

March 5, 1968

H. W. MOSER ETAL

3,371,585

GLUED FLAP BOX FOLDING MACHINE

Filed Oct. 14, 1963

7 Sheets-Sheet 1

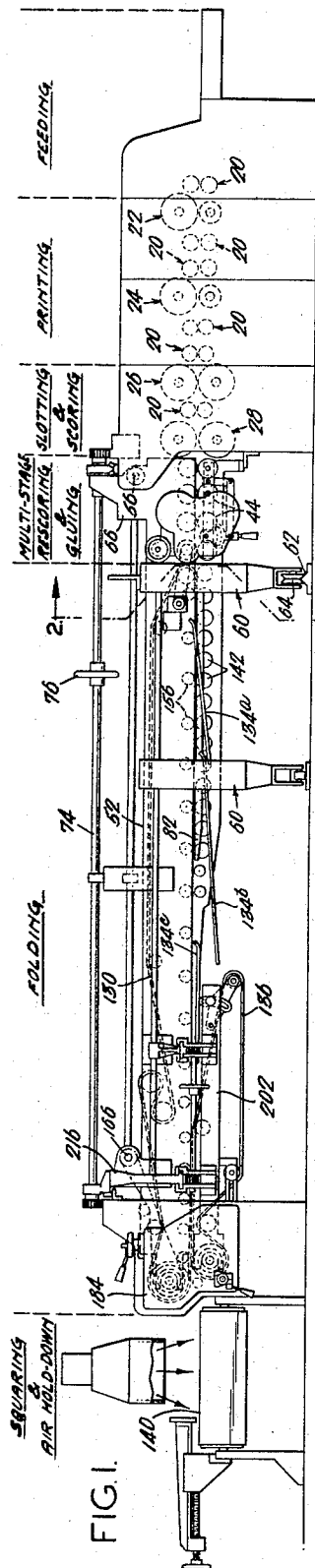
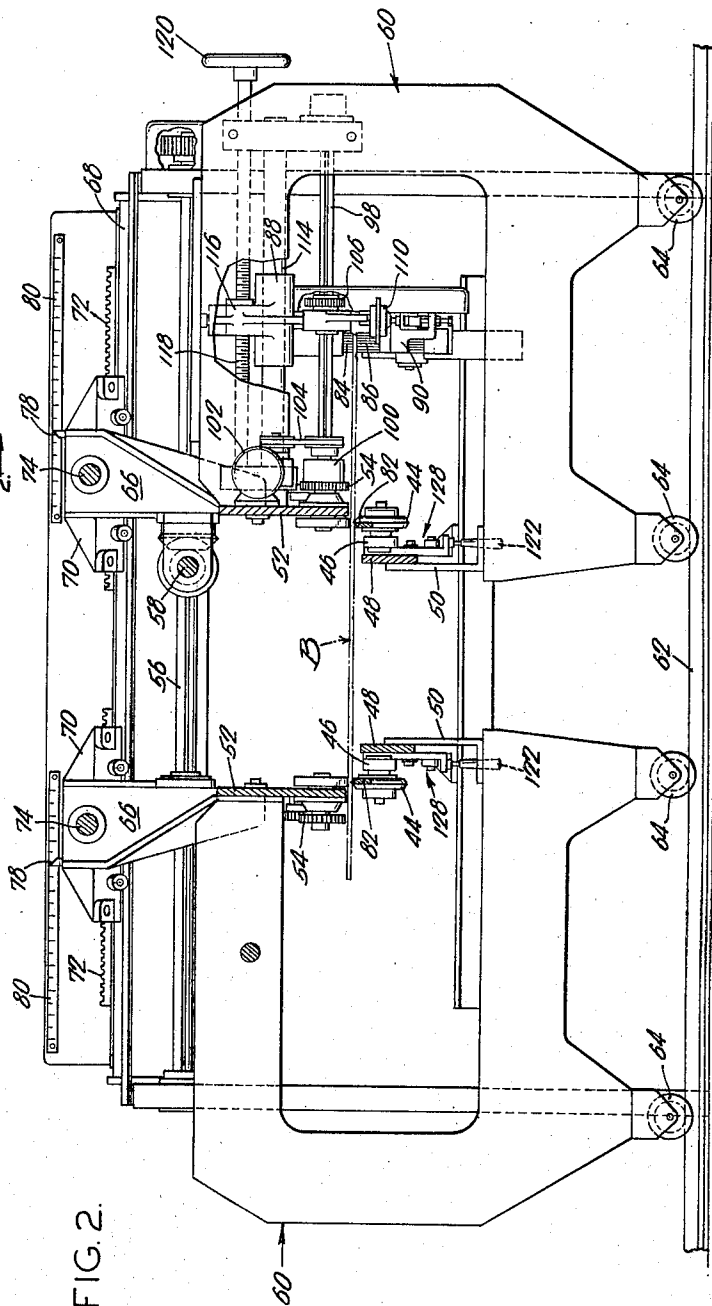


FIG. 2.

INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN
BY *Howdorn & Howdorn*
ATTYS.

