

June 20, 1967

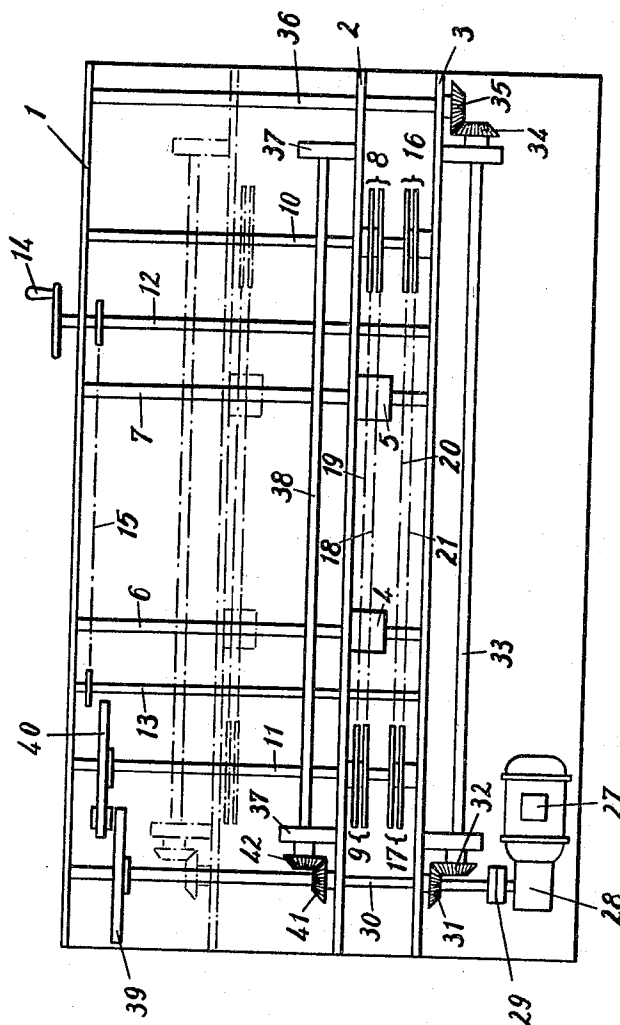
R. KIRSTEN
PACKING MACHINE

3,325,977

Filed Nov. 22, 1963

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Fig. 1



