May 8, 1951 E. A. WILCKENS ET AL 2,552,246

INTERMITTENT VARIABLE SPEED DRIVE MECHANISM

Original Filed Dec. 23, 1941 2 Sheets-Sheet 1

FIG. 1.

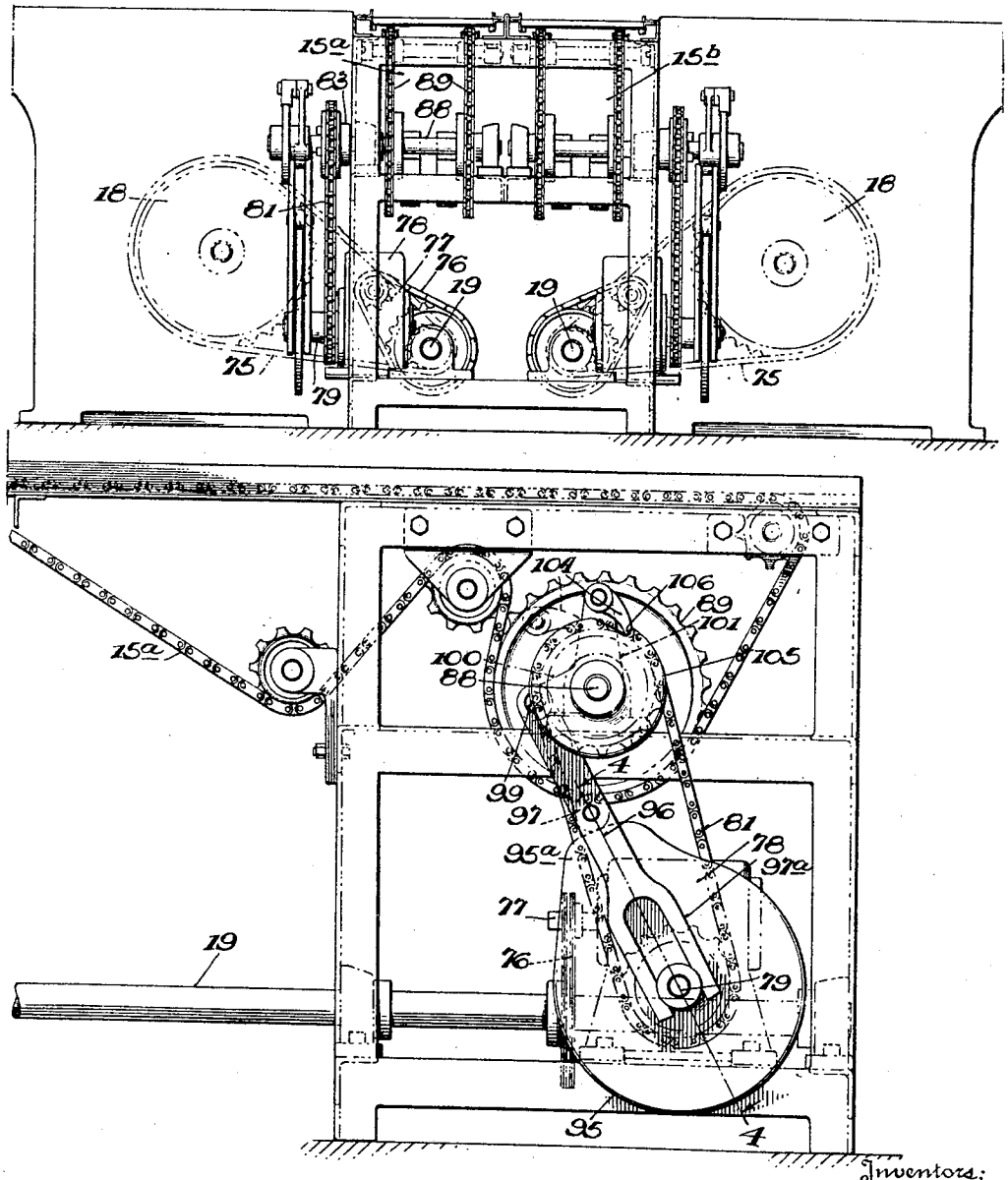


FIG. 2.

