March 31, 1959 M. V. SCOZZAFAVA ET AL 2,879,993

PAPER FEEDING DEVICE

Filed May 21, 1957

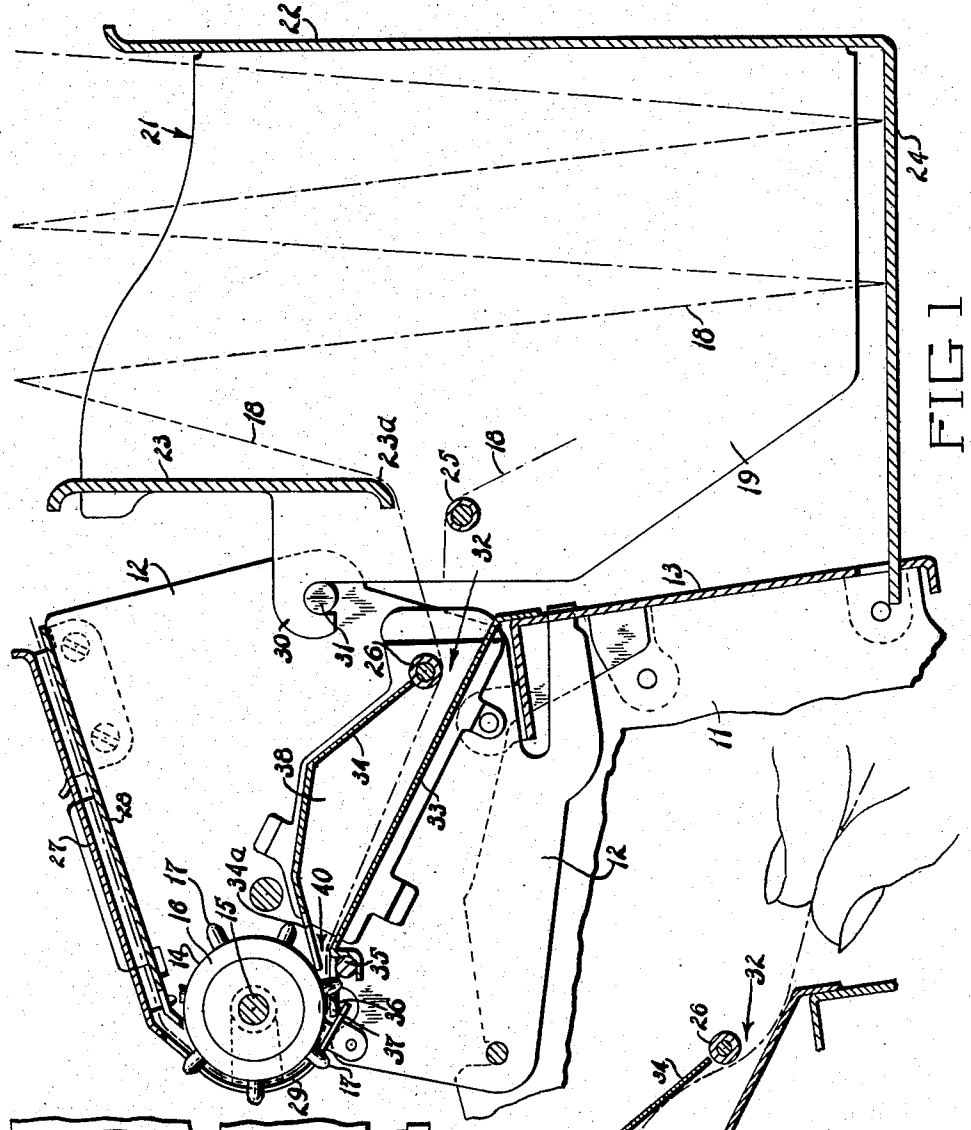

FIG 1

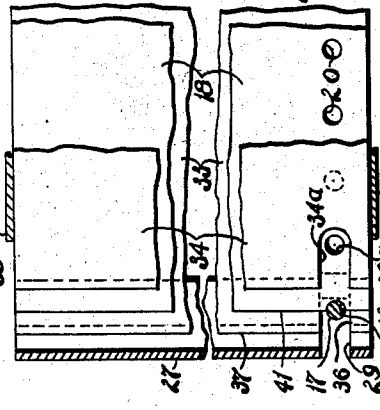

FIG 3

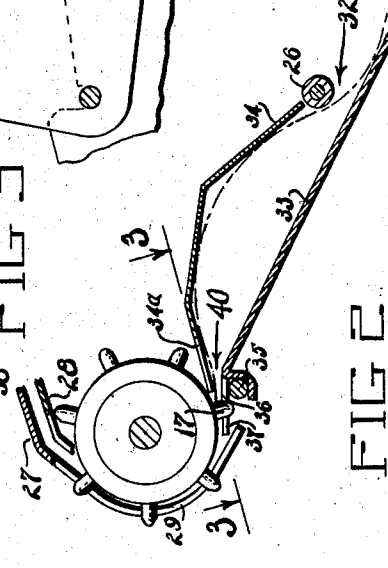

FIG 2

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PAPER FEEDING DEVICE

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3 Claims. (Cl. 271—2.1)

This invention relates to paper feeding devices for printing machines such as adding-listing machines, cash registers, accounting machines, etc., and has particular reference to feeding devices utilizing pin wheels to positively drive the paper through the machine.

In the above type of feeding devices, the paper generally has a row or rows of perforations along its length in which pins of the pin wheel engage to positively drive the paper.

Such machines generally feed the paper satisfactorily. However, trouble has been encountered in threading new lengths of paper onto the pin wheel so as to initially register the first perforation with a drive pin. This problem is aggravated if the point of insertion of the leading edge of the paper is remote from the pin wheel itself and must be suitably guided thereto.

Although threading under the above conditions may be accomplished by providing a usual narrow paper guiding trough or guide-way leading from the point of entrance to the pin wheel, a constant endwise pressure must be applied to the paper to cause its leading edge to follow one of the pins as the pin wheel is rotated so that a succeeding pin will properly fit in one of the perforations to establish driving relation. Since the paper is relatively weak in compression, it is very difficult to develop a sensitive "feel" whereby to apply the proper endwise pressure to cause the leading edge to properly follow one of the drive pins. Too much pressure tends to cause the paper to buckle in the guideway whereupon it may jam and thus not feed. Conversely, too little pressure will not cause the leading edge to follow a drive pin and thus the next drive pin will not properly register with a following perforation.

