

Feb. 1, 1944.

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AUTOMATIC STOPPING MECHANISM FOR BOTTLE WASHING MACHINERY

Filed May 12, 1941

2 Sheets-Sheet 1

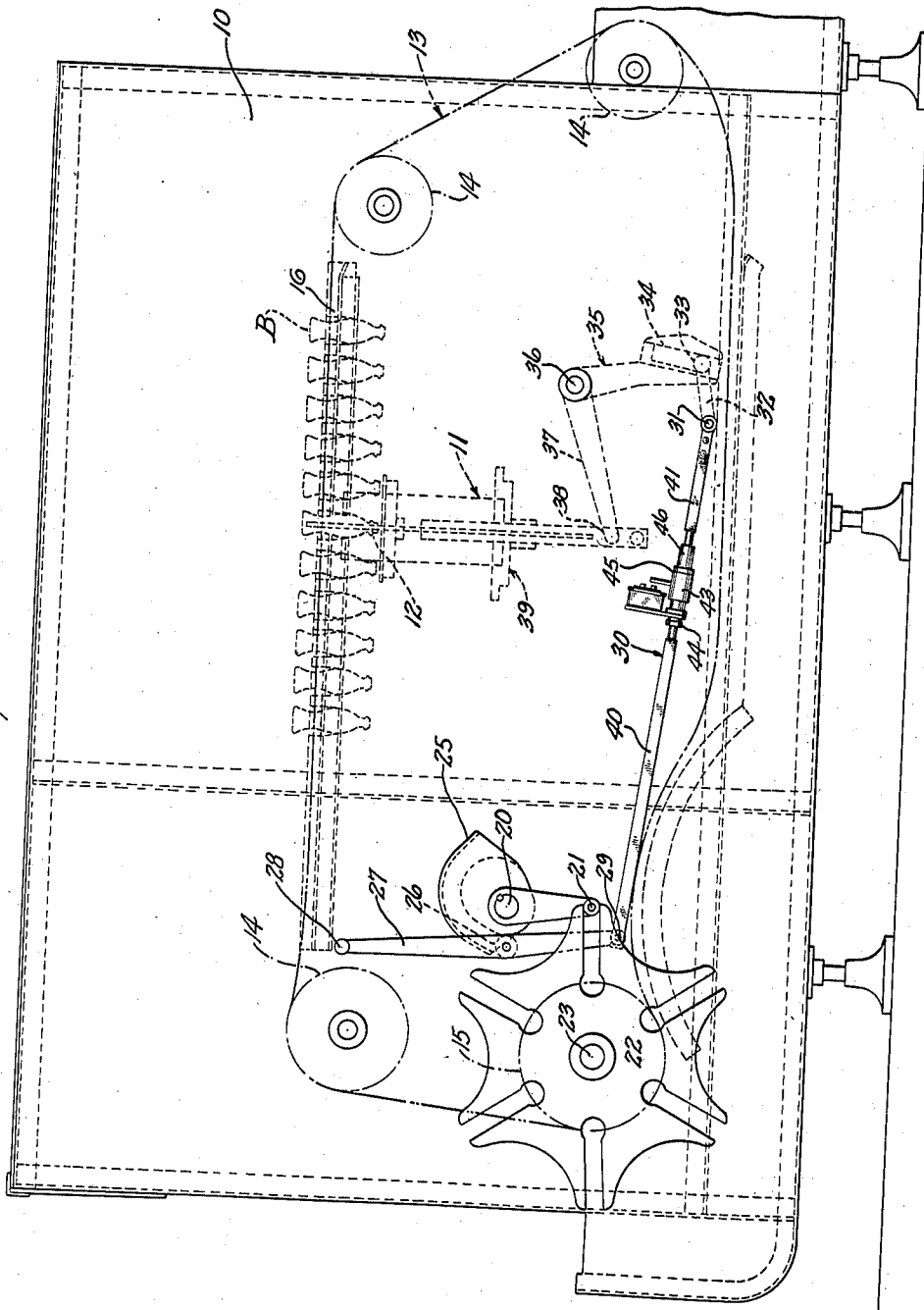


Fig. 1.