March 5, 1968

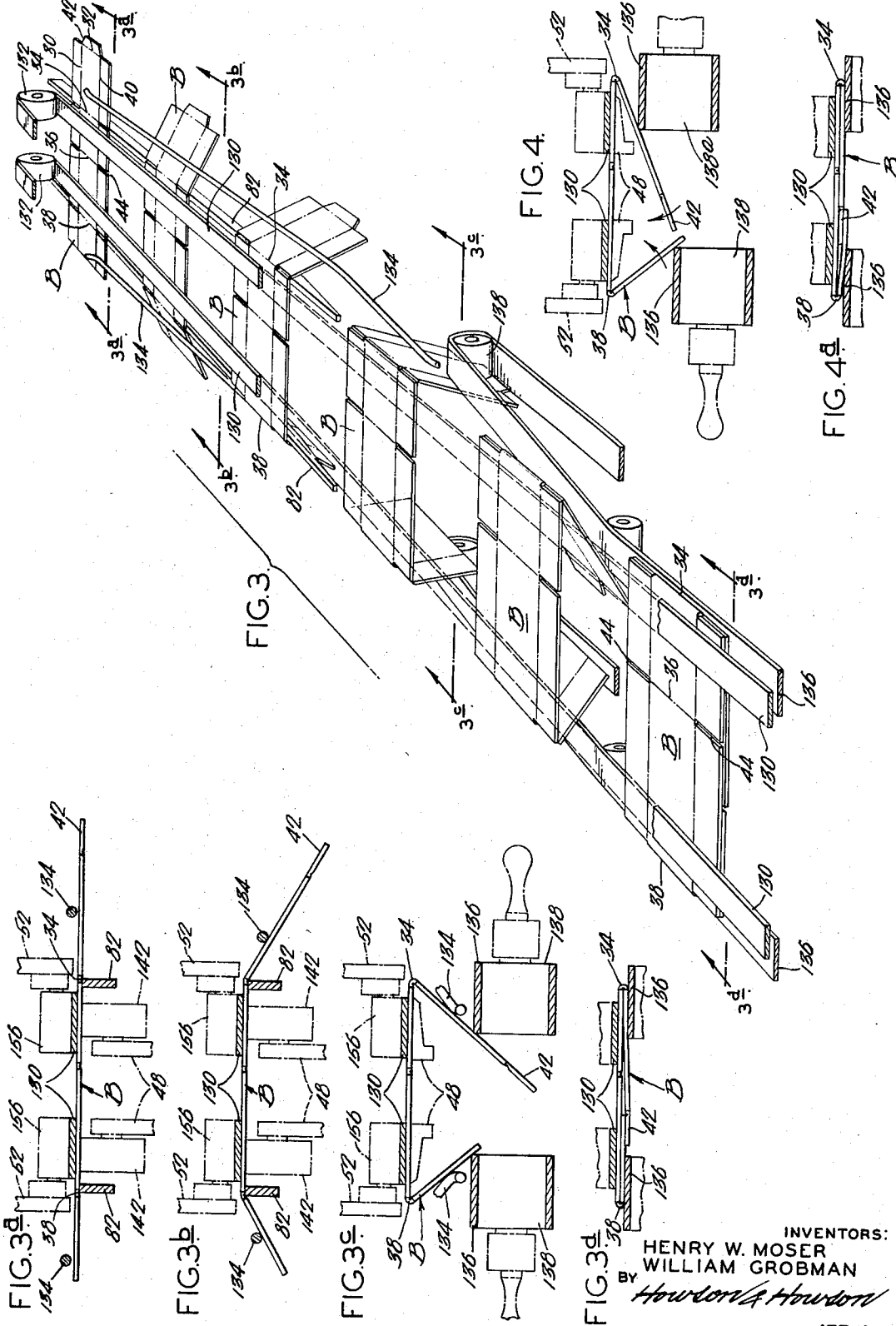
H. W. MOSER ETAL

3,371,585

GLUED FLAP BOX FOLDING MACHINE

Filed Oct. 14, 1963

7 Sheets-Sheet 2



INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN

BY *Howard A. Howard*

ATTYS.

March 5, 1968

H. W. MOSER ETAL

3,371,585

GLUED FLAP BOX FOLDING MACHINE

Filed Oct. 14, 1963

7 Sheets-Sheet 3

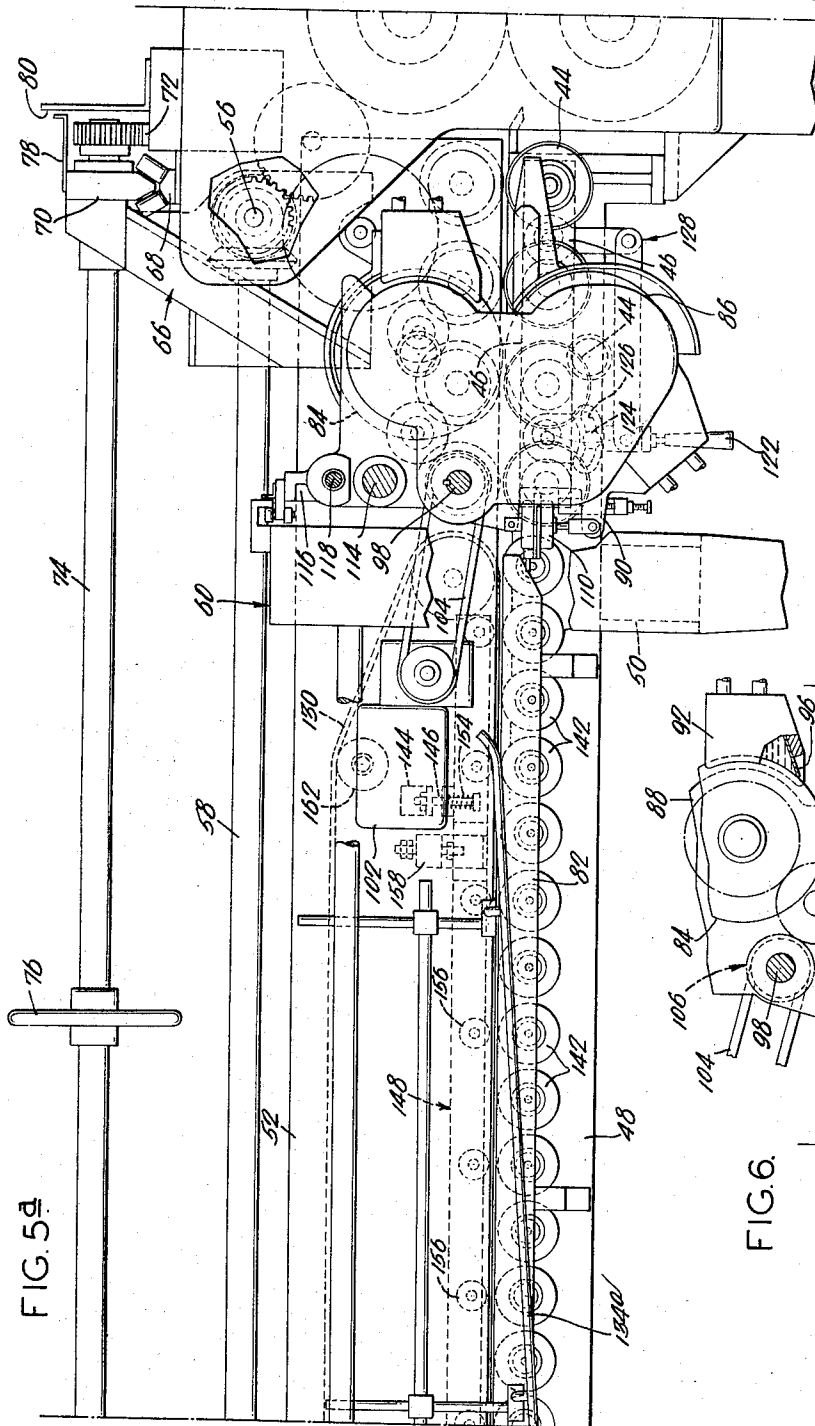


FIG. 5

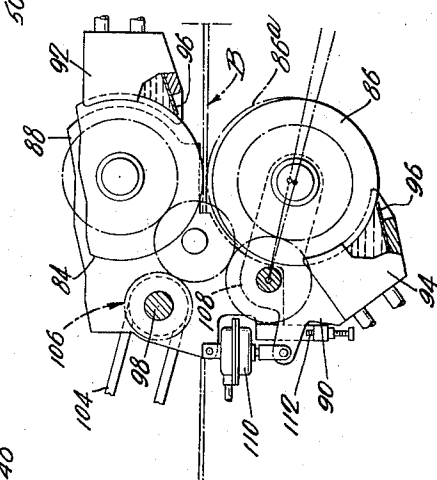


FIG. 6

INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN

BY *Houder & Houder*

ATTYS.

