

Feb. 20, 1940.

W. S. CLOUD

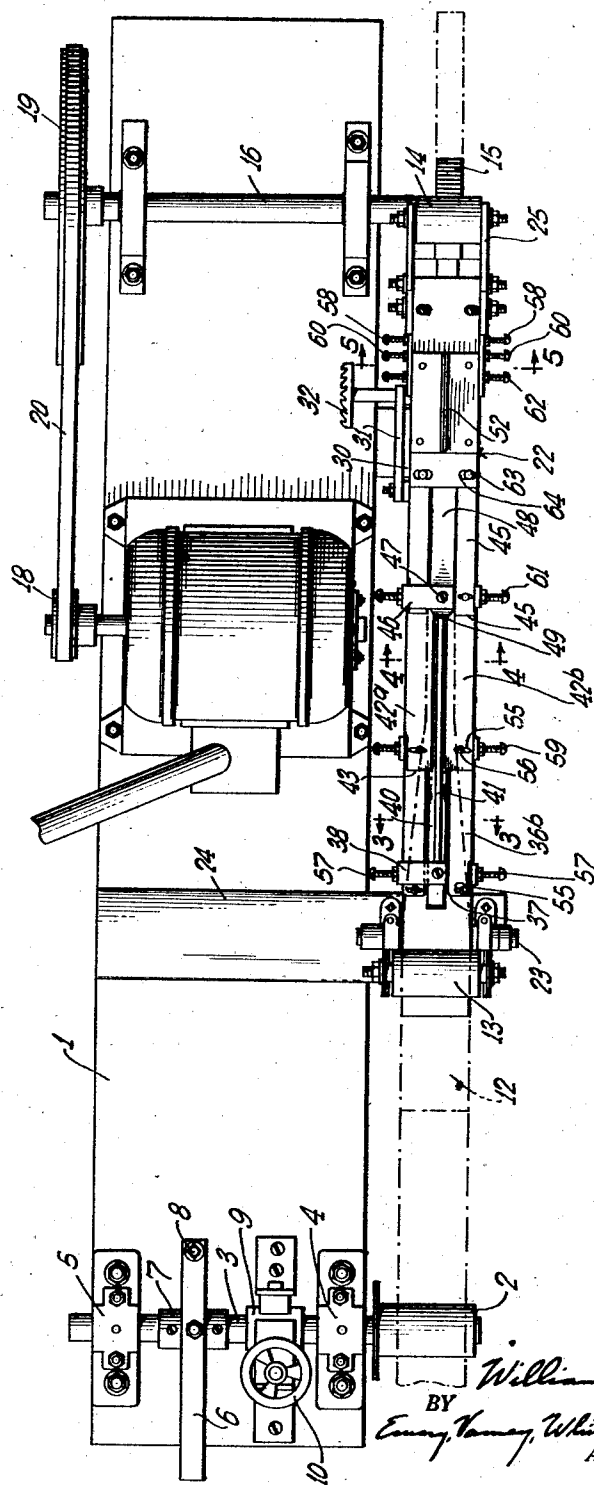
2,190,823

METHOD AND APPARATUS FOR FOLDING STRIPS OF PAPER AND THE LIKE

Filed June 15, 1937

2 Sheets-Sheet 1

Fig. 1.



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2 Sheets-Sheet 2

Fig. 6.

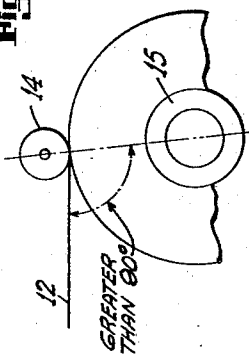


Fig. 2.

