Dec. 24, 1957 P. G. SCHLEMMER 2,817,199

FOLDING BOX CONSTRUCTION FOR WRAPPING MACHINES

Filed Feb. 26, 1954 5 Sheets-Sheet 1

Fig. 7.

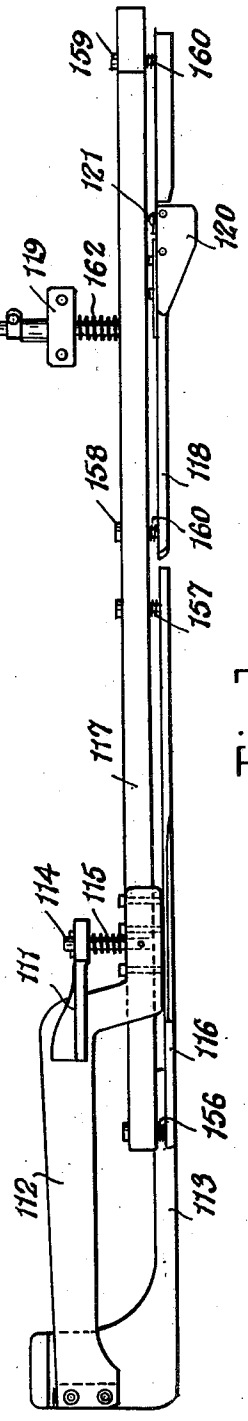
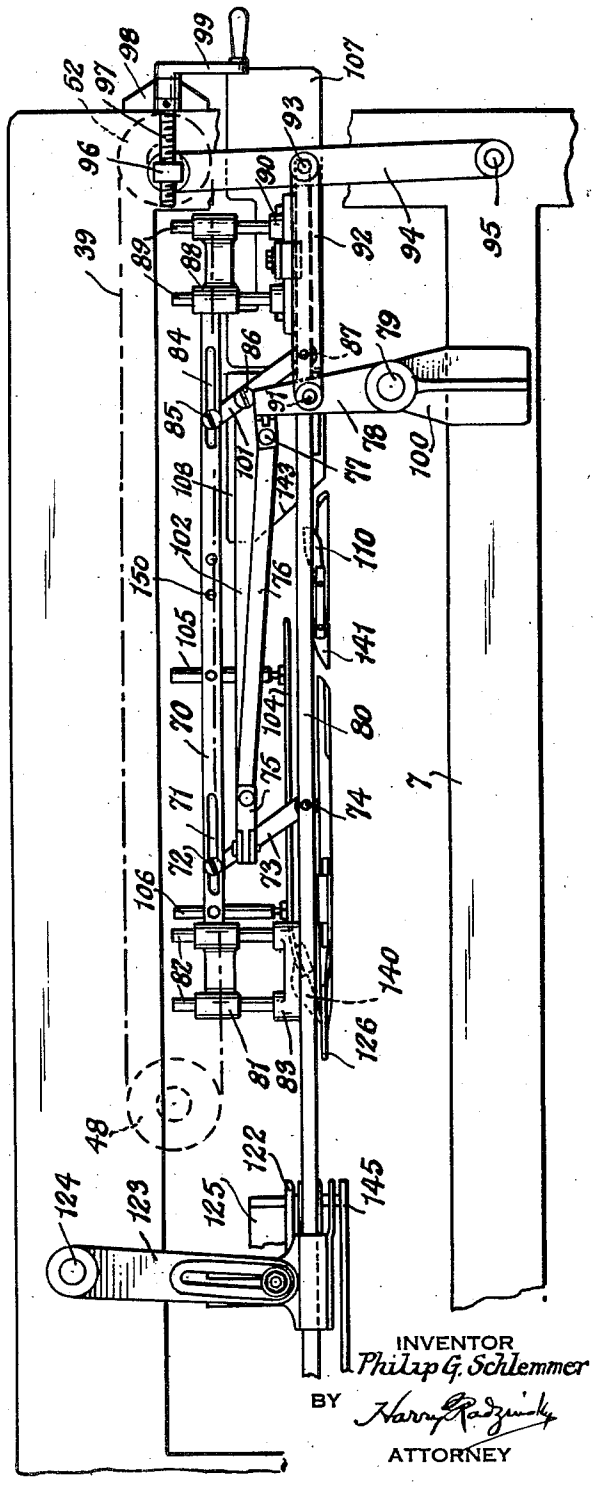


Fig. 1.



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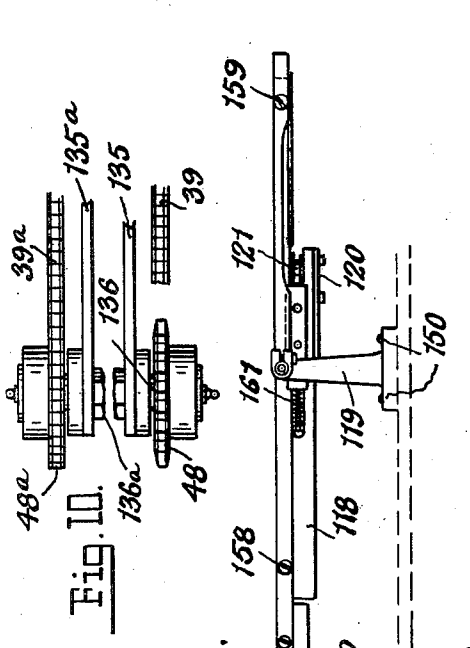


Fig. 10.

