

Dec. 24, 1968

W. W. HANNON ETAL

3,417,987

DOUBLE-ACTING FINGER MECHANISM FOR PRIMARY FOLDING STATION
OF NEWSPAPER FOLDING AND WRAPPING MACHINE

Filed July 18, 1966

2 Sheets-Sheet 1

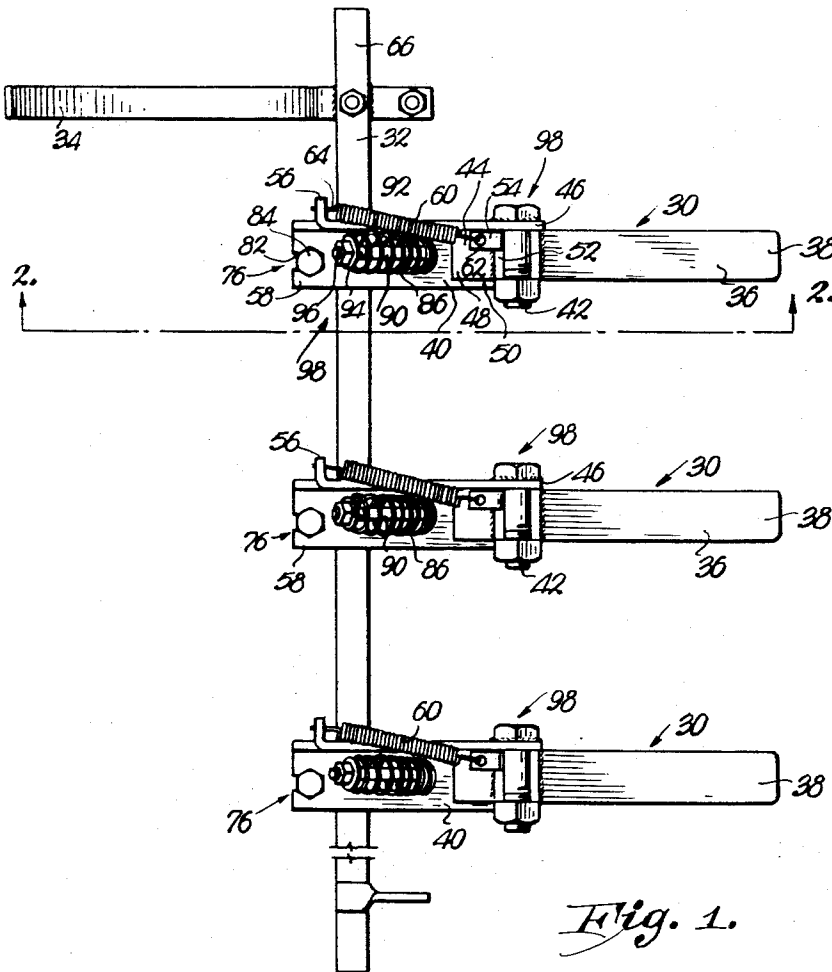


Fig. 1.

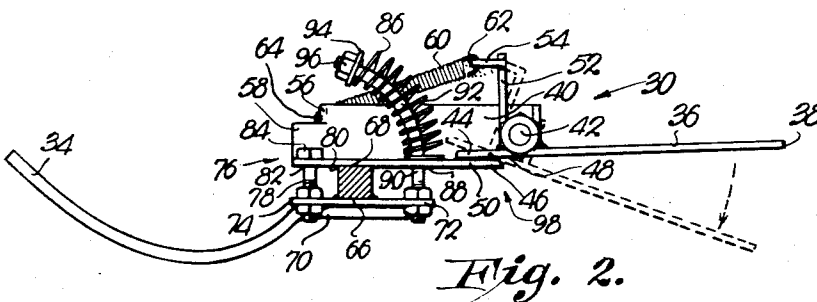


Fig. 2.

