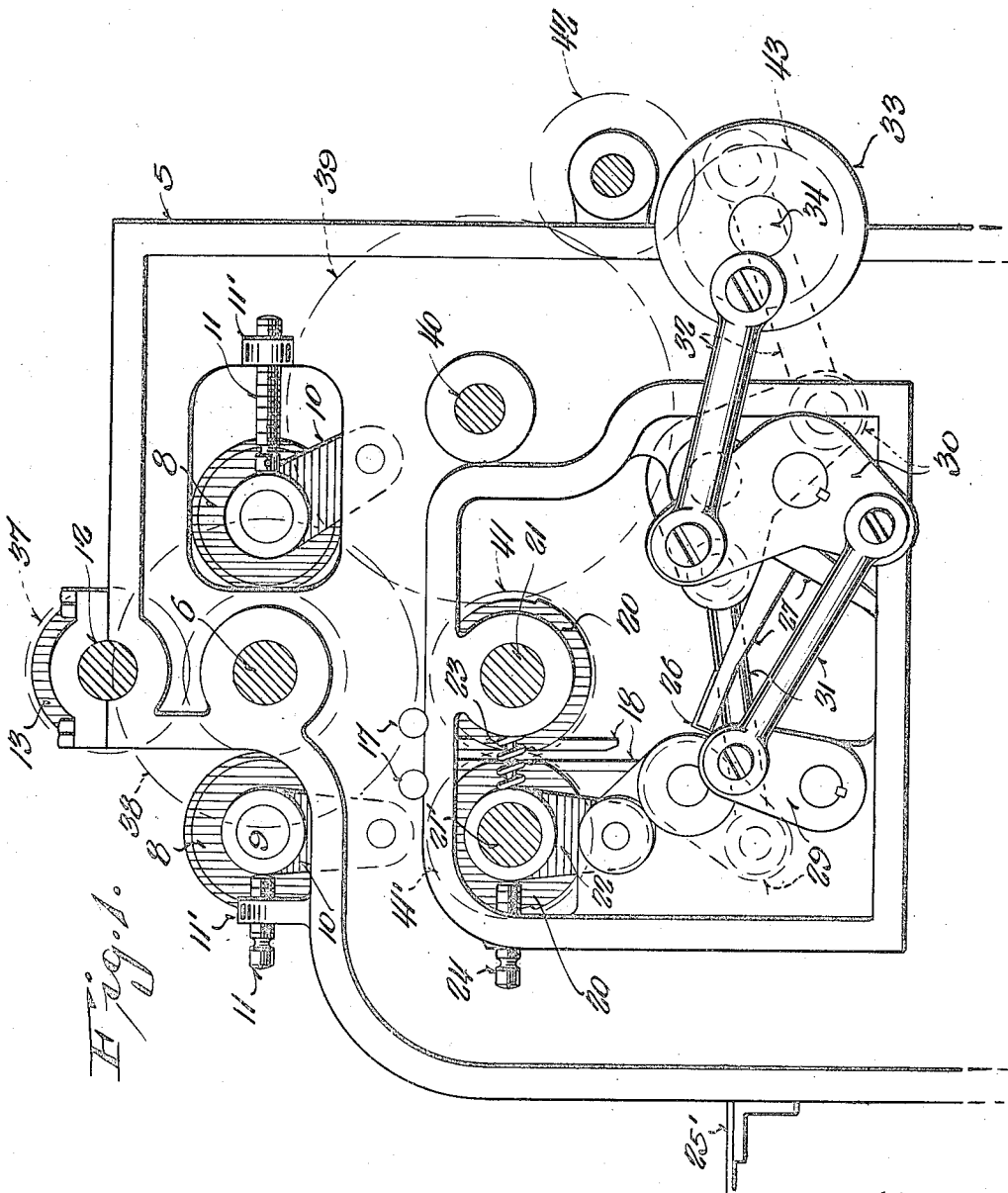


1,423,276.

L. A. STRAUBEL.
PAPER FOLDING MACHINE.
APPLICATION FILED APR. 9, 1921.

Patented July 18, 1922.