March 5, 1968

H. W. MOSER ET AL

3,371,585

GLUED FLAP BOX FOLDING MACHINE

Filed Oct. 14, 1963

7 Sheets-Sheet 4

FIG. 5b

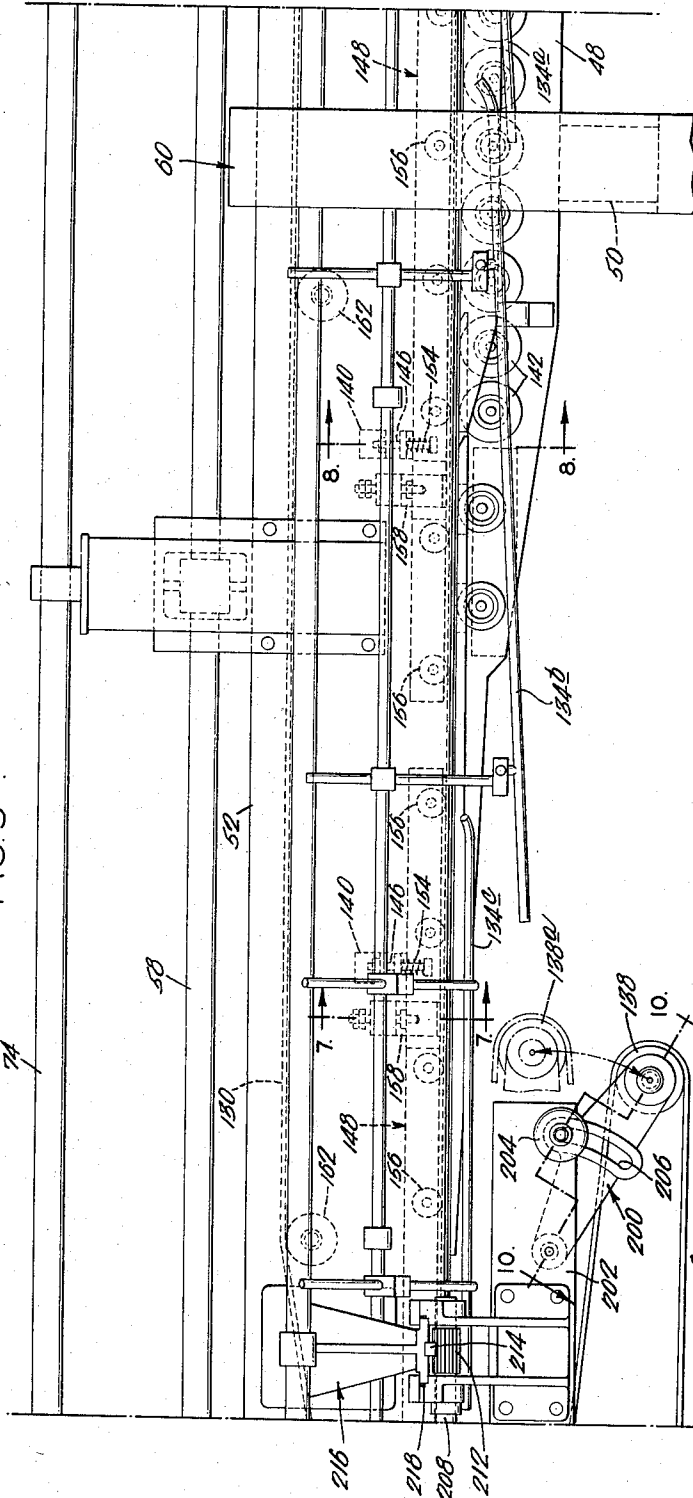


FIG. 8a

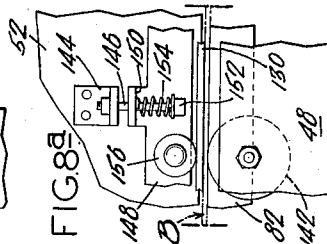


FIG. 8b

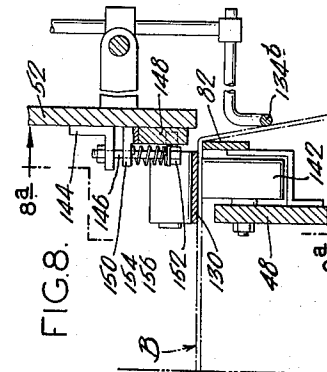


FIG. 7a

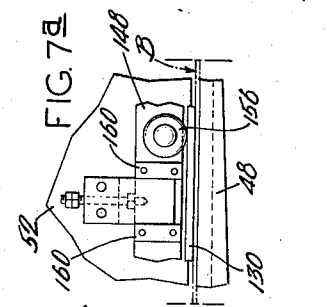
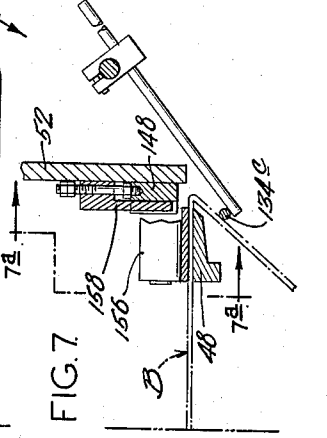


FIG. 7b



INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN

BY *Howdon & Howdon*

ATTYS.

