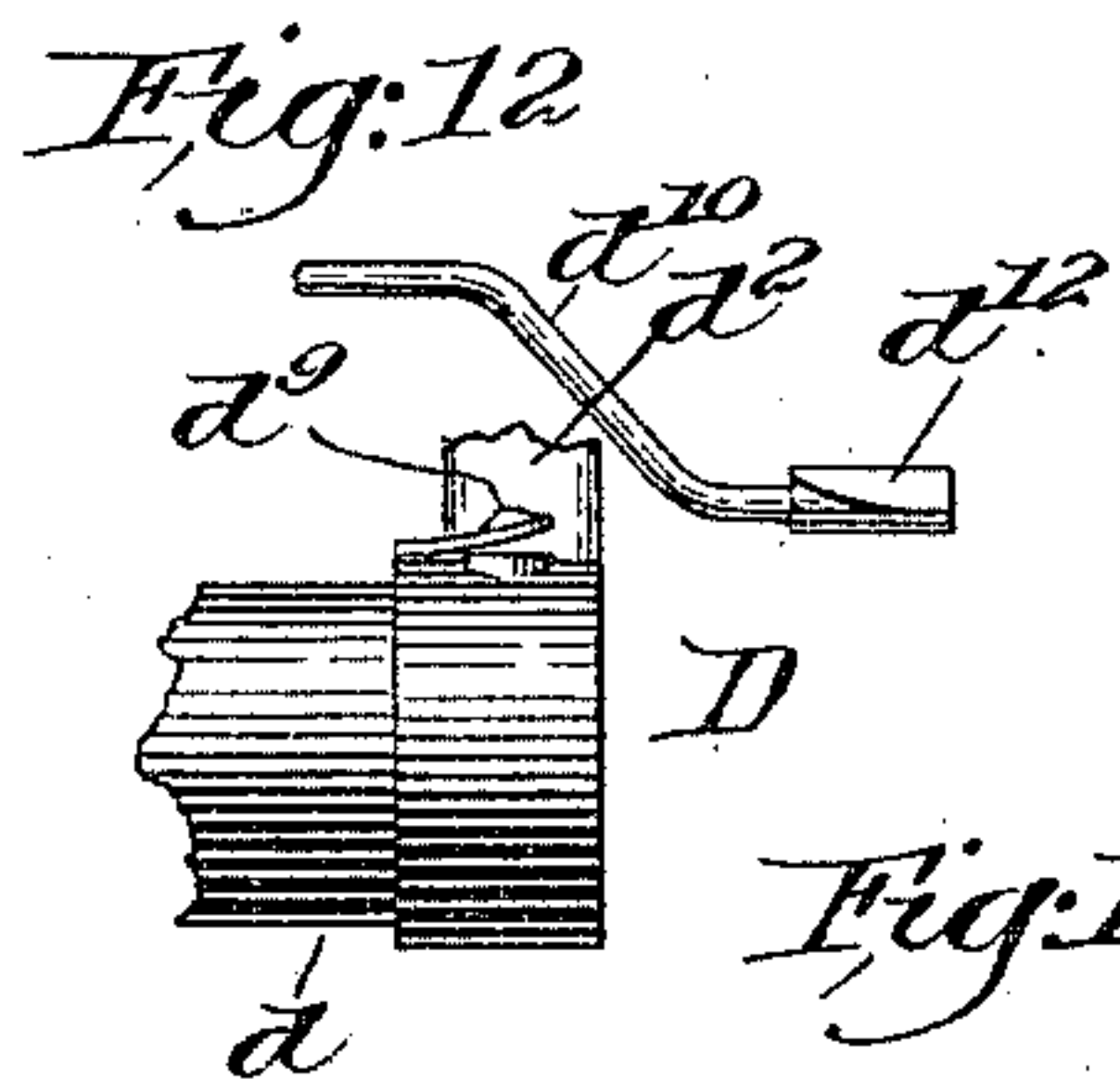
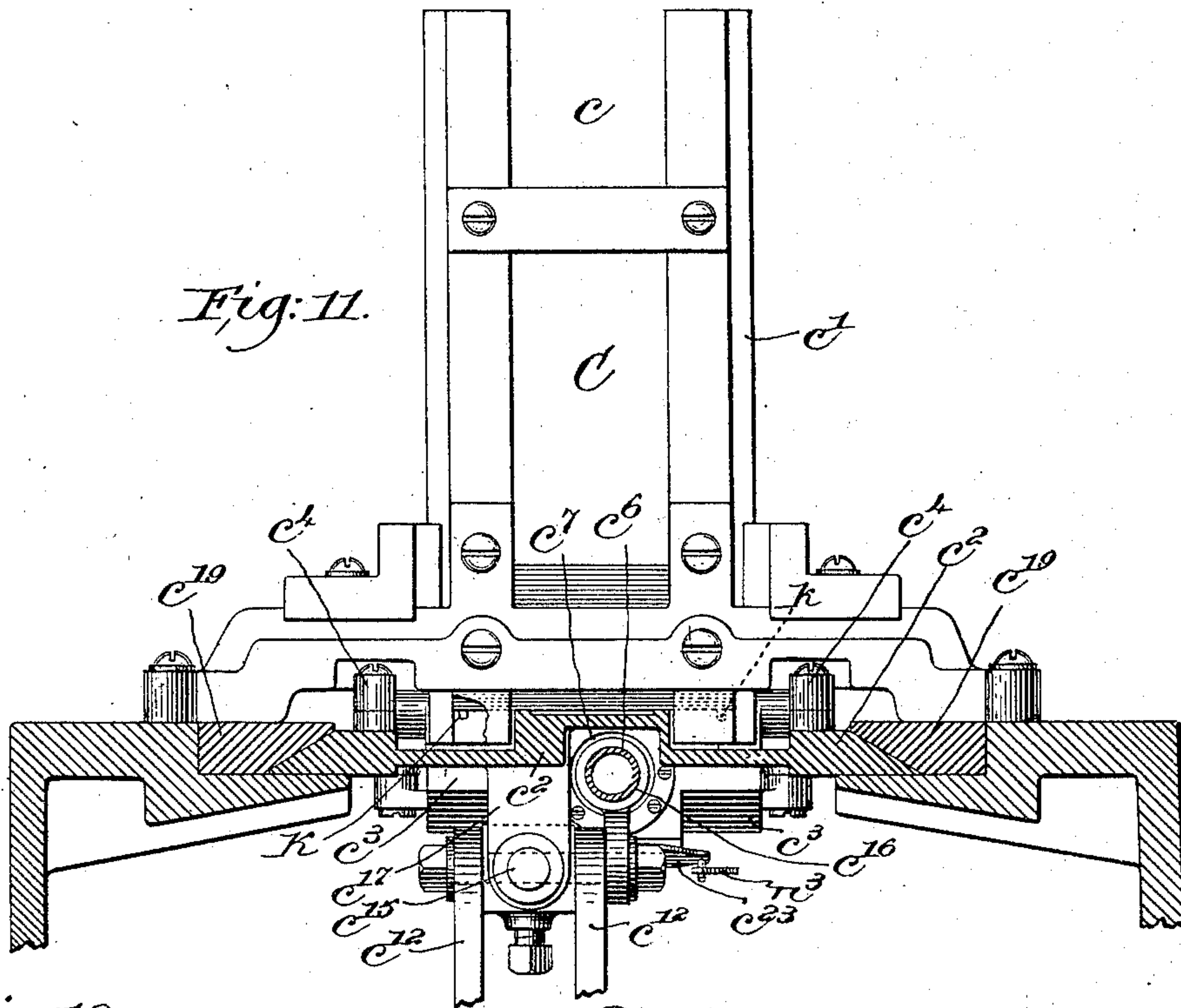
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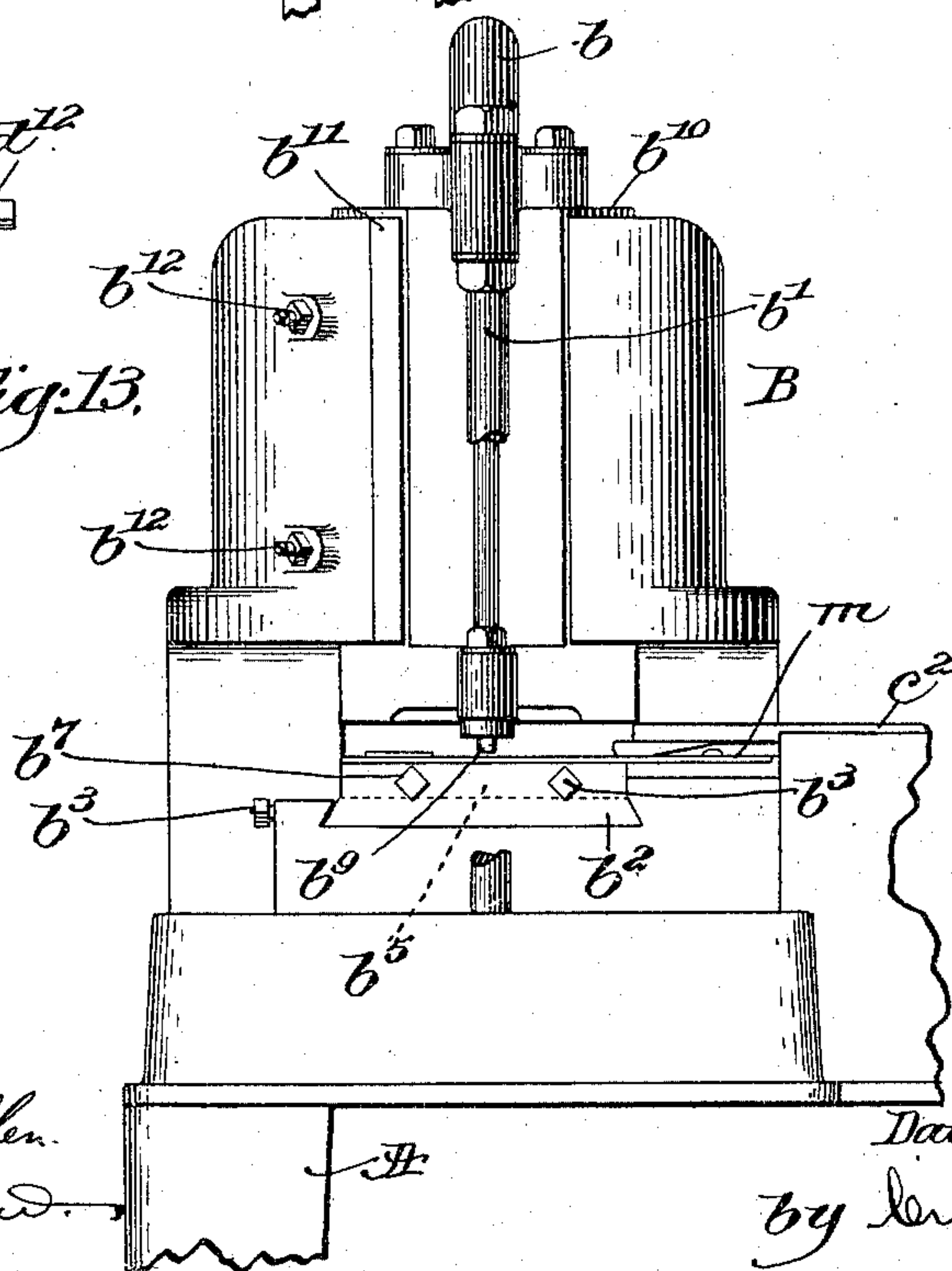
(Application filed Aug. 16, 1897.)

