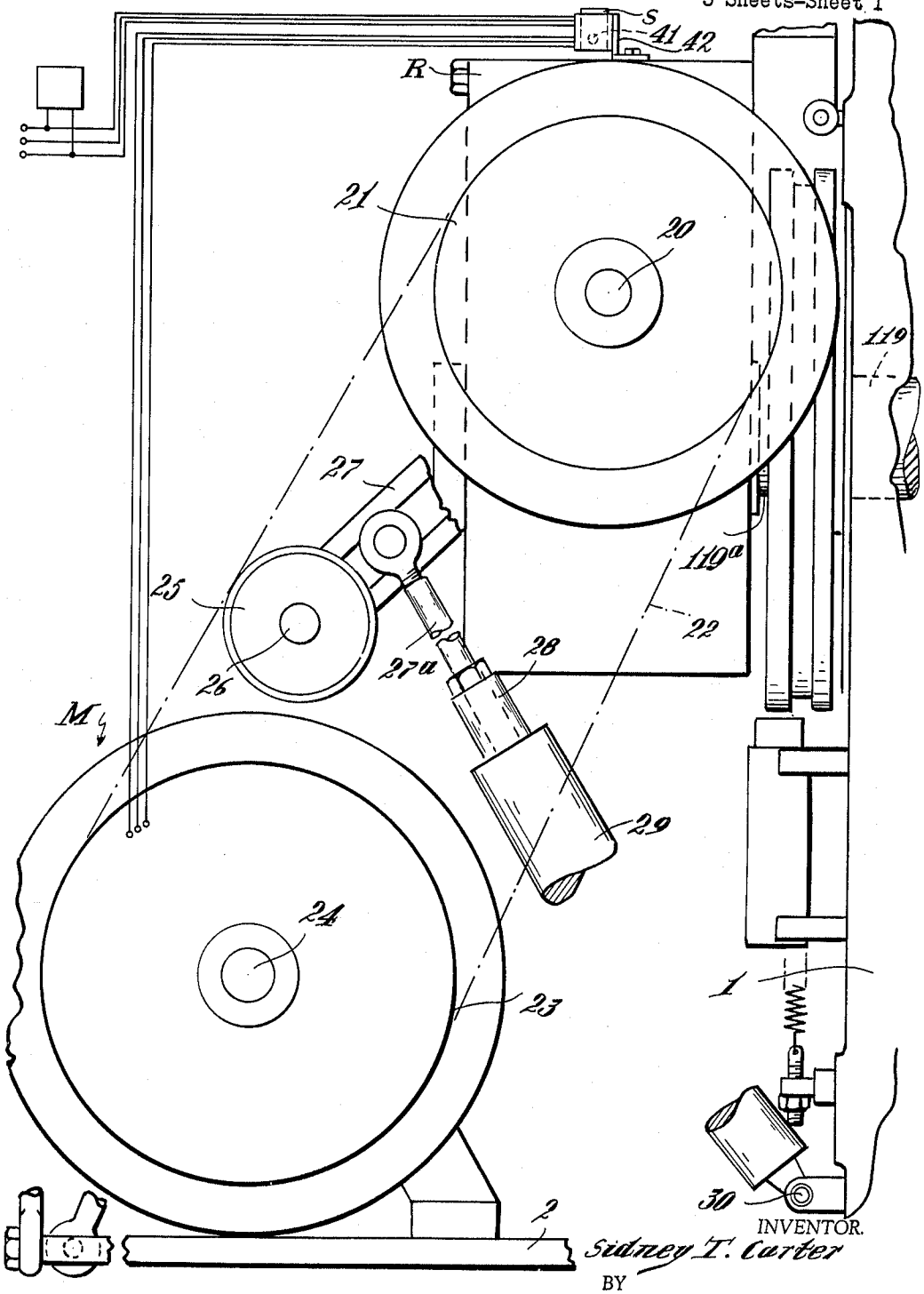
March 1, 1966 S. T. CARTER 3,238,436

AUTOMATIC POWER CUT-OFF FOR LABELING MACHINES

Filed Aug. 6, 1962 3 Sheets-Sheet 1



