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[54] **COIN-ACTUATED CRANKCASE PUMP CONTROL CIRCUIT**

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[58] **Field of Search** 184/1.5; 417/12, 417/43, 44

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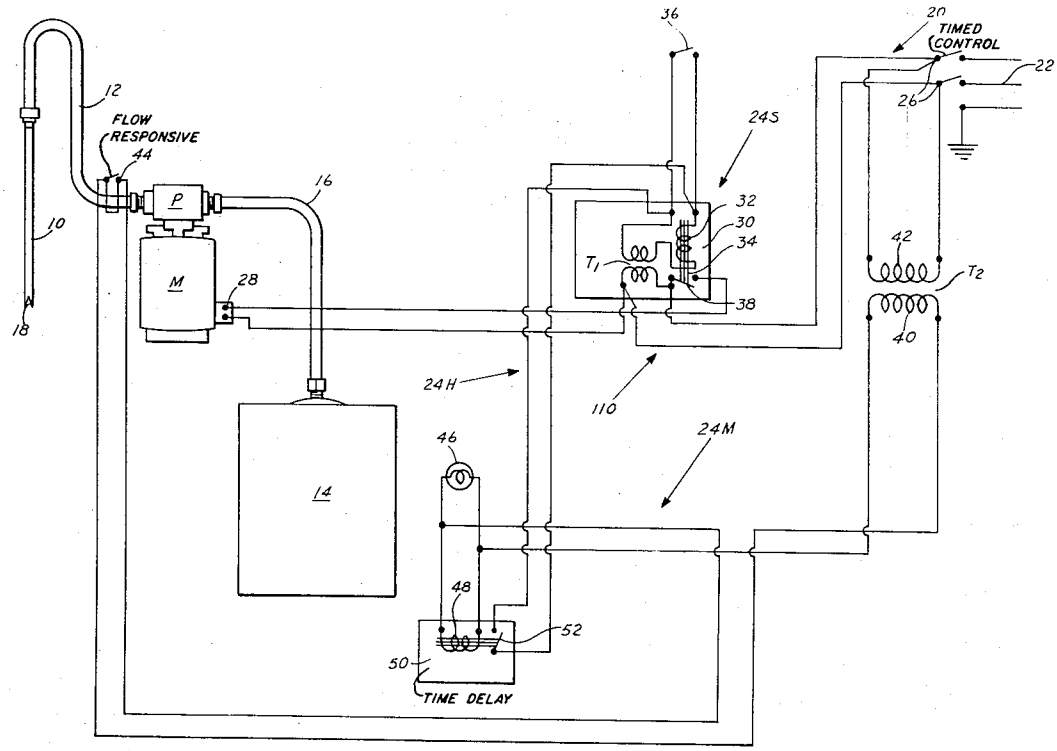
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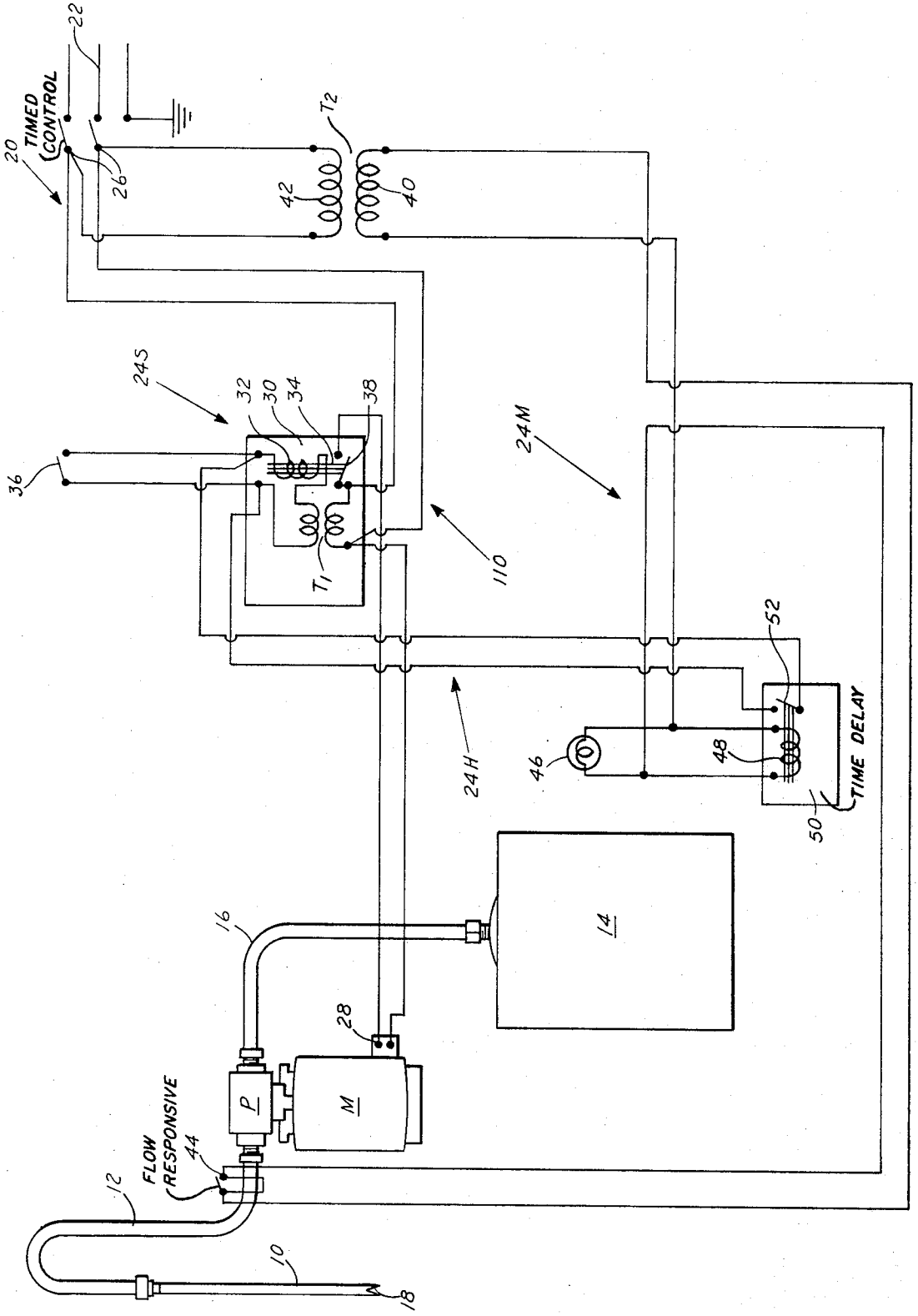
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[57] **ABSTRACT**

