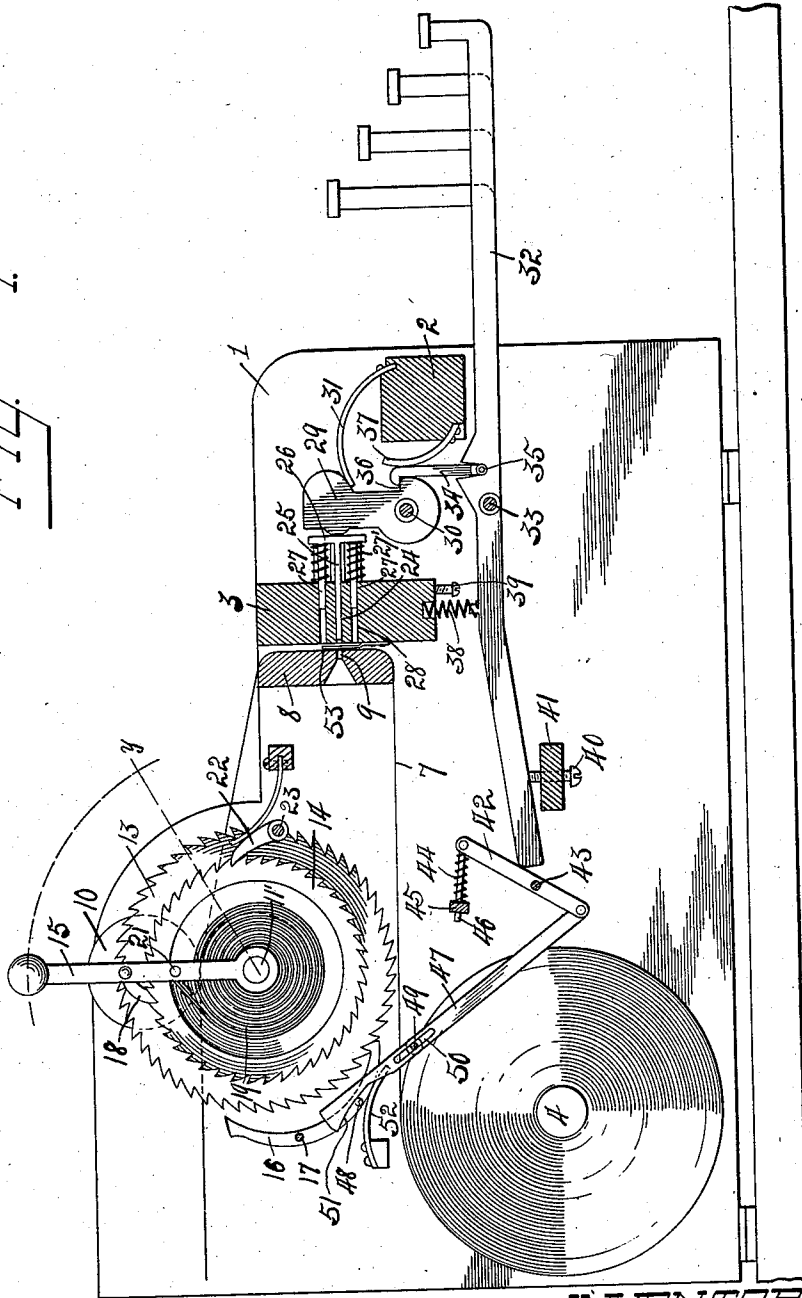


1,028,557.

P. J. DREHER.
SHEET PERFORATING MACHINE.
APPLICATION FILED SEPT. 5, 1911.

Patented June 4, 1912.
3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:
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M. Z. Oppenheim.