It therefore becomes a principal object of the present invention to thread the leading edge of a length of perforated paper onto the surface of a pin wheel, especially when threaded from a point remote from the pin wheel.

The foregoing object is accomplished by providing a paper guiding trough of a particular shape through which the paper is threaded onto the pin wheel. One wall of the trough is substantially flat. The other wall provides a generally concave paper guiding surface, the two walls terminating in a relatively narrow throat adjacent the pin wheel for guiding the leading edge of the paper tangentially onto the pin wheel. When the paper is fed endwise through the throat, the leading edge thereof engages the first pin on the pin wheel. Then, as the paper is further pressed inward, it buckles or bubbles, taking the general shape of the concave contour of the second wall of the trough.

Accordingly, the paper, because of its bowed shape, exerts a lengthwise yieldable pressure tending to straighten out, thereby holding the leading edge in continual engagement with one of the pins on the pin wheel. Now, as the pin wheel is rotated to complete the paper threading operation, the leading edge of the paper will follow the engaged pin until the next pin registers with the next successive perforation in the paper, even though the paper is held stationary at the point of insertion.

The manner in which the above and other objects of the invention are accomplished will be readily understood on reference to the following specification when read in conjunction with the accompanying drawings, wherein:

Fig. 1 is a sectional view through a paper feeding mechanism embodied in a business machine.

Fig. 2 is a sectional view similar to that of Fig. 1, but with parts broken away, illustrating the initial stages of a paper threading operation.