This invention relates to an improved electrical circuit for controlling the operation of a crankcase pump which is characterized by a coin-actuated 110 V. pump motor actuating circuit and an overriding low-voltage pump shut-down circuit that monitors the flow of fluid and responds to the cessation thereof. The circuit also includes a manual starting switch that enables the operator to delay initiation of the pumping cycle so that it will not begin upon insertion of the coin. The pump shutdown circuit has a time-delay feature which prevents premature termination of the pumping cycle initiated by a false response by the fluid-flow sensor. Finally, the circuit provides the operator with a signal that denoted completion of the pumping cycle.

5 Claims, 1 Drawing Figure




22
TIMED CONTROL
20
26
T2
42
40
24S
32
30
34
38
36
24M
110
T1
52
TIME DELAY
24H
46
48
50
14
16
28
P
M
FLOW RESPONSIVE
44
12
10
18

COIN-ACTUATED CRANKCASE PUMP CONTROL CIRCUIT

In recent years, "do-it-yourself" coil-operated car wash facilities have become increasingly popular. The vehicle owner generally finds he can wash his own car in a few minutes time at a cost of a quarter or two. Generally speaking, the same person who is willing to wash his own car would not be adverse to changing the oil in it provided there was a convenient way to drain the crankcase and dispose of the dirty oil. Most so-called "discount" stores, of which there are many, offer even major brands of oil at about half what it costs in the service station and it certainly does not require any particular skill to open the can and pour it into the crankcase through the fill-pipe.

Draining the oil from the crankcase by removing the drain plug in the pan as is done by the service station attendant presents certain problems to the vehicle owner because he has no hoist available to him; therefore, about the only practical way left is to suck the dirty oil back up out of the dip stick tube which reaches all the way to the bottom of the crankcase. There is no particular problem encounted in doing so and the pumping equipment is readily available commercially; however, its use demands a certain amount of skill and experience that one cannot be sure that the average passenger car owner possesses.

Accordingly, provision must be made to protect both the equipment and the operator against improper use of the equipment while, at the same time, insuring its satisfactory operation in substantially all types and styles of automotive vehicles. To accomplish this end, several things must be considered, probably the most important of which is to not run the pump dry. A variable pumping cycle should be provided that is automatically adjustable to the requirements of each different vehicle. Most important, the unit must be perfectly safe to use on any type of vehicle and by even the most inexperienced person.