(No Model.)

6 Sheets—Sheet 6.



*Fig. 13.*



Witnesses.  
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# UNITED STATES PATENT OFFICE.

DAVID E. HUNTER, OF CAMBRIDGE, MASSACHUSETTS.

## MACHINE FOR OPERATING ON CARDS.

SPECIFICATION forming part of Letters Patent No. 612,609, dated October 18, 1898.

Application filed August 16, 1897. Serial No. 648,408. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID E. HUNTER, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented an  
5 Improvement in Machines for Operating on Cards, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 My invention is a machine for operating upon cards, being particularly intended for cutting and punching cards. The object of my invention is to secure extreme accuracy, so that all the cards shall be absolutely uni-  
15 form, extreme certainty of operation, so that no injury, marking, &c., of the card shall occur, and also neatness and despatch.

One feature of my invention resides in separating and taking the cards from the stack  
20 or supply-pack. Whereas heretofore there have been various devices for pushing and pulling the cards in order to feed them to the machine and for nipping or grabbing the cards and carrying them to the machine, my  
25 invention proceeds on an entirely different idea, and instead of moving the card, in the first place, in the direction of its own plane, my machine slices or shaves off the card from  
30 it, in the first place, transversely to its own plane and completely separating it from its own pack before any feeding movement thereof takes place.