Fig. 3 is a sectional plan view taken along the line 3—3 of Fig. 2.

Referring to the drawing, the machine embodying the present invention comprises spaced side frames, one of which is shown at **11**. To the latter are suitably attached auxiliary side frames, one of which is shown at **12**. A cross brace **13** is attached at opposite ends thereof to the frames **11** and **12** to maintain them in proper spacial relation.

A platen **14** extends between the side frames **12** and is provided with a shaft **15** rotatably mounted in suitable bearings formed in the frames **12**. A pin wheel **16** of the same diameter as the platen and having a plurality of drive pins **17** thereon is suitably attached to one end of the platen.

A means (not shown) is provided to either automatically or manually advance the platen so as to advance the paper thereover into proper relationship with a printing mechanism (also not shown). For details of the manual and automatic platen advancing mechanism, reference may be had to the copending patent application of Scozzafava and Busch, Serial No. 648,354, filed on March 25, 1957, for "Platen Line Spacing Mechanism," now Patent No. 2,843,245.

A paper strip **18** having a row of pin driven perforations **20** along one side thereof (as shown in Fig. 3), is furnished in fanfold or accordion shaped form, several such folds being shown in Fig. 1.

The fanfold paper is mounted in a removable container **21** having front and back walls **22** and **23**, respectively, side walls **19**, and a bottom wall **24**. The forward wall **23** extends only part way, leaving an opening to permit the paper to be withdrawn forwardly from the interior of the container either beneath a curved lower edge **23***a* of the wall **23** or over a roller **25** extending between the side walls of the container.

The paper thereafter passes under a second roller **26** and then extends around the combined platen and pin wheel and emerges through a narrow chute comprising two closely spaced parallel guide walls **27** and **28**. The upper wall **27** is curved downwardly around a substantial portion of the periphery of the platen and pin wheel, but is spaced therefrom sufficiently to allow the paper to pass freely thereunder. A slot is provided in the wall, through which the drive pins **17** pass.

The container may be readily removed for replacement of paper or for threading. For this purpose, the side walls of the container are formed into hooks, like hook **30**, engageable with studs **31** attached to the side frames **12**.

The paper, upon emerging from the container **21**, passes into a point of entrance **32** formed partly by the roller **26** and then extends through a peculiarly shaped threading guide chute before moving over the pin wheel and platen.

The threading chute comprises a substantially flat wall **33** and a generally curved second wall **34**, the latter being provided at its forward edge with a slot **34***a* to permit passage of the pins **17**.

The wall **33** rests at its upper end on a cross rod **35** extending between the side frames **12**. A slot **36** is

formed in the forward edge 37 of the wall 33, and the portion removed to form the slot is bent to underlie the rod 35. The lower end of the wall member 33 is bent to fit over the lateral cross brace 13.

The walls 33 and 34 are suitably attached to side plates, one of which is shown at 38, which in turn are suitably attached to the side frames 12 to edge guide the paper strip as it passes through the threading chute.

The upper wall 34 is shaped to form a generally concave paper guiding surface which converges at its upper end with the wall 33 to form a narrow throat 40 extending substantially tangentially toward the periphery of the pin wheel 16 so as to guide the leading edge of the paper thereon. The lower end of the wall member 34 terminates directly adjacent the roller 26.

In threading the paper, the container 21 is removed by unhooking the same from the studs 31. The leading edge of the paper is then passed through the opening or mouth 32 and into the threading chute. Since the paper tends to maintain a relatively straight endwise shape, it may be forced through the chute from a point outside the opening 32, permitting the walls 33 and 34 to generally guide the leading edge through the throat 40 and into engagement with a pin of the pin wheel positioned adjacent the throat. Further inward pressure against the paper causes it to bow as it assumes substantially the form shown in Fig. 2. It will be seen that the shape of the wall 34 is such that the paper may bow to a limited extent only and will not tend to buckle back upon itself and thereby lose its endwise stiffness. Also, when completely bowed, the paper will form a smooth curve wherein the leading edge portion extends substantially tangentially therefrom and through the throat 40.