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Feb. 1, 1944.

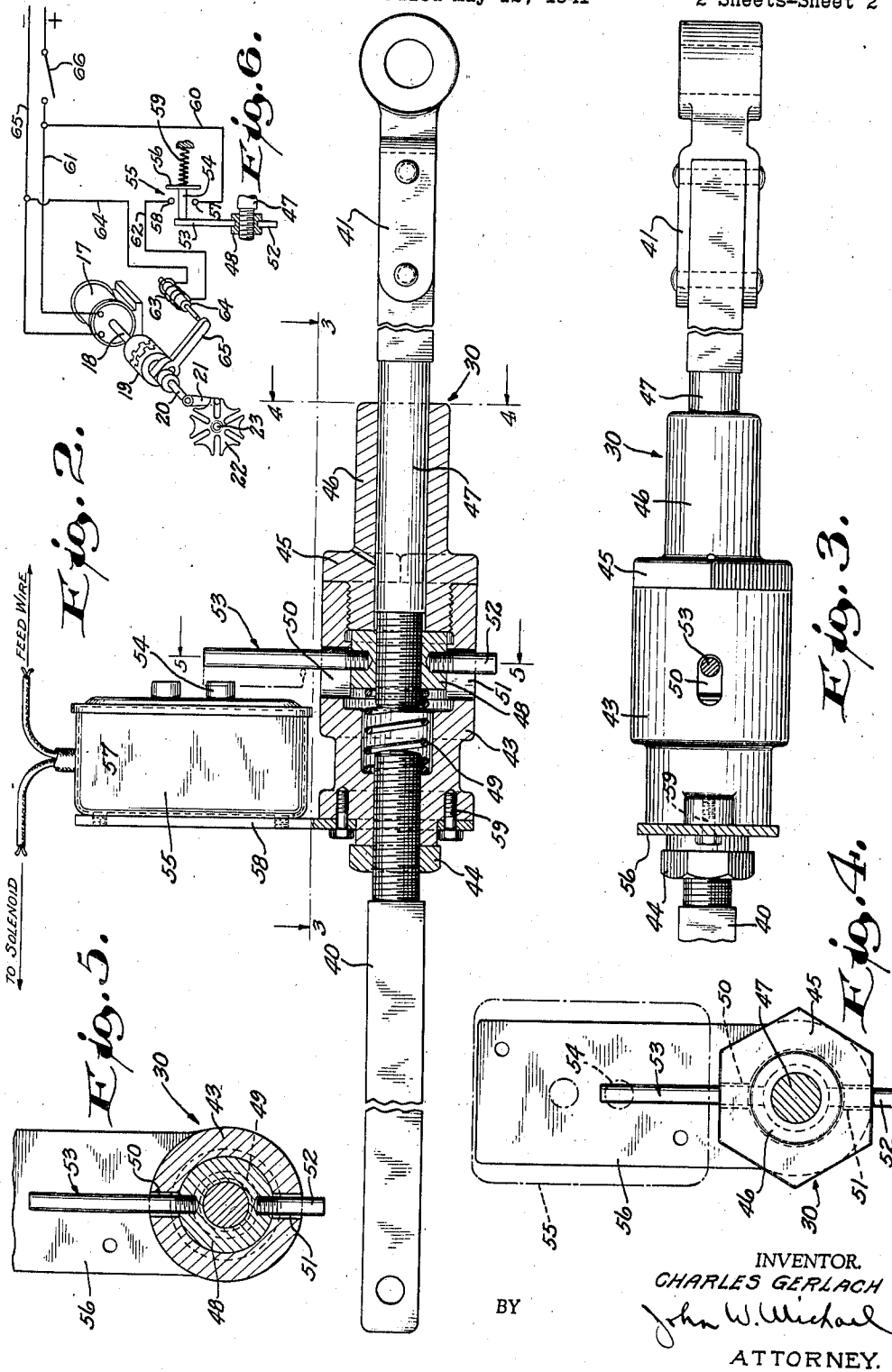
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,340,465

