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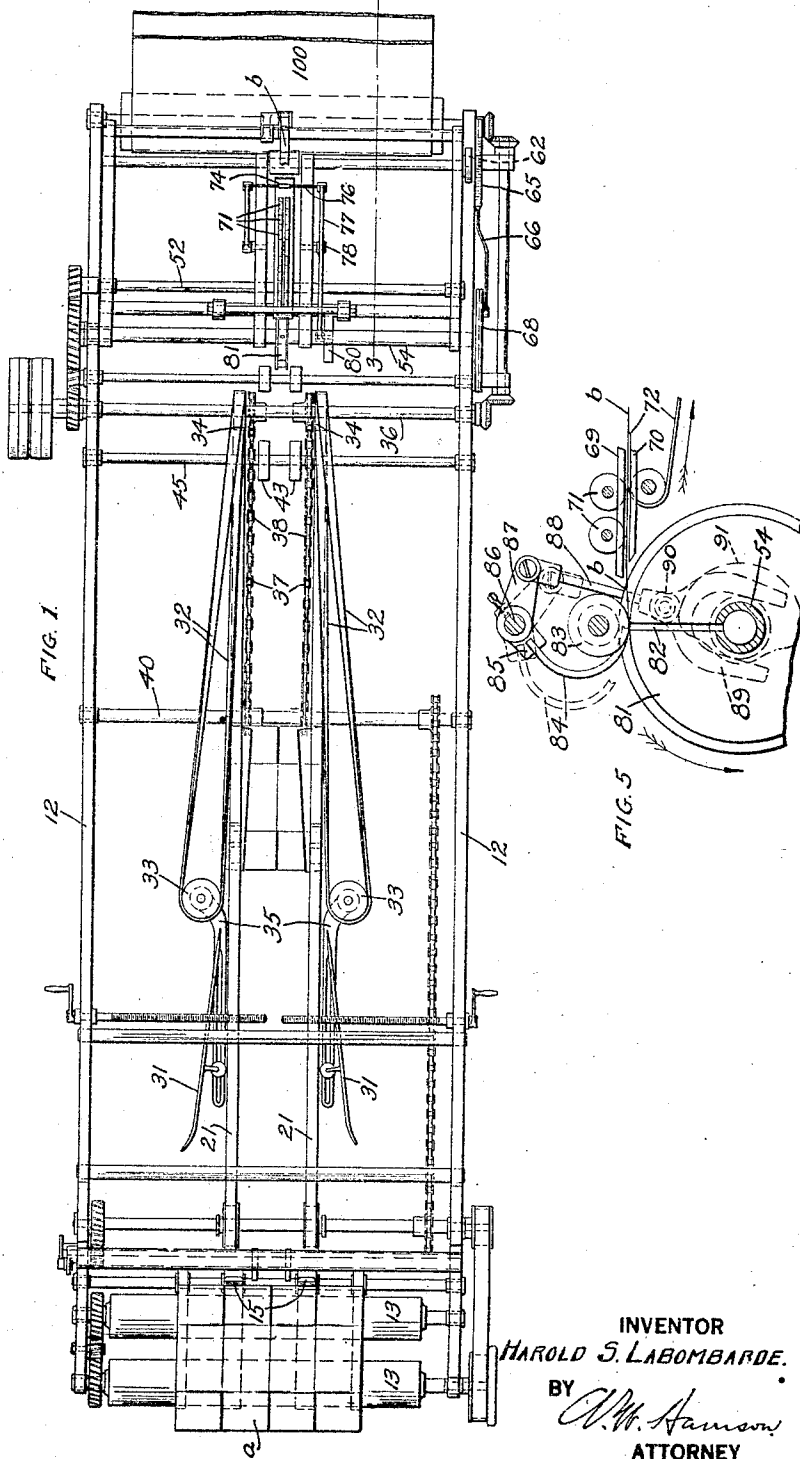
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MACHINE FOR MAKING TAPED CARTONS

