June 28, 1927. 1,634,074

H. S. LABOMBARDE

FEEDER FOR SHEET MATERIAL

Filed Nov. 30, 1925

Fig. 1

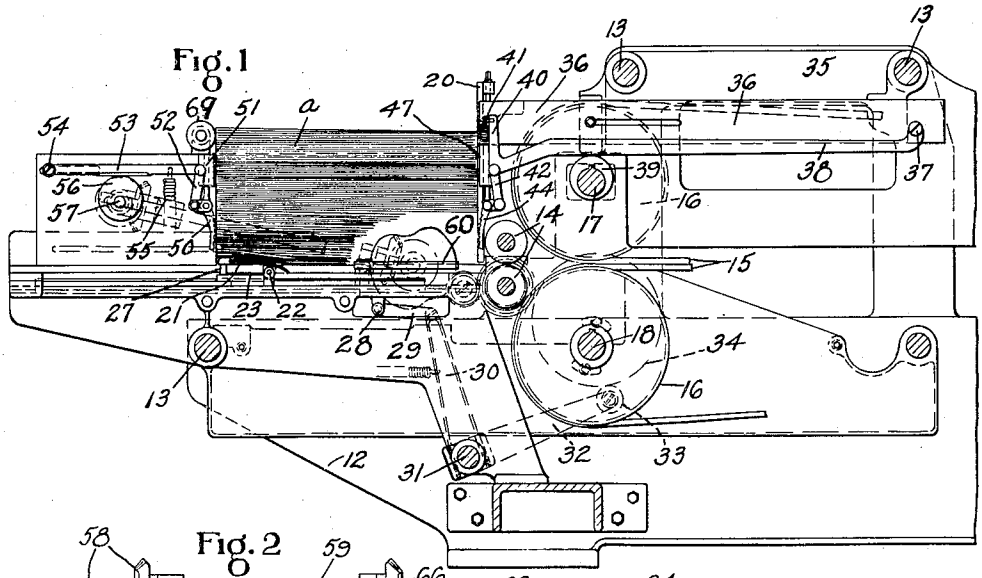


Fig. 2

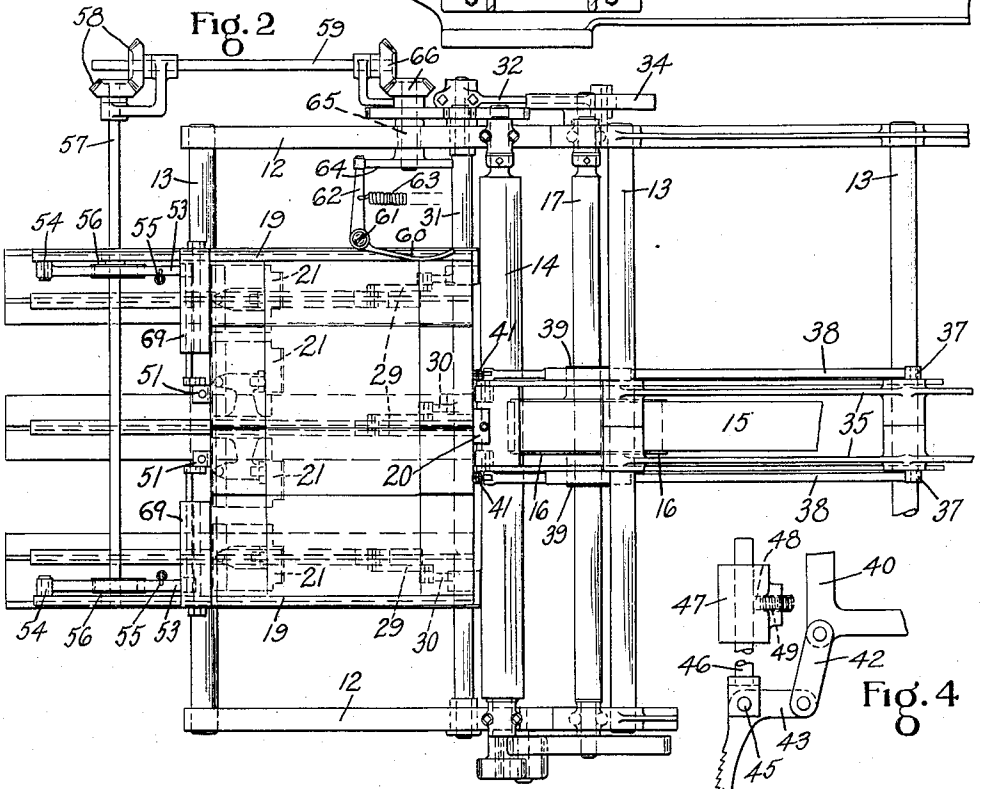


Fig. 3

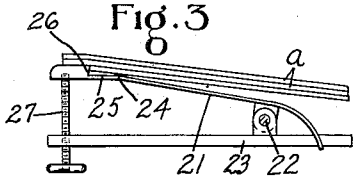


Fig. 5

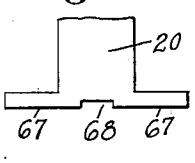


Fig. 4

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UNITED STATES PATENT OFFICE.

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FEEDER FOR SHEET MATERIAL.

Application filed November 30, 1925. Serial No. 72,292.

This invention relates to machines for feeding cut sheets or blanks, and has particular reference to means for forwarding singly, from the bottom of a pile, such thick and large blanks as those which are employed for making corrugated paper cartons or cases.

As is well-known, corrugated paper, while stiff, is very soft as to thickness and will not withstand much compression especially at the edges. Paper blanks of single thickness can be readily forwarded from the bottom of a pile and in timed succession, to other mechanism such as folding machines, by feeders which push each blank through a narrow opening commonly referred to as a gate or gateway. Feeders of this type however, as heretofore constructed, do not operate satisfactorily on blanks of corrugated paper which, as is known, always consists of at least three layers of which the upper and lower ones are flat and not very thick. The reason for such unsatisfactory operation is due to two characteristics of the material, viz, its extreme softness particularly at the edges, and a common tendency of the edges of the upper and lower layers to curl. These characteristics often result in improper engagement of the pushers with the rear edges of the blanks, or engagement with two blanks instead of one, and sometimes result in the front edges of two blanks getting into the outlet gate and causing a jam.