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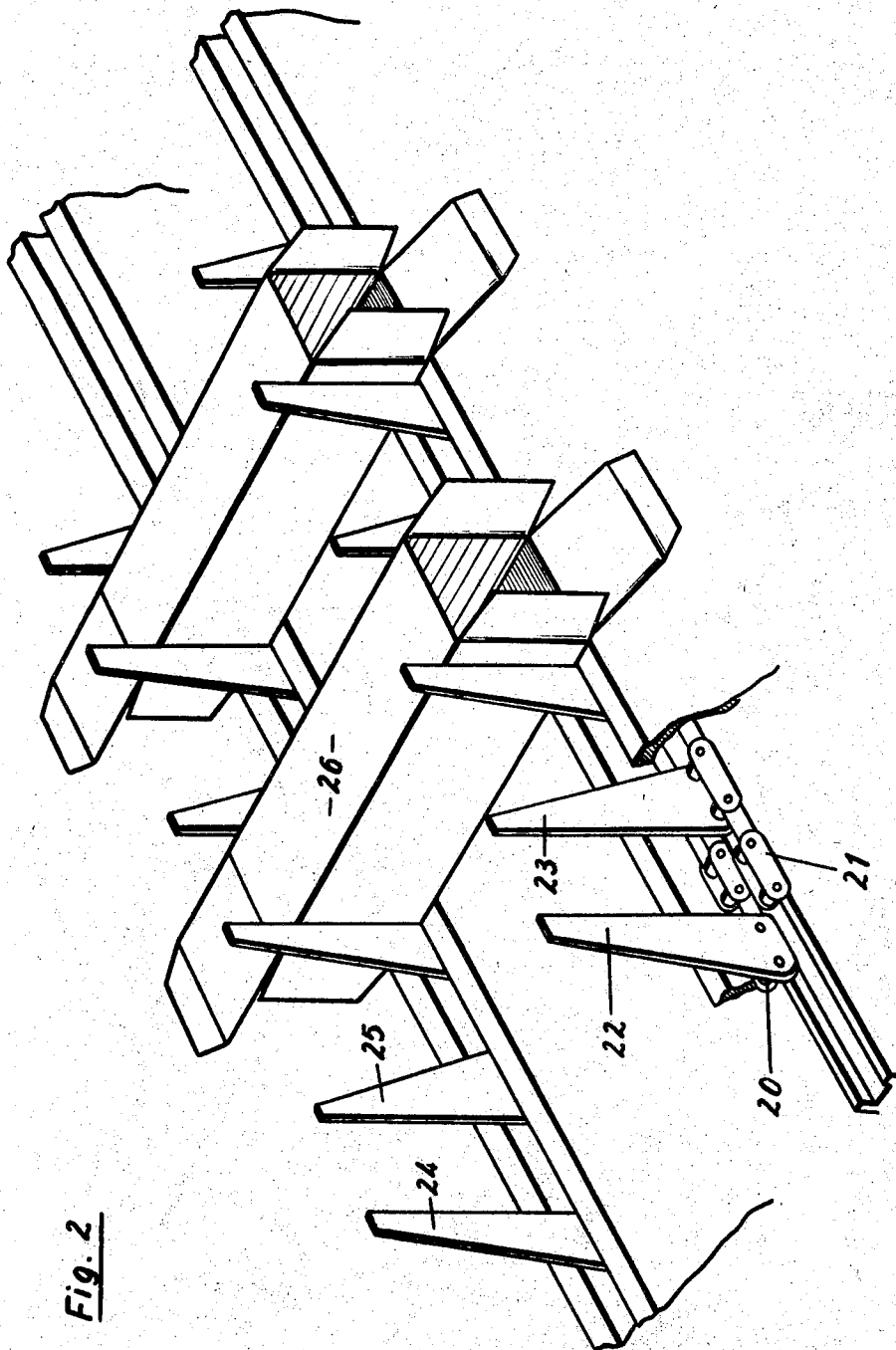
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Fig. 3

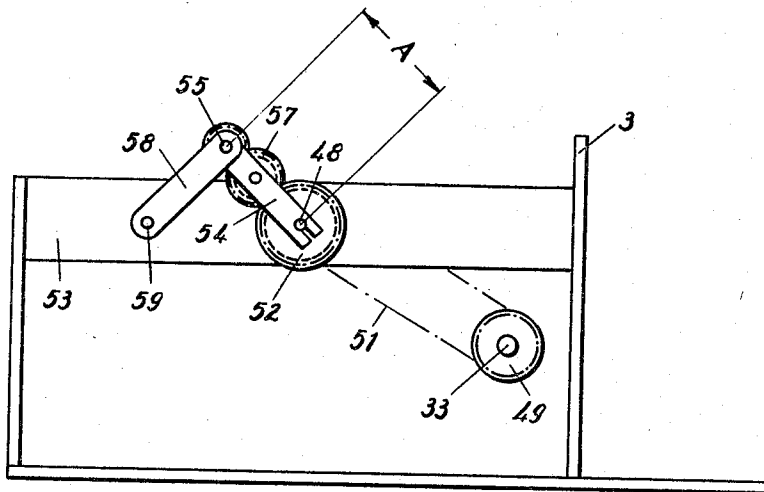
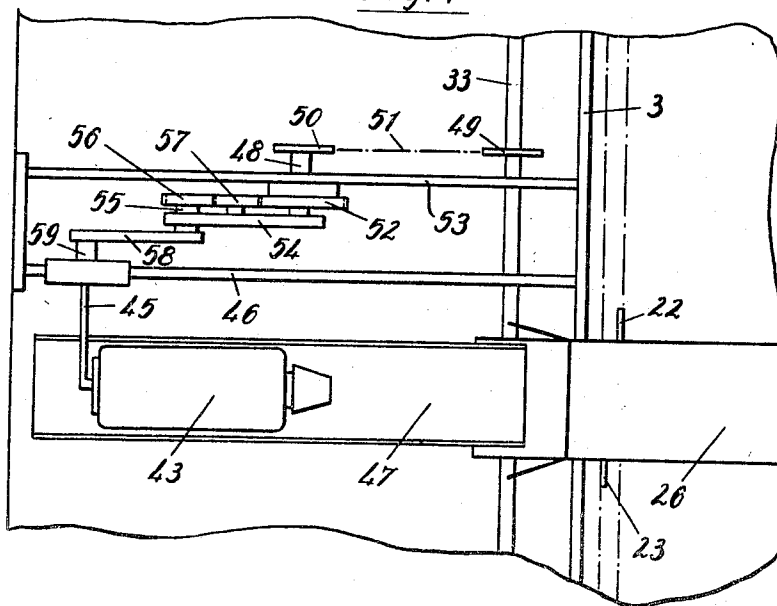


