May 23, 1961 S. T. CARTER 2,985,283

MOTOR CONTROL MEANS FOR SPOTTING MECHANISM

Original Filed April 13, 1954 2 Sheets-Sheet 1

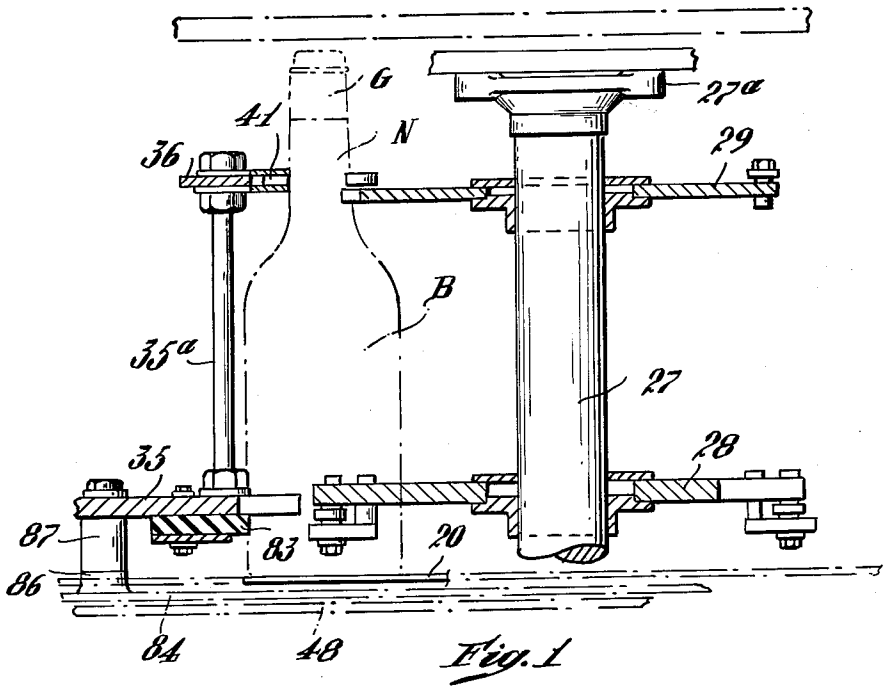

Fig. 1

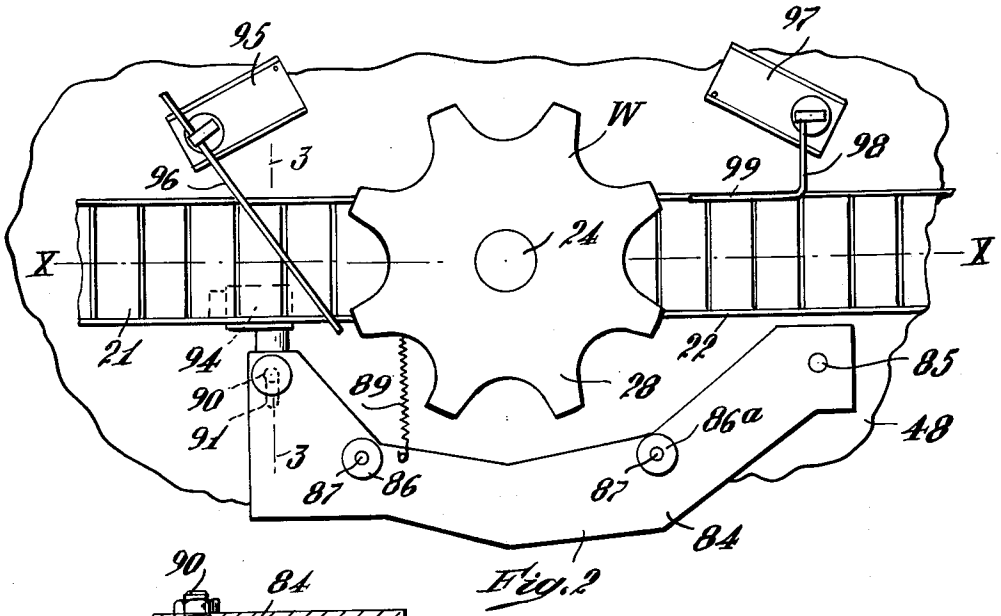

Fig. 2

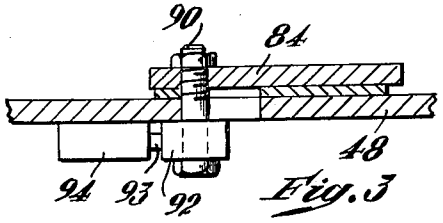

Fig. 3

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May 23, 1961 S. T. CARTER 2,985,283