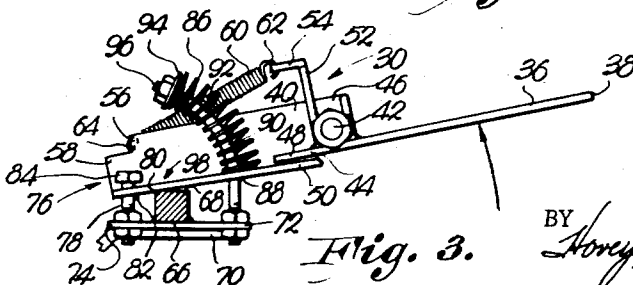


Fig. 3.

INVENTORS
Warren W. Hannon
Charles N. Hannon

BY *Hovey, Schmidt, Johnson & Hovey*
ATTORNEYS

Dec. 24, 1968

W. W. HANNON ETAL

3,417,987

DOUBLE-ACTING FINGER MECHANISM FOR PRIMARY FOLDING STATION
OF NEWSPAPER FOLDING AND WRAPPING MACHINE

Filed July 18, 1966

2 Sheets-Sheet 2

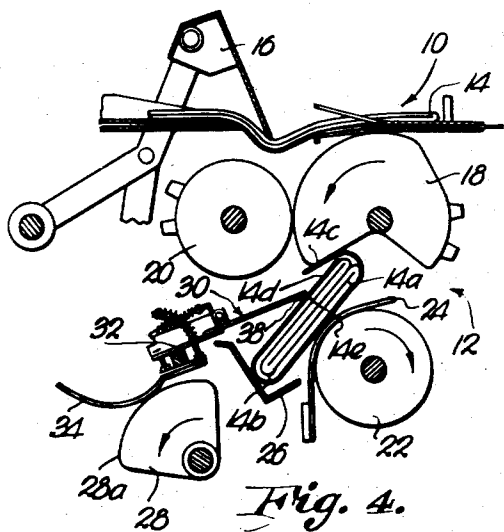


Fig. 4.

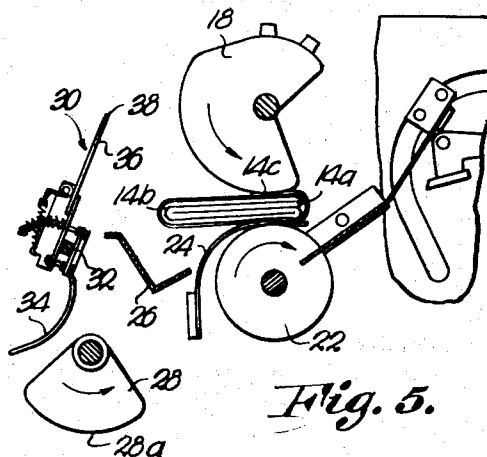


Fig. 5.

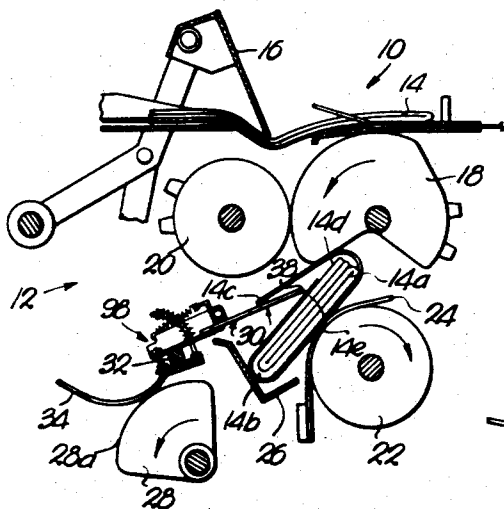


Fig. 6.

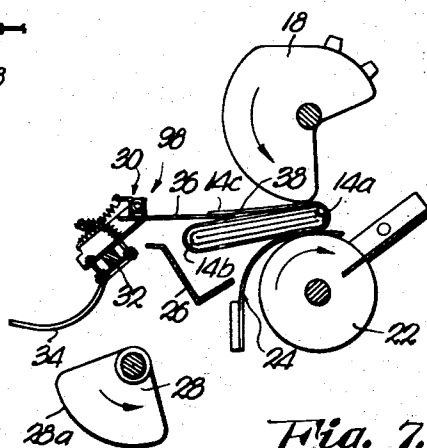


Fig. 7.