4 SHEETS—SHEET 1.



Witness
Louis A. Straubel

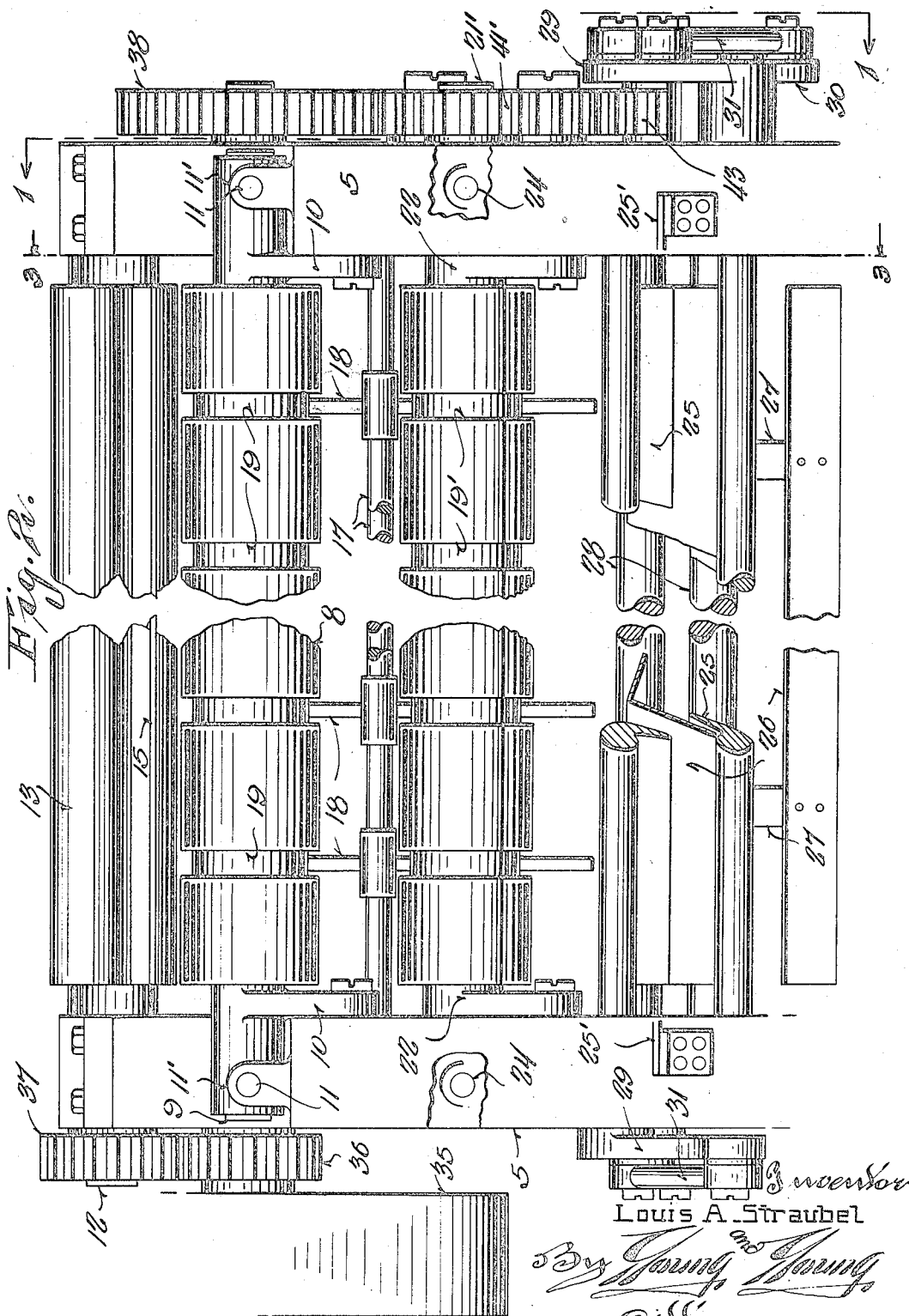
By *Young Young*
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4 SHEETS—SHEET 2.



