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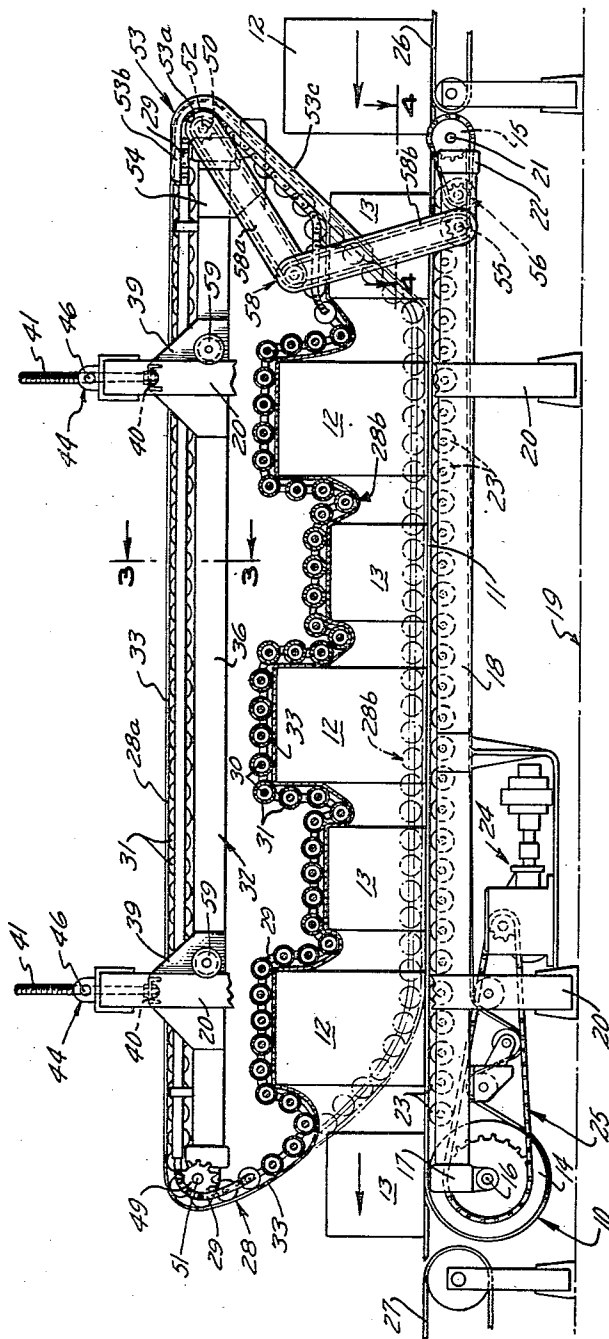
2,805,533

