July 14, 1925.

1,545,492

C. HENDERSON

PAPER FEEDING CONTROL MECHANISM

Filed Feb. 1, 1922

2 Sheets-Sheet 1

Fig. 2.

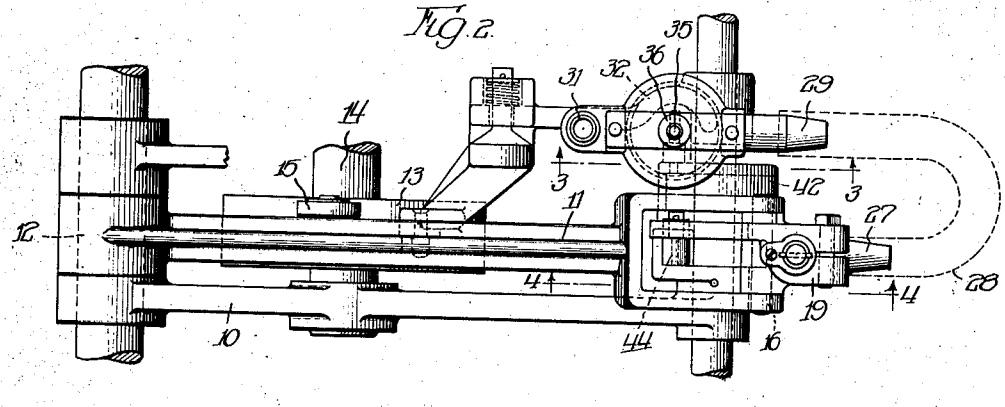
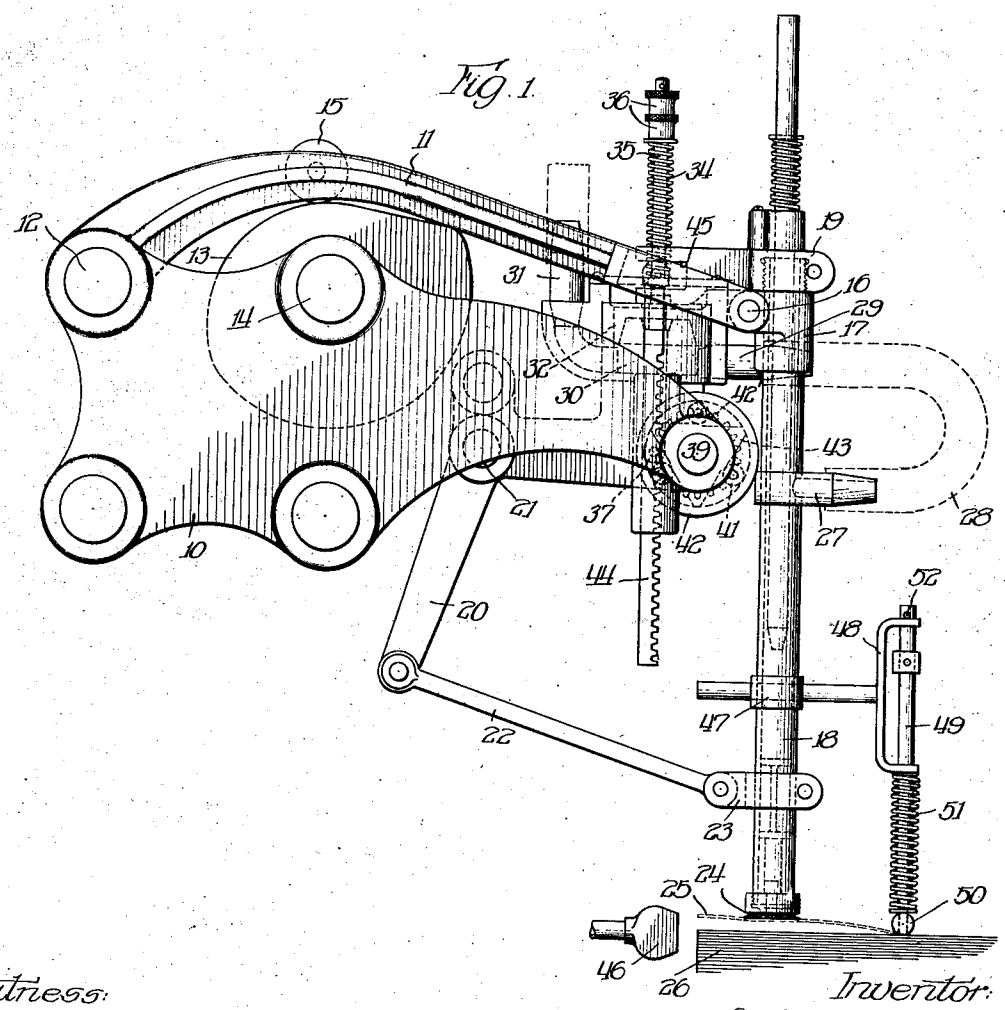


Fig. 1.