March 5, 1968

H. W. MOSER ETAL

3,371,585

GLUED FLAP BOX FOLDING MACHINE

Filed Oct. 14, 1963

7 Sheets-Sheet 5

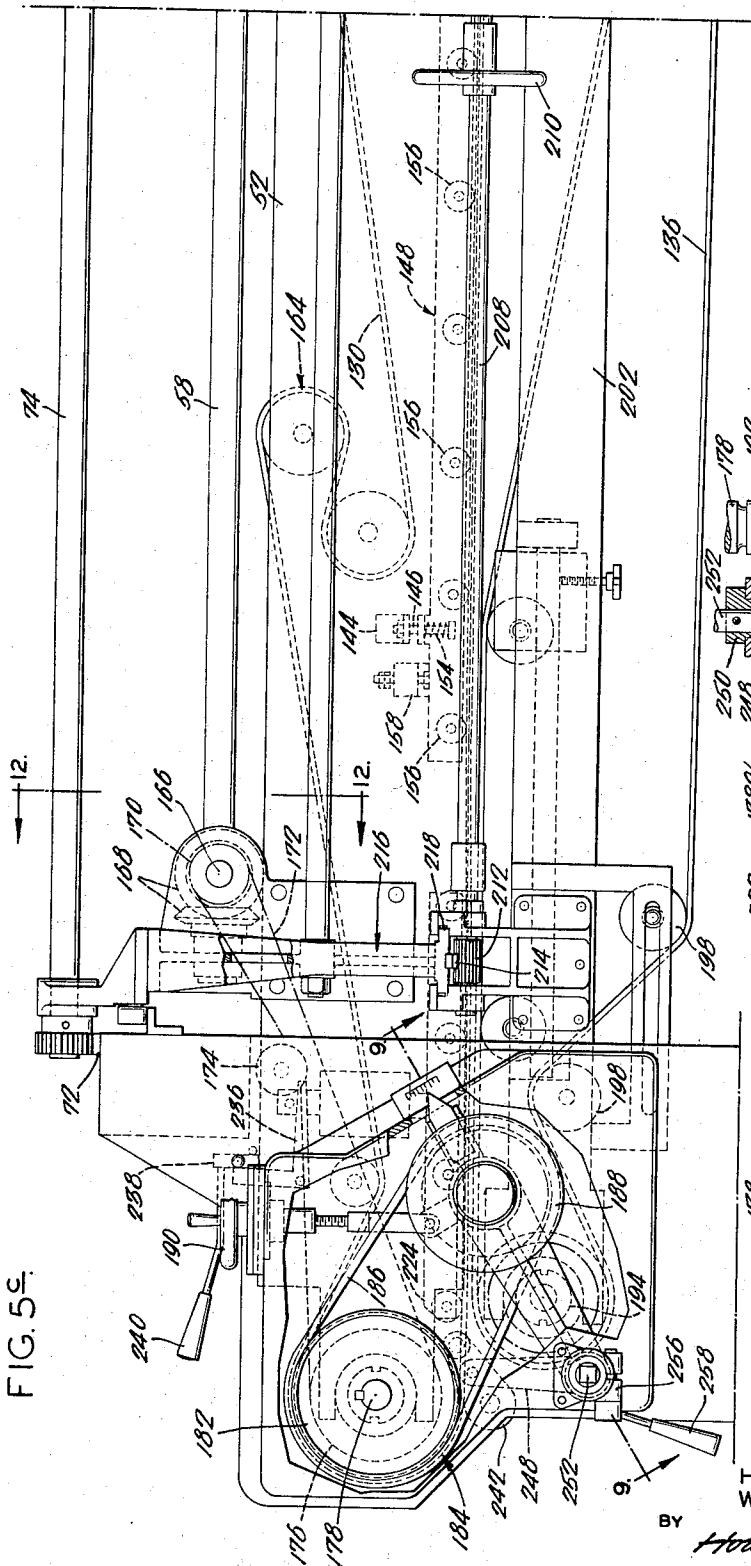
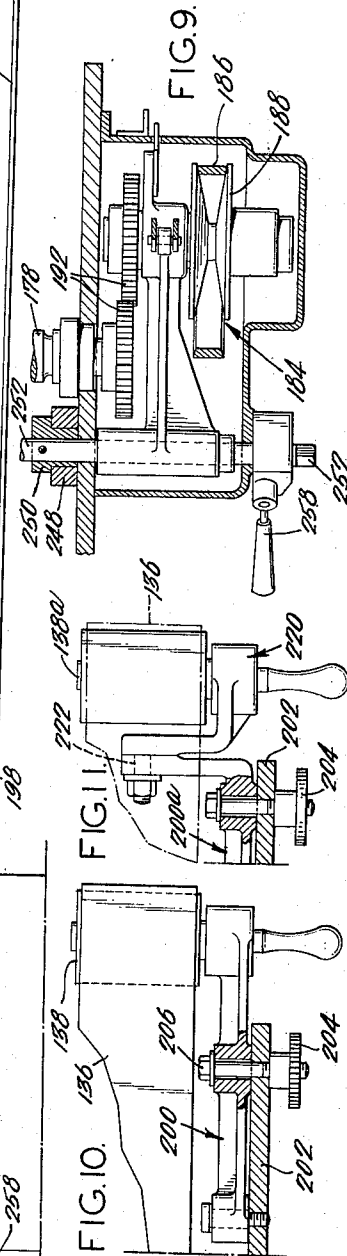


FIG. 5.



INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN

BY

Howdon & Howdon
ATTYS.

March 5, 1968

H. W. MOSER ET AL

3,371,585

GLUED FLAP BOX FOLDING MACHINE

Filed Oct. 14, 1963

7 Sheets-Sheet 6

FIG. 14.

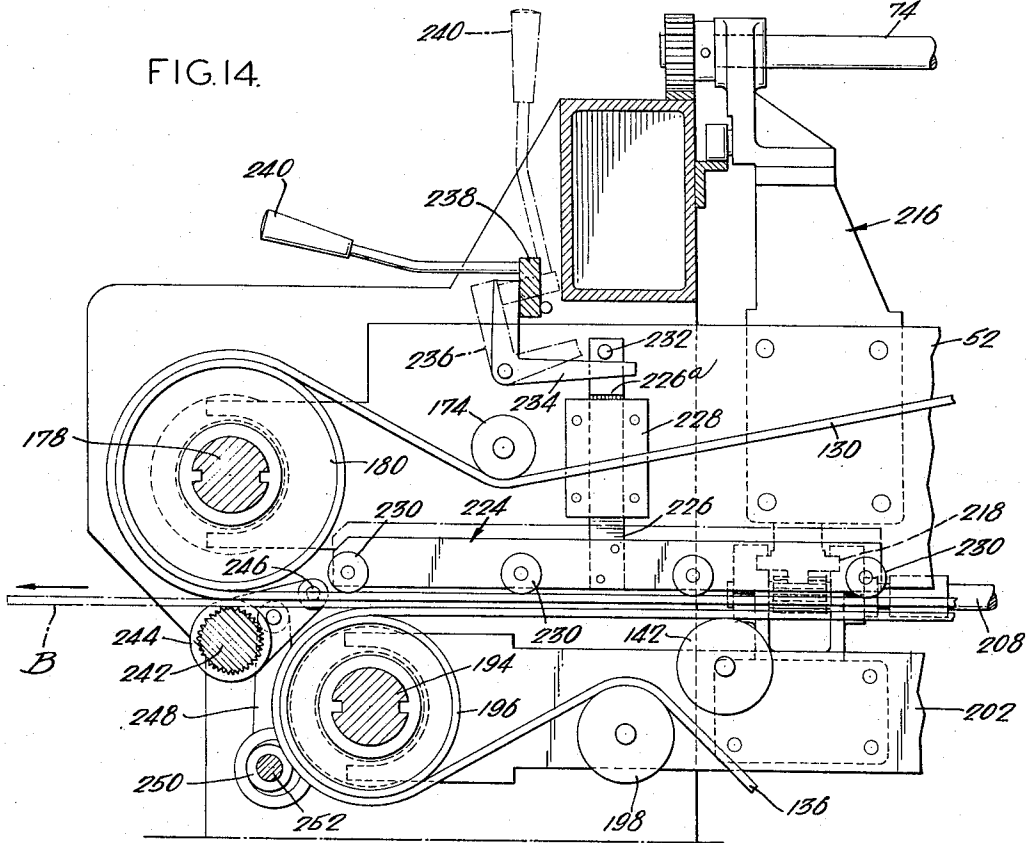
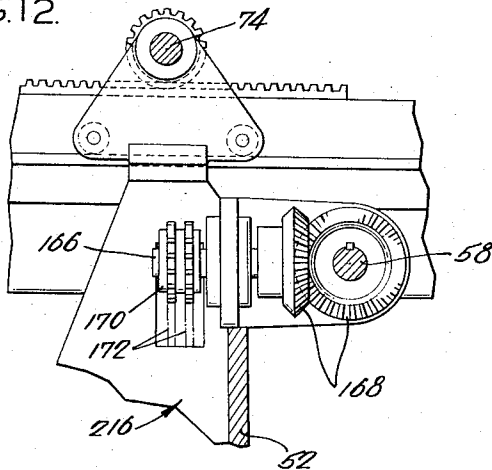


FIG. 12.



INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN
BY *Howson & Howson*
ATTYS.