MACHINES FOR SEALING SHIPPING CARTONS OR THE LIKE

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2 Sheets-Sheet 1

FIG. 1



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2 Sheets-Sheet 2

FIG. 2

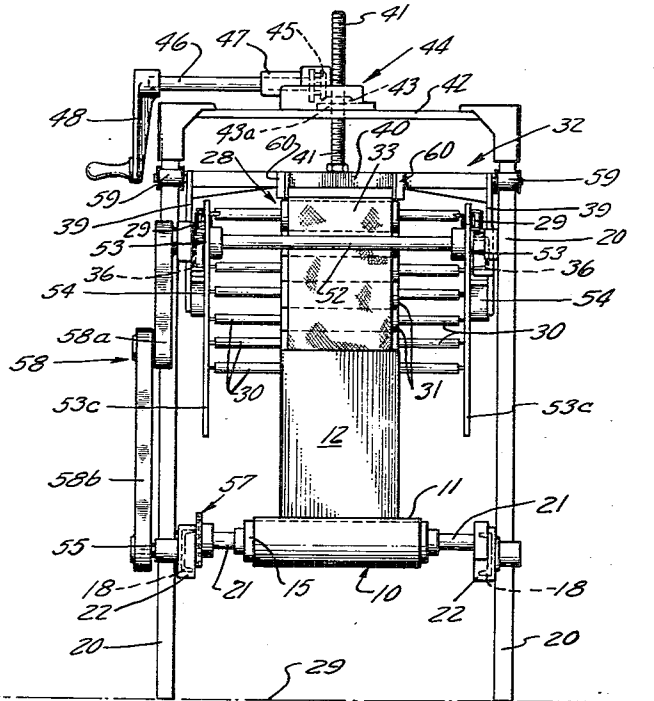


FIG. 3

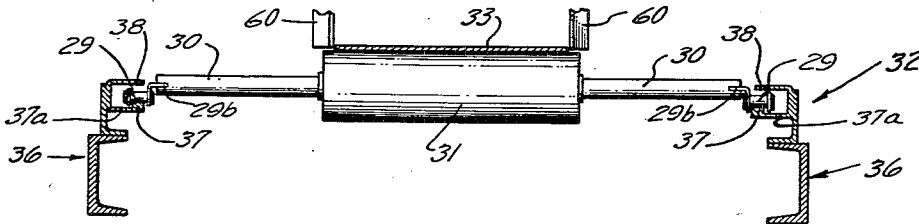


FIG. 4

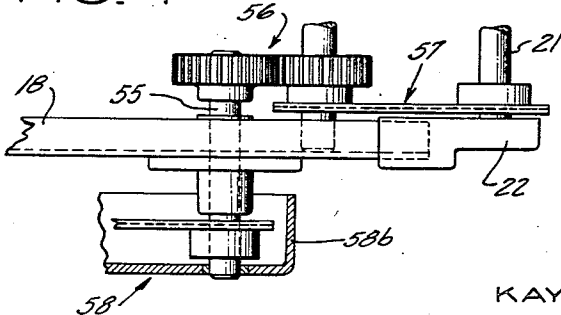
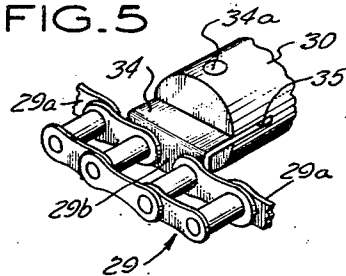


FIG. 5



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MACHINES FOR SEALING SHIPPING CARTONS OR THE LIKE

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4 Claims. (Cl. 53—387)

This invention relates generally to improvements in machines for sealing shipping cartons or the like and more particularly to improvements in that kind of sealing machine which is commonly referred to as a "compression unit" and which has upper and lower vertically spaced compression belts between which cartons to be sealed are passed and by which freshly glued and closed flaps of the carton are pressed firmly in their proper sealing positions for a time sufficient for the glue thereon to set.

As disclosed by the U. S. Patent 1,887,699 to Reid, it has been proposed to provide pivoted hanging arms above the lower reach of the upper pressure belt of a certain carton sealing machine of the kind referred to, the lower ends of these arms carrying rollers to press the underneath portions of such belt downwardly against the upper surfaces of the carton passing therebeneath.

Compression units having rollers carried by pivoted arms above the lower stretch of a flexible upper pressure belt have certain disadvantages which are inherent therein. They can accommodate cartons of only a limited range of different heights. Moreover, each carton in passing through such a compression unit will encounter and must lift and sustain the weight of heavy rollers and their swingable suspension arms. In consequence, cartons and/or fragile articles, such as electric light bulbs, packed therein have been damaged or broken during passage through such a compression unit.

An object of the invention is to provide a carton sealing compression unit which is adapted to accommodate cartons of much greater ranges of heights and wall strength characteristics than can be accommodated by a compression unit of the prior art.

Another object of the invention is to provide for gentle application of effective downward pressure on the top surface of each of successive cartons fed into and passed through a compression unit embodying the invention so that cartons containing such easily breakable articles as electric light bulbs may be passed through and acted on by such unit without damage to the cartons or their contents.

A further object of the invention is to provide for the imposition of an effective downward pressure gently throughout substantially the entire upper surface area of each carton as it enters the compression unit and to maintain such pressure on the carton during its travel through the unit.

To attain the foregoing and other objects of the invention, the upper pressure belt may be formed to provide an endless series or chain of transversely disposed adjacent rollers of such length and so mounted and driven in relation to the path, direction and rate of travel of cartons through the unit that a portion of the lower reach of such chain of rollers will be laid across the upper surface of each carton entering the unit from the front or leading transverse edge to the rearward edge of that carton so as to be draped thereover and thereafter will remain on this carton with its position

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practically unchanged during the travel of the carton through the unit. An endless cover band of cotton or other suitable fabric or material may be provided to extend around the chain of rollers for direct contact with the cartons and in particular to prevent marring or damage of a carton because of a transverse upper edge portion being wedged into a space between adjacent transverse rollers of the upper pressure chain during operation of the unit.

