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SHEET STACK ADVANCE MECHANISM

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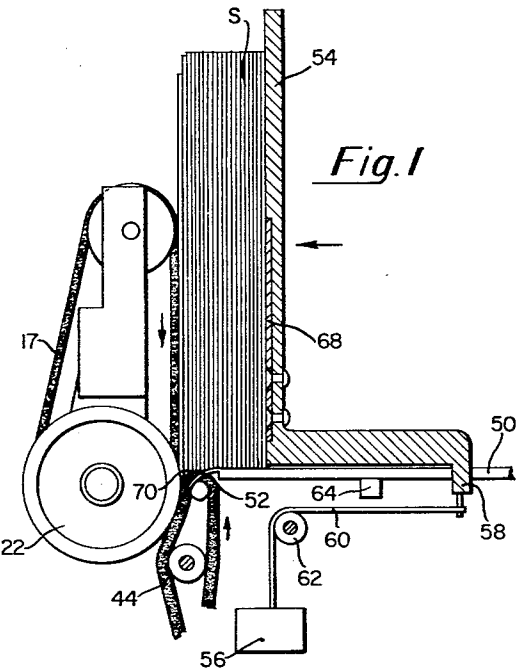


Fig. 1

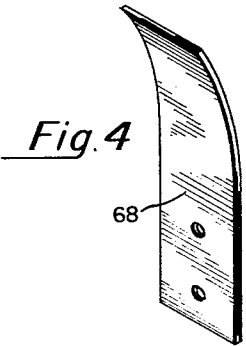


Fig. 4

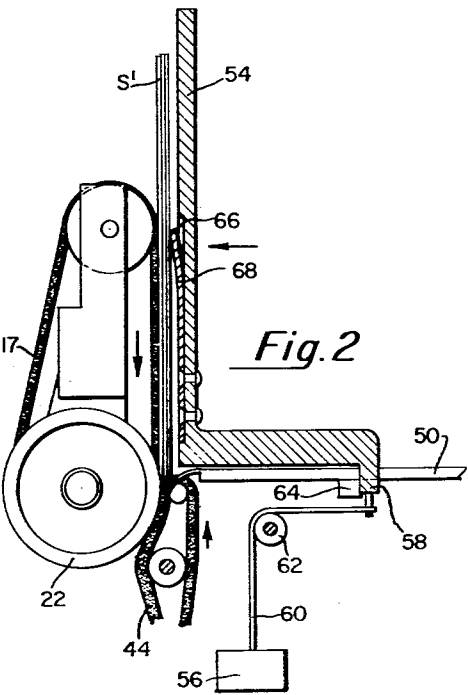


Fig. 2

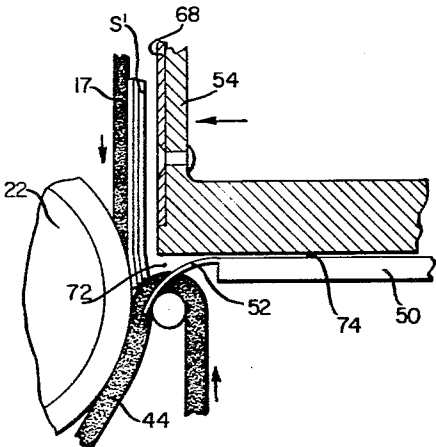


Fig. 3

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SHEET STACK ADVANCE MECHANISM

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2 Claims. (Cl. 271-34)

This invention relates generally to sheet feeding machines, and more particularly to devices for advancing a stack of sheets to a sheet feeding mechanism at which place the sheets are individually and successively separated from the stack and forwarded to their destination.

In certain sheet feeding applications when feeding sheets from a stack it is found that there is a tendency to buckle the last few sheets of the stack at a time when the stack has been diminished to a small number of sheets. This difficulty is believed to be due to the fact that the force of the stack drive means, while adequate for advancing a full stack of sheets, is excessive when the stack has been reduced to a small number of sheets and thus tends to cause buckling of sheets.

The principal object of the present invention is to provide a stack advancing device which will eliminate buckling of the last few sheets in a stack.

Another object of the invention is to provide means for applying one force for advancing the sheet stack at a time when it is full, and a different more appropriate force for advancing the stack when it has been reduced to a small number of sheets.