MOTOR CONTROL MEANS FOR SPOTTING MECHANISM

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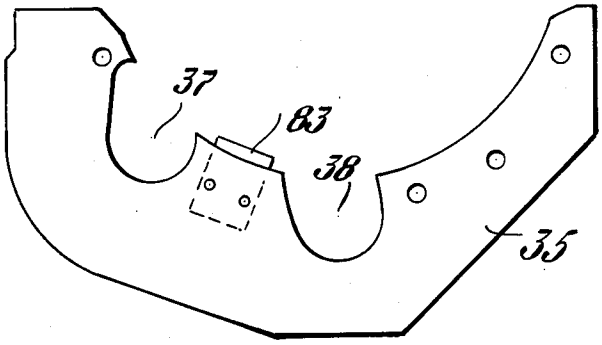
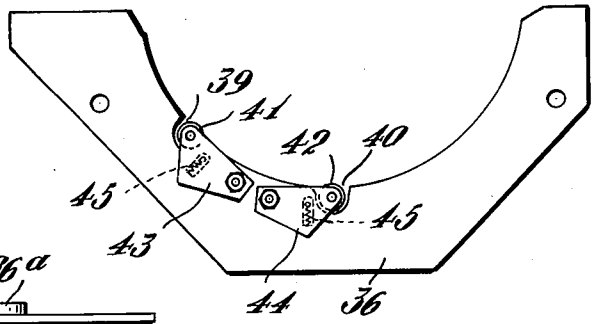


Fig. 4



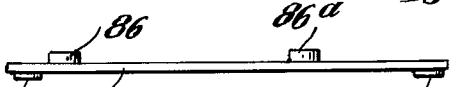


Fig. 6

Fig. 5

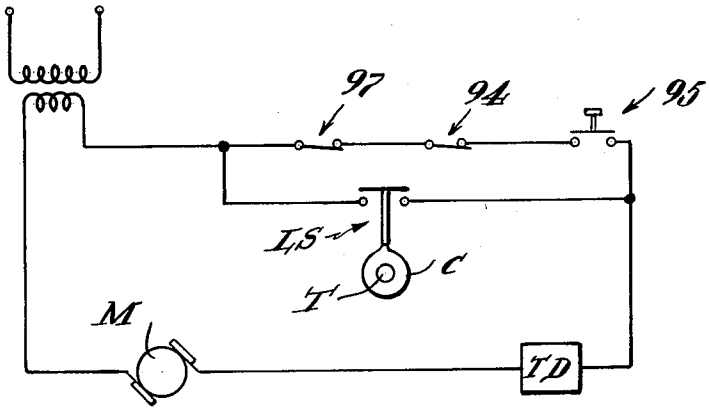


Fig. 7

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MOTOR CONTROL MEANS FOR SPOTTING MECHANISM

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Original application Apr. 13, 1954, Ser. No. 422,890, now Patent No. 2,880,845, dated Apr. 7, 1959. Divided and this application Aug. 5, 1958, Ser. No. 753,241

2 Claims. (Cl. 198—232)

This invention pertains to apparatus of the type known as "spotting mechanism" whose purpose is to orient an article, for instance a bottle to which a label or the like is to be applied, so as to insure the application of the label to a definite area of the peripheral surface of the bottle, this application being a division of the co-pending application for Letters Patent, Serial No. 422,890, filed April 13, 1954, now Patent No. 2,880,845, by Sidney T. Carter, for Spotting Mechanism for Use With Article-Banding Machines. Such spotting mechanism is customarily employed as an adjunct to a labeling machine and usually comprises means, including a friction clutch, for rotating the bottle through an arc of indeterminate extent until a projection, for instance a so-called "teardrop" on the peripheral surface of the bottle, contacts an abutment element and thereafter the clutch slips. In labeling machine practice it is customary to engage a so-called "head grip" with the top of the bottle neck, or a cap thereon, to hold the bottle in the final position of orientation resultant from its rotation and engagement with the abutment, until the label has been properly applied. However, if for any reason it is not practicable to employ a head grip, the above suggested spotter apparatus cannot be employed with any certainty that the bottle will be oriented to an exact predetermined position. For example, if a bottle having a label already applied thereto is to have a neckband applied which carries a printed design or other indicia which must be accurately related to a design or indicia on the label, it is manifestly impossible to engage a head grip with the bottle neck, since the neckband usually embraces the upper end of the neck or may even cover the cap. Moreover, the neckbanding operation is exceedingly rapid, so that the time available for orienting the bottle is very limited. Since, at times, the bottle may have to be turned through an arc of approximately 360°, a very high angular velocity of rotation must be available, while on the other hand the stopping of the bottle, when the projection or teardrop engages the abutment must be so controlled as to avoid breakage.