Fig. 4



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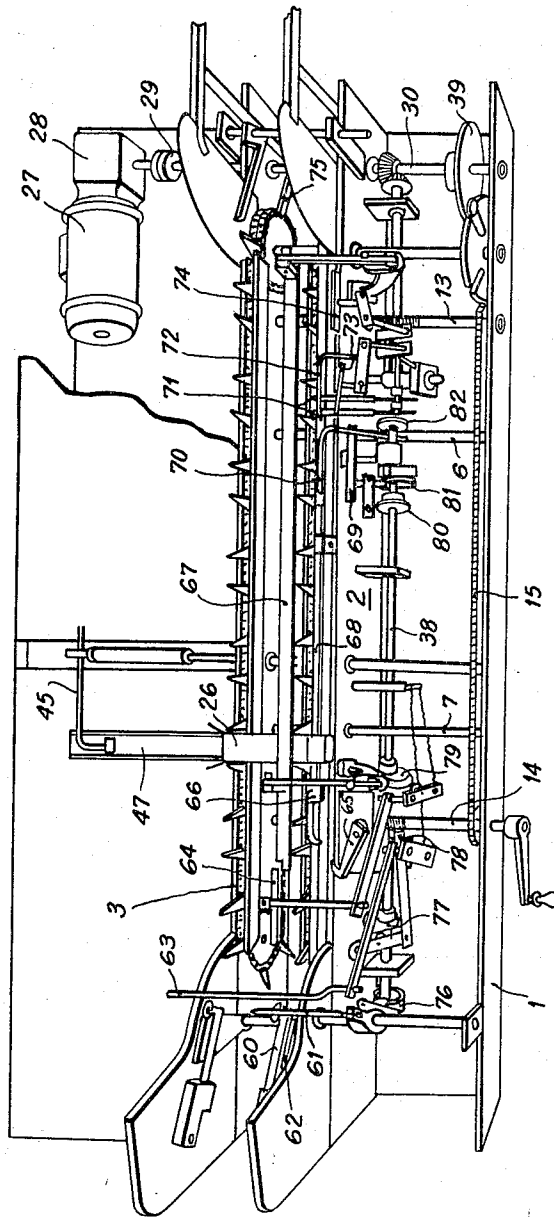
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Fig. 5



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PACKING MACHINE

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Filed Nov. 22, 1963, Ser. No. 325,553

Claims priority, application Germany, Nov. 23, 1962,

K 48,288

5 Claims. (Cl. 53—250)

The present invention relates to a machine for packing articles of any kind into cartons.

Such a machine is usually provided with a chain with buckets thereon for conveying the articles and also with a chain which is provided with carrier members for conveying the open folding cartons.

In order to adjust the buckets to receive articles of different widths, each bucket is usually made of two parts so as to form two series of half buckets, and a separate chain is then required for carrying each series. When required, the distance between the two bucket parts may be changed by turning the two sprocket wheels for the desired amount relative to each other. The same applies accordingly to the carton carriers, regardless of whether they consist likewise of two-part buckets or of carrier members in the form of triangular or similar metal parts. In the latter case, however, at least three chains are required.

