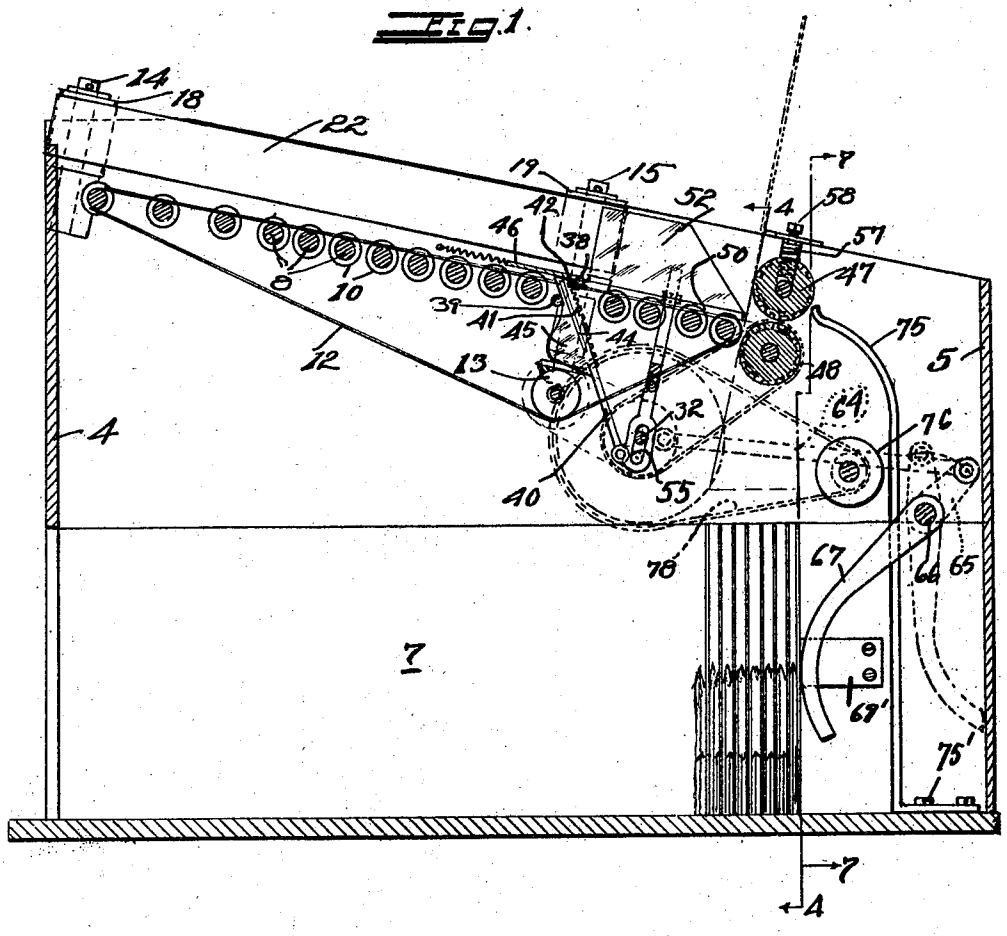
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C. F. RAYNAUD

BOX COLLAPSING AND PACKING MACHINE

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Fig. 1.



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FIG 2

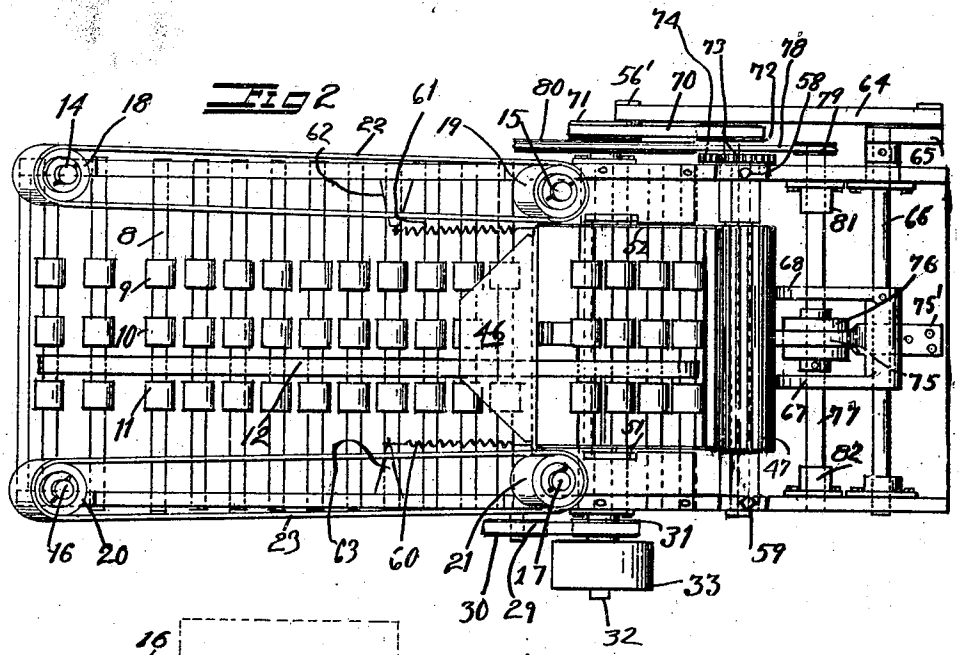
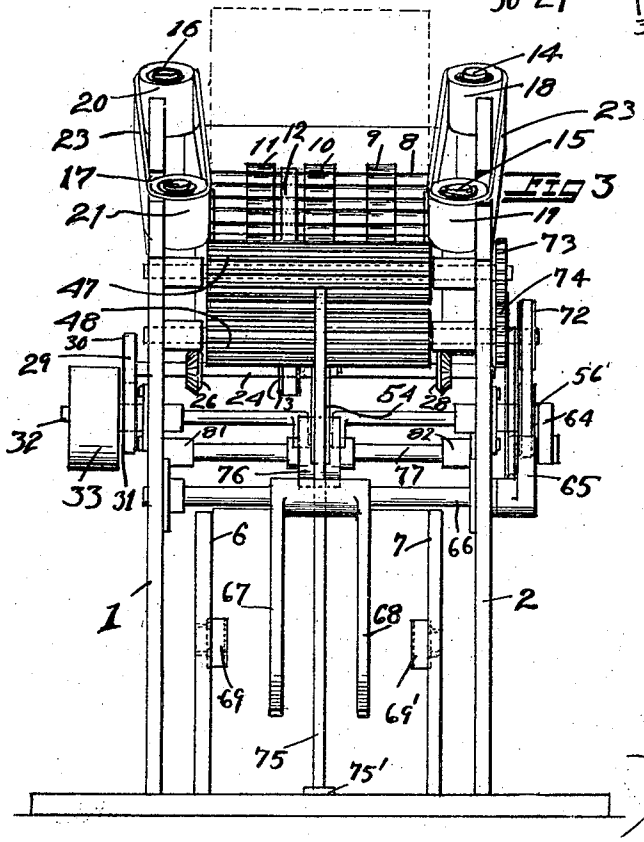


FIG 3



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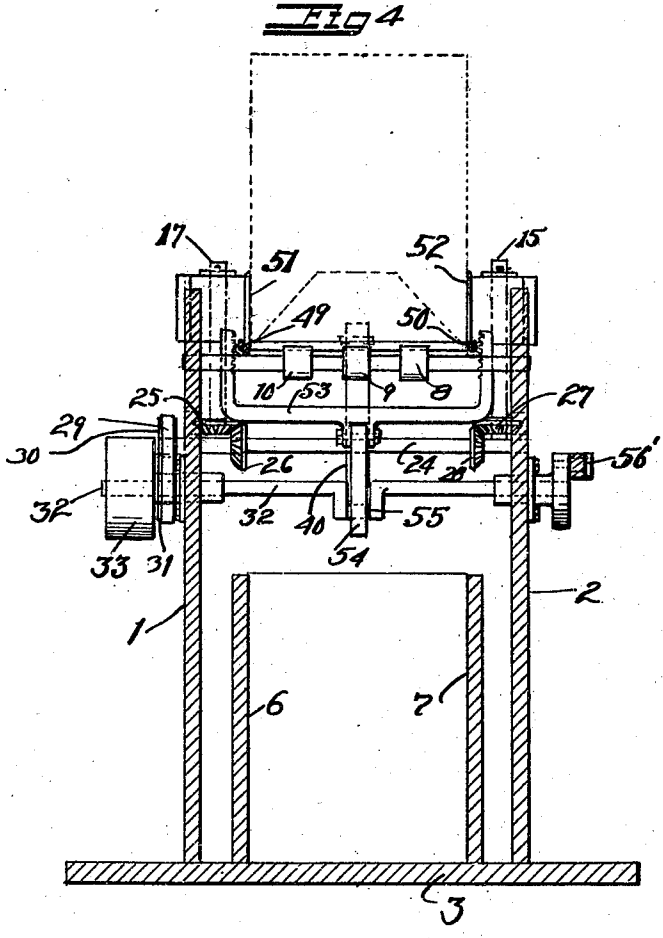
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BOX COLLAPSING AND PACKING MACHINE

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Fig 4



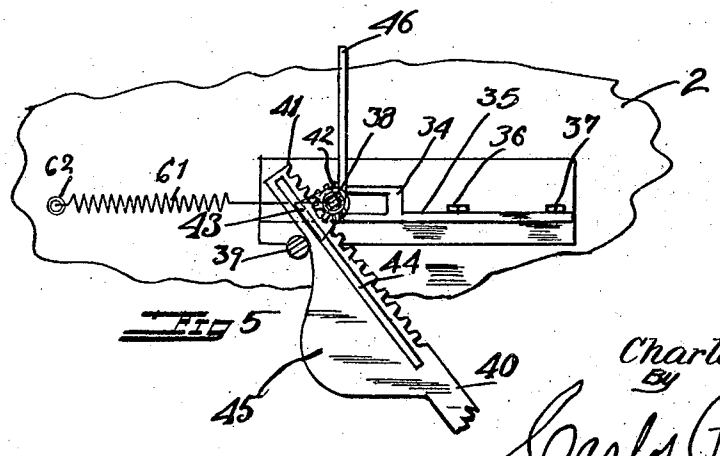


Fig 5

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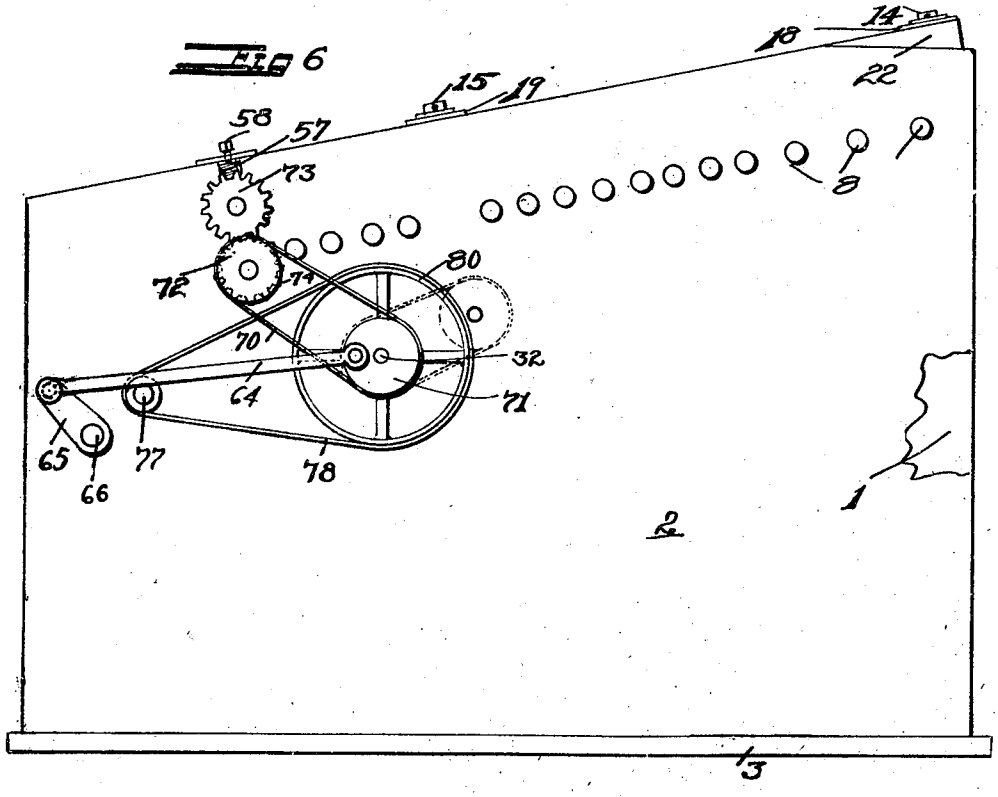
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BOX COLLAPSING AND PACKING MACHINE

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Fig 6



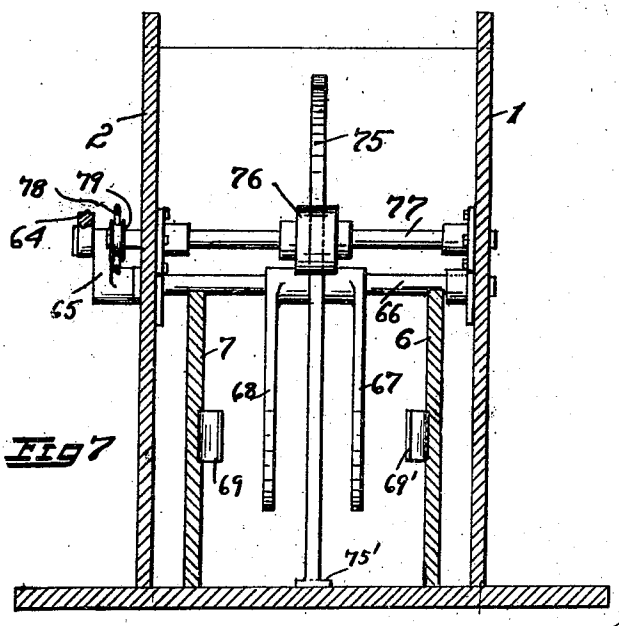


Fig 7

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UNITED STATES PATENT OFFICE.

CHARLES F. RAYNAUD, OF SAN FRANCISCO, CALIFORNIA.

BOX COLLAPSING AND PACKING MACHINE.

Application filed April 19, 1923. Serial No. 633,250.

To all whom it may concern:

Be it known that I, CHARLES F. RAYNAUD, a citizen of the United States, residing at San Francisco, in the county of San Francisco, State of California, have invented a new and useful Box Collapsing and Packing Machine, of which the following is a specification in such full and clear terms as will enable those skilled in the art to construct and use the same.

This invention relates to a machine for collapsing paper boxes for shipping and for placing the collapsed boxes in a bundle for convenient packaging.

It will be understood by those skilled in the art that in the manufacture of paper boxes certain glueing machines deliver large quantities of boxes in a set up condition. The space occupied by these boxes is so great that means must be provided to flatten the boxes so as to more conveniently ship them, and when flattened they must be assembled in a suitable receptacle to hold them flat until they can be tied in bundles for shipment.

Another object of the invention is to produce a very rapidly operating machine, the box being carried forward without a stop and when collapsed being at the same time forced forward more rapidly under the rolls for completely flattening it.

Other objects of the invention will appear as the description proceeds.

An embodiment of the invention is shown in the accompanying drawings in which the same reference numeral is applied to the same portion throughout, but I am aware that there may be modifications thereof.

Fig. 1 is a longitudinal vertical section of the apparatus,

Fig. 2 is a plan view of the machine,

Fig. 3 is an elevation of the machine looking from the right of Fig. 1,

Fig. 4 is a section on the line 4—4, Fig. 1,

Fig. 5 is a detail of the means for operating the back folder,

Fig. 6 is a side elevation of the machine looking oppositely from Fig. 1 and

Fig. 7 is a section on line 7—7, Fig. 1 looking towards the right.

The operating parts of the machine are assembled on two side members 1 and 2 which are supported by the base 3. Cross plates 4 and 5 connect the side members at the ends to give the side members the proper stiffness.

The base also supports two flat plates 6 and 7 which form a receptacle for the flattened boxes.

Journalled in the sides 1 and 2 are a plurality of shafts 8 each carrying three small pulleys 9 and 11 inclusive forming an inclined floor. These pulleys are rapidly rotated by contact with a belt 12 which passes over all of them and around the two end shafts 8, said belt being driven by the pulley 13 under which it passes. At each side of the machine there are two inclined shafts as indicated at 14, 15 and 16, 17 said shafts supporting the pulleys 18, 19 and 20, 21, around which the belts 22, 23 pass to hold the boxes in the proper position to be delivered to the collapsing mechanism.

The shafts 15 and 17 are rotated from the shaft 24 by means of the two pairs of bevel gears 25, 26 and 27, 28, said shaft 24 being driven by the belt 29 passing around pulleys 30, 31. The pulley 31 is on the shaft 32 which shaft also carries the main drive pulley 33.

In each side member 1 and 2 there is an opening to receive a slotted slide box 34 said boxes being symmetrically placed and each having a flat extension 35 to receive two bolts 36—37. See Fig. 5.

Extending from one side of the machine to the other with its ends resting in and slidable in the slots of the two boxes 34 is a shaft 38. A bolt 39 extends from side to side of the machine and forms a rest for a slide rack bar 40. This bar has teeth 41 in mesh with a gear 42 on the shaft 38 and a yoke 43 holds the rack teeth in the proper engagement with the gear teeth. The yoke engages a slot 44 in the bar 40.

The bar 40 also has a cam 45 so that as soon as it begins to move the folding plate 46 on the shaft 38 down it also begins to move it forward so that when the folding plate is completely down the box is pushed into the rolls 47, 48 far enough to be caught by them and pulled through them and pushed down into the receptacle formed by the sides 6 and 7.

At the sides of the machine in front of the two flattening rollers 47, 48 are two shafts 49, 50 carrying folding plates 51, 52. Each of the shafts 49, 50 has a small

pinion in mesh with the teeth on the ends of a U shaped rack bar 53. This double rack bar is slidable in suitable guides and at its lower portion is pivotally connected to a pitman 54 the lower end of which is slotted to receive the crank 55 of the shaft 32. This pitman is slotted to permit the proper timing of the folding plates and it is also pivotally connected to the lower end of the pitman or rack bar 40.

The flattening roll 47 is held down by two springs 57 the pressures of which on the roller 47 are regulated by the set screws 58, 59.

Springs 60, 61 connected to brackets 62, 63, insure the rapid return of the folding plates and prevent the plate 46 from accidentally rising and interfering with the forward movement of the boxes.

The shaft 32 has a crank pin 56′ on its outer end which is connected to the pitman 64. The other end of the pitman 64 is connected to an arm 65 on the end of the transverse shaft 66 and this shaft has two curved arms 67, 68 which are arranged to press the boxes forward as they are pushed down into the receptacle for them. On the inside of the plates 6 and 7 there are two short flat springs 69, 69′ fastened in place at one end only, the object of which is to hold the boxes in the position they are pushed into by the operation of the arms 67, 68.

The rollers 47, 48 are rotated continuously by the belt 70 running over the pulleys 71, 72 and gears 73, 74 insure the positive drive of each roller.

The boxes when carried through the rollers strike a curved guide plate 75 near which a rapidly running pulley 76 is placed to aid in pushing the boxes down into the receptacle without allowing them to spring open again. The pulley 76 is secured to a shaft 77 driven by the belt 78 passing around two pulleys 79, 80. The shaft 77 is journalled in two boxes 81, 82 carried by the sides of the machine. The guide plate 75 is bolted to the base 3 as shown at 75′.

The operation of the machine is as follows: The boxes are fed into the space between the two belts 22, 23 on the floor formed by the series of rollers from any suitable source of supply with the long cover flap extending up on the forward edge of the box as shown in Fig. 1. The belts carry the box down till the box contacts with the roller 47 whereupon the plate 46 begins to move up to fold down the back edge of the box. The timing is so arranged that the box is kept in motion all the time, the pressure on the back of the box tending to move forward under the rollers and at the same time as the folding operation is taking place the cam 45 is pushing the box under the rollers 47, 48. While the back of the box is being folded down, the side folding plates 51, 52 move inwardly and fold down the sides of the box, but none of the folding plates hold the box tight enough to prevent the rollers 47, 48 from pulling the folded box out from under them. It will also be noticed that the side folding plates have one corner cut off while the plate 46 has both corners cut off. The object of this is to allow for the diagonal creasing of the box corners, the sides folding over the top of the plate 46.

When the rollers 47, 48 take the box they completely flatten it and push it down into the receiving receptacle the pulley 76 and rod 75 holding it straight.

When the box is being pushed down into the receiving receptacle the arms 67, 68 are in the dotted line position Fig. 1, but as soon as the box drops on the bottom they return and push the box up so the springs 69, 69′ hold them in a solidly packed bundle. The receptacle for the flattened boxes may be made as long as desired to suit the convenience of the operator.

What I claim is as follows, but modifications may be made in carrying out the invention shown in the drawings and in the above particularly described form thereof, within the purview of the invention:

1. In a box collapsing machine, a box supporting and carrying channel, plates for collapsing the sides of the box, a pair of rollers, and means whereby one of said plates moves forward as it collapses the box side to push the collapsed box into the rollers.

2. In a box collapsing machine, a box supporting and carrying channel, plates for collapsing the sides of the box at the end of the channel, a pair of rollers and means whereby one of the side collapsing plates pushes the collapsed box out from under two of said plates into engagement with said rollers.

3. In a box collapsing machine, a box supporting and carrying channel, three plates for collapsing the sides of the box, a pair of flattening rollers, and means to advance one of said plates as it is collapsing the box side to push the box out from under the other two plates into engagement with said rollers.

4. In a box collapsing machine, a series of rollers for supporting a box and advancing them, endless belt forming the sides of a channel through which the boxes are advanced over the rollers, plates for collapsing the sides of the box, a pair of flattening rollers, and means to advance one of said plates to push the partially flattened box into the rollers.

5. In a box collapsing machine, a box supporting and carrying channel, plates for collapsing the sides of the box, a pair of flattening rollers, a guard to direct the flat-

tened box into a receiving channel, an arm to push the boxes into a given position in said receiving channel and springs to prevent the boxes from returning when pushed into a given position.

6. In a box collapsing machine, a box supporting and carrying channel, plates for collapsing the sides of the box, means whereby one of said plates pushes the collapsed box ahead, a pair of flattening rollers between which the collapsed box is pushed, a receiving channel for the collapsed boxes, a guard to direct the collapsed boxes into said receiving channel, a rapidly running roll against which the boxes bear to aid in taking them away from the flattening rollers, an arm to push the boxes into a given position into the receiving channel and springs to prevent the boxes from returning when pushed into a given position in said receiving channel.

7. In a box collapsing machine, a box supporting and carrying channel, three pivoted plates for collapsing the sides of the boxes, a pair of flattening rollers, means to advance one of said plates as it is collapsing the box side to push the box into engagement with said rollers, a guard plate, a rapidly running roll to disengage the box from the flattening rollers, a receiving channel and springs to prevent the boxes from returning when pushed into a given position in said receiving channel.

In testimony whereof I have hereunto set my hand this 29th day of March A. D. 1923.

CHARLES F. RAYNAUD.