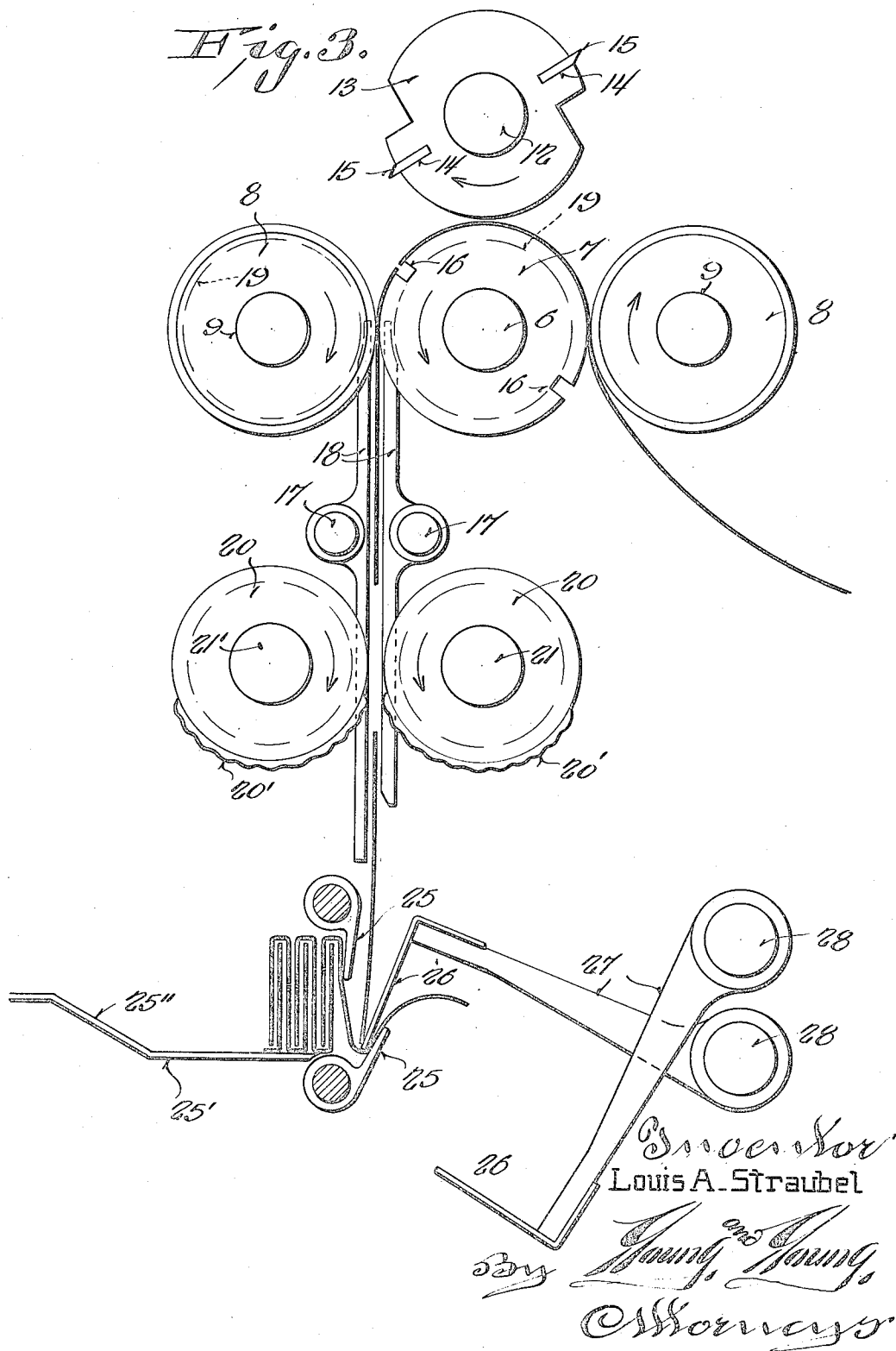
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4 SHEETS—SHEET 3.



