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WATER DETECTOR FOR FUEL SYSTEMS

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Fig. 1

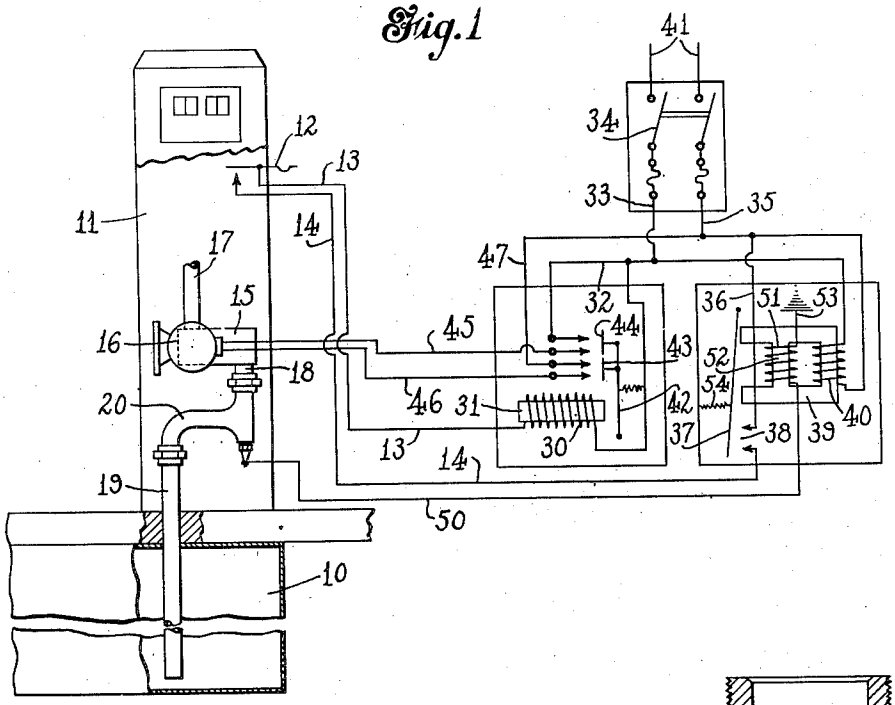
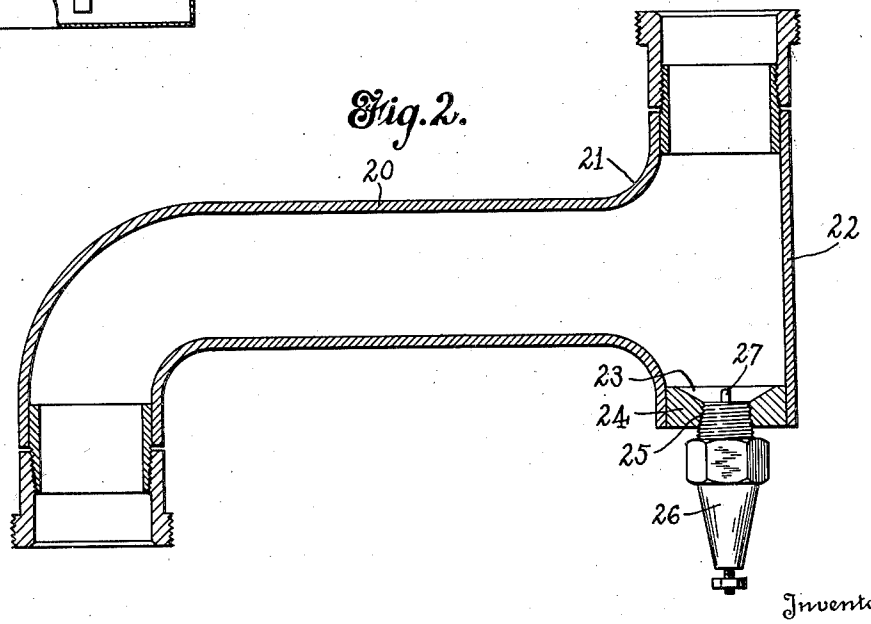


Fig. 2.



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WATER DETECTOR FOR FUEL SYSTEMS

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6 Claims. (Cl. 103—25)

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This invention relates to water detectors for fuel systems and the like, and more particularly to a device for preventing water from being carried from a gasoline tank or the like to a point of delivery.