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FIG. 3.

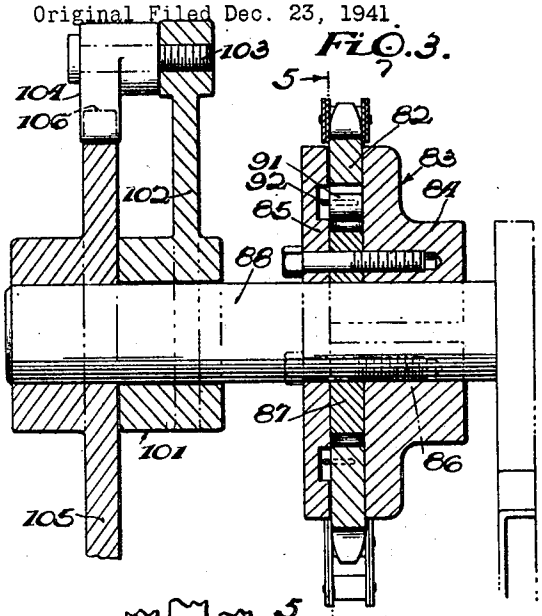


FIG. 5.

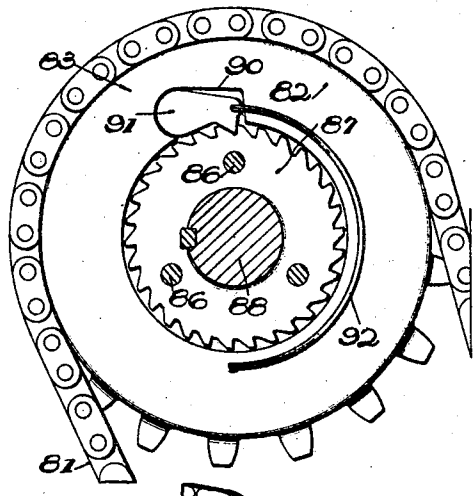


FIG. 4.

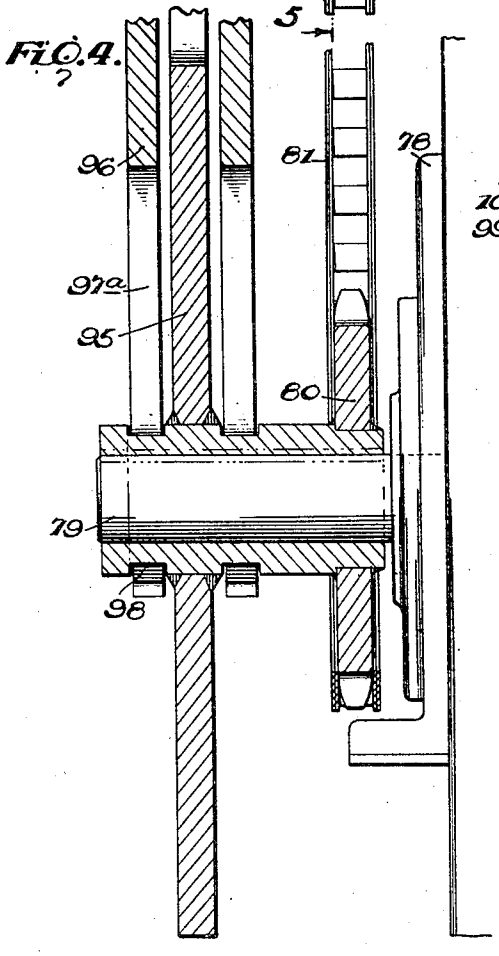
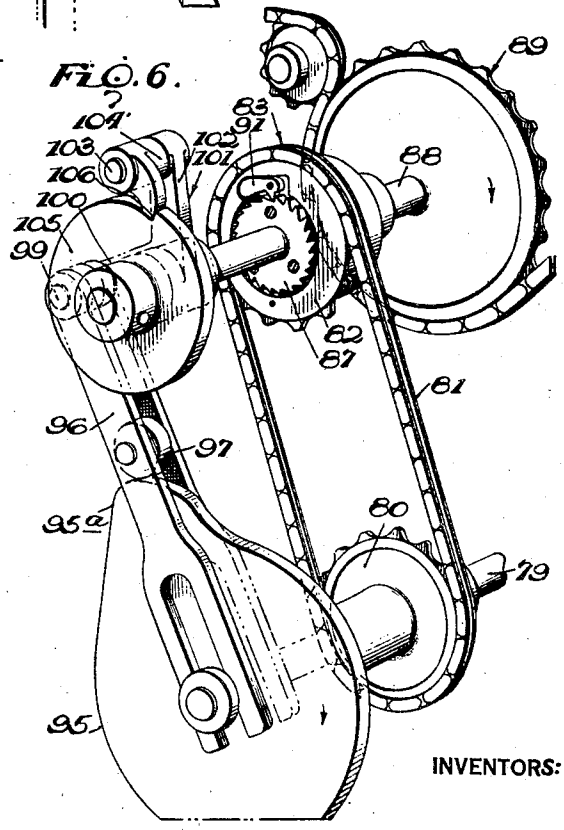


