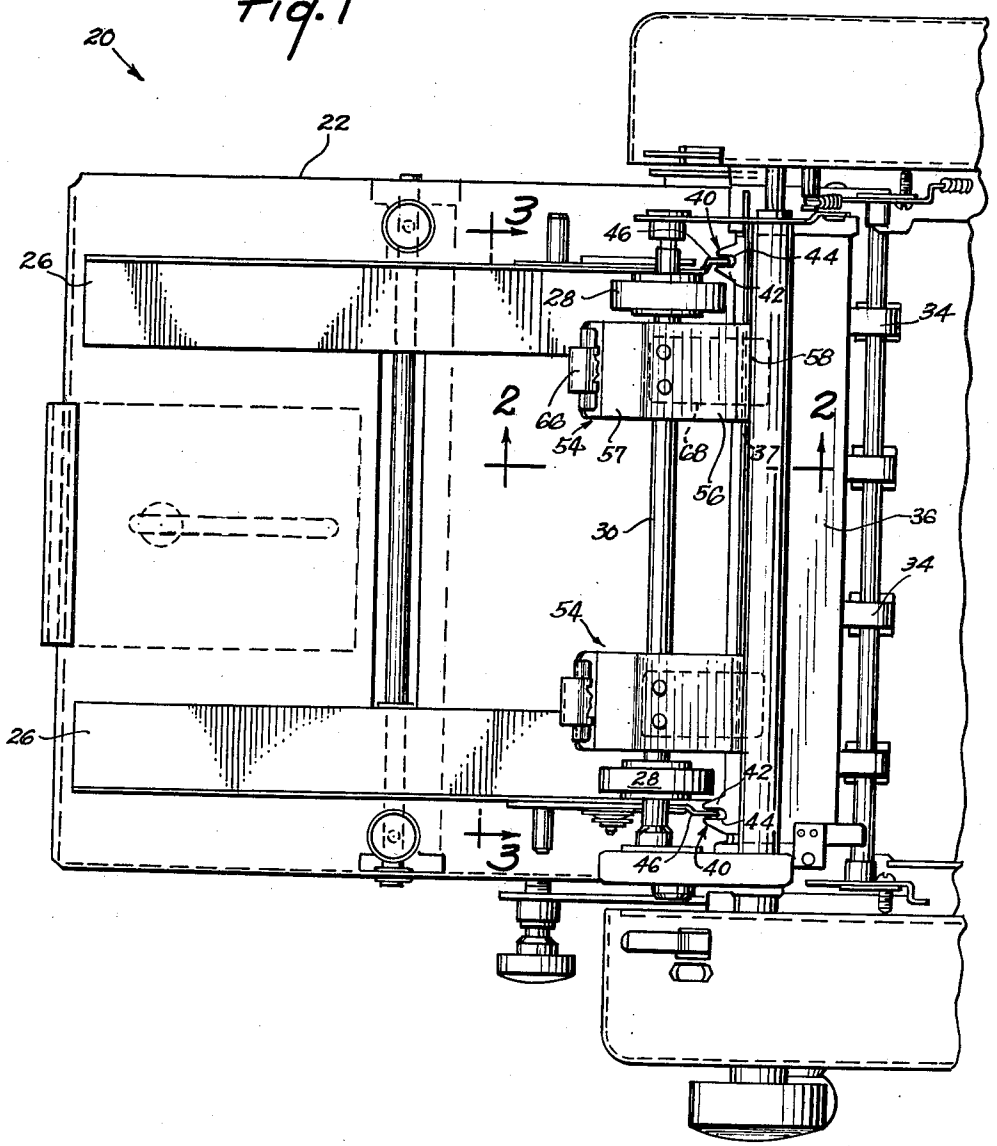
Nov. 12, 1963 G. J. ZAHRADNIK 3,110,489

SHEET SEPARATING MECHANISM CAPABLE OF FEEDING THIN LIMP PAPER

Filed June 20, 1960 3 Sheets-Sheet 1

Fig. 1