The present invention has for one of its objects the provision of automatic means for stopping the drive motor for the spotting apparatus in the event that a jam of articles occur within the spotting apparatus itself or on the delivery conveyor leading from the spotting apparatus. A further object is to provide automatic means for starting the apparatus in response to the accumulation of a predetermined number of articles on the terminal portion of the supply conveyor adjacent to the entrance to the spotting apparatus. Another object is to provide means whereby the circuit of the drive motor can only be broken at a predetermined time in the operating cycle of the spotting apparatus. Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings wherein:

Fig. 1 is a diagrammatic elevation, partly in vertical section in a diametrical plane through the axis of the star wheel which forms a part of the spotting apparatus, said plane making an angle of approximately 45° with the centerline of the conveyor path;

Fig. 2 is a diagrammatic plan view showing the relation of the star wheel to the supply and delivery conveyors and illustrating automatic means for starting and stopping the machine;

Fig. 3 is a fragmentary section to a larger scale substantially on the line 3—3 of Fig. 2;

Fig. 4 is a plan view of the normally stationary guide which cooperates with the lower element of the star wheel to confine the bottle to a predetermined path;

Fig. 5 is a plan view of the corresponding normally stationary guide member which cooperates with the upper member of the star wheel;

Fig. 6 is an edge elevation of a support for the normally stationary guide elements of the spotting mechanism, and which is movable in response to a jam of articles in passing the spotting mechanism so as to permit the guide members to move away from the star wheel; and

Fig. 7 is a diagram merely to illustrate in general such a control circuit as may be found useful in the practice of the invention, and the specific details of which are well within the knowledge of those skilled in the electrical arts.

While it is to be understood that the spotting mechanism herein disclosed is of more general utility (although particularly adapted for use in a banding machine where the operation to be performed is extremely rapid), the invention is here illustrated with especial reference to its application to a neckbanding machine of the general type of that more fully illustrated and described in Patent No. 2,760,321 to Henry W. Greer et al., entitled Device for Applying Bands to Containers and dated August 28, 1956. The bottle is brought to the band-applying mechanism by a conveyor **21** (Fig. 2) and after receiving the band is carried away by a conveyor **22**. These conveyors are constantly moving at uniform speed and the bottles are transferred from the supply conveyor **21** to the delivery conveyor **22** by means of an intermittently moving star wheel W (Fig. 2), and while thus being transferred from the supply conveyor **21** to the plate **20** (on which the bottle dwells while receiving the band) the bottles are oriented so as, for example, to insure that a design carried by the band G (Fig. 1) will be, when the band is applied, in accurately registered or predetermined relation to a design carried by a label on the body of bottle B.

Referring to Fig. 2, the numeral **24** designates the axis of the star wheel W forming a part of the spotting mechanism. As illustrated in Fig. 2, the broken line X—X diagrammatically designates the center line of conveyor means **21** (Fig. 2) which brings the bottles to the spotting mechanism and conveyor means **22** (Fig. 2) which carries them away from the spotting mechanism. While these two conveyors are shown as aligned with each other, this is not necessary, since the discharge or delivery conveyor **22** may lead off from the center of the apparatus at an angle exceeding 180° away from the supply conveyor.

The star wheel W comprises a vertical shaft **27** (Fig. 1), a bottom plate **28** (Fig. 1) and a top plate **29** (Fig. 1), these plates being secured, in vertically spaced relation, to the shaft **27** to turn with the latter. Suitable bearings (not shown) for the shaft are provided and the shaft is turned intermittently through an angle of 45° by means including a Geneva motion, one element of which is fixed to the shaft and indicated at **27a** (Fig. 1). The bottom plate **28** is provided with a plurality of uni-

formly spaced recesses, each of a radius such that it may receive the body portion of the bottle which is to be spotted. The upper plate 29 is likewise provided with uniformly spaced recesses (not here shown) of smaller radius than the recesses in the bottom plate, and which are designed to receive the neck portions of the bottles, the center of curvature of each recess in the top plate being in the same radial plane of the star wheel as the center of curvature of the corresponding recess in the bottom plate.