March 5, 1968

H. W. MOSER ETAL

3,371,585

GLUED FLAP BOX FOLDING MACHINE

Filed Oct. 14, 1963

7 Sheets-Sheet 7

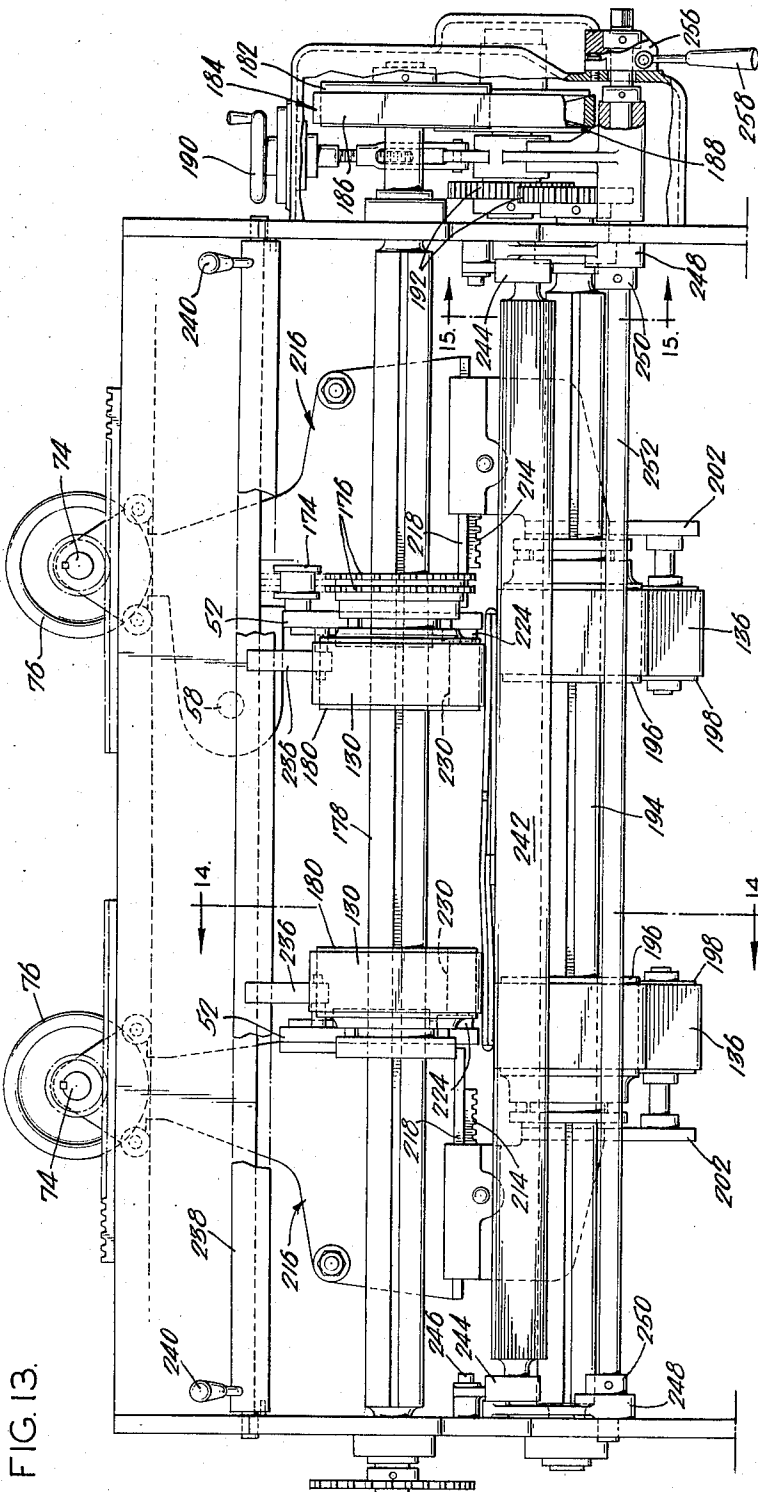


FIG. 13.

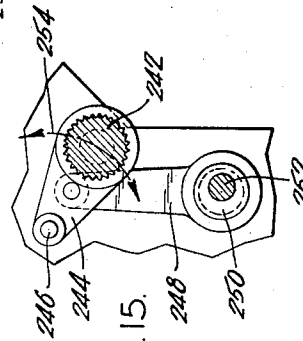


FIG. 15.

INVENTORS:
HENRY W. MOSER
WILLIAM GROBMAN
BY *Howard & Howard*
ATTYS.

1

3,371,585

GLUED FLAP BOX FOLDING MACHINE

Henry W. Moser, Haddonfield, N.J., and William Grobman, Philadelphia, Pa., assignors, by mesne assignments, to The Langston Company, Camden, N.J., a corporation of New Jersey

Filed Oct. 14, 1963, Ser. No. 316,495

9 Claims. (Cl. 93—52)

The present invention relates generally to glued flap box folding machines and more specifically to such a machine having unique features which render it highly desirable in operation and which constitutes an improvement over previously known equipment of this type.

An object of the present invention is to provide in such a machine a folder section which folds the blank downwardly with respect to the printing thereon and wherein the adhesive can be applied selectively either to the top or bottom of the glue flap depending on whether an inside or outside glued joint is desired.

A further object of the present invention is to provide in such a machine means operable so that if the machine is stopped while a box blank is under a glue applicator wheel, the wheel can be so actuated as to drop out of contact and thereby preventing flooding of glue on the box.

An additional object of the present invention is to provide such a machine having a pressure roll throw out feature operable in the event of a box blank jam to facilitate easy jam removal.

Another object of the present invention is to provide in such a machine resiliently mounted pressure rolls for automatic adjustment for board thickness and which can include spring or air mounting means.

A still further object of the present invention is to provide in apparatus of the nature described an arrangement and mounting of fold belts which include easily adjustable means for shifting positions of idler rolls therefore to control the sequence of the final fold and wherein additionally lower folding belts move in a single plane and require no flanged idlers to keep them on the pulleys and wherein no tracking problems of the belt are encountered.

A still further object of the present invention is to provide in such a machine means whereby the speed of a lower belt can be adjusted with respect to the speed of an upper belt to facilitate folding of box blanks having long narrow panels.

Additional objects and advantages of the present invention will be more readily apparent from the following detailed description of an embodiment thereof when taken together with the accompanying drawings in which:

FIG. 1 is a schematic view, in elevation, of an entire machine for providing printed and folded glued flap box blanks of a type in which the present invention is useful;

FIG. 2 is an elevational view, partly in section, of C-frame units utilized for mounting and adjusting the positions of re-scoring means for blanks including a progressive scoring feature;

FIG. 3 is a schematic perspective view illustrating the folding section of the apparatus and illustrating the principles of operation thereof with mechanical elements of the apparatus disclosed;

FIGS. 3a, 3b, 3c and 3d are respectively sectional views taken on lines a—b, b—c, c—d, and d—d of FIG. 3;

FIG. 4 is a view similar to FIG. 3c but disclosing a different positioning of the lower blank folding belts and in a position to provide an inside glue joint rather than an outside glue joint as shown in FIG. 3c;

FIG. 4a is a sectional view showing a joint completed following complete folding subsequent to FIG. 4;