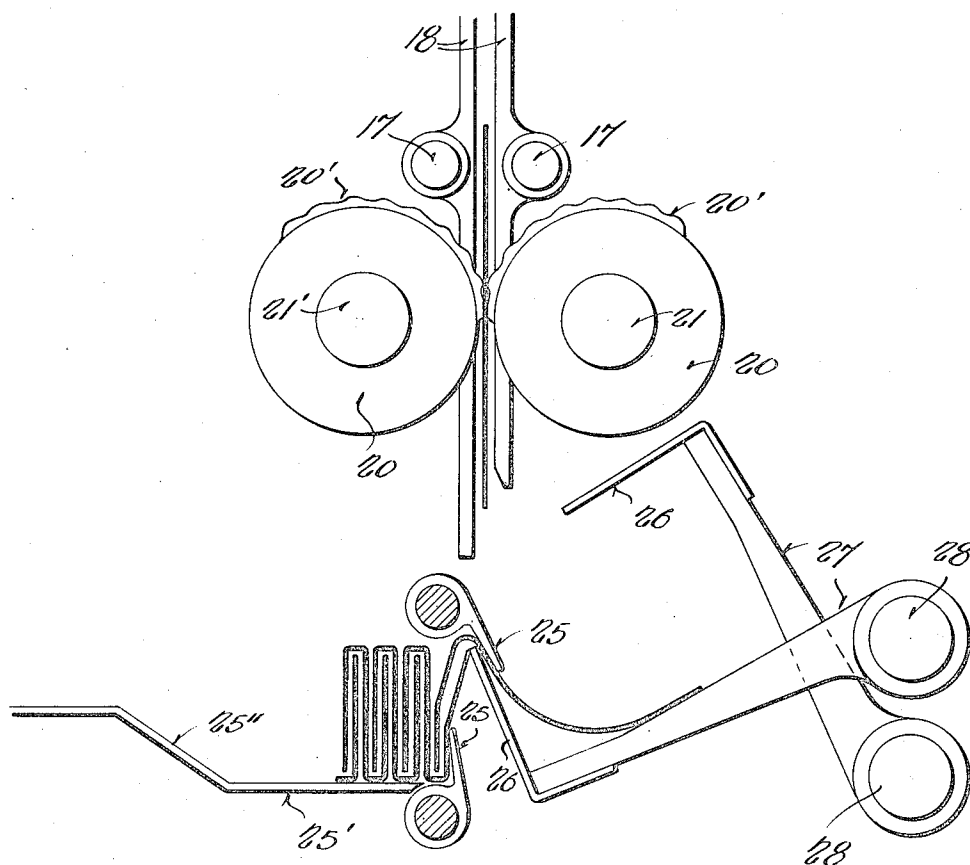
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4 SHEETS—SHEET 4.

Fig. 4.



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UNITED STATES PATENT OFFICE.

LOUIS A. STRAUBEL, OF GREEN BAY, WISCONSIN.

PAPER-FOLDING MACHINE.

1,423,276.

Specification of Letters Patent.

Patented July 18, 1922.

Application filed April 9, 1921. Serial No. 460,066.

To all whom it may concern:

Be it known that I, LOUIS A. STRAUBEL, a citizen of the United States, and resident of Green Bay, in the county of Brown and State of Wisconsin, have invented certain new and useful Improvements in Paper-Folding Machines; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to improvements in folding machines and more particularly to that type of machines employed for the purpose of producing packages of material such as toilet paper and paper toweling, composed of three leaved units or books, whose end leaves are interfolded with the end leaves of the adjacent units.

The primary object of my invention is to generally simplify the construction of machines of this character, and at the same time increase their capacity, by eliminating cam controlled reciprocating and intermittent movement of the folding mechanism, which movement greatly reduces the capacity of the machine, and providing continuous driven folding and interfolding means.

Another object lies in the provision of folding members operating and arranged in such a manner as to permit the paper to be fed between them, and the stack or package support, thereby providing greater space for movement of the folding members.

Another object resides in the provision of means adapted to press and grip the folds of paper, and at the same time feed the stack or package from the machine.

A more specific object is to provide a machine of this general character, with an inclined stack or package support, whereby the stack is under slight pressure at all times and displacement of the interfolded leaves is prevented.

With these and other objects in view, which will be apparent as the description proceeds, my invention consists in what is herein shown and described, and more particularly defined in the appended claims.

In the drawings:

Figure 1 is an end elevational view of an interfolding machine embodying the present invention, with parts in section as indicated by line 1—1 of Figure 2.

Figure 2 is an elevational view looking in at the front of the machine.

Figure 3 is a transverse sectional view on the line 3—3 of Figure 1, and

Figure 4 is a view similar to that of Figure 3, showing the folding mechanism in the reverse position.

