

