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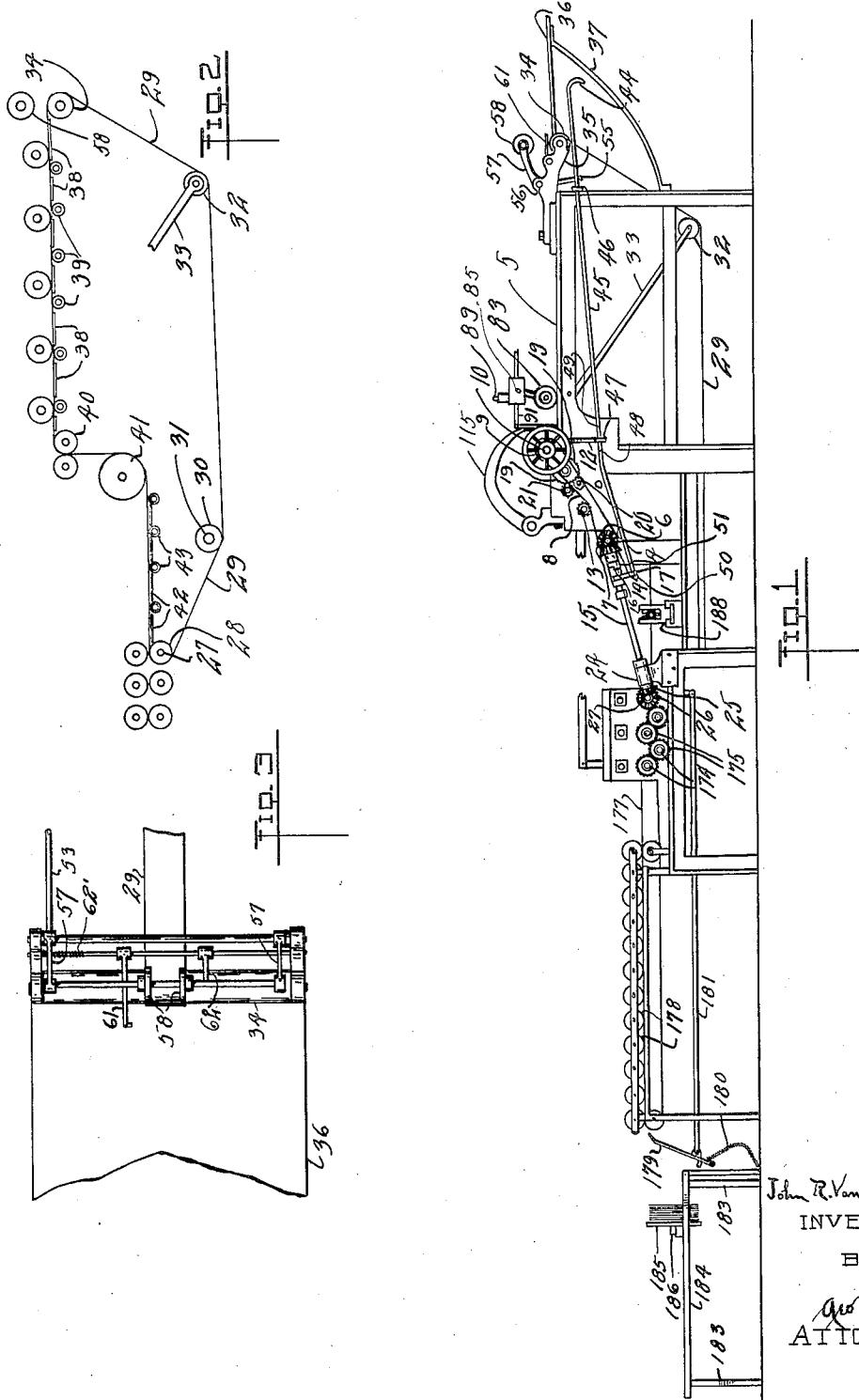
J. R. VAN 'WORMER

1,897,715

KNOCK-DOWN BOX MANUFACTURE

Filed June 16, 1924

5 Sheets-Sheet 1



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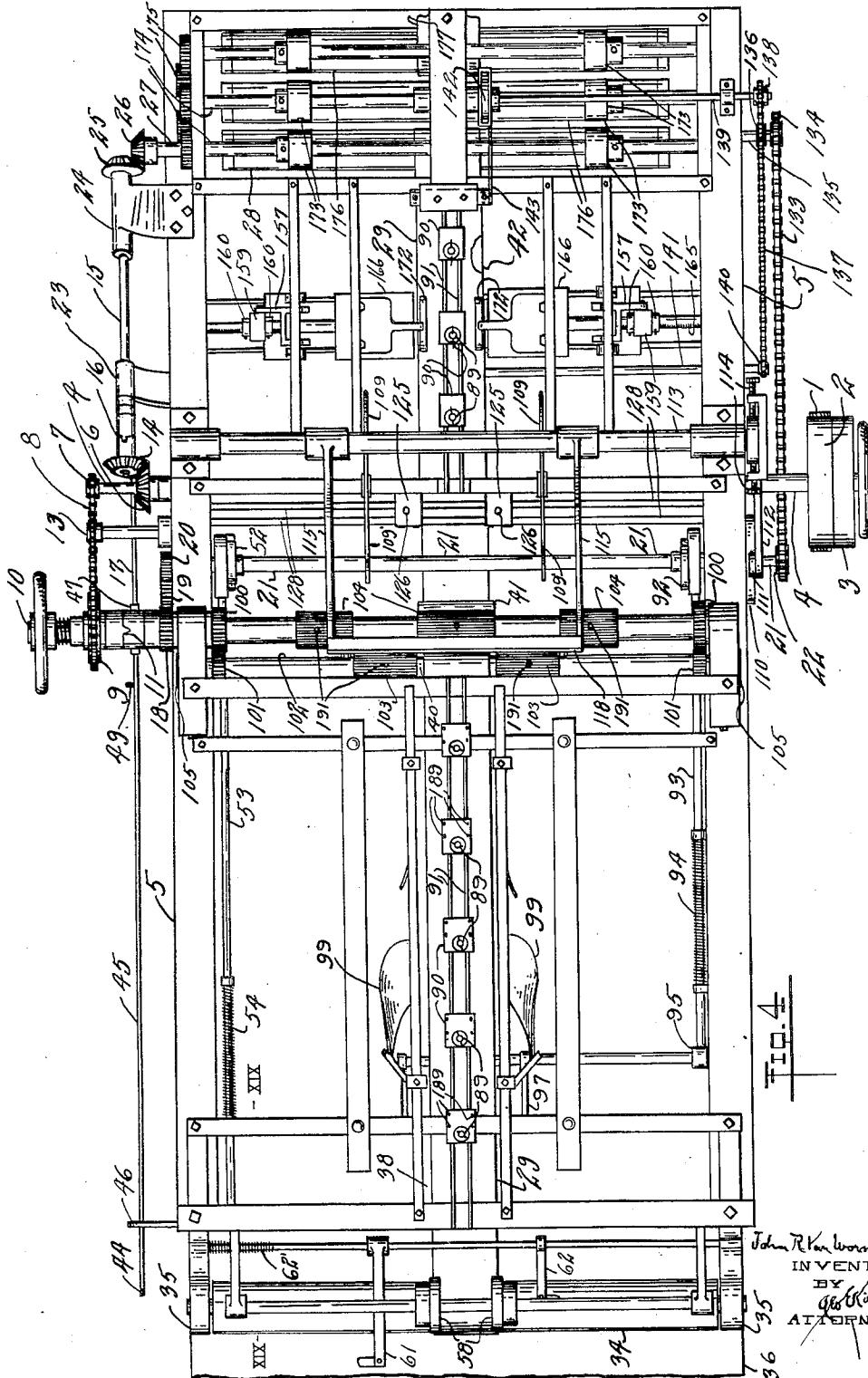
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KNOCK-DOWN BOX MANUFACTURE