The object of my present invention is to provide a feeder of the pusher and gateway type above referred to, which will reliably forward accurately, one at a time and in spaced timed relationship, blanks having the characteristics of corrugated paper.

With the above stated object in view, the invention consists in the construction and combination of parts substantially as hereinafter described.

Of the accompanying drawings:—

Figure 1 is a side elevation of the feeder as used in connection with other mechanism to which the blanks are fed.

Figure 2 is a plan view of the same, partly broken out.

Figure 3 is a detail side view, on a larger scale, of one of the pushers.

Figure 4 is a detail side view, on a larger scale, of one of the pressers and its mounting.

Figure 5 is a face view of the lower end portion of the gate strip.

Similar reference characters indicate similar parts or features in all of the views.

Portions of the frame of the machine are indicated at 12, connected by tie rods 13. The blanks *a* are fed between rolls 14 to belts 15 mounted on pulleys 16 carried by upper and lower shafts 17, 18, said belts then carrying the blanks to machines which act on the blanks as by folding them. Such a folding machine is illustrated in Letters Patent No. 1,565,167, granted to me December 8, 1925.

The blanks *a* are supported in a hopper including floor strips such as are commonly employed in blank feeders, side wall members 19 (Fig. 2), and a front wall having an adjustable gate strip 20 (Fig. 1) below the lower end of which the blanks are fed, one by one, the construction of all of the members so far referred to being of such well-known type (excepting a feature of the gate strip hereinafter explained) as not to need detailed description and illustration.