FIGS. 5a, 5b and 5c respectively are fragmentary ele-

2

mental views of three contiguous sections of the machine from the inlet to discharge or outlet end;

FIG. 6 is a fragmentary enlarged view of a portion of the glue applying section showing active and inactive lower glue roll positions;

FIG. 7 is a sectional view taken on line 7—7 of FIG. 5b;

FIG. 7a is a fragmentary sectional view taken on line 7a—7a of FIG. 7;

FIG. 8 is a sectional view taken on line 8—8 of FIG. 5b;

FIG. 8a is a fragmentary sectional view taken on line 8a—8a of FIG. 8;

FIG. 9 is a sectional view taken on line 9—9 of FIG. 5c;

FIG. 10 is a sectional view taken on line 10—10 of FIG. 5b;

FIG. 11 is a fragmentary view of that portion of the machine shown in FIG. 10 but disclosing a modification wherein the lower folding belt can be twisted or placed at an angle for some folding operations;

FIG. 12 is a fragmentary sectional view taken on line 12—12 of FIG. 5c showing driving gearing connections for the lower box blank folding belt;

FIG. 13 is a rear elevational view of the device, parts thereof being broken away for clarity;

FIG. 14 is a fragmentary sectional view taken on line 14—14 of FIG. 13; and

FIG. 15 is a sectional view taken on line 15—15 of FIG. 13.

Referring now to the drawings, there is schematically shown in FIG. 1 a printer-slotter folder-gluer machine which has been shown to illustrate the type of machine in which the present invention is utilized. Generally speaking, the overall machine includes a feeding section as designated at the inlet end of the machine and then subsequent processing sections including printing; slotting and scoring; multi-stage pre-scoring and glueing; folding; and squaring and air hold down. The feeding; printing; and slotting and scoring sections form no part of the present invention and are conventional including the usual type and arrangement of feed rolls 20, printing rolls 22, 24 and the like depending upon the printing to be done, slotting rolls 26 and creasing or scoring rolls 28. As is usual in the printer-slotter section of the machine, the blanks have been printed and scored and slotted with a glue flap formed along one edge thereof. By reference to FIG. 3 of the drawings, a so processed blank is then fed into the next section of the machine having the various crease or score lines 30, 32, 34, 36, 38 and 40 with a glue flap formed at 42 and slots such as at 44, all in a known manner and these operations are performed at suitable locations depending upon the width of the blank and the desired end box to be constructed.

In the past many so processed blanks have been found to be unsatisfactory when erected into boxes and/or during the folding process and difficulties were encountered in control of the gap at the glue joint, squareness and quality of the fold required more than the scores in the press section. It was found that many of these difficulties could be overcome and various portions of the present invention are directed to that end. One step which has been taken following the processing of the blank in the press section and the first operation in the folder-gluer section is the accenting or re-scoring of each 180° score line, where the board is to be folded at an angle of 180°, by utilizing a plurality of pairs of scoring wheels in series. As one example of this, in the multi-stage rescoring and glueing section a series of four pairs of scoring wheels generally indicated at 44 are provided in series. For maximum flexibility, these are so-devised as to permit progressive scoring and the individual wheels can be individually

or gang adjusted. Means are also provided whereby the lateral positioning of these progressive scoring wheels is integral with the folding mechanism as will appear hereinafter. Multiple score lines, it has been found, applied by one pair of score wheels often stretch the liners past their elastic limit. Progressive scoring however avoids this and has permitted 180° folds which are sharply defined and free of blisters and tears. This portion of the apparatus however will be described in the present application with only sufficient detail to lend an understanding thereof and to describe its orientation and coordination with the present invention. The details of that construction are more clearly set forth in copending application Ser. No. 316,067, filed Oct. 14, 1963 and assigned to a common assignee herewith.

The construction and adjustability features of the multi-stage re-scoring section will be more readily apparent from various figures of the drawings including FIG. 2. Each of the folding or support rails 46 has a multiplicity of pairs of scoring wheels where the sheet enters the folder-gluer. In the present machine as shown, there are four pairs of heads 44 on each rail. The lower support rail is carried by lower side frames 48 supported by L-shaped members 50 and the upper ones of the scoring heads or wheels are suspended from upper side frames 52 by means of bearing assemblies and operatively associated with gears 54 in a driving gear train which is so driven as to be synchronized with the linear speed of board moving through the printer-slotter section through connection with power shaft 56 which extends transversely and is operatively connected to longitudinally extending power shaft 58 which is operatively connected with the main drive for the machine. The rails holding the upper and lower scoring wheels are held in fixed lateral relationship to each by means of C-frames 60 mounted on transverse tracks 62 by means of rollers 64 or the like. Upper side frames 52 are supported by brackets 66 which are movable by virtue of track 68 and a trolley carriage arrangement 70 coacting therewith. A rack 72 engageable by pinions in the trolley carriage are utilized to simultaneously move the two C-frames toward or away from one another upon rotation of shaft 74 carrying the pinions by means of handwheel 76 or the like so that the lateral positioning of the scoring heads can be varied and adjusted by means of pointer 78 and scale 80. Suitably mounted fold rails 82 are positioned in alignment with the scoring heads so that the score line remains in fixed relation with the outer upper edge of these score rails and which move with and are adjustable with the scoring heads to later coact with the various other folder mechanisms as will appear hereinafter to insure proper folding of the box blanks.

The function of the re-scoring operation is to improve the accuracy and uniformity with which the box blank can be folded in subsequent operations and fixes the score with respect to the fold bars or rails. By making the score lines in stages, it is possible to make a more sharply defined score line without cracking the liners.

It is also possible to produce a hinge type score line by progressively changing the shape of each score in this type of mechanism, which is not possible with a single impression, but this is explained in greater detail in the afore-mentioned copending application. Additional it is possible to have greater control in scoring board that is very fragile by using air loaded lower scorers or upper scorers.

In this same section of the machine, as the blank travels therethrough, adhesive can be applied either to the top or bottom of the glue flap 42 depending upon whether an inside or outside glued joint is desired. To this end upper and lower glue rolls 84 and 86 are rotatably mounted and carried on upper glue wheel frame 88 and lower glue wheel frame 90. Glue reservoirs 92 and 94 are provided and the glue is metered onto the rolls by means of metering blades 96. Since there are two glue wheels, either one can be used as an applicator or pressure roll. Both wheels

are gear driven in timed relation to board travel through shaft 98 operatively connected to and driven by the main drive of the machine. An overrunning clutch 100 is provided in this drive so that when the machine is shut down an auxiliary drive for the glue wheels can be used to keep the wheels turning to prevent glue from drying thereon. This is accomplished by idling motor 102 having an overrunning clutch thereon and driving through belt 104 and through a suitable gear train, generally designated 106. Lower glue wheel 86 has a pivoted mounting 108 actuated by air cylinder 110 to an up normal glue position shown in dotted lines at 86a and limited by stop 112. When the machine is stopped air is exhausted from air cylinder 110 which permits glue wheel 86 to drop due to its weight out of contact with the blank and the blank also can then drop so as to break contact with upper glue wheel 84. This prevents flooding of glue on the blank.