Fig. 9.

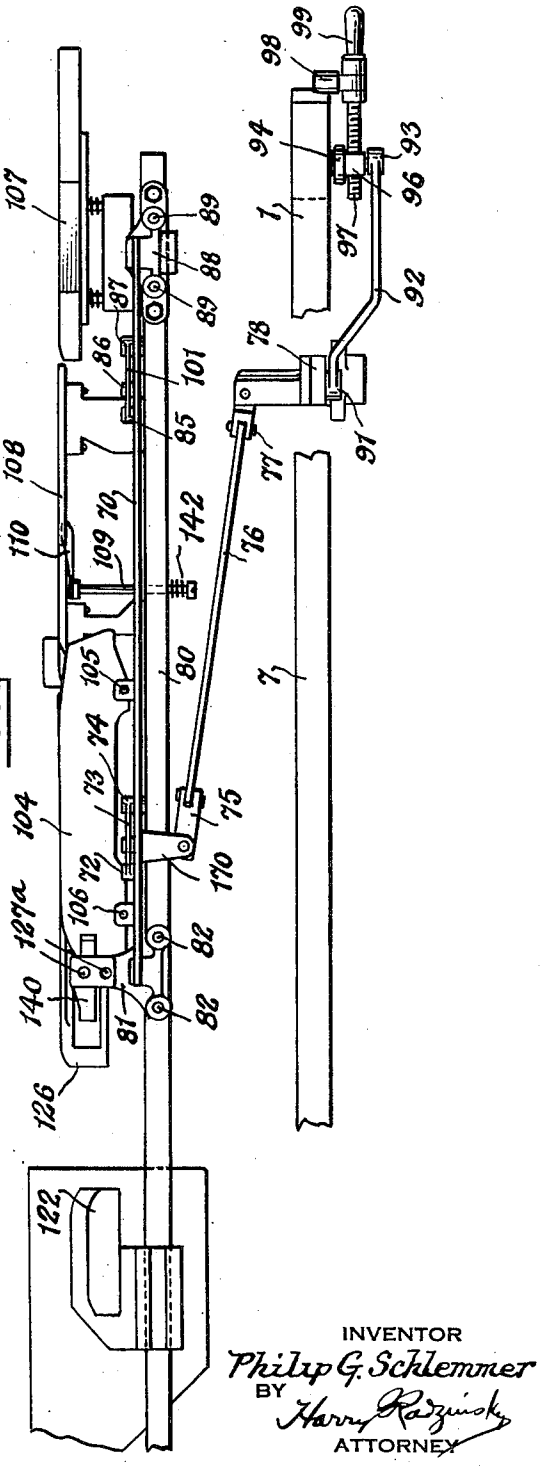


Fig. 2.