The rear portion of the pile of blanks, or rather the rear edge portion of the lowermost blank, rests on one or more plates 21. Figure 2 indicates four of such plates, but a lesser number, or even one, is sufficiently serviceable in some machines. Each plate (Fig. 3) is pivoted at 22 to a slide 23 and is inclined upwardly and rearwardly to a portion indicated at 24 beyond which is a substantially horizontal portion 25, and a shoulder or abutment 26. For convenience of description the angular portion 24 is referred to as a hump. By means of a screw 27 rising from the slide 23 the inclination of the plate 21 may be adjusted.

Each slide 23 (Fig. 1) has a downwardly extending lug 28 connected by a link 29 with an arm 30 of a rock shaft 31, said shaft having at one end an arm 32 having a roll 33 bearing on a cam 34 carried by the lower shaft 18, whereby all of the slides are reciprocated in unison.

The reason for the formation of the pushers as illustrated by Figure 3 is to prevent crushing of the rear edges of the lower blanks by the weight of the pile above, which crushing would be liable to cause the shoulders of the pushers to engage the edges of two blanks instead of only the bottom

one. It frequently happens that the edges of all of the layers of a corrugated paper sheet or blank are not flush with each other. For instance, the edges of the upper and lower thin flat layers of a sheet or blank sometimes project beyond the edge of the intermediate corrugated layer. In such case the thickness of the edge of the bottom blank of a pile is liable to be reduced by the weight of the blanks above it if the extreme edge of the bottom blank is resting on anything. By forming the pushers 21 with recesses at 25, due to the humps 24, any tendency to crush the lower blank would be at said humps at a sufficient distance from the extreme rear edge of the bottom blank to prevent the occurrence of any such pressure at the extreme edge as would let the edge of the next higher blank get into the path of movement of the shoulders 26 of the pushers so as to result in the simultaneous feeding of two blanks.

The reason for adjusting the pushers, as by the screws 27 (Fig. 3) is to meet varying conditions as to degree of edge curling existing in corrugated paper made of different stocks or by different manufacturing methods or machines.

Mounted on two of the tie rods 13 are two flat plates or bars 35 which support strips 36. Pivoted at 37 to said strips are two levers 38 which are actuated by cams 39 carried by the shaft 17, each of said levers having an upwardly extending end portion 40. A spring 41 connects a pin at the top of said end portion with a portion of strip 36, said spring coacting with cam 39 to effect vertical movements of the lever 38.

A link 42 (Figs. 1 and 4) connects each lever 38 with the arm 43 of a presser finger 44 pivoted at 45 to the lower end of a slide 46 mounted in a bracket 47 carried by strip 36. A friction pad 48 is pressed against the slide 46 by a spring 49 so that when the lever 38 rises it will first swing the finger 44 away from the front edges of the blanks and then overcome the friction of pad 48 so as to shift the slide and finger upward, the finger being then out of contact with the edges of the blanks. Upon return or downward movement of the lever 38, effected by the spring 41, the finger 44 is first swung yieldingly against the edges of the blanks, and then the slide 46 and finger 44 move down so that the finger yieldingly urges the front edges of the lowermost blanks down, said action being sufficient to overcome any upward curl of the edge of the bottom blank and facilitate its correct feeding movement through the gate by the pushers 21. The movements of the fingers may be described as four-motion in that they move inward against the edges of the blanks, then down, then outward and up. The gearing or drive connections are such that the downward movement of the fingers occurs just as, or just before, the pushers 21 begin their forward and feeding movement.

To aid in securing proper successive engagement of the pushers with the blanks, I provide pressing fingers to act on the rear edges of the blanks as well as those at the front, said rear pressers being constructed and operated substantially as the front ones just described. Each rear pressing finger 50 (Fig. 1) is pivotally connected to a slide frictionally mounted in a suitably supported bracket 51, and has an arm connected by a link 52 with a lever 53 pivoted at 54. Each lever 53 is actuated by a spring 55 and a cam 56 carried by a shaft 57. The shaft 57 is driven by bevel gear connections 58 with a suitably driven shaft 59.