In order to prevent the possibility of injury  
35 to the cards by improper feeding thereof, I have provided one or more stops to control the feed depending for their operation upon the feed itself.

A further object of my invention resides in  
40 means to maintain the cards in accurate alignment throughout their movement, so that they will be in absolutely correct position beneath the forming mechanism when the latter is caused to operate.

45 Further objects and advantages of my invention will be more fully pointed out in the following description, reference being had to the accompanying drawings.

In the drawings illustrative of a preferred  
50 embodiment of my invention, Figure 1 is a central vertical longitudinal section of my improved machine, parts being broken away

for clearness of illustration. Fig. 2 is a front end elevation, parts being broken away to show the details thereof. Fig. 3 is a trans- 55  
verse section taken on the line 3 3, Fig. 1. Fig. 4 is a top plan view of the machine. Fig. 5 is an enlarged horizontal section taken on the line 5 5, Fig. 1. Fig. 6 is an enlarged detail of one of the stops. Fig. 7 is an illustra- 60  
tive detail showing the method of removing the cards. Fig. 8 is a perspective view of a portion of the bed of the machine adjacent the card-holder. Figs. 9 and 10 are respec- 65  
tively sectional details on the lines 9 9, 10 10, Fig. 1. Fig. 11 is a similar section on line taken at the rear of the card-holder, parts being broken away. Fig. 12 is a fragmentary detail in side elevation of the valve-actuator. Fig. 13 is a broken detail showing a side ele- 70  
vation of the die-block and bed, looking toward the left, Fig. 2.

Referring to the drawings, the frame A, made rigid by suitable braces A', may be of any desired construction. At the forward 75  
end thereof I have mounted the forming mechanism B, herein shown as in the form of dies, to cut and punch the cards, and supported from a yoke b, sustained at either end by posts b'. At the rear of the forming mech- 80  
anism is the feeding mechanism C and suction apparatus D, the parts mentioned deriving their movement from a suitable source, herein shown as a power-shaft E, on which are mounted a number of cams, as presently 85  
explained.

The cards to be fed are retained in stack form by any suitable magazine or holder c, the one herein shown comprising a plurality of vertical slats or posts c', held together by 90  
cross-bars and bolted to the bed of the machine, (shown in elevation in Figs. 1 and 3 and in top plan in Fig. 4,) where it will be noted that the rear posts of the holder extend at their lower end below the supporting- 95  
plate c<sup>2</sup> of the holder, thereby preventing any of the cards from moving to the rear of the holder. (See also Fig. 8.)

Adjacent the front end of the card-holder I have arranged a suction apparatus, a cham- 100  
ber c<sup>3</sup> being herein shown provided at its ends with trunnions (shown in dotted lines in Fig. 5) held down by journal-blocks or caps c<sup>4</sup> in bearings c<sup>21</sup>, Fig. 8, in the supporting-plate c<sup>2</sup>,



so as to be capable of a swinging movement in order to bring its upper surface flat against the bottommost card, and thereby suck the latter down with a minimum exhaust of air, (although it would work if not hinged, provided a very strong suction were employed,) this chamber being closed except for a central opening or mouth  $c^5$  in its top plate flush with the upper surface thereof to suck against the lowermost card, a tube  $c^6$  entering the rear side of this chamber and connecting thence with the pumping mechanism, this tube being secured to the chamber by a flexible connection, herein shown as in the form of leather washers or leather packing  $c^7$  on the chamber and secured by its flanges to the tube.

The pump is shown as comprising a stationary cylinder  $d$ , having a piston  $d'$  working therein to exhaust the air and having a port at its rear end connecting with a shell or telescoping section  $c^8$  of the tube  $c^6$ , the upper end of the port being shown at  $d^2$ , Fig. 1, and the rear end of the cylinder and its connection being shown in elevation in Fig. 3 and indicated in dotted lines in Fig. 2. The forward portion  $c^6$  of the tube is connected to the rear portion  $c^8$  by a packed telescoping joint  $c^9$ . The piston-rod  $d^3$  of the pump mechanism is pivoted at  $d^4$  to the upper end of a link  $d^5$ , driven by a rod  $d^6$  and eccentric ring  $d^7$  from an eccentric cam  $d^8$  on the main shaft. The chamber  $c^3$  is operated from a cam  $c^{10}$ , on which is a ring  $c^{11}$ , having connection with a link  $c^{12}$  by a rod  $c^{13}$ , the link  $c^{12}$  being secured by a set-screw  $c^{14}$  to a slide-pin  $c^{15}$ , pivoted at its forward end to the lower end of the chamber  $c^3$ . The pin  $c^{15}$  slides in lugs  $c^{17}$   $c^{18}$ , depending from the plate  $c^2$ . (See Figs. 1 and 11.) The connection last described also serves to operate the feeding mechanism by means of a strap  $c^{16}$ , extending upwardly from the link and fixed on the tube  $c^6$  between said depending lugs  $c^{17}$   $c^{18}$ , secured to the movable supporting-plate  $c^2$ . The latter are far enough apart to permit a small amount of lost motion, as will be evident by viewing Fig. 1. Thus when the link  $c^{12}$  moves forward it first slides forward the tube  $c^6$  and the rod or pin  $c^{15}$ , so as to lift the suction-chamber  $c^3$ , and then when the latter is in raised position the shoulder of the connection  $c^{14}$  strikes the lug  $c^{18}$  and moves forward the entire feeding apparatus. The tube  $c^6$ , moving directly with and by the link  $c^{12}$ , has a distinct forward and backward movement in its relation to the feeding mechanism, this movement enabling the tube  $c^6$  to be carried directly by the link  $c^{12}$  instead of being attached rigidly to the feeding mechanism, in which latter case it would be liable to interfere with the free movement of said feeding mechanism.

The feeding apparatus operates on the principle of cutting or shearing off the cards one by one from the bottom of the stack, as is illustrated in Fig. 7, where it will be seen that

the cards  $K$  are held between the bars  $c'$  of the holder, the forward bars thereof being shorter than the rear ones, and a separator  $h$  is shown as entering immediately beneath the forward bars  $c'$  to split or slice off the bottommost card from the stack of cards.

Fig. 7 shows the principle of operation of my feeder.