INVENTORS
Warren W. Hannon
Charles N. Hannon

BY
Henry Schmidt Johnson & Henry
ATTORNEYS

1

2

3,417,987

DOUBLE-ACTING FINGER MECHANISM FOR PRIMARY FOLDING STATION OF NEWS- PAPER FOLDING AND WRAPPING MACHINE

Warren W. Hannon, 501 S. Chestnut, Olathe, Kans.
66061, and Charles N. Hannon, Olathe, Kans.; said
Charles N. Hannon assignor to said Warren W.
Hannon

Filed July 18, 1966, Ser. No. 565,913

3 Claims. (Cl. 270—61)

ABSTRACT OF THE DISCLOSURE

In a newspaper folding and wrapping machine, a presser finger is provided having two spaced pivotal joints that permit the free end of the finger to move either toward or away from a folded, composite newspaper unit which such end engages during operation of the machine. The two sections of the finger thus formed are yieldably biased in opposite directions against stops which normally prevent movement of the finger under either biasing force.

The instant invention relates to apparatus for folding and tying individual newspapers and particularly relates to the combination with such apparatus of double-acting finger mechanism for maintaining a folded paper, with or without a wrapper therearound, in a folded condition to insure proper further wrapping even if the paper is improperly folded at the first folding station, or the trailing edge of a wrapper around the folded paper is excessively long.

In the folding machine shown in U.S. Patent No. 3,161,000, newspapers to be folded are sequentially removed from a hopper therefor, directed onto a folding platform, folded in half by a tucker blade and transferred to support therefor where a series of notched wheels are employed to engage the upper edge of the folded paper and turn the paper for movement to a further processing station of the machine. A series of spring biased, cam controlled presser fingers are employed in conjunction with the notched wheels to maintain the once folded paper in proper folded configuration until the notched wheels can engage, commence turning and shift the paper toward the next station. The machine of the above patent also has structure for placing a protective wrapper about the paper and which is directed under each paper as it is conveyed to the first folding station. The wrapper is normally larger than the paper before folding so that a trailing edge is left after the first fold is formed in the paper, to provide a tail which may be folded over the exposed edge of the once folded paper to increase the moisture integrity of the final wrap. The notched wheels previously mentioned operate to fold the trailing edge of the wrapper over the once folded paper and as the presser fingers function to hold the paper in folded condition and the wrapper against the paper.

It can be appreciated that if the wrapper is somewhat longer than normal, is not properly moved under the paper as it is directed to the first folding station or is not properly aligned with the paper for any other reason, a trailing edge can be left which is of such length that upon folding of such edge over the paper by the notched wheels, the wrapper trailer is also folded down over the presser fingers and prevent the same from returning to normal under the spring bias thereon. Since the fingers are not permitted to return to standby, the next folded paper directed downwardly by the tucker blade ultimately engages the presser fingers and causes a jam-up of the folded papers since the presser fingers are never allowed to return to normal until the machine has been stopped and

cleared. This obviously is an unsatisfactory arrangement in regard to the equipment, the use of which is justified mainly on the saving of time and manpower.

A related problem can also occur when an accessory newspaper hopper of the type shown in U.S. Patent No. 3,255,569 is used in conjunction with the machine of U.S. Patent No. 3,161,000. In this instance only one third of the newspaper is folded over the remainder thereof and the notched wheels then operate to fold the trailing third of the paper over the initial folded part thereof. Again the presser fingers serve to hold the paper in folded condition until the notched wheels can complete the initial folding operation. If the transfer of a paper from the accessory hopper is improper, or if the first fold is not formed in exactly the right manner, the trailer of the once folded paper can be, under certain circumstances, sufficiently long to be folded over the presser fingers before they can return under the spring pressure thereon as previously described and cause a jam-up of the machine as subsequent papers are first folded and then directed toward the support trough associated with the notched wheels and presser fingers.