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3 Sheets-Sheet 2

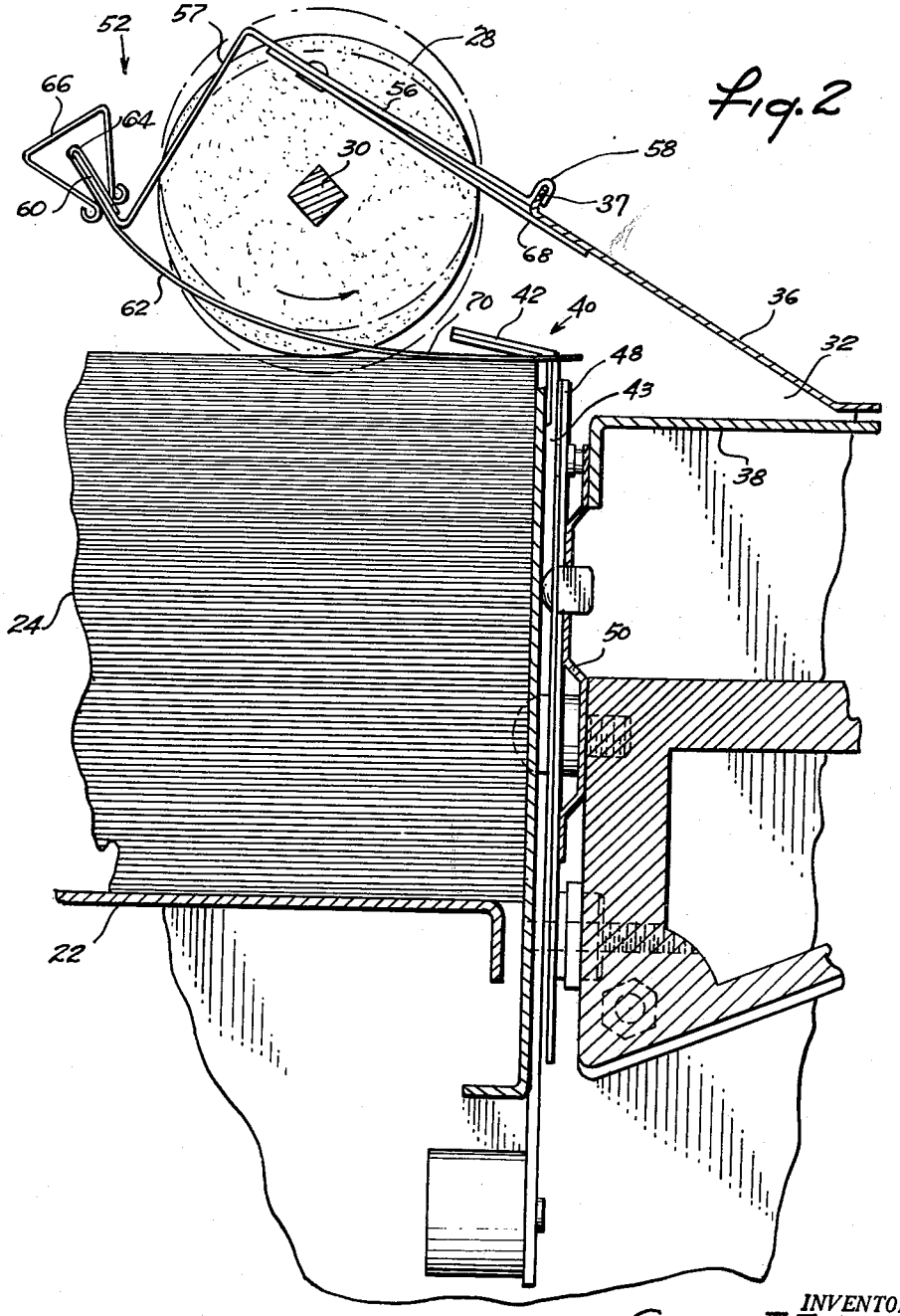


Fig. 2

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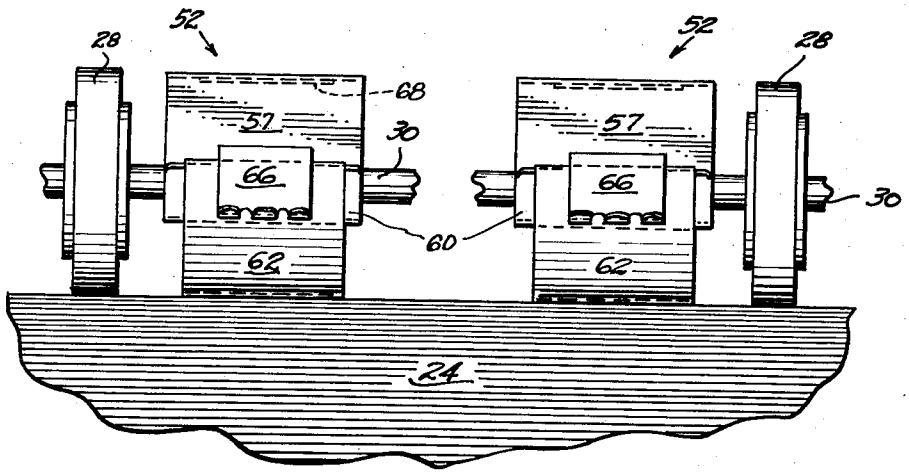