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5 Sheets-Sheet 2



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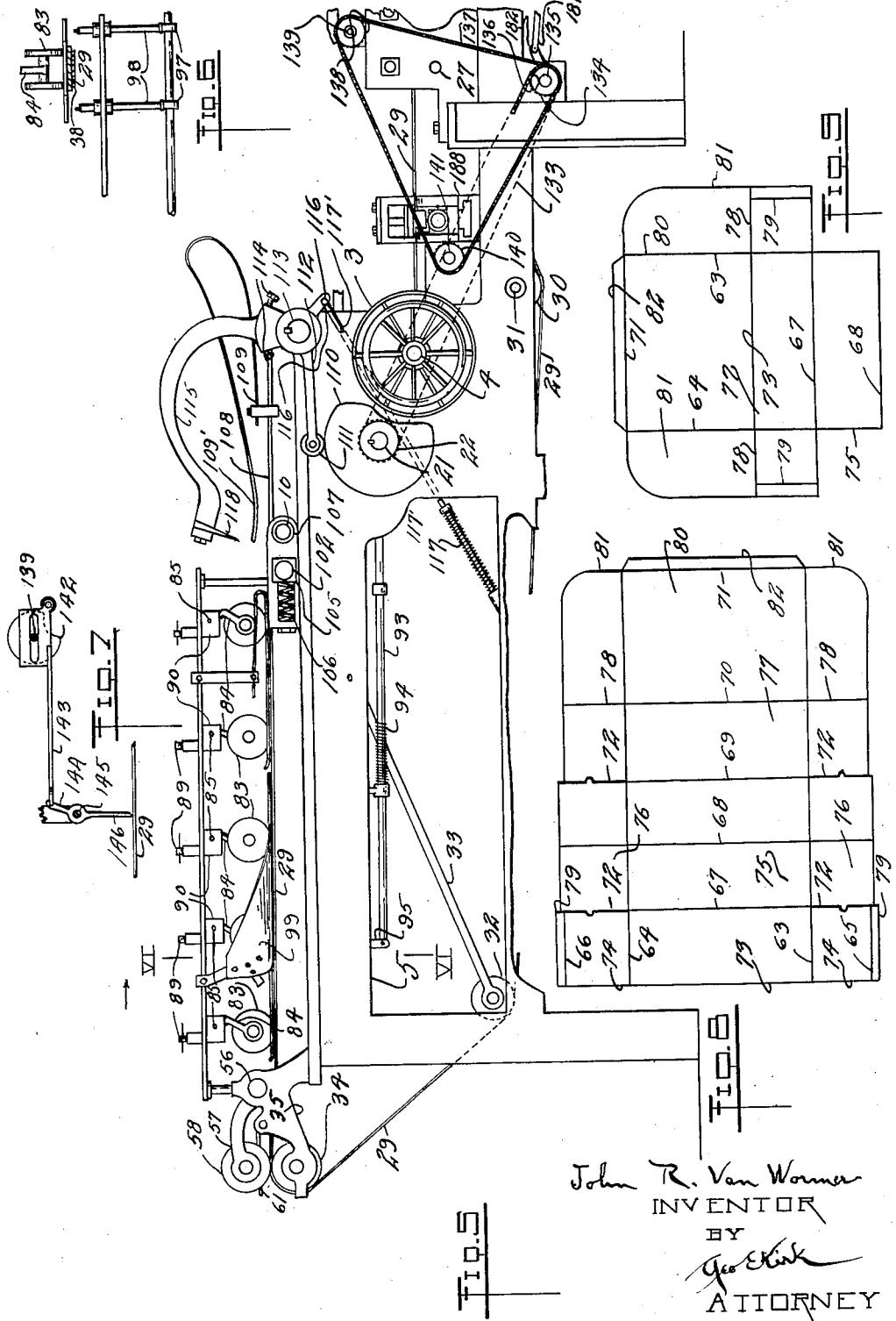
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KNOCK-DOWN BOX MANUFACTURE

