June 23, 1953 D. R. P. JACKSON 2,643,120

SUCTION BLANK FEED FOR PRINTING, WRAPPING, AND OTHER MACHINES

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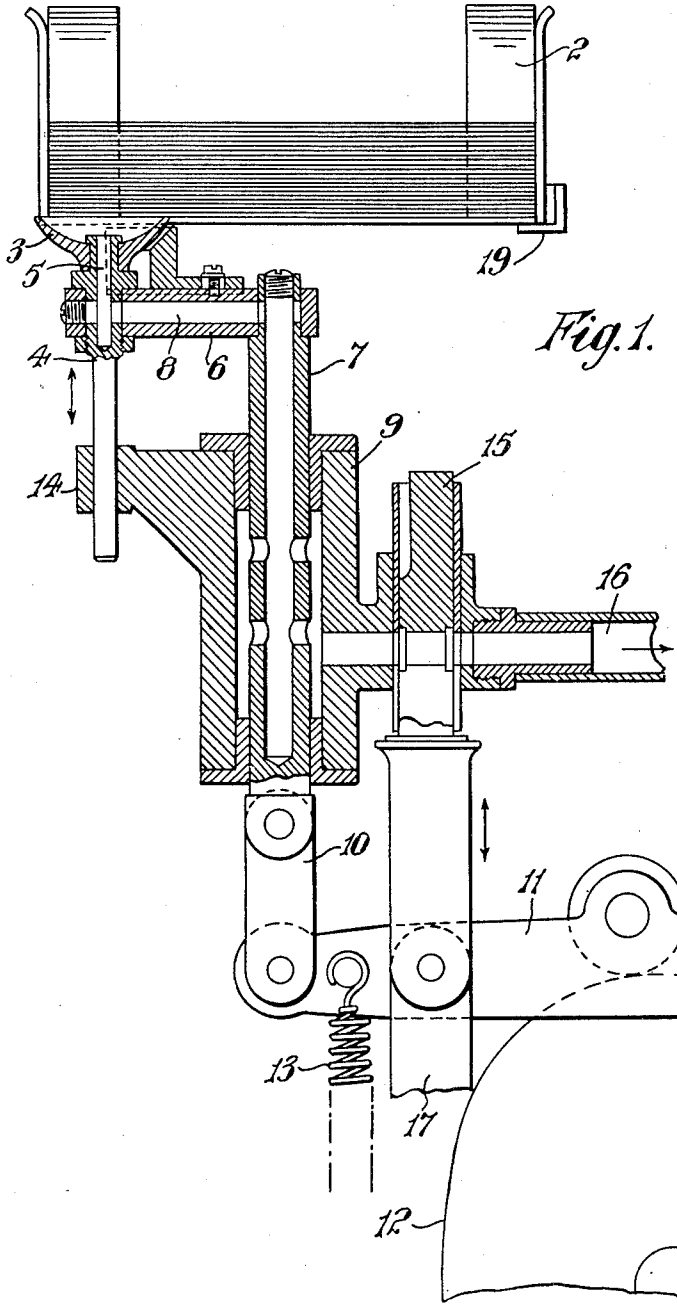


Fig. 1.

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Fig. 2.