Viewing Fig. 1,  $h$  designates a separator preferably rigid with plate  $c^2$  and beneath which and herein shown as having arms  $h^{10}$  bolted thereto is the retaining member or carrier  $h'$ , preferably having an upwardly-projecting lip  $h^2$  at its rear end, and these two portions  $h$   $h'$  being preferably slightly inclined, as therein shown, so that when a card has been sucked down at its forward end by the suction apparatus  $c^3$  the separator and carrier may pass to the rear, telescoping over the card respectively above and below the said card, so that when the said separator and carrier are at their rearmost position of movement they will have completely inclosed the card between them or swallowed it, as it were, the card, however, having been simply moved downwardly transversely to its plane and still being in its proper relative position beneath the stack for the reason that the depending ends of the rearmost posts or bars  $c'$  prevent any backward movement of the card.

Fig. 8 shows in perspective a portion of the feeding apparatus, from which it will be seen that the rear part or supporting-plate portion  $c^2$  thereof is provided with beveled edges  $c^{19}$  to enter dovetailed ways, as shown clearly in Fig. 9, and has in its upper portion recesses  $c^{20}$ , in which the depending ends of the rear bars  $c'$  may hang as the plate is moved backward and forward, the stack of cards resting on the intermediate portion of plate  $c^2$  and the latter being dished out, so as to have as little frictional contact as possible with the cards as it moves beneath them.

In Fig. 8 the suction-chamber is removed for clearness of illustration, its further pivotal bearing being indicated at  $c^{21}$ .

In order that the card may be caught with certainty by the lip  $h^2$  of the carrier, I provide means for bending the card downwardly, so that it may be caused to snap over the lip when the latter slides under the rear end of the card, this being accomplished, as herein shown, by upwardly curving the rear ends of the separator and carrier, as clearly shown in Fig. 1. The result is that the card is bent up, so that when the lip  $h^2$  slides off the rear end of the card as the feeder moves to the rear of the card the latter snaps down firmly in front thereof, being thereby finally and entirely separated from the stack ready to be moved forward. Coöperating with these feeding devices I provide a stationary guideway  $h^x$ , having grooves or apertures  $h^4$ , provided with mouths, at the sides of the separator and the carrier made somewhat funnel-shaped, with converging walls, as is clearly shown in Figs. 1, 8, and 9, where it will be seen that the lip



$h^2$  occupies an intermediate position substantially on a horizontal line with the beveled surfaces between the separator and carrier and that the flaring openings at  $h^{3x}$  of the guiding-recesses  $h^4$  receive the cards as the latter are moved forward by the carrier.

In order that the suction-chamber  $c^3$  may let go of the card the moment that the separator has entered above the card, and also in order that the exhausting or pumping apparatus may act only at the moment desired, I have provided a valve  $d^9$  at the rear end of the cylinder  $d$ , (see Figs. 1, 3, and 4,) this valve opening outwardly under spring action, so as to permit the free exit of the air from the cylinder and by its opening prevent or stop the exhausting of the air thereby.

The valve  $d^9$  is controlled by a rod  $d^{10}$ , secured to and moving with the plate  $c^2$  or any other convenient part of the feeding mechanism which projects adjacent this valve, and is provided with a valve-actuator  $d^{12}$  (shown clearly in Fig. 3) to engage the valve and close it, so that the suction action in the chamber  $c^3$  will begin to take place just as the latter is about to be raised against the lowermost card and will continue until the separator  $h$  has moved rearwardly sufficiently to enter beneath the stack and above the bottommost card which has been sucked down by the sucker action of the chamber  $c^3$ . The block or actuator  $d^{12}$  is adjustable by means of a set-screw  $d^{13}$  to regulate the position at which the valve  $d^9$  should be cut off. This adjustment is necessary because thick cards necessitate a stronger suction than thin cards. For instance, for thick cards the adjustable block  $d^{12}$  should be so located that the air-valve  $d^9$  would be closed about midway of the forward stroke of the feeder C, which would give a good vacuum in the air-chamber  $d$ . In case, however, little suction was required the air-valve  $d^9$  would not be cut off by the block on rod  $d^{10}$  until the feeder C had almost completed its forward movement.

In case it were decided to feed very thin cards through this machine a retarding device is applied to prevent more than one card being drawn down by the suction-plate. This is shown in Fig. 4 as a short projection or pin  $k$  on the inner face of the forward bars  $c'$  on a direct line with the bottom of the stack of cards, the pins  $k$  having a tendency to retain the card to a certain extent—that is, to prevent it from dropping readily of its own accord upon the suction-chamber—but in the case of thin cards the suction-chamber will bend them at their forward edge until the lower card is released. The points or pins  $k$  thus form a retarding device to overcome the natural tendency of thin cards to drop upon the suction-plate, exerting a retention which is overcome by the strength of the suction. Upon a return forward movement of the carrier the card is accurately carried forward thereby. When the card and carrier have reached the position of the latter shown

in Fig. 1, a hold or clamp  $m$  (see Figs. 4 and 5) is brought down over the card to retain the latter and prevent it from being carried back again by the return movement of the carrier. This hold or clamp in the present instance is shown in the form of a plate actuated by a rod  $m'$ , extended upwardly from a rocker-arm  $m^2$  and operated by a rim  $m^3$  in contact with a roll  $m^4$  of an arm  $m^5$  of the rocker-arm, said rim being on a cam  $b^{13}$ . The cards follow each other along a straight path  $h^4$ , having parallel guiding sides only slightly wider than the cards themselves, and in order to insure the absolutely correct placing of the cards beneath the cutting-dies I employ a plate  $m$  adjacent the right-hand side, viewing Fig. 2, (see also Fig. 5,) and have provided it with a flange  $m^6$  on its under side slightly back of its forward edge, projecting into a recess therefor, this plate being lifted and lowered by the rod  $m'$ , as just explained, springs  $m^7$   $m^8$  being provided (see Fig. 5) in order to give extreme delicacy of movement. A second movement of the carrier to the rear leaves the card which was carried forward thereby and causes the carrier to separate or peel off another card from the pack and in turn bring this second card forward. In the meantime, however, the first card brought forward, which, as we have seen, was retained by the hold  $m$ , has been caught by a shoulder  $h^3$  at the forward end of the carrier, so that when the carrier moves forward for the second time this shoulder pushes the first card ahead in the proper position beneath the forming mechanism. In order to insure that the card shall be engaged by the shoulder  $h^3$ , the latter is raised somewhat and the upper wall of the carrier is arched downwardly somewhat at each side of the shoulder, as shown at  $h^{30}$ , so as to bend the card in order to make it certain that the card shall snap down in front of the shoulder  $h^3$ , as will be clearly apparent by viewing Fig. 10.

From the above description it will be understood that the cards move forward in a train one after another. The apparatus is preferably so proportioned that there is no appreciable gap between the cards in order to cooperate with a stop mechanism, which I will now explain.

