Jan. 6, 1953 C. J. PETERSON 2,624,448

CONVEYER MECHANISM FOR BOX WRAPPING MACHINES

Filed Nov. 19, 1946 6 Sheets-Sheet 1

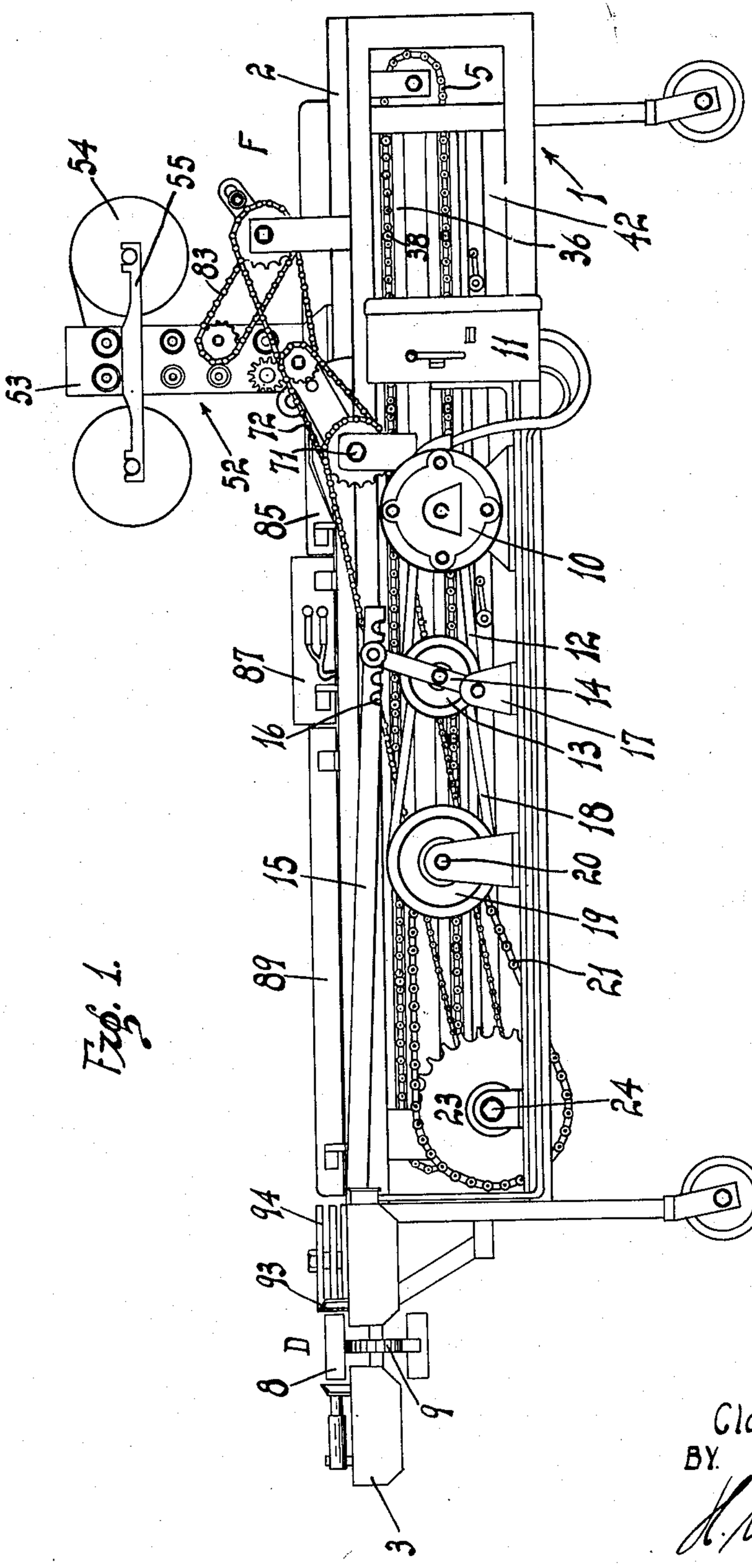

Fig. 1.

INVENTOR.
Clarence J. Peterson.
BY.
H. A. Dieckman.
ATTORNEY.

Jan. 6, 1953 C. J. PETERSON 2,624,448

CONVEYER MECHANISM FOR BOX WRAPPING MACHINES

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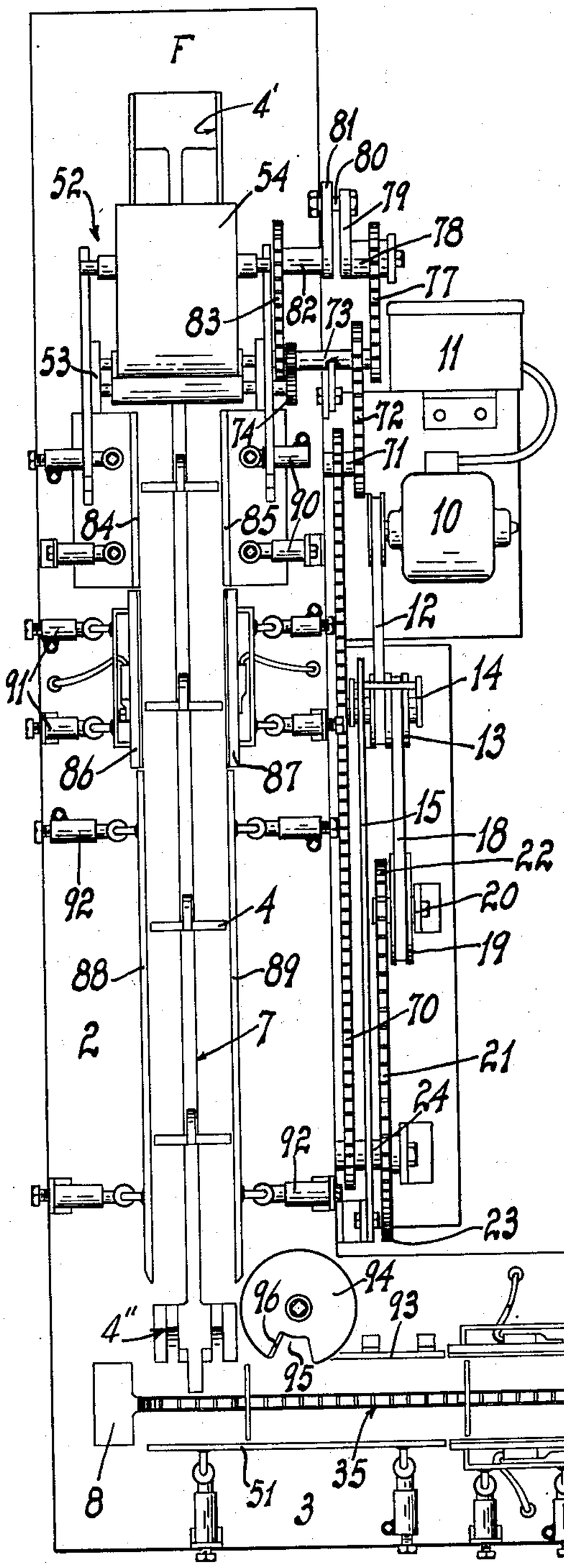

Fig. 2.

INVENTOR.
Clarence J. Peterson.

BY
H. A. Dieckman.
ATTORNEY.