These and other objectives will be more fully revealed in the following detailed description of a specific embodiment of the invention when read in conjunction with the accompanying drawings in which:

FIG. 1 is a diagrammatic view of one form of sheet feeding apparatus constructed in accordance with the invention and showing a stack of sheet items being fed;

FIG. 2 is a view similar to FIG. 1 but showing the stack of sheets reduced to a small number of sheets;

FIG. 3 is an enlarged view of a fragmentary portion of FIG. 2; and

FIG. 4 is an enlarged view in perspective of a spring leaf member.

Considered briefly, the invention contemplates the use of a sheet stack pusher or follower for advancing a stack of sheets to a sheet feeding device, and means associated with the pusher for advancing the last small number of sheets in the stack with a lesser force than that used for advancing a full stack of sheets.

With reference to the drawings, the preferred embodiment of the invention is illustrated as incorporated in a sheet feeding apparatus which includes an endless sheet feeding belt 17, a drive-down roller 22, and an endless retarding belt 44, shown fragmentarily, the construction and operation of these three members being fully described in a copending application of Erik R. Solyst, Serial No. 781,729, filed December 19, 1958 and assigned to Burroughs Corporation, the same assignee of the present invention.

For supporting a stack of sheets S on edge (FIG. 1) there is provided a table 50 having curved lip portions 52 at the feed-off end of the table, only one of which is shown, which straddle the retarding belt 44. A stack pusher 54 is arranged for movement along table 50 for advancing the sheet stack S to the sheet feeding belt 17.

While other drive means may be used, such as shown in the aforesaid copending application, in the present instance, the drive means for the stack pusher 54 is illustrated as a weight 56 which is connected to a depending lug 58 on pusher 54 by means of a cable 60 leading over a pulley 62. A stop member 64 secured to table 50 and in the path of movement of lug 58 serves to limit movement of pusher 54 in the direction of stack advance.

Secured to the leftward or stack advancing side of

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pusher 54 in a recess 66 (FIG. 2) is a flexible spring leaf 68 for advancing the last few sheets of the stack in a manner to be explained. In its normal position (FIG. 4) spring leaf 68 is bent arcuately away from pusher 54, however, when a stack of sheets is being advanced to the sheet feeding belt 17 by pusher 54, spring leaf 68 is pressed flush against the pusher.

When the sheets are being separated from a full stack of sheets S as seen in FIG. 1, the leading or endmost number of sheets tend to fan out downwardly over the lip portions 52 toward the nip of drive-down roller 22 and retarding belt 44, and thus the leading sheet in the stack has a substantial backing behind it by the fanned out sheet stack so that no buckling of the end sheet is experienced when it is separated from the stack by belt 17. However, it is found in the prior art devices that when the stack has been reduced to a small number of sheets S' as shown in FIGS. 2 and 3, these sheets no longer have the firm backing of the sheet stack and the region 70, FIG. 1, which was originally occupied by the leading portions of fanned out sheets is now a space 72, FIG. 3, between the bottom face 74 of pusher 54 and retarding belt 44 so that there is now insufficient backing behind the few remaining sheets to avoid buckling of the sheets as they are separated from the stack by belt 17.

The buckling of the last few sheets of the stack has been found to be due to the excessive force of weight 56 at a time when their leading edge portions are not sufficiently backed up as explained above. This difficulty is overcome in the present invention when lug 58 comes against stop 64 (FIG. 2) to stop pusher 54 and thus render the force of weight 56 ineffective against further advancing of the sheet stack. At this point, spring leaf 68 will commence flexing leftwardly to resume its normal position and thus continue the advance of the sheet stack with a light progressively diminishing force suitable to the number of sheets remaining.

Thus it is found that by applying a lesser force for advancing the remaining small number of sheets than the force for advancing a full stack of sheets, the difficulty of buckling of the sheets is effectively eliminated.

While there has been shown and described an exemplary embodiment of the invention, it is to be understood that this is the preferred form and that the invention may be constructed in a variety of forms without departing from the spirit and scope thereof. Accordingly, it is to be understood that the invention is not to be limited by the specific structure disclosed but only by the subjoined claims.