AUTOMATIC STOPPING MECHANISM FOR
BOTTLE WASHING MACHINERYCharles Gerlach, Waukesha, Wis., assignor to
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Application May 12, 1941, Serial No. 393,015

2 Claims. (Cl. 192—150)

This invention relates to an improvement in bottle-washing machines of the type wherein the bottles are carried through the soaking tank and external brushing mechanism, and internal brushing means and suitable rinsers, by a motor-driven conveyor having endless chains carrying individual pockets or compartments supporting the bottles in an inverted position in the upper run of the conveyor.

The internal brushing means for the bottles for the type of the machine contemplated comprises a vertically movable washing head carrying spindles or nozzles from which the washing fluid issues. The gearing interposed between the conveyor and its driving motor is of such character as to move the conveyor with step-by-step motion, and during the intervals when the conveyor is at rest the washing head first ascends to cause the spindle or nozzles carried thereby to pass up into the inverted bottles and then descends to move the spindles and nozzles down out of the bottles to their original position below the upper run of the conveyor. This up and down movement of the washing head is timed or synchronized with the step-by-step movement of the conveyor, but if for any reason, as for example a broken bottle, the washing head should lock up or jam with the washing spindles or nozzles in position in the bottles, serious breakage or damage to the machine and loss of production may result.

The present invention proposes to preclude breakage or damage to the machine and consequent loss of production by interposing a yieldable element in the motion mechanism which raises and lowers the washing head and so combining this yieldable element with a control device for the machine drive that in the event of lock-up or jamming of the washing head, the machine will automatically be stopped. Preferably the yieldable element is yieldable in one direction only and takes the form of a connecting rod or pitman made up of two sections which positively abut one another when transmitting the upward movement of the washing head, but which may move relative to each other against the action of a spring when controlling the downward movement of the descent of the washing head. If the washing head is jammed or locked, when lifted, the sections of the connecting rod move relative to each other and bring a switch operator carried by one into engagement with the button of a switch carried by the other to open the switch and stop the machine. The switch may be established in controlling relation

to the machine in various ways. For example, it may regulate the action of an electro-magnetically controlled clutch, or it may be in electrical control of the motor itself by means of contactors or other suitable switch gear.

Another object of the invention is to provide a device of the character and having these advantages, and which is extremely simple and compact in its construction, reliable and effective in operation, easy and comparatively inexpensive to manufacture and install, and of such a nature as not to interfere with or impair in any way the normal functioning of the machine although always ready for action should the undesirable lock-up or jamming of the washing machine occur.

Other objects and advantages reside in certain novel features of the construction, arrangement, and combination of parts, which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:

Figure 1 is a view in side elevation illustrating the internal brushing or washing means of the bottle-washing machine equipped with an automatic stop mechanism providing the present invention;

Figure 2 is a view partly in side elevation and partly in central, vertical, longitudinal section showing the special connecting rod and the co-operating control device which constitutes the major elements of the automatic stop mechanism embodying the present invention;

Figure 3 is a view taken on line 3—3 of Figure 2 and looking in the direction of the arrows;

Figures 4 and 5 are views in transverse vertical section taken on lines 4—4 and 5—5, respectively, of Figure 2, and looking in the direction of the arrows, with parts shown in elevation for the sake of simplicity in illustration of the invention; and

Figure 6 is an elementary diagram showing by way of illustrative example how the control device of the automatic stop mechanism may be combined with the drive for the conveyor of the machine.