Even in those instances where folding apparatus of the general type shown in U.S. Patent No. 3,161,000 is used to fold a newspaper in thirds rather than in half (a function of the disposition of the newspaper stops on the first folding station tucker blade platform), the problem of jamming of the machine can occur if the trailer after initial folding is long enough to be folded over in trapping relationship to the presser fingers upon operation of the notched wheels to further fold the paper.

It is, therefore, the primary object of this invention to provide improved presser finger structure for use on newspaper folding machines of the general type shown in the above referenced patents and which will not be held by the trailer of the newspaper or wrapper if it is too long after initial folding of the paper to thereby preclude jamming of the machine or damage to the papers.

Another important object of the invention is to provide improved presser finger structure for holding the paper in folded condition, with or without a wrapper thereover, until the notched wheels previously described can function, and wherein the fingers are capable of providing proper pressure on the folded paper during normal operation of the machine but which will flex in the opposite direction if they become trapped under a paper or wrapper trailer, to an extent to cause the fingers to be withdrawn from under such trailer during continued operation of the machine and thereby precluding jamming of the mechanism even under adverse operating conditions.

As a corollary to the foregoing object, it is an important aim of the instant invention to provide such a finger having a pair of oppositely bending knuckles and springs for yieldably biasing the knuckles into a normal position to the end that the finger will yield to a force applied on either side thereof and then return to its normal position after the force is removed.

In the drawings:

FIGURE 1 is a plan view of a plurality of our novel fingers and the mechanism for mounting the fingers in a manner to employ the concepts of the instant invention;

FIG. 2 is an elevational view taken along line 2—2 of FIG. 1, using dashed lines to illustrate the action of the fingers in response to a downward force applied at the end of a respective finger;

FIG. 3 is an elevational view similar to FIG. 2 but illustrating the action of the fingers in response to an upward force applied at the end of a respective finger;

FIGS. 4 and 5 are elevational views on reduced scale of the pertinent portions of a paper-handling machine finishing the folding of a wrapper around a folded composite unit under normal conditions; and

FIGS. 6 and 7 are elevational views similar to FIGS. 4 and 5 illustrating the action of the finger after having been overlapped.

The numeral 10 broadly designates the folding station of a paper-handling machine which operates substantially in the manner disclosed in U.S. Patent No. 3,161,000. Although not shown in the drawings hereof but clearly illustrated in the above patent, a hopper for receiving a plurality of newspapers in stacked relationship is provided in association with folding structure 12 provided at station 10. A newspaper 14 having a number of leaves is shown positioned on the platform of station 10 in disposition to be folded in half by tucker blade assembly 16. Structure 12 in addition includes a set of horizontally spaced notched wheels 18 serving as folding cams, a set of rollers 20, a series of rollers 22, guide fingers 24, and a folded newspaper receiving trough 26.

The machine is also preferably capable of delivering a protective wrapper leaf designated 14c to the station 10 in underlying relationship to the leaves of the newspaper 14, and to ensure full protection for the paper. The wrapper is somewhat larger to provide a trailer which is wrapped over the exposed edge of the once folded paper by notched wheels 18 as is apparent from FIGS. 4 and 6. The cams 18, as they continue rotating, transfer the unit 14a away from the folding station 10 as can be seen in FIG. 5. The foregoing components and their mode of operation are completely and adequately disclosed in U.S. Patent 3,161,000 and it is believed that further description in this specification is unnecessary.

Finger means in the nature of a series of presser fingers 30 are provided adjacent structure 12 for contacting the face 14d of the folded unit 14a at a zone of contact 14e spaced from the fold 14b for maintaining the unit 14a in folded condition by pressing the unit 14a against the guides 24 while structure 12 operates to fold the trailer of wrapper 14c over face 14d. Fingers 30 are carried on a mechanism in the nature of a shaft 32 for movement between a standby position as shown in FIG. 5 and an operative position shown in FIG. 4.

Shaft 32 has an arm 34 thereon disposed for engaging a cam surface 28a on a cam 28 and the shaft 32 is rotated clockwise whenever cam 28 is rotated to cause surface 28a to contact arm 34. Thus, the fingers 30 are moved positively into contact with zone 14e.