In order to confine the bottles to the recesses of the star wheel as they are moved along by the star wheel, normally stationary guide plates 35 and 36 (Fig. 1) are provided, these guide plates being disposed substantially in the horizontal planes of the star wheel members 28 and 29, respectively, and being held in properly spaced relation by means of posts or columns 35*a* preferably of adjustable length. The lower guide plate 35 (Fig. 4) is provided with recesses 37 and 38 for the accommodation of bottle spinning rolls (not shown), while the upper plate 36 (Fig. 5) is provided with recesses 39 and 40 for the reception of antifriction rolls 41 and 42 (Fig. 5) mounted at the free ends of horizontally swinging levers 43 and 44 which are urged inwardly by means of springs 45 so as resiliently to press the rolls 41 and 42 against the necks N of the bottles. The numeral 20 (Fig. 1) indicates the stationary plate whose upper surface is in the horizontal plane of the bottle-supporting surface of the conveyor, the plate 20 supporting the bottle while the latter is being moved by the star wheel from the supply conveyor to the delivery or discharge conveyor. As shown in Fig. 1, this stationary supporting plate 20 is located a short distance above the upper surface of the table 48 of the banding machine.

Referring to Fig. 4, the numeral 83 indicates a piece of soft resilient friction material, for example felt, which is mounted in a clamp carried by the normally stationary guide plate 35 and which is so located as to be engaged by the periphery of the body portion of a bottle as the latter is moved along by the star wheel.

The upper and lower guide plates 36 and 35 are rigidly connected by posts 35*a* (Fig. 1) to form a unitary structure and this structure is mounted on a horizontally swinging arm 84 (Fig. 2) which is pivotally supported at one end to swing about a vertical pin 85 projecting up from the machine table 48. The arm 84 (Fig. 6) has upwardly projecting bosses 86 and 86*a* which form anchorages for the lower ends of posts 87 (Figs. 1 and 2) which rigidly unite the lower guide plate 35 to the arm 84. Desirably the arm 84 has downwardly directed bosses 88 and 88*a* (Fig. 6) having finished lower surfaces which slide upon the upper surface of the table 48. A spring 89 (Fig. 2) tends to swing the arm 84 in a clockwise direction.

Near its free end the arm 84 carries a bolt 90 (Fig. 2) which extends down through a slot 91 in the table 48. To the lower end of this bolt is fixed a block 92 (Fig. 3) so located as normally to engage the actuating pin 93 (Fig. 3) of a snap-action electrical switch 94 (Figs. 2, 3 and 7) fixed to the under surface of the table 48. However, if a jam occurs between the star wheel W and the guide plates 35 and 36, the arm 84 will swing outwardly in opposition to the spring 89, thus removing the block 92 from the pin 93 and breaking the electrical circuit controlled by the switch 94.

As illustrated in Figs. 2 and 7 another snap-action electrical switch 95 is suitably mounted at a point near the terminus of the supply conveyor 21, this switch being of the type which has a rotary actuating pin and to this pin is secured a long, desirably flexible arm 96 which extends diagonally across the conveyor 21 in position to be engaged by articles moving along the conveyor 21 and approaching the star wheel. The switch 95 is so connected into the circuit of the motor M (Fig. 7) which operates the banding machine that when the arm 96 yields in response to pressure of a bottle against it, the switch 95 is closed to complete the motor circuit and thus initiates the starting of the machine. Desirably the electrical circuit connections are such that when the starter switch 95, for initiating operation of the machine as a whole, is closed, the motor circuit is not actually completed until time has elapsed sufficient for several bottles to have arrived at the terminus of conveyor 21. For this purpose the motor circuit is preferably designed to include an electronic timer TD (Fig. 7) of conventional type which delays the actual closing of the motor circuit after the actuation of switch arm 96 until time has elapsed sufficient to insure the presence of a predetermined number of articles near the delivery end of the conveyor 21. If the incoming articles are not advancing in a continuous stream but are separated one from another by short distances, the motor (except for this delay action device) would stop and start for each article. Such performance would be unsatisfactory from a wear standpoint. Thus articles will accumulate on the conveyor 21 and the machine starts and stops for groups of articles rather than for each isolated article moving along the conveyor.