When so inserted, the outer portion of the paper may be held stationary while the leading edge thereof exerts a light endwise pressure against the nearest drive pin due to its inherent resiliency. The paper thus tends to staighten out even though it has not been inserted so far as to completely bow into the position shown in Fig. 2. Accordingly, when the platen and pin wheel are rotated clockwise, the leading edge of the paper will follow the engaged drive pin until the next pin engages in the next perforation whereupon a positive driving relation is established. The container is then replaced, permitting the paper to follow the path shown in Fig. 1.

The leading edge 41 of the paper is preferably formed, as shown in Fig. 3, with a partial pin perforation 42 regularly spaced from the first whole perforation 20*a* and arranged to engage the surface of the nearest drive pin 17 extending from the pin wheel.

Although we have described our invention in detail in its preferred form and have therefore utilized certain specific terms and languages herein, it is to be understood that the present disclosure is illustrative rather than restrictive and that changes and modifications may be made without departing from the spirit or scope of the claims appended hereto. For example, the wall member 33 may be formed to present a slightly convex paper guiding surface to assist in causing the paper within the threading chute to assume its bowed shape.

Having thus described the invention, what we desire to secure by United States Letters Patent is:

1. A paper feeding device for a printing machine or the like in which a paper having regularly spaced pin holes therealong is fed by a pin wheel engageable in said holes, comprising first and second spaced walls forming a threading chute, said walls terminating in a guide throat extending adjacent the periphery of said pin wheel, said

walls forming an entrance mouth at a point remote from said throat, said second wall presenting a generally concave paper guiding surface terminating in a portion extending substantially tangent to the periphery of said pin wheel, said walls being effective to guide said paper into an endwise bowed shape when forced into said chute whereby said paper will tend to straighten out and thereby exert a yielding force to maintain its leading edge against a pin on said pin wheel during rotation of said pin wheel, said first wall presenting a guiding surface effective to prevent said paper from bowing away from said second wall, the length of said concave paper guiding surface approaching a distance equal to the straight line distance between said mouth and said throat plus the spacing between adjacent ones of the pins on said pin wheel.

2. A paper threading device for a printing machine or the like in which a paper having regularly spaced pin holes therealong is fed by a pin wheel engageable in said holes, comprising first and second spaced walls forming a threading chute, said walls terminating adjacent said pin wheel in a guide throat, said walls forming an entrance mouth at a point remote from said pin wheel, said first wall presenting a paper guiding surface located substantially in a flat plane, said second wall terminating adjacent said pin wheel in a portion extending substantially tangent to the periphery of said pin wheel and said second wall presenting a substantially concave paper guiding surface effective to guide said paper into an endwise bowed shape when forced into said chute whereby said paper will tend to straighten out and thereby exert a yieldable force to maintain its leading edge against a pin on said pin wheel during rotation of said pin wheel, the length of said concave paper guiding surface approaching a distance equal to the straight line distance between said mouth and said throat plus the spacing between adjacent ones of the pins on said pin wheel.

3. In a paper threading device for a printing machine or the like in which a paper having regularly spaced pin holes therealong is fed by a pin wheel engageable in said holes, comprising first and second spaced walls forming a threading chute, said walls forming an entrance mouth at a point remote from said pin wheel, said first wall terminating adjacent said pin wheel and presenting a paper guiding surface located substantially in a flat plane, said second wall terminating adjacent said pin wheel and presenting a substantially concave paper guiding surface effective to guide said paper into an endwise bowed shape when forced into said chute whereby said paper will tend to straighten out and thereby exert a yielding force to maintain its leading edge against a pin on said pin wheel during rotation of said pin wheel, the portion of said second wall which terminates adjacent said pin wheel extending substantially tangent to the periphery of said pin wheel, the length of said concave paper guiding surface approaching a distance equal to the straight line distance between said mouth and said end of said second wall adjacent said pin wheel plus the spacing between adjacent ones of the pins on said pin wheel.

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