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Fig. 1

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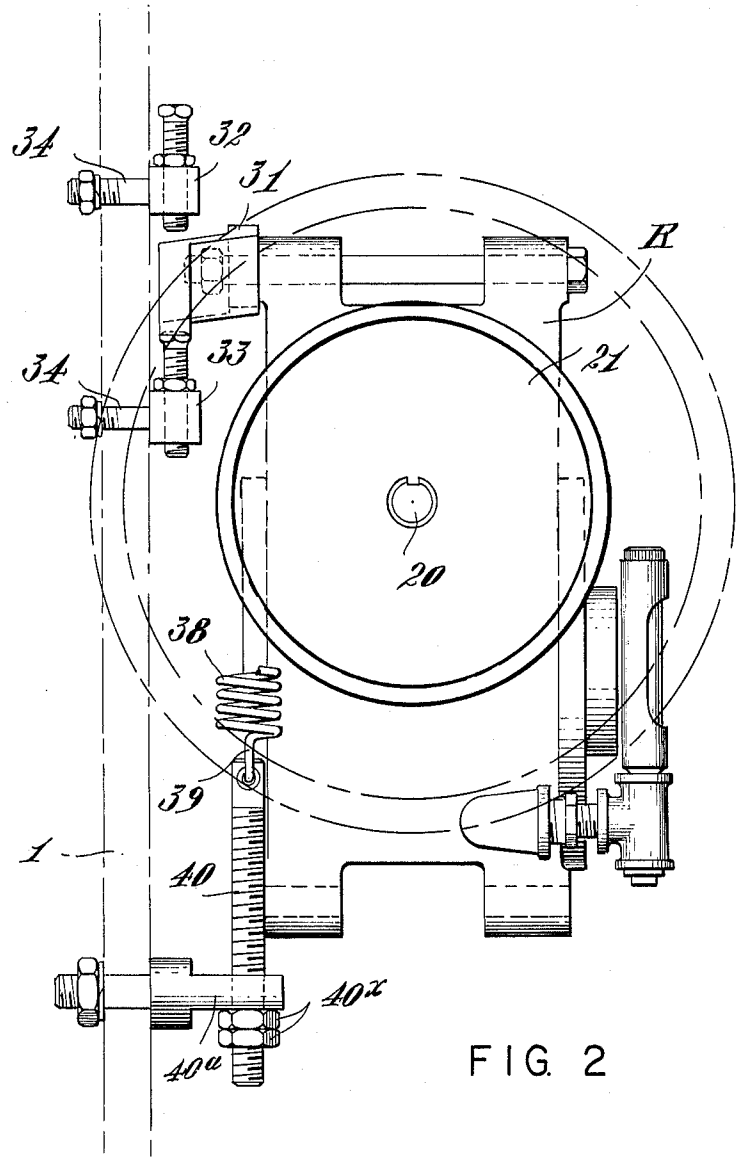