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CONVEYER MECHANISM FOR BOX WRAPPING MACHINES

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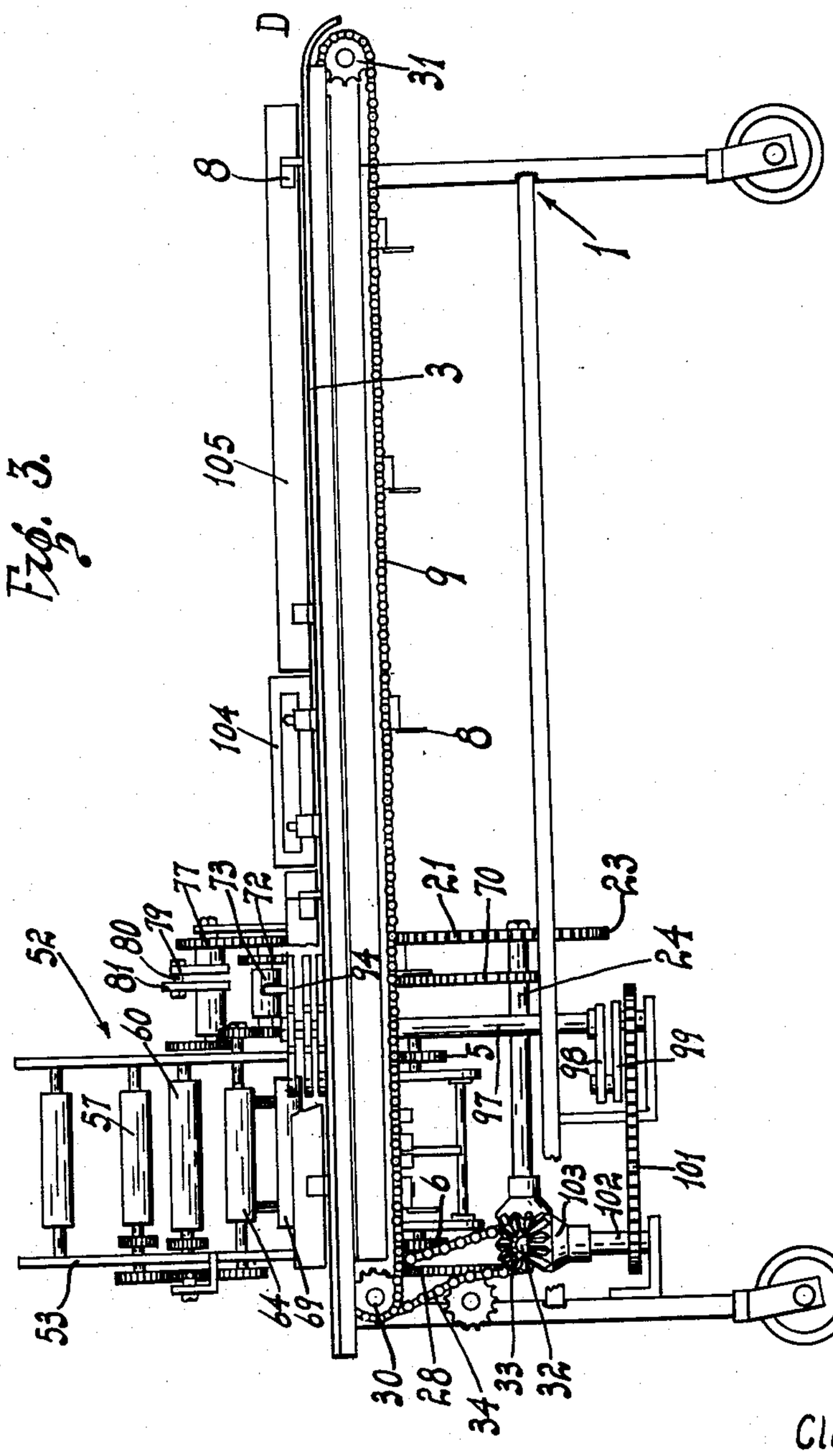
Fig. 3.



INVENTOR.
Clarence J. Peterson.
BY.
H. A. Fuckman.
ATTORNEY.

Jan. 6, 1953 C. J. PETERSON 2,624,448

CONVEYER MECHANISM FOR BOX WRAPPING MACHINES

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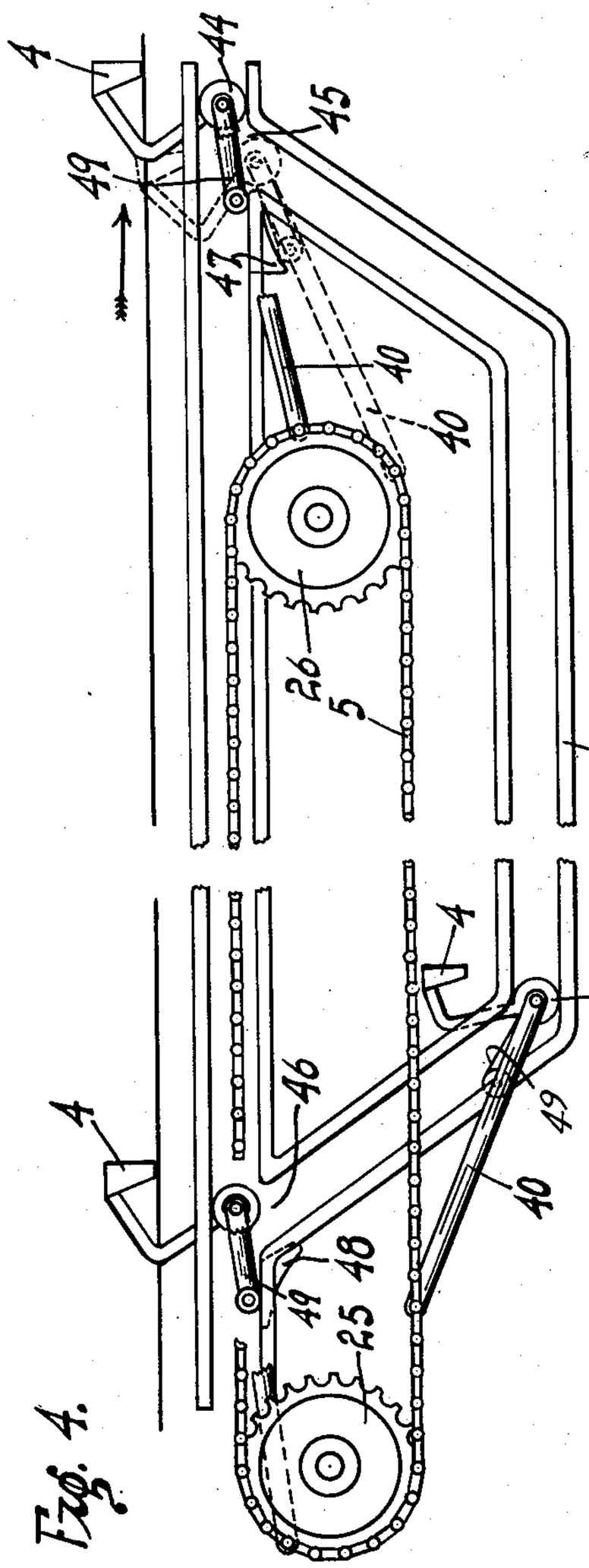

Fig. 4.