To secure proper registration or squaring up of the blanks as they descend due to the successive removal of the lower ones, I provide a side presser 60, pivoted at 61 and having an arm 62 which, by a spring 63, is held against the periphery of a cam 64 carried by shaft 65 having bevel gear connections 66 with the shaft 59. The presser 60 acts through an opening in one of the side walls 19 to intermittently and yieldingly press the lower blanks of the pile squarely against the other side wall 19.

Blanks for making corrugated paper cartons are usually made with narrow slots in their edges, in line with their creases. The machine for cutting out the blanks sometimes fails to entirely remove the little pieces which are cut out to provide said slots, said pieces being herein referred to, for convenience, as slivers. If any such sliver remains in a slot which is in line with the gate strip 20 when fed, its presence is liable to prevent free and accurate passage of the blank through the gateway. To permit such sliver to pass without interfering with the passage of the blank carrying such sliver, I provide a plurality of gate edges instead of a single strip having a straight horizontal lower edge. In Figure 5 I illustrate two gate edges or members 67. In said figure said edges 67 are illustrated as parts of a single strip 20 but, obviously, each member might be the lower edge of its own strip. In other words, the strip 20 could be vertically divided. Either way, the result is to provide a recess or space 68 through which any sliver being carried along by a blank may freely pass.

Owing to the character of corrugated paper blanks, such as their stiffness and their usually large areas, it is not easy for an attendant, when making additions to the pile in a hopper of ordinary construction, to so locate the added blanks that they will arrive in the hopper in properly registered positions. To facilitate the proper locations of blanks manually added to the top of a more

or less depreciated supply in the hopper, I provide one or more rolls 69, preferably two as illustrated in Figure 2, suitably supported in an elevated position at the rear of the hopper (Fig. 1), said rolls being free to revolve as on pins carried by the side walls 19. The attendant, when adding to the pile, drops the blanks so that they extend over the rolls 69, partly resting thereon, and shoves them forward, the natural inclination of the added blanks aiding them in sliding forward against the gate strip 20 and their rear edges dropping down to the front of and past said rolls to horizontal positions. This, of course, is when the pile in the hopper is lower than illustrated in Figure 1. The rolls are wide enough so as to cause no longitudinal depressions being made in the under surface of the blank which bears thereon, while riding over the rolls.

As the operations of the different members of the feeder mechanism have been explained in connection with the description of the structures thereof, an explanation of the operation of the feeder as a whole is unnecessary.

Having now described my invention, I claim:—

1. A blank feeder having a hopper provided with an outlet at its front, means for forwarding blanks flatwise and singly from the bottom of a pile in the hopper through said outlet, and means having a four motion operation for urging edge portions of the blanks downward, said urging means being located close to said front outlet.

2. A blank feeder having a hopper provided with an outlet, means for forwarding blanks flatwise and singly from the bottom of a pile in the hopper through said outlet, and means located close to said outlet for urging edge portions of the blanks downward, the forwarding means and the urging means being constructed to operate in timed relationship to act substantially simultaneously.

3. A blank feeder having means for supporting a pile of blanks and permitting the delivery of the blanks singly from the bottom thereof, a pusher having a shoulder and a raised portion at a sufficient distance forward of the shoulder to support the weight of the pile at a point removed from the edge of the bottom blank and prevent crushing of said edge.

4. A blank feeder substantially as specified by claim 3, the said pusher being adjustable.

5. In a feeder having means for forwarding blanks singly from the bottom of a pile, a frictionally mounted slide having a finger pivoted thereto, and means connected with said finger to oscillate it relatively to the slide and to shift the slide and its finger.

In testimony whereof I have affixed my signature.

HAROLD S. LABOMBARDE.