Viewing Fig. 5,  $n$  designates a bell-crank lever having its free end under a tendency by reason of a spring  $s$  to project into the path of the train of cards, this lever being connected by a link  $n'$  with a hooked lever pivoted at  $n^2$  (said pivot  $n^2$  extending down through the bed) and having at its free end a hook  $n^3$ , Figs. 5 and 11, capable of engaging a pin or projection  $c^{23}$  on the free end of a valve-closure  $c^{23}$ , mounted on the lower side of the chamber  $c^3$ . Thus when the cards are being fed forward properly and there is a continual train thereof the lever  $n$  will be held out of the path of the cards, bearing lightly against the edges thereof as they move along, and in such case the hook  $n^3$  will be out of the line



of engagement with the valve-closure  $c^{23}$  of the suction-chamber; but in case a card should get wedged at the mouth of the feeding apparatus, or if from any other cause a card should not be fed at the proper time by the apparatus, the lever  $n$  will enter the unoccupied path of the card, bringing the hook  $n^3$  into the path of the valve-closure  $c^{23}$ , so that upon every rearward movement thereafter of the feeding apparatus the chamber  $c^3$  will be automatically opened, thereby preventing any suction thereby and accordingly leaving the cards undisturbed in the stack.

In order further to insure that if one card should get jammed or lodged successive cards would not be fed into the machine, thereby choking the latter and damaging the cards, and to insure that the cards in the stack shall maintain their undisturbed position, I have provided a stop, a portion of which is shown in detail in Fig. 6, where it will be seen that a rod  $p$ , having a shoe  $p'$  at its lower end, gently pressed downwardly by means of a spring  $s'$ , rests normally on the moving train of cards beneath it, two cards being indicated in said figure at 1 and 2. This rod is secured at its upper end to a bell-crank  $p^2$ , pivoted at  $p^3$ , and preferably provided with a handle  $p^4$ , being provided at its opposite end with a stop-rod  $p^5$ , extending rearwardly adjacent the forward end of the card-holder immediately beneath the normal position of the lowermost card of the stack. Below the shoe  $p'$  is a pocket or depression  $p^6$ . As long as the cards move forward normally in succession there will be a continuous support thereby to the shoe  $p'$  and the stop-rod  $p^5$  will be held out of the path of the stack of cards; but the moment that a gap occurs by the improper feeding of a card the shoe will have an opportunity to fall into its pocket  $p^6$ , thereby projecting the stop-rod  $p^5$  beneath the stack of cards and preventing further feeding thereof.

Viewing Fig. 1, it will be seen that I have provided a holding-block  $b^2$ , having a dovetailed sliding connection in the bed of the machine, this block being provided to hold the die-bed and connected parts. This block is preferably slid into the bed of the machine from the right hand, viewing Fig. 2, and is held therein by means of bolts  $b^3$ , as clearly shown in Fig. 5. On its upper surface it is provided adjacent its left-hand end, Fig. 2, with a dovetailed way  $b^4$  to receive the bed-piece  $b^5$  of the cutting-die, said bed-piece having at its opposite or right-hand side preferably V-shaped recesses  $b^6$  to receive the tapered ends of fastening-bolts  $b^7$ , these bolts being set slightly below alinement with these recesses, thereby firmly and accurately seating the bed-piece.

The cutter and die-block is herein shown (see Fig. 5) as having a shape to cut a card with two tabs or projections at its upper edge, this being a usual form of card employed as a division-card—for instance, in a card-catalogue. At the opposite side, or what would

be the bottom of the card, I have provided a die-piece  $b^8$ , having a hole to receive a punch  $b^9$ , carried by the movable part of the forming apparatus, in order to punch a hole in the bottom of a card.

While I have herein illustrated the forming device as capable of punching a hole in the card and providing tabs at its upper edge, I do not mean in any wise to restrict myself to these or similar features of forming apparatus, inasmuch as the general mechanism of my invention is capable of operating on cards and feeding them for various other purposes.

It will be understood that as usual in die-carrying apparatus there are male and female portions, the upper movable part corresponding to the lower part which I have described, and viewing Fig. 4 it will be seen that I have provided a dovetailed way  $b^{10}$  for the moving part of the forming mechanism to operate in, a tightening-plate  $b^{11}$  and screw  $b^{12}$  being shown to insure nicety of action.

The movable cutter or die is operated by a path-cam  $b^{13}$ , roller  $b^{14}$ , and bifurcated guiding-head  $b^{15}$  and connections.

In preparing cards for library-indexing and card-records it is of the utmost importance that the cards shall be absolutely uniform in every respect, and it is the object of my invention to produce cards as nearly perfect as possible in this regard.

Adjacent the edge of the card, opposite the plate  $m$  and beneath the forming mechanism, I have provided two delicate springs  $s^2 s^3$ , against which the card in its forward movement presses slightly, and is thereby accurately and delicately pushed over against the flange  $m^6$  of the clamping-plate  $m$ , so that it is necessarily in absolutely correct position. I have herein shown these springs as secured to the front face of a movable positioning device  $t$ , (see Figs. 2 and 5,) pivoted at  $t'$  and normally held forward by springs  $t^2$  on rods  $t^3$ , projecting from the rear end of the positioning device and operating through eyes  $t^4$ , the forward end thereof normally abutting against a stop  $t^5$  on the bed of the machine. This positioning device is immediately below the movable die of the forming mechanism, so that it serves to position and retain the card perfectly until the cutting-die has begun its descent and comes in contact with said positioning device, and then the latter, being freely movable, is moved ahead and out of the way of the cutting-die as the latter descends, being returned immediately to its original position by its spring  $t^2$  as the cutting-die again rises.