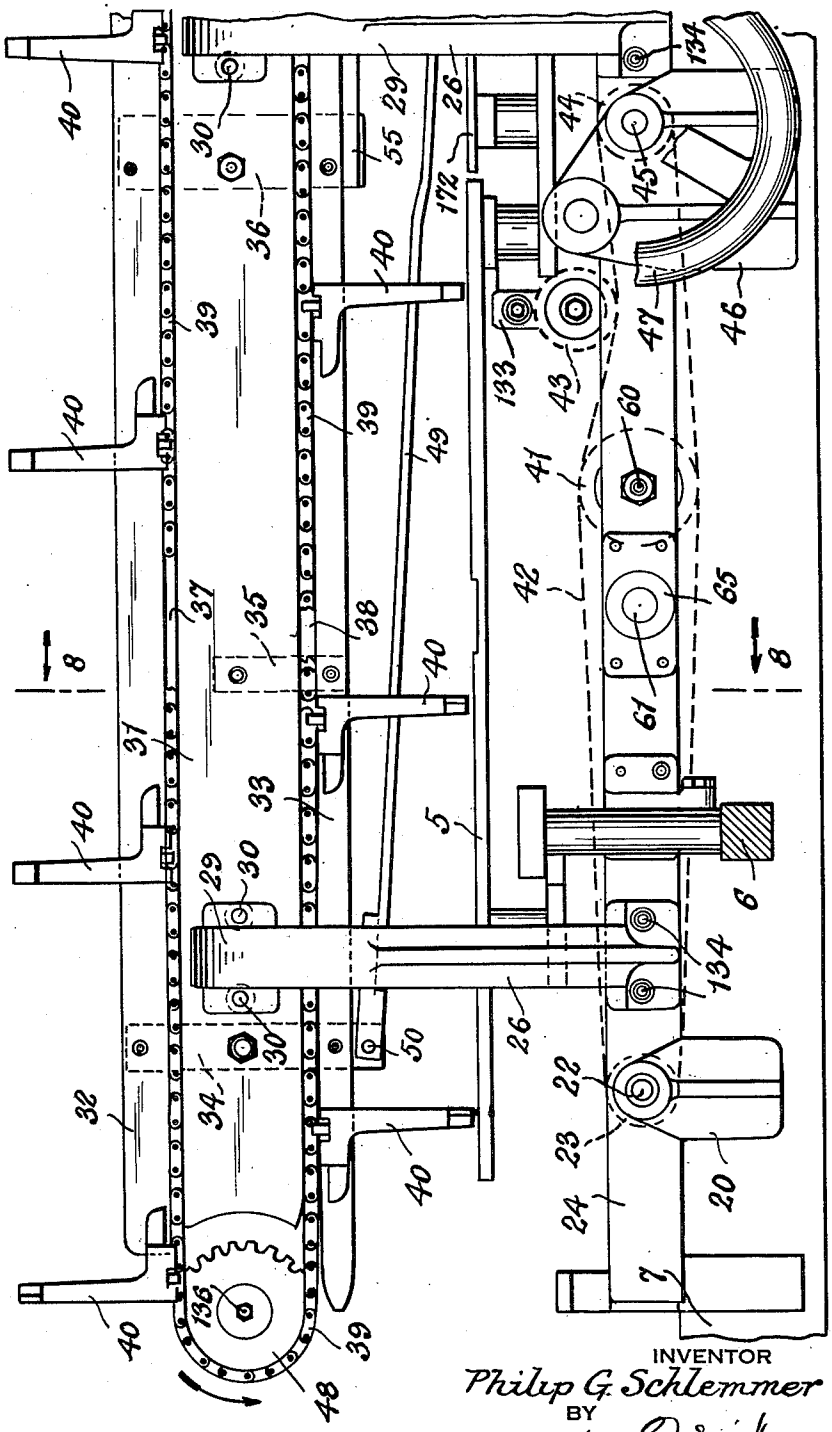
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FOLDING BOX CONSTRUCTION FOR WRAPPING MACHINES

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Fig. 3.



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FOLDING BOX CONSTRUCTION FOR WRAPPING MACHINES

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Fig. 4.

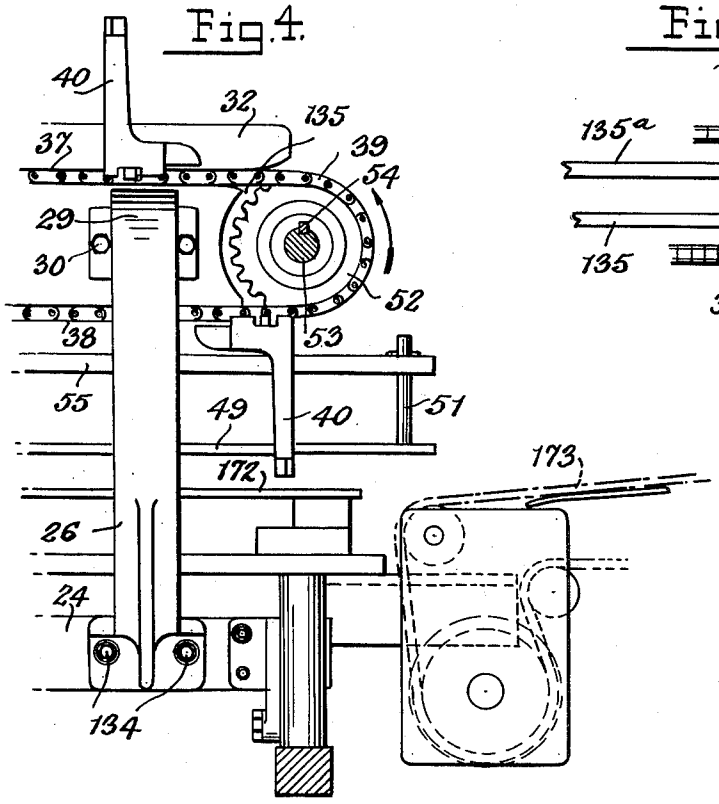


Fig. 5.