It has now been found in accordance with the teaching of the present invention that a novel coil-operated circuit for controlling the operation of a crankcase pump possessing the previously-described attributes can, in fact, be made. It becomes operable for a predetermined time interval sufficient to drain the crankcase of any one vehicle, but not two, upon insertion of a coin of appropriate denomination. The pumping cycle is initiated at the will of the operator whenever he wishes during the preset interval, whereas, the cycle is terminated automatically whenever the crankcase is pumped dry. Upon completion of the pumping cycle, the pump is shut down following the lapse of a short time interval selected to insure that the monitor circuit has not responded to a false signal indicating flow had stopped.

It is, therefore, the principal object of the present invention to provide a novel and improved electrical circuit for controlling the operation of a crankcase pump.

A second objective of the invention forming the subject matter hereof is the provision of a system of the type aforementioned which automatically shuts down the pump when the crankcase is completely drained and no more oil flows.

Another object of the within-described invention is to provide a unit for draining automobile crankcases that is programed to operate upon actuation by a single coin over a time interval sufficient to service any one vehicle but seldom, if ever, two.

Still another objective is the provision of an electrically-controlled apparatus for draining crankcases that includes means for ignoring spurious signals that would falsely indicate the pumping cycle was complete.

An additional object is to provide a crankcase pump control circuit that allows the user to initiate the pumping cycle but terminates it automatically. Further objects of the invention herein disclosed and claimed are to provide a pump control circuit that is safe, versatile, easy to service and repair, simple, fool-proof and reliable.

Other objects will be in part apparent and in part pointed out specifically hereinafter in connection with the description of the single figure of drawings that illustrates in schematic form the control circuit of the present invention together with the pumping apparatus controlled thereby.

Referring next to the Drawing for a detailed description of the invention, the letter M has been selected to designate the electric motor used to drive the pump P which is connected to suck the oil from a vehicle crankcase (not shown) through nozzle **10** on the end of vacuum hose **12**. The pump delivers the oil to a sump **14** through a drain hose **16**.

Nozzle **10** is preferably notched as shown at **18** to prevent its bottoming-out in the pan and thus restricting the oil flow. The diameter of the nozzle is such as to easily pass down into the crankcase of an automotive vehicle through its dip stick tube. The length of the tube must, of course, be sufficient to reach to the bottom of the crankcase and rest on the pan. Actually, none of the above-described apparatus is novel nor is the use of the several items in combination with one another for the purpose of sucking oil out of a crankcase a new idea. Instead, it is the control circuitry used to oversee the system and prevent its misuse that is unique and, therefore, patentable.

The control circuit forming the subject matter hereof has been designated broadly by reference numeral **20** and it will be seen to include a 110 V. branch identified by reference numeral **110** and a low-voltage 24 V. branch similarly denominated by reference numeral **24**. A source of 60 cycle 110 V. alternating current **22** supplies current to both the 110 V. and 24 V. branches of the control circuit **20** through a double-pole single-throw coin-controlled master switch **26**.

Master switch **26** is normally open and closes upon insertion of a coin of proper denomination. Once closed, an automatic timer incorporated therein is triggered and holds it closed for a predetermined time interval. Coin-actuated timer switches such as this are, of course, common shelf items that are widely available in the market place. In this particular circuit, an interval of about five minutes more or less has proven to be just about right. It is long enough to insure that even the largest capacity crankcase will be completely drained even when filled with viscous oil, yet, at the same time the interval is too short to permit two vehicles to be drained on the same coin. This is because pump P is preferably selected with a capacity such that it requires a minimum of about 2 minutes to drain the minimum capacity crankcase and the 3 minutes left on the timer is insufficient to drain a second vehicle. For instance,

even if we assume the first user had the nozzle in place in the dip stick hole and that he initiated the pumping cycle as soon as the coin was deposited, he would probably use up most, if not all, of the remaining time in removing the nozzle, refilling the crankcase with fresh oil and driving out of the service bay. During whatever time that remains, the second user would have to drive his car into the service area, raise the hood, remove the dip stick from its tube and insert the nozzle before he could even begin the pumping operation. If, as will most always be the case, there is insufficient time left to completely drain the second crankcase, another coin will have to be used anyway to insure that no dirty oil remains in the system to contaminate the fresh oil. Thus, while it is certainly possible to temporarily disable the system following a single "paid-for" use, to do so would unnecessarily complicate the circuit when it is far simpler, and just as effective to merely choose the right time interval during which the operation is to be completed.