FIG. 6.



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INTERMITTENT VARIABLE-SPEED DRIVE MECHANISM

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Original application December 23, 1941, Serial No. 424,174. Divided and this application October 18, 1945, Serial No. 623,036

4 Claims. (Cl. 74—393)

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The present invention relates to drive mechanisms. The application is a division of our application for Conveyor Loading Machanisms, Serial No. 424,174, filed December 23, 1941, now Patent #2,408,838, issued October 8, 1946.

Certain types of containers are sealed by applying thereto a cap of substantially planar form and of an outside diameter larger than the bottle mouth, closing being performed by bending the edge of the cap down around the bottle mouth so that the bent-down portion forms the cap skirt or flange. A cap of this type is disclosed in the patent to George W. Booth, No. 1,956,217, issued April 24, 1934, for Container Closure and is hereinafter referred to as a disc-type cap.

During manufacture, some disc-type caps are coated on their container contacting surface with a latex or similar compound in liquid form adapted to be subsequently baked or otherwise treated to form a resilient liner. In such cases, care must be exercised to prevent the caps from nesting or overlapping while the compound is still soft because, due to their very flat form, an overlapped relationship will enable the lining compound of one cap to contact with and adhere to the other cap. In addition, if the lining is applied in the form of an annular ring to a shallow annular groove formed in the cap body, nesting or overlapping will mar the form of the lining so that, when the cap is applied to a container, the lining may not properly contact with the container mouth.

The necessity of keeping coated disc-type caps from nesting until the lining or coating hardens, coupled with the fact that their extremely light weight and smooth metal construction causes them to move about when even very slightly disturbed, has made the rapid handling of freshly coated caps extremely difficult. More particularly, for high rate of production, it is desirable to place the freshly coated caps in close juxtaposition on a moving conveyor for subsequent baking. Positioning of the caps in close order on a moving conveyor, of course, requires that each cap be exactly positioned at the proper point on the conveyor, without possibility of any cap so moving during or after the transfer that it will slide upon an adjacent cap.

An additional difficulty arises because in some cases it is desirable to subject the caps, after baking to harden the coating, to a spray of a liquid which dries to form a hard, smooth film. If such spraying is performed while the caps are upon the conveyor, which is the most desirable

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procedure, the conveyor has a hard smooth film formed upon it. Thus, caps subsequently placed upon the conveyor are even more apt to slide with respect to each other.

A still further difficulty arises from the fact that it is frequently desirable to place the liquid coating containing caps within shallow trays carried by a moving conveyor, rather than directly upon a conveyor, so that each tray will support a large number of caps during baking. Such trays are provided with upstanding side and end walls and the delivery of caps must be so controlled that none of the caps will land upon a tray end wall. If the caps are sprayed after baking while still in trays, the trays likewise become coated with a smooth film which enables even a slight jarring to shift caps within the tray.

If the caps or other articles are to be placed in trays including upstanding edge walls, as referred to above, the invention contemplates so regulating the movement of the conveyor that at proper time intervals its travel will be accelerated so that the tray edge will move clear of the depositing mechanism before a cap can fall upon the tray edge.