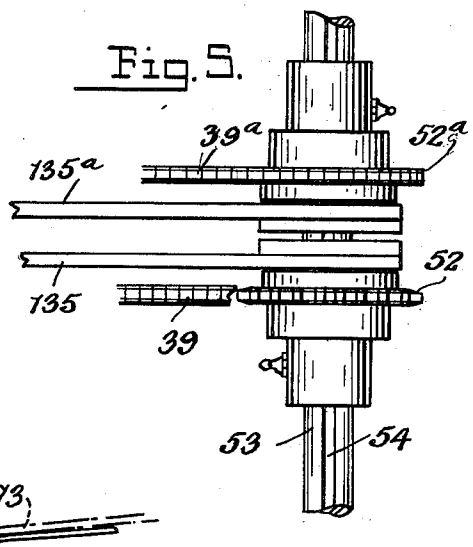
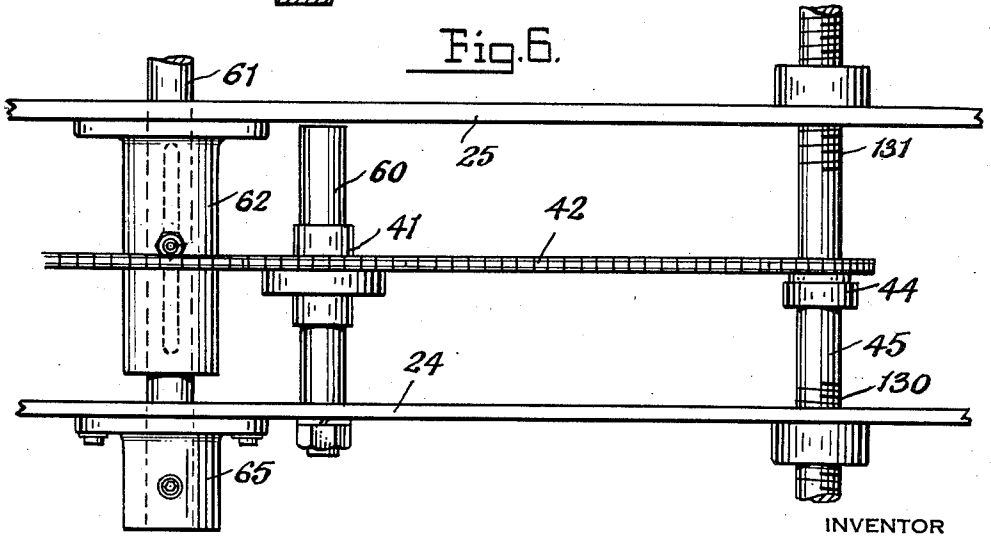


Fig. 6.



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FOLDING BOX CONSTRUCTION FOR WRAPPING MACHINES

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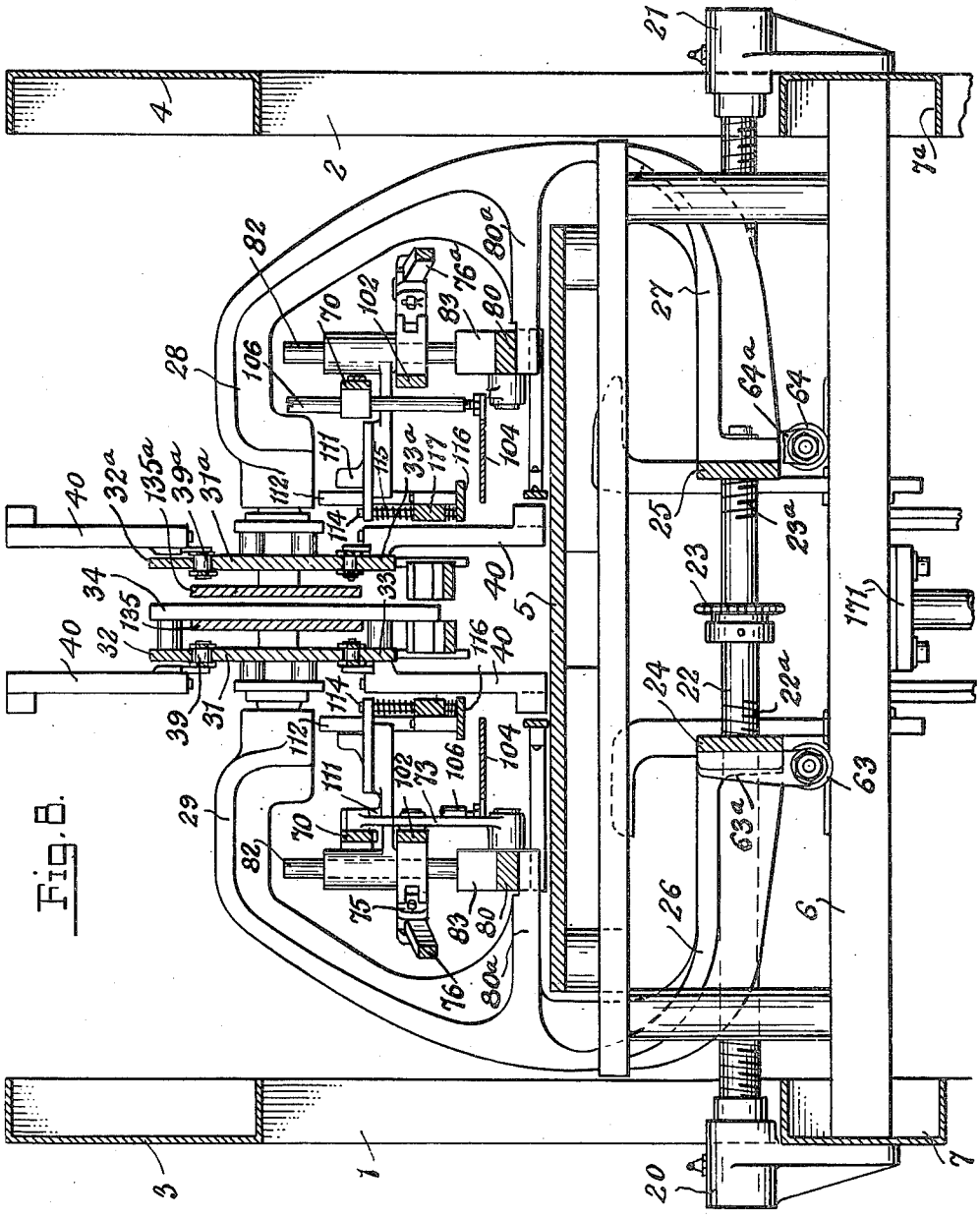