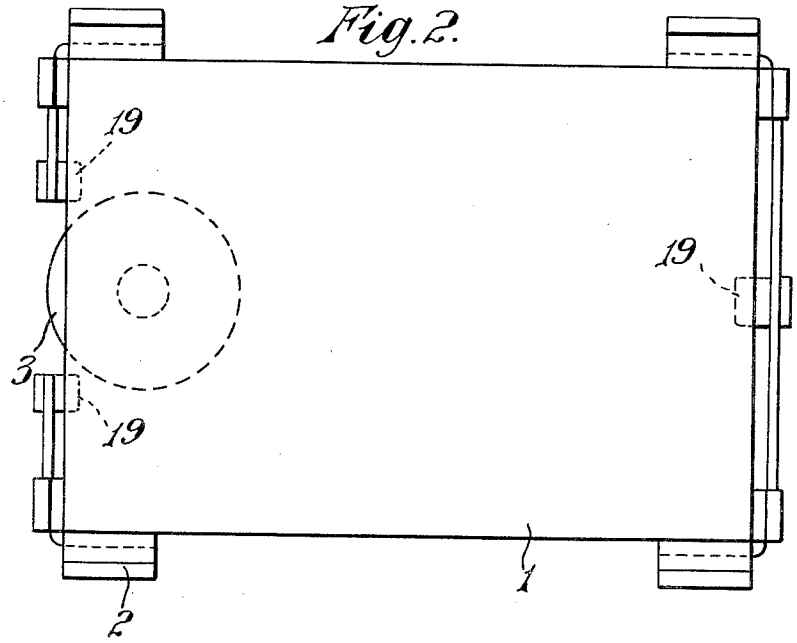


Fig. 3.

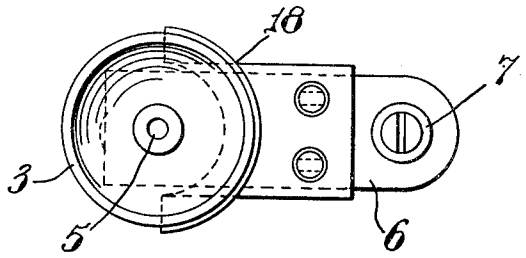
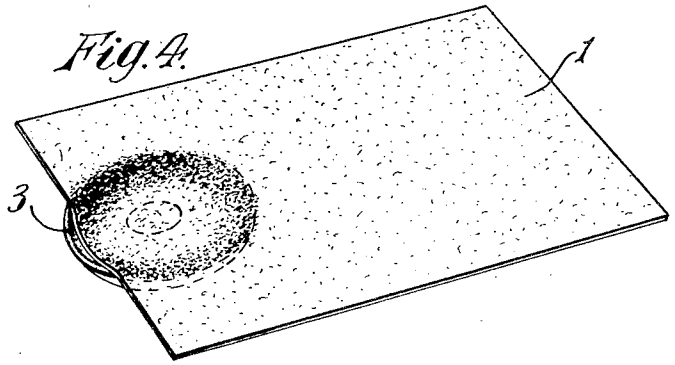


Fig. 4.



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UNITED STATES PATENT OFFICE

2,643,120

SUCTION BLANK FEED FOR PRINTING, WRAPPING AND OTHER MACHINES

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2 Claims. (Cl. 271—32)

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This invention concerns improvements in or relating to suction blank feeds for printing, wrapping and other machines of the kind wherein a moving sucker is arranged beneath a pile of blanks or sheets and is operated to remove them one at a time from the pile. Usually the sucker pulls down one end of a sheet so that it can be engaged by feed rollers or the like to complete the withdrawal of the sheet, but sometimes the sucker effects the whole operation.

As is well known, it is extremely difficult to devise such a feed which will unfailingly remove one blank, and only one, at each movement, and the difficulties increase when the blanks are of a porous nature such as is the case with the poor cardboard available in some countries today for blanks for boxes such as cigarette cartons. In such cases if sufficient suction is employed to ensure that a blank is fed, it is often sufficient to draw down two or three blanks in the feeding operation.

According to the invention there is provided a suction feed of the kind referred to wherein the sucker is so arranged that part of its aperture projects beyond the edge of the pile of blanks when the sucker is in blank-engaging position and wherein the size of the sucker is sufficient for that part of a blank which is engaged to be drawn down into the aperture by flexure or distortion of the blank.

The aperture of the sucker is preferably of a saucer-like shape.

The invention will be more fully described with reference to the accompanying drawings in which:

Figure 1 is a sectional elevation of the essential parts of a suction blank feed embodying the invention;

Figure 2 is a plan of the blank magazine of Figure 1 showing the location of a sucker relatively to the edge of the pile of blanks in the magazine.

Figure 3 is a plan of a sucker and associated parts.

Figure 4 is a perspective diagram illustrating the sucker action.

