

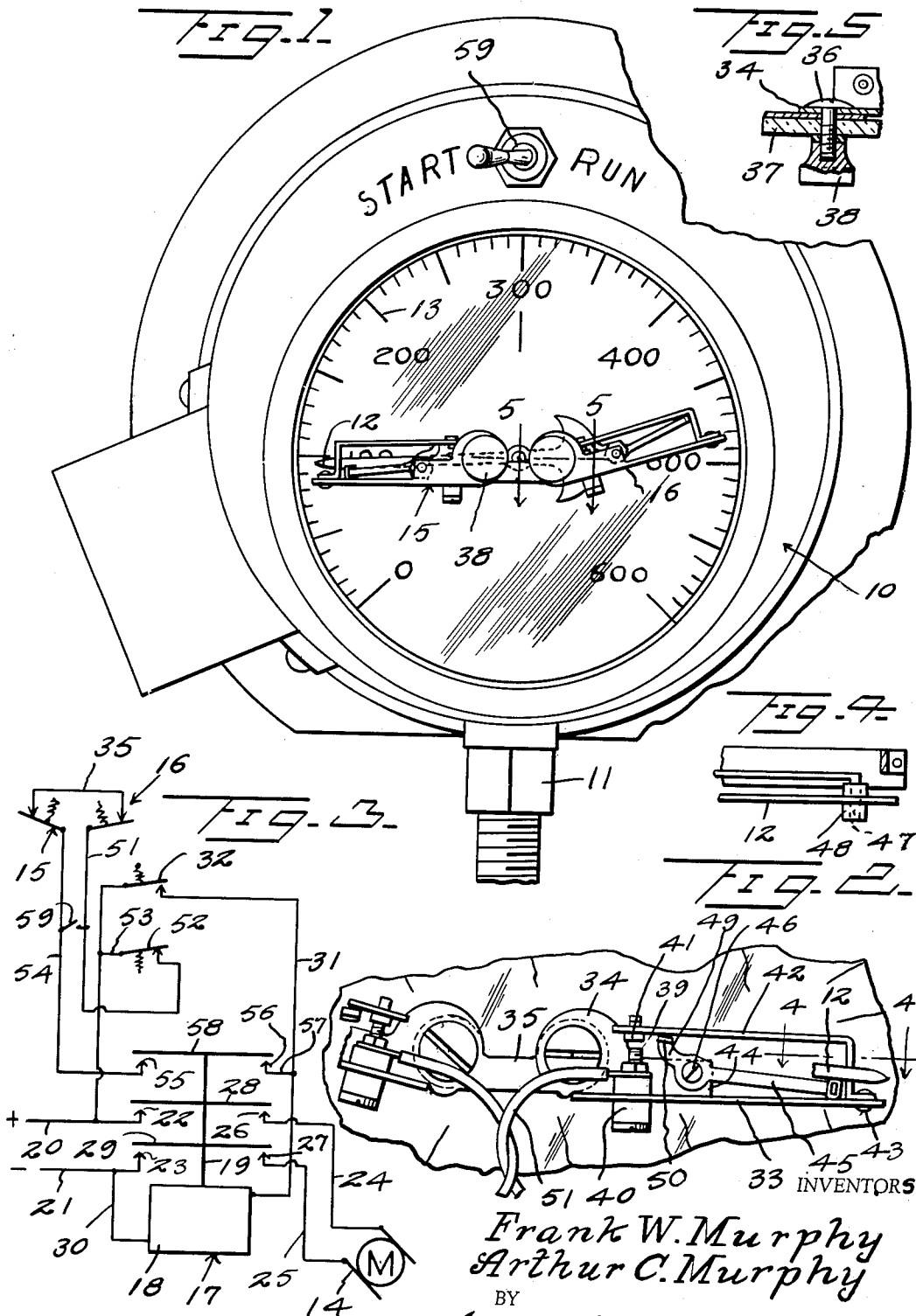
April 17, 1956

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2,741,987

SAFETY MEANS FOR ELECTRICALLY OPERATED PUMPS

Filed Feb. 10, 1953



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2,741,987

SAFETY MEANS FOR ELECTRICALLY OPERATED PUMPS

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Application February 10, 1953, Serial No. 336,068

1 Claim. (Cl. 103—25)

This invention relates to a safety means for an electrically operated pump.