Filed Sept. 20, 1923

2 Sheets-Sheet 1



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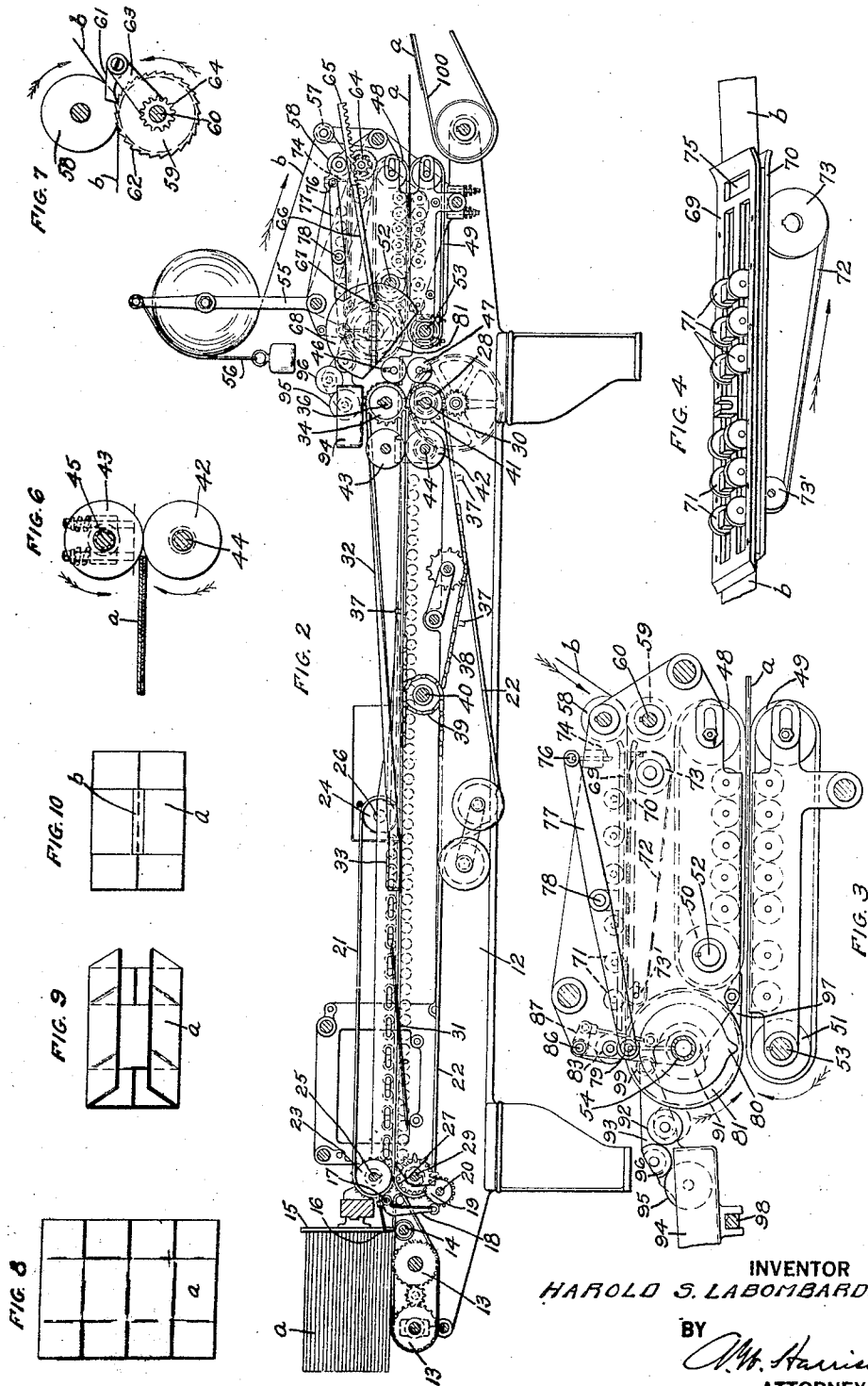
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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE.

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## MACHINE FOR MAKING TAPED CARTONS.

Application filed September 20, 1923. Serial No. 663,881.

*To all whom it may concern:*

Be it known that I, HAROLD S. LABOMBARDE, a citizen of the United States, and resident of Nashua, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Machines for Making Taped Cartons, of which the following is a specification.

This invention relates to the production of paper or paste-board boxes, and has particular reference to the manufacture of corrugated paper cartons of the type comprising a blank folded to bring opposite edges into abutting instead of overlapping relationship, and having its abutting edges held together by a strip of tape crossing the line of juncture and adhesively secured in position so as to form a hinge joint when the carton is set up for use.