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5 Sheets-Sheet 3



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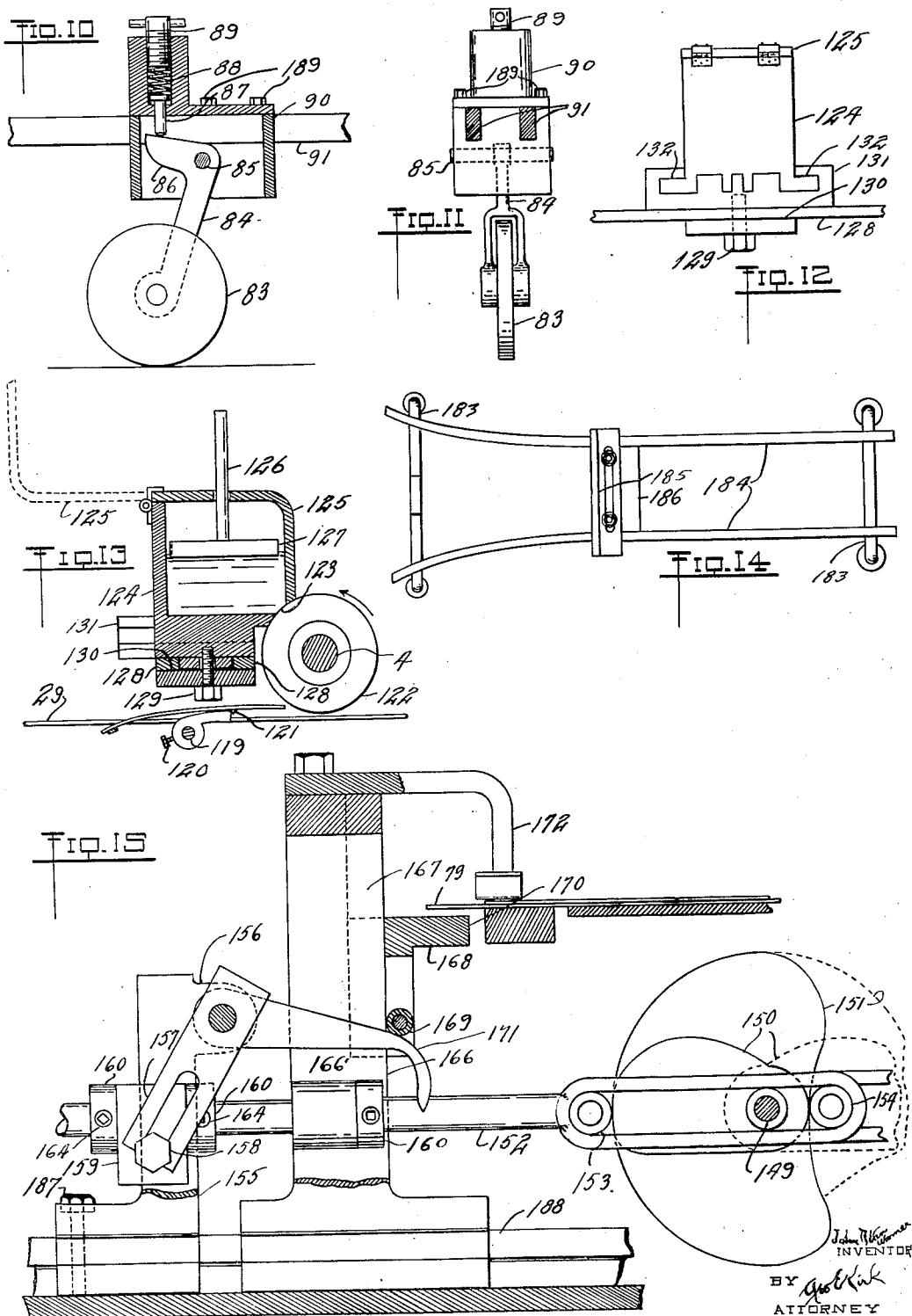
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KNOCK-DOWN BOX MANUFACTURE

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5 Sheets-Sheet 4



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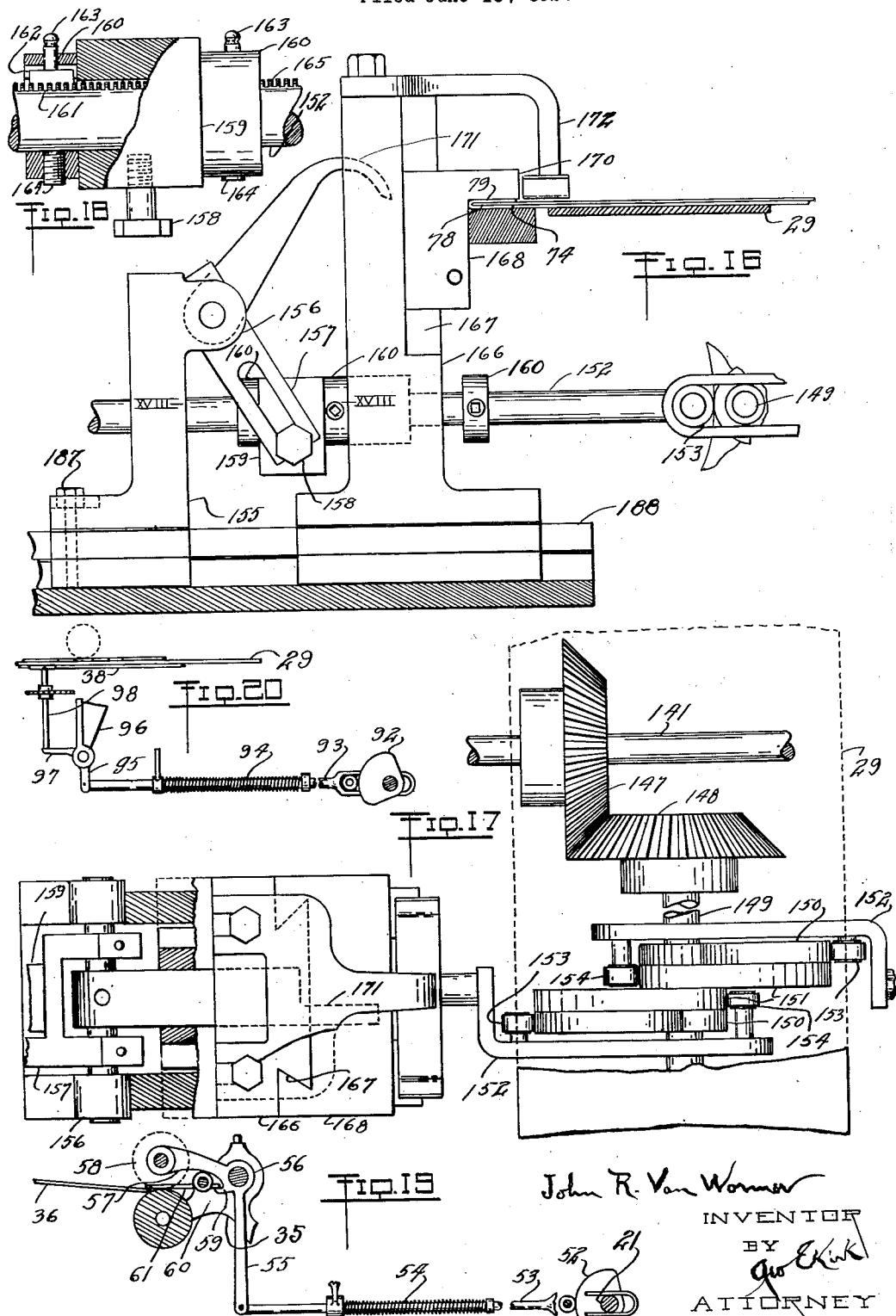
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KNOCK-DOWN BOX MANUFACTURE

Filed June 16, 1924

5 Sheets-Sheet 5



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KNOCK-DOWN BOX MANUFACTURE

Application filed June 16, 1924. Serial No. 720,307.