It is well known that gasoline service stations, for example, have a more or less serious problem in that water will collect in the gasoline storage tanks and be pumped from the tanks into the consumer's tank upon the latter's truck or car. It is well known that a certain percentage of water is present in gasoline, and, due to condensation and other causes, this water becomes separated from the gasoline, and, being heavier than the latter, will collect at the bottom of the tank, from which point the inlet pipe to the pump usually draws its supply. As a result, this water will be picked up by the pump and delivered to the consumer, thus causing trouble in the operation of the automobile or truck of the latter.

It is contemplated by the present invention to provide a device which will, during the pumping operation, serve to separate the water from the gasoline, if there is any appreciable quantity of water present, and this separated water will be employed to prevent action of the pump, so that, as soon as any appreciable quantity of water is present in the gasoline being delivered to the consumer, the pump will be automatically stopped so as to warn the operator that water is present and no more gasoline should be drawn from the storage tank until the situation is remedied.

As is well known, water is heavier than gasoline and can, therefore, be separated from the latter by the action of centrifugal force. This principle is made use of in the present device in that the gasoline is caused to follow a curved path in its flow from the tank to the point of delivery, this curved path bringing about a centrifugal action on the flowing liquid so that the water will be separated from the gasoline. Adjacent this portion of the device provision is made for collection of the water so separated, and means are provided whereby this water will close an electrical circuit so as to stop the pump and thus prevent further delivery of gasoline from the tank.

One object of the invention is to provide a novel water-detecting device for gasoline storage tanks or the like.

Another object of the invention is to provide a device which may be readily attached to the pumping systems of gasoline storage tanks or the like, and which will stop the action of the pump so soon as any appreciable amount of

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water is present in the gasoline being drawn from the tank.

Still another object of the invention is to provide a water-detecting device for gasoline storage tanks or the like so arranged that any water present in the gasoline being drawn from the storage tank will be separated from the gasoline during transit, and the separated water employed to indicate to the operator that water is present in the gasoline by stopping the pumping operation.

Still another object of the invention is to provide a device of the character described in which the gasoline, during its travel from a storage tank to a delivery outlet, is caused to follow a curved path and thus is subjected to the action of centrifugal force to cause any water present in the gasoline to be separated therefrom.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the drawings:

Fig. 1 is a diagrammatic view of a water-detecting device for fuel systems embodying my invention, and

Fig. 2 is a sectional view of a portion of the device showing the part in which the separation of the water from the gasoline takes place.

To illustrate a preferred embodiment of my invention, I have shown, more or less diagrammatically, a storage tank 10 for gasoline or the like, the usual pumping standard 11 having a pivoted hook 12 for holding the filling nozzle, this hook, when the nozzle is removed therefrom, closing the circuit between conducting wires 13 and 14, which will, as explained hereinafter, close the circuit through the pump to start the latter in operation, as is usual with devices of this character.

A pump of any desired form is indicated at 15, this pump being designed to be driven electrically by the motor 16, the outlet of the pump being shown at 17, and the inlet being indicated by the pipe 18. A supply pipe 19 leads into the storage tank 10 and extends to a point adjacent the bottom thereof, the pipe 19 being offset from the pipe 18 and being connected thereto by a reversely curved pipe section 20.

The section 20 is shown in section in Fig. 2, and it will be noted that the end of this section adjacent the pipe 18 makes a sharp turn, as indicated at 21, in this case substantially a 90° turn. This sharp bend in this portion of the path of the gasoline during transit causes the liquid being drawn from the tank 10 to be sub-

jected to the action of centrifugal force, thus throwing outwardly against the portion 22 of the pipe any water which may be present in the gasoline being pumped.

Adjacent the angled portion 21 of the pipe a depression or sump 23 may be provided, in which may collect the water separated from the flowing gasoline by the action of centrifugal force. This sump may be closed by a member 24 provided with a threaded opening 25 in which is screwed a "probe" comprising a plug 26 having mounted therein a conducting member 27, which conducting member will ordinarily be electrically insulated from the plug 26. It will be understood that the pipe 20 will usually be of conducting material, as will the member 24, and that the pipe will be grounded, as is usual in such devices, so that, when the sump contains any appreciable amount of water, electrical contact will be made between the pipe 20 and the conducting member 27, for, as is well known, water will complete an electrical circuit while gasoline will not. I make use of the completion of an electrical circuit by the water thus separated from the gasoline to check the operation of the pump, and thereby signal the operator that water is present in the gasoline.