Other objects and advantages of the invention will be pointed out or will become obvious from the following description of a practical embodiment thereof as shown in the accompanying drawings, in which:

Fig. 1 is a side elevation of a compression unit embodying the invention with certain portions thereof broken away and other portions being shown in section;

Fig. 2 is an end view of such unit, looking at the right hand end thereof as shown in Fig. 1;

Fig. 3 is a relatively enlarged vertical cross-sectional view through the upper reach of the upper pressure belt and the supporting means therefor as viewed on the line 3—3 of Fig. 1;

Fig. 4 is a relatively enlarged section along the line 4—4 of Fig. 1, partially showing a reversing and driving mechanism for operatively connecting the lower with the upper pressure belt of the compression unit; and

Fig. 5 is a further enlarged fragmentary perspective view of a portion of a carrying chain and its connection with an end of a roller shaft of the upper pressure belt.

The illustrative compression unit comprises a lower endless pressure belt 10, Figs. 1 and 2, supported and driven by means presently to be described so that the upper reach thereof, indicated at 11, constitutes a horizontal conveyor to carry upright cartons standing thereon longitudinally through the machine from the right hand, receiving end to the left hand, delivery end thereof as viewed in Fig. 1. As shown in Fig. 1, cartons of two different heights and sizes, 12 and 13, respectively, are being moved by the conveyor 11 through the machine. The cartons may, of course, vary in height and size to a greater extent than illustrated in Fig. 1 and cartons of different height or size may be arranged in line according to any predetermined pattern or the cartons may all be of the same height or size.

The lower belt 10 is trained about a driving roll 14 at the forward or head end of the machine and about a cooperative roll 15 at the rearward end of the machine. The head roll 14 may be mounted on a transverse head shaft 16 which is journaled in bearings in brackets 17 on the forward ends of longitudinal frame members 18 which are carried at a suitable level about a factory floor or the like 19 by uprights 20 resting on that supporting surface and spaced apart so as to be suitably located for the support of the structure involved. The roll 15 is mounted on a shaft 21 journaled at its ends in bearing portions of brackets 22 on the rearward ends of the longitudinal frame members 18. The upper reach 11 of the belt 10 may be supported between the rolls 14 and 15 by cross rollers 23 extending between the longitudinal frame members 18.

A motor and gear reduction unit generally indicated at 24 is operatively connected, as by a chain and sprocket assembly 25, with the head shaft 16 so as to rotate the latter in a counterclockwise direction, thereby moving the carton-conveying upper reach 11 of lower belt 10 at the speed desired from the right to the left as viewed in Fig. 1. The cartons may be fed onto the rear end of conveyor 11 by a supply conveyor 26 and may be delivered from the conveyor 11 at the forward end of the machine onto a take-away conveyor 27.

The upper pressure belt of the machine is indicated generally at 28, Figs. 1 and 2. It comprises a pair of spaced,

parallel endless carrier chains 29, Figs. 2 and 3, closely spaced transverse shafts 30 extending between and connected at their ends to the carrier chains 29 and freely turnable rollers 31 on the shafts 30. A vertically adjustable upper belt support, generally designated 32, Figs. 1 and 2, positions such belt so that its upper stretch, indicated at 28a, Fig. 1, is parallel with and at a predetermined distance directly above the upper carton conveying reach 11 of the lower belt 10 and linearly approximately co-extensive therewith while the remaining, substantially greater part of the total length of the belt is disposed below the support 32 as a very slack lower reach, 28b, Fig. 1, which will be draped in a fore-and-aft direction across the upper ends of the cartons on the underneath conveyor as shown in Fig. 1 and as hereinafter more fully explained. Reach 28b may sag onto the conveyor 11 when no cartons are present as indicated by dotted lines in Fig. 1. An endless band 33 of cotton or other suitable fabric or material may be provided around the chain of rollers of the upper pressure belt for direct contact with the upper ends of the cartons on the underneath conveyor as successive portions of the lower reach of such upper belt are laid over the upper ends of successive such cartons.

The chains 29 may be of conventional construction except that at closely spaced intervals along the inner sides thereof, conventional side links, such as those indicated at 29a in Fig. 5, may be replaced by special side links, 29b, having returned integral attaching portions 34 extending into transverse slits 35 in the adjacent ends of the cross shafts 30 to which they may be fastened by fastening devices 34a or in any other suitable known manner, whereby to support the cross shafts 30 and their rollers 31 for movement with the chains 29.