This invention relates to improvements in knock-down box manufacture for making cartons of paper, cardboard, fiber composition or other similar material, and more particularly to the operation of folding and glueing and flattening the initial sheet of material out of which the carton is to be formed.

A further object of the invention is to provide an apparatus for forming and glueing the knock-down cartons in a manner which will permit the easy opening and formation of the carton in a simple manner.

A further object of the invention is to provide an apparatus in which the folding, glueing and flattening operations are completely accomplished in a single machine and delivered therefrom in knock-down form and in condition to be packed for shipment.

A further object of the invention is to provide an apparatus which is of simple construction, is strong and durable, and well adapted for the purpose described.

With the above and other objects in view, the invention consists of the improved knock-down box manufacture and its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawings in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a side view of the machine for forming knock-down boxes, parts broken away;

Fig. 2 is a diagrammatic view of the rollers and the path of travel of the conveyor belt forming part of the machine;

Fig. 3 is a fragmentary top view of the feed table of Fig. 1, parts broken away;

Fig. 4 is a top view of the forward portion of the machine;

Fig. 5 is a side view of the forward portion of the machine, on the opposite side to that shown in Fig. 1 and on a larger scale;

Fig. 6 is a transverse sectional detail view taken on line VI—VI of Fig. 5 of the machine, showing manner of first holding the box plank;

Fig. 7 is a side detail view of the interceptor and connected parts for holding the blanks while adhesive material is applied thereto;

Fig. 8 is a side view of one of the blanks used in forming the knock down box;

Fig. 9 is a top view of a glued box in knock-down form as produced from the blank shown in Fig. 8;

Fig. 10 is a vertical detail view of a guide roll with connected parts in section;

Fig. 11 is a vertical detail view of the parts shown in Fig. 10 but at right angles thereto;

Fig. 12 is a detail rear side view of the adhesive carrying reservoir showing its closed side and its adjustable mounting;

Fig. 13 is a vertical sectional view of the adhesive carrying reservoir and connected parts;

Fig. 14 is a top view of the receiver for the completed knock-down boxes;

Fig. 15 is a detail longitudinal, vertical sectional view on a larger scale, of the folding portion of the machine at the start of the third folding operation, parts being broken away;

Fig. 16 is a similar view to Fig. 15 with the parts in the position of completing the flexing and flattening operation for folding the box;

Fig. 17 is a top view of the sealing effecting cams and other parts associated therewith as shown in Fig. 16, and also including the drive therefor and portions of the sealer;

Fig. 18 is a longitudinal sectional detail view on a larger scale taken on line XVIII—XVIII of Fig. 16;

Fig. 19 is a vertical sectional detail view of the blank receiving feed control taken on line XIX—XIX of Fig. 4; and

Fig. 20 is a detail side view of the first longitudinal folding effecting means coacting during the travel of the blank, at right angles to the view shown in Fig. 6.

Referring to the drawings the reference numeral 5 indicates a main frame upon which is journaled the main transverse driving shaft 4 having fast and loose pulleys 100

3 and 2 respectively positioned thereon. A driving belt 1 (shown in Fig. 4) extending around loose pulley 2 may be shifted to fast pulley 3 to drive the machine. The main driving shaft 4 extends transversely through the main frame 5, and at its opposite end portion carries a bevel pinion 6 and a sprocket wheel 7, the latter being on the outer end of the shaft. The sprocket wheel 7 has a sprocket chain 8 extending there-around and also around a sprocket wheel 9 which is journaled on a shaft 10 also extending transversely of the frame 5. The sprocket wheel 9 is provided with a clutch hub face 11 positioned to engage a complementary clutch member mounted fast on the shaft 10 to drive said shaft. A depending rock arm 12 controls the reciprocation of the clutch 11 to engaging and disengaging positions. A chain tightener guide 13 is provided for the sprocket chain as shown in Fig. 4.

Main drive

The bevel pinion 6 is in mesh with a bevel pinion 14 loosely mounted on a rearwardly and downwardly extending shaft 15 journaled on one side of the main frame 5. Clutch elements 16 are formed in part on the pinion 14 and controlled by a depending arm 17 for drivingly connecting the said pinion to the shaft 15.

The shaft 10, near the clutch 11, is provided with a pinion 18 which is in mesh with an intermediate gear 19, and said gear 19 is in turn in mesh with a gear 20. Said gear 20 is mounted on one end of a transverse shaft 21 extending transversely through the main frame 5, and on the opposite side of the frame carries a sprocket wheel 22 as shown in Figs. 4 and 5.

Conveyer belt

The downwardly and rearwardly extending shaft 15 journaled in main frame bearings 23 and 24, has a bevel pinion 25 mounted on its lower end which is in mesh with bevel pinion 26 mounted on shaft 27. Said shaft 27 extends through and is journaled transversely in the frame 5 and carries a long roller 28 as a main driving means for a conveyer belt 29. The conveyer belt passes around the main driving roller 28 and extends downwardly and around an idler guide roller 30 carried by a transverse shaft 31, thence around a belt tightener roller 32 carried by an adjustable arm 33 swung downwardly from the upper portion of the main frame 5. From this point the belt conveyer 29 extends upwardly and around a terminal roller 34 carried by brackets 35 mounted on the main frame and extending towards the feed table 36, as clearly shown in Figs. 1, 2, 4 and 5. From the terminal roller 34 the belt 29 passes over the way 38 having rollers

39, thence around roller 40 and then downwardly and beneath the large idler roller 41 and over guide rollers 43 to the drive roller 27 before mentioned.

Clutch control

Adjacent the feed table 36 is located a handle 44 connected to the bar 45 which is carried by guides 46 and 47 mounted on the main frame 5. The bar 45 has pins 48 and 49 coacting with the arms 12 and pins 50 and 51, and also with the arm 17 so that by thrusting the arm 44 away from the table 36, the operator can simultaneously shift the arms 12 and 17, and thereby disconnect the main driving shaft 4 from driving connection with the parts of the machine actuated by the sprocket chain 8 and the shaft 15. The reverse reciprocation of the bar 45 serves to simultaneously connect these parts for operating the machine.