Referring now more particularly to the accompanying drawings, the improved machine comprises side frames 5, in which is longitudinally journaled a shaft 6 carrying the body roll 7 of the feeding and cutting mechanism. Mounted adjacent opposite sides of the body roll are a pair of rubber faced feed rolls 8 journaled upon the shafts 9, which are carried in the brackets 10 pivoted to the side frames. The feed rollers 8 are adjusted and held in contact with body roll 7, by means of the set screws 11, threaded in lugs 11' of the side frames 5 and engaging the pivoted brackets 10.

Also journaled in the side frames 5 and disposed directly above the body roll is a shaft 12, on which is mounted a cutting roll 13 provided with a pair of oppositely disposed longitudinal slots 14, in which are secured cutting knives 15 adapted to transversely cut the work material passing over the body roll. To compensate for the cutting knives 15, the body roll is provided with longitudinal recesses 16 for the reception of the same, and as is common in other machines of this nature, the cutting roll and body roll are so timed as to permit the knives and corresponding recesses of the body roll to register during their revolutions.

Extending longitudinally through the machine and mounted in the side frames 5 are a pair of stationary shafts 17, on which are secured a plurality of vertical guides 18 having their upper ends projected into annular grooves 19, provided in the body roll and feed roll 8 positioned adjacent the discharge side of the body roll.

Positioned directly below the body roll 7 are a pair of spaced braking rolls 20 mounted on the shafts 21 and 21', the shaft 21 being journaled in the side frames 5, while the shaft 21' has its bearings in the brackets 22 pivoted to the side frames. The rollers 20 are normally urged apart by springs 23 disposed between the pivoted brackets 22, and the journals provided in the side frame 5 for the shaft 21. Portions of the rollers 20 are provided with corrugated rubber faces 20' adapted to engage and grip the work

material fed between the rolls, and due to the fact that these rolls are timed to travel at a greater speed than the feed rolls, the work material will be severed at the point where it has been cut by the transverse cutting blades, it being understood that due to the annular grooves 19 in the body roll, the knives 15 will not completely sever the paper at these points, leaving a thin connecting web. The severed sheet of work material is then fed into the last fold of the preceding sheet, as best shown in Figure 3. Adjustment of the braking rolls toward each other to insure gripping of the material between faces 20' is attained by set screws 24, threaded in the side frames and engaging the brackets 22. The rollers 20 are further provided with annular grooves 19', which permit the lower ends of the guides 18 to extend therethrough.

Taking up the folding mechanism of the machine, a pair of vertically aligned presser flaps 25 extending longitudinally through the machine are positioned below the braking rolls 20, adjacent one side of the path of work material fed therefrom. Positioned adjacent one side of the presser flaps, carried by the side frames 5, is a horizontal stack support 25' provided with an inclined surface 25'' for that purpose, which will be more particularly described in the operation of the machine. The ends of the presser flaps 25 are journaled in the side frames 5, whereby the flaps may be oscillated in conjunction with the tucking blades 26, which blades are secured to the arms 27 mounted upon the vertically aligned shafts 28, also extending longitudinally through the machine and journaled in the side frames. The upper and lower presser flaps have one of their journaled ends extended outwardly of the side frames, at opposite sides of the machine, and have keyed thereon arms 29. These arms are connected, by means of the links 31, to bell-cranks 30 keyed upon the shafts 28 at opposite sides of the machine outwardly of the side frames. Oscillatory movement is imparted to the bell-cranks 30 through the connecting links 32 fastened to the crank heads 33, which are mounted upon the longitudinal shaft 34 journaled in the side frames 5 rearwardly of the machine.

A drive for the various parts of the machine is obtained through a suitable train of gears, mounted upon the various shafts outwardly of the side frames 5. Power enters the machine through the pulley 35 mounted upon the shaft 6, which shaft also carries a gear 36 that drives the gear 37 mounted on the shaft 12 of the cutting roll. The opposite end of the shaft 6 is provided with a gear 38, which drives the idler gear 39 mounted upon a stud 40 carried by one of the side frames 5. From the idler gear 39, power is transmitted to the braking rolls

20 through the gears 41 and 41' keyed to the shafts 21 and 21' respectively. An idler 42 is also driven by the gear 39, and in turn, drives the shaft 34 through the gear 43 fastened thereon.