In an electrically operated pump, particularly of that type having a relatively high voltage motor, when there is a break in the fluid line thereby reducing pressure below the operating minimum, or when for some reason the fluid pressure rises above the desired maximum, the motor and pump will continue to operate and thereby cause a loss of the fluid or cause a break in the pipe line or other equipment due to the excessive high pressure. It is, therefore, an object of this invention to provide an automatically operable safety means connected in circuit with the electromagnetic switch for breaking the circuit to the switch when the fluid pressure reaches a predetermined maximum, and also for breaking the circuit to the switch when the fluid pressure reaches a predetermined minimum.

Another object of this invention is to provide in an automatic safety means of this kind, manually operable means for starting the operation of the motor, and manually operable means for stopping the motor irrespective of the fluid pressure.

A further object of this invention is to provide in combination with a pressure gauge, a pair of normally closed switches mounted on the face of the gauge and operable by the pressure indicating hand for breaking the circuit in which the switches are interposed and in which the switches are connected together in series when the pressure is either at a predetermined minimum or maximum.

A further object of this invention is to provide a safety means which can be mounted as an attachment on a conventional pressure gauge and connected in circuit with an electric motor which may or may not be operated by an electro-magnetic controller.

With the above and other objects in view, our invention consists in the arrangement, combination and details of construction disclosed in the drawing and specification, and then more particularly pointed out in the appended claim.

In the drawing—

Figure 1 is a detailed front elevation of a fluid pressure gauge having a safety means associated therewith and mounted within the housing thereof,

Figure 2 is a fragmentary front elevation of the safety switch means on an enlarged scale,

Figure 3 is a diagrammatic view showing the electric circuits with which the safety means is coupled,

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 2,

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 1.

Referring to the drawing, the numeral 10 designates generally a gauge housing which includes a nipple 11 adapted to be connected to a source of fluid pressure supply. A swinging pointer 12 is formed as a part of the gauge structure and is movable across a graduated dial 13.

In order to provide a means whereby the electric motor 14 which operates a pump with which the gauge 10 is connected may be cut off when a predetermined maximum

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pressure is produced, I have provided a pair of switch members generally indicated at 15 and 16.

The motor 14 has connected therewith an electromagnetic or solenoid operated switch 17 of conventional construction which includes a coil 18 with a core 19 movable relative to the coil 18. A pair of supply conductors 20 and 21 forming the supply circuit for the motor 14 are connected to a pair of contacts 22 and 23 and a pair of conductors 24 and 25 are connected to a pair of contacts 26 and 27.

A bridging contact member 28 is fixed relative to the core 19 and is adapted to bridge the two contacts 22 and 26. A second bridging member or contact 29 is also fixed to the core 19 and is adapted to bridge the contacts 23 and 27. One end of solenoid coil 18 is connected as by a conductor 30 to supply conductor 21.

A conductor 31 is connected at one end to the opposite end of coil 18 and is connected at the opposite end thereof to conductor 20. A manually operable switch 32 which is normally biased to open position is interposed in conductor 31 and constitutes a starter switch whereby the coil 18 may be initially energized to close the power circuit embodied in conductors 21, 24, and 25 to the motor 14.

The two safety switches 15 and 16 are of like construction and each includes an elongated base member 33 which is formed with a right angularly disposed ear 34 frictionally engaging a connecting bar 35. The ear 34 has fixedly secured relative thereto a bolt 36 which extends through the transparent panel 37 of the gauge 10.

A knob 38 is threaded onto the bolt 36 on the outer face of the panel 37 and provides a means whereby the base 33 may be swung with the bolt 36 as an axis.

A fixed contact 39 extends through insulation 40 carried by the base member 33 and is disposed in confronting position to a movable contact 41 carried by an elongated resilient bar 42 which is fixed as at 43 to the outer end of the base bar 33. The base 33 also has extending right angularly therefrom a flange 44 and an elongated lever 45 is pivotally mounted on a pivot member 46 extending through the flange 44.

The lever 45 has extending from the outer end thereof a right angular extension 47 disposed in the path of the swinging of the pointer 12, and an insulated sleeve 48 is mounted on the extension 47. The lever 45 also includes a short lever 49 extending from the opposite side of pivot member 46 and a right angular projection 50 extends from the short lever 49 and is engageable with the spring contact carrier 42 so that when pointer 12 bears against extension 47 and rocks this extension with lever 45 toward the base 33, projection 50 will raise spring contact carrier 42 upwardly to circuit breaking position.