Fig. 3

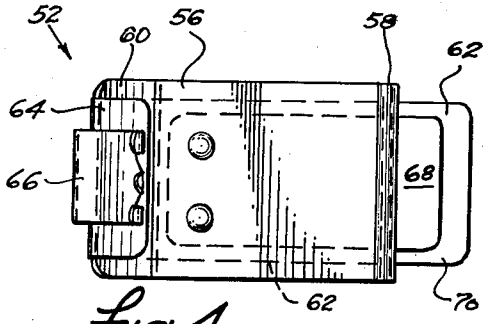


Fig. 4

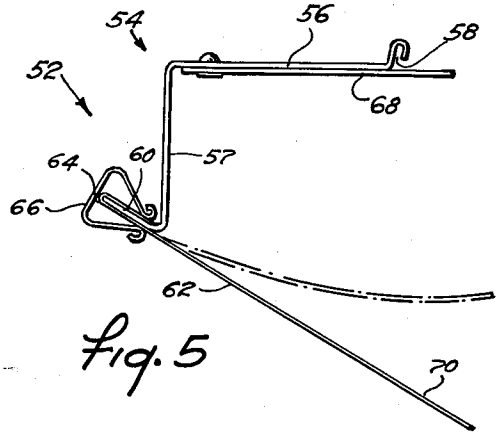


Fig. 5

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SHEET SEPARATING MECHANISM CAPABLE OF FEEDING THIN LIMP PAPER

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3 Claims. (Cl. 271—22)

This invention relates to duplicators or other printing machines, and pertains particularly to means for separating the topmost sheet from a supply stack and feeding it to the machine.

The present invention pertains particularly to sheet separating mechanisms employing corner separators. Such sheet separating mechanisms, as exemplified by the machines shown in United States Patents 2,912,241, and 2,922,644, have proven very satisfactory for the purposes for which they were designed. Experience has shown, however, that when extremely thin, limp paper, such as onion-skin paper, is used in such machines, the corner separators tend to cause excessive buckling of the individual sheets being fed. This excessive buckling occasionally causes the sheets being fed to jam in the machine. Since there is an increasing tendency to use such thin paper in duplicating or printing machines, it has become desirable to improve the feeding of such paper.

One object of this invention is to provide printing machines or duplicators with a sheet separating mechanism which can separate and feed single sheets of very thin paper, as well as heavier paper, from the top sheet in the stack down to the very last sheet.

A further object of this invention is to provide an attachment for duplicating or printing machines, employing corner separators, which permits single sheets of very thin paper to be separated from a stack and fed to the machine without jamming the machine.

Another object of this invention is to provide means for preventing excessive buckling in single sheets of very thin paper being fed from a stack to a duplicating or printing machine.

Further objects and advantages of the present invention will appear from the following description, taken with the accompanying drawings wherein:

FIG. 1 is a fragmentary plan view of a duplicating machine showing the new and improved separating mechanism to be described as an illustrative embodiment of the present invention.

FIG. 2 is an enlarged fragmentary sectional view, taken generally along a line 2—2 in FIG. 1.

FIG. 3 is a fragmentary sectional view, taken generally along a line 3—3 in FIG. 1.

FIG. 4 is a plan view of an attachment employed in the machine of FIGS. 1–3.

FIG. 5 is a side elevational view of the attachment.

As already indicated, the drawings, particularly FIG. 1, illustrate a portion of a duplicating or printing machine 20 which may be of any desired type, such as a stencil-type duplicator. The machine 20 may be provided with a conventional removable feed table 22 for supporting a stack 24 of sheets (FIG. 2). Left and right hand adjustably mounted side rails 26 are on the feed table for positioning and guiding the lateral sides or edges of the stack 24.