Each finger 30 has a length 36 with a free end 38 positioned to engage zone 14e of unit 14a and an elongated element 40. A hinge pin 42 is provided for swingably mounting the other end 44 of length 36 on one terminus 46 of element 40. Length 36 is swingable about pin 42 in a vertical plane, viewing FIGS. 2 and 3.

First stop means in the nature of a tab 48 on one end 44 of length 36, and a shelf 40 on terminus 46 of element 40 cooperate for preventing the length 36 from swinging about pin 42 in a counterclockwise direction beyond the solid line position shown in FIG. 2. An arm 52 extends upwardly and perpendicularly from length 36 presenting a free end 54 while an ear 56 is provided on element 40 at the other terminus 58 thereof. Coil spring 60 has one end 62 thereof attached to end 54 and the other end 64 of spring 60 is attached to ear 56. Thus, it can be seen, viewing FIG. 2, that the length 36 is yieldably biased about pin 42 in a counterclockwise direction with tab 48 engaging shelf 50.

Shaft 32 is elongated and transversely square, thereby presenting a pair of opposed faces 66 and 68, and an oblong plate 70 is provided for each finger 30 on shaft 32. Plate 70 has a pair of extremities 72 and 74 and is disposed to extend laterally of shaft 32 with face 66 of the latter being connected to plate 70 between extremities 72 and 74 thereof. An element 40 is disposed in contact with face 68 in spaced relationship with respect to a plate 70 and extends substantially parallel therewith.

Second stop means 76, including a rod 78, is provided for limiting the clockwise rotation of element 40 about a

fulcrum 80 provided by the interengagement of element 40 and face 68 of shaft 32. Rod 78 extends from extremity 74 of plate 70 and toward the terminus 58 of element 40. An aperture 82 in terminus 58 receives rod 78, and a head 84 on rod 78 is disposed to engage terminus 58 adjacent aperture 82.

Bias means in the nature of a compression spring 86 is provided for biasing the element about fulcrum 80 in a clockwise direction as can be seen in FIG. 3. Element 40 has an opening 88 therein adjacent terminus 46. An elongated spring guide 90 extends from extremity 72 of plate 70 through opening 88 and has an arcuate portion 92. Portion 92 has a keeper 94 at the free end 96 thereof, and spring 86 extends coaxially with the portion 92 between keeper 94 and element 40. Thus, it can be seen that spring 86 biases element 40 in a clockwise direction around fulcrum 80 until head 84 contacts terminus 58 of element 40 thereon adjacent aperture 82 therein.

Finger 30 when considering its action with respect to shaft 32 thereby presents a pair of yielding knuckles 98, one of which breaks in a clockwise direction, while the other breaks in a counterclockwise direction. The action provided by the knuckles 98 allows the outer finger member or length 36 of the finger 30 to be withdrawn from between wrapper 14c and zone 14e of the folded newspaper if the trailer of wrapper 14c is of sufficient length to tend to trap the finger member 36 thereunder as the wrapper 14c is folded over the face 14d by structure 12 (FIGS. 6 and 7).

It is to be noted that the end 38 of length 36 is swingable in a plane perpendicular to face 14d about the axis of pin 42 and about the axis of fulcrum 80 for respectively escaping from beneath the trailer of wrapper 14c if the latter is sufficiently long to tend to trap end 38 thereunder, and for preventing stressing of the shaft 32 when the end 38 is engaged with zone 14e of the folded unit 14a.