As shown in Fig. 2, the machine also comprises a snap-action switch 97 suitably mounted on the machine table and having an actuating arm 98 of the rotary type and which has a portion 99 which lies substantially parallel to the delivery conveyor 22. The arrangement of this switch is such that if, through failure of the delivery conveyor 22 to remove articles from the star wheel as fast as they are expelled by the latter, the arm 99 will be swung by the lateral pressure of articles accumulating at the entrance of the delivery conveyor and will so actuate the switch 97 as to stop the machine motor.

Because of the complicated mechanically interlocked movements used in the banding machine, it is undesirable to stop the machine haphazardly at any point in the cycle. It is essential, for example, to have the star wheel stop exactly in proper registry with the conveyor 21 so as to be ready to accept the next incoming bottle from the conveyor 21 without jamming. For this reason, a limit switch LS (Fig. 7) is incorporated in the motor circuit, this switch being normally closed. However, once in each cycle of operation of the machine, this switch is opened by a cam C mounted on a shaft T which rotates in time with the star wheel. The arrangement is such that, after closure of the switch 95 and the starting of the motor M, the switch LS is immediately closed but is opened once during each cycle. If any of the switches 94, 95 or 97 be opened, after the motor has started, the motor circuit will be maintained closed at the switch LS, but at a predetermined time in the cycle of operation the cam C will open switch LS, whereupon the motor circuit is broken and the star wheel stops.

While one desirable embodiment of the invention has herein been illustrated and described by way of example, it is to be understood that the invention is inclusive of any and all modifications within the scope of the claims.

I claim:

1. In combination, in an article processing machine having a vertical shaft to which is fixed a star wheel having peripherally open recesses for the reception of articles, rectilinear, aligned conveyors whose center lines are radial with respect to the axis of said shaft, one of said conveyors supplying articles directly to and the other removing articles directly from the processing machine, an electric motor for turning said vertical shaft thereby to move the articles along an arcuate path coaxial with said shaft while they are being processed, a guide having an arcuate surface, normally concentric with the star wheel, for retaining said articles within said recesses, a normally stationary support on which the guide is mounted, the support being pivoted to swing toward or from the shaft about a vertical axis, spring means urging the support toward the shaft, and a stop element for limiting such movement, a normally closed switch in the motor circuit, means actuated by the support, in moving outwardly away from the shaft, in response to a jam of articles between

the guide and star wheel, to open said switch, and means operative to prevent the motor from stopping when said switch is opened, except when the star wheel is in article receiving position, a normally open switch, in series with the aforesaid switch, a detector element responsive to the presence of an article at the delivery end of the supply conveyor and which is about to enter a recess of the star wheel, said detector element, by its response to the pressure of an article, closing said last-named switch, and delaying means in series with said last-named switch such that the motor circuit is not completed to start the machine until sufficient time has elapsed, after closure of said switch, for the accumulation of a plurality of articles at the terminus of the supply conveyor.

2. In combination, in spotting apparatus of the class described and which is driven by an electric motor and to which articles are delivered and taken away by rectilinear, aligned, constantly running conveyors, the spotting apparatus comprising a vertical shaft whose axis is in the vertical plane of the center lines of said conveyors, a star wheel fixed to said shaft and which moves the articles along an arcuate path, coaxial with such vertical shaft, while they are being spotted and which transfers them directly from the supply conveyor to the delivery conveyor, normally stationery but movable guide means normally positioned to keep articles in operative relation to the star wheel as the latter moves them along said arcuate path, the motor control circuit having three switches therein, arranged in series one switch being normally open

but closing automatically in response to the arrival of an article at the terminus of the supply conveyor, electronic delay means in said circuit, in series with said normally open switch, whereby the motor circuit is not completed and the motor is not started until sufficient time has elapsed, after the closure of said normally open switch, to permit the accumulation of a plurality of articles at the terminus of the supply conveyor, the second of said switches being normally closed but automatically opening in response to an abnormal accumulation of articles on the delivery conveyor, and the third of said switches being normally closed but automatically opening in response to a jam of articles between the star wheel and said guide means, and a cam-actuated switch, in parallel with the aforesaid switches, operative, upon opening of any of said switches after the motor circuit has been closed, to keep the motor circuit closed until the star wheel has reached a predetermined point in its cycle of rotation.

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