Fig. 8.

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FOLDING BOX CONSTRUCTION FOR WRAPPING MACHINES

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Application February 26, 1954, Serial No. 412,721

3 Claims. (Cl. 53—220)

This invention relates to wrapping machines, and more particularly to that type of machine which wraps boxes or similar articles in cellophane or other suitable sheet material.

Most machines of this character are designed for the wrapping of boxes or similar articles of a given size, and although provision is sometimes made by means of which the machines can be modified or altered to enable boxes of various sizes to be wrapped, the transition from boxes of one size to another is usually one which requires the services of a mechanic, the substitution of parts or different mechanisms, or requires other time-consuming and expensive alterations often involving delay or periods of idleness for the machines.

It is one of the objects of the present invention to provide, in a machine of this character, means by which the wrapping mechanism, or that part of the machine which is generally known in this art as the "folding box," can be adjusted speedily, easily and accurately to enable the machine to accommodate and wrap boxes or other articles of different size.

It is an object of the invention to provide, simple adjustment means by which the path of travel of the boxes during the wrapping operation will be defined by pressure elements and wrapping elements arranged to be moved to or from one another by simple adjustment means to thereby enable the effective size of the folding box to be arranged according to the sizes of the boxes or other articles to be wrapped.

It is an object of the invention to provide adjustment means as above described, which shall be operative by hand operation; which shall not require the use of tools or expert services and which shall not materially delay the operation of the machine when changing from one box size to another.

In the accompanying drawings, wherein an illustrative embodiment of the invention is disclosed,

Fig. 1 is a side elevational view of the folding box mechanism embodying the present invention, with the box-moving means shown in dotted lines;

Fig. 2 is a top plan view of the mechanism shown in Fig. 1;

Fig. 3 is a side elevational view of a portion of the box-moving means;

Fig. 4 is a view of the right end of the box-moving means, this view being a continuation of the structure shown in Fig. 3;

Fig. 5 is a top plan view of the drive shaft and sprockets and chains carried thereby and constituting part of the box-moving means;

Fig. 6 is a top plan view of part of the adjusting means by which the sides of the folding box are adjusted to and from one another;

Fig. 7 is a side elevational view of the top pressure plate assembly of the folding box;

Fig. 8 is a sectional view, taken substantially on the line 8—8 of Fig. 3, looking in the direction of the arrows;

Fig. 9 is a top plan view of the top pressure plate assembly, and

Fig. 10 is a top plan view of the left end portion of the chain drive for the box-moving mechanism.

In a machine of the character of that to which the present invention relates, the wrapping material, which may be cellophane or other suitable sheet material, is generally severed into proper lengths or separate sheets from a supply roll, and the severed sheets are then conveyed to a position above the boxes to be wrapped. The boxes are successively elevated by suitable elevating mechanism and each box is brought up against a sheet which is partially wrapped around it by the elevating movement. The wrapping of the sheet around each box continues as the box and sheet are moved through a folding mechanism or so-called "folding box" and near the outlet end of which heat is applied against the overlapped end parts of the wrapper to thereby seal the same. The wrapped box emerges from the apparatus and is received upon a travelling belt or other conveying device which carries it to a point of removal. In my co-pending application Serial No. 404,430, filed January 18, 1954, now Patent No. 2,751,982, is shown means for severing the sheets of required sizes from the supply roll, and in my co-pending application Serial No. 409,983, filed February 12, 1954, now Patent No. 2,752,152, is shown the mechanism by which the sheets are conveyed to position above the box elevator. The present application relates to the means which moves the boxes through the folding box and the folding instrumentalities thereon, and which means are adjustable to thereby enable boxes of different sizes to be wrapped with a minimum of effort in changing the position of the parts from the accommodation of one size of box to the wrapping of boxes of other sizes.