FIG. 2

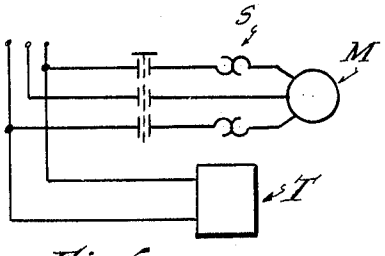


Fig. 5

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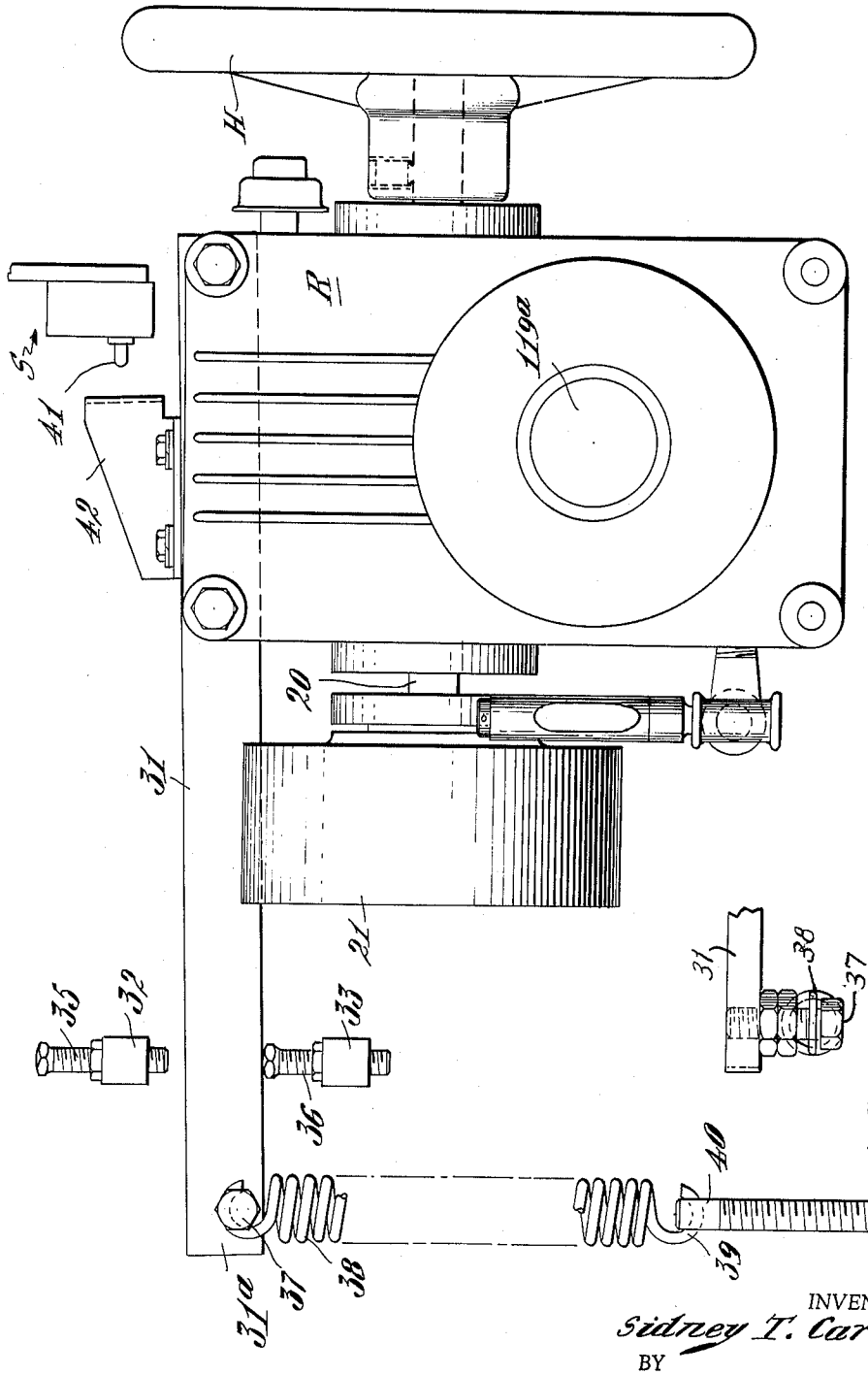


FIG. 3

FIG. 4

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AUTOMATIC POWER CUT-OFF FOR LABELING MACHINES

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1 Claim. (Cl. 318—475)

This invention pertains to power transmission mechanism, more especially to apparatus comprising automatic means for terminating the delivery of power from a source in response to an abnormal increase in the load as, for instance, the accidental intrusion of foreign material between relatively moving elements of the driven mechanism—the apparatus of the present invention being designed with particular reference to its use in driving a machine for applying labels to articles, for example fragile articles such as glass bottles which are moved at high velocity along a predetermined path and wherein the breakage of such an article, unless the apparatus be stopped at once, may result in serious damage to expensive mechanism.

Since, in a modern labeling machine, it is customary to fix the various cams, operative to actuate corresponding elements of the labeling mechanism, to a main shaft which turns but once for each cycle of operation, it becomes necessary to drive the main shaft at an angular velocity substantially less than that of the power-delivery shaft of a customary electrical drive motor, and thus it is expedient to interpose a speed-reducing unit between the power-delivery shaft of the motor and the main cam shaft of the labeling machine.

The present invention has for an object the provision of means whereby, in response to the occurrence of an unexpected load, such as may result, for example, from the breakage of a bottle or the tipping of a bottle so that it obstructs the path of following bottles, the drive motor will be stopped automatically. A further object is to provide means operative to cut-off the current supply to the drive motor in response to the imposition of an abnormal torque upon the output shaft of a speed-reducing unit interposed between the drive motor and the main cam shaft of the labeling machine. A further object is to provide mechanism for driving the cam shaft of a labeling machine which comprises a speed-reducing unit whose input shaft is driven by an electrical motor and wherein the speed-reducing unit is so mounted that, in response to the imposition of unusual torque upon its output shaft, the speed-reducing unit will itself be moved from normal position and, in so moving, will break the supply circuit for the power-supply motor.