Referring to the drawings the numeral 10 designates a washing tank containing a vertically shiftable washing head 11 carrying nozzles or washing spindles 12. The washing head 11, and its washing nozzles or spindles 12, may be of the type disclosed in United States Letters Patent 1,978,721, granted October 30, 1934, to Frank P. Perkins, for "Nozzles for washing bottles," al-

though various other constructions well known in the art may also be employed. An endless flexible or chain conveyor, diagrammatically illustrated at 13, is provided in the tank 10, and is reeved about idler pulleys 14 and a driving pulley 15. The upper run of this endless conveyor 13 is substantially horizontal. Along the conveyor are transverse rows of bottle carriers 16 having individual bottle compartments or pockets, each of which support a bottle, designated at B, in an inverted position. The upper run of the conveyor is horizontal and travels over the washing head 11 and its nozzles and spindles 12 when these parts are in their lowered position. The conveyor 13 is driven in a step-by-step motion from an electric motor 17. The motor shaft 18 acts through suitable drive gear, including a clutch diagrammatically illustrated at 19, to drive a shaft 20. This shaft 20 is supported for rotation in suitable bearings provided therefor on the washing tank 10, extends transversely of the tank, and projects at its ends therebeyond. On one projecting end of the shaft 20 a one-toothed driving gear 21 is fixed. The one-toothed driving gear 21 coacts with and drives a multi-slotted gear 22 fixed to the projecting end of a parallel shaft 23 on which the driving sprocket 15 for the conveyor 13 disposed inside the washing tank 10 is fixed.

In order to cause the washing head 11 and its nozzles or spindles 12 to ascend and descend when the conveyor 13 is at rest, a double-flanged cam 25 is also fixed to the projecting end of the shaft 20. The groove of this cam receives a laterally projecting cam roller 26 carried by an intermediate portion of a cam lever 27. One end of the cam lever 27 is fulcrumed as at 28 on the outside of the washing tank 10. The opposite end of the cam lever 27 is pivotally connected, as at 29, to one end of a connecting rod, designated generally at 30. The opposite end of this connecting rod 30 is pivotally connected, as at 31, to a link 32. The link 32 has a link block 33 non-pivotally interfitted with a slot 34 provided therefor in a crank arm 35 fixed to the projecting end of a transverse rock shaft 36 also supported in suitable bearings provided therefor on the tank 10. Within the tank 10 a crank arm or rock lever 37 is fixed to the rock shaft 36 and is operatively interconnected with the carriage 39 which supports and controls the raising and lowering movement of the washing head 11 and its nozzles 12.

The connecting rod 30 is of special construction and has sections 40 and 41, the section 40 being connected to the cam follower lever 27 and the section 41 to the link 32. The section 40 has a cylinder or guide socket structure 43 adjustably threadedly interconnected therewith, and is held in selected adjustment by a nut 44. One end of the cylinder is provided with a removable end head 45 which has an integral guide sleeve 46. The guide sleeve 46 of the section 40 slidably receives a piston or guide rod 47 provided or incorporated in the section 41 of the connecting rod. A piston-like structure or guide collar 48 is threaded or otherwise suitably secured to the inner end of the piston rod 47 and has a free sliding fit in the cylinder or socket 45. A compression coil spring 49 is disposed in the cylinder 43 and has one end abutting the integral end of the cylinder 43 and its other end abutting the piston or guide collar 48. The spring 49 is under sufficient compression to tend to maintain the piston 48 engaged with the head

45 of the cylinder. The cylindrical wall of the cylinder 43 is provided with diametrically opposite slots 50 and 51. A stop pin 52 is threaded into the piston 48 and works in the slot 51 to limit the extent to which section 40 may move relative to the section 41. A switch operating pin 53 is also threadedly connected or otherwise suitably secured to the piston 48 and extends out through and projects beyond the slot 50 and is cooperatively related to the push button 54 of a control switch 55. The control device 55 is enclosed and supported in a housing 57 which is fixed to a bracket 58 secured by studs 59 or the like to the integral head of the cylinder 43.