The operation of my machine is as follows: Referring to Fig. 1, the magazine or holder  $c$  is filled with cards to be operated upon and the drive-shaft  $E$  operated slowly by hand until the suction-chamber  $c^3$  is about midway in its travel beneath the cards, in which position the front edge of the lowermost card cannot enter the opening below the reciprocating separator  $h$ . The power is then ap-



plied to the shaft E, causing the various cams thereon to travel in the direction indicated by arrow on cam  $c^{10}$ . The cam  $c^{10}$  carries the separator  $h$  backward to its limit, and as the  
 5 cam goes by its central or dead point in its relation to the connecting-link  $c^{12}$  the motion of the link  $c^{12}$  is reversed, and starting on its forward movement the said link first actuates the slide-pin  $c^{15}$ , which by means of its con-  
 10 nection with the suction-chamber  $c^3$  raises the said chamber until its face-plate is on the same level or plane as the face of the supporting-plate  $c^2$ , the cards in the receiver resting directly upon the face of both the  
 15 suction-chamber and the plate  $c^2$ . The connection attached to the sliding pin  $c^{15}$  by means of the screw  $c^{14}$  now presses against the lug or boss  $c^{18}$  of the feeding mechanism, causing the latter to travel forward be-  
 20 neath the stack of cards. While the feeder C is making the forward stroke the cam  $d^8$  is operating the air-pump  $d$ , causing a strong suction through the suction-plate mouth  $c^5$ , the cam  $d^8$  being so positioned in its relation  
 25 to the cam  $c^{10}$  that the suction is the strongest when the feeding mechanism C is at its most forward position. Continued rotation of the cam  $c^{10}$  now reverses the movement of link  $c^{12}$ , which again actuates slide-pin  $c^{15}$  in  
 30 a reverse manner, thereby pulling down the suction-chamber  $c^3$ , the latter in its movement drawing down, by means of its suction, the lowermost card and holding the card close against its face. The connection  $c^{14}$ , moving  
 35 with the pin  $c^{15}$ , now strikes the lug  $c^{17}$  and carries the feeder C in its reverse or backward movement, which movement causes the card held by the suction-plate to be encompassed or swallowed within the open jaws  
 40 formed by the separator  $h$  and carrier  $h'$ . The feeder continues in its backward movement until the card becomes inclosed within the jaws of the movable receiver and conveyor  $h$   $h'$   $h^2$ , &c. The revolution of the cam  
 45  $c^{10}$  causes the plunger or carrier and separator to reverse as before; but it is now carrying a card which it has literally shaved off from the bottom of the pack, the said card being securely prevented from moving back-  
 50 ward in the carrier by means of the barb or raised lip  $h^2$ . By the forward movement of the feeder the card is entered between the stationary receiving-guide  $h^4$ , where immediately on the arrival of the feeder at its full  
 55 forward movement the card is clamped by means of the clamp  $m$  and rod  $m'$ . The feeder now returns, shaving off another card, as above described. In the next forward move-  
 60 ment of the feeder the raised lip  $h^3$  of the carrier  $h'$ , and which in the latter's backward movement has retreated behind the card held by the clamp, pushes the card into the desired position beneath the operating-press or forming mechanism, the clamp-rod  $m'$  hav-  
 65 ing been relieved at the proper time to permit said movement. The irregular path-cams  $b^{13}$  on each side of the machine (see

Figs. 2 and 3) now come into play by the continued revolution of the driving-shaft and actuate the bifurcated guiding-head  $b^{15}$ , caus-  
 70 ing the cutting-press to descend, cutting the card beneath the press to its proper configuration, as shown by the shape of the cutters in the drawings, this shape being varied by  
 75 substituting other cutters and dies. The irregular path-cam  $b^{13}$ , in which the roll  $b^{14}$  of the guide-head  $b^{15}$  runs, has its channel so cut that in one half-revolution of the driv-  
 80 ing-shaft the cutting-press makes a down and up movement, the down movement cutting the card and the up movement leaving it clear to be ejected from the press-guides. It  
 85 will be seen by the action of the cam  $b^{13}$  that when the feeder C is retreating the press is doing the cutting operation upon the card, and that when the feeder is coming on its  
 90 forward movement (which said forward movement is performed by one half-revolution of the driving-shaft) the cutting-dies of the press are at their uppermost position, which  
 95 enables the card directly beneath the press to be pushed from the guides and ejected by the next following card, the latter card being pushed into place by the regular operation of the machine already described.

It will be noted by the above description that a card is first shaved from the bottom of the pack and becomes swallowed within the forward portion of the reciprocating feeder, and that the card is then carried forward  
 100 thereby and clamped within the guides, the feeder on its backward movement leaving the card in that position. The feeder retreats until its forward end is behind the card so left, which end pushes it beneath the press. After  
 105 being operated upon the card is pushed out by the next card following. It will also be noted that the cam  $b^{13}$  performs its work in one half-revolution of the driver E, thereby enabling  
 110 the machine to cut and punch a card on the backward movement of the feeding mechanism C.

While I have herein shown cams as the means for moving the parts and have shown  
 115 these cams as mounted on one shaft, I do not intend to restrict myself to such construction, inasmuch as any other operating means may be substituted; also, many changes in construction and arrangement may be resorted  
 120 to without departing from my invention. For instance, the parts need not be movable precisely as stated, and therefore in certain of my claims I have used the term "relatively  
 125 movable," meaning thereby that either part may move, provided substantially the same relative movement results therefrom, and, furthermore, while I have herein shown a  
 130 suction device for aiding in separating cards this may be dispensed with, and any other usual separating means or any other variety of suction device may be substituted. It  
 will be noticed that in certain of my claims I have omitted certain elements, and accordingly I wish it understood that I am not lim-



ited otherwise than as set forth in the claims, and that the combinations as set forth may be used in various other relations than as herein set forth.

5 I claim as broadly new the feeding of cards by slicing or shaving them off from the "stack," the latter term being used in the claims to designate an aggregation or pack of cards, although it may be only a portion of the  
10 entire body of cards, and I have attempted to define this new feature broadly in the claims by stating that the separator enters between the endmost card (of the group or subgroup constituting the stack) and first separates the  
15 card from its fellows (above or below or in other relation, as the case may be) by a body movement perpendicular to the stack, meaning thereby to distinguish from the old endwise-sliding movement of the card due to a  
20 push or pull transversely of the stack. By "body movement" I mean simply that the card is moved in whole or in part relatively to the stack enough to allow the separator to enter, and I also wish it understood that this  
25 movement need be only relatively to the rest of the cards of that stack, so that, if desired, the latter may be moved or permitted to move away from the card.

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

1. In a machine of the kind described, the combination with means to maintain a plurality of cards together superimposed as a  
35 stack, of means to cut or slice off and remove the cards successively therefrom, said means including a separator to go in between the body or central portion of the card being removed and the body of the adjacent card of  
40 the stack, substantially as described.

2. In a machine of the kind described, a stack-holder for cards, a separator to enter between the body of the endmost card and the rest of the stack, and move said endmost  
45 card bodily away from the stack in a direction perpendicular to its plane, and means to remove said separated card, substantially as described.

3. In a machine of the kind described, a  
50 stack-holder for cards, a separator to enter between the endmost card and the rest of the stack, and move said endmost card bodily away from the stack in a direction perpendicular to its plane, and a member moving  
55 therewith to move beneath said endmost card, said member and separator cooperating to telescope over said card receiving it between them, and means then actuating said telescoping member and separator to remove it,  
60 substantially as described.