An important object of the present invention is to provide a conveyor drive of such construction that the conveyor movement will be synchronized with the cap depositing mechanism to accelerate the movement of the conveyor at predetermined time intervals, thereby insuring that the caps will be spaced further apart with respect to the conveyor at predetermined intervals.

In order to prevent the caps from sliding relative to the conveyor, the manner of accelerating the movement of the latter must be so regulated that it will have no abrupt change of speed.

Another object of the invention is to provide a conveyor drive mechanism of such design that it will not jar the articles to cause them to shift position upon the conveyor.

Another object of the invention is to provide a drive mechanism adapted to periodically accelerate a driven element.

Other objects and advantages of the invention will be apparent from the accompanying drawings wherein:

Figure 1 is an end elevation showing the mechanisms of the present invention applied to a cap handling conveyor of the character discussed above.

Figure 2 is a side elevation of the drive mechanism looking from the left with respect to Figure 1;

Figure 3 is an enlarged vertical sectional view of the driven shaft of the drive mechanism;

Figure 4 is an axial sectional view on the line 4—4 of Figure 2;

Figure 5 is a sectional view on the line 5—5 of Figure 3, and

Figure 6 is a perspective view, with portions omitted, of the driving mechanism.

The drawings illustrate the drive mechanisms used for the operation of two conveyors designated 15*a* and 15*b* in Figure 1, these two conveyors being of the cap handling type disclosed in our original application. Each conveyor has its own drive means, the two being identical except that their positions are reversed so that both must drive their conveyors in the same direction. In view of the similarity of the two conveyor drives the drive of only one is described in detail herein, namely, the drive on the conveyor 15*a* shown at the left in Figure 1.

It will be obvious that in some instances one wide conveyor could be used instead of two arranged in tandem.

Conveyor 15*a* is driven from the motor 18 acting through a drive chain 75. Chain 75 engages a sprocket on the shaft 19 which, as hereinbefore explained, drives the various cap lining and cap feeding mechanisms positioned alongside the conveyor 15*a*. A large sprocket on shaft 19 drives a chain 76 engaging a sprocket upon the shaft 77 of a speed reduction unit 78. The speed reduction unit includes a shaft 79 which comprises the driving shaft for the conveyor 15*a*.

As best shown in Figures 2 to 6, shaft 79 has a sprocket wheel 80 fixed thereto which drives a sprocket chain 81 passing about a sprocket wheel 82 forming part of an overrunning clutch mechanism 83. Clutch mechanism 83 includes two housing elements 84 and 85, one on each side of and free of sprocket wheel 82. The two housing members are secured together by bolts 86 which extend through a ratchet wheel 87 to hold the latter to the housing members. Housing members 84 and 85 and ratchet wheel 87 are keyed to the driven shaft 88 which carries a pair of large sprocket wheels 89 which directly engage the conveyor 15*a*.

As illustrated in Figure 5, the sprocket wheel 82 is recessed as indicated at 90 to receive a pawl 91 normally held in engagement with the teeth of ratchet wheel 87 by a spring 92.

The arrangement described immediately above comprises the normally effective driving means for the conveyor. That is, assuming that the sprocket chain 81 is moving in the direction of the arrow illustrated in Figure 6 to rotate sprocket wheel 82 in a corresponding direction, the pawl 91 will act upon the ratchet wheel 87 to rotate shaft 88. It will be noted that the sprocket wheel 82 included in overrunning clutch mechanism 83 only has an operative connection with shaft 88 by reason of the action of pawl 91, sprocket wheel 82 otherwise being independent of shaft 88. Obviously, so long as pawl 91 is in driving engagement with ratchet wheel 87, conveyor shaft 88 will rotate at a predetermined speed controlled by sprocket chain 81.