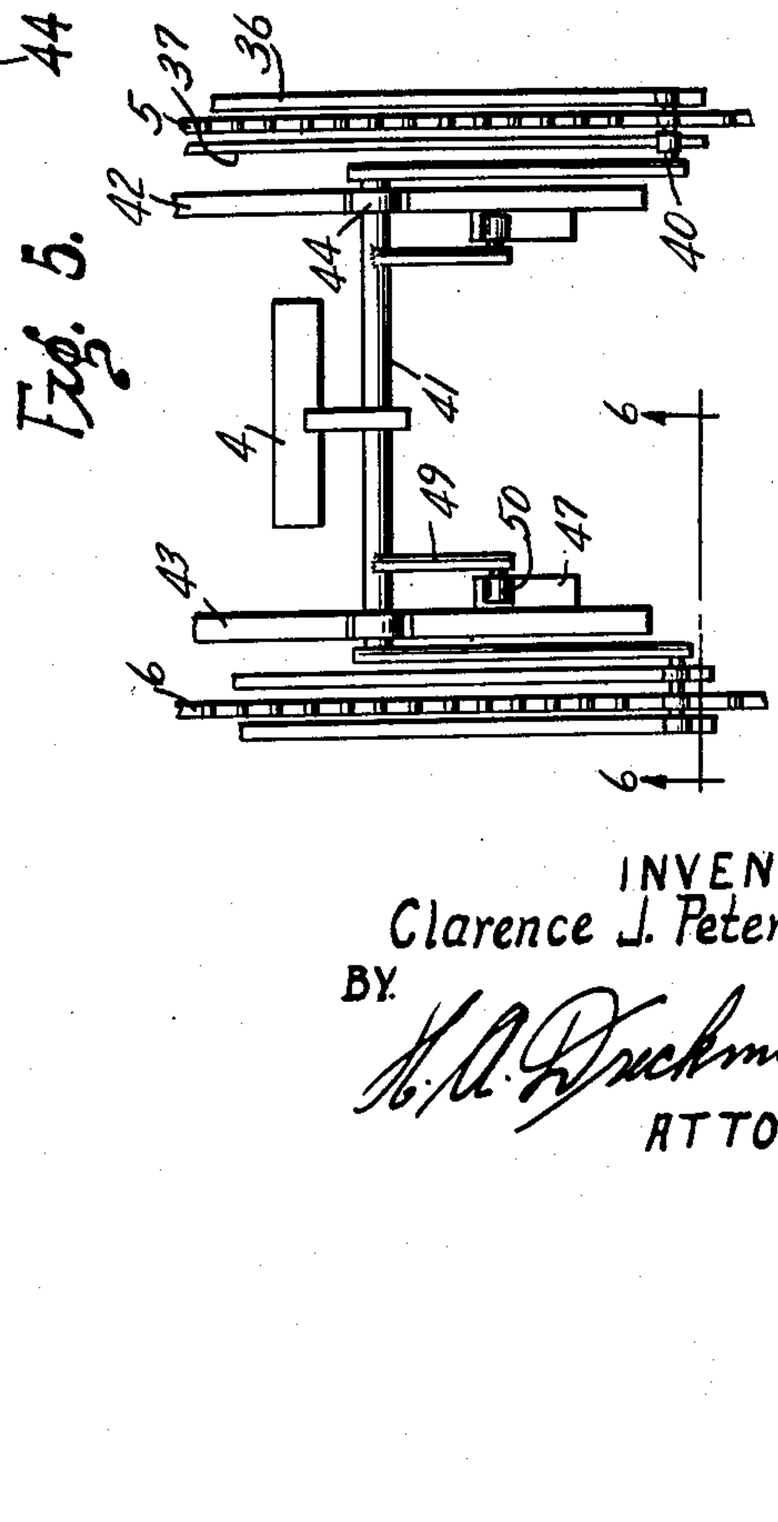

Fig. 5.

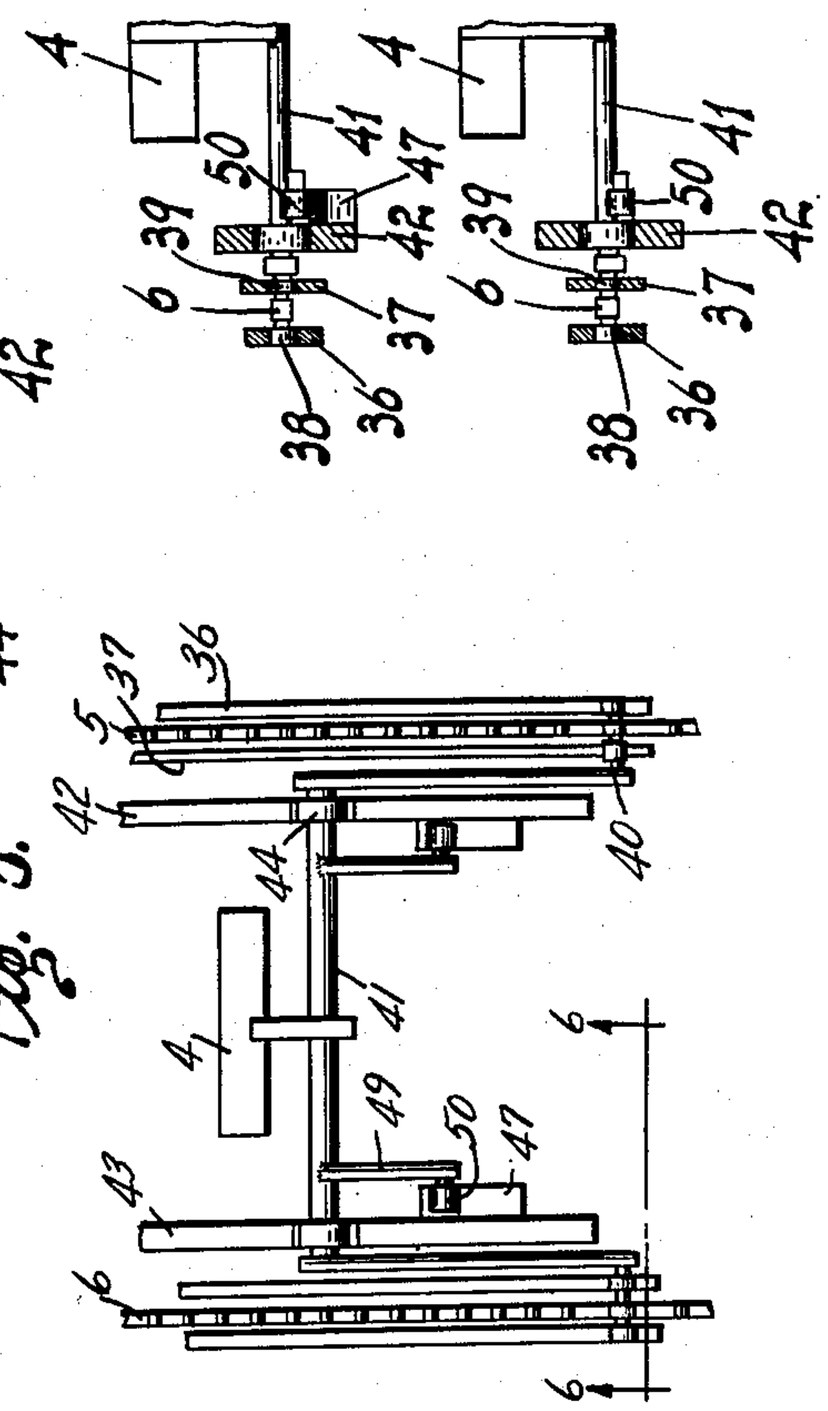

Fig. 6.

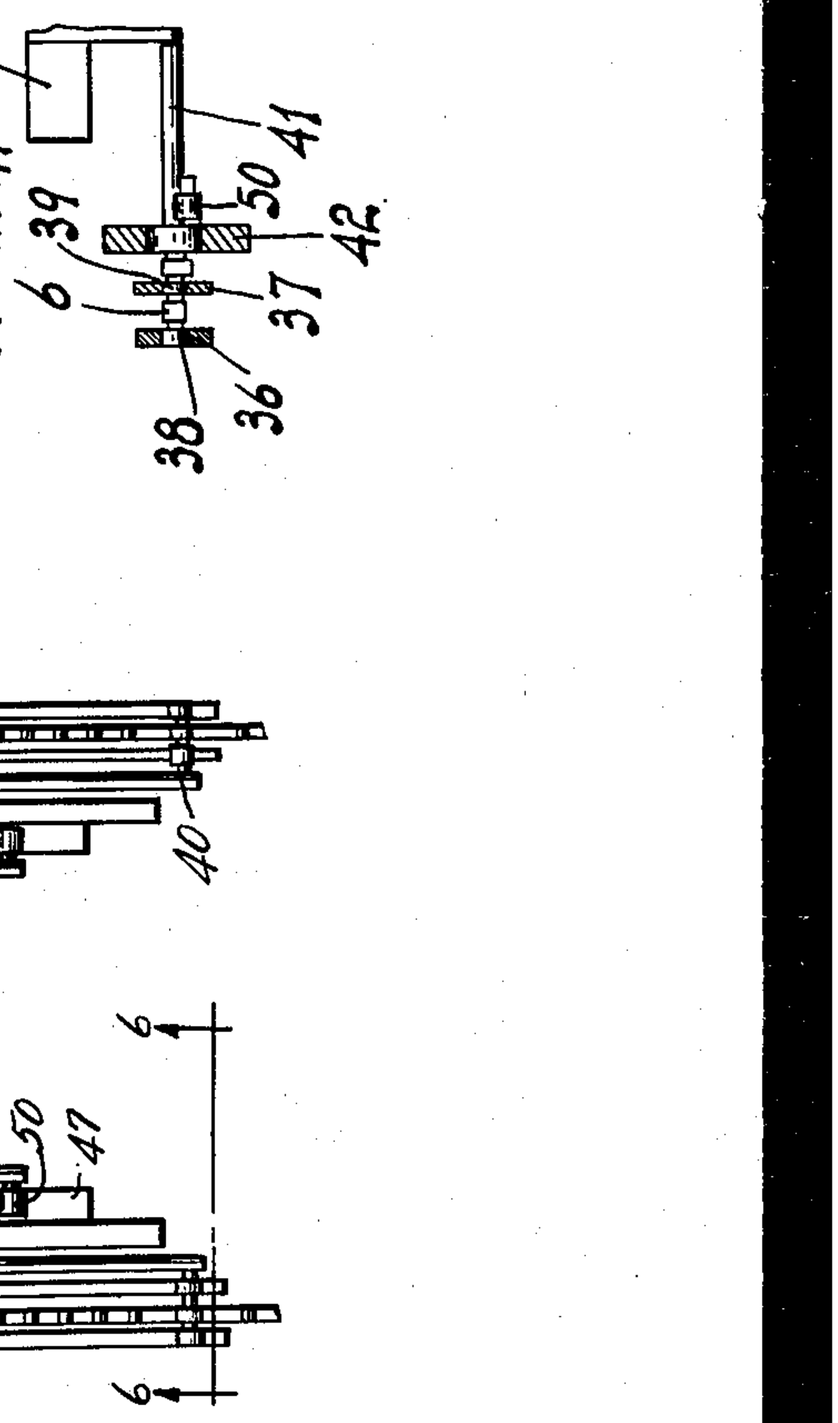

Fig. 7.