In addition, the machine is provided with a suitable feed mechanism for advancing the topmost sheet from the stack 24. In this case, the feed mechanism includes two laterally spaced feed rollers 28, which may be made of rubber or other soft friction material. The rollers 28 are slidably mounted on a drive shaft 30 in a manner well known in the art. In this way the position of the rollers may be adjusted for use in feeding sheets of various widths. By means of a suitable mechanism (not shown) the shaft 30 and rollers 28 are actuated so that the rollers engage the topmost sheet in stack 24 and move it through a guideway 32 (FIG. 2). From the guideway the sheet moves to the forwarding rollers 34, which advance the sheet to the stencil drum or other duplicating cylinder. As seen in FIG. 2, the guideway 32 is defined by guide plates 36 and 38.

The illustrated machine comprises a pair of corner separators 40 (FIGS. 1 and 2). Each corner separator 40 includes an upper flange or finger 42 and a downwardly extending portion 43. The flange or finger 42 is adapted to rest on the topmost sheet in the stack 24 adjacent one corner thereof. The weight of the corner separators maintains the flanges 42 in position on the top of the stack 24. As seen in FIG. 1 each flange 42 is provided with a slot 44 adapted to receive an outwardly offset guide 46, mounted on the corresponding side rail 26. The downwardly extending bar portion 43 is slidably mounted for vertical movement on a carrier 48, which is horizontally adjustable on a support plate 50. The structure and operation of these portions of the machine 20 are illustrated and described in greater detail in United States Patents 2,912,241 and 2,922,644.

As stated above, such corner separators function very well with ordinary papers but tend to cause some difficulty when very thin paper is used in the duplicating machine. This difficulty is due to excessive buckling of the topmost sheet. Sometimes the excessive buckling may cause the sheet to jam in the guideway 32. To prevent this from happening, a pressing device or attachment, indicated generally by the reference numeral 52 (FIG. 5), is employed on the machine 20. This attachment has a portion which presses lightly against the topmost sheet in the stack, but with enough force to prevent excessive buckling when the paper being used in very thin or limp.

The attachment 52 includes a bracket 54, which is angle shaped and comprises leg portions 56 and 57 (FIG. 5). The free end of the leg portion 56 is bent to form a downwardly open U-shaped attaching flange 58. The free end of the leg portion 57 is bent outwardly at a generally 45° angle to form a support flange 60 (FIGS. 2 and 5).

A resilient strip 62 is mounted on the bracket 54. One end of this strip is bent or folded to form a flattened U-shaped flange 64 which embraces the support flange 60. In this case, a spring clip 66 is employed to clamp the U-shaped flange 64 against the support flange 60, see FIGS. 3 and 4. Various materials may be employed in the strip 62, but it is preferred to make the strip of a resilient plastic material, such as nylon, for example.

The U-shaped attaching flange 58 is adapted to fit over a reinforcing flange 57 on the upper guide plate 36 of the illustrated machine. It will be evident, however, that the attaching bracket may be modified, as required, to fit on other kinds of machines.

A flat leaf spring 68 is attached to the leg portion 56. The outer end of this leaf spring extends beyond the U-shaped flange 58 and is adapted to press against the underside of guide plate 36. In this way, the leaf spring retains the attaching flange 58 on the flange 37. Thus, the attachment 52 is frictionally held in position on the guide plate 36 so that the attachment may be moved horizontally to accommodate paper of different widths.

In use, as seen in FIG. 3, two of the attachments 52 are preferably provided, one for each side of the paper. The attaching flanges 58 of each are mounted on the flange 37 of the guide plate 36 as shown. The bracket 54 is shaped so that the lower end portion 70 of the plastic strip 62 engages and is flexed by the top of the stack of paper 24 in the machine 20, as shown in FIG. 2.

The resilient plastic strip 62 exerts a gentle force on the top of the stack. The strip is made with a resilience such that this force is sufficient to prevent excessive buckling of the topmost sheet due to the operation of the corner separators, while avoiding any undue drag on the sheet. With this structure, the sheet separating mechanism in the machine 20 can effectively feed single sheets of very thin paper without causing the paper to jam in the machine. When heavier sheets are to be fed, the presser attachments 52 may readily be removed from the machine.

It will be apparent that the use of the clip 66 provides a convenient means for quickly and easily replacing the plastic strip 62 when it becomes worn.

Thus, the illustrated attachment provides a simple effective way to adapt existing duplicators for use with very thin paper. With all of its advantages, the attachment is easy to manufacture and low in cost.