In order to intermittently accelerate the speed of movement of the conveyor 15*a*, the driving shaft 79 has a cam 95 fixed thereto as shown in Figures 4 and 6 and this cam is engaged by a follower 96 including a roller 97 to bear on the periphery of cam 95. Follower 96 may include fork elements 97 to engage the hub 98 of cam

95. Hub 98 is keyed to shaft 79 and may also carry the sprocket wheel 80.

The follower 96 is pivotally connected as at 99 to one arm 100 of a bell crank 101 freely mounted on the driven shaft 88. The other arm 102 of bell crank 101 has a stud 103 secured in its outer end on which a pawl 104 is pivotally mounted. Pawl 104 bears upon a ratchet element or ratchet wheel 105 secured to the driven shaft 88. In the present arrangement ratchet wheel 105 is provided with a single tooth 106.

The operation of the cam 95 and the elements actuated thereby including the pawl 104 is as follows: During the time that the low portion of cam 95 is moving beneath the roller 97 of the follower 96, bell crank 101 will be in such position that pawl 104 will be at the point shown in dotted lines in Figure 2. Ratchet element 105 will be rotating beneath the pawl 104 in a clockwise direction with shaft 88 since the latter shaft is at that time being driven through chain 81 by pawl 91 of Figure 5.

However, when the rise 95*a* of cam 95 moves beneath roller 97, follower 96 will be lifted to the position shown in Figure 2 to rotate bell crank 101 in a clockwise direction with respect to Figures 2 and 6 and thereby move pawl 104 to the position shown in solid lines in Figure 2. An instant before this lifting movement of the follower 96 begins, the tooth 106 of ratchet 105 will have rotated beneath the pawl 104 so that the face of the pawl is now in engagement with the tooth. As a result, the lifting movement of the follower will cause pawl 104 to act on tooth 106 to rotate the ratchet 105 in a clockwise direction. Since the ratchet is fixed to shaft 88, which is the conveyor driving shaft, the conveyor will be correspondingly moved at an accelerated speed. This rotation of shaft 88 will be entirely independent of sprocket wheel 82 and sprocket chain 81 because the ratchet wheel 87 included in the overrunning clutch element 83 will simply rotate beneath pawl 91.

The above-described rotation of shaft 88 through cam 95 and pawl 104 will terminate at an instant when the pawl 91 of the overrunning clutch has dropped into engagement with a tooth of ratchet wheel 87 so that there will be no pause in the driving of the conveyor shaft 88. Furthermore, the contour of the rise 95*a* on cam 95 is such that the movement of bell crank 101 in a clockwise direction will begin with a gradually accelerated speed and will terminate at a gradually decelerated speed. It therefore results that no jerking will be imparted to the movement of the conveyor 15*a* such as might cause caps to slide about the same. Nevertheless, cam 95 will advance the conveyor 15*a* at a sufficiently rapid speed that between the time that the cap feeding mechanism has placed the last cap in a tray and before it can then drop a succeeding cap, the end walls of the trays will have moved past the cap dropping apertures and the succeeding cap will therefore drop into the following tray entirely clear of the leading end wall of that tray.

The terminology used in the specification is for the purpose of description and not of limitation, the scope of the invention being indicated by the claims.

We claim:

1. In a conveyor drive mechanism, a driving shaft, a driven shaft operatively connected to the conveyor to drive the latter, a normally effective driving means to drive the driven shaft from the driving shaft at a predetermined speed, a

cam operated from the driving shaft, a ratchet device fixed to the driven shaft, and a pawl controlled by said cam to periodically impart a driving rotation to said ratchet to rotate the driven shaft independently of said normally effective driving means for the latter.

2. A drive mechanism of the character defined in claim 1 wherein said shafts have their axes spaced and parallel.

3. In a conveyor drive mechanism, a driving shaft, a driven shaft operatively connected to the conveyor to drive the latter, a ratchet wheel on the driven shaft, a pawl carrier on the driven shaft including a pawl normally engaged with said ratchet wheel, means to rotate said pawl carrier from the driving shaft, a cam fixed to said driving shaft, a cam follower pivotally supported on said driven shaft, a second ratchet wheel fixed on said driven shaft, and a pawl operatively connected to said cam follower to periodically engage said second ratchet wheel to advance the driven shaft independently of said pawl carrier.

4. A drive mechanism of the character defined in claim 3 wherein said shafts have their axes spaced and parallel.

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