INVENTOR.
Clarence J. Peterson.
BY
H. A. Deckman.
ATTORNEY.

Jan. 6, 1953 C. J. PETERSON 2,624,448

CONVEYER MECHANISM FOR BOX WRAPPING MACHINES

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Fig. 8.

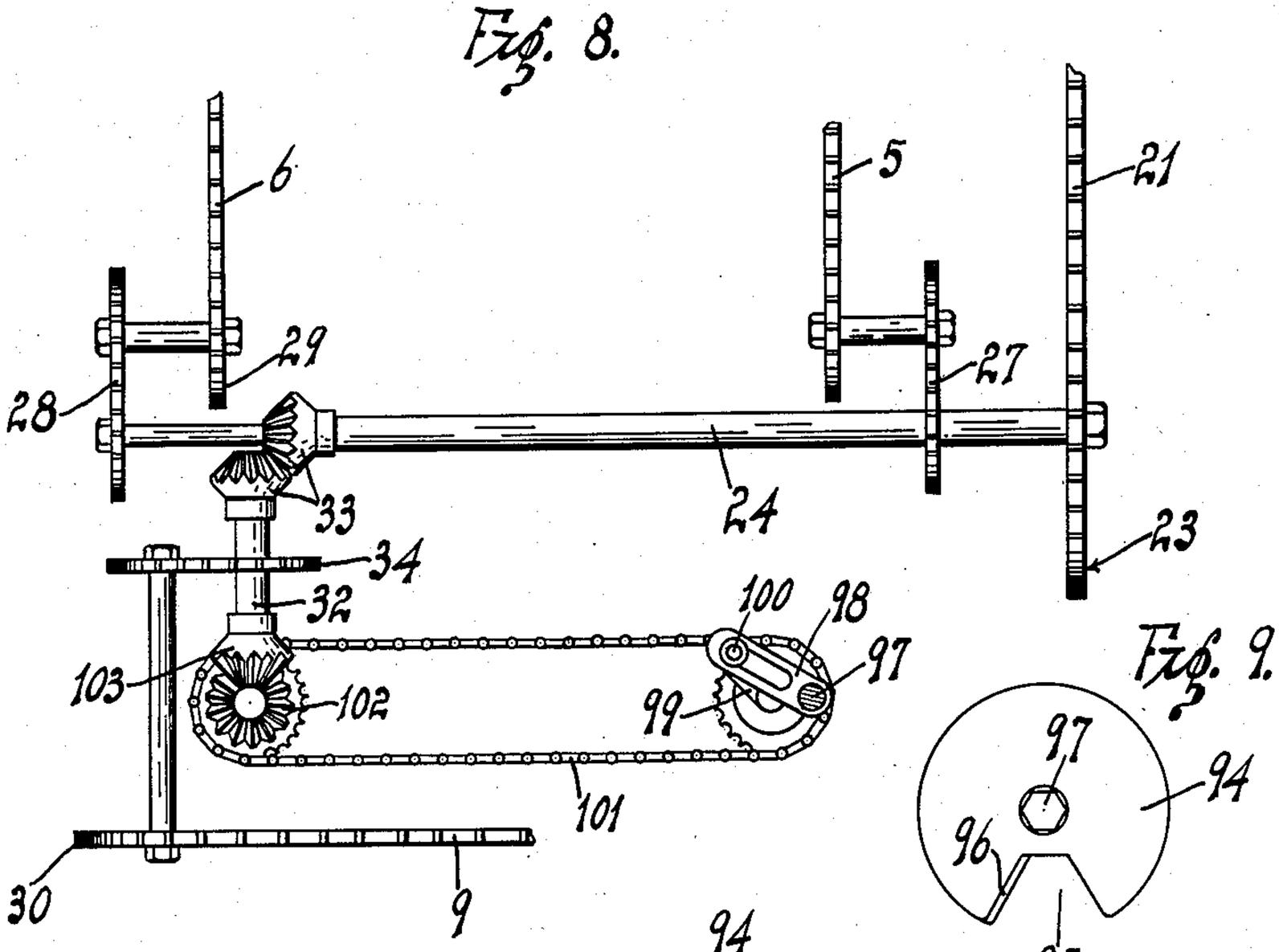

Fig. 9.

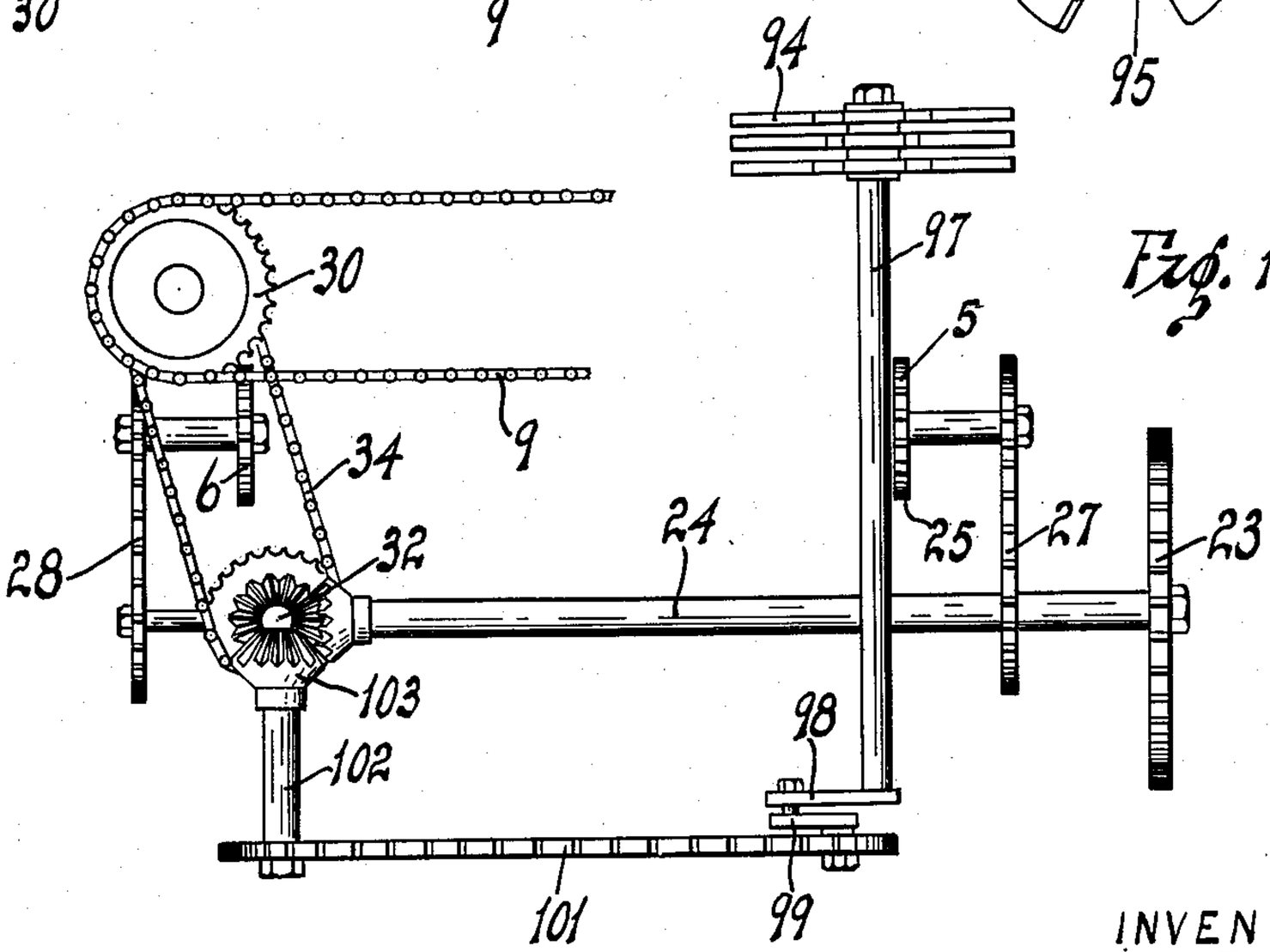

Fig. 10.