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Fig. 4.

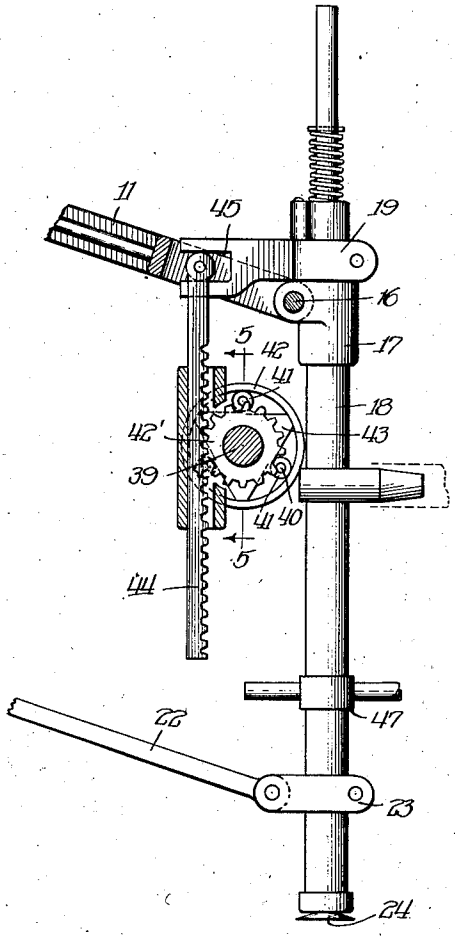


Fig. 3.

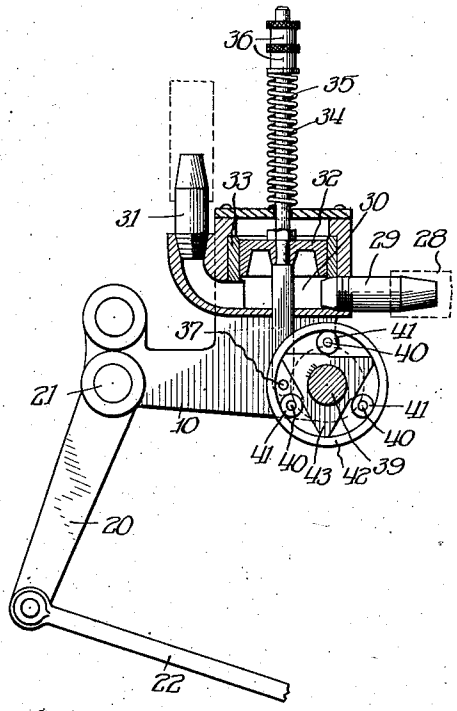
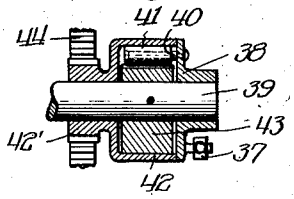


Fig. 5.



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UNITED STATES PATENT OFFICE.

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PAPER-FEEDING-CONTROL MECHANISM.

Application filed February 1, 1922. Serial No. 533,184.

To all whom it may concern:

Be it known that I, CARL HENDERSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Paper-Feeding-Control Mechanism, of which the following is a specification.

This invention relates to paper feeding control mechanism and more particularly to means for controlling a lower limit of movement of a suction shoe for separating the top sheet from a second sheet on a pile of sheet material.

It is an established fact that when a suction shoe passes down solidly on top of a pile of sheet material there is a tendency to drive out any air which is in between the top and second sheets with the result that there is considerable likelihood that the second sheet will be drawn up with the top sheet by the suction shoe. However, assuming that air is being blown between the sheets of paper for "fluffing" same, it is advantageous to prevent the suction shoe from lowering to the extent that the top sheet is forced down into engagement with the second sheet at the point of suction of the suction shoe. Furthermore, when the sheets are irregular in the pile and do not lie flat, means must be provided for separating and withdrawing same in an efficient manner.

Therefore one object of the invention is to provide an arrangement whereby a suction shoe or the like will be prevented from forcing a top sheet of material into engagement with a second sheet of material which previously has been slightly separated regardless of the irregular arrangement of the sheets in the pile.

Another object of the invention is to provide simple and automatic means for limiting the downward movement of a suction shoe in a manner to meet all the requirements for successful commercial operation.