Machines as heretofore constructed for producing this type of carton have not been entirely satisfactory because of difficulty in effecting a close juncture of the abutting edges prior to the application of the strip of tape, this being especially true when the material for making the cartons consists of previously cut and scored blanks of corrugated paper, such material comprising a plurality of layers of paper. Usually the cartons showed lapped joints, or spaces between said edges slightly diverging from one end to the other of the joints. The result was not only to present an unsightly appearance, but the cartons, when set up for use, then tapered somewhat from one end to the other, and sometimes a crevice existed along at least a portion of the line of juncture.

A particular object of the present invention is to provide a machine which folds the blanks to bring opposite edges of each blank into close abutting relationship from end to end and hold them so while a joining strip of tape is secured in position to hold said edges close together.

A further object is to provide a machine of this character which, if a folded blank is passing to position for the application of the tape and has its approximately meeting edges not parallel, will automatically straighten or square up said folded blank to ensure parallelism of said edges.

Another object is to provide a machine which automatically applies to folded

blanks, in accurate locations, sections of tape cut from a strip.

With these and other objects in view, the invention consists in the construction and combination of parts substantially as hereinafter described and claimed.

Of the accompanying drawings:

Figure 1 is a plan view of a complete machine constructed according to my invention, a few portions being broken out to illustrate portions below.

Figure 2 is a sectional side elevation of the machine.

Figure 3 represents a section on line 3—3 of Figure 1 on a larger scale.

Figure 4 is a detail perspective hereinafter referred to.

Figure 5 is a detail sectional elevation illustrating the stop mechanism for temporarily arresting each section of cut tape.

Figure 6 is a detail elevation of the mechanism for squaring up inaccurately folded blanks.

Figure 7 is a detail elevation of a portion of the strip feeding mechanism.

Figures 8, 9 and 10 are views illustrating the work performed by the machine.

Similar reference characters designate similar parts in all of the views.

At one end of a suitable frame 12 is a feed mechanism for cut and creased blanks such as indicated at *a* in Figures 1, 2 and 8. Said blanks are usually of corrugated paper and are supported in the form of a pile on belts mounted on rolls 13 (Figs. 1 and 2) which are driven in a direction to tend to advance the bottom-most blank and push it through a narrow space between a small roll 14 and the lower end of a gate strip 15. Said space is intermittently opened and closed by a finger 16 carried by a rock shaft 17 having an arm 18 which is actuated at the proper times by a cam 19 carried by shaft 20. Usually and preferably two of the fingers and gate strips are employed, side by side.

Each blank fed by the mechanism just referred to is advanced by upper and lower belts 21, 22, the upper belts being mounted on pulleys 23, 24, carried by shafts 25, 26, and the lower belts being mounted on pulleys 27, 28, carried by shaft 29 and a driven shaft 30.

Each blank advanced by the said belts is first acted upon by inclined rods 31 to fold

it on two of its crease lines toward the condition indicated by Figure 9. That is, its two marginal panels are turned upwardly. The blank then, as it is about to pass from the forward end of the upper belts, is further folded by a pair of twist belts 32 mounted on pulleys 33, 34, the former rotating freely on axles carried by adjustably mounted brackets 35, and the latter being carried by a driven shaft 36. It is to be understood that, when the blanks to be folded are of the type illustrated in the drawings, the four panels of each blank are of equal width so that the edges of the marginal panels may meet without overlapping. The twist belts 32 bring the edges into approximate abutting relationship as indicated by Figure 9 prior to the application of the tape section *b* shown in that figure.

As so far described the mechanism is similar to box-folding machines of a well-known type and as I do not claim any novelty for said mechanism, more detailed illustration or description thereof is unnecessary.

To engage the rear edge of each blank and positively advance it during the latter part of the folding operation, pins 37 carried by two chains 38 are employed, said chains being mounted on sprockets 39 carried by a shaft 40 and on sprockets 41 carried by the driven shaft 30. Said pins are so spaced, and the driving connections of the machine are such, that each blank permitted by the fingers 16 to be fed, arrives just in front of a pair of chain pins 37. And the chains travel sufficiently faster than the belts 21, 22, to cause said pair of chain pins to "catch up" with the rear edge of each blank and push it along.