INVENTOR.
Clarence J. Peterson.
BY
H. A. Duckman
ATTORNEY.

Jan. 6, 1953 C. J. PETERSON 2,624,448

CONVEYER MECHANISM FOR BOX WRAPPING MACHINES

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Fig. 11.

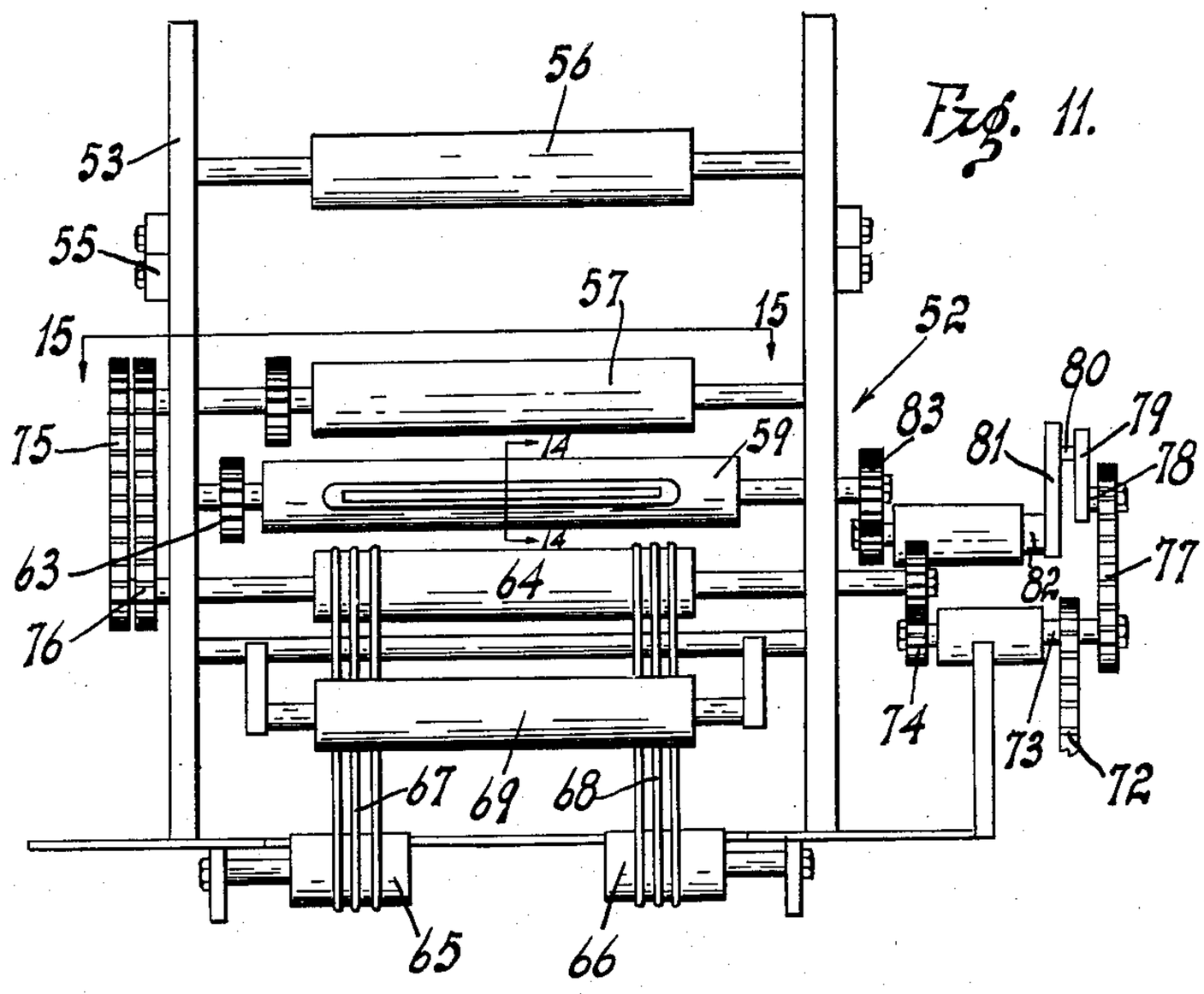


Fig. 12.

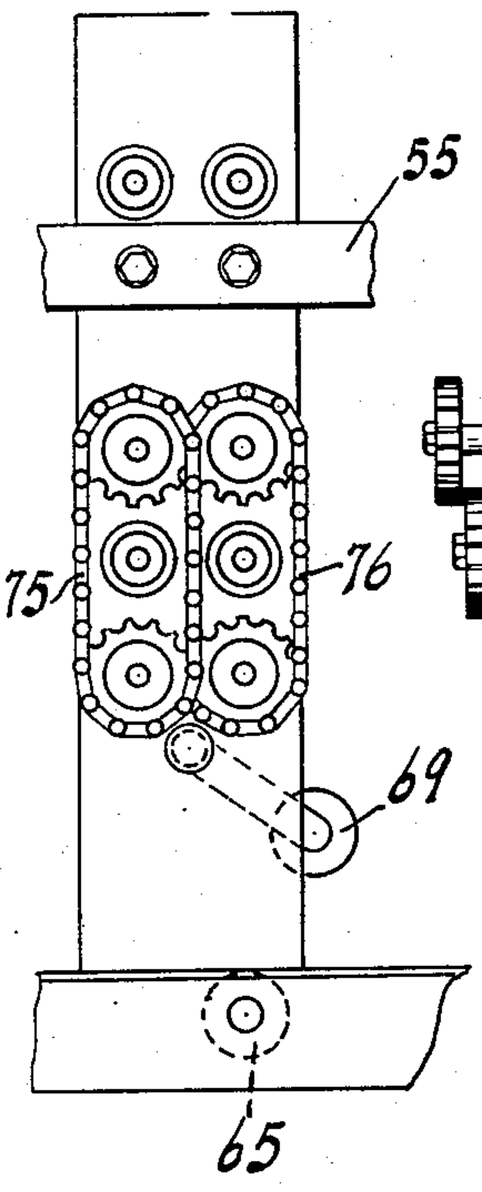
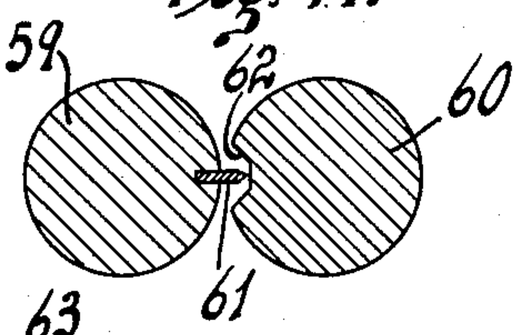


Fig. 14.



