(No Model.) 2 Sheets—Sheet 1.

G. R. CLARKE.

FEEDER FOR SHEETS OF PAPER, &c.

No. 419,501. Patented Jan. 14, 1890.

Fig. 1.

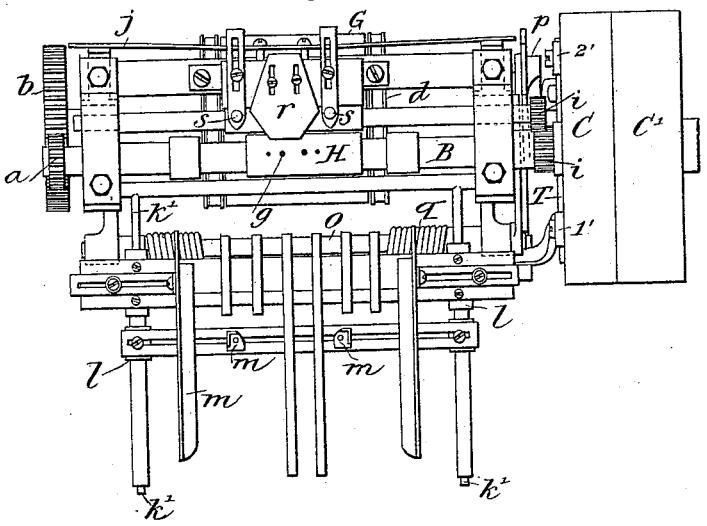
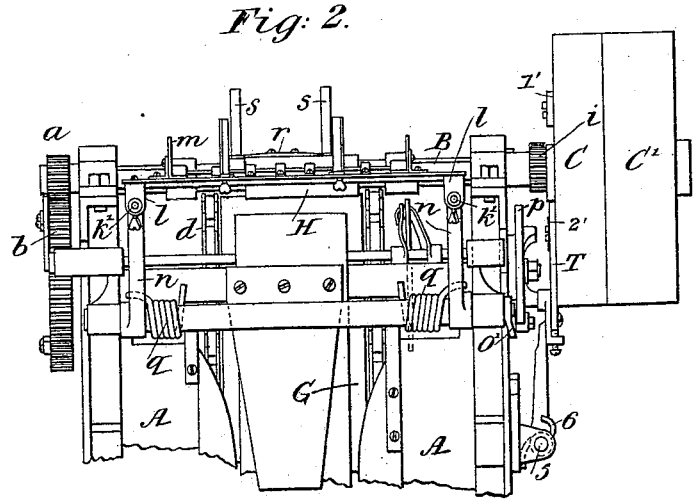


Fig. 2.



INVENTOR:

George R. Clarke.

By Henry Connett

Attorney.

WITNESSES:

John A. Rennie.

J. B. Applewhite

(No Model.) 2 Sheets—Sheet 2.

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Fig: 3.

