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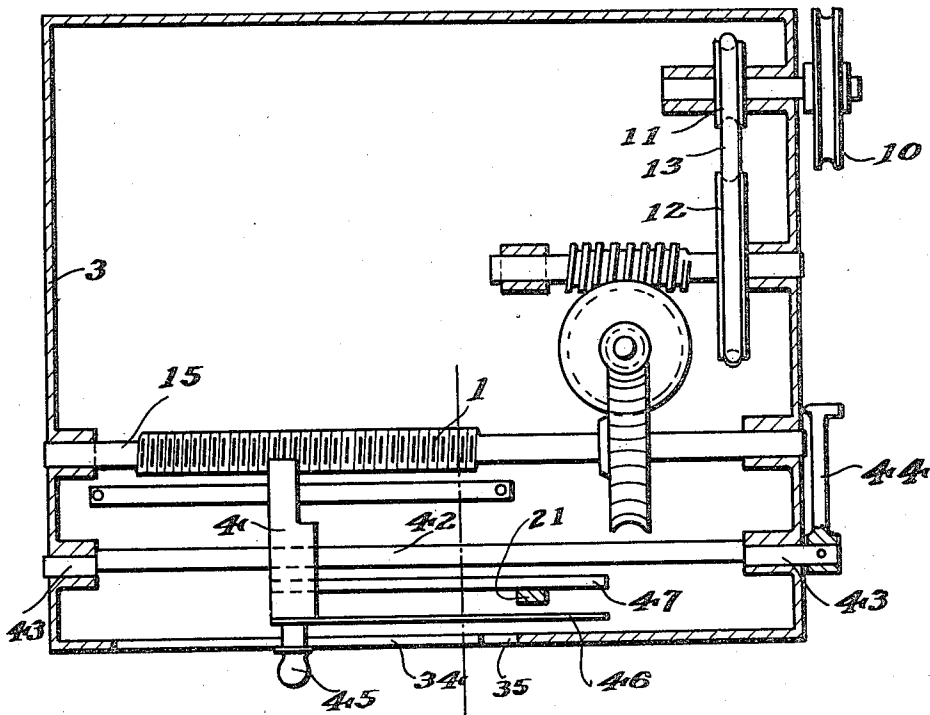
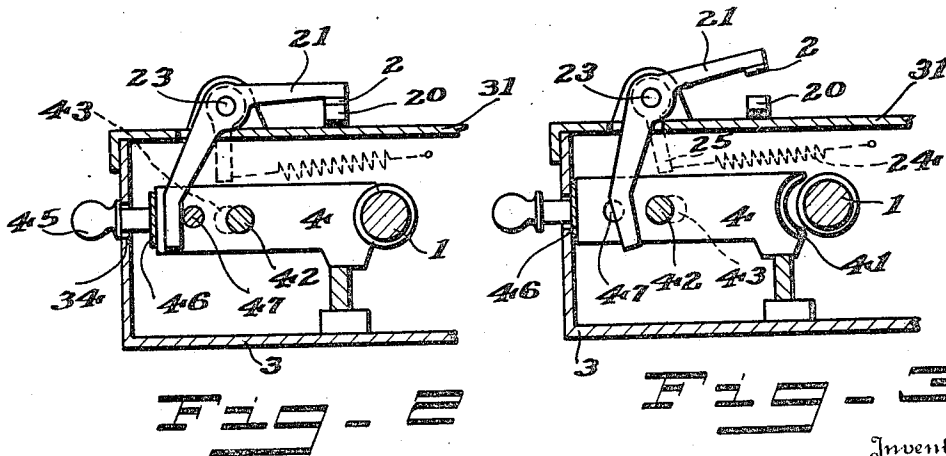
1,522,896

H. McKAY

LIMIT SWITCH

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Fig - 1



Inventor

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UNITED STATES PATENT OFFICE.

HEUBERT MCKAY, OF SEATTLE, WASHINGTON.

LIMIT SWITCH.

Application filed August 8, 1923. Serial No. 656,320.

To all whom it may concern:

Be it known that I, HEUBERT MCKAY, a citizen of the United States of America, and resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Limit Switches, of which the following is a specification.

My invention relates to a limit stop and is particularly designed for use in connection with the engine or motor which is employed to operate pumps or like apparatus which it is desired to operate for a considerable period and then stop.

It is an object of my invention to provide such a limit switch which can be set at will for operation of the engine or motor through a given period of time, and which will then automatically break the controlling circuit to stop the operation of the motor or engine, thus to obviate the necessity of the operator being present or leaving other duties to manually stop its operation.