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 fragmentary elevation showing parts of the drive end of a labeling machine, including a portion of the main cam shaft, with the speed-reducing unit, according to the present invention, interposed between the main cam shaft and an electrical drive motor;

FIG. 2 is an elevation of the speed-reducing unit of FIG. 1, a portion, only, of the machine frame being indicated in broken lines to illustrate the relation of the speed-reducing unit to the frame;

FIG. 3 is an elevation, looking from the right-hand side of FIG. 2, showing the speed-reducing unit in its normal operating position, together with the means for loading it, and indicating the circuit-controlling switch;

FIG. 4 is a fragmentary plan view showing the manner of attaching the loading spring to the speed-reducing unit; and

FIG. 5 is a circuit diagram.

Referring to the drawing and, in particular, to FIGS. 1 and 5, the apparatus for the present invention is shown as arranged to control the operation of a labeling machine, for example of the type more fully disclosed in the patent to Carter, No. 2,940,630, June 14, 1960, wherein the major portion of the label-applying apparatus is driven or controlled by cams on a main shaft. In FIG. 1 of the present drawings, one of the end frames of such a machine is indicated by the numeral **1**, and one end of a cam shaft, such as that of the above patent, is indicated by the numeral **119** in FIG. 1. The character M indicates an electrical motor for driving the labeling machine—this motor being mounted upon a base member **2** connected to or forming a part of the frame of the labeling machine and the motor is supplied with current (FIG. 5) by a circuit which, as illustrated in FIG. 5, includes a switch S—the same circuit, which supplies the motor, providing current for the primary of a transformer T whose secondary supplies current for various control mechanisms of the labeling machine not involved in the present invention. The character R (FIGS. 1, 2 and 3) designates the casing of a speed-reducing unit of a conventional type, illustrative examples of which may be found in the patents to Cheshire, 779,907, January 10, 1905, and Schumb, 2,868,031, January 13, 1959, here shown as of that kind wherein the axes of the input and output shafts are in planes which intersect at right angles. Thus, in FIGS. 1 and 3, the output shaft is indicated at **119*a***, this latter shaft being axially aligned with the main cam shaft **119** of the labeling machine and fixed relatively to the latter by any suitable type of clutch means (not here shown) so that the shafts **119*a*** and **119** turn at the same speed. However, the part **119*a*** may be an integral continuation of the main shaft **119** if preferred. A drive pulley **21** is keyed or otherwise fixed to the outboard end of the input shaft **20** and is embraced by a drive belt **22** (FIG. 1) which also embraces the driving pulley **23** fixed to the shaft **24** of the motor M. A belt-tensioning pulley **25** (FIG. 1) engages the inner side of the belt **22**, this pulley being mounted on a stud shaft **26** carried by an arm **27** pivoted to swing about a stud (not shown) fixed to the frame of the machine, and this arm is urged upwardly so as to press the pulley **25** against the belt by a rod **27*a*** attached to a piston **28** working in a cylinder **29** whose lower end is pivotally connected at **30** to the frame of the machine. This cylinder may contain a coil spring exerting an upward force on the piston **28**, or it may be supplied with compressed air, under such pressure as to keep the belt **22** under proper driving tension. In either event, the pulley **25** is yieldingly urged upwardly but may move downwardly in response to abnormal tension of the belt or, if the cylinder be supplied with compressed air, then, under certain conditions, the pressure of this air may be released to reduce the tension on the belt.

It will be understood that within the casing of the speed-reducing unit R there is suitable reduction gearing such that the angular velocity of the output shaft **119*a*** is substantially less than that of the motor-driven input shaft **20**. As here shown, a hand wheel H is fixed to the end of the shaft **20** for convenience in adjusting certain parts of the labeling machine when the motor is not in operation.

It will be noted that the output shaft **119*a***, with its rigid, coaxial connection to the cam shaft **119**, provides the sole support for the speed-reducing unit R, and thus it is possible for the casing of the speed-reducing unit to rock about the axis of the output shaft **119*a*** as is permitted by the resiliently tensioned belt **22**.