4. In a machine of the kind described, a stack-holder for cards, and a separator to enter between the endmost card and the rest of the stack and move said endmost card bodily  
65 away from the stack in a direction perpendicular to its plane, and a member moving

therewith to move beneath said endmost card, said member and separator cooperating to telescope over said card receiving it between them, and having means to flex the card, substantially as described. 70

5. In a machine of the kind described, a holder for cards, forming mechanism to operate on said cards, a way engaging the edges of the cards and leading from said holder  
75 to said forming mechanism, and supporting means to engage said cards at their rear edges and support and carry them successively end to end along said way to be operated on, substantially as described. 80

6. In a machine of the kind described, a holder for cards, forming mechanism to operate on said cards, a way leading from said holder to said forming mechanism, means to move said cards step by step and end to end  
85 along said way to be operated upon, a clamp to hold said cards in said way, actuating means therefor to hold the cards intermittently after their said step-by-step movement, substantially as described. 90

7. In a machine of the kind described, a holder for cards, forming mechanism to operate on said cards, a way leading from said holder to said forming mechanism, feeding mechanism to move said cards end to end  
95 along said way to feed them to said forming mechanism, and a stop cooperating with said moving cards to automatically stop the engagement thereof by said feeding mechanism upon an interruption in said end-to-end feed, substantially as described. 100

8. In a machine of the kind described, a holder for cards, forming mechanism to operate on said cards, a way leading from said holder to said forming mechanism, feeding  
105 mechanism to move said cards end to end along said way to feed them to said forming mechanism, and a stop cooperating with said moving cards to automatically prevent said cards from leaving said holder upon an interruption in said end-to-end feed, substantially as described. 110

9. In a machine of the kind described, a stack-holder for cards, a suction device located adjacent one end of the endmost card  
115 to suck the endmost card away from the stack, a retarding device to retain the cards in the holder and permit only the end one to be sucked away, and a feeder to receive said endmost card as its end is held away from the stack by the suction device, substantially as described. 120

10. In a machine of the kind described, a stack-holder for cards, a supporting-plate for the cards to rest against, a separator to cut  
125 off the bottom card, a carrier below said separator and slightly removed therefrom, and means to reciprocate said plate, separator and carrier relatively to the stack of cards in their holder, the bottom card being encompassed by the separator and carrier during  
130 said relative movement as the plate retreats



from under said card and the card being removed from the holder by their return movement, substantially as described.

11. In a machine of the kind described, a stack-holder for cards, an end support for the cards therein, a feeder to feed the cards, said feeder including a separator and a carrier inclosing a space to receive the endmost card between them, and means to move said feeder relatively to the stack of cards, said separator detaching the end card from the stack by moving it bodily transversely to its plane, and said carrier then removing said detached card, substantially as described.

12. In a machine of the kind described, a stack-holder for cards, an end support for the cards therein, a feeder to feed the cards, said feeder including a separator and a carrier to receive the endmost card between them, and means to move said feeder relatively to the stack of cards, said separator detaching the end card from the stack by moving it bodily transversely to its plane, and said carrier then removing said detached card, said carrier having an upturned lip at its rear end to engage the rear edge of the card.

13. In a machine of the kind described, a stack-holder for cards, an end support for the cards therein, a feeder to feed the cards, said feeder including a separator and a carrier to receive the endmost card between them, and means to move said feeder relatively to the stack of cards, said separator detaching the end card from the stack by moving it bodily transversely to its plane, and said carrier then removing said detached card, said carrier having an upturned lip at its rear end to engage the rear edge of the card, and said separator having a downwardly-bent portion on each side of said lip to cooperate therewith in bending the card upwardly at its middle as the card is being received thereby, substantially as described.

14. In a machine of the kind described, a stack-holder for cards, an end support for the cards therein, a feeder to feed the cards, said feeder including a separator and a carrier to receive the endmost card between them, and means to move said feeder relatively to the stack of cards, said separator detaching the end card from the stack by moving it bodily transversely to its plane, and said carrier then removing said detached card, a projection being provided between said separator and carrier at their forward end to engage a previously-removed card, substantially as described.

15. In a machine of the kind described, a stack-holder for cards, an end support for the cards therein, a feeder to feed the cards, said feeder including a separator and a carrier to receive the endmost card between them, and means to move said feeder relatively to the stack of cards, said separator detaching the end card from the stack by moving it bodily transversely to its plane, and said carrier

then removing said detached card, a projection being provided between said separator and carrier at their forward end to engage a previously-removed card, and cooperating portions acting with said projection to bend the card and cause it to snap against the front of said projection to positively engage the same, substantially as described.

16. In a machine of the class described, a holder for a stack of cards, a suction device to move the end card, and a feeder to remove said card, said suction device comprising a chamber pivoted at its upper rear side opposite said feeder and having an orifice in the upper side adjacent the cards, means to swing said chamber on its pivot, an exhausting apparatus, and a cut-off for the latter, and means to cause said cut-off to operate after the feeder has engaged the card, substantially as described.

17. In a machine of the class described, a holder for a stack of cards, a suction device to move the end card, and a feeder to remove said card, said suction device being provided with an exhausting apparatus, and a cut-off for the latter, and adjustable means to cause said cut-off to operate after the feeder has engaged the card, substantially as described.

18. The combination with a stack-holder for cards open at its bottom and projecting below the cards at its rear end, of card-feeding mechanism operating across said open bottom, and including a supporting-plate for the stack of cards, a separator to cut off the bottom card, said separator having its upper surface in the same plane with the top of the said plate, and a carrier for the cards, said carrier and said separator receiving the card between them, to remove it, and means to reciprocate said feeding mechanism relatively to said holder, substantially as described.

19. The combination with a stack-holder for cards open at its bottom and projecting below the cards at its rear end, of card-feeding mechanism operating across said open bottom, and including a supporting-plate for the stack of cards, a separator to cut off the bottom card, a carrier for the cards, and a suction-chamber operating between said plate and said separator to deflect the forward end of the card, said carrier and said separator receiving the card between them to remove it, and means to reciprocate said feeding mechanism relatively to said holder, substantially as described.

20. The combination with a stack-holder for cards open at its bottom and projecting below the cards at its rear end, of card-feeding mechanism operating across said open bottom, and including a supporting-plate for the stack of cards, a separator to cut off the bottom card, a carrier for the cards, and a pivoted suction-chamber operating between said plate and said separator to deflect the forward end of the card, said carrier and said separator receiving the card between them to remove it, and means to reciprocate said feed-



ing mechanism relatively to said holder said means including a device to swing said suction-chamber up to get a card and to return it with the card before moving said separator to engage the card, substantially as described.