For adjusting the machine to folding cartons of different lengths, it is usually necessary to shift and newly set up individually a series of devices which are intended for straightening and closing the individual folding cartons. Aside from this, the sprocket wheels for the chains for conveying the folding cartons must also be adjusted individually to the desired positions.

Although packing machines of the above-mentioned kind which may be designed either for an intermittent or continuous operation may produce a very high output, they are very uneconomical when smaller amounts of articles are to be packed in folding cartons of different sizes since the operations necessary for readjusting the machine from one carton size to another require a considerable length of time which is not in a proper proportion to the effective working time of the machine.

It is an object of the present invention to provide a packing machine which may be adjusted very quickly by only a few manipulations to folding cartons of any desired sizes or shapes within a very large range of sizes without requiring any parts to be exchanged, and which is of a very simple design and construction and may also be inexpensively manufactured.

According to the invention, this object is attained by providing a frame which comprises two longitudinal walls with a third wall between and parallel to the first two walls. This inner wall is movable in a direction normal to the first two walls such that it may be positioned appropriately for the different lengths of cartons to be utilized. The movable wall is adapted so that the elements used for adjusting the machine to handle different sizes of cartons are movable with the movable inner wall. The movement of the inner wall, together with its associated operative elements, is preferably accomplished by means of a spindle drive. This enables the machine to be quickly adapted to handling cartons of common cross-sectional size, but different lengths, by the operation of a single drive control.

Since the folding boxes are conveyed by two pairs of chains which are provided with carrier plates which are spaced from each other to receive the folding cartons, and one pair of these chains being axially nonadjustable, while the other is axially adjustable together with the intermediate wall, each of the folding cartons regardless of its length will always be guided in a fixed axial

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position near one end by a pair of carrier plates and will thus be prevented from tilting over, while at the other end the elements of the machine may be adjusted in accordance with cartons of different lengths which may vary within any desired range.

The invention further provides an efficient means for adjustment of the longitudinal spacing between the coating elements of each pair of carrier plates to accommodate cartons of different cross-sectional size. In the machine herein described, this adjustment may be readily accomplished by moving one sprocket wheel of each pair relative to the other of each pair. Since the movement of a sprocket wheel results in corresponding movement of the chain which it drives, and since the individual carrier plates are fixed to the chain upon which they are carried, an appropriate spacing of the coating elements of each pair of carrier plates may simply and quickly be effected.

For inserting the articles to be packed into the open ends of the folding cartons, each of which is held between two pairs of carrier plates, the invention further provides a reciprocating packing arm or the like which slides an article or group of articles along a channel, for example, of a U-shaped cross section toward and into one of the folding cartons while this channel is held in a fixed position. In order to avoid the necessity of providing a separate element for guiding the articles to be packed into the open end of a carton, the channel is adapted to reciprocate at intervals coordinated with the arrival of a carton at the end of said channel. The reciprocating motion of the channel is such that the forward edge of the channel advances between the closure flaps at the open end of a carton and into the main body of the carton in its forwardmost position. The reciprocating channel preferably guides the article or articles to be packed completely into the carton so that the rear end of said article or articles passes beyond the closure flaps at the open end of the carton.

By designing the packing arm and its actuating mechanism so that this arm extends from one side into the feed channel and may swivel upwardly during its return stroke, it is possible to fill the channel continuously with new articles to be packed. At the end of its return stroke, the packing arm will then swivel downwardly and enter between two adjacent articles and then push that or those articles in front of it toward and into the folding carton. Thus, there is no need to provide an expensive conveying mechanism with separate chains for conveying the articles to be packed.

For driving the packing arm, the invention provides a hypocycloid gear which despite the small size of the machine produces such a long stroke of the packing arm that it may also push long articles or a longer group of articles into a folding carton.

The features and advantages of the present invention will become more clearly apparent from the following detailed description of a preferred embodiment thereof which is illustrated in the accompanying drawings, in which—

FIGURE 1 shows a top view of the machine frame and the drive mechanism;

FIGURE 2 shows a perspective view of the conveyer chains with the carrier plates thereon;

FIGURE 3 shows a side view of the drive mechanism for the packing arm;

FIGURE 4 shows a top view of FIGURE 3 including the packing arm, its drive mechanism and the filling channel; while

FIGURE 5 shows a perspective view of the intermediate wall with the operating and control elements thereon.