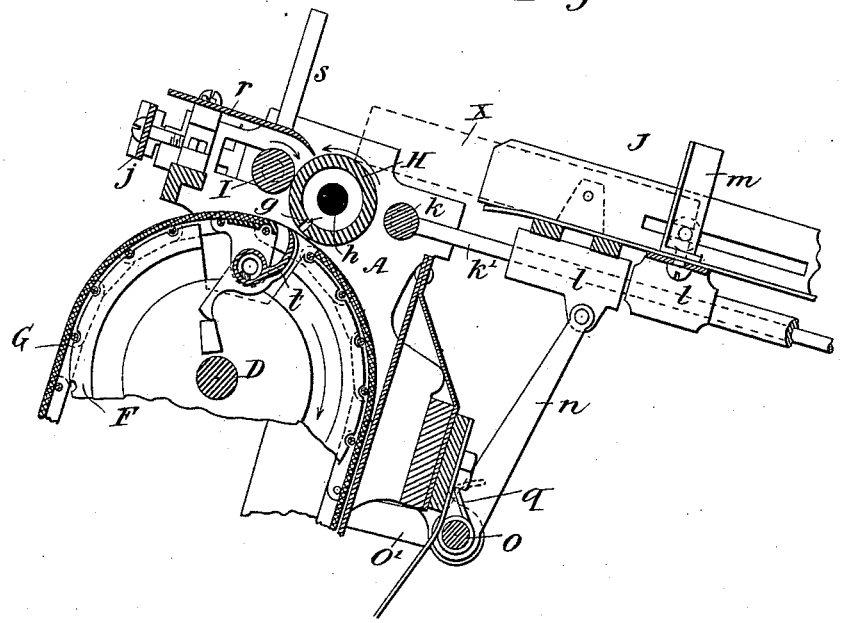


Fig: 4.a

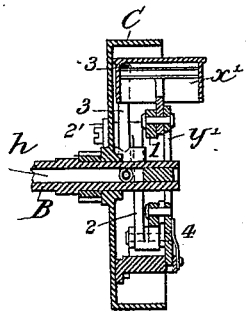
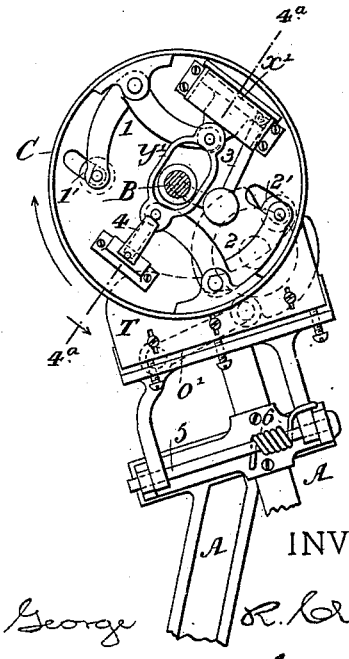


Fig: 4.



WITNESSES:

John A. Rennie.

F. J. Kaplinger.

INVENTOR:

George R. Clarke.

By Henry Connett

Attorney.

UNITED STATES PATENT OFFICE.

GEORGE R. CLARKE, OF MONTELL, TEXAS.

FEEDER FOR SHEETS OF PAPER, &c.

SPECIFICATION forming part of Letters Patent No. 419,501, dated January 14, 1890.

Application filed August 7, 1889. Serial No. 319,981. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. CLARKE, a citizen of the United States, and a resident of Montell, Uvalde county, Texas, have invented certain Improvements in Feeders for Sheets of Paper and the Like, of which the following is a specification.

My invention relates to the class of pneumatic mechanical feeders for feeding sheets of paper and the like to machines of various kinds; and the object of my invention is to take the sheet which is to be fed from the bottom of the pile of sheets on a reciprocating platform which moves forward, when the sheet is seized by the suction-roller, with approximately the same speed as that of the periphery of the said roller.

My invention is adapted for feeding sheets to machines of various kinds, and I do not herein limit myself to its application to any machine whatever.

In my pending application for a patent for an envelope or bag machine, Serial No. 296,412, I show this feeder applied to and adapted for feeding the machine illustrated and claimed therein, but I make no claim to the feeder in that application.

In the accompanying drawings I have, for the purpose of illustrating an application of the feeder, shown it arranged to feed sheets of paper, or blanks cut from sheets of paper, to grippers in a carrier-belt similar to that employed in the envelope-machine illustrated in my said pending application.

Figure 1 is a plan view of the feeder, and Fig. 2 is a rear view of the same. Fig. 3 is a sectional view on a larger scale than Figs. 1 and 2, the plane of the section being taken transversely to the suction-roller and at about the middle of the same. Figs. 4 and 4ª are detail views illustrating the air-exhausting mechanism.

Before proceeding to describe my feeder, I will say that in a former patent granted to me November 13, 1888, No. 392,781, I show and claim a pneumatic mechanical feeder in which the blank-platform reciprocates and moves up to the suction-roller with a speed about equal to the peripheral speed of said roller, and this feature I do not claim herein.

A in the drawings represents any suitable frame.

B is the driving-shaft of the feeder, and forming a part of this shaft is a hollow roller H, which I call the "suction-roller." This roller will be, by preference, a little larger in diameter than the other parts of the shaft. In the roller H are one or more holes or perforations *g*, as shown. The hollow in roller H communicates with a bore *h* in the shaft B, (see Fig. 4ª,) which communicates in turn with the air-exhauster illustrated in Figs. 4 and 4ª, the specific construction of which will be hereinafter described.

I is a pressure-roller arranged in front of the suction-roller H, and arranged to bear elastically on the latter peripherally. This roller I is driven positively in unison with the roller H, through the medium of gears *i*, (seen in Fig. 1,) and said roller I is held up to the roller H by a suitable spring *j*, which may be arranged in any convenient manner adapted to accomplish the result.

J is the reciprocating platform that bears the sheets to be fed. The precise construction herein shown need not be adhered to in constructing this platform, or in mounting and operating it, but I will describe that herein illustrated, which is the form preferred when the feeder is to be applied to an envelope-machine.

On a rock-shaft *k*, mounted in the frame A just back of the suction-roller H, are fixed two parallel guide-arms *k'*, on which slides the carriage *l* of the platform. On this carriage are mounted in slotted bars the adjustable side and back stops *m m*, which embrace the pile of sheets or blanks X. (Indicated by dotted lines in Fig. 3.)