Feed control

The transverse shaft 21 adjacent one end portion is provided with a cam 52, as shown in Figs. 4 and 19, for thrusting the bar 53 towards the table 36 and against the resistance of the spring 54 surrounding said bar. The thrust movement of the bar 53 is against the depending arm 55 of a lever fulcrumed on a shaft 56 and having upper arms 57 which carry a pair of feed rollers 58, so that in the timed relation of the rotation of the shaft 21, the feed rollers 58 are swung upwardly to clear the conveyer belt 29 which is traveling over the roller 34 adjacent the table 36. The lever arms 55 and 57 carry a finger 59 movable to turn a rock bar 60, and swing stop members 61 and 62 (Figs. 4 and 5) mounted on said bar 60, downwardly against the resistance of torsion spring 62.

The blank

The blank used in forming the box is shown in Fig. 8, and comprises a sheet of material having longitudinal parallel lines of spaced scorings 63 and 64, short longitudinal lines of scorings 65 and 66, and spaced transverse scorings 67, 68, 69 and 70. The blank has cut in portions 72 from the intersections of scorings 67 and 69 with the scorings 63 and 64. The scorings 63, 64 and 67 form one side 73 of the box and said side is provided with fractional end portions 74 extending therefrom. The scorings 63 and 64 between the scorings 67 and 69 form the box bottom 75 and said bottom portion is provided with end portions 76 extending beyond the scorings 63 and 64.

The scorings 63 and 64, between the scorings 69 and 70, form a box side 77 opposite to box side 73 and is formed with fractional end extensions 78 which coact with the ends 74. Extensions 79 from the ends 74 are

coated with an adhesive to cause the ends 74 to adhere to the end portions 78. The scorings 63 and 64 between the scorings 70 and 71 form the top portion 80 of the box 5 and said top portion is provided with tuck-in end flaps 81, and a tuck-in terminal tongue 82.

Blank guidance

10 The box blank in flat condition with its scoring groove on its lower side is placed on the table 36 in position to have its tongue 82 coact with the stop 62, and with the edge of the flap 81 resting against the stop 61 15 as the pair of receiving rolls 58 are raised. This movement positions the end portions of the box blank upon the conveyer belt 29 adjacent the roller 34 to prevent travel of said blank on said belt due to the stops 61 20 and 62. As the shaft 21 is continuously rotated, the cam 52 is effective in permitting the spring 54 to swing the pair of receiving rollers 58 downwardly to yieldingly engage the box blank resting on the belt. Simultaneously with this engagement, the stops 61 and 62 are moved out of the path of travel of the engaged box blank, and the blank will be immediately moved by said belt, thus providing for the blanks being 30 intermittently fed into the machine in a timed and registered sequence. The box blank is moved by the belt in the region of the guide 38 and supporting rollers 39 therefor.

35 During this travel, definite guidance of the box blank is provided by mounting over the belt 29, justifier rolls 83 either singly or mounted in pairs. Said rolls are carried by and journaled in depending bell crank 40 arms 84 mounted on fulcrum pins 85 connected to the frame 5, and the horizontally extending arm portions 86 of said bell cranks are yieldingly engaged by pins 87 as shown in Fig. 10. Springs 88 yieldingly 45 hold the pins in engagement with the arm portions 86 and the tension of said springs may be adjusted by screws 89. The last mentioned parts forming guide roll assemblies are mounted in housings 90 carried by 50 bars 91. This construction provides for adjusting the tension of the rollers 83 upon the blanks carried by the belt 29 to more firmly hold the traveling blanks in position on said belt.

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First end fold

The shaft 21 on its end remote from the gear 20 and cam 52 carries a cam 92 which coacts to thrust bar 93 against the tension 55 of spring 94 (Figs. 5 and 20) to rock the angle levers 95 carried by bracket 96 mounted on the main frame 5. Said angle levers 95 have their upper arms 97 extending towards the feed table 36 and engage plungers 98 for thrusting said plungers upward as

the ends 76 of the blanks pass thereover. This movement of the parts folds the end portions 76 on the score lines 63 and 64. The end portions 76 as thus folded upwardly during their travel, pass under adjustable curved guide means 99 to further direct the said end portions 76, during their travel, into completely folded down position against the inner side of the bottom portion 75 of the blank. The partly folded 75 blank now travels with the belt 29 to the roller 40.

Mid-bottom transverse fold

The shaft 10 has mounted thereon adjacent the inner sides of the frame 5, pinions 100 which are in mesh with pinions 101 mounted on an adjacent parallel shaft 102 which carries the roller 40 and the milled adjustable roller sections 103. Said milled rollers are staggered with relation to milled roller sections 104 mounted on the shaft 10. 80

The shaft 102 is journaled at its opposite ends in bearing blocks 105 slidably positioned in bearings 107 mounted on the main frame 5, and yieldingly engaged by springs 106 positioned in the bearings 107 to force the shaft 102 towards the shaft 10. 85

The partly folded blank, having its ends 76 folded towards each other, passes over the roller 40, and upon engaging the milled rollers 103 is forced off the belt 29 and forwardly upon guides 108 and will be moved to the adjustable stops 109. 90

The portion of the shaft 21 projecting outwardly from one side of the main frame 5 and adjacent the sprocket wheel 22 carries a cam 110 which is engaged by a roller 111 carried by an arm 112, and said arm is adjustably mounted on a rock shaft 113 by set screws 114. Folder arms 115 are also mounted on the rock shaft 113, and likewise arm 116 which is pivotally connected to a downwardly extending rod 117. A coiled spring 117 surrounds the lower portion of the rod and bears against the frame and the rod and indirectly yieldingly holds the roller 111 in engagement with the cam 110. 100 As the shorter radius of the cam 110 is reached by the roller 111, the folder arm 115, which has a toothed or plate portion 118 at its free end, will be forced downwardly by the said cam 110, and the toothed or plate portion 118 will strike downwardly on the score line 68 of the blank. This movement will fold the inwardly folded end portions 76 as well as the bottom portion 75 of the blank transversely as distinguished from the longitudinal fold occurring during the travel of the blank to the transverse folding position. 110

115 After the transverse folding operation the partly folded blank is redelivered to the conveyer belt 29 by passing between the milled rollers 103 and 104 on the relatively 120 125 130

yieldable shafts 10 and 102. Adjustable guide arms 109 limit the upward flapping of portions of the blank during the last mentioned folding. From the rollers 103 and 104 the partly folded blank is carried by the belt beneath the idler roller 41 and then travels with the belt 29 in a horizontal direction. The breaking of the crosswise scores in the blank is effected by the passage 10 of the collapsed blank around roller 41.