The packaging machine according to the invention comprises a frame which comprises three longitudinal walls

1, 2, and 3. The two outer walls 1 and 3 are stationary, while the inner wall 2 on which guide bushings 4 and 5 are secured is adjustable transversely along crossrods 6 and 7 for the purpose of adjusting the machine to folding cartons of different lengths. This may be accomplished in a simple manner by turning a handwheel 14, whereby two spindles 12 and 13 are equally turned which are connected by a chain 15. Depending upon the direction in which the handwheel 14 is turned, the intermediate wall 2 will thus be moved toward or away from the outer longitudinal wall 1. An adjustment of the intermediate wall 2 also results automatically in a corresponding adjustment of all parts which are directly or indirectly mounted thereon, such as the operating elements 60 to 75, the two pairs of sprocket wheels 8 and 9 which are connected to the shafts 10 and 11, the chains 18 and 19 with the carrier plates 24 and 25 thereon, the bevel gear 41 which is connected to shaft 30, the bevel gear 42 on shaft 38 which is rotatably mounted in the bearing blocks 37, all of the cam plates and eccentrics 76 to 82 which are mounted on this shaft 38, and the levers which are associated with these cam plates and eccentrics. In FIGURE 1, the movable inner wall is indicated in dotted lines in an intermediate position.

Aside from the two pairs of sprocket wheels 8 and 9 which are slidable in the axial direction on shafts 10 and 11, the two other pairs of sprocket wheels 16 and 17 are also mounted on these shafts. Each of the four chains 18, 19, 20, and 21 is provided with carrier plates of the same shape. However, the carrier plates are arranged on the different chains in such a manner that each of the carrier plates on the inner chains 18 and 20 are aligned in one direction while each of the carrier plates on the outer chains 19 and 21 are aligned in the opposite direction.

The longitudinal distance between the associated carrier plates 22 and 23 and plates 24 and 25 between which the folding boxes 26 are placed may be varied by turning the inner sprocket wheels relative to the outer sprocket wheels of each pair after a setscrew on each inner sprocket wheel has been loosened. In this manner it is possible to adjust the carrier plates in accordance with the width of the cartons.

For driving the machine, an electric motor 27, the speed of which is adjustable, is connected by a gear unit 28 and a clutch 29 to the main drive shaft 30. This shaft has rigidly secured thereto a bevel gear 31 and carries axially slidable thereon a bevel gear 41 which is rotatably connected to the longitudinal wall 2 so as to be movable thereby. Bevel gears 31 and 41 are in mesh with the associated bevel gears 32 and 42 to drive the shafts 33 and 38 on which cam plates and eccentrics are mounted which are adapted to control the individual operations of the machine. Shaft 33 carries another bevel gear 34 which is in mesh with an associated bevel gear 35 so as to drive the transverse shaft 36 on which likewise eccentrics are mounted, for example, for driving or controlling the means for inserting the folding cartons between the associated carrier plates. The main shaft 30 further carries a driving element 39 which acts upon a Maltese cross transmission 40 which rotates the chain drive shaft 11 in a step-by-step movement.

The operating elements which are required for the operation of the machine and are to be adjusted when cartons of a different size are employed comprise the suction member 60, the severing blade 61, the inserter 62, the preliminary folder 63, the pivotable depressor rail 64, the side folder 65, the reversing rail 66, the depressor rail 67, the guide rail 68, the tuckers 69 and 70, the piercers 71, the guide bracket 72, the closing members 73 and 74, and the applicator 75.

The operations of the severing blades 61 are controlled by the cam plate 76, of the preliminary folder 63 by the cam plate 78, of the side folder 65 by the cam plate 77, and of the pivotable depressor rail 64 by the cam plate

79, whereas the movements of the two tuckers 69 and 70 are controlled by the cam plates 80 and 81 and those of the piercer 71 are controlled by the cam plate 82. The cam member which controls the movements of the closing members 73 and 74 is not shown in FIGURE 5 as it would render the drawing too complicated and unclear.