Any suitable electrical devices may be employed for this purpose, and it will be understood that the particular electrical arrangement shown is for purposes of illustration rather than limitation. As shown, the wire 13 from the hook 12 leads to a coil 30 about the magnet 31 of a relay, and also, through wires 32 and 33, leads to one pole of the double-pole switch 34. The wire 14 is connected with the other pole of the switch 34 by means of wires 35 and 36, and the switch-closing member 37, designed to close the gap 38 between the wire 36 and wire 14. The member 37 serves as the armature of a relay magnet 39, energized by a coil 40 connected to both poles of the switch 34, this switch being the main current switch of the apparatus and controlling the delivery of current from service wires 41. It will be apparent from the above description that as soon as the switch 34 is closed the armature 37 will be caused to close the gap 38, and therefore the coil 30 will be energized when the nozzle is lifted from the hook 12.

When the coil 30 is energized, the armature 42 will be attracted, thus, by means of contact members 43 and 44, connecting the wires 45 and 46 to wires 32 and 47, respectively, which lead to the switch 34. Thus when the switch 34 is closed to cause the armature 37 to close the gap at 38, and when the nozzle is lifted from the hook 12 to complete the circuit through wires 13 and 14, current will be supplied through wires 45 and 46 to the pump motor 16, and it will be understood that it will be necessary for both of these gaps at 38 and between wires 13 and 14 to be closed for the pump to be in operation.

The conducting member 27 projects from the outer end of the plug 26, and from this projecting end a conducting wire 50 leads to a coil 51 which surrounds a bridge 52 across the arms of the magnet 39, the other terminal of this coil being grounded, as shown at 53. It will be understood that as long as the circuit is not completed between the member 27 and the pipe 20, the circuit through the coil 52 will be open, but when the circuit is closed a current will be induced in the coil 51 which will counteract the effect of the current in the coil 40 and release the contact member 37 so that it will be drawn away from the contact members of the gap 38 by the spring 54, which breaks the circuit through the coil 30, and therefore breaks the circuit to the motor 16 of the pump. As soon, therefore, as water collects in the sump 23 to make electrical contact between the member 27 and the pipe 20, current from the service wires 41 to the pump motor 16 will be discontinued and the pump will cease its operations. Therefore, not only will the pumping of water into a customer's tank or other point of delivery be immediately checked, but also the user of the device will receive an indication of the presence of water in the gasoline so that the situation may be corrected before further supplies are drawn from the storage tank.

While I have shown and described a preferred embodiment of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. The method of pumping gasoline or other liquid lighter than water from a tank which comprises pumping the liquid from the tank, forcing the liquid about a curved path to subject the liquid to the action of centrifugal force and thereby separate therefrom any water which may be contained therein, and directing the water so separated to the spaced terminals of an electrical circuit adjacent said curved path to close said circuit.

2. The method of pumping gasoline or other liquid lighter than water from a tank which comprises pumping the liquid from the tank, forcing the liquid about a curved path to subject the liquid to the action of centrifugal force and thereby separate therefrom any water which may be contained therein, directing the water so separated to the spaced terminals of an electrical circuit adjacent said curved path to close said circuit, and controlling the operation of the pump by the circuit so closed.

3. A pumping system comprising a tank, a pump for drawing liquid from the tank, means providing a curved passage through which the liquid is forced to subject it to the action of centrifugal force to separate from the liquid any water that may be therein, and an electrical circuit having spaced terminals adjacent said curved passage upon which terminals the separated water collects to close the circuit therethrough.

4. A pumping system comprising a tank, a pump for drawing liquid from the tank, means providing a curved passage through which the liquid is forced to subject it to the action of centrifugal force to separate from the liquid any water that may be therein, an electrical circuit having spaced terminals adjacent said curved passage upon which terminals the separated water collects to close the circuit therethrough, and means energized by the closing of said circuit for discontinuing the action of the pump.

5. A device of the class described comprising a tank, a pump for drawing a relatively light liquid fuel from the tank, means providing a passage through which said fuel is forced, said passage having a curved portion to subject the liquid to the action of centrifugal force and thereby separate from the liquid any water that may be therein, an electrical circuit having spaced terminals toward which any such water is directed to span the gap between said terminals and close

said circuit, and means controlling the operation of said pump by the closing of said circuit.

6. A device of the class described comprising a tank, a pump for drawing a relatively light liquid fuel from the tank, means providing a passage through which said fuel is forced, said passage having a curved portion to subject the liquid to the action of centrifugal force and thereby separate from the liquid any water that may be therein, an electrical circuit having spaced terminals, means directing such separated water from the outer side of the curved portion of said passage to said terminals to close the circuit therethrough, and means energized by the closing of said circuit for discontinuing the action of the pump.

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