A further object is the provision of a simple and conveniently operated switch of this type.

A further object is the provision of means in such a switch which will prevent damage to the mechanism in case the switch fails to break the circuit or stop the operation of the engine or motor.

A further object is the provision of a switch of this sort and mechanism for controlling the same whereby the switch may readily be disconnected from the automatic mechanism to permit manual operation thereof, and further, a mounting for the switch which will permit such disconnection and which will maintain the switch in accessible position and shielded against short circuiting or damage from oil or grease which is necessarily associated with the automatic mechanism.

Other objects, and especially those relating to structural details, may be ascertained from a study of the accompanying drawings, in which my invention is shown in its present preferred form, and of the present specification and the claims terminating the same.

My invention comprises those novel parts which are shown in the accompanying drawings, described in the specification, and particularly defined by the claims terminating the same.

Figure 1 is a plan view of my mecha-

nism, the casing enclosing the same being shown in section and certain parts above the line of section being omitted.

Figures 2 and 3 are transverse sections through the automatic limiting mechanism, showing parts respectively in operative and inoperative positions.

As stated above, I intend my device to be used for such purposes as for controlling the operation of a pump on a farm, wherein it is desired to operate the pump for perhaps three hours and then to stop its operation. The pump in such case might be operated by an internal combustion engine, including an ignition circuit, or by an electric motor. In either case the switch members 2 and 20 may be included either in the main circuit of the engine or motor or in a control circuit. The manner of connection of these switch members is unimportant. I have shown a pulley 10, which is connected to rotate a screw 1 through suitable speed reduction means. The pulley 10 is intended to be connected in some suitable manner to be driven by the motor or engine which drives the pump, in the illustration given above. Thus it will be seen that so long as the motor or engine driving the pump is operative, the screw 1 will rotate, and as the switch members 2 and 20 are in the control circuit of the motor or engine, it follows that the screw 1 will rotate so long as the switch members 2 and 20 are in contact.

The exact drive connection between the pulley 10 and the screw 1 is immaterial, although I prefer that it should include pulleys 11 and 12 connected by a belt 13. By this means, or its equivalent, it is possible to vary the speed ratio between the pulley 10 and the screw 1 to accommodate a given limit switch mechanism to engines or motors of different speeds. This is done by varying the relative diameters of the pulleys 11 and 12.

The speed reduction gearing and the screw 1 which it drives, are preferably enclosed within a casing 3 upon which fits a cover 31. Within this casing 3 I mount a carriage 4 which is movable towards and from the screw 1 and is provided with threads which are complementary to and engageable with the threads of the screw 1. Such movement of the carriage towards and from the screw may be secured in a variety of ways. For this purpose I have shown a

guide rod 42, journaled in the casing 3 upon eccentric bearings 43. By rotating the rod 42 upon these eccentric bearings 43, as by means of a handle 44, the carriage 4 is reciprocated.

I have shown a handle 45 connected to the carriage 4 and projecting through a slot 34 in the casing 3. A bar 46 secured to the carriage within the casing is visible through an enlargement 35 of the slot 34 and may be graduated in proper units, as of time, corresponding to the rate of travel of the carriage 4 when its threads are engaged with the screw 1. The carriage 4 can thus be set at any position lengthwise of the screw 1 when its threads 41 are disengaged therefrom by means of the handle 45, and the length of time which will be required to advance the carriage to the end of its normal travel, by means of rotation of the screw 1, can be determined by reference to the gage or scale bar 46, visible through the enlarged index opening 35.

Associated with the carriage 4 are means for controlling the position of the switch members 2 and 20. I have shown the switch member 20 as mounted upon the cover 31, and the member 2 as carried upon a bell crank arm 21 pivoted at 23 upon the cover 31. One arm of the lever 21 extends within the casing 3 where it is engageable with a pin 47 carried by the carriage 4. The length of this pin 47 is so proportioned relative to the position of the bell crank lever 21 and the screw 1 that when the carriage 4 reaches the end of its normal travel upon the screw 1, the switch arm 21 will pass beyond the end of the pin 47. A spring 24 may be secured to an arm 25 secured upon the shaft 23 which carries the switch arm 21, and anchored at its other end to the cover 31 or to the casing 3. By this means the switch members 2 and 20 tend constantly to be separated but may be held closed against the tendency of the spring 24 by means of the pin 47. It will be evident then that when the carriage 4 reaches the end of its normal travel the spring 24 will pull upon the switch arm, and the latter, being unsupported then by the pin 47, will permit the switch members 2 and 20 to be separated, thus to break the controlling circuit of the motor or engine.