The mechanism for imparting a reciprocating motion to the platform J on its guides *k'* may be of any kind, and as the movement of the platform will usually be in unison with that of the machine to which the sheets are being fed the reciprocating mechanism will vary with circumstances. As herein shown it is constructed as follows: Two arms *n*, coupled at their upper ends to the carriage *l*, are attached at their lower ends to a rock-shaft *o*, mounted in the frame or in any suit-

able bearings. This shaft *o* is rocked in such a manner as to move the platform J forward (toward the left in Fig. 3) by means of a cam *p* (see Fig. 4) on a shaft D of the machine to which the sheets are to be fed. This cam *p* acts on a bowl or anti-friction roller carried by an extremity of an arm *o'*, Fig. 2, fixed on the rock-shaft *o*. A spring or springs *q* on the shaft *o* serves to retract the platform J after the cam has passed.

The shaft D is driven from the shaft B through the medium of a pinion *a* on shaft B, which gears with a spur-wheel *b* on the shaft D, and on the shaft D is a drum F, which drives an endless belt G, provided with grippers *t*, which seize the sheet that is fed and remove it. This drum, belt, and gripper form no part of the feeder, However, as herein shown, the parts are so proportioned that the peripheral speeds of the belt G, moving with the drum, the suction-roller H, and the pressure-roller I are alike, and the cam *p* moves the platform J forward toward the rollers H and I with substantially the same speed as that imparted to the periphery of the roller H. The arrows on or adjacent to the parts show the direction of the motion. Of course the movements of the parts will be properly timed, as in all automatic machines of this general character.

The operation of the feeder is as follows: Any suitable number of sheets are placed in a pile on the platform J and evened by pressing them up snugly to the stops *m*. The front end of the pile of sheets will now project out, as seen in Fig. 3, over the suction-roller H, and the bottom sheet will rest on said roller. The machine is set in motion, and when the holes *g* in the revolving suction-roller are at the top of the roller, or directly under the bottom sheet near its front end, the air will be exhausted from the roller and this will cause the said sheet to adhere to said roller. At this instant the platform is advanced by the cam *p* and the pile of sheets is moved forward at the same speed as that at which the roller H is moving. Consequently the sheet will not be pulled loose from the suction-roller by the resistance of the pile, and the forward end of the bottom sheet will be carried over by the roller H until it enters the bite formed by the rollers H and I and is nipped tightly between them. The cam *p* holds the platform J in its advanced position until the rollers have drawn the bottom blank nearly out from beneath the pile, when it passes and the spring *q* instantly retracts the platform to its first position. (Seen in Fig. 3.) The plate or finger *r* is a precautionary device designed to prevent more than one sheet from being carried down between the rollers H and I by reason of sheets adhering together, and the adjustable uprights *s* are designed to keep the pile of sheets back against the stops *m* while the bottom sheet is being removed. When the platform is moved forward quickly, the momentum tends to throw the pile of sheets forward, and these uprights *s* serve as stops to check such movement, and also to even up the front edge of the pile at each forward movement of the pile. After the sheet has been fairly nipped between the rollers H and I the suction is released and the pressure of these rollers on the sheet removes the latter from the pile. The rollers H and I thus separate the bottom sheet from the pile, and they may feed it to any other mechanism whatever. As herein shown, they carry the advancing end of the sheet directly downward toward the belt G, and at this moment a gripper *t* mounted on the belt seizes it and carries it away.

I will now describe the air-exhausting device herein illustrated, premising that any device for intermittently exhausting air may be employed in lieu of that shown.

Reference may be had to Figs. 4 and 4ª for the details of construction.

As I have before stated, the air is exhausted from the roller H intermittently at proper intervals in order to cause the bottom sheet of the pile to adhere to it. I will add that, as here illustrated, the suction-roller is constructed and driven so as to make two revolutions for each sheet that is fed, and in consequence of this provision is made for exhausting the air only at alternate revolutions of the suction-roller.

On the shaft B—which is the driver—are mounted the driving-pulleys C and C', the former being the fixed and the latter the loose pulley. In the fixed pulley C is secured an air-pump cylinder *x'*, the piston of which is coupled by a yoke *y'* to two bell-cranks 1 and 2, also mounted in the pulley. On studs in the arms of these bell-cranks are rotatively mounted rollers 1' and 2'. The studs play in slots in the inner face of the pulley C and the rollers stand outside of the pulley. The cylinder *x'* connects, through the medium of a tube 3, with the bore *h* in the shaft B. This connection of the cylinder with the bore *h* may be effected through any form of closed passage or channel. When the pulley C rotates, a cam T pushes rollers 1' and 2' alternately inward toward shaft B. When roller 1' is pushed in, the piston is driven into the cylinder *x'*, as seen in Fig. 4, and when roller 2' is pushed in said piston will be drawn back again. Thus inward pressure on either of said rollers operates the piston, but they move it in opposite directions. A spring 4 presses on the guided extremity of the yoke *y'* and serves to overcome the effect of centrifugal force on the movable parts.