Referring to the drawings, **1** generally indicates one of the side frames of the machine, and **2** indicates generally the opposite side frame, the frame members being suitably spaced apart and braced in proper relation, one of the brace or cross members therefor being seen at **6** in Figs. 3 and 8. Mounted on the horizontal frame member **7** of the side frame **1**, is a bearing bracket **20**. On the opposite side frame member *7a* is mounted a similar bearing bracket **21**, and rotatively mounted in the brackets **20** and **21** is a threaded shaft **22**, which, as seen in Fig. 8, is provided with two sets of opposite threads indicated respectively at *22a* and *23a*. Threadable on threads *22a* is a longitudinally-extending bar or rail **24**. Threadably mounted on the threads *23a* is a similar bar or rail **25**. This arrangement is such that by rotative movement of the shaft **22**, the two bars or rails **24** and **25** are moved to or from one another to thereby bring the sides of the folding box either toward or away from one another to compensate for boxes of various sizes to be wrapped.

Mounted on the side frame portion **7** is a bracket **46** in which a threaded shaft **45** is manually rotative. A similar bracket, not shown, is located at the opposite side of the machine on the frame member *7a*. Secured on the end of the threaded shaft **45** is a handwheel **47**, by the manual rotation of which the shaft **45** may be turned in either clockwise or counter-clockwise directions. As will be noted in Fig. 6, the shaft **45** is oppositely threaded, as at **130** and **131**, and the bars **24** and **25** are respectively threadably engaged with these separate threaded parts of the shaft **45**. It will be therefore apparent that when shaft **45** is rotated, the bars **24** and **25** may be caused to be adjusted to or from one another.

The shafts **45** and **22** are coupled together for simultaneous rotative movement, by means of an endless chain **42** which passes around a sprocket **44** secured on shaft **45**, and also extends around a sprocket **23** secured on shaft **22** as shown in Fig. 8, wherein the chain is omitted, and also seen in dotted lines in Fig. 3. The chain **42** also extends under an idle sprocket **43** rotatively mounted on a bracket **133** (Fig. 3). A stud shaft **60** is secured to

the bar 24 and extends inwardly toward the bar 25 and a sprocket 41 is rotative and slidably adjustable on the shaft 60. The chain 42 also engages said sprocket 41, whereby the chain is supported and held taut for its length. To aid in maintaining parallelism between the bars 24 and 25, and the parts carried thereby, and to be soon described, the bar 24 carries a boss 65 in which is secured one end of a guide rod 61 that slidably extends through a sleeve 62 secured on the bar 25. This telescopic arrangement of the parts 61 and 62 acts to guide the two bars 24 and 25 to or from one another in parallelism. Rollers 63 and 64 are carried by arms 63*a* and 64*a* on the bars 24 and 25 and the rollers ride upon cross member 6 as bars 24 and 25 are moved toward or away from one another.

The arrangement just described is such that by manipulation of the handwheel 47, shaft 45 will be rotated and through the chain-and-sprocket drive extending therefrom and just described, the shaft 22 will be correspondingly rotated, and hence the bars 24 and 25 can be adjusted to or from one another. Thus, the parts attached to these bars, and to be described, can be suitably adjusted.

Secured by the bolts 134 to the bar or rail 25 is a pair of C-shaped brackets 26, each of which has its upper end 29 secured by bolts or equivalent fastening elements 30, to a plate 31 which is in turn fastened to a parallel plate 135. Located above the plate 31 and spaced therefrom is a guide bar 32, the spacing between the guide bar 32 and the upper edge of the plate 31 being such as to provide a channel 37 (Fig. 3) in which the upper stretch of a box-moving chain 39 travels. Located below and spaced from the lower edge of the plate 31 is a guide bar 33, which provides a channel 38 between its upper edge and the lower edge of said plate 31 for the reception and guidance of the lower stretch of the chain 39. The plate 31 and the guide bars 32 and 33 are held in the spaced relation above described by means of reinforcing cross bars indicated respectively at 34, 35 and 36 secured by bolts or equivalent fasteners to the plate 31 and guide bars.

At one end, beyond the end of plate 31, the plate 135 carries a stud shaft 136 on which a sprocket 48 is freely rotative and the chain 39 extends about this sprocket. At the other end of the stretch of the chain is located a sprocket 52 (Figs. 4 and 5) which is keyed on the drive shaft 53, as indicated at 54, in a manner to rotate the sprocket 52 when the shaft 53 is rotated, but to permit adjustment of the sprocket 52 longitudinally of the shaft. The drive shaft 53 is driven in any suitable manner from the main shaft or other drive element forming a part of the machine.

The arrangement at the opposite side of the machine is similar to that just described, and as seen in Fig. 8. That is to say, at the opposite side of the machine there are two C-shaped brackets 27 secured at their lower ends to the bar 25 and having their upper ends secured to the plate 31*a*, fastened to plate 135*a*. Guide bars 32*a* and 33*a* function similarly to those indicated respectively at 32 and 33, and guide the chain 39*a*, which extends at one end around the sprocket 53*a*, rotative with and slidably mounted on the drive shaft 53. At the opposite end, the chain 39*a* extends around sprocket 48*a* rotative on stud shaft 136*a* secured on the plate 135*a*. Attached to the chains 39 and 39*a* are the pusher fingers 40 which operate, when the chains move in the direction of the arrows in Figs. 3 and 4, to move the boxes along on the supporting table 5 and through the folding box mechanism.