As more clearly shown in FIG. 3, an elongate, rigid arm **31** is secured to the casing of the speed-reducing unit, this arm being of substantial length such that its free

outer end 31*a* is located outwardly a substantial distance beyond the pulley 21.

Two brackets 32 and 33, respectively, are secured by means of bolts 34 to the frame member 1, as shown in FIG. 2, each of these brackets having a screw-threaded vertical hole in which adjustable stop screws 35 and 36, respectively are threaded—the opposite ends of these stop screws being above and below, respectively, the outer portion of the arm 31.

Closely adjacent to its outer end the arm 31 is provided with a stud 37 to which the upper end of a coiled tension spring 38 is secured. The lower end 39 of this spring is hooked into an opening in the upper end of a screw-threaded rod 40 which extends down through a hole in a bracket 40*a* (FIG. 2) which is secured to the frame member 1 of the machine. Nuts 40*x*, engaging the lower end of the rod 40, provide for adjusting the tension of the spring 38, thus to vary the force which is effective for urging the outer end of the arm 31 to move downwardly into contact with the adjustable stop 36.

The switch S, which controls the supply of current to the motor M, as indicated in the diagram of FIG. 5, is of a conventional type which is normally closed but which may be opened to break the motor circuit by pressure exerted against the end of a movable pin or button 41 (FIG. 3). A pressure- applying member 42 is fixed to the top of the casing of the speed-reducing unit in a position such that, if the casing of the speed-reducing unit be swung in a counterclockwise direction, as viewed in FIG. 3, through a sufficient arc, the member 42 will engage the pin 41 and thus open the circuit of the drive motor M and bring the labeling machine to rest.

The spring 38 is normally so tensioned as to keep the arm 31 in contact with the upper end of the stop member 36 and the latter is preferably so adjusted that, in this position of the parts, the axis of the input shaft 20 is horizontal.

The parts occupy this position during the normal operation of the labeling machine but if any abnormal force or obstruction opposes the rotation of the cam shaft 119, the result is to cause the speed-reducing unit to swing in a clockwise direction, as viewed in FIG. 3, about the axis of the shaft 119*a*, and if this abnormal force become sufficiently great the member 42 will engage the pin 41, thus opening the motor circuit and bringing the labeling machine to rest. By this arrangement, severe damage to the machine or to the material being operated upon, or to personnel in the neighborhood of the machine is avoided such as might be occasioned were the full driving power to continue after a smash, in which rapidly moving bottles are broken and wedged or lodged between moving parts of the labeling apparatus.

While one desirable embodiment of the invention has herein been disclosed by way of example, it is to be understood that the invention is broadly inclusive of any and all modifications falling within the scope of the appended claim.

I claim:

Power-transmission mechanism useful in delivering power to the main shaft of a machine such as a modern labeling machine which, during operation, may be subjected to sudden accidental overload, said transmission mechanism comprising, in combination with the main shaft of a machine to be driven, an electric drive motor attached to a fixed support and having a shaft with a pulley fixed thereon, a speed-reducing unit of that kind wherein a casing houses reduction gearing interposed between an input and an output shaft whose axes are in planes which intersect at right angles, the output shaft of the speed-reducing unit being coaxial with the main shaft of the machine to be driven, and means rigidly uniting said shafts, a pulley fixed to the input shaft of the speed-reducing unit, and an endless belt embracing said last-named pulley and the pulley on the motor shaft, resiliently yieldable means operative to maintain working tension in said belt, the entire speed-reducing unit being supported by the main shaft of the machine to be driven and so that it may rock about the axis of said last-named shaft, an elongate rigid arm fixed to the casing of the speed-reducing unit, said arm being parallel to the axis of the input shaft of the speed-reducing unit, spaced, adjustable stop elements operative, by contact with said arm, to limit rocking of the casing of the speed-reducing unit in opposite directions about the axis of the output shaft of said unit, a loading spring normally holding said arm in contact with one of said stop elements, a normally closed switch, for controlling the supply of current to the drive motor, which is attached to a fixed support, said switch having an actuating pin, a pin-actuating member fixed to the casing of the speed-reducing unit, and which is operative, in response to abnormal resistance to turning of the output shaft of the speed-reducing unit, to actuate the switch pin so as to break the circuit of the drive motor—the belt tensioning means being such as to permit the speed-reducing unit to rock in response to such abnormal load.

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