Although the detailed description above has been restricted to use of the improved presser fingers 30 and structure for operating the same, it is to be understood that the improved presser fingers have important usage as well in the folding of newspapers in thirds and wherein there is a possibility of the trailing portion of each of the papers being folded over the presser fingers.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a paper handling machine for folding a plurality of paper sheets in stacked relationship into a composite unit of greater thickness and including structure at a folding station for folding said stack along a line of fold causing a portion of at least one of the sheets to extend beyond one edge of the folded unit, thereafter folding said portion over said edge of the unit into overlying relationship thereto, and then transferring the folded unit away from said station, the combination with said structure of:

a finger member positioned to engage said folded unit at a zone of contact thereon spaced from said line of fold for maintaining said unit in folded condition as said portion is folded over said edge;

means mounting said finger member for movement in a plane generally perpendicular with respect to said folded unit and in a direction to effect withdrawal of the finger member from beneath said portion if the latter is of sufficient length to tend to trap the finger member thereunder as the portion is folded over said edge into said overlying relationship to the unit by said structure during operation thereof;

means coupled with said finger member and yieldably biasing the latter in the opposite direction; and

stop means on said mounting means and said finger member for preventing the latter from moving in said opposite direction under the action of said biasing means beyond a predetermined normal position of the finger member.

2. In a paper machine for folding a plurality of paper leaves in stacked relationship into an at least doubly thick composite unit and having structure at a folding station for folding said leaves along a line of fold leaving a portion of at least one leaf extending beyond the folded unit, thereafter folding said portion into overlapping relationship with respect to said folded unit, and then transferring the folded unit away from said station, the combination with said structure of:

finger means having a length with a free end positioned to engage said folded unit at a zone of contact thereon spaced from said line of fold for maintaining said unit in folded condition while said structure operates to fold said portion into said overlapping relationship, and a support element provided with first pivot means mounting the other end of said length for swinging of the latter about a first axis and in a plane generally perpendicular with respect to said folded unit;

first means yieldably biasing said length to cause the latter to tend to swing on said element and away from said folded unit;

first stop means on said length and said element for preventing said length from swinging on said element, in response to the force exerted thereon by the first bias means, beyond a certain point;

mechanism provided with second pivot means mounting said element for swinging movement in said plane about a second axis spaced from said first axis;

second means yieldably biasing said element to cause the latter to tend to swing on said mechanism and toward said folded unit; and

second stop means on said element and said mechanism for preventing said element from swinging on said mechanism, in response to the force exerted thereon by the second bias means, beyond another certain point, whereby said one end is swingable in said plane about two separate axes for respectively escaping from beneath the portion if the latter is sufficiently long to tend to trap said one end thereunder and preventing stressing of said mechanism when said one end is engaged with said folded unit.

3. The invention of claim 2, wherein said mechanism includes an elongated, transversely square shaft presenting a pair of opposed faces and an oblong plate having a pair of extremities and extending laterally of said shaft, one of said faces being connected to said plate between the extremities of the latter, said element being elongated and disposed in contact with the other of said faces in

spaced relationship with respect to said plate and extending substantially parallel with respect to the latter,

said first pivot means including a hinge pin mounting said length on said element, said first stop means including a tab on said other end of the length and a shelf on one terminus of said element adjacent said pin disposed to engage said tab as the length is swung about said pin by said first bias means,

said first bias means including an arm extending laterally from said length, a coil spring with one end thereof attached to the free end of said arm, and ear means connecting the other end of said spring to said element,

said second stop means comprising a rod extending from one extremity of said plate and toward the other terminus of said element, said element having an aperture therein at said other terminus receiving said rod, said other face of said shaft presenting a fulcrum for said element to swing about in response to the force exerted thereon by said second bias means to define said second pivot means, there being provided a head on said rod disposed to engage said other terminus adjacent said aperture as the element is swung about said fulcrum by said second bias means,

said second bias means having an elongated spring guide with an arcuate portion extending from the other extremity of said plate and toward said element, said element having an opening therein receiving said guide with the arcuate portion disposed on the opposite side of said element from said plate, there being provided a keeper on the free end of said arcuate portion and an arcuately extending compression spring disposed coaxially with respect to said portion and extending between said keeper and said element.

References Cited

UNITED STATES PATENTS

3,161,000 12/1964 Hannon et al. ----- 53—120

EUGENE R. CAPOZIO, *Primary Examiner.*

P. V. WILLIAMS, *Assistant Examiner.*

U.S. Cl. X.R.

53—120; 270—45