Adhesive applying device

15 Adjacent the main shaft 4 and parallel therewith is journaled a bar or shaft 119 (Fig. 13) provided with spring guide arms 121 adjustably connected thereto by set screws 120. These yielding guide arms 121 serve to direct the blank extensions 79 from 20 the end portions 74 upwardly against the adhesive applying rollers 122 which are mounted on the main drive shaft 4. Said rollers 122 bear against and close outlet 25 openings 123 formed in adhesive carrying reservoir 124 carried by the main frame 5. Preferably the adhesive material used is in the form of a glue which may be applied cold.

30 The adhesive reservoir 124 has an angularly shaped hinged cover 125 through which the stem 126 of a packer head or piston extends, to permit thrusting the head downwardly to force the adhesive material towards the outlet opening and the adhesive 35 applying roller 122. Extending in a plane parallel to the bar or shaft 119 are spaced mounting strips 128 to form a groove or slot for adjustably receiving the lower ribbed portion of the reservoirs 124. Bolts 129 extending through cross bars 130 and the slot and threaded into the bottom portions of 40 guide tracks 131 adjustably hold the guide tracks in position. The guide tracks extend longitudinally of the frame 5. The reservoir 124 is formed with flanges 132 which coact with the guide tracks in permitting the reservoirs to be adjusted toward and away 45 from the adhesive applying rollers 122.

As the shaft 4 rotates continuously during the operation of the machine, even though the conveyer belt be idle, the adhesive material in the reservoirs will not bind the rollers to the reservoirs during said operation.

Blank guiding

Guide rollers similar to rollers 83 carried by the housing 90 engage the twice folded blank in traveling through the portion of the machine applying the adhesive material to the partly formed blank.

Interceptor

A sprocket chain 133 extends around the sprocket wheel 22 and downwardly and forwardly therefrom and also around sprocket

70 wheel 134 which is mounted on the shaft 135. Adjacent the sprocket wheel 134 and on the same shaft 135 is mounted another sprocket wheel 136 around which extends a sprocket chain 137, said sprocket chain also 75 extending around sprocket wheel 138 mounted on shaft 139 and thence around sprocket wheel 140 mounted on shaft 141, as shown in Fig. 5.

The shaft 139 is provided with a cam 142 75 for reciprocating bar 143 which is pivotally connected at its opposite end to a short arm 144 mounted on a shaft 145 and has an interceptor 146 extending downwardly therefrom. The driving sequence is so arranged 80 that the interceptor may hold the first longitudinal and additional transversely folded blanks against travel with the conveyer belt notwithstanding the blanks are resting on the belt. At this period of holding the extensions 79 are coated with the adhesive and then flexed over and upon the portions 78 and flattened thereagainst to effect sealing. The holding action of the interceptor is for 85 a brief interval of time for maintaining registry in the flexing and flattening in the sealing operation.

Sealing

90 The sprocket chain 137 in driving the shaft 141 brings about the flexing, flattening and the sealing completing operation. Said shaft 141 is provided with a bevel gear 147 (Fig. 17) which is in mesh with a bevel pinion 148 mounted on shaft 149 which also carries a pair of cams 150 and 151. These cams are arranged in rights and lefts so that bars 152 may be simultaneously oppositely reciprocated. The bar 152 carries a roller 153 which coacts with the cam 150, and a roller 154 which coacts with cam 151. The bar 152 may pass through an adjustable fixed 95 guide member 155. This guide member 155 has a bearing 156 for an angled lever member having a slotted arm 157 which coacts with a pin 158 carried by a block 159 adjustably held by collars 160 mounted on the bar 152. Said collars 160 have rack jaws 161 which extend into the collar way 162. Pins 163 extending upwardly through the collars 100 may be manually operable to shift the rack jaws 161 (Fig. 18) in the ways 162 when the collars 160 are released from said bar 152 by unscrewing set screw 164.

105 The rack 161 coacts with rack portions 165 on the bar 152 for maintaining the collars 160 in their desired adjusted positions. Loosely mounted on the bar 152 and shiftable toward and away from the collars 160 is mounted a carrier 166 having a guideway 167 into which extends a vertically reciprocable member 168 carrying a roller 169. The member 168 has an overhanging portion or projection 170.

110 As the cam 160 coacts with the roller 163 120

to pull the bar 152 away from the guide 155, the pin 158 serves to rock the arm 157 on the fulcrum 156 (Figs. 15, 16 and 17) and cause the arm 171 to ride beneath the roller 169 and lift the member 168 in the guide 167 into engagement with the overhanging portion 170 and cause said portion to rise against the lower side of the blank extension opposite to that provided with the adhesive 10 coating.

The overhanging arm 172 extending from the carrier 166 terminates in close proximity to the folded blank end portions 78 so that it will hold down the blank on the guide 42, 15 and the upward movement of the overhanging portion 170 will cause the flexing of the extension 79 on the score lines 65 and 66. The flexing movement is effected during the movement of the carrier 166 towards the 20 shaft 149, when the intermediate collar 160 engages bearing 166' (Fig. 15), but the rate of upward movement of the overhanging portion 170 is such as to cause the flexing of the blank extensions 79 at the score lines. 25 Furthermore, as the member 170 rises, the free end of the arm 171 clears the roller 169 so that the member 168 can move downwardly and engage the flexed over blank extensions 79 and flatten such adhesive carrying blank extensions against opposite blank portions for sealing the parts together. This flexing and flattening occurs while the interceptor 146 is holding the twice folded blank for the third folding or 35 second longitudinal folding operation.

The cams 150 and 151 rotate continuously and as the member 170 moves downwardly upon the extensions as unfolded for the flattening and sealing operation, there is a 40 slight pause, and then the recover travel occurs in the shifting of the carrier 166 back to starting position for a repetition of this cycle of operation as actuated by the inner collar 160.

Flattening

As the interceptor 146 is raised, the thrice folded blank in its knock-down box assembly may continue its travel with the conveyor belt 29 and pass over the main driving roll 28 and there have the blank extensions 79 further flattened or rolled into sealing relation with other portions of the blank by pairs of rollers 173 mounted on shafts 174 and driven by gears 175 from the shaft 27. Lower live rollers 176 oppose the pairs of rollers 173 beyond the roller 28. The final roller 176 has a conveyor belt 177 over 50 which the sealed thrice folded blank, as a knock-down box, may pass for further flattening opening operation under gravity idler rollers 178. After passing the rollers 178 the folder blanks are then discharged 55 upon the kicker 179 (Figs. 1 and 4).

Discharge grouping

Standards or legs 183 (Figs. 1 and 14) carry parallel bars 184, and an abutment 185 loaded by friction weights 186 to ride upright along said parallel bars 184. The thrice folded blank upon the bottom portion 75 is folded on itself short of the end portions 74 and has been sealed with the end portions 78 by means of the member 168. These articles are thrust by the kicker 179 to have the folded bottom portion 75 of the formed knock-down box travel between the pair of rails 184 as the formed knock-down box assembly is now on edge and in a vertical position, so that its projecting edges end portions 74 and 78 will ride on the bars or rails 184.

The yieldable mounting 180 for the kicker 179 permits yieldable thrusting of the successively formed knock-down boxes into position along the pair of rails 184 for packing said boxes on edge on said receiver. The resistance to such packing is yieldable as the abutment gradually slides along the 90 rails 184.

Adjustments are provided for the folders and guides to permit the making of boxes and styles of different sizes within a considerable range. There is therefore in the disclosure of this invention, a machine which has a wide range of utility for the rapid production of symmetrical knock-down boxes or containers.

The stops, guides and sealing folders are adjustable along the main frame 5, and also the belt 29. Set screws 187 may adjust the folder member 155 on track 188. Set screws 189 permit guide housings 90 to be adjusted along the bars 91. Set screws 191 permit adjustment of the milled rollers 103 and 104 to insure folding and may partially overlap in their staggering.

The machine may be operated at a high production rate with unskilled labor in producing a product of high grade. The machine does not require extreme care when set up for operation and will handle in addition to different sizes of boxes, different thicknesses of stock for said boxes.

From the foregoing description it will be seen that the machine is of very simple construction for the work it accomplishes and is well adapted for the purpose described.

What is claimed and it is desired to secure by Letters Patent is:—

1. A conveyor for effecting travel of a cut and scored blank, in combination with folding means for the blank on a scoring during said travel of the blank, said folding means embodying plungers lifting portions of the blank, guides directing the lifted portions as the conveyor shifts the blank along, and a succession of rollers including 130

a pair of rollers and a single roller holding the blank to the conveyor.

2. A machine for handling sheet material comprising a conveyor for a blank for a knock-down box, independently yieldable pairs of rollers and additional single rollers out of alignment along said conveyor with said pairs of rollers for holding the blank to the conveyor, and material fold effecting means acting upon the sheet material as delivered to said rollers by said conveyor.

3. In the handling of sheet material, a conveyor belt, a way for the belt, a succession of rollers yieldably opposing the belt to hold the material for travel with the belt, independent means for varying adjustment of said yieldable rollers, and material fold effecting means as to which the material and belt travel, said means acting upon the sheet material as delivered to said rollers by said conveyor.

4. A knock-down box machine embodying means for moving a flat blank, mechanism effective during such movement for folding portions of the blank up out of the plane of the blank and over upon the blank, thereafter devices for doubling the folded blank during its further travel, in the same general direction, adhesive applying means for then coating a portion of the blank, and blank portion flexing and flattening means for bringing a blank portion against the adhesive coated blank portion.

5. A machine for handling sheet material embodying a conveyor belt for the material and laterally beyond which the material extends, rollers for changing the direction of the belt, roughened feed roll sections at the direction change for engaging the sheet material laterally beyond the belt to urge the material in taking the direction change of said belt, and means for acting upon said belt conveyed material.

6. A machine for handling sheet material embodying a conveyor belt for moving sheet material, a plunger movable against the material during material shifting to flex a portion of said material, and stationary guides for directing the flexed portion into folded over position.

7. A machine for handling sheet material embodying a conveyor belt for moving sheet material, a plunger movable against the material during material shifting to flex a portion of said material, stationary guides for directing the flexed portion into folded over position, and rollers holding the material against the belt to preclude warping of the material.

8. A machine for handling sheet material embodying a sealer for an adhesive coating region comprising a movable member, a carrier therefor, means for moving the carrier toward the material, and a rock-

er coacting with said carrier for shifting the member during carrier travel.

9. A machine for handling sheet material embodying a sealer for an adhesive coating region comprising a movable member, a carrier therefor, means for moving the carrier toward the material, and a fixedly mounted rocker coacting with said carrier for shifting the member during carrier travel, said carrier travel shifting the member to clear the rocker after the material is flexed to then move against the material in flattening the flexed portion against the material in completing the fold.

10. A machine for handling sheet material embodying a conveyor, flexing and flattening means for effecting folding of the material as resting on the conveyor, an interceptor for holding the material against travel with the conveyor during said flexing and flattening, and a drive for the conveyor having connections for actuating the interceptor.

11. A knock-down box machine embodying a driving shaft, adhesive coating rolls thereon, two longitudinal folders, a transverse folder therebetween, and clutch mechanism for connecting the folders to be driven from said driving shaft.

12. A knock-down box machine embodying a main shaft, adhesive coating rolls thereon, two longitudinal folders, a transverse folder therebetween, and a clutch to connect one longitudinal and the transverse folders to be driven from said main shaft.

13. A knock-down box machine embodying a main shaft, adhesive coating rolls thereon, two longitudinal folders, a transverse folder therebetween, transmission mechanism including a clutch from said main shaft to connect one longitudinal and the transverse folder to said transmission mechanism, a second clutch for connecting the transmission mechanism to the other longitudinal folder, and a common control for said clutches.

14. A machine for converting scored blanks into knock-down boxes embodying a feed table, a conveyor for receiving the blank as fed from the table, a guide coacting with the conveyor handled blank, a first folder for the guided traveling blank, a guide way from the conveyor, a second folder for the first folded blank portion coacting to direct the blank from the way back to the conveyor, an adhesive coating delivering means past which the conveyor may shift the twice folded blank, an interceptor, a guide coacting with the blank as traveling from the coating delivering means to the interceptor, flexing and flattening means for effecting a third folding of the blank at the adhesive coated region for sealing as the guided blank is held by the interceptor, rolls for further flattening the

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blank, said conveyor delivering the blank to said rolls, a receiver, and a kicker for delivering the blanks from the rolls as to said receiver.

5 15. A box making machine embodying a conveyor, a folding device therealong, and adjustable roughened face oppositely rotating sections laterally beyond the conveyor for driving the box therebetween in a folding thereof.

10 16. A sheet material handling machine embodying a folding device for a portion of sheet material upon itself comprising a pair of slidable members, one mounted in the other, an actuator for the members, and a lever from the actuator to shift the one member in effecting bending of a portion of sheet material out of its plane, said actuator in further movement directly actuating the other member to shift the one member, as bending the sheet material, clear of the lever to further flex the material to fold the material back on itself.

15 17. A machine for handling sheet material embodying a conveyor, an adhesive receiver, a lower side edge outlet for said receiver and including an outer roll which closes the outlet and contacts with the adhesive within the receiver, said roll being engaged by said conveyed material for directly applying adhesive to the upper side of the material, sheet material flexing means coacting with the material adjacent the adhesive receiving region for causing the material to positively engage the adhesive roll, and flattening means coacting with the flexed region to fold the blank on itself adjacent the adhesive coated region.

20 18. A machine for handling sheet material embodying a member movable upwardly transversely of the plane of the material and coacting with the material in bending the material over toward itself, said member being shiftable in said transverse travel to oppose the plane of travel of the material, and means for shifting the member against the material in flattening the bent material portion into flattened position against the material.

25 19. In a machine for making boxes, the combination of means for feeding a blank in a desired path; means for collapsing out of said path those portions of the blank which are to form the bottom of the box; means for feeding the blank in such collapsed form; and means for securing portions of the blank when fed in such collapsed form.

30 20. A machine of the character described, comprising means for feeding a blank; means for bending adjacent portions of a blank out of the path of said feed on a line crosswise of the blank and into parallelism with each other, said portions being intermediate of the end portions of the blank

and said blank having two sets of flaps; and means to secure the flaps of each set together.

35 21. A machine of the character described, comprising means for feeding a blank; 70 means for bending adjacent portions of a blank out of the path of said feed on a line crosswise of the blank and into parallelism with each other, said portions being intermediate of the end portions of the blank 75 and said blank having two sets of flaps, said bending means including two members extending crosswise of the blank, one member engaging one of said portions and the other member engaging the other of said 80 portions; means to feed the blank with said portions so bent to gluing mechanism; means to apply glue to one of said sets of flaps; and means to press the flaps having glue applied and the corresponding flaps 85 of the other set together.

40 22. A machine of the character described, comprising means for feeding a blank; means for bending adjacent portions of a blank out of the path of said feed on a line 90 crosswise of the blank and into parallelism with each other, said portions being intermediate of the end portions of the blank and said blank having two sets of flaps, said bending means including means to engage and partially collapse the blank on said line at one face of the blank and including two other members extending crosswise of the blank and engaging the opposite 95 face of the blank, one of said other members engaging one of said portions and the other of said other members engaging the other of said portions to complete said collapse; means to feed the blank with said portions so bent to gluing mechanism; 100 means to apply glue to one of said sets of flaps; and means to press the flaps having glue applied and the corresponding flaps 105 of the other set together.

45 23. A machine of the character described, comprising means for feeding a blank in a desired path; means for collapsing out of said path those portions of the blank which are to form the bottom of the box; means for advancing the blank in such collapsed form; means for applying glue to portions of the blank when advanced in such collapsed form; and means for sealing the glued portions, said glue applying means acting on the blank while the latter 115 is in a path which is substantially a longitudinal extension of the path of the blank 120 when fed by said feeding means.

50 24. A machine for making a box from a blank having flaps extending transversely 125 from that portion of the blank which is to form the bottom of the box; means to fold said flaps over into substantial parallelism with said portion; means to collapse said portion; and means to hold said flaps 130

in folded over position until said collapsing means acts.

25. In a machine for making collapsible bottom boxes, means for feeding a blank through the machine, means for folding portions of the blank that are to form the bottom of the box, means for assembling the box and means for delivering the box from the machine in assembled condition and 10 folded flat through the bottom of the box.

26. In a machine for making collapsible bottom boxes, means for feeding a blank through the machine, means for folding portions of the blank which are to form the 15 bottom of the box, means for feeding the blank in such folded form, and means for securing other portions of the blank together while such blank is in such collapsed form and means for delivering said collapsed blank from the machine.

27. In a machine for making collapsible bottom boxes, means for feeding a blank through the machine, said blank comprising a bottom wall, back and front walls, side 25 liners, side walls attached to said back and front walls, means for folding said side liners over onto said bottom wall, means for folding the resultant blank through the bottom wall and said side liners, means for 30 folding some of said side walls over the other of said side walls, and securing said side walls together, and means for delivering the resultant product from the machine.

28. In a machine for making boxes the 25 combination of means for feeding a blank in a desired path, means for collapsing out of said path those portions of the blank which are to form the bottom of the box, means for positioning the blank for action 40 by said collapsing means, means for feeding the blank in such collapsed form and means for applying glue to portions of the blank when fed in such collapsed form.

29. A machine of the character described 45 comprising means for feeding a blank, means for bending adjacent portions of a blank out of the path of said feed on a line crosswise of the blank and into parallelism with each other, said portions being intermediate of the end portions of the blank and 50 said blank having two sets of flaps, said bending means including means to engage and partially collapse the blank on said line at one face of the blank and including two 55 other members extending crosswise of the blank and engaging the opposite face of the blank, one of said other members engaging one of said portions and the other of said other members engaging the other of said 60 portions to complete said collapse, means to move the first mentioned engaging means out of the path of the blank, means to feed the blank with said portions so bent to gluing mechanism, means to apply glue to one 65 of said sets of flaps, and means to press the flaps having glue applied and the corresponding flaps of the other set together.

30. A machine of the character described comprising means for collapsing a blank having crosswise scores, a roll, and means for bending the collapsed blank around said roll to break said crosswise scores.

31. In a machine for making boxes the combination of means for feeding a blank in a desired path, means for squaring up 75 the blank transversely preparatory to collapsing, means for collapsing out of said path those portions of the blank which are to form the bottom of the box, means for feeding the blank in such collapsed form, and means for securing portions of the blank when fed in such collapsed form.

32. In a machine for making boxes the combination of means for feeding a blank in a desired path, means for squaring up 80 the blank longitudinally preparatory to collapsing, means for squaring up the blank transversely preparatory to collapsing, means for collapsing out of said path those 85 portions of the blank which are to form the bottom of the box, means for feeding the blank in such collapsed form, and means for securing portions of the blank when fed in such collapsed form.

In witness whereof I affix my signature. 90
JOHN R. VAN WORMER.