Just before a folded blank is discharged from between the folding belts 32 and the pin-carrying chains 38, the front edges of its four panels (the marginal ones being on top of the two intermediate ones) arrive at the bite of rolls 42, 43 (Figs. 1, 2 and 6). There are two lower rolls 42 carried by a shaft 44, and the two rolls 43 above them are carried by a shaft 45, the latter being mounted in yielding bearings as indicated by dotted lines in Figure 6. The two shafts 44, 45, are not driven but are preferably geared so that both will rotate in unison when the folded blank is pushed between them. When the front edges of the several panels of the folded blank arrive at the bite of the rolls 42, 43, (Fig. 6), the continuing pushing action of the chain pins ensures a squaring up of the folded blank if it has arrived there with its edges not parallel. This operation is due to the fact that if a blank is folded otherwise than accurately on its outer two previously-formed parallel crease lines (Fig. 8), the side edges of the outer panels will diverge at one end or the other

and may partly overlap. And neither the front edges nor the rear edges will be flush. But since the rolls 42, 43, temporarily arrest any forwardly projecting edges while the chain pins continue to push against any rearwardly projecting edges, the result is to bring the front and rear edges of the two layers of the blank into parallelism and necessarily at the same time swing the outer or marginal panels sufficiently to cause their outer edges to meet squarely. Then the upper pair of rolls 43 yield and permit the folded blank to pass through, exerting sufficient pressure thereon to ensure its retaining a squared up condition as it passes to the tape-applying mechanism presently described. As indicated in Figure 2, a pair of forwarding pressure rolls 46, 47, may be interposed between the delivery ends of the belts 22, 32, and the tape-applying mechanism. Each folded and squared up blank is delivered by the rolls and belts just described, between upper and lower belts 48, 49, (Figs. 2 and 3), the pulleys 50, 51, of said belts being carried by driven shafts 52, 53, respectively. Above the shaft 53 is a driven shaft 54, said shaft being hollow and, in practice, connected to suitable mechanism for tending to produce a vacuum therein, such mechanism being unnecessary to illustrate. The purpose of said hollow shaft will presently be explained.

A roll of gummed or un-gummed tape *b* which is to be cut into sections and applied as indicated by Figure 10, is suitably supported, as by a standard 55 (Fig. 2), a weighted friction strap 56 being preferably employed to prevent too free uncoiling of the strip. The strip passes over a small roll 57 and between feed rolls 58, 59, (Figs. 2 and 7), the latter being carried by a shaft 60 which is intermittently rotated by a pawl 61 engaging a ratchet wheel 62 secured to one end of said shaft (Fig. 1). The pawl is carried by an arm 63 mounted to oscillate on the shaft. Secured to or compounded with the pawl arm 63 is a pinion 64 with which a reciprocatory rack 65 is engaged (Fig. 2). The rack is carried by a rod 66 the other end of which is connected to a crank pin 67 which is adjustably secured in a radial slot formed in a disk 68 secured to one end of the shaft 54 (Fig. 1). Figure 2 represents the disk as partially broken away, in order to show parts of the machine beyond it. By adjusting the crank pin 67 the extent of oscillation of the pawl 61 is varied according to what the length of feed of the tape is to be prior to being cut as presently described. That is, by said adjustment, the sections to be cut and later applied to the folded blanks may be accurately determined according to the size of the blanks, longitudinally, which are to be operated upon.

From the feed rolls the tape passes between upper and lower guide plates 69, 70, (Figs. 3, 4 and 5), the plate 69 having suitable bearings for the axles of small rolls 71 which bear on the tape. A belt 72 mounted at one end on a driven pulley 73 and at the other end on a small pulley 73' carries the sections of tape along after they are cut from the strip. The cutting is effected by a knife 74 which descends through a slot 75 in the plate 69. Said knife is carried by a cross bar 76 (Figs. 1, 2 and 3) one end of which is connected to a lever 77 pivoted at 78 and having a roll 79 which engages a cam disk 80 carried by the shaft 54. Any suitably connected spring may be employed to effect return of the knife lever after its operation by the cam. The timing is such that the knife does not act until after the rack 65 ceases to effect feeding of the tape.

Secured to the hollow shaft 54 is a wheel 81 which will be referred to as the suction wheel. A port in its periphery communicates with the air passage in the shaft 54 by a small pipe or duct 82 (Fig. 5). Said wheel is peripherally recessed to form a groove into which each cut section of tape is advanced by the belt 72. Above the suction wheel is a small roll 83 substantially fitting the groove of said wheel, said roll being omitted from Figure 1 to avoid confusion of illustration. Said small roll ensures such closeness of the tape section against the suction wheel that it will be reliably and accurately taken control of by said wheel.