Lateral adjustment of the glue rolls for different sizes of blanks is possible due to the mounting of the glue wheel frames on shaft 114 carrying an internally threaded arm 116 in operable engagement with threaded shaft 118 rotatably mounted and adapted for rotation through handwheel 120. This permits lateral adjustment in an obvious manner.

Gang adjustment of the lower scoring rolls 44 is obtained by actuation of lever arm 122 pivotally mounted and having a stud 124 slidably positioned in guide 126 and being connected to a parallel operating lever system generally designated 128. Upon movement of lever arm 122 the lower scoring rolls are adjusted as a gang through vertical movement of the support rails 46.

Following the re-scoring and glueing section, the box blanks enter into the folding section of the machine.

Reference is here made to FIG. 3 and sectional views taken therefrom which schematically indicate, together with certain mechanical aspects of the machine, the folding action as the blanks proceed through the machine. The score rails or fold rails 82, as pointed out hereinbefore have their upper edges lying in the lower plane of the blank passing through the machine and the outer upper edge operatively in alignment with the score lines 34, 38. These rails are operatively mounted on and carried by the lower main side frames and extend a substantial distance from the entry end to the completely folded section with respect to the blanks. In this figure, the various pressure and support rolls and the like have been omitted for clarity but will be described later. The blank generally designated B is carried along over the rails 82 and in contact therewith. An upper traction belt 130 passing around entry end rolls 132 and other rolls or cylinders at the discharge end is adapted to be driven in synchronization with the speed of the preceding sections of the machine and has the lower run thereof in frictional engagement with the upper surfaces of the blanks. In this figure, one piece type folding bars 134 are positioned at opposite sides of rails 82 and are so shaped that as the blank passes from the position at section 3a they engage the upper surfaces of the outer panels and progressively fold them downwardly to the positions indicated in sections 3b and 3c. At a position substantially at station 3c the outer panels have been folded through an angle slightly in excess of 90°, approximately 110-120° and have left contact with the rails 82. At this point, the outer panels are engaged by a pair of folding belts 136 entrained over pulleys such as entry end pulley 138 and others and these belts are driven by variable speed drive means as will appear hereinafter. The angular disposition and placement of the belts 136 is such that the folding of these panels of the box blanks is completed as indicated at the position of section 3d and are then discharged onto a delivery belt 140 in the squaring and air hold down section of the machine. Although not shown in the drawings, in this section the blanks are arranged in shingled relationship one to another by virtue of different speeds utilized in the different sections and the blanks are prevented from springing open at the glue joints by means

of air under pressure directed against the upper surfaces of the blanks until such time as the glue has been sufficiently set so that it will not slip or give.

The arrangement of the belts shown in FIGS. 3a-3c is such as to provide an outside glue joint whereas the arrangement shown in FIG. 4 will provide for an inside glue joint which for the most part is that type utilized in the equipment.

In connection with the foregoing description, it is to be noted that in FIG. 3 a one-piece type folding bar has been shown whereas from FIGS. 1 and FIGS. 5a-5b it will be noted that a three-section fold bar is used as indicated at 134a, 134b and 134c. The operation of this is substantially identical as will be readily apparent. A plurality of lower pressure wheels 142 are rotatably carried by lower main side frame and serve in conjunction with upper traction belt 130 to convey the box blanks through the section of the machine during the folding operation. The upper main side frames 52 have angles 144 secured thereto through which depend bolts 146. Support rails for the upper pressure rolls are shown at 148 and positioned therealong are lugs 150 at right angles thereto and through which the bolts 146 extend. The bolt head and washers indicated at 152 serve in conjunction with the lugs 150 to support and confine therebetween springs 154. Upper pressure rolls 156 are rotatably mounted on the support rails 148 and engage the upper surface of the lower run of the upper traction belt so as to maintain tractive force upon the surface of the blanks. The springs 154 are utilized to partially support the weight of the support rails 148 and upper pressure rolls 156 to prevent crushing of the blank passing thereunder. The springs therefore serve to counterbalance the weight of the bar and rollers leaving a net pressure which is enough for traction but not enough to crush the box. The spring mounting also allows the pressure roller assembly to accommodate itself automatically to different flute sizes or thickness of board being processed.

In order to prevent longitudinal movement of the upper pressure rolls in the event of movement, the suspension of the support rail 148 is additionally affected by means of tongues 158 secured to upper main side frame 52 as shown in FIG. 7 and coacting gibs 160, which construction serves to prevent any longitudinal or angular movement of the support rails.

It will be apparent that in place of the spring-type of suspension, an air or other fluid loading mechanism could be utilized to give the same end result, although a particular construction of the same is not shown in the drawings since it is not thought necessary to an understanding thereof.

The upper run of upper traction belt 130 is supported by means of a plurality of idler rolls such as at 162 and including an idler roll couple at 164 for tensioning of the belt. The drive for the upper traction belt is accomplished through transverse shaft 166 which is operatively connected to the main drive system for the machine. Bevel gears 168 transmit this drive to sprocket 170 (FIG. 12) from whence a chain 172, a portion of which passes under and in contact with chain tightener 174 and is thence entrained around sprocket 176 which is splined on transverse shaft 178. This sprocket is also secured by any suitable means to pulley 180 about which is entrained the upper traction belt 130. It will thus be apparent that the upper traction belt is moved in synchronism with the main movements of the other portions of the machine. The pulleys 180 together with sprockets 176 are slidably disposed with respect to shaft 178 and upon lateral adjustment of various portions of the machine to accommodate different sizes of blanks these members will also be equally adjusted.

The shaft 178 extends outwardly of the side frame of the machine which is stationary.

A wheel 182 which is a portion of a variable speed transmission 184 is attached to the end of shaft 178. A belt 186 entrained over wheel 182 is in operative engage-

ment with an adjustable sheave 188 having a sheave adjustment wheel 190 to adjust the sheave and thereby the output speed of the variable speed transmission. Intermeshing gears 192 transmit this output to folding belt pulley shaft 194 which carry thereon folding belt pulleys 196, the fold belts 136 are entrained over these pulleys 196, extend over takeup pulleys 198 which are adjustably mounted as shown and thence are entrained around the entry end pulleys 138. The pulleys 138 are mounted on arms 200 pivotally carried by the adjustably mounted side frames 202 and can be locked in any desired position by means of locking handwheel 204 in conjunction with arcuate slot 206. The arms 200 on opposite sides of the machine are independently adjustable with respect to one another. If the pulley 138 is raised to the position shown at broken lines in FIG. 5b and designated 138a, the fold belt will engage a partially folded flap on a blank earlier than if in the lowered position shown in full lines and this can be used to reverse the fold as hereinbefore described.

In order to permit more precise alignment of the folding belts for use with different sizes of blanks or because of different size end closure flaps on the blanks to permit individual and separate lateral adjustments of the folding belts. To accomplish this, on each side of the machine longitudinally extending shafts are rotatably journaled. These shafts 208 have handwheels 210 thereon to permit rotation. The shafts are journaled in slide sections as will appear hereinafter. Pinions 212 are carried on the ends of the shafts and coact with racks 214 formed on main frame brackets 216. The main frame brackets 216 are mounted on upper side frames 52 for movement therewith under general adjusting procedures. The main frame bracket 216 is supported on rollers in a manner similar to the other end of the machine as previously described. Slide means 218 are provided between the adjustably mounted side frame 202 and the main frame bracket 216. Upon actuation of handwheel 210 and through the medium of shaft 208 and coaction of pinion 212 and rack 214, a relative adjustment of the components can be accomplished in addition to the main lateral adjustment as hereinbefore described.