The belt support 32 comprises a pair of spaced, parallel, rigid longitudinal frame members, designated 36, formed in part to provide longitudinally extending rails 37, on which the side carrier chains 29 of the upper stretch of the upper pressure belt 28 are slidably supported and by which the longitudinal movement of such upper stretch is appropriately guided. The rails 37 may be provided on returned longitudinally extending flanges 37a on the longitudinal frame members 36. Accidental or unintended upward displacement of the side chains 29 from these rails may be prevented by longitudinally extending chain guards 38 which also may be returned flanges on the upper edge portions of longitudinal frame members 36. See Fig. 3.

The longitudinal members 36 of the upper belt support 32 are suspended at a plurality of places along their length from the main framework by hanger arms 39 which depend from opposite ends of cross members 40 which at their middle portions have fixed upwardly projecting threaded rods 41 extending through cross bars 42 by which upper ends of the main supporting uprights 20 are connected, the threaded rods 41 being engaged by nuts 43 which rest on the cross members 42. The nuts 43 are held against vertical movement relative to cross members 42 by suitable cages or housings 44 fixed to such cross members. Each nut 43 has a bevel gear portion as indicated at 43a, in mesh with a bevel gear 45 on the end of a rotatable adjusting rod 46 which is journaled in a suitable bearing 47 on the cage 44. See Fig. 2. A handle 48 on the outer end of one of the rods 46 may be turned to adjust the associated hanger assembly up or down and the several adjusting rods 46 may be operatively connected by suitable known motion transmitting connections, not shown, so that the several hanger assemblies by which the support 32 is carried will all be adjusted vertically, up or down, at the same time and to the same extent.

The carrier chains 29 pass over sprockets 49 and 50 on cross shafts 51 and 52, respectively, such shafts being mounted on the forward and rearward ends of the longitudinal members 36 of the pressure belt support. Shaft

52 and sprockets 50 thereon are turned clockwise by a suitable driven connection with the shaft 21 of the lower belt assembly so that the portions of the slack lower stretch 28b of upper belt 28 draped over cartons on the underneath conveyor 11 will be moved with such cartons. This driven connection will presently be more fully described.

In passing around the sprockets 50, the chains 29 pass along the inner surfaces of suitably positioned chain guards 53, each of which lies in the same vertical plane as its associated sprocket and comprises an arcuate intermediate portion 53a concentric with that sprocket, a forwardly extending substantially horizontal attaching arm 53b fixed to the longitudinal member 36 which is located at that side of the upper belt support, and a downwardly and forwardly inclined relatively long lower arm 53c which extends to a level not appreciably above and preferably below the level of the top surface of the shortest carton to be passed through the machine when the upper belt support is at any one of the vertically adjusted positions to which it can be moved. The arms 53c will guide the upper belt downwardly and forwardly to a level below the top of any of a procession of cartons fed to the machine. Each carton, on entering the machine will contact at its leading upper edge with a downwardly and forwardly inclined portion of the loosely hanging lower stretch of the upper belt. As the carton is moved forward by the supporting conveyor 11, a portion of the slack lower stretch of such belt will be laid progressively across its top as shown for the carton 13 at the right hand end of the machine in Fig. 1. Belt guiding arms 53c may be strengthened by firm direct structural connections, as at 54, Figs. 1 and 2, with the longitudinal belt support members 36.

A short shaft indicated at 55, Figs. 1 and 4, rotatably supported by one of the longitudinal frame members 18, has a driven connection by means of the meshed reversing gear arrangement 56 and the sprocket and chain assembly 57, Fig. 4, with the lower belt driven shaft 21. Short shaft 55 is connected by a "shear" type drive connection indicated generally at 58 with the shaft 52 so that the upper pressure belt will be driven in the reverse direction from that of the lower belt 10. The driving connection between the conveyor shaft 21 and the upper belt shaft 52, as shown, is adapted to drive the upper belt at a higher linear speed, as 50% higher, than that of the conveyor 11. The "shear" type drive connection 58 is known and comprises pivotally connected sections 58a and 58b so as to be automatically self-adjusting to maintain the drive from shaft 55 to shaft 52 unchanged for all vertical adjustments of the upper belt support 32 relative to the lower belt.

Flanged wheels 59, Figs. 1 and 2, mounted on the arms 39 at opposite sides of upper belt support 32, may be provided for rolling contact with the stationary uprights 20 to aid in guiding such support during its vertical adjustments and in stabilizing the position of the support in relation to the stationary main supporting structure of the machine.

The flexible covering band 33 may be restrained against creeping laterally from centered position on the rollers 31 by guides 60, Figs. 2 and 4, depending from the cross members 40 of the upper belt support 32 in positions to contact the edges of such band.