To temporarily arrest each tape section until the suction wheel, in its continuous rotation, causes the duct 82 to arrive below the front end of the tape section, a stop is employed, said stop comprising a curved arm 84 having a notched tip (Fig. 5) and projecting from a block 85 adjustably secured to a rock shaft 86. An arm 87 of the rock shaft is connected to a rod 88 having a fork 89 which slidably embraces the shaft 54. A roll 90 carried by the rod or the fork is actuated by the cam 91 carried by the shaft 54, at the proper times to swing the stop arm 84 from the dotted to the full line positions indicated by Figure 5 and back again. When a section of the tape arrives against the stop 84 it is arrested thereby until the duct 82 arrives under its front end. Then the stop swings away and the suction through the duct causes the tape section to adhere to the wheel and travel around with it during about one-half revolution of the wheel. As it does so, the outer surface of the section contacts with a roll 92 (Fig. 3) mounted in arms 93 of a trough 94. A roll 95 in the trough, and a roll 96 which contacts with both the rolls 95 and 92, carry a film of water or glue to the roll 92 which latter applies such film to the outer

surface of the passing tape section. Water is employed if the strip *b* is gummed tape, and a suitable adhesive is employed if the strip is plain tape.

To ensure removal of the tape section from the suction wheel when said section has been carried around to position to be laid on the folded carton which is travelling along below the wheel, I employ a detachable device such as shown in Figure 3, in which this device is illustrated as a finger 97 having its sharp tip fitting close to the periphery of the suction wheel or extending into a slight peripheral groove thereof, so as to strip the tape section from the wheel and cause it to lay face down on the folded blank across the meeting edges of the latter as shown by Figure 10. It is to be understood, of course, that the relative timing of the operation of the different parts of the machine is such that the folded blank arrives on belt 49 under the suction wheel in time to cause the section *b* to be applied thereto in proper position longitudinally of said folded blank, as illustrated by Figure 10. This timing feature is important in a machine which folds and tapes previously cut blanks. When the blanks have flaps as indicated by Figures 8, 9 and 10, which flaps are to be eventually folded and overlapped to close the bottoms and tops of the cartons in the usual well-known manner, said flaps could not be properly folded if the tape had been applied the full length of the article illustrated by Figure 10. Even if the tape were to extend only part way onto the flaps at either end, proper folding of the flaps could not be effected. The timing feature referred to is important when previously cut blanks are operated upon, even if there are no end flaps, because decidedly imperfect work would be effected if any tape section were to be applied with one end projecting beyond one edge of the blank and the other end terminating short of the other edge of the blank.

As indicated in Figure 3, the trough 94 is mounted to rock or tilt on a supporting rod 98, and the arm 93 has a roll 99. A suitable cam acts on said roll 99 so as to effect a rocking motion that will result in applying the roll 92 to position at the proper times to transfer glue or water to the tape section and not to the wheel itself. In other words, the roll 92 will be in the position shown by the dotted lines in Figure 3 only while a tape section is passing said roll 92.

Each finished product such as illustrated by Figure 10, after being compressed by the belts 48, 48, and the rolls illustrated by Figures 2 and 3 as supporting and guiding the cooperating stretches of said belts, is delivered to any suitable receptacle or stacking mechanism or to a conveying belt such as shown at 100 in Figures 1 and 2.

In the drawings I have illustrated most of the gearing and driving connections which secure proper relative timing of operation of the different parts of the machine, but since such gearing and connections may differ specifically, a detailed description thereof is unnecessary. It is sufficient to explain that the operation is continuous, each blank travelling, without any functional stop or pause, from the time when it leaves the timed feeder shown at the left in Figures 1 and 2 until it emerges from the machine folded and squared up, and with a strip of tape crossing the line of junction or meeting of the side edges of the blank.

Having now described my invention, I claim:—

1. A machine of the character described, comprising means for folding blanks, and bringing the edges thereof into substantial abutting relationship, means for adhesively securing a piece of tape throughout its length to the adjoining edges of each folded blank, and means for causing the blanks to travel during the folding and tape-securing operations, said machine having means for ensuring a predetermined location of each piece of tape on a folded blank longitudinally thereof.