From the foregoing, it will be seen that all of the moving parts are rotatably driven by direct gear drive, with the exception of the oscillatory tucking blades and presser flaps, which derive their movement through links connected to the cranks 33. In other words, abrupt reciprocating movements and cams are eliminated, thereby greatly simplifying the mechanism of the machine and at the same time, increasing its capacity to a maximum.

Considering the operation of the machine, particular attention is directed to Figures 3 and 4 wherein it will be seen that the work material is fed over the body roll 7 between the feed rollers 8, where it is transversely cut into the desired length. From the body roll, it passes through the guides 18 to a point where it is engaged by the gripping surfaces of the braking rolls 20, and fed to the folding mechanism, which comprises the presser flaps and tucking blades. It will be noted in this particular type of folding mechanism that each section or sheet of work material receives two folds, and the succeeding sheet is fed into the last fold, in order to obtain the interfolded relation between the adjacent units which comprise the package or stack.

The presser flaps are oscillated through a limited arc, from a vertical position to that of approximately 45 degrees, at which point they receive the tucking blades to form the folds in the work material. As shown in Figure 3, the upper fold is held against the stack by the upper presser flap, while the lower flap is at its outward limit and the tucking blade has formed the lower fold. It will be noted that the succeeding sheet of material is then fed into the lower fold and is guided between the upper pressure flap and the tucking blade. To obtain the last or upper fold on the succeeding sheet, both the presser flaps and tucking blades are oscillated to that position shown in Figure 4, whereby the lower fold is gripped and held against the stack by the lower pressure flap, and the tucking blade enters the upper presser flap forming the upper fold, and at the same time, acting to guide the end of the preceding sheet into the same.

As the presser blades oscillate to engage the work material, it will obviously be seen that the stack is fed upon the support, which due to its incline, necessitates a certain amount of pressure being exerted upon the stack, which pressure not only causes the folds of the work material to be thoroughly pressed, but firmly holds the same against displacement.

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Particular attention is directed to the fact that the work material is fed to the preceding fold between the tucking blades and presser flaps, as best illustrated in Figure 3, whereas in former practice, it has been customary to position both the tucking blades and presser flaps to one side of the work material, thereby crowding this mechanism and greatly limiting its movement. The present structure overcomes this disadvantage, allowing ample room for movement of the tucking blades.

From the foregoing, it will be seen that a simple, efficient mechanism has been designed, which, due to certain novel features in the construction, will permit a maximum output for machines of this character, and while I have shown and described a specific mechanism for carrying out the invention, it is understood that various changes in minor details of construction are contemplated within the scope of the appended claims.

I claim:

1. In a machine of the class described, the combination of means for feeding sheets of work material, presser flaps positioned at one side of the path of said sheets and tucking means positioned at the opposite side of said sheets.

2. In a machine of the class described, the combination of, means for feeding sheets of work material, a pair of oscillatory presser flaps positioned at one side of the path of said sheets, and a pair of oscillatory tucking members positioned at the opposite side of said sheets and adapted to work in conjunction with said presser flaps.

3. In a machine of the class described, the combination of, means for partially cutting and feeding the work material, a pair of rolls driven at a greater speed than the feeding means and adapted to sever the cut portion of work material, and means for folding and interfolding the severed sheets into packages, comprising, a pair of oscillatory presser flaps and a pair of oscillatory tucking blades adapted to operate in conjunction with said presser flaps.

4. In a machine of the class described, the combination of, means for partially cutting and feeding the work material, a pair of rolls driven at a greater speed than the feeding means and adapted to sever the cut portion of work material into sheets, means for folding and interfolding the sheets into packages, and a support positioned adjacent said folding and interfolding means to receive the package fed thereto, said support being provided with an incline.

5. In a machine of the class described, the combination of means for partially cutting and feeding the work material, means for folding said work material into books of three or more leaves, and a pair of rollers driven at a greater speed than the feeding means for severing the cut portion of work material and delivering the same into the last fold of the preceding sheet.

In testimony that I claim the foregoing I have hereunto set my hand at Green Bay, in the county of Brown and State of Wisconsin.

LOUIS A. STRAUBEL.