For some purposes it might be desirable to have the folding belt pulleys tilted angularly disposed to thereby twist or tilt the belt for better contact with the blanks being folded. The embodiment shown in FIG. 10 is for a fixed position of the belt pulley 138. FIG. 11 shows a modification permitting tilting of the belt pulley 138a. The mount for this belt pulley comprises an angled arm 220 pivotally connected at 222 to an arm 200a having a bent upper portion. By means of this pivotal connection, the pulley 138a can be adjusted as described and therewith the belt.

There is always the possibility of a jam occurring due to improper presentation or folding of a box or the like. Means are therefore provided to permit a quick release in case of such a jam to remove a jammed blank. This mechanism is more clearly shown in FIG. 14. A plate 224 on each side of the machine is mounted by means of an extension 226 which connects to the plates and extends through a bracket 228 secured to the upper side frames. The plates rotatably mount pressure rolls 230 thereon which ride on the upper surface of the lower run of upper traction belt 130. The extension 226 has a pin 232 in proximity to its upper end. An arm 234 of a bellcrank lever 236 is operatively engaged with the pin 232. A camming plate 238 is transversely mounted between the fixed side frames of the machine and has a handle 240 secured thereon. In the event a jam occurs, the handle is moved from the full line position shown in FIG. 14 to the dotted line position thereby rotating the camming plate 238 which acts on the bellcrank lever to elevate arm 234 which thereby lifts extension 226 and plate 224 by coaction with pin 232. This of course elevates the pressure rolls 230 from contact with the traction belt and permits removal of the jammed blank. A shoulder 226a is provided which coacts with bracket 228 to limit downward move-

ment of the extension and plate 224 in the event a blank is not positioned at this station to thereby prevent frictional contact and wear between the traction belt and the folding belt. This latter feature of the machine permits a quick release of pressure of the rolls 230 in the event of a jam in this portion of the machine and facilitates removal of a folded box blank which has been jammed.

As can be seen from FIG. 14 of the drawings, the pulleys 180 and 196 at the discharge end of the machine are not in vertical alignment and means are therefore provided to insure continued contact of the blank with the upper traction belt to insure discharge from the machine. This structure includes a transversely disposed serrated kickout roll 242. The pickout roll is trunnioned in arms 244 pivotally mounted on the side frames at 246 at opposite ends of the machine. The arms are also adjustable to permit varying the contact pressure and reference is here made to FIG. 15. Intermediate of the arms 244, there are pivotally connected adjusting links 248 eccentrically mounted at their lower ends by eccentrics 250 secured to shaft 252 which is rotatably mounted in the side frames and has an extension at its right hand end extending beyond the machine and ending in a square head or the like adapted for engagement with an adjusting member such as a wrench. Upon such adjustment, the eccentric will serve to vary the angular position of arm 244 as indicated by arrow 254 to adjust the nip pressure. Locking means are provided for the shaft 252 including a split collar locking member 256 engaged by handle 258 and in operative engagement with a portion of the machine whereby upon rotation, a locking action will take place on shaft 252.

The foregoing description and the mechanism as shown in the drawings are directed to one specific embodiment of the invention, although manifestly the principles involved and portions of the structure are susceptible of incorporation in other and different machines. Manifestly minor changes can be effected in the described and shown mechanism without departing from the spirit and scope of the invention as defined in and limited solely by the appended claims.

We claim:

1. In a glued flap box folding machine, a folder section, folding belts on each side of said section, said belts being so driven as to fold panels of a box blank inwardly from the top and upwardly into juxtaposition with the remainder of the blank, an upper traction belt, pressure rolls above said upper traction belt, and means resiliently mounting said pressure rolls for automatic adjustment for board thickness throw-out means mounting some of said pressure rolls in proximity to the discharge end of the machine and operable to facilitate jam removal.

2. In a machine as claimed in claim 1, lower pressure wheels, said upper traction belt and said lower pressure wheels operable to convey a box blank through the machine, longitudinally extending folding bars preceding said folding belts and operable to fold opposite end panels of a blank down through an angle of greater than 90° and said folding belts thereafter completing the fold to 180°.

3. In a machine as claimed in claim 2, said folding belts moving in a single plane.

4. In a glued flap box folding machine, a folder section, folding belts on each side of said section, said belts being so driven as to fold panels of a box blank inwardly from the top and upwardly to juxtaposition with

the remainder of the blank, an upper traction belt, pressure rolls mounted above said upper traction belt, means resiliently mounting said pressure rolls for automatic adjustment for board thickness, a pair of folding rails below the plane of said upper traction belt, said folding rails being adapted to facilitate downward folding of end panels on a box blank, bending means cooperating with the folding rails to effect partial downward bending of the end panels on a box blank, and means supporting said folding rails and their cooperating bending means for movement toward and away from one another to accommodate different widths of blanks.

5. In a machine as claimed in claim 4, adjustably mounted idler rolls supporting the forward end of said folding belts, adjustment thereof varying the contact point with a portion of a box blank being folded and adaptable for creating an inside or outside glue joint.

6. In a machine as claimed in claim 4, variable speed drive means for said folding belts whereby speed of said folding belts can be increased relative to that of the upper traction belt for optimum folding of long panels.

7. In a machine as claimed in claim 4, upper and lower glue applicator wheels, means driving both said wheels in timed relation with board travel, means pivotally mounting the lower of said glue wheels and operable upon stoppage of the machine to drop said lower glue wheel to thereby remove contact between the board and each said glue wheel.

8. In a box folding machine comprising a folder section having folding belts on each side thereof, said belts being positioned and driven so as to fold downwardly extending panels of a box blank inwardly and upwardly, said section including a pair of upper traction belts parallel to one another, pressure rolls above and engaging a lower run of said upper traction belts, means resiliently mounting said pressure rolls for automatic adjustment of board thickness, a pair of spaced parallel folding rails, said folding rails lying in vertical planes spaced from one another by a distance greater than the distance between vertical planes containing said upper belts, and a pair of frame members mounted for movement toward and away from each other for accommodation of different widths of box blanks, said folding rails being supported by said frame members for movement therewith.

9. In a machine in accordance with claim 8 wherein said bending means includes longitudinally extending folding bars preceding said folding belts, said folding bars being spaced further apart from each other than the distance between said folding rails, said folding bars being positioned to fold opposite end panels of the blank downwardly through an angle of approximately 90 degrees so that completion of folding of the end panels may be accomplished by said folding belts.

References Cited

UNITED STATES PATENTS

2,783,693	3/1957	Felber	93—52
2,911,889	11/1959	Welsh	93—49
2,931,277	4/1960	LaBombard	93—52
3,073,217	1/1963	Spalding et al.	93—52
3,105,418	10/1963	Talbot et al.	93—52
1,849,045	3/1932	Wolf	198—165
3,128,207	4/1964	Schmitt	118—126

BERNARD STICKNEY, *Primary Examiner*.