2. A machine of the character described, comprising means for causing blanks to travel in spaced relationship, means for folding each blank while travelling, and bringing the edges thereof into substantial abutting relationship, means for cutting a strip of tape into sections, and means for adhesively securing a section of tape to the adjoining edges of each folded blank, said machine having means for ensuring a predetermined location of each strip of tape on a folded blank longitudinally thereof.

3. A machine of the character described, comprising mechanism for folding blanks on two lines and bringing the edges into close abutting relationship from end to end, and means for adhesively securing a flexible strip in position across the said edges while the latter are held close together, said machine having means for ensuring a predetermined location of each strip on a folded blank longitudinally thereof.

4. A machine of the character described, comprising mechanism for folding blanks, means for causing two edge portions of each blank to meet in squared up position and in the same plane, and means for adhesively securing a flexible strip in position across the said edges while the latter are held in juxtaposition, said machine having means for ensuring a predetermined location of each strip on a folded blank longitudinally thereof.

5. A machine of the character described, comprising mechanism for folding blanks to

flat condition with abutting edges, means for applying a flexible strip across the abutting edges of each folded blank, and means for causing the blanks to travel during the folding and strip-applying operations, said machine having means for ensuring a predetermined location of each strip on a folded blank longitudinally thereof.

6. In a machine having means for folding blanks to flat condition, a pair of rolls relatively positioned to receive the front edges of the folded blanks against adjacent peripheral portions of the rolls, and means for causing the folded blanks to contact with said rolls and then pass between them.

7. In a machine having means for folding blanks to flat condition, a pair of rolls relatively positioned to receive the front edges of the folded blanks against adjacent peripheral portions of the rolls, and pin-carrying chains for pushing the folded blanks against and between said rolls.

8. A machine of the character described, comprising mechanism for folding blanks on two lines and bringing the edges into close abutting relationship, means for cutting sections of tape from a strip, and means for adhesively securing each section to a folded blank across the abutting edges thereof, said machine having means for ensuring a predetermined location of each section of tape on a folded blank longitudinally thereof.

9. A machine of the character described, comprising mechanism for folding blanks on two lines and bringing the edges into close abutting relationship, means for cutting sections of tape from a strip, means for varying the length of the cut sections, and means for adhesively securing each section to a folded blank across the abutting edges thereof.

10. In a machine having means for folding blanks to flat condition with abutting edges, a suction wheel for applying sections of adhesive tape to the blanks across said edges, and means for supplying said sections of tape to the wheel.

11. In a machine for making taped cartons, means for folding blanks to flat condition with abutting edges, a suction wheel for applying sections of adhesive tape to the blanks across said edges, means for cutting a strip of the tape into sections, and means for conveying the sections of tape successively to the suction wheel.

12. In a machine having means for folding blanks to flat condition with abutting edges, a suction wheel for applying sections of adhesive tape to the blanks across said edges, means for supplying said sections of tape to the wheel, and means for temporarily arresting each section in wheel-taking position.

13. In a machine having means for fold-

ing blanks to flat condition with abutting edges, a suction wheel for applying sections of adhesive tape to the blanks across said edges, means for supplying said sections to a position of proximity to the wheel, a rock shaft having an arm movable to position to present its end in the path of movement of the sections, and means for actuating said rock shaft.

10 14. In a machine having means for folding blanks to flat condition with abutting edges, a suction wheel, means for delivering sections of tape successively to the suction wheel at one point of its rotation, means for detaching each section from the wheel at another point of its rotation, and means for conveying folded blanks past the wheel at the last mentioned point.

15 15. In a machine having means for folding blanks to flat condition with abutting edges, a suction wheel, means for delivering sections of tape successively to the suc-

tion wheel at one point of its rotation, a pointed finger bearing against the wheel at another point to detach the sections therefrom, and means for conveying folded blanks past the wheel at the last mentioned point. 25

16. In a machine having means for folding blanks to flat condition with abutting edges, a suction wheel, means for delivering sections of tape successively to the suction wheel at one point of its rotation, means for detaching each section from the wheel at another point of its rotation, means for applying a coating to each section as it passes from one to the other of said points, and means for conveying folded blanks past the wheel at a point to receive the tape sections as they are detached. 30 35 40

In testimony whereof I have affixed my signature.

HAROLD S. LABOMBARDE.