The 110 V. circuit **110** is tapped off the contacts of master switch **26** and wired across the contacts **28** of motor M as shown. Current for the low-voltage starter subcircuit **24S** is taken from circuit **110** through transformer T_1 that forms an integral part of conventional 110 V. – 24 V. switching relay **30**. The 24 V. secondary of transformer T_1 energizes coil **32** of relay **34** upon closure of normally-open momentary contact switch **36**. As relay **34** is energized, it actuates normally-open motor control switch **38** in the 110 V. circuit to start the motor M.

Another 24 V. pump monitor circuit **24M** is powered by the secondary **40** of transformer T_2. The primary **42** of this transformer is connected across the terminals of master switch **26** as shown. Circuit **24M** includes a vacuum switch **44** connected into the vacuum side of pump P. This switch is a normally open one adapted to sense the flow of oil in hose **12** and respond to such flow by closing. As it does so, a circuit is completed through signal **46** which tells the user that the system is pumping oil. Signal **46**, in the particular form shown, constitutes a lamp but it could be an audible signal just as well.

Closure of vacuum switch **44** also energizes the coil **48** of time-delay relay **50** which, in turn, closes normally open switch **52**. The latter switch is connected in parallel with switch **36** in starter circuit **24S** and it functions to hold relay **30** energized when the user releases start switch **36** to its normally open position. Relay **50** is, once again, of conventional design, and it incorporates a time-delay of approximately 30 seconds to a minute during which the pump will continue to operate even though no fluid is flowing and vacuum switch **44** has reopened. The reason for this is to prevent a premature shutdown of the system in the event of a false indication that the crankcase is empty such as might be caused by an air bubble in the line or the like. If, in fact, the indication is a false one, the time-delay feature permits the pump to continue operating long enough to start the fluid flowing again, whereupon, the vacuum switch will reclose returning the system to normal operation. Of course, the system can be restarted at any time during the time cycle established by main switch **26** if the operator will merely reactuate start switch **36**; however, he has no way of knowing that oil remains in the crankcase and that the pumping operation is incomplete. For all practical purposes, the time-delay feature in the 24 V. holding circuit **24H** that includes switch **52** and relay **30** overcomes this problem.

What is claimed is:

1. The control circuit for operating an electrically-driven suction pump of the type used to pump oil out of the crankcase of an automotive vehicle which comprises: an electric pump motor connectable to a source of electrical energy to define a main motor circuit; a first normally-open relay-actuated switch connected in the main motor circuit in series with the motor; a second normally-open relay-actuated switch connected in series with the relay of the first relay-actuated switch and connectable to a source of electrical energy to define a holding circuit; a normally-open fluid-actuated switch responsive to the flow of fluid through the pump connected in series with the relay of the second relay-actuated switch means and connectable to a source of electrical energy to define a sensing circuit; and, a normally-open manually-actuated switch connected in series with the relay of the first relay-actuated switch means and in parallel with the second relay-actuated switch means to define a starting circuit, said starting circuit being operative upon closure of the manually-actuated switch means to actuate the main motor circuit and start the motor, the sensing circuit being operative upon actuation of the main motor circuit in a manner to cause fluid flow so as to actuate the holding circuit and keep the main motor circuit actuated upon deactivation of the starting circuit, and said sensing circuit being responsive to discontinuance of the fluid flow through the pump to deactivate the holding circuit thereby deactivating the main motor circuit if the starting circuit is deactivated.

2. The suction pump control circuit as set forth in claim **1** which includes: signaling means connected in the sensing circuit in series with the fluid-actuated switch means and in parallel with the relay of the second relay-actuated switch means, said signaling means being operative to indicate the flow of fluid through the pump so long as said sensing circuit is activated.

3. The suction pump control circuit as set forth in claim **1** which includes: normally-open coin-actuated switch means connected into the main motor circuit in series with the first relay-actuated switch means, said switch means being operative in closed position with said first relay-actuated switch means closed to activate said main motor circuit for a predetermined time interval.

4. The suction pump control circuit as set forth in claim **1** in which: the second relay-actuated switch means is of a time-delay type operative upon actuation to remain actuated for a predetermined time interval following deactivation of the sensing circuit.

5 The suction pump control circuit as set forth in claim **3** in which: the coin-actuated switch is timed to remain closed for an interval of approximately 5 minutes.

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