These and other objects are accomplished by means of the arrangement disclosed on the accompanying sheets of drawing, in which—

Figure 1 is a fragmentary side elevation of a printing press attachment embodying my invention and also showing the same in cooperative action with a pile of sheet material;

Figure 2 is a top plan view of the same arrangement;

Figure 3 is a detail sectional view taken in the plane of line 3—3 of Figure 2;

Figure 4 is another detail sectional view taken in the plane of line 4—4 of Figure 2; and

Figure 5 is a detail sectional view taken in the plane of line 5—5 of Figure 4.

The various novel features of my invention will be apparent from the following description and drawings and will be particularly pointed out in the appended claims.

Referring to the figures of the drawings it will be noted that all of the operating parts are supported directly or indirectly by a bracket 10 in which an arm 11 is pivotally mounted at 12 and is actuated in an upward vertical direction by a cam 13 fixed to a shaft 14 mounted in the bracket 10. This cam cooperates with a roller 15 carried by the arm 11. Pivotally connected to the outer end of the arm 11 at 16 is a collar 17 which loosely receives a suction tube 18 to which a clamp 19 is secured over the collar 17. It is seen, therefore, that the arm 11 is effective through the cam 13, collar 17 and clamp 19 for lifting the suction tube 18. This suction tube 18 lowers as a result of its own weight as the cam 13 permits it to lower. This suction tube is guided in its movements through connections including an arm 20 connected at 21 to the bracket 10, a link 22 pivotally connected to the arm 20 and to a member 23 clamped to the suction tube 18. The lower end of the suction tube is provided preferably with a flexible suction shoe 24 which is the element that directly engages the top sheet 25 in the pile 26, as shown.

When the suction tube is not sealed by a sheet of paper, air is drawn upwardly through the suction tube 18 and then outwardly therefrom through a pipe connection 27, flexible hose connection 28, nipple 29, piston chamber 30, and nipple 31 to any suitable source of suction. When air is thus drawn through the connections described a piston 32 is held in an elevated position within a cylinder 33 by a coiled spring 34 which is operatively connected to said piston and surrounds a piston rod 35, the tendency of the spring 34 being to prevent the piston 32 from lowering. The compres-

sion of this spring is controlled by suitable threaded members 36. If, however, the lower end of the suction tube 18 becomes sealed, such as by the top sheet of paper 25, no air passes therethrough and the suction exerted in the piston chamber 30 causes the piston 32 to be drawn downwardly in the cylinder 33 against the action of the spring 34 for causing a locking action against further downwardly movement of the suction tube 18.

This locking action is effected through connections including the piston rod 35, the lower end of which is pivotally connected at 37 to an oscillatory plate 38 loosely mounted on a stationary shaft 39. This plate 38 carries a plurality of parallel arranged pins 40 upon which are mounted rollers 41 which extend into a casing 42 and are interposed between the annular flange of said casing and a triangular block 43 secured to the shaft 39 within the casing. Formed integrally with the casing 42 is a gear 42′ which meshes with and is driven by a rack 44, the upper end of which is loosely mounted in a slotted portion 45 of the clamp 19. In connection with the locking action referred to for limiting the downward movement of the suction tube 18 it will be appreciated, reference being had particularly to Figure 3 of the drawings, that when the tube 18 is sealed, the suction thereby drawing the piston 32 downwardly against the action of spring 34, the disc or plate 38 is given a counterclockwise movement, as viewed in Figure 3, causing the rollers 41 to become wedged between the flange of casing 42 and the stationary triangular member 43, the result being that the casing 42 is thereupon prevented from further rotary movement in a counterclockwise direction, as viewed in Figure 3, and accordingly the gear 42′ is prevented from movement in that direction and the rack 44 is prevented from further downward movement, thereby preventing the tube 18 from further downward movement.

As mentioned above, the downward movement of the suction tube 18 is to be automatically limited and positively stopped at the instant that the lower end of the suction tube 18 becomes sealed by the top sheet of paper to prevent the suction tube from forcing the top sheet of paper into engagement with the second sheet and thereby forcing the air from between said two sheets of paper. Accordingly at the instant that the lower end of the suction tube 18 becomes sealed the roller ratchet arrangement described hereinabove immediately automatically acts as a lock against further downward movement of the suction tube 18.

When the top sheet of paper is withdrawn from the suction tube air again passes upwardly through the suction tube 18 and piston chamber 30, permitting the spring 34 to move the piston 32 upwardly in the cylinder 33 and thereby releasing the casing 42 and gear 42′, the latter then being free to be rotated by the rack 44 which is raised through the clamp 19, collar 17 and arm 11 when the lifting cam 13 passes through its lifting period, it being understood that the suction tube 18 is being raised at the same time.