As shown particularly in FIGURE 4, the articles 43 to be packed are placed either by hand or automatically on a feed channel 47 along which each of them is pushed by a packing arm 45 which is movable back and forth at timed intervals along a crossbar 46 into one of the open folding cartons 26 which is held between two pairs of associated carrier plates.

The packing arm 45 is driven by means of a cycloid gear, as illustrated in FIGURES 3 and 4. The continuous rotation of shaft 33 is transmitted by sprocket wheels 49 and 50 and chain 51 which connect these wheels to a shaft 48 to drive the latter by an intermittent rotation. Gear 52 is rigidly secured to a crossbar 53 and contains a bearing for the rotation of shaft 48. Shaft 48 also carries a lever 54 which is thus likewise rotated about the axis of shaft 48 so that a shaft 55 which is rotatably mounted on the lever 54 will carry out a concentric circular movement about the stationary gear 52. Shaft 55 carries on one end a gear 56 which has a number of teeth at a ratio of 1:2 to the number of teeth of gear 52. Gears 52 and 56 are connected to each other by an intermediate gear 57. As indicated in FIGURE 3, a lever 58 is secured to shaft 55 and carries a pin 59 at a distance equal to the distance between shafts 48 and 55. The 1:2 ratio between gears 52 and 56 will, therefore, effect a linear reciprocating movement of pin 59 through a distance of four times the distance between shafts 48 and 55. This reciprocation produces an equivalent reciprocation of arm 45.

Although my invention has been illustrated and described with reference to the preferred embodiment thereof, I wish to have it understood that it is in no way limited to the details of such embodiment, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. A machine for packing articles into cartons of different sizes, comprising: a frame having a pair of stationary longitudinal walls, at least one movable longitudinal wall extending substantially parallel to said stationary walls therebetween and movable transversely relative to said stationary walls, a drive shaft, a second shaft extending parallel to said drive shaft, said shafts being rotatably mounted on and extending between said walls, two pairs of sprocket wheels driven by said shafts, one of said pairs of sprocket wheels being nonrotatably mounted on said drive shaft for axial movement thereon, the other of said pairs of sprocket wheels being nonrotatably mounted on said second shaft for axial movement thereon, said two pairs of sprocket wheels being rotatably connected to said movable wall so as to be movable thereby along said shafts and so that each pair of sprocket wheels remains in longitudinal alignment with the other pair of sprocket wheels at any position of adjustment of said movable wall, adjusting means for moving said movable wall transversely to said stationary walls, conveyor chains on said sprocket wheels, carton carriers on said chains for receiving and conveying cartons and for holding them near the open end thereof, means for adjusting said carriers to permit them to receive, hold and convey cartons of different widths, and means for feeding at least one article into said open end of each carton.

2. A packing machine as defined in claim 1, further comprising a feed channel for moving the articles to be packed in intermittent succession toward said cartons, a packing member adapted to engage with one article at a time for moving at least said one article along with said feed channel and into the open end of one of said cartons,

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and means for moving said packing member back and forth in a timed sequence, said last means for moving said packing member comprising a cycloid gear.

3. A packing machine as defined in claim 1, further comprising a further pair of sprocket wheels mounted in a fixed position on each of said shafts adjacent to one of said stationary walls, conveyor chains connecting said further pairs of sprocket wheels, carton carriers on said last chains adapted to receive and convey said cartons and to hold them near the closed end thereof, and means for adjusting said carriers on said last chains to permit them to receive, hold, and convey cartons of different widths.

4. A packing machine as defined in claim 1, further comprising a Maltese cross transmission for intermittently rotating said drive shaft.

5. A packing machine as defined in claim 3, in which said means for adjusting said carriers on all of said con-

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veyor chains comprise means for permitting the distance between the associated carriers of each pair of chains to be adjusted by turning the sprocket wheels of one chain relative to the sprocket wheels of the other chain.

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