From the description of the apparatus thus far given, it will be apparent that the conveyor chains 39 and 39*a* may be adjusted to or from one another the required distance to enable the pusher fingers 40 to properly engage and move boxes of various lengths. This adjustment is attained by simple rotative movement of the hand wheel 46.

In Figs. 1, 2, 7 and 9, the folding box mechanism will be seen. This mechanism was not shown in Fig. 3 to avoid obscuring the box-moving means shown in that figure. It will be noted that at the right a bracket 98 secured to the frame 1, rotatably receives a threaded shaft 97, which is provided with a crank 99 on its end and by which said threaded shaft 97 can be manually rotated. The threaded shaft 97 threadably extends through a block 96 pivotally carried at the upper end of a lever 94 which is pivoted at its lower end on the frame 1, as indicated at 95. A link 92 has one end pivotally attached at 93 to the lever 94 and has its other end attached at 91 to a lever 78 which is pivoted at its lower end at 79 to bracket 100 fastened to the frame member 7. A link 76 has one end attached to a universal coupling 77 secured to the upper end of lever 78. The second end of the link 76 is attached to a universal coupling 75 attached to a lug 170 extending from a link 73. The coupling 75 also receives one end of a link 102 (Fig. 1) which has its other end attached at 86 to link 101.

The link 73 is provided at its upper end with a pin 72 which is slidable in an elongated slot 71 formed in a rail 70. The lower end of the link 73 is pivotally attached at 74 to a bar 80 which, as seen in Fig. 8, is attached to an inwardly-extending arm 80*a* formed on each of the C-shaped brackets 26. These brackets and the box-moving means associated therewith, have been omitted from Fig. 1 in order to prevent obscuring of the folding box mechanism therein shown.

The link 101 has a pin 85 at its upper end slidable in an elongated slot 84 in the rail 70 and the lower end of the link 101 is pivotally attached at 87 to the bar 80 that is carried by the C-shaped brackets 26 as heretofore explained. In its raising and lowering movements, the rail 70 is guided at one end by the posts 82 which extend upwardly through a bracket 81 provided at this end of the rail 70. The posts 82 have their lower ends secured in a base 83 fastened to the bar 80. The opposite end of the rail 70 is provided with the bracket 88 vertically slidable on the posts 89 having their lower ends fastened in the base 90 mounted on the bar 80. The foregoing arrangement is such that by turning the crank 99, the bar 70 will be raised or lowered and hence the parts carried thereby, as described, will be raised or lowered and thus the effective height of the folding box arranged accordingly.

Secured to the bar 70 are spaced vertical posts 105 and 106 and adjustably attached at the lower end of these posts is a plate 104 which is provided at one end with a pivoted side tucker finger indicated at 140. In the folding operation, this finger co-operates with a side tuck folder 126 located below it. This finger 140 is carried by plate 104. The pivoted arrangement of the tucker finger 140 is such as to permit its end or terminal to maintain its operative position despite the various positions of elevation of the rail 70 and parts carried thereby. The lower crease folder is shown at 141; the side creaser finger is seen at 110, the same being normally urged upwardly by torsional spring 142 surrounding the stem 109 on which the finger 110 is secured (Fig. 2). The inclined surface shown at 143 on plate 108 constitutes the means by which the top flap at the end of the wrapper is downturned into its final position. The spring-pressed heater for one of the ends of the folder wrapper is disclosed at 107.

The means for folding parts of the wrapper, as herein disclosed, is known in this art and hence the parts which actually crease and fold down parts of the wrapper are not herein described in great detail, the present invention primarily relating to the manner in which the parts of the folding box are adjustable to enable boxes of various sizes to be accommodated.

In Fig. 1 the female interlocking side tuck folder is shown at 122 and the same carries the box ejector 125 which acts to move the box away from its initial wrapping position and into the folding box. At the

lower end of the side tuck folder **122** is the bottom lap folder **145**. Lever **123**, secured on shaft **124** is oscillated by suitable means to move the tucker as required to perform the known folding operation.

The top tension pressure plate assembly will be seen in Figs. 7 and 9. This assembly is omitted from Fig. 2 to avoid obscuring the box end-folding means therein shown. The assembly shown includes a bracket **111** which is secured by the bolts **127** extending into the holes **127***a* of the bracket **81** mounted on bar **80**. The assembly also includes a bracket **119** secured by the fastening elements **150** to the rail **70**. This arrangement is such that when the rail **70** is raised or lowered by manipulation of the crank **99**, the tension plate assembly will be moved with said rail **70**. The top pressure plate assembly includes a guide shoe **113** at one end vertically guided by the slot **155** in a bracket **112** fastened to the front top tension pressure plate **116**. A rail **117** is provided with an upstanding pin **114** movable through a hole in bracket **111**, and a coil spring **115** is interposed between the bracket **111** and rail **117**. Springs **156** and **157** are interposed between the front top tension plate **116** and the rail **117**. The rear top tension plate is shown at **118** and the same carries pins **158** and **159** surrounded by the pressure springs **160**. Folder **120** operative to initiate the first downfold of the top flap of the wrapper, is carried by plate **118** and is spring mounted as at **161**, and a follower roller is employed at **121**.