It will be noted that casing 42 and gear 42′ are always free to rotate in a clockwise direction, as viewed in Figures 1, 3 and 4, but are limited in their counterclockwise rotation by the locking means hereinabove described for limiting the downward movement of the suction tube 18.

The pile of paper may be "fluffed" by any suitable blower 46. The extent to which the air will penetrate the pile is limited by an attachment secured to the suction tube 18 at 47. This attachment includes a yoke shaped member 48 in which a rod 49 is vertically movable, the lower end of the rod having a bar 50 which directly engages the top sheet of the pile. This bar is yieldably pressed into engagement with the top sheet of paper by a coiled spring 51 surrounding the rod 49, any excess downward movement of the attachment being absorbed by the spring 51 as the rod 49 rises in the yoke 48. A pin 52 limits the relative downward movement of the rod with respect to the yoke by engagement with the latter.

It is my intention to cover all modifications of the invention falling within the spirit and scope of the following claims.

I claim:

1. In paper feeding control mechanism, the combination of means for drawing a sheet of material away from a pile and being relatively movable with respect to the pile, and pneumatically controlled means for limiting such relative movement for preventing engagement of the drawing means with the pile.

2. In paper feeding control mechanism, the combination of movably mounted means for drawing a sheet of material away from a pile, and pneumatically controlled means for automatically limiting the movement of said drawing means for preventing its engagement with the pile.

3. In paper feeding control mechanism, the combination of movably mounted suction means for lifting a sheet of material from a pile, and suction controlled means for limiting movement of said suction means for preventing engagement of the latter with the pile.

4. In paper feeding control mechanism, the combination of suction means for lifting a sheet of material upwardly from a pile, and means for stopping the movement of said suction means in one direction before it reaches the pile when said suction means becomes sealed.

5. In paper feeding control mechanism, the combination of a movably mounted suction member whereby a sheet of material may be lifted from a pile, and means whereby said member is locked against movement in one direction as a result of its becoming sealed.

6. In paper feeding control mechanism, the combination of vertically movable suction means for lifting a top sheet of paper from a pile, and means for locking of said suction means against movement towards the pile when the suction means becomes sealed by the top sheet of paper.

7. In paper feeding control mechanism, the combination of vertically movable suction means for lifting a sheet of material away from a pile, and suction controlled means for locking of said suction means against movement towards said pile to prevent engagement therewith.

8. In paper feeding control mechanism, the combination of movably mounted suction means for withdrawing a top sheet of material away from a pile, and suction controlled means for locking of said suction means against movement with respect to said pile under certain predetermined conditions.

9. In paper feeding control mechanism, the combination of movably mounted suction means for lifting a top sheet of material away from a pile, means for stopping the movement of said suction means, and suction controlled means for controlling said stopping means.

10. In paper feeding control mechanism, the combination of movably mounted suction means for lifting a sheet of material away from a pile, means responsive to air pressure when said suction means becomes sealed for locking said suction means against a certain movement.

11. In paper feeding control mechanism, the combination of movably mounted suction means for lifting a sheet of material from a pile, a piston responsive to change in suction in said suction means, and means controlled by said piston for locking against movement of said suction means under certain predetermined conditions.

12. In paper feeding control mechanism, the combination of a suction tube movably mounted with respect to a pile for lifting the top sheet from the pile, gear mechanism actuated when said tube is moved from said pile, and means for locking said gear mechanism in one movement of said tube when the latter becomes sealed.

13. In paper feeding control mechanism, the combination of a suction tube movably mounted with respect to a pile of sheet material and for lifting the top sheet therefrom, gear mechanism actuated with said tube, and suction controlled means for locking said gear mechanism for preventing further downward movement of said suction tube when the latter has become sealed by the top sheet of material.

14. In paper feeding control mechanism, the combination of a suction tube having a vertical movement with respect to a pile of sheet material and for lifting the top sheet therefrom, gear mechanism actuated with said tube, and a piston operatively associated with said suction tube for controlling said gear mechanism in accordance with suction conditions in said tube.

15. In paper feeding control mechanism, the combination of means for fluffing up piled sheet material, means engageable with the pile for limiting the extent of the fluffing action, movably mounted means for lifting the top sheet of material away from the pile to increase the separation of the top and second sheets, and means for locking said movably mounted means against movement toward said pile under certain predetermined conditions.

Signed at Chicago, Illinois, this 28th day of December, 1921.

CARL HENDERSON.