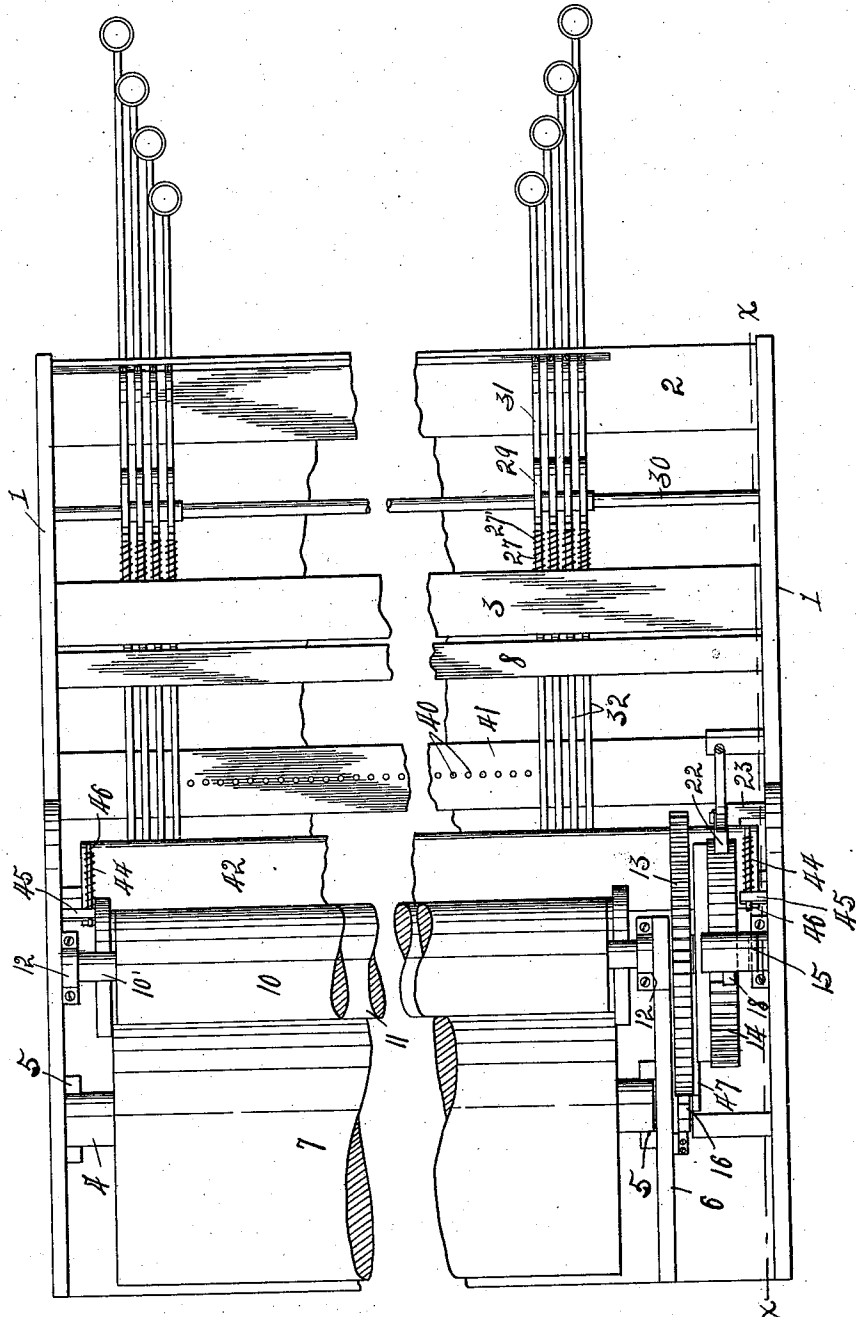
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Fig. 2.