In order to enable the suction-roller to make two revolutions while the exhaust mechanism acts only at each alternate revolution, I provide means for moving the cam T out of the path of the rollers 1' and 2' at each alternate revolution. I will describe this device, although it is only employed where the suction is to take effect, as stated, and is not

at all essential in cases where the suction-roller is designed to act at each revolution. The cam T is pivotally mounted on a rod 5 on the machine-frame, and a spring 6 coiled about said rod serves to throw said cam normally out of the plane of the rollers 1′ and 2′. The cam *p*, before referred to as operating the platform J, and which is seen in Fig. 4, is a double cam—that is, its edge serves as a cam to actuate the platform J, while a cam on its face, which bears on a projection on the pivoted cam T, serves to push the latter cam up into the path of the rollers 1′ and 2′ as they are carried around by the pulley C.

The operation is as follows: The pulley C and shaft B make one revolution when the cam T is back or out of its operative position, and the air-exhauster is therefore not operated. The next revolution causes cam *p*, however, to set cam T into its operative position, when roller 2′ will strike it and draw back the piston of the cylinder *x*′, thus exhausting the air from the suction-roller. When pulley C shall have made half a revolution, roller 1′ will strike cam T and retract the piston of cylinder *x*′, thus "breaking" the vacuum. During the next revolution of the pulley the air-exhauster will again remain inoperative.

The essential characteristic of my feeder is the reciprocating platform which carries the pile of sheets, so arranged with reference to the suction-roller that the latter will seize, segregate, and remove the bottom sheet from the pile. This may be effected without following the specific details of the construction herein shown. In fact, considerable modification might be required to adapt the feeder to different machines to which the paper is to be fed. One advantage of taking the sheets from the bottom of the pile is that the attendant may at any time while the feeder is in operation replenish the pile of sheets. It also very materially lessens the cost and complexity of the mechanism, as the sheets are fed to the removing point by their own weight and the overlying sheets hold the bottom sheet steady and in place.

It is not essential that the platform J shall move in a horizontal plane; but it is necessary that the plane in which the bottom of said platform on which the sheets rest moves during the reciprocation of the platform shall pass over some part of the upper surface of said roller and adjacent thereto, in order that the bottom sheet of the pile on said platform shall rest on said roller and be held down thereon by the weight of the sheets above it; but this pressure need not be very great, and whatever may be the angle of the plane of the bottom sheet with the horizon it will be substantially tangent to the suction-roller.

Having thus described my invention, I claim—

1. A pneumatic mechanical feeder for sheets of paper and the like, comprising the suction-roller, an air-exhauster connected therewith, a revolving pressure-roller which bears on said suction-roller peripherally, and a reciprocating platform which carries the sheets to be fed, the plane of movement of the bottom of said platform, on which the sheets rest, passing over the upper surface of said suction-roller and being substantially tangent thereto, whereby the bottom sheet of the pile on said platform is carried by the reciprocating movement of the latter over the upper surface of said suction-roller, substantially as and for the purposes set forth.

2. A pneumatic mechanical feeder comprising the suction-roller, the pressure-roller, and an air-exhauster, arranged to operate as described, the reciprocating platform for the sheets to be fed, arranged to carry the sheet at the bottom of the pile over the upper surface of said suction-roller, whereby the latter may seize it, the upright stops *s*, and the finger or plate *r*, arranged and adapted to operate substantially as set forth.

3. The combination, with a suction-roller and a pulley fixed on the shaft of said roller, of the cylinder *x*′, and its piston mounted in said pulley, the interior of said cylinder being connected with the interior of the suction-roller by an air-passage, the two bell-cranks mounted on said pulley and having one arm of each crank coupled to said piston, the rollers on the other arms of said cranks, and a cam which actuates the piston in the cylinder through the medium of said cranks and rollers, substantially as set forth.

4. The combination, with the pulley C and the air-exhauster mounted thereon, of the movable cam T, which actuates said exhauster, provided with a retracting-spring, and a cam *p*, which moves the cam T into operative position, substantially as set forth.

5. The combination, with a reciprocating platform carrying the sheets to be fed arranged in a pile, of a pneumatic feeder arranged below the path traversed by the bottom sheet of said pile and adapted to seize and remove said sheet at each feeding operation.

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

GEORGE R. CLARKE.

Witnesses:
HENRY CONNETT,
J. D. CAPLINGER.