21. The combination with a stack-holder for cards open at its bottom and projecting below the cards at its rear end, of card-feeding mechanism operating across said open bottom, and including a supporting-plate for the stack of cards, a separator to cut off the bottom card, a carrier for the cards, and a pivoted suction-chamber operating between said plate and said separator to deflect the forward end of the card, said means comprising a slide-pin connected to said chamber and sliding in two lugs fixed to said feeding mechanism, and an operating member fixed on said pin between said lugs, the latter being apart sufficiently to permit said operating member to move said pin and thereby said suction-chamber before engaging the lugs and thereby moving the rest of the feeder, substantially as described.

22. In a machine of the class described, the combination with a way for the cards, and feeding mechanism to feed them in said way, of a clamp to hold said cards intermittently, said clamp comprising a plate at one side of said way overhanging said cards, springs tending to lift said plate out of engagement with said cards, a rod to actuate said plate in opposition to said springs, and means to operate said rod as the successive cards are moved in place by said feeding mechanism beneath said plate, substantially as described.

23. In a machine of the class described, the combination with a way for the cards, and feeding mechanism to feed them in said way, of a clamp to hold said cards intermittently, said clamp comprising a plate at one side of said way overhanging said cards, said plate having a depending flange back of its overhanging portion to enter a recess provided therefor at the edge of said way, springs tending to lift said plate out of engagement with said cards, a rod to actuate said plate in opposition to said springs, and means to operate said rod as the successive cards are moved in place by said feeding mechanism beneath said plate, substantially as described.

24. A machine of the class described, having a way for the cards, feeding mechanism to feed the cards successively end to end along said way, means to hold a stack of cards and deliver the same to said feeding mechanism, an automatic stop, combined therewith, and consisting of a shoe normally riding along said cards in contact therewith, a recess being provided to receive said shoe on the opposite side of said cards, means to maintain said shoe with a gentle pressure against said cards with a tendency to enter said recess, and stop connections between said shoe and said card-delivering means, said shoe being maintained on said cards by their continuous end-to-end feeding, and dropping into said recess be-

tween said cards when the latter are improperly fed to cause a gap between their adjacent ends, and said stop connections being rendered operative to stop the delivery of said cards to said feeding mechanism, by the moving of said shoe into said recess, substantially as described.

25. The combination with a way for the cards, and a feeding mechanism, said feeding mechanism including a carrier to feed said cards end to end along said way, and a suction apparatus to position said cards to be received by the carrier, said suction apparatus having a valve to open and release the suction therein, of a stop pivoted adjacent said way and having an arm adapted to bear against the edges of said cards as they move end to end in said way, a spring normally holding said arm against said cards with a tendency to move inwardly thereto, and a connection between said arm and said valve, said connection being inoperative when said arm is held by said cards and being rendered operative to close said valve by the inward movement of said arm due to the absence of a card, substantially as described.

26. In a machine of the class described, the combination with a way for the cards, and feeding mechanism to feed the cards along said way, of a forming mechanism, said forming mechanism having at one side thereof and in line with the adjacent edge of said way, a rigid flange to receive the adjacent edge of the card as the latter is fed from said way to be acted upon by said forming mechanism, and springs opposite said flange and in the path of said card to exert a gentle pressure on the edge of said card opposite said flange, thereby accurately positioning the card and moving it with certainty over against said flange, substantially as described.

27. In a machine of the class described, the combination with a way for the cards, and feeding mechanism to feed the cards along said way, of a forming mechanism, said forming mechanism having at one side thereof and in line with the adjacent edge of said way a rigid flange to receive the adjacent edge of the card as the latter is fed from said way to be acted upon by said forming mechanism, said flange being carried by a plate and depending therefrom to enter a recess formed therefor in the bed of the machine, said plate projecting from said flange over the path of the card and being provided with means to raise and lower it in order to clamp the card when properly positioned, and springs opposite said flange and in the path of said card to exert a gentle pressure on the edge of said card opposite said flange thereby accurately positioning the card and moving it with certainty over against said flange, substantially as described.

28. In a machine of the class described, the combination with card-feeding mechanism, and card-forming mechanism, the latter including a reciprocating member to operate



upon the cards when properly positioned, of a positioning device pivoted out of the path of said reciprocating operating member and normally projecting at its forward end into said path to contact with a card as it is moved by said feeding mechanism into position to be operated upon, said positioning device thereby acting against said card to insure its proper positioning, and being free to move out of the way of said operating member as the latter descends, substantially as described.

29. In a machine of the class described, the combination with card-feeding mechanism, and card-forming mechanism, the latter including a reciprocating member to operate upon the cards when properly positioned, of a positioning device pivoted out of the path of said reciprocating operating member and normally projecting at its forward end into said path to contact with a card as it is moved by said feeding mechanism into position to be operated upon, a stop to limit the forward movement of said positioning device, and a yielding device normally holding the same against said stop whereby said positioning device acts against said card to insure its proper positioning, and is free to move out of the way of said operating member as the latter descends, substantially as described.

30. In a machine of the class described, operating mechanism, including a holding-block secured by a dovetailed connection in the bed of the machine, said holding-block having a transverse way in its top side, said way having an undercut portion at one side and conically-ended securing means at its other side, combined with a die bed-piece formed to fit

the said recess, said piece having a V-shaped groove along its side adjacent said securing means, said securing means being slightly below alinement with said V-groove, whereby inward movement of the former against the latter tends to wedge said bed-piece into position, substantially as described.

31. In a machine of the class described, the combination with a stack-holder for the cards, of a supporting-plate for the cards in said stack-holder, feeding mechanism to shave or slice a card from the bottom of said stack and to feed it along the machine, forming mechanism to operate upon the cards, and actuating means for said parts, said actuating means causing said forming mechanism to operate upon a card simultaneously with the back shaving movement of said feeding mechanism, and to move said forming mechanism away from the card when the feeding mechanism is in its forward or feeding movement, substantially as described.

32. In a machine of the class described, a holder for cards, forming mechanism to operate on said cards, means to direct said cards from said holder to said forming mechanism, means to feed the cards, a clamp to hold said cards at times while being fed, and means to actuate said clamp intermittently, substantially as described.

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

DAVID E. HUNTER.

Witnesses:

GEO. H. MAXWELL,  
EDWARD F. ALLEN.