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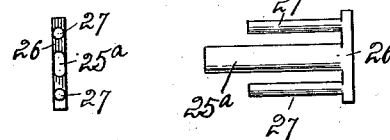
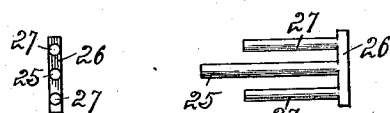
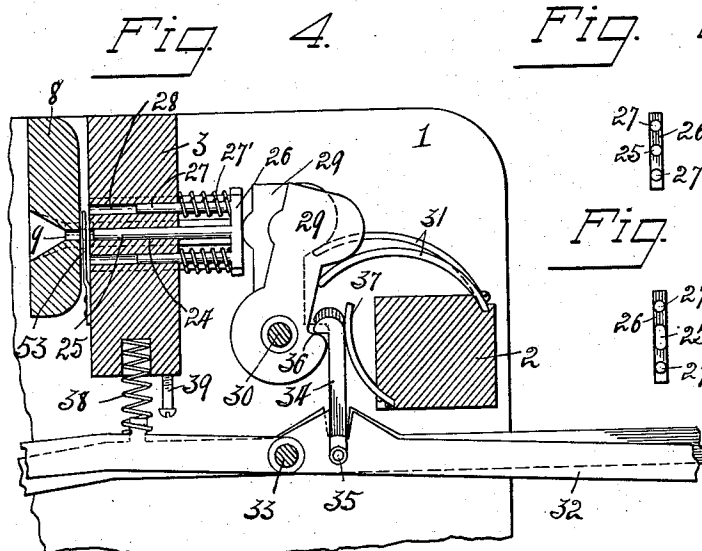
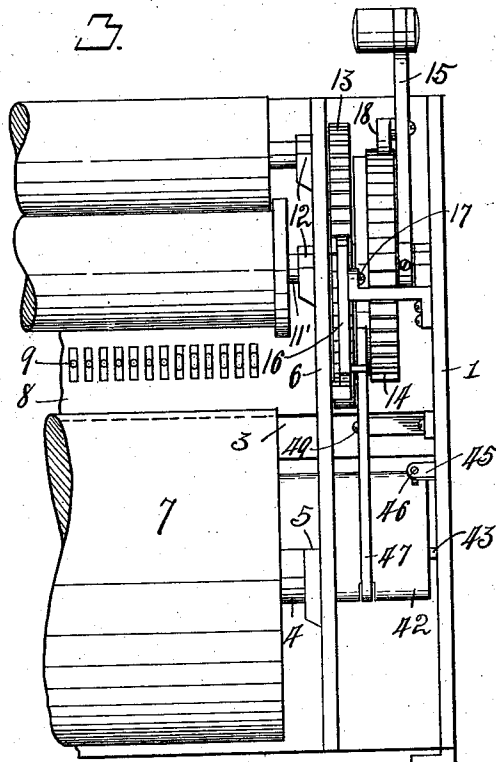
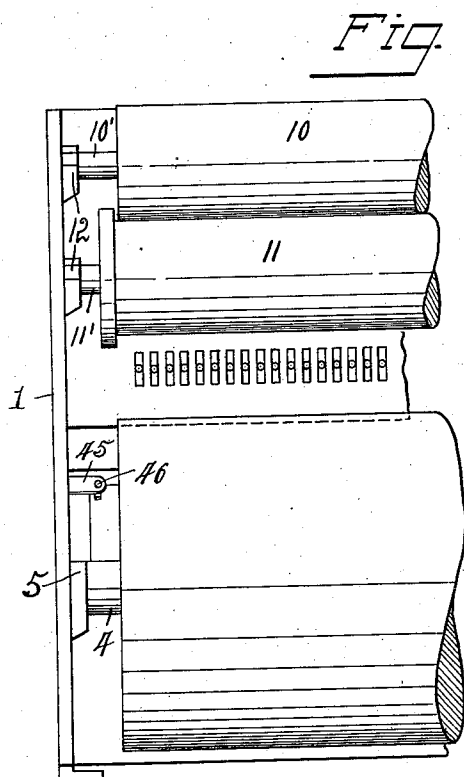
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3 SHEETS-SHEET 3.



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UNITED STATES PATENT OFFICE.

PHILLIP JACOB DREHER, OF TOLEDO, OHIO.

SHEET-PERFORATING MACHINE.

1,028,557.

Specification of Letters Patent.

Patented June 4, 1912.

Application filed September 5, 1911. Serial No. 647,622.

To all whom it may concern:

Be it known that I, PHILLIP JACOB DREHER, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Sheet-Perforating Machine; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to sheet perforating apparatus, and has particular reference to a machine for perforating the control sheets of pneumatically operated typewriters or the like, as described in connection with my former applications Serial Nos. 638,894 and 641,560, but may be used for the perforating of the control sheets of musical instruments or other pneumatically operated machines of this character.

The object of my invention is the provision of an apparatus of this character, which is simple, efficient and inexpensive in its construction, and capable of being easily and rapidly operated in a manner similar to the operating of a typewriter.

Further objects and advantages thereof will be apparent from the following description.

The invention is fully described in the following specification, and while, in its broader aspect it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which,—

Figure 1 is a vertical section of a machine embodying my invention taken on the dotted line *xx* in Fig. 2 with parts removed. Fig. 2 is a top plan view thereof with portions removed and broken away. Fig. 3 is a front elevation of the machine with portions broken away. Fig. 4 is an enlarged detail of the perforating mechanism with a key lever partly depressed, and Figs. 5 to 8, inclusive are different details of the perforating punches.

Referring to the drawings, 1—1 designate the frame sides of the machine, such sides being rigidly connected in the present instance by beams 2 and 3, and by any other suitable means as desired.

Mounted within the frame at the lower

forward portion thereof is a paper roll shaft 4, which is shown as having its ends removably mounted in suitable bearings 5, one of which is provided in a frame side 1, while the other is provided in a bearing standard 6 disposed adjacent the other side of the frame. The sheet 7 which unwinds from the roll upon the shaft 4, passes rearward therefrom and upward around the guide member or bar 8, which is perforated as at 9 to form the female perforating dies of the apparatus, and thence extends forward therefrom between the pair of feed rolls 10 and 11 which have their shaft ends 10' and 11' mounted in suitable bearings 12 provided in one of the frame sides 1 and the standard 6, as best shown in Fig. 3. The end of the shaft 11' which is journaled in the standard 6, projects beyond said standard and has two ratchet wheels 13 and 14 fixed thereto and a lever 15 loosely mounted thereon. The ratchet wheel 13 serves as one member of an anchor escapement while the other member of such escapement comprises the pallet 16, which is pivoted as at 17 to a stud, shown in the present instance as projecting from the adjacent frame side 1. The lever 15 carries a pawl 18 for engagement with the teeth of the ratchet wheel 14, said pawl and ratchet wheel teeth engaging in such manner as to cooperate to drive the ratchet wheel and attached shaft in the direction of projection of the teeth on the escapement wheel 13 when the lever 15 is moved for such purpose. The lever 15 is shown as rising from the shaft 11' and has its ratchet wheel driving movement actuated by a coiled power spring 19 which encircles said shaft within a recessed portion of the ratchet wheel 14 having its inner end attached to the shaft, and its outer end attached to the lever, as at 21. A back turning of the ratchet wheel 14 is prevented by the engagement of a spring pressed pawl 22 with its teeth, such pawl being carried by a bracket or stud 23 projecting from the adjacent frame side. It is evident, that with this construction of feed roll driving means the spring actuated lever 15 and its pawl 18 act upon the ratchet wheel 14 to drive such ratchet wheel, the shaft 11', on which it is mounted, and the escapement wheel 13 in the direction of engagement of such escapement wheel with the pallet 16, while such pallet is oscillated by mechanism herein-after described to cause its ends to alter-

nately engage and release the escapement wheel teeth to permit an intermittent step-by-step rotary movement thereof.

The beam 3, which is shown as connecting the two sides of the machine frame, is disposed to the rear of the cross bar 8, in slightly spaced relation thereto to permit a free passage of the sheet 7 therebetween, and is provided with transverse openings 24 corresponding in number to and in register with the openings 9 of the member 8. A punch 25 of suitable form is mounted for movement within each of the openings 24 and is adapted when projected therethrough to enter the registering opening 9 in the bar 8 to cooperate therewith to cut or perforate the sheet 7. Each of the punches 25 is preferably provided at its outer end with a head 26 from which project guide-studs 27 in the direction of projection of the punch 25 in parallelism therewith, said studs working within registering guide openings 28 in the beam 3, as shown in Figs. 1 and 4. Coiled compression springs 27' encircle the studs 27 intermediate the beam 3 and punch heads 26 and act thereon to normally hold the punches 25 retracted from sheet perforating position. Some of the punches 25 are preferably of circular form in cross section, while others thereof are preferably transversely elongated for the purpose herein-after described, as indicated at 25^a in Figs. 7 and 8.

A punch striking hammer 29 is provided for each punch 25 and is loosely mounted upon a shaft 30 in advance of the beam 3 in position for its upper end to strike and normally bear against the head of a registering punch 25, one of such hammers being provided for each punch. A hammer spring 31 projects from the beam 2 for each hammer 29 and acts thereon to normally retain the hammer in engagement with the associated punch, or if the hammer is retracted, to impart a punch striking movement thereto. The tension of the springs 27' of each punch is sufficient to hold the punch in retracted position against the pressure of the spring-pressed hammer 29 thereon when the hammer is in engagement therewith, but is not sufficient to prevent a sheet punching movement of the punch when struck by the hammer.

The mechanism employed for retracting the hammers 29 against the tension of the springs 31 and then releasing the hammers to permit them to strike the punches 25 comprises a series of key-levers 32, which are pivoted to a shaft 33 and are similar in operation to the keys of a typewriter, one of said keys being provided for each hammer. A trigger or hooked finger 34 projects upward from each key-lever 32 in advance of its fulcrum, being pivoted thereto as at 35, and has its upper end hooked or angled to

adapt it to engage over a rearwardly projecting shoulder 36 at the lower end portion of the associated hammer 29. A spring 37 projects from the beam 2 for each trigger 34 and acts thereon to yieldingly hold its hooked end in engagement with the shoulder 36 of the associated hammer. The trigger 34 and hammer surface 36 are adapted to coact in such manner that a depression of a key will move the attached trigger to impart a cocking or retracting movement to the associated hammer and when the key lever has been depressed a predetermined extent the coacting trigger and hammer surfaces will slip from engagement with each other, thus permitting a rapid return or striking movement of the hammer 29 under the influence of its spring 31. The outer ends of the key levers 32 are shown as being angled upward and provided at their ends with striking surfaces in the manner of typewriter keys, and one of these levers and the associated striking and punching parts are provided for each character which it is desired to designate by a perforation on the sheet 7. A coiled compression spring 38 is shown as being interposed between each key lever 32 to the rear of its fulcrum and the beam 3 to normally hold the outer ends of the key levers elevated in striking position. A stop screw 39 projects from the under side of the beam 3 for each lever 32 to limit and regulate its movement in one direction while a stop screw 40 is threaded through a cross member 41 for each key lever to limit its movement in the other direction.

For the purpose of causing the pallet 16 of the escapement mechanism to be rocked at each striking movement of a key to permit a turning of the feed rolls 10 and 11 to move the sheet 7, I provide a transversely broadened rocking member 42, which extends lengthwise between the frame sides adjacent the inner ends of the key-levers 32 and has a trunnion 43 projecting from each end thereof and journaled in the frame sides 1. This member tilts rearward from its axis over the forward ends of the key levers 32 in contact therewith whereby a raising of the forward end of any one of such levers will effect a forward rocking of the upper portion of such member, as is apparent with reference to Fig. 1. This forward rocking movement of the lever member 42 is against the tension of a pair of coiled compression springs 44, one of which is disposed between the upper forward edge of said member adjacent each end thereof and a stud or bracket 45 projecting from the adjacent frame side, said springs being shown as encircling rods 46 which pivotally project from the upper edge of the member 42 and work freely through a registering opening in the associated stud 45. A bar 47 pivotally projects

upward and forward from the lower edge of the lever member 42 at the end thereof adjacent to the escapement mechanism and has its free end working loosely over a pin 48 projecting laterally from the lower end portion of the pallet 16. The bar 47 is guided for longitudinal reciprocal movements, but anchored against lateral movements, by a pin 49 which projects from the standard 6, working through a longitudinal slot 50 in said bar. The portion of the bar 47 which works over the pallet pin 48 is made in cam form, as indicated at 51, to cause said pin and bar to cooperate upon a rearward movement of the latter to move the lower end of the pallet from and the upper end thereof into engagement with registering ones of the escapement wheel teeth, against the tension of a spring 52 which acts upon the lower end portion of the pallet. It is thus apparent that upon a depression of a key lever 32 the rocking of the lever member 42 thereby will impart a rearward movement to the bar 47 and a consequent coaction of the cam surface 51 thereof and pin 48 to effect a rocking of the pallet 16 to permit a movement of the escapement wheel a distance equal to one notch or tooth thereof. Upon the return of the key lever to normal position, the bar 47 is caused to return to its normal position to permit the lower end of the pallet to again move into engagement with the escapement wheel and its upper end to move from engagement therewith to permit another movement of the escapement wheel a distance equal to one tooth thereof. With this mechanism the feed wheels 10 and 11 have a two-notch or doublestep feeding movement at each depression and raising of a key lever, one-half of such movement occurring upon the down stroke and the other half upon the upstroke of the lever.

53 designates a thin spring finger which is attached to the forward side of the beam 3 and yieldingly bears against the sheet 7 adjacent the punch openings 9 in the bar 8 to hold the sheet 7 to the face of the bar 8 during the punching and retracting movements of the punch 25.

The operation of my machine is as follows: The free end of a sheet 7 having been fed upward between the beam 3 and bar 8 and forward therefrom between the feed rolls 10 and 11, the operator pulls the lever 15 forward to, say, the line *y*, thus effecting a tightening of the power spring 19 to cause it to act through the lever and pawl 16 carried thereby and the engaged ratchet wheel 14 to communicate sheet feeding movements to the feed roll 11 when the escapement mechanism is worked for such purpose. The operator then strikes the key levers 32 as the letters or characters to be designated upon the sheet 7 by perforation may re-

quire, thus working the proper hammers 29 to strike the associated punches 25 to perforate the sheet, the punches being retracted to normal position after each sheet perforation by the action of the springs thereof. Upon the down stroke of any key lever 32 of the set, the lever member 42 will be rocked to effect a movement of the bar 47 to release the lower end of the escapement pallet 16 from engagement with a notch of the escapement wheel and to move the upper end of such pallet into engagement with a registering notch of the escapement wheel, when the wheel has moved the distance of one notch, the striking of the punch occurring after such single notch movement of the wheel. Upon the release of a depressed key lever and its return to normal position, the escapement pallet 16 is rocked in the opposite direction to permit another single notch movement of the escapement wheel and associated parts as is apparent. Should it be desired to make an elongated perforation in the sheet 7 a key lever in association with one of the laterally broadened punches 25^a is struck, the successive striking of any of the punches 25^a effecting a cutting of an elongated opening of the desired length in the sheet 7.

It is apparent that I have provided a simple and inexpensive machine for the perforating of sheets 7 of the character described and that such machine is capable of being easily and rapidly operated in a manner similar to the operating of a typewriter, thus materially facilitating the perforating of such sheets.

I wish it understood that my invention is not limited to any specific construction or arrangement of the parts except in so far as such limitations are specified in the claims.

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

1. In a machine of the class described, a movable sheet perforating part, a hammer movable to impart perforating movements thereto, means operable to retract the hammer from part striking position and then to release said hammer, and spring means for influencing a quick return of the hammer to part striking position.

2. In a machine of the class described, a movable punch part, means normally retaining such part retracted from punching position, a pivoted member influenced to normally strike and impart punching movements to said part, a key lever, and means connecting said member and lever and operable to rock said member away from said part when the lever is rocked in one direction and to release said member at a predetermined point to permit a quick return of the same to part striking position.

3. In a machine of the class described, a

yieldingly movable sheet perforating punch, an oscillatory member adapted to strike and impart punching movements to said punch when retracted therefrom and then released, ⁵ a key lever, and a hooked finger projecting from said key lever and engaging said member to retract the member and release it when the key lever has been moved a predetermined distance.

- 10 4. In a machine of the class described, sheet perforating means, means operable to actuate the perforating movements of the perforating means, a set of sheet feeding rolls, a ratchet wheel fixed to one of said ¹⁵ rolls, a lever having its fulcrum coaxial with said ratchet wheel, a pawl carried by the lever for engaging the ratchet wheel

teeth in one direction of movement of the lever, a spring influencing a movement of the lever in the direction of wheel driving ²⁰ movement of said pawl, means preventing a back turning of the drive roll and an escapement mechanism operable by a movement of said operating means to permit a step by step feeding movement of the feed ²⁵ rolls.

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

PHILLIP JACOB DREHER.

Witnesses:

C. W. OWEN,

M. Q. OPPENHEIM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."