Various modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the invention, as exemplified in the foregoing description and defined in the following claims.

I claim:

1. In a printing machine, the combination comprising a table for supporting a stack of sheets to be fed through the printing machine, a pair of side rails on said table for engaging and positioning the sides of the stack, feed means for engaging the stack and propelling the topmost sheet forwardly therefrom, a pair of corner separators mounted on the printing machine for engaging the front corners of the stack adjacent the front ends of said rails and causing the topmost sheet of the stack to buckle at its front corners as the topmost sheet is moved forwardly by said feed means, each of said corner separators comprising a generally vertical bar in front of one front corner of the stack and a rearwardly projecting lip on the upper end of said bar and resting upon the top of one of the front corner portions of the topmost sheet in the stack, a pair of highly flexible and resilient spring strips engaging the upper side of the topmost sheet in the stack adjacent the corner separators to prevent the topmost sheet from buckling excessively and thereby jamming in the machine, each of said strips being substantially straight in its initial unflexed condition, and means rigidly supporting one end of each of said strips on said machine above said table, each of said strips extending downwardly and forwardly at an inclined angle, the lower end portion of each of said strips being resiliently flexed upwardly in its position of use into a curved shape by engagement with the topmost sheet in the stack.

2. In a printing machine, the combination comprising a table for supporting a stack of sheets to be fed to the printing machine, a pair of side rails on said table for engaging and positioning the sides of the stack, feed means for engaging the stack and propelling the topmost sheet forwardly, a guide plate inclined upwardly and rearwardly in front of and above said stack for guiding the topmost sheet through the machine, said guide plate having an upwardly projecting reinforcing flange thereon, a pair of corner separators mounted on the machine for engaging the front corners of the stack adjacent the front ends of said rails and causing the front corner portions of the topmost sheet in the stack to buckle as the topmost sheet is moved forwardly under the guide plate by said feed means, each of said corner separators comprising a generally vertical bar in front of one front corner of the stack and a rearwardly projecting lip on the upper end of said bar and resting upon the upper side of one of the front corner portions of the topmost sheet in the stack, a pair of angle-shaped brackets mounted on said guide plate adjacent said corner separators, each of said brackets having first and second leg portions, said first leg portion having a U-shaped flange thereon embracing the reinforcing flange on said guide plate, a leaf spring secured to said first leg portion and extending beyond said U-shaped flange into pressing engagement with said guide plate for adjustably securing the corresponding bracket to the guide plate, a supporting flange on said second leg portion of each bracket, highly flexible and resilient spring strips mounted on said brackets to exert downward resilient pressure on the topmost sheet adjacent said corner separators for preventing excessive buckling of the topmost sheet and thereby preventing the topmost sheet from jamming in the machine, each strip having an upper end portion formed into a flattened U-shaped flange which embraces the support flange of the corresponding bracket, and spring clips bearing against said flattened U-shaped flanges for removably clamping said strips to the corresponding brackets, each strip being initially straight in an unflexed condition and extending downwardly and forwardly at an inclined angle from the corresponding support flange, the lower end of each strip being resiliently flexed upwardly into a curved shape in its position of use by engagement with the topmost sheet in the stack.

3. In a printing machine, the combination comprising a table for supporting a stack of sheets to be fed through the printing machine, a pair of side rails on said table for engaging and positioning the sides of the stack, feed means for engaging the stack and propelling the topmost sheet forwardly therefrom, a pair of corner separators mounted on the printing machine for engaging the front corners of the stack adjacent the front ends of said rails and causing the topmost sheet of the stack to buckle at its front corners as the topmost sheet is moved forwardly by said feed means, each of said corner separators comprising a generally vertical bar in front of one front corner of the stack and a rearwardly projecting lip on the upper end of said bar and resting upon the top of one of the front corner portions of the topmost sheet in the stack, a pair of highly flexible and resilient spring strips engaging the upper side of the topmost sheet in the stack adjacent the corner separators to prevent the topmost sheet from buckling excessively and thereby jamming in the machine, each of said strips being substantially straight in its initial unflexed condition, each of said strips being made of flexible resilient resinous plastic material, and means rigidly supporting one end of each of said strips on said machine above said table, each of said strips extending downwardly and forwardly at an inclined angle, the lower end portion of each of said strips being resiliently flexed upwardly in its position of use into a curved shape by engagement with the topmost sheet in the stack.

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