The mechanism shown in Figs. 1 and 2 and 9 is intended for one side of the folding box, and is that which is carried by the brackets **26**. As will be noted from Fig. 8 this mechanism is substantially duplicated at the opposite side of the machine and is supported by the brackets **27**. Thus, the folding of the parts of the wrapper at both ends of the boxes to be wrapped, occurs simultaneously. It will be noted however, that only a single crank **99** is required to operate to move the rails **70** on opposite sides of the machine upward or downward simultaneously, this effect being attained by providing two of the arms **78** on the single shaft **79** which extends across the machine. One of these arms **78** is that shown in Fig. 1. The other arm is a similar one secured on the opposite end of the shaft **79** and attaches to the link shown at **76***a* in Fig. 8.

From the foregoing, the operation of the apparatus herein disclosed will be readily understood. The boxes to be wrapped are moved upwardly upon elevating means, a portion of which is generally indicated at **171** in Fig. 8. The sheet to be wrapped about the box has been brought to a position above the box and as the box rises, the sheet is partly brought around the box. The tucking devices **122** and **126** infold the parts of the wrapper at the ends of the box and fingers **40** start movement of the box through the folding box wherein the various folding elements **141**, **110** and **143** operate to complete the end-folding of the wrapper. The parts **116**, and pressure plate **49**, pivoted at **50** on bar **34**, maintain the box under pressure as it is moved along the surface of the table **5**. The end of the pressure plate **49** is movably supported by the pin **51**, seen in Fig. 4. As the box passes from the table **5** it is received by the heater plate **172**, which heats the underside overlap of the wrapper and the ends of the then folded wrapper are heat-sealed by the two heated pressure plates **107**. Finally, the wrapped box emerges onto a travelling belt **173** or other suitable conveying means, shown in Fig. 4, which carries it off to a point of removal.

By means of the arrangement herein described, the mechanism is adjustable in a manner to raise or lower the upper pressure means on the box; to raise or lower the wrapper-folding instrumentalities, or to bring the same to or from one another to accommodate boxes of various size, and to regulate the spacing between the box-moving chains. These adjustments are obtained solely by hand-wheel or crank operation and thus the machine readily can be adapted to boxes of various sizes without delay or mechanical change of parts.

Having described a single embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. In an apparatus of the character described, an oppositely-threaded shaft, crank means on one end of said shaft by which the same is rotated, a pair of spaced, parallel bars respectively in threadable engagement with the opposite threads on said shaft and moved toward or away from one another by rotative movement of the shaft, brackets secured to the bars, a member supported by each of the brackets, a rail movably carried by each member and supporting a plurality of wrapper-folding elements, the rails being capable of raising or lowering movements relatively to the bars, linkage extending from the rails, a threaded adjusting shaft, a crank secured on said adjusting shaft, the linkage being connected to said adjusting shaft in a manner to cause raising or lowering movement of the rails when the adjusting shaft is rotated by crank operation, pressure means carried by the rails for holding boxes on a support, a support on which the boxes are moved, chain conveyors for moving the boxes along on said support, the conveying means being adjusted at various distances apart by adjustment of the brackets to or from one another to accommodate such conveying means to boxes of different lengths.

2. In an apparatus of the character described, a threaded shaft, means for manually rotating the shaft, a pair of spaced, parallel bars threadably engaging the shaft and caused to be adjusted toward or away from one another by rotative movement of the shaft, a bracket secured to each bar and extending upwardly therefrom over an article support, each bracket carrying a conveyor chain whereby the chains are adjusted toward or away from one another by movements of the brackets, an elongated member carried by each bracket, a rail carried from each elongated member and mounted for raising and lowering movement with respect thereto, linkage coupling the rails to the elongated members, each rail carrying a plurality of wrapper-folding elements, the brackets each carrying an upper pressure plate whereby said pressure plates are moved toward or away from one another on adjusting movements of the brackets, and a manually-rotated adjusting shaft, the linkage being connected thereto in a manner to cause raising or lowering of the rails.

3. In an apparatus of the character described, a box support, a plurality of endless chains operative above the support, fingers on the chains for moving boxes along on the support, a folding box through which the boxes are successively moved, said folding box including side frames carrying folding elements operative upon the end portions of a wrapper on the box to thereby infold said wrapper ends against the opposite ends of the box, means for manually adjusting the side frames toward or away from one another to thereby regulate their relative spacing to accommodate boxes of various lengths, said adjusting means consisting of oppositely-threaded shafts, brackets caused to be moved by rotation of said shafts, the side frames being supported by the brackets, a crank-operated rotating threaded shaft, pressure means forming part of the folding box, said pressure means being carried and adjustably moved by the side frames of the folding box, and linkage extending from the pressure means to the crank-operated rotating threaded shaft whereby a raising or lowering of said pressure means is attained by rotation of the crank-operated shaft.

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