What is claimed is:

1. In a sheet feeding machine, the combination comprising, means for supporting a stack of sheets by an edge thereof and having a feed-off end from which sheets are to be separated from said stack, an endless sheet feeding belt adjacent to and spaced from said feed-off end of the supporting means for separating sheets individually and successively from said stack, a roller for advancing each sheet as it is separated from the stack, means cooperating with said roller for retarding sheets in excess of the foremost one separated from said stack, said sheet feeding belt being supported for rotation at one end about an axis adjacent to said retarding means and at its opposite end about an axis adjacent to the medial portion of said stack, the feeding surface of said sheet feeding belt being parallel to the plane of sheets in said stack and being substantially in line with the grip of said roller and said sheet retarding means, said roller and sheet retarding means being displaced relative to the feed-off end of said supporting means in the direction of sheet feeding such that in view of the spacing between said sheet feeding belt and feed-off end the sheet separating action of the sheet feeding belt urges a number of the endmost sheets of

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said stack toward the grip of said roller and retarding means, the leading portions of the urged sheets being backed up firmly by the remaining sheets in the stack when the stack is substantially full and being unsupported and susceptible to buckling when there are but a few sheets remaining in the stack, a pusher for advancing said stack of sheets along said supporting means to said sheet feeding belt, drive means for said pusher for maintaining said stack of sheets in contact with said sheet feeding belt as sheets are separated thereby from the stack, means in the path of movement of said pusher for stopping the pusher in opposition to said drive means at a predetermined distance from said sheet feeding belt when there are only a few remaining sheets left in said stack having said unsupported leading portions, and a spring leaf secured at one end to said pusher with its opposite operative end normally projecting outwardly therefrom at a region away from said unsupported leading portions, said operative end being pressed flush against said pusher by said stack of sheets when said pusher is advancing the stack and gradually flexing outwardly therefrom upon said stopping of the pusher for pressing said few remaining sheets against said opposite end of said sheet feeding belt with a diminishing and lesser force than the force of said drive means, thereby to assure proper entry of each said unsupported leading portion into the grip of said roller and sheet retarding means without said buckling thereof.

2. In a sheet feeding machine, the combination comprising, means for supporting a stack of sheets by an edge thereof and having a feed-off end from which sheets are to be separated from said stack, an endless sheet feeding belt adjacent to and spaced from said feed-off end of the supporting means for separating sheets individually and successively from said stack, a roller for advancing each sheet as it is separated from the stack, an endless sheet retarding belt in arcuate contact with said roller for retarding sheets in excess of the foremost one separated from said stack, said sheet feeding belt being supported for rotation at one end about an axis common to the axis of said roller and at its opposite end about an axis adjacent to the medial portion of said stack, the feeding surface of said sheet feeding belt being parallel to the plane of sheets in said stack and being substantially in line with the grip of said roller and said retarding belt, said roller and retarding belt being displaced relative to the feed-off end of said supporting means in the direction of sheet feed-

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ing such that in view of the spacing between said sheet feeding belt and feed-off end the sheet separating action of the sheet feeding belt fans out a number of the endmost sheets of said stack toward the grip of said roller and 5 retarding belt, the leading portions of the fanned out sheets being backed up firmly by the remaining sheets in the stack when the stack is substantially full and being unsupported and susceptible to buckling when there are but a few sheets remaining in the stack, a pusher for 10 advancing said stack of sheets along said supporting means to said sheet feeding belt, yieldable drive means for said pusher for maintaining said stack of sheets in contact with said sheet feeding belt as sheets are separated thereby from the stack, an obstruction in the path of 15 movement of said pusher for stopping the pusher in opposition to said yieldable drive means at a predetermined distance from said sheet feeding belt when there are only a few remaining sheets left in said stack having said unsupported leading portions, and a spring leaf secured at 20 one end to said pusher with its opposite operative end normally bowed outwardly therefrom at a region away from said unsupported leading portions, said operative end being pressed flush against said pusher by said stack of sheets when said pusher is advancing the stack and 25 gradually flexing outwardly therefrom upon said stopping of the pusher for pressing said few remaining sheets against said opposite end of said sheet feeding belt with a diminishing and lesser force than the force of said yieldable drive means, thereby to assure proper entry of each 30 said unsupported leading portion into the grip of said roller and sheet retarding belt without said buckling thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 12,505	Barr	July 17, 1906
132,325	Ryninger	Oct. 15, 1872
236,427	Griffith et al.	Jan. 11, 1881
664,340	Sturtevant	Dec. 18, 1900
1,135,140	Roberts	Apr. 13, 1915
1,146,929	Droitcour	July 20, 1915
1,154,237	Dixon	Sept. 21, 1915
1,214,474	Jones	Jan. 30, 1917
1,587,417	Reyes	June 1, 1926
2,856,187	Burckhardt	Oct. 14, 1958
2,919,130	Fiehl	Dec. 29, 1959