Referring to the drawings, a pile of blanks 1 is placed in a magazine 2. Beneath the magazine is a sucker 3 fixed at the upper end of a rod 4 which is drilled at 5 to provide an air passage. The rod 4 is fixed in a bar 6 and the latter is also fixed to a tube 7. As shown in Figure 1, the bar 6 is drilled at 8 and the tube 7 is cross-drilled so that there is a passage from the sucker to the tube 7. The tube 7 is caused to reciprocate in a guide block 9 which is fixed to the frame of the

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feed and is chambered as shown so that air can pass through the block and tube and through the above-mentioned passage from the sucker. The tube 7 is connected by a link 10 to a lever 11, the other end of which is pivoted, at a position not shown, to the feed frame. The lever is oscillated on its pivot by any suitable device such as a cam 12 and spring 13. The blank is supported in the magazine by short supports 19.

As the cam rotates, the tube 7 moves up and down and carries the sucker up and down for blank feeding. During these movements the rod moves in a guide 14 attached to the guide block. A blank engaged by the sucker is drawn down first in the manner illustrated in Figure 4, and thereafter from the magazine as its edges slip past the supports 19, and its final removal from the feeding apparatus is effected in any known way. A suction control valve 15 is located between a suction pipe 16 and the chamber of the block 9, and this valve is operated by a link 17 pivoted thereto which is operated by a further cam lever (not shown) so that the timing of the suction can be altered by adjustment of the cam operating said lever.

The timing and operation of the suction device are such that as the sucker moves into contact with the lowest blank in the pile the valve is opened to the suction tube 16 and is held open until the sucker has moved down to its lowest position and released when other feeding members (according to the particular design of the feeding apparatus) engage the blank.

It will be found that with such an arrangement it is possible to feed any blanks quite satisfactorily, and while no definite theory is offered in explanation, it is thought that as the sucker moves towards the engaging position or, more usually, is in said position, the flow of air through the exposed part of the aperture operates in such a way that simultaneously with the suction effect there is a flow past the edges of the blanks at the front of the pile having a considerable velocity, and by the arrangement according to the invention the flow and suction operate at the same instant. The combined effect is to distort or flex part of the lowest blank by the suction into an inclined cupped form which is determined by the shape of the aperture of the flexible sucker, and as soon as the flexing occurs, the air flow is instantly effective in penetrating between the flexed part of the lowest blank and the underneath of the one above it, thus effecting positive separation of the lowest blank.

Usually the sucker is brought into contact with

the lowest blank, after which the suction is applied, and this operation together with the actual separation of first and second blanks in the locality of the sucker takes place while the sucker is at rest in the top position. After the operations described in the previous paragraph have taken place the sucker starts its downward movement.

The arrangement may vary for different conditions such as the quality of the blank, the size of the blank and the maximum weight of the pile, but no real problem is involved because most of these factors have to be cared for in any design of a blank feed, and given a feed it is only necessary to shift the sucker until enough of its aperture is exposed to get satisfactory feeding.

In order to make the engagement between sucker and blank as close and effective as possible, the sucker is preferably of the rubber cup type or the edges of its aperture may be of elastic material such as rubber. Where the cup is of such size and material that the suction would cause it to flatten out too much on engaging the blank, or it would be flattened by raising the pile, as is usual in such feeds, the rear half of the cup, that is the part remote from the edge of the pile, may be reinforced by an outer half-cup 18 of metal which prevents such flattening of the cup and retains the cup-like shape sufficiently for the blank to be able to bend down into the cup shape. The size of the cup or aperture should be such that a blank of any given thickness can flex and enter the cup without too much effort.

The invention may be applied to any form of blank feed of the kind referred to. For feeding blanks such as the slides of ordinary slide and shell packets the rubber suction cup is 1¼" diameter and the aperture projects ⅛" beyond the edge of the pile, that is, so as to form a chord whose height is ⅛".

What I claim as my invention and desire to secure by Letters Patent is:

1. A suction feed comprising a support for a pile of blanks, a feed member supported for movement toward and away from said pile to effect successive withdrawal of the end blanks of said pile, a sucker carried by said member and having a suction opening, and suction means connected with said sucker, said sucker being positioned on said member to engage with a portion of the blank to be withdrawn adjacent an edge of the blank, and to extend beyond that edge, whereby a portion of the sucker opening is exposed and the edge portion of the engaged blank is flexed toward the sucker.

2. A suction feed as claimed in claim 1, wherein the sucker is made of elastic material such as rubber and a support of metal or the like is positioned at that part of the sucker which is remote from the edge of the pile to prevent the sucker from losing its effective shape by distortion.

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