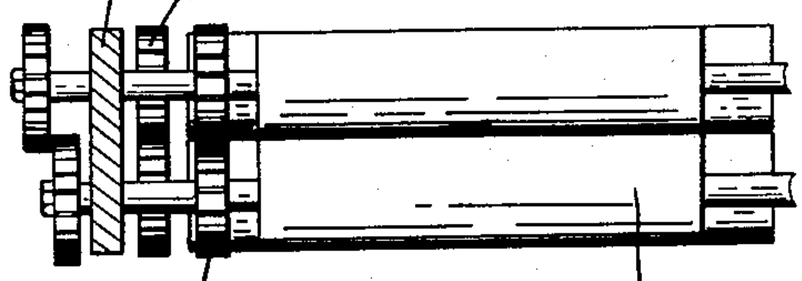
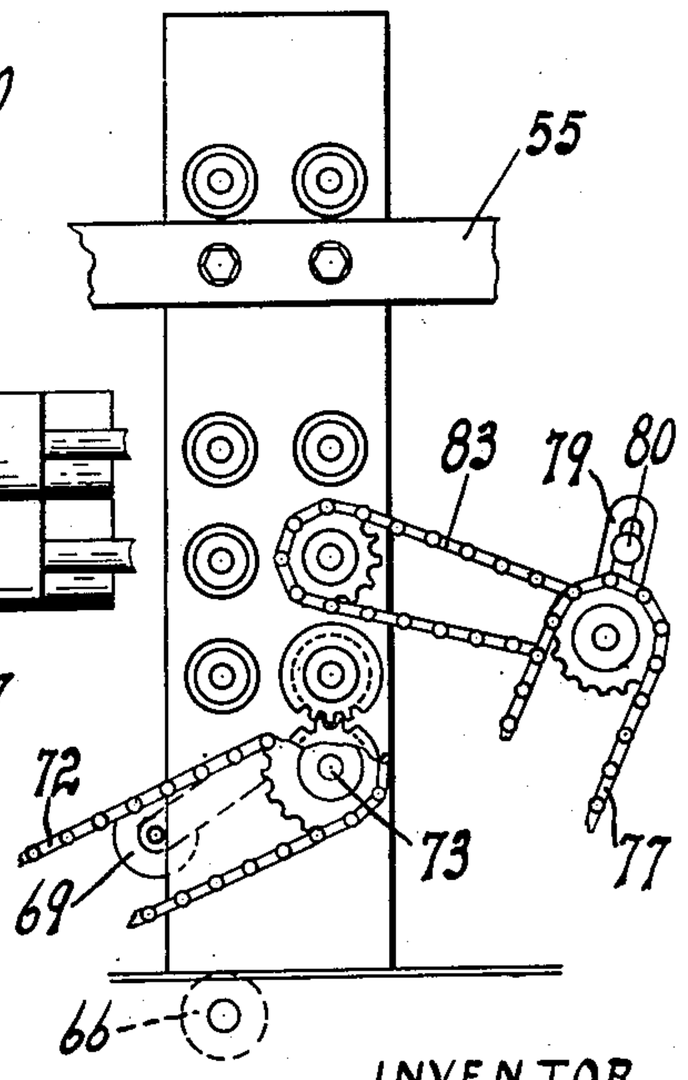


Fig. 15.

Fig. 13.



INVENTOR.
Clarence J. Peterson.
BY. H. A. Druckman.
ATTORNEY.

Patented Jan. 6, 1953 2,624,448

UNITED STATES PATENT OFFICE

2,624,448

CONVEYER MECHANISM FOR BOX WRAPPING MACHINES

Clarence J. Peterson, Watsonville, Calif.

Application November 19, 1946, Serial No. 710,865

7 Claims. (Cl. 198—170)

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This invention relates to a box wrapping machine wherein oiled or paraffined paper is automatically wrapped around a box as this box moves through the machine.

An object of my invention is to provide a continuous movement of the boxes through the machine in one horizontal plane, this plane being continuous from the feeding to the discharge end of the machine.

A feature of my invention is to provide a vertical paper feed which feeds the paper in front of each box as it goes into the machine, the box being moved against the paper which is thus partly folded around the box.

Another feature of my invention is to provide yieldable heaters, folders, and coolers which are spring pressed and thus compensate for irregularities in the boxes.

Another object is to provide a novel means to guide and hold the rams on a top track, and to feed these rams back on a bottom track, the rams being held rigidly while moving on the top track and while engaging the boxes.

Another feature of my invention is to provide a novel means of advancing the rams beyond the chain sprocket, thereby pushing the boxes into the path of a second conveyor, moving at right angles to the first conveyor.

Another object of my invention is to provide in a box wrapping machine, a novel variable speed tucking wheel in the second or right angle conveyor, whereby the rear edge of the paper is tucked against the box during the final wrapping step.

Another feature of my invention is to provide a novel variable speed drive for the tucking wheel and a second variable speed drive for the paper cutting rollers.

Another feature of my invention is to provide a simple, effective and inexpensive variable speed drive between the driving motor and the main driving shaft of the machine.

Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detailed description and the appended claims.

In the drawing:

Figure 1 is a side elevation of my box wrapping machine.

Figure 2 is a top plan view of the same.

Figure 3 is an end view of the same observed from the discharge end.

Figure 4 is a fragmentary side elevation of the ram drive and guide track therefor.

Figure 5 is an end view of the same.

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Figure 6 is a sectional view taken on line 6—6 of Figure 5.

Figure 7 is a fragmentary transverse sectional view similar to Figure 6, but taken just forwardly of that figure.

Figure 8 is a fragmentary plan view of the drive mechanism from the main shaft to the tucking wheel shaft.

Figure 9 is a plan view of the tucking wheel.

Figure 10 is a side elevation of the drive assembly shown in Figure 8.

Figure 11 is a front elevation of the paper feed mechanism.

Figure 12 is a side elevation as viewed from the left in Figure 11.

Figure 13 is a side elevation of the paper feed viewed from the right in Figure 11.

Figure 14 is a transverse sectional view of the paper cutting rollers.

Figure 15 is a fragmentary sectional view taken on line 15—15 of Figure 11.

In my box wrapping machine, the boxes are fed on to one end of a horizontal table. The boxes then move against a sheet of paper which is stretched vertically in front of each box. The paper is cut just before the box engages it, and the box in moving against the paper, causes this paper to fold around one edge, and the top and the bottom of the box; thereafter, the box with the paper partly wrapped around it, is carried through folders which fold two opposite sides of the paper and seal the same.

The boxes are then conveyed into a right angle conveyor and in moving along this right angle conveyor, the final or trailing edge of the paper is folded and sealed around the boxes, thus completing the wrapping operation.

Paraffined or oiled paper is used and the folding cams as well as the heating plates, and the cooling plates, are usual and well known in this art; however, the folding of two sides and a trailing edge of the paper around the box is a feature of my invention and will be subsequently described in detail.

Referring more particularly to the drawing, my box wrapping machine comprising a frame 1, which supports a main table 2, and a transverse table 3, the table 3 extends substantially at right angles to the table 2 and these tables may be integral or may be separate pieces, as desired. The boxes are fed substantially horizontal on to the table 2 at the feed end F and are discharged completely wrapped at the discharge end D. The boxes are advanced singly along the table 2 by spaced rams 4 which are mounted

between conveyor chains 5 and 6. The method of mounting the rams on the chains and the detail construction of the chains will be subsequently described.

The rams 4 are substantially T-shaped and project through a slot 7 in the table 2. As the boxes reach the end of the table 2, they are moved on to the table 3 and are there picked up by rams 8 which are spaced similar to the rams 4 and move the box to the discharge end D. The rams 8 are mounted on a conveyor chain 9 and the detailed construction of this chain will be subsequently described. The rams 4 can move to a position above the table 2 at the end F through a window 4' and can move below the table at the other end through a window 4''.

The wrapping machine is driven by a motor 10 which is controlled by the switch box 11. The switch box and motor are both mounted on the frame 1, substantially as shown. A belt 12 extends from the motor 10 to a variable pitch pulley 13, the purpose of this pulley being to vary the speed of the machine, and pulleys of this type are usual and well known, and the detailed construction thereof forms no part of this invention. The pulley 13 is adjusted to various drive positions by the adjusting arm 14, and this arm is held in its adjusted position by the arm 15, which in turn is secured to the frame 1 of the machine. The adjusting arm 14 can be moved to various positions by dropping it into any one of the notches 16 in the arm 15.

The adjusting arm 14 is pivotally attached to a pad 17 and thus moves arcuately to various adjusted positions which may be required. A second belt 18 extends from the variable speed pulley 13 to the pulley 19, which drives the jack shaft 20. A chain 21 extends from the sprocket 22 on the jack shaft 20, thence to a sprocket 23 on the main drive shaft 24. The chains 5 and 6 are both driven at the same rate of speed from the main drive shaft 24 in the following manner: The chain 5 encircles sprockets 25 and 26, each of which are suitably journalled on the frame 1 of the machine. A chain 27 drives the sprocket 25 from the drive shaft 24 substantially as shown. The conveyor chain 6 is similarly driven by the chain 28 which extends from the drive shaft 24 and drives the sprocket 29 at one end of said chain.