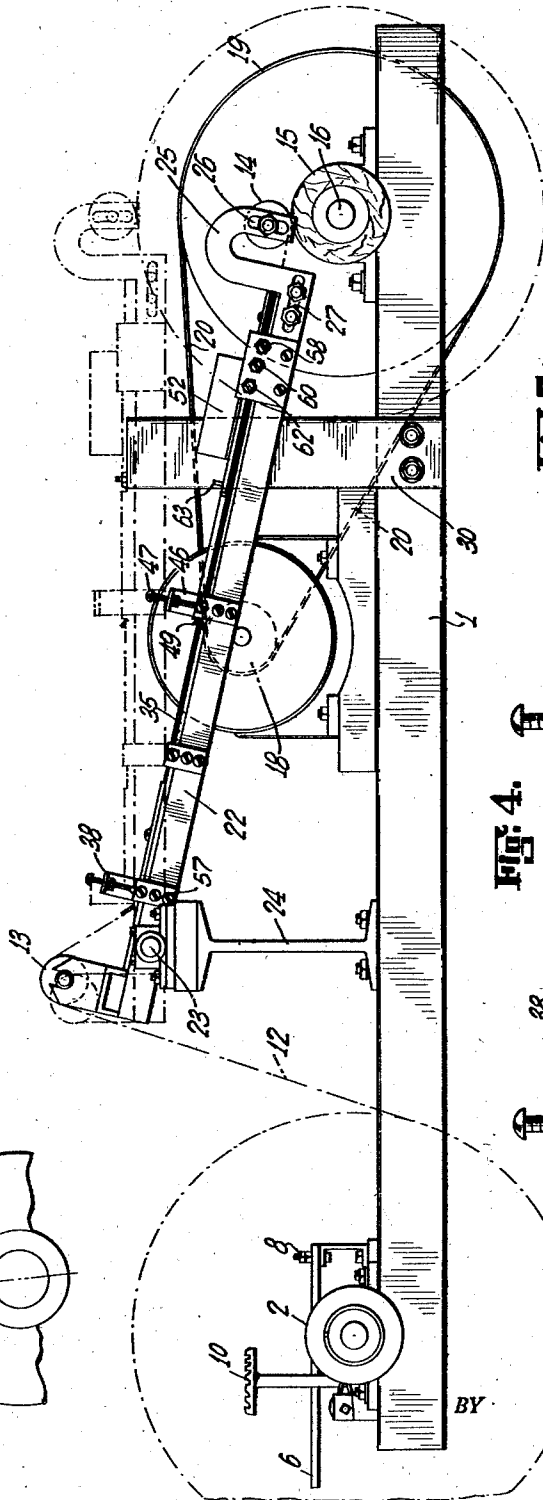


Fig. 4.

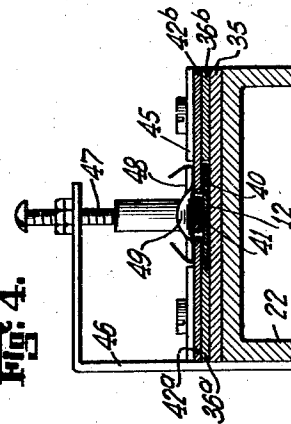


Fig. 5.

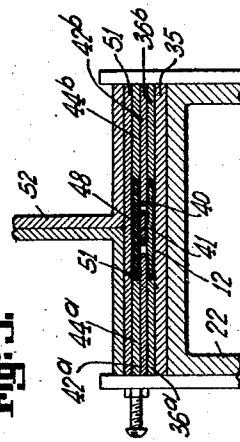
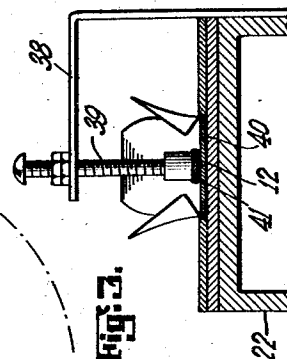


Fig. 3.



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METHOD AND APPARATUS FOR FOLDING
STRIPS OF PAPER AND THE LIKE

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Application June 15, 1937, Serial No. 148,261

10 Claims. (Cl. 270-93)

This invention relates to machines for continuously folding a paper strip to form a longitudinally folded or pleated strip.

It is an object of the invention to provide a machine which may be operated at high speed; which may be easily adjusted to accurately position the folds; which may be easily cleaned to remove accumulations of ink and paper; and which will form a tightly wrapped reel of folded material which may be used subsequently in other machines.

Other objects and advantages of the invention will appear hereinafter.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawings, in which:

Figure 1 is a top plan view.

Figure 2 is a front elevation.

Figures 3, 4 and 5 are transverse sections on the lines 3-3, 4-4 and 5-5 respectively of Figure 1, and

Figure 6 is a diagram.

Referring to the drawings, the machine may be conveniently mounted on a table 1. At one end of the table a supply spool 2 carrying a reel of paper to be folded is mounted on shaft 3 supported in journals 4 and 5. The shaft 3 is slidable longitudinally in said journals and may be controlled by lever 6 connected to sleeve 7 and pivoted at 8 to adjust the supply reel to feed the paper properly. A brake band 9 surrounds shaft 3 and variable braking pressure may be applied by adjusting the hand wheel 10, so that the tension applied to the paper strip may be adjusted as desired.