The control switch 55 is so combined with the motor means for driving the conveyor as to be effective to stop the machine when the washing head 11 is jammed or locked up, and while this may be accomplished in various ways, one way of bringing about the desired results is illustrated in an elemental and diagrammatic fashion in Figure 6. As there shown the push button 54 of the switch 55 is rigidly connected with the bridging contact 56 of the switch. Contact 56 is cooperable with spaced fixed contacts 57 and 58, and is biased into engagement therewith by means of a spring 59. Contact 57 is connected by wire 60 to one of the power lines 61 which supply electric current of the motor 17. Contact 58 is connected by wire 62 to one terminal of an electro-magnetic winding or coil 63, and the other terminal of this coil 63 is connected by wire or conductor 64 to the other power line 65 of the motor supply circuit. A hand-operated switch 66 of any suitable type is also incorporated in the motor circuit. The electro-magnetic winding 63 may be the coil of the solenoid which has a reciprocable core or plunger 65 operatively interconnected in any suitable way with the operating means 65 provided for the clutch 19. The arrangement may be such that when the switch 66 is closed the coil 63 is energized and the clutch 19 is engaged so that the motor drives the conveyor. In the event of lock-up or jamming of the washing head, the section 40 of the connecting rod 30 moves to the right, as viewed in Figures 1 and 2, relative to the section 41, whereupon the push button 54 will be moved over and pressed against the switch-operating pin 53, thereby shifting the bridging contact 56 to its open position shown in Figure 6, consequently deenergizing the solenoid and effecting disengagement of the clutch 19 and stoppage of the machine.

It is to be understood that the jaw clutch shown in Figure 6 merely illustrates in a very simple manner a clutch mechanism, and that any suitable clutch mechanism may be employed, and any suitable electro-magnetic operating mechanism may be provided for engaging and disengaging the clutch. Further, as before indicated, the automatic stopping mechanism embodying the present invention may be utilized in other ways for effecting the automatic stoppage of the machine, as for example the switch 55 may be utilized to control the energization and deenergization of the winding of the contactor incorporated in the motor circuit.

While I have shown and described several constructions in which the invention may be advantageously embodied, it is to be understood that the constructions shown have been selected merely for the purpose of illustration or example, and that various changes in the size, shape, and arrangement of the parts may be made without

departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A safety stop mechanism of the character described for use with motor-driven mechanism and including a connecting rod through which the drive is transmitted from the motor to the mechanism, said connecting rod being made up of two sections, a coupling between said sections including a cylinder fixed to one of the sections and a piston fixed to the other and slidable in said cylinder, a spring interposed between the piston and the cylinder and normally forcing the piston against one end of the cylinder to provide for a positive transmission of motion in one direction, said spring under normal conditions transmitting motion in an opposite direction without yielding but yielding and allowing relative motion of the piston and cylinder when the mechanism is overloaded, control means including a control switch mounted on the cylinder, biased to closed position, and acting when closed to provide for the drive of said mechanism by said motor, and an operator directly actuated by the piston and effective to open the switch and stop the drive of the mechanism upon relative movement of the piston and cylinder.

2. A safety stop mechanism of the character described for use with motor-driven mechanism and including a connecting rod through which the drive is transmitted from the motor to the mechanism, said connecting rod being made up of two sections, a coupling between said sections including a cylinder fixed to one of the sections and a piston fixed to the other and slidable in said cylinder, a spring interposed between the piston and the cylinder and normally forcing the piston against one end of the cylinder to provide for a positive transmission of motion in one direction, said spring under normal conditions transmitting motion in an opposite direction without yielding but yielding and allowing relative motion of the piston and cylinder when the mechanism is overloaded, control means including a control switch mounted on the cylinder, biased to closed position and acting when closed to provide for the drive of said mechanism by said motor, said cylinder having a slot therein, and an operating pin fixed to the piston projecting through the fixed slot and engageable with said switch to open the same and automatically stop the drive of the mechanism on relative movement of said piston and cylinder.

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