Contact 39 is connected by means of a conductor 51 to a manually operated stop switch 52 which is biased to a circuit closing position. Switch 52 is connected by a conductor 53 to conductor 31. The connecting bar or member 35 is connected between the two ears 34 of the switch members 15 and 16, and as shown diagrammatically in Figure 3, switch 15 is connected by means of a conductor 54 to a fixed contact 55. A second fixed contact 56 is connected by a conductor 57 to conductor 31 and a bridging member 58 carried by the solenoid core 19 is adapted when the coil 18 is energized to engage the contacts 55 and 56.

The switch members 15 and 16 being normally biased to a circuit closing position will maintain the solenoid coil 18 energized so long as the pointer 12 is disposed between the predetermined minimum and maximum pressure.

A shunt switch 59 is connected between conductors 51 and 54, being manually operable, and forming a safety switch adapted to be operated before pressure has built up in the gauge 10.

In the use and operation of this safety means, the two

switch members 15 and 16 are manually adjusted relative to the dial 13 by turning the knobs 38 so as to bodily swing the switch members 15 and 16 to the predetermined minimum and maximum circuit breaking position. As shown in Figure 1, switch member 15 is adapted to break the electric circuit to the solenoid 17 when pointer 12 reaches a minimum of approximately 100 lbs. Switch member 16 is adjusted to break the electric circuit to the solenoid 17 when a maximum pressure of approximately 500 lbs. has been reached.

These minimum and maximum pressures may be regulated as may be desired so that the solenoid 17 will be de-energized at any predetermined minimum and maximum. Assuming that the motor 14 is to be initially started, switch 32 is initially closed manually, thereby energizing solenoid 17 so that bridging members 28 and 29 will be disposed in bridging position with respect to associated contacts 22 and 26, and 23 and 27. At the same time bridging member 58 will be disposed in contact with contacts 55 and 56. At the start of the motor 14 pointer 12 will engage extension 47 of switch 15 so that the latter switch will be disposed in circuit breaking position. At this time switch 59 may be initially closed manually and with switch 32 closed, motor 14 will operate to build up pressure in gauge 10.

After pointer 12 has moved clockwise, as viewed in Figure 1, away from extension 47 of resilient carrier 42 of switch 15, contact 41 of switch 15 will engage contact 39 of this switch. At the same time switch 16 will be disposed in a circuit closing position so that a circuit will be completed through switches 15 and 16, conductors 51, switch 52, and conductor 31 to supply conductor 20 and conductor 54 through bridging member 58 and conductor 57 to conductor 30.

The solenoid 17 will thereby be maintained energized until a maximum pressure has been built up and when this maximum pressure is reached, pointer 12 will strike extension 47 of switch 16 so as to move the latter switch into a circuit breaking position. With switch 16 in a circuit breaking position, the circuit to one end of coil 18 will be broken and solenoid 17 will thereby be de-energized and bridging members 28 and 29 will be spring urged to a circuit breaking position.

The safety means hereinbefore described is adapted to be connected to the conventional solenoid switch which latter switch is connected with a pump operating motor so that the motor will be cut off when a predetermined maximum pressure has been reached and the circuit will also be broken in the event pressure generated by the pump drops below a predetermined minimum.

We do not mean to confine ourselves to the exact details of construction herein disclosed, but claim all variations falling within the purview of the appended claim.

What we claim is:

In combination with an electrically operated pump having an electro-magnetic switch interposed in the power circuit for the motor and a pressure gauge having a rotatable pointer connected with the pump, a pair of normally closed separable contact switches carried by said gauge connected in series with said electro-magnetic switch, means rotatably mounting said pair of switches in said gauge on the axis of rotation of said pointer for angular adjustment relative to each other, and means carried by each of said pair of switches projecting into the path of movement of said pointer whereby said pointer upon contact with said means of one of said pair of switches moves said switch to circuit breaking position when a predetermined maximum pressure is indicated by said pointer and upon contact with the means of the other one of said pair of switches moves said other switch to circuit breaking position when a predetermined minimum pressure is indicated by said pointer.

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