I have shown the end of the screw 1 reduced, as shown at 15. This lies beyond the normal end of travel of the carriage 4. If it should happen that the switch members 2 and 20 should not be separated when the carriage reaches the end of its normal travel, or if for some other reason the motor or engine should fail to stop, its continued operation would carry the carriage 4 beyond the end of the screw 1 to the cut-away portion 15. While the screw would continue to rotate, it would not then produce any

further movement of the carriage 4 and the mechanism consequently would not be damaged.

It is believed that it will be obvious from the above description how the carriage 4, by disengagement from the screw 1, may be adjusted lengthwise thereof and set to operate for a given period of time, and how at the end of that period of time the switch members 2 and 20 will be separated to stop the operation of the motor or switch. I will, therefore, not go into further detail regarding the operation of the device.

What I claim as my invention is:

1. A limit switch comprising, in combination with a pair of switch members normally tending to be separated, a screw rotatable while said switch is closed, a carriage having threads complementary to the screw and engageable therewith, means upon said carriage for holding said switch members closed until the carriage reaches the end of its normal travel, and means for engaging the threads upon said carriage with the screw, or for disengaging them to permit adjustment of the carriage lengthwise of the screw.
2. In combination with a pair of switch members normally tending to be separated, a screw rotatable while said switch is closed, a carriage movable towards and from the screw and having threads complementary thereto and engageable therewith, means upon said carriage for holding said switch members closed until the carriage reaches the end of its normal travel, and means for moving said carriage at will towards the screw to engage its threads therewith, or away from the screw to permit adjustment of the position of the carriage lengthwise of the screw.
3. In combination with a pair of switch members normally tending to be separated, a screw rotatable while said switch is closed, a carriage having threads complementary thereto and engageable therewith, means upon said carriage for holding said switch members closed until the carriage reaches the end of its normal travel, a rod guiding said carriage for movement lengthwise of the screw, and eccentric bearings for said guide rod, whereby the carriage may be moved at will towards the screw to permit manual movement of the carriage lengthwise of the screw.

4. In combination with a pair of switch members normally tending to be separated, a switch arm carrying one of said members, a screw rotatable while said switch is closed, a carriage movable towards and from the screw and having threads complementary thereto and engageable therewith, means for moving said carriage towards or away from the screw to engage its threads therewith or disengage them therefrom, respectively, and a pin movable with said carriage and engageable by said switch arm, and of a

length to support the latter until the carriage reaches the end of its normal travel.

5 5. In combination with a pair of switch members normally tending to be separated, a screw rotatable while said switch is closed, limit means including a threaded member engageable with said screw for retaining said switch members closed, and operable through said screw to release the switch members
10 after a predetermined period of operation, and the threads of said screw being cut away at a point beyond the position of the threaded member at the normal releasing position.

15 6. In combination with a casing and a removable cover therefor, a switch arm pivotally mounted upon said cover, a pair of complementary switch members, one upon said arm and the other upon said cover, means within said casing having a bearing engage-
20 ment with said switch arm, and operable to permit separation of the switch members following a predetermined period of operation, said means and the switch arm being disengageable upon removal of said cover.

25 7. In combination with a casing, a switch arm supported from and movable relative to said casing, and projecting therethrough, a pair of complementary switch members, one upon the outer portion of said arm and the
30 other upon the outside of said casing, means tending to move said switch arm to sepa-

rate said switch members, and means within said casing engageable with the inner end of said arm to maintain said switch mem- 35
bers in contact, and operable to permit separation of said switch members following a predetermined period of operation.

8. A device as in claim 7 including a removable cover for the casing, the switch arm and its associated parts being mounted on
40 said cover and the arm projecting there- through, said means engaging the inner end of the switch arm being fixed within the casing, and being disengageable from said arm to permit separation of the switch members
45 upon removal of the cover.

9. In combination with a control arm nor- mally tending to move to an inoperative or "stop" position, a screw rotatable while said arm remains in operative position, a car-
50 riage having threads complementary to the screw and engageable therewith, and means upon said carriage for holding said arm in operative position until the carriage reaches the end of its normal travel, said means and
55 the arm being thereupon disengageable to permit movement of the arm to normal in- operative position.

Signed at Seattle, King county, Washing- ton, this 31st day of July, 1923

HEUBERT McKAY.