The paper strip 12 from the spool 2 is led over idler roller 13, through the folding dies herein-after described, and the folded strip then passes under idler roller 14 to a winding spool 15 on which a reel of folded paper is wound. The winding spool 15 is carried on shaft 16 which is driven by motor 17 in any suitable manner as by pulleys 18 and 19 and belt 20.

The folding dies are mounted on an arm 22 preferably in the form of an inverted channel pivoted at 23 on the standard 24. The idler roller 13 is mounted near the pivoted end of the arm 22 and the roller 14 is supported on U-shaped brackets 25 at the free end of the arm 22, the arrangement being such that a substantial portion of the weight of the arm is carried by the roller 14 resting on the spool 15 or the folded strip reeled thereon. It will be noted, moreover, that the arm 22, being pivoted can

adjust itself to the increasing size of the reel as the folded strip is wound.

The position of the roller 14 is adjustable in the slots 26 formed in the brackets 25 and is preferably so adjusted that the folded strip emerging from the forming dies moves in a straight line to engage the periphery of the roller.

Preferably the length of the arm 22 is so adjusted and the position of the pivot 23 is so selected that in all positions of the arm as the reel increases in size, the folded paper emerging from the folding dies first engages the roller 14 then follows the periphery of the roller a short distance, being gradually pressed between the roller and the preceding layers of reeled paper until it passes the point of tangency between the roller and the reel. In other words, the strip engages the roller at a point in advance of the point of tangency between the roller and the reel. It is found that better and more tightly wound reels can be formed in this manner than when the strip engages the reel at a point in advance of the point of tangency between the roller and the reel. Furthermore it will be understood that in order to maintain this condition as the reel increases in size, the angle between the plane of the strip to be wound and a line connecting the axes of the roller 14 and the reel must always be greater than 90°. This is illustrated in the diagram Figure 6.

The effective length of the arm 22 may be readily adjusted for this purpose by shifting the brackets 25, the adjusting slots 27 being provided for this purpose.

If desired a fixed standard 30 may be secured to the table 1, extending vertically through a slot between the arm 22 and an adjustable clamp 31 operated by the hand wheel 32. The standard 30 serves primarily to guide the arm 22 to prevent sidewise movement thereof, but if the clamp 31 is pressed against the standard it serves to increase the pressure of the arm against the reel and thus increases the tightness of the winding. The clamp is also used to support the arm when changing reels.

The arrangement of the folding dies is best shown in Figures 3, 4 and 5. Secured to the arm 22 is a bed plate 35, above which are mounted two spaced strips 36a and 36b which extend from their leading edges 37 the full length of the arm. Starting at approximately the same point and supported on bracket 38 by bolt 39 is a strip 40 located between strips 36a and 36b and spaced therefrom. Secured to the top of the strip 40 near its forward end is a narrower strip or

tongue 41, and both the strips 40 and 41 extend from the bracket 38 the full length of the arm.

Starting at a point somewhat further along the arm are another pair of strips 42a and 42b, overlying the strips 36a and 36b, and lying opposite strip 41 but spaced therefrom. The leading edges of these strips are shown at 43, and the strips extend from this point the full length of the arm.

Starting at a point still further along the arm are another pair of strips 44a and 44b, overlying the strips 42a and 42b. The leading edges of these strips are shown at 45 and the strips extend from this point the full length of the arm.

Starting at approximately the same point and supported on bracket 46 by bolt 47 is a strip 48 located between strips 44a and 44b and spaced therefrom. The leading edge of this strip is shown at 49, and the strip extends from this point the full length of the arm.

Finally a plate 51 overlies the rear ends of all of the strips, this plate being weighted by angle irons 52.

The plates 36a and 36b, 42a and 42b and 44a and 44b are all provided with transverse slots 55 registering with screws 56 which are threaded into the arm to hold the strips against longitudinal movement but to permit lateral adjustment. Each of said strips is provided with an adjusting screw at each end of the strip by means of which the strips may be adjusted laterally. Thus screws 57 are provided for adjusting one end of the strips 36a and 36b, while screws 58 are provided for adjusting the other ends. Similarly screws 59 adjust one end of strips 42a and 42b and screws 60 adjust the other ends. Screws 61 adjust one end of strips 44a and 44b, and screws 62 adjust the other ends.

The strips 40, 41 and 48 are floating strips, in that they are secured only at their forward ends and their trailing ends are free to adjust themselves as necessary.

Plate 51 is held in position by studs 63 mounted in the arm and passing through slots 64 in the plate. The strips beneath the plate 51 are also provided with slots, of course, to accommodate the studs 63.

It will be observed that all of the side strips or plates 36a and 36b, 42a and 42b, 44a and 44b and the floating strips 40, 41 and 48 and the plate 51 are individually removable from the arm for cleaning. This is of considerable advantage in the practical operation of the machine because lint and ink scraped from the paper as it passes through the plates sometimes accumulates and must be removed from time to time for proper operation of the machine.

The manner in which the strip is folded is illustrated in Figures 3, 4 and 5, showing the successive reverse folds formed to provide a folded or pleated strip.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

I claim as my invention:

1. A machine for folding paper or the like, comprising in combination, a plurality of staggered folding strips on each side of a center line of movement for a strip of paper to be folded, and a plurality of floating strips yieldably mounted for vertical movement held at their forward ends between said staggered strips.

2. A machine for folding paper or the like, comprising in combination, a plurality of staggered folding strips on each side of a center line

of movement for a strip of paper to be folded, and a plurality of floating strips held at their forward ends between said staggered strips, said side strips resting loosely upon each other and being progressively shortened from the lower strips to the upper strips.

3. A machine for folding paper or the like, comprising in combination, a plurality of staggered folding strips on each side of a center line of movement for a strip of paper to be folded, a plurality of floating strips held at their forward ends between said staggered strips, studs upon which said side strips are mounted for free movement toward and from the center line, and adjusting means at the ends of said strips for limiting their outward movement.

4. A machine for folding paper or the like, comprising in combination, a bottom plate, a first pair of side plates approximately as long as said bottom plate and resting thereon, a first floating center plate disposed between said first side plates and resting on said bottom plate, a second pair of side plates resting on the first pair, said second pair of plates being closer together than the first pair, a second floating center plate disposed between said second pair of side plates and resting on the first floating center plate, a third pair of side plates resting on the second pair, said third pair of plates being spaced as far apart as the first pair, a third floating center plate disposed between said third pair of side plates and resting on the second center plate, and a weighted plate resting on said third pair of side plates and third center plate, said sets of side and center plates being progressively shorter from the bottom to the top but terminating at substantially the same point at the outgoing end.

5. A machine for folding and winding paper, comprising in combination, a swingable arm, a supply spool, a winding spool adjacent the free end of said arm, folding means disposed longitudinally of said swinging arm, and a presser member mounted on the free end of said arm and resting on said winding spool to crease the folds in the paper.

6. A machine for folding and winding paper, comprising in combination, a winding spool, a supply spool, means to apply a drag on said supply spool, means to drive said winding spool to wind a folded strip of paper thereon, and a swinging arm disposed between said spools and having its free end resting on said winding spool but engaging the strip of paper between said spools, and folding means disposed longitudinally of said swinging arm.

7. The method of folding and winding paper or the like, comprising in combination, forming folds in the edges of a strip of paper, winding said folded strip on a spool under tension emanating from said winding spool, said spool simultaneously drawing the unfolded strip from a source of supply.

8. The method of folding and winding paper or the like, comprising in combination, forming folds in each edge of a strip of paper, winding said folded strip on a spool under tension emanating from said winding spool, said spool simultaneously drawing the unfolded strip from a source of supply, creasing said folds by passing said strip around a curved surface just before it engages said spool, and subsequently pressing said strip against said spool.

9. A machine for folding and winding paper or the like, comprising in combination, a winding spool, a swinging arm having its free end

disposed adjacent said spool, an idler roller mounted on the free end of said arm, folding means disposed longitudinally of said swinging arm, and means for guiding a folded paper strip under said roller to said spool, said arm and roller being mounted in position for said roller to engage said paper strip before the strip engages said spool.

mounted on the free end of said arm, folding means disposed longitudinally of said swinging arm, and means for guiding a folded paper strip beneath said presser member to said spool, said arm and presser member being mounted in such position that the angle formed between the paper strip and a radius of said spool drawn to the point of contact of said presser member on said spool remains greater than 90° during winding, for the purposes set forth.

10. A machine for folding and winding paper or the like, comprising in combination, a winding spool, a swinging arm having its free end disposed adjacent said spool, a presser member

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