The operation of the illustrative machine will be readily understood from the foregoing description of the parts thereof. The lower reach of the novel upper pressure belt will have enough looseness or slack therein to cause successive portions thereof to be laid gently over successive cartons as they are started through the machine so that the upper end portion of each such carton will be draped by a portion of such belt extending upwardly against or close to the front wall of the upper portion of the carton, then rearwardly across the top of the carton and finally downwardly against or close to the rear wall of the carton as shown for each of the cartons being con-

veyed through the machine as illustrated in Fig. 1. Because of the extra length or slack in the lower reach of the upper pressure belt and the excess speed of driving of such belt, the portion of the pressure belt draped over each carton top will remain thereon with its position and therefore its downward pressure on the freshly glued and closed top flaps of the carton substantially constant during passage of the carton through the machine. While such cartons customarily have their bottom flaps closed and sealed before being filled so that only the top flaps require sealing in the machine, it will be obvious that the pressure exerted on the upper portions of the cartons will hold the lower flaps firmly against the underneath carton conveyor so that sealing of these flaps may be effected if required.

The individual rollers of the novel upper pressure belt may be long enough to extend completely across the carton tops and the manner of draping portions of such belt over the carton tops in a fore-and-aft direction permits use of relatively light weight individual rollers as the upper surface of each carton will be subjected to the total weight of a relatively large number of these rollers. If heavier individual rollers should be desired for any specific installation or use of the machine, their weight may be increased by placing metal shot within them or by any other suitable known expedient.

Many changes in and modifications of the illustrative embodiment of the invention which has been particularly described herein will be apparent to or readily occur to those skilled in the art and I therefore do not wish to be limited to the details of such embodiment.

I claim:

1. In a machine of the character described, an endless conveyor belt, means for operatively supporting said belt so that it has a horizontal upper reach movable in a substantially fixed plane to receive and convey cartons in a single file order from a receiving point at one end of said upper reach to a delivery point at the opposite end thereof, an endless pressure belt comprising an endless chain of closely spaced flexibly connected, transverse rollers, vertically adjustable supporting means for operatively supporting said endless pressure belt so that it has a horizontal upper reach spaced vertically above and parallel with the upper reach of the conveyor belt, said pressure belt having an over-all length sufficiently greater than twice the length of its upper reach to provide sufficient slack in its lower reach to cause it to tend to sag downwardly to a level substantially below the level of the upper surface of the lowest of any carton to be supplied to and conveyed by the upper reach of the conveyor belt, and means to drive said conveyor belt and said pressure belt cooperatively to pass between them each of successive cartons supplied to the upper reach of the conveyor belt at said receiving point.

2. In a machine of the character described, the combination specified by claim 1 wherein said driving means is constructed and arranged to drive the upper reach of the pressure belt in the reverse direction to that of the upper reach of the conveyor belt and at a sufficiently higher speed in view of the slack in the lower reach of the pressure belt to cause successive portions of the lower reach of the pressure belt respectively encountered by successive cartons supplied to the upper reach of the conveyor belt to be laid gently across the upper end portions of such cartons and to move therewith during passage of the cartons through the machine.

3. In a machine of the character described, the combination specified by claim 2 wherein guide means carried by the supporting means for the pressure belt guide successive initial portions of the slack lower reach of the pressure belt downwardly and forwardly into the path of movement of the cartons supplied to the upper reach of the conveyor belt and below the level of the leading upper edge of the lowest of such cartons.

4. In a machine of the character described, carton conveying means to receive and convey cartons along a horizontal path from a receiving point to a delivery point, an endless pressure belt comprising a pair of transversely spaced, parallel endless carrier chains, closely spaced transverse shafts extending between and connected at their ends to the carrier chains, freely turnable rollers on said shafts, means for operatively supporting said carrier chains so that said endless pressure belt has a horizontal upper reach spaced vertically above and parallel with said horizontal path, said carrier chains having an over-all length sufficiently greater than twice the length of said upper reach of the pressure belt to provide a lower reach of the pressure belt having sufficient slack therein to cause it to tend to sag downwardly to a level substantially below the level of the upper surface of the lowest of any carton to be conveyed along said horizontal path by said carton conveying means, and driving means for the pressure belt arranged to drive the upper reach thereof in the reverse direction to that of the movement of cartons along said horizontal path by said carton conveying means and at a sufficiently higher speed in view of the slack in the lower reach of the pressure belt to cause successive portions of the lower reach of the pressure belt respectively encountered by successive cartons entering said path to be laid gently across the upper end portions of such cartons and to move therewith during passage of the cartons along said path.

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