The transverse conveyor chain 9 travels over the sprockets 30 and 31, each of these sprockets being journalled on the frame 1 of the machine. A shaft 32 is driven by the meshing bevelled gears 33 from the main drive shaft 24. A chain 34 drives the sprocket 30 from the shaft 32 substantially as shown.

It will be apparent that the conveyor chains 5 and 6 are arranged below the table 2 and the conveyor chain 9 is arranged below the table 3. The rams 4 extend through a slot 7 in the table 2 as previously described, and similarly the rams 8 extend through a slot 35 in the table 3 in order to engage the boxes and move them along this table to the discharge end D.

The rams 4 are held in a horizontal plane while they are moving along the table 2 and projecting from the slot 7, that is, they are supported so that they will not sag and also at the lower end, it is necessary that these rams advance beyond the chains 5 and 6. The reason for this movement of the rams beyond the ends of the chains 5 and 6 is to push the boxes into the path of the rams 8 so that these boxes can then be moved along the transverse table 3.

The chains 5 and 6 are mounted in an identical manner and only one will be described. A pair of spaced rails 36—37 extend below the table 2 and are fixedly mounted thereon, these rails are grooved or slotted longitudinally and the drive chains have projecting rollers 38—39, which fit in these slots. Thus the chains are prevented from sagging on the upper reaches thereof. The rams 4 are each connected to the chains 5 and 6 by arms 40. These arms are pivotally secured to the chains and fixedly attached to a transverse rod 41. Cam tracks 42—43 are fixedly attached to the frame 1 on each side of the table 2. The rods 41 are provided with a roller 44 on each end thereof, and these rollers fit into one of the cam tracks 42 or 43. The tracks 42 and 43 are an upper horizontal track and a lower horizontal track the upper portion being used for the guiding of the rams along the table 2 and the lower reach of the track for the return of the rams. Thus, an opening 45 must be provided at the lower end of the track and a similar opening 46 at the feed end thereof.

To guide the rollers 44 over these openings, I provide cam lugs 47 at the lower end and 48 at the feed end. A supporting arm 49 is fixedly attached to the rod 41 and a roller 50 rests on the lugs 47 and 48, and supports the roller 44 across the openings 45 and 46. In Figure 4 I have illustrated how the ram 4 is moved beyond the sprocket 26, the arm 40 pushes the ram along the track 42 and when the opening 45 is reached, the arm 49 will hold the ram up and permit it to move beyond the opening 45. This operation is shown in solid lines. Now, as the arm 40 moves around the sprocket 26 to the position shown in dotted lines, the arm 49 will drop off the lug 47, and the roller 44 will move into the return path of the track 42, again as shown in dotted lines. Thus the ram 4 can push the box into the path of the rams 8, the plate 51 acting as a stop.

It will be evident that the means of supporting the rams 4 across the opening 46 is the same as the mechanism supporting the same over the opening 45. The rams are not only supported in their proper position above the table 2 when moving across the openings 45 and 46, but also they are prevented from dropping into these openings accidentally, which would break the machine, if this were to occur.

As the boxes are moved along the table 2 by the rams 4, each box first picks up a sheet of paper from the paper feed mechanism 52. The paper feed mechanism comprises a frame 53 which extends vertically above the table 2. The paper rolls 54 are mounted on a support 55 and are free to rotate when pulled by the feed rollers as will be further described. The paper from the roller 54 first passes over an idler 56 which is freely journalled in the frame 53.

The paper then moves downwardly to a pair of feed rollers 57 which engage the sheet of paper and pull it downwardly. The rollers 57 are both journalled in the frame 53 and are geared together as shown at 58. Below the feed rollers 57, I provide a paper cutter consisting of parallel rollers 59—60. The roller 59 is provided with a knife 61 and the roller 60 is provided with a groove 62 into which the knife extends. These cutter rollers are geared together as shown at 63, so that their movement will be synchronized.

A second set of feed rollers 64 is positioned below the cutters 59—60 and below the rollers 64 are provided spaced rollers 65—66, the spaced rollers being driven by the belts 67—68 respec-

tively. A paper smoothing roller 69 is mounted between the rollers 64 and the spaced rollers 65—66, the purpose of this roller being to smoothe the paper over the top of the box, as the box passes under this roller and between the belts 67—68 and on top of the table 2.

The drive for the paper feed mechanism is as follows: A chain 70 extends from the main drive shaft 24 and drives the jack shaft 71. A chain 72 drives the shaft 73 by encircling sprockets on the two shafts. The shaft 73 is geared to the roller 64 as shown at 74. Chains 75—76 drive the feed rollers 57 from the shaft of the roller 64 substantially as shown. Thus it will be evident that the feed rollers 57, 64, 65, and 66 are all synchronously driven.

In order to effectively cut the paper it is desirable that the knife 61 move rapidly during the cutting operation, that is, the arcuate speed of the cutting rollers 59—60 should be high during the cutting operation, and thereafter can move at the same rate of speed as the feed rollers 67—64. To accomplish this variable speed, I provide the following drive: A chain 77 extending from the shaft 73 drives a shaft 78. A slotted arm 79 is fixedly secured to the shaft 78 and a pin 80 travels in the slot, this pin projecting from an arm 81 on the shaft 82. The shaft 82 chain drives the shaft of the roller 60, as shown at 83, and 59 and 60 are geared together at 63, as previously described. Due to the slot and pin drive connection, the shaft 82 will have a variable speed and this variable speed is imparted to the rollers 59 and 60 as will be evident.

The paper is fed vertically into the path of the boxes which move horizontally on the table 2. The paper feeds from the roll 54 and thence between the feed rollers 57, 64 and the belts 67, 68. The cutter knife 61 is so timed that when the bottom of the paper extends the proper distance below the face of the table 2, this knife will cut a sheet of paper and the advancing box moving below the roller 69 will pick up this loose sheet which is frictionally held by the belts 67, 68. The paper is smoothed over the top and the bottom of the box and is now ready to have the sides of the paper folded. As a ram carries a box beyond the paper feed mechanism, the folding operation commences.

As the box moves through the paper feed mechanism 52 both sides and the trailing edge of the paper are open and must be folded around the box. The rams 4 move the box through the side folders 84—85, which are of the cam slot type, usual and well known in the art. The sides of the paper wrapper are thus simultaneously folded and moved into the heater plates 86—87 which are preferably electrically heated, and melt the paraffin or oil on the paper, thus causing the fold to be retained. Again these heater plates are usual and well known in the art.

The pressure and cooler plates 88—89 on each side of the box hold the fold in proper position while the paraffin or oil is cooling. When the box reaches the lower end of the table 2, the side folds have been completed and the paraffin or oil is set. The folding plates 84—85 are each yieldably pressed inwardly by the spring cylinders 90 and similarly the heater plates 86—87 are yieldably pressed inwardly by the spring cylinders 91. Similarly, the pressure plates 88—89 are pressed inwardly by the spring cylinders 92. All of these cylinders are substantially identical, and a constant spring pressure is thus maintained against

the side of the boxes to hold the paper in its folded position.

When the boxes reach the lower end of the table 2, they are pushed into the path of the rams 8, are picked up by these rams, and are then moved transversely to the discharge end D. During this transverse movement, the trailing edge of the paper is the only part which has not been folded, and therefore, it is this trailing edge which is folded during the transverse movement.

A cam folding plate 93 folds one edge of the paper during this transverse movement, and the tucking wheel 94 folds the rear edge of the paper before the box moves into the folder 93. The tucking wheel is provided with a notch 95, which fits around the rear edge of the box, and the edge 96 of the notch is the one which engages the paper and tucks it in to complete the fold. The wheel 94 has a variable speed, moving rapidly during the tucking operation, and then at a reduced speed during the remainder of its revolution.

The tucking wheel drive is as follows: The wheel is mounted on a shaft 97 which is journalled below the table 3. A slotted arm 98 extends from the bottom of the shaft 97, a crank 99 has a pin 100 which extends into the slot of the arm 98. The crank 99 is driven by the chain 101 encircling sprockets on the crank 99 and a shaft 102. The shaft 102 is driven from the main drive shaft 24, through the gears 33, shaft 32 and gears 103. Thus the tucking wheel 94 is synchronously driven with the remainder of the machine, as will be evident, and is so timed that the notch 95 in the wheel will be in proper position each time that a box is advanced by one of the rams 8.

After the folding and tucking operation is complete, the boxes move past a heater 104 and finally through the cooler and pressure plate 105. The box is now completely wrapped and moves out of the machine at the discharge end D.

In operation, the machine is continuously driven by the motor 10 and the speed of the rams 4 and 8 is determined by the setting of the variable speed pulleys 13. The rams 4 and 8 move continuously and the boxes are fed in front of each of the rams 4 at the feed end F. The boxes are then moved through the paper feed mechanism 52 and as each box moves through this paper feed, it picks up a sheet of paper which has been previously fed into vertical position ahead of the boxes, and lies between the rollers 64, 65 and 66. The paper has been cut off in proper length by the knife 61, and is then frictionally held in the rollers 64, 65, and 66. The box as it is pushed forwardly, causes the sheet of paper to be wrapped around one edge, the top and the bottom, and then moves past the folders 84—85. At this point, the sides of the paper are folded inwardly, are heated by the heaters 86—87 and are cooled and pressed into position by the plates 88—89.

The remaining trailing edge of the paper is folded when the boxes are moved into the transverse conveyor 9. The rams 4 when they reach the lower end of the table 2 position the boxes into the path of the rams 8 and against the stop plate 51. This is accomplished by the arms 40 on the rams 4, and the supporting arms 49, which engage the cam 47, and carry the ram rollers 44 over the opening 45 in the track 42. As soon as the box has been pushed into the path of the rams 8, the rams 4 are retracted and then drop down-

wardly through the opening 45, and thence into the return path of the track 42.

The box is now picked up by the ram 8 and is moved through the folder 93 and simultaneously the tucking wheel 94 tucks in the trailing edge of the paper wrapper, and the completely wrapped box now passes through the heater 104 and the plates 105, and is discharged at D. The speed of the rams 4 and 8 and the feed of the paper in 52, as well as the speed of the tucking wheel 94, are all synchronized, so that the successive operations are continuously and uninterruptedly continued.

Having described my invention, I claim:

1. A box wrapping machine comprising a horizontal table and a transversely extending table, a plurality of spaced rams, chains on which said rams are mounted, the upper reach of said chains being positioned adjacent to and below the first named table, guide rails adjacent the chains, said chains extending into the guide rails and guided thereby, a cam track including an upper horizontal race and a return race, said track having openings therein at the point of entrance of the return race into the horizontal race the upper race extending beyond the openings, arms of substantial length extending from the rams to the chains, said arms being pivotally attached to the chains, a supporting arm on the rams, and means engageable by said supporting arm whereby the rams are supported over said openings during movement of the rams in the horizontal race said track supporting the first named arms at the ram end thereof.

2. A box wrapping machine comprising a horizontal table and a transversely extending table, a plurality of spaced rams, chains on which said rams are mounted, the upper reach of said chains being positioned adjacent to and below the first named table, guide rails adjacent the chains, said chains extending into the guide rails and guided thereby, a cam track including an upper horizontal race and a return race, said track having openings therein at the point of entrance of the return race into the horizontal race the upper race extending beyond the openings, arms of substantial length extending from the rams to the chains, said arms being pivotally attached to the chains, a supporting arm on the rams, and means engageable by said supporting arm whereby the rams are supported over said openings during movement of the rams in the horizontal race said track supporting the first named arms at the ram end thereof, a plurality of spaced rams on the transverse table, chains mounted below said transversely extending table, said last named rams being mounted on said last named chains, and means synchronously driving the first and last named chains.

3. A box wrapping machine comprising a horizontal table and a transversely extending table, both of said tables being in the same horizontal plane, a plurality of spaced rams, chains on which said rams are mounted, the upper reaches of said chains being positioned adjacent to and below the first named horizontal table, guide rails adjacent said chains, means on said chains extending into the guide rails to support the chains, a cam track arranged below the first named horizontal table, said cam track including an upper horizontal race parallel to and below the first named horizontal table, a return race, said cam track having openings therein where the return race enters the horizontal race the upper race extending beyond the openings, arms

of substantial length extending from the rams to the chains, said arms being pivotally attached to the chains, a supporting arm mounted on the rams, and means engageable by said supporting arms whereby the rams are supported over said openings during movement of the rams in the horizontal race said track supporting the first named arms at the ram end thereof, a series of rams on the transverse table, chains on which said last named rams are mounted, and means synchronously driving the first and last named chains.

4. A box wrapping machine comprising a horizontal table and a transversely extending table, both of said tables being in the same horizontal plane, a plurality of spaced rams, chains on which said rams are mounted, the upper reaches of said chains being positioned adjacent to and below the first named horizontal table, guide rails adjacent said chains, means on said chains extending into the guide rails to support the chains, a cam track arranged below the first named horizontal table, said cam track including an upper horizontal race parallel to and below the first named horizontal table, a return race, said cam track having openings therein where the return race enters the horizontal race the upper race extending beyond the openings, arms of substantial length extending from the rams to the chains, said arms being pivotally attached to the chains, a supporting arm mounted on the rams, a cam lug engageable by said supporting arms as the rams move over said openings in the horizontal race, said supporting arm disengaging the cam lugs on movement of the rams over said openings said track supporting the first named arms at the ram end thereof, a series of rams on the transverse table, chains on which said last named rams are mounted, and means synchronously driving the first and last named chains.

5. A box wrapping machine comprising a horizontal table and a transversely extending horizontal table, a plurality of spaced rams projecting above the first named horizontal table, endless chains mounted adjacent to and below the first named horizontal table, sprockets over which said chains extend, said chains being positioned adjacent to and below the first named horizontal table, guide rails in which said chains project and are guided, a cam track including an upper horizontal race arranged parallel to and below the first named table, a return race, said track having openings therein where the return race enters the horizontal race the upper race extending beyond the openings, arms of substantial length extending from the rams to the chains, said arms being pivotally attached to the chains, both of said sprockets being spaced longitudinally of the machine from said openings, a supporting arm on the rams, and means engageable by said supporting arm whereby the rams are supported over said openings during movement of the rams in the horizontal race said track supporting the first named arms at the ram end thereof, a series of rams on the transverse table, chains on which said last named rams are mounted, and means synchronously driving the first and last named chains.

6. A box wrapping machine comprising a horizontal table and a transversely extending horizontal table, a plurality of spaced rams projecting above the first named horizontal table, endless chains mounted adjacent to and below the first named horizontal table, sprockets over which said chains extend, said chains being positioned

adjacent to and below the first named horizontal table, guide rails in which said chains project and are guided, a cam track including an upper horizontal race arranged parallel to and below the first named table, a return race, said track having openings therein where the return race enters the horizontal race the upper race extending beyond the openings, arms of substantial length extending from the rams to the chains, said arms being pivotally attached to the chains, both of said sprockets being spaced longitudinally of the machine from said openings, a supporting arm on the rams, cam lugs on the cam track, engageable by said supporting arms whereby the rams are supported over said openings during movement of the rams in the horizontal race in one direction, said supporting arm disengaging the cam lugs on return movement of the rams in said horizontal race, a series of rams on the transverse table and chains on which said last named rams are mounted, and means synchronously driving the first and last named chains.

7. A box wrapping machine comprising a horizontal table and a transversely extending horizontal table, a plurality of spaced rams projecting above the first named horizontal table, endless chains mounted adjacent to and below the first named horizontal table, sprockets over which said chains extend, said chains being positioned adjacent to and below the first named horizontal table, guide rails in which said chains project and are guided, a cam track including an upper horizontal race arranged parallel to and below the first named table, a return race,

said track having openings therein where the return race enters the horizontal race the upper race extending beyond the openings, arms of substantial length extending from the rams to the chains, said arms being pivotally attached to the chains, both of said sprockets being spaced longitudinally of the machine from said openings, a supporting arm on the rams, said rams having a reciprocating motion at both ends of the upper horizontal race at said openings, cam lugs engageable by said supporting arms whereby the rams are supported over said openings during movement of the rams in one direction and disengage the cam lugs on reverse movement of the rams in the horizontal race said track supporting the first named arms at the ram end thereof, a series of rams with transverse table, chains on which said last named rams are mounted, and means synchronously driving the first and last named chains.

CLARENCE J. PETERSON.

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