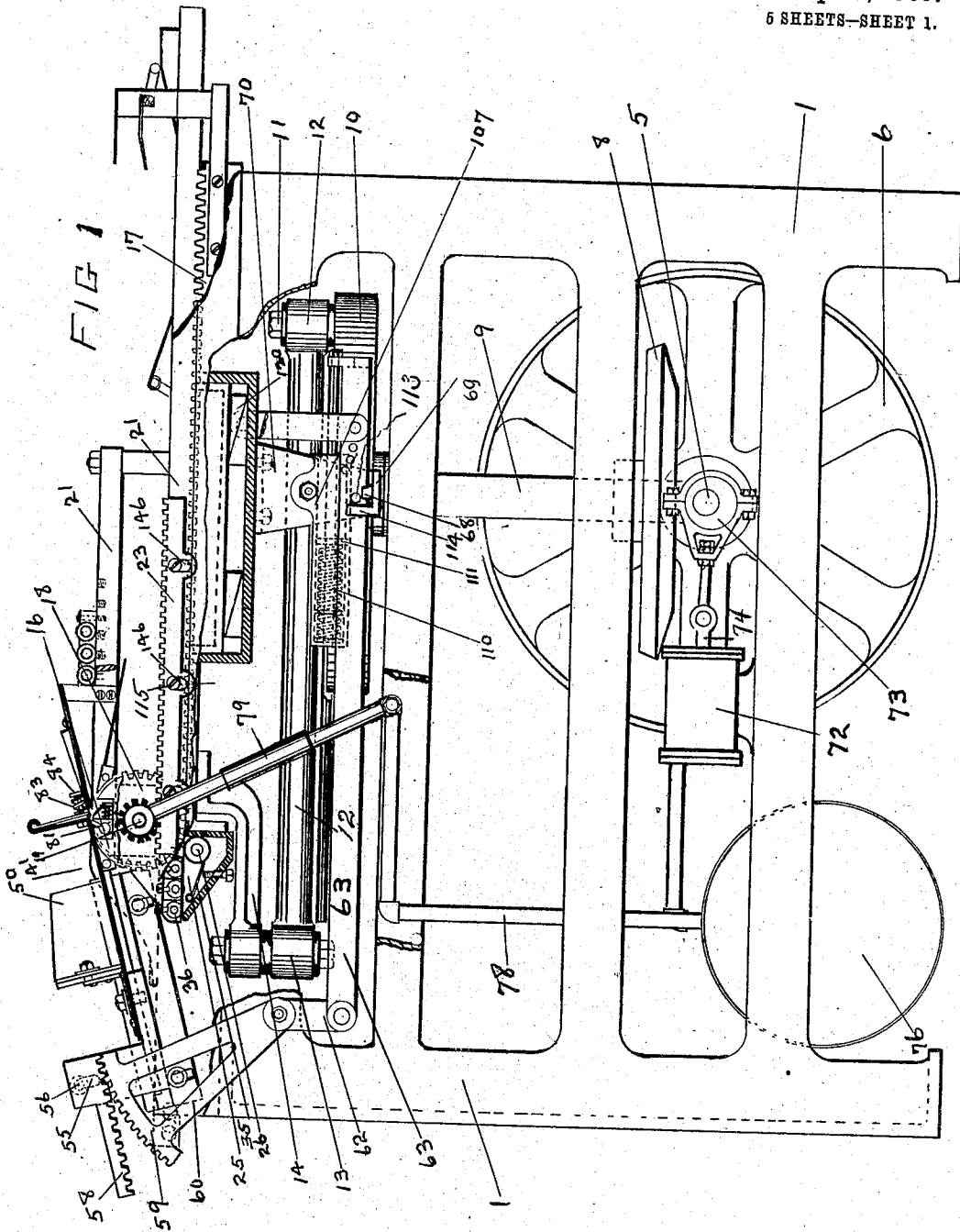


E. N. MILLS & G. W. SMITH.
 PRINTING PRESS.
 APPLICATION FILED JULY 28, 1906.

933,322.

Patented Sept. 7, 1909.
 6 SHEETS—SHEET 1.

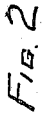


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APPLICATION FILED JULY 28, 1906.

5 SHEETS—SHEET 2.



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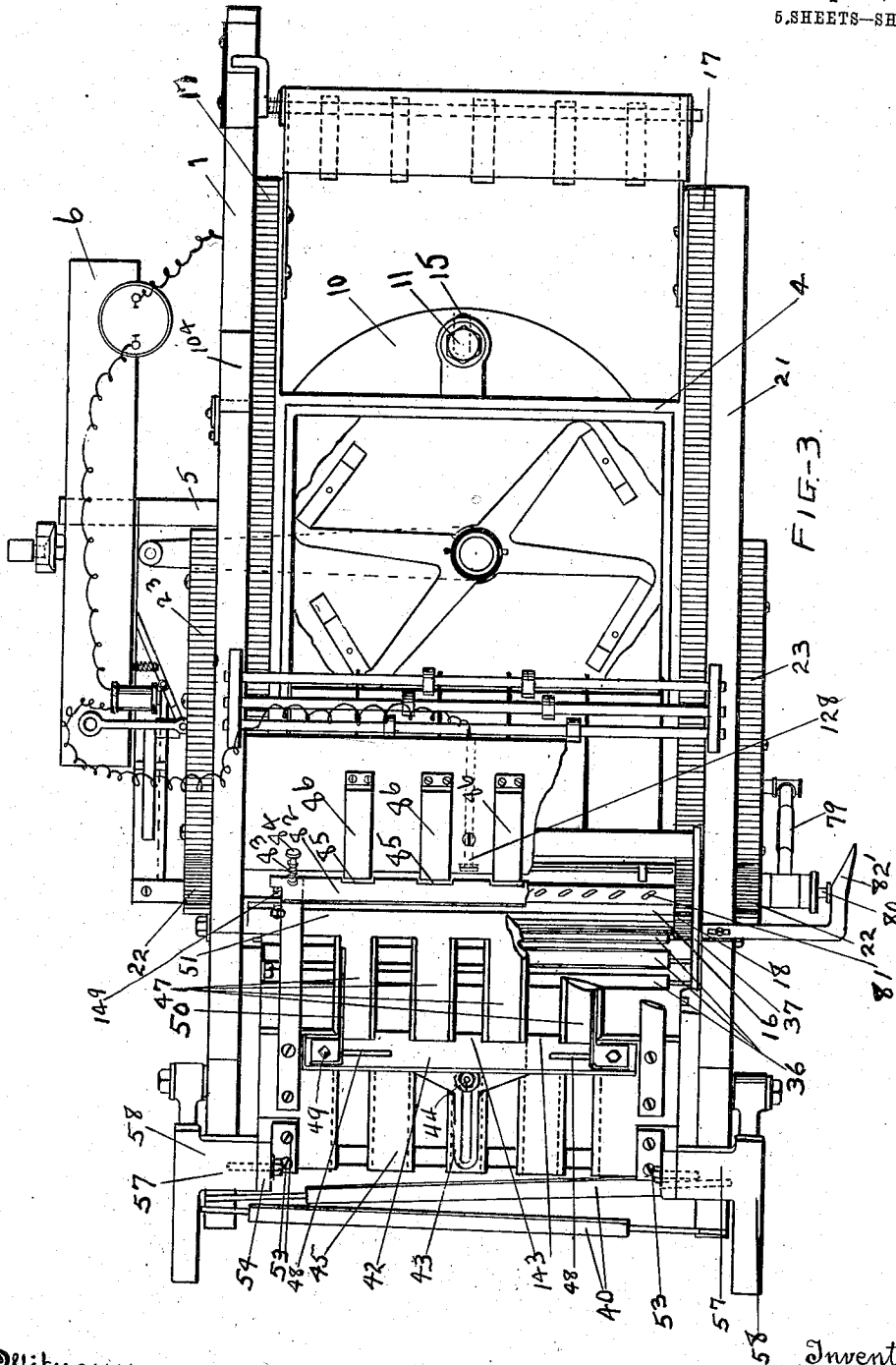
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5 SHEETS—SHEET 3.

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 6 SHEETS—SHEET 4.

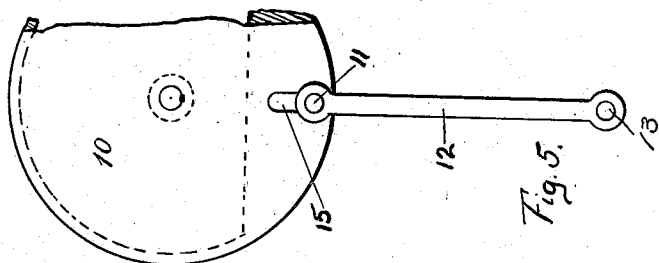


Fig. 5.

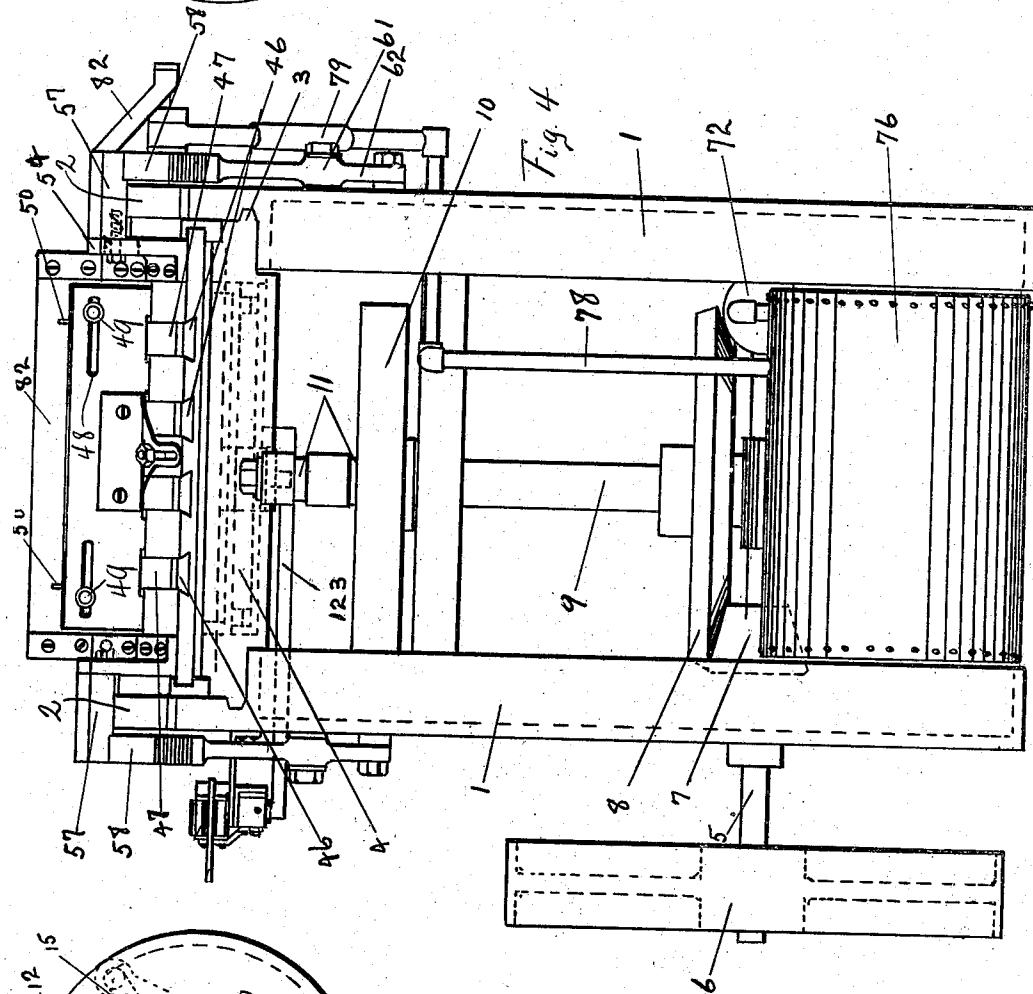


Fig. 4.

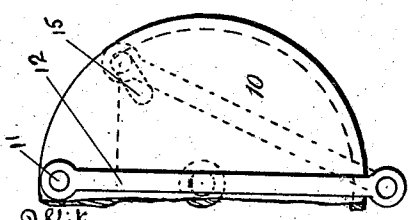


Fig. 6.

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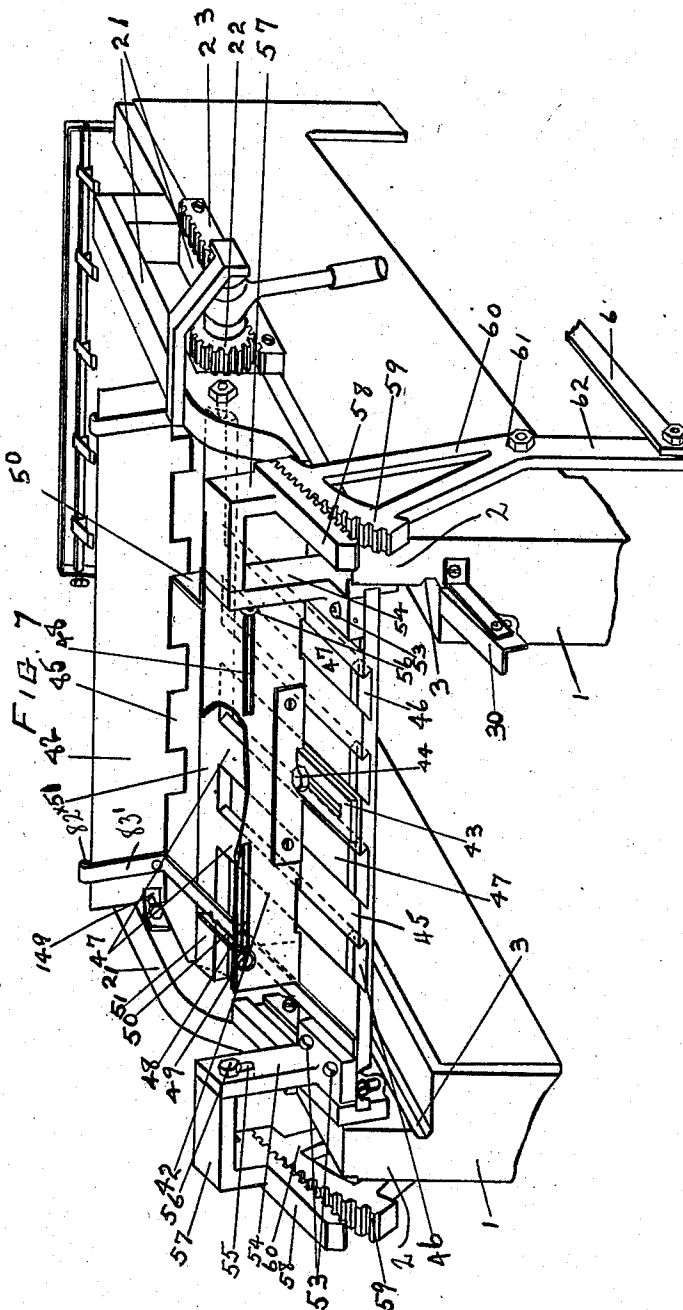
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APPLICATION FILED JULY 28, 1906.

933,322.

Patented Sept. 7, 1909.

5 SHEETS—SHEET 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWARD NEWTON MILLS AND GEORGE W. SMITH, OF SAN FRANCISCO, CALIFORNIA,
ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE HOAG RAPID PRESS COMPANY, OF
SAN FRANCISCO, CALIFORNIA, A CORPORATION.

PRINTING-PRESS.

933,322

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed July 23, 1905. Serial No. 271,713.

To all whom it may concern:

Be it known that we, EDWARD NEWTON MILLS and GEORGE W. SMITH, citizens of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Printing-Presses, of which the following is a specification.

10 This invention relates to improvements in printing presses.

The object of the invention is to provide an improved feeder for the paper enabling a much larger pile of paper to be placed in the feed box, while at the same time permitting the lowest sheet to be taken from said feed box; in which the motion of the feed box can be adjusted to correspond with different widths of paper; which will contain improved means for taking the paper from the cylinder; also improved means for raising the platen; and in which said latter means will be rendered in-operative when the sheet of paper is not taken.

25 In the accompanying drawings, Figure 1 is a side elevation of the printing press, certain parts being broken away; Fig. 2 is a similar view at the opposite side; Fig. 3 is a broken plan view; Fig. 4 is an end view of the machine; Fig. 5 is a broken plan view of the disk in one of its positions; Fig. 6 is a similar view in another position; Fig. 7 is a detail perspective view of the feed box.

Referring to the drawing, 1 represents a suitable frame, having side pieces, 2 and grooves 3 in said side pieces, in which the bed 4 reciprocates.

5 represents the driving shaft which receives its motion from a driving wheel 6, said shaft having a bevel pinion 7 meshing with a bevel gear 8 on a vertical shaft 9 carrying at its upper end a disk 10. Upon the upper surface of said disk is secured a wrist pin 11, which is connected by a link 12 pivotally connected, as shown at 13, with an arm 14 extending from the front end of the bed, that is at the end at which the paper is fed. By the rotary motion of said disk a reciprocating motion is imparted to the bed. The wrist pin 11 is secured to the disk 10 adjustably, by means of a radial slot 15 in said disk, whereby the length of

the stroke can be increased or diminished as required.

As will be presently explained the cylinder 16 is given a reciprocating motion from the reciprocating motion of the bed, but in the opposite direction thereto, so that when the bed reaches its farthest point at the rear end of the machine, the cylinder has also reached its farthest point at the front end of the machine ready to take the paper.

An important feature of this invention is the arrangement of the disk relatively to the machine. As shown in Figs. 3 and 4, said disk is set to one side of the center, the object being to cause the cylinder to make a pause at the end of its movement to the front end of the machine where it takes the paper but to make a quick return from the other end of the machine after delivering the paper. By providing for this pause, the feed of the paper is rendered more certain, and the machine can be run at a higher speed with sufficient certainty of taking the paper. One important part of the construction for producing this pause is, that the wrist pin is attached to the disk near its edge so as to be farthest from the feed end of the machine at the time when the cylinder has reached the feed end of the machine, that is, into the position shown in Fig. 5. On the other hand, when the cylinder has reached the delivery end, where a quick return is desirable, the wrist pin has passed into the position nearest the feed end of the machine, as shown at Fig. 6. The advantage of this construction is that, in the first case, the motion of the bed at that time is derived from the difference of the two longitudinal motions of the wrist pin, the one due to its swinging about its pivotal connection with the bed as a center, and the other due to its swinging about the center of the disk as a center. For a given small angular motion, there will be a certain longitudinal movement of the wrist pin relative to the point 13, less than the former movement, and it is the difference of these two movements that produces the motion of the bed relatively to the center of the disk, when the parts are in the position shown in Fig. 6, but their sum when in the position shown in Fig. 5. In the former position, this motion

of the bed relatively to the disk is small; in the latter comparatively large. By adjusting the relative dimensions of the distance of the wrist pin from the center of the disk and its distance from its connection 13 with the bed, so as to make them more or less equal, the pauses may be made greater or less, as desired. By making these distances very nearly equal the pause may be made great at the end of the movement of the cylinder at the feed end of the machine. We have herein shown this adjustment as being accomplished by increasing the distance of the wrist pin from the center of the disk, thus making the two distances more nearly equal to each other, but it is obvious that it may be accomplished by adjusting the connection of the link 12 with the bed. A still further feature of the construction, which causes this pause at the delivery end of the machine is that the disk 10 is set to one side of the center of the machine, namely, to the side from which the wrist pin is traveling at the time when the cylinder is at its feed end. In consequence, the line between the centers of the disk and the point 13 of attachment of the link to the bed is not parallel with the longitudinal direction of the machine, but makes a slight angle therewith, and, it being when the link and the radius to the wrist pin are in line with one another that the longitudinal movement of the wrist pin relatively to the disk and bed becomes zero and changes to an opposite direction, it is at this point that the motion of the bed ceases, but, from that point on, the longitudinal motion of the wrist pin due to its rotation about the point 13 and about the center of the disk, respectively are in opposite directions and thus counter-balance each other. The longitudinal motion of the wrist pin due to its rotation about the center of the disk is then toward the delivery end of the machine but is reversed at an earlier point than is the motion of the wrist pin due to its rotation about the point 13 and when said reversal takes place these motions counter-balance each other, thus producing a longer pause in the cylinder at its feed end. Said bed carries on each side a rack 17 with which mesh gear wheels 18 secured upon the ends of the cylinder 16. Said cylinder has a shaft 19, the ends of which are mounted in boxes 20 which travel in guides 21 formed upon the frame 1. On the ends of said shaft 19, outside said boxes, are mounted smaller gear wheels 22, which mesh with stationary racks 23, mounted upon the frame, the effect of this construction being that when the bed is moved longitudinally in one direction the cylinder rotates and also moves bodily in the opposite direction.

Attached to the bed and moving therewith is an ink fountain 25, in which revolves an inking roller which is actuated by a ratchet

wheel 27, rotated by means of a dog 28, carried upon a swinging frame 29, upon the shaft of the inking roller, said frame 29, in the movement of the bed, being adapted to engage with some stationary part of the frame, thereby causing the frame to tilt and the dog to drop by gravity into engagement with the ratchet wheel, imparting rotation to the inking roller so as to ink the surface of the same.

36 are distributing rollers which are carried by frames 37 attached to the boxes 20 of the cylinder.

40 represents the angle rollers which are mounted upon the frame, such as are in common use, and having rotary and also longitudinal movement therein.

The paper feed box Fig. 41 consists of a back 42 adjustably attached by means of a bracket 43 and a set screw 44 to a web 45, forming the bottom of the box, which has a number of undercut grooves 46 to receive guides 47 beneath which the web slides. Said back has downward extensions or fingers 143 which extend between said guides and prevent the paper working underneath the back. To said back are also adjustably attached by means of slots 48 in the back and set screws 49, side pieces 50 which can be moved to and from each other to correspond with the width of the paper being fed. The guides 47 are all attached at their front end to a stationary cross piece 51, the front edge of which is arranged behind, but as close as possible to, the line of suction holes 81 in the cylinder 16 by which, as herein-after described, the paper is caused to adhere to the cylinder. The pile of paper is placed upon these guides, the back of the pile resting against the front surface of the back 42, and the bottom of the pile sliding forward on the guides, being impelled thereto by the motion of said back. To impart said motion, the web 45 has secured thereto, by screws 53, side pieces 54, which are adjustably secured by slots 55 and screws 56 to arms 57 of racks 58, said racks engaging segment gears 59 on levers 60 pivoted on the frame of the machine, as shown at 61 and having short depending arms 62 pivotally attached to links 63, the other ends of which are suspended from hangers 64 swinging from the frame, by means of studs passing through holes 66 in the lower ends of said hangers and also passing into holes 145 in the sides of the links. Said links are formed on their under sides, with notches 67, which are adapted to be engaged by lugs 68 on the outwardly extending feet 69 of hangers 70 attached to the bed of the machine, and in the motion of the bed toward the feed end of the machine, said lugs, engaging said notches, carry with the bed said links in the direction of the feed end of the machine, thereby imparting a rocking motion to said segment gears

59 to cause the pile of paper to slide over the guides 47 as the lowest sheet of the pile is being taken by the cylinder, which is then moving in the same direction as the paper feed box. The feeding movement of the pile of papers is limited by the fact that, as said links 63 swing in said direction, their rear ends are gradually raised on account of their swinging from said hangers 64, which describes an arc of a circle, and thus cause the notches to be raised from off the lugs and to be no longer engaged thereby, so that the forward movement ceases, and the bed moves on without carrying with it the links, and consequently the forward movement of the feed box stops.

In order to adjust the extent of forward movement for paper of different sizes, the holes 145 in the sides of the links are provided in circular series, and by selecting holes which are more or less distant from the upper edges of the links the amount of feed of the paper will be less or more as may be desired, this arising from the fact that if the links be connected with the hangers when the studs are inserted in the holes near the upper edges, then the hangers being already more oblique, their upward motion will be more rapid, than from the position shown in Fig. 2 and consequently the notches will be sooner released from the lugs.

As the pile of paper is fed forward the front edge of the lowest sheet of the pile is drawn toward the cylinder by suction. This cylinder is of the same construction as that shown in the patent to E. N. Mills No. 785821 issued March 28th, 1905, and therefore need not be more particularly described. Exhaust is supplied to said cylinder by means of a pump 72 operated by an eccentric 73, on the main shaft, a piston rod 74, a pipe 75 leading from said pump to an exhaust reservoir 76, the latter communicating with the cylinder by means of a pipe 78 which may be either wholly flexible, or partly flexible and have a flexible joint, as shown at 79. In like manner as in said patent, there is provided a suitable valve 80 for opening the exhaust when the cylinder arrives at the position to take the paper, this position being that shown in Fig. 3, and, when the cylinder begins its forward movement carrying with it the paper, the front edge of which has been caused to adhere to the cylinder by suction through the holes 81, a cam 82' being provided to operate the valve and cut off the exhaust as soon as the grippers grip the edge of the paper and hold it to the cylinder. None of the mechanism relating to the construction of the cylinder or the means of holding the paper thereto is novel in this application, but we refer to the above patent granted to E. N. Mills for the construction used herein.

Along the front of the box 41 is provided a reciprocating jogging board 82 supported

by a pair of rods 83' and hinged thereto at 82* at its upper edge. The jogging board is normally held against the paper pile by springs 83 which are supported in position by the studs 84.

149 indicates a stop, comprising a screw, mounted in a bracket 149', fixed to some stationary part of the frame. The stop engages with a stud or projection on the end of the jogging board and operates to throw the latter open along its lower edge and release a sheet of paper from the paper pile at the instant the suction holes of the cylinder arrive at this point.

The lower edge is cut out as shown at 85 to pass over wedges 86, located in front of the jogging board 82 and upon a stationary part of the machine, said wedges serving to raise the paper, as the lowest sheet is being taken off, to relieve said lower sheet, and to permit the rear edge thereof to be pulled easily from underneath the pile, when the cylinder has made almost its complete revolution. The lower edge of the front side is cut out to pass between the wedges in order to engage and aline the front edges of the pile, and particularly at the bottom of the pile.

It will be understood that in all cases the speed of box is substantially equal to that of the cylinder, so that the pile of sheets moves with substantially the same velocity as that of the lowest sheet, so that no force is required to move said lowest sheet as it is being detached from the remaining sheets of the pile, and inasmuch as the weight of the pile is then taken by the wedges 86, there is no weight on the lowest sheet, and therefore it is possible to put a large pile of paper in the feed box.

When the bed returns after a paper sheet has been printed and delivered to the delivery table, it imparts a return movement to the feed box to withdraw the pile of sheets into position to feed another sheet. It is important that this movement should be started without shock or jar to the feed box. For this purpose there is secured on each side of the bed a depending hanger 70, carrying a cylinder 107 closed at one end except for a small hole through which passes a piston rod 108, the other end of which is loosely attached to the link 63, and which has secured thereto a flange 109 which acts as a piston and against which a coiled spring 110 abuts. As the bed returns this piston enters the cylinder 107 and compresses the air therein, which forms a cushion. Moreover the movement of the piston is resisted by the compressing of the spring 110, a loose washer being mounted on the rod 108 in front of the said spring which engages with the end of the cylinder. In this way the motion of the bed is communicated to the link gradually and resiliently through the

spring of the compressed air and of the metallic spring. Therefore by the time that the lug 68 carried by the hanger 70 secured to the bed has reached the notch 67 in the lower edge of the link 63, said link has attained a speed almost approaching that of the bed. The lug has been moving against the lower edge of the link, so that, as soon as said lug reaches said notch, the link is forced down by the hanger 64, and the notch drops on to the lug.

By reason of the spring of the compressed air and the metallic spring, the link has attained substantially the same velocity as the bed when the engagement of the notch and bed takes place, so that there is no sudden increase of velocity and no jar to the feed box casing by any such sudden increase. It has already been explained how upon the return movement the notch is lifted from off the lug by the circular movement of the hangers. At the same time in order to absolutely insure that the carriage should reach the same place at the same time, there is provided on the link a stud 113 which engages an angle piece 114 upon the bracket, so that the bed and the link move absolutely together.

The arrangement of the feed box is such that very narrow paper can be printed, because the front edge of the stationary bottom of the feed box is arranged very near to the front wall of the feed box, so that a very small portion of the paper is unsupported at any time, and there is no danger of the paper sagging in a wide unsupported place as is generally the case with other machines.

In order to adjust the machine for large or small paper, as may be necessary, the speed and extent of travel of the cylinder may be varied by removing the gear wheels 22 upon the shaft of the cylinder and substituting larger or smaller gears with correspondingly different number of teeth. At the same time the racks 23 engaged by said gears must be raised or lowered. This is done by set screws 115 and slots 146 in said racks.

We claim:—

1. In a printing press, the combination with a suction cylinder having to and fro motions, of a feed box having a stationary bottom adapted to support a pile of paper, and a back movable relative to and over said bottom and means for reciprocating the said back.

2. In a printing press, the combination with a suction cylinder having to and fro motions, of a feed box having a stationary bottom adapted to support a pile of paper, and a back movable relative to and over said bottom, means for reciprocating the said back, and a jogging board movable with the back.

3. In a printing press, the combination with a suction cylinder having to and fro motions, of a feed box having a stationary bottom comprising a series of bars separated from each other, adapted to support a pile of paper, and a back movable relative to and over said bottom, and means for reciprocating the said back.

4. In a printing press, the combination with a suction cylinder having to and fro motions, of a feed box having a stationary bottom comprising a series of separated bars adapted to support a pile of paper, a web movable between and guided by the said bars, and a back secured to the web, and means for reciprocating the said back.

5. In a printing press, a paper feed box comprising a back, a stationary cross piece over which the sheets are successively drawn, and means for supporting the pile of paper, extending from the said cross piece to the back, means for moving the pile of sheets forward and backward, and feeding mechanism for taking the sheets from the pile successively from the bottom thereof.

6. In a printing press, a paper feed box comprising a back, a web secured to said back having a plurality of undercut grooves, guides in said grooves beneath which the web slides, said back having downward extensions or fingers extending between said guides and means for reciprocating the back and web, substantially as described.

7. In a printing press, a paper feed box comprising a back, a web secured to said back having a plurality of undercut grooves, and guides in said grooves beneath which the web slides, a stationary cross piece to which said guides are all attached at their front ends and means for reciprocating the back and web, substantially as described.

8. In combination with a cylinder having a row of suction holes, and means for reciprocating the cylinder, a paper feed box and guiding mechanism therefor comprising a stationary cross piece the front end of which is arranged behind and in close proximity to the row of suction holes in the cylinder when the latter has reached the end of its movement, and means for reciprocating the paper feed box, substantially as set forth.

9. In a printing press, the combination of a paper feed box, a guide therefor, a bed, a cylinder operated by said bed, and means for moving the feed box with the cylinder, comprising a rack connected with the feed box and a segment gear engaging said rack, and an operative connection between said segment gear and bed whereby the motion of the bed rocks said gear, substantially as described.

10. In a printing press, the combination of a paper feed box, a guide therefor, a bed, a cylinder operated by said bed, and means for moving the feed box with the cylinder,

comprising a rack connected with the feed box and a segment gear having a depending arm, a link attached thereto, a hanger from which the other end of the link is suspended, said link being formed on its under side with a notch, and a device attached to the bed and adapted to engage said notch in the motion of the bed to move the link with the bed and rock the segment gear, substantially as described.

11. In a printing press, the combination of a paper feed box, a guide therefor, a bed, a cylinder operated by said bed, and means for moving the feed box with the cylinder, comprising a rack connected with the feed box and a segment gear having a depending arm, a link pivotally attached thereto, a hanger from which the other end of the link swings, said link and the bed having cooperating parts adapted to engage each other in the motion of the bed to cause the link to move with the bed to rock the segment gear, substantially as described.

12. In a printing press, the combination of a paper feed box, the guide therefor, a bed, a cylinder operated by said bed, and means for moving the feed box with the cylinder, comprising a rack connected with the feed box and a segment gear having a depending arm, a link pivotally attached thereto, a hanger from which the other end of the link swings, said link and the bed having cooperating parts adapted to engage each other in the motion of the bed to cause the link to move with the bed to rock the segment gear, said

coöperating parts being arranged to be disengaged from each other as the rear end of the link is raised by the oscillation of the hanger, substantially as described.

13. In a printing press, the combination of a paper feed box, a guide therefor, a bed, a cylinder operated by said bed, and means for moving the feed box with the cylinder, comprising a rack connected with the feed box and a segment gear having a depending arm, a link pivotally attached thereto, a hanger from which the other end of the link swings, said link and the bed having cooperating parts adapted to engage each other in the motion of the bed to cause the link to move with the bed to rock the segment gear, that link being provided with a circular series of holes by means of one of which it is connected with the hanger to adjust the time of release of said coöperating parts, substantially as described.

14. In a printing press, a paper feed box having the front side swinging from the top, and springs pressing forward the lower edge, said lower edge being cut out, and stationary wedges in said cut out portions, substantially as described.

In witness whereof we have hereunto set our hands in the presence of two subscribing witnesses.

EDWARD NEWTON MILLS.
GEORGE W. SMITH.

Witnesses:

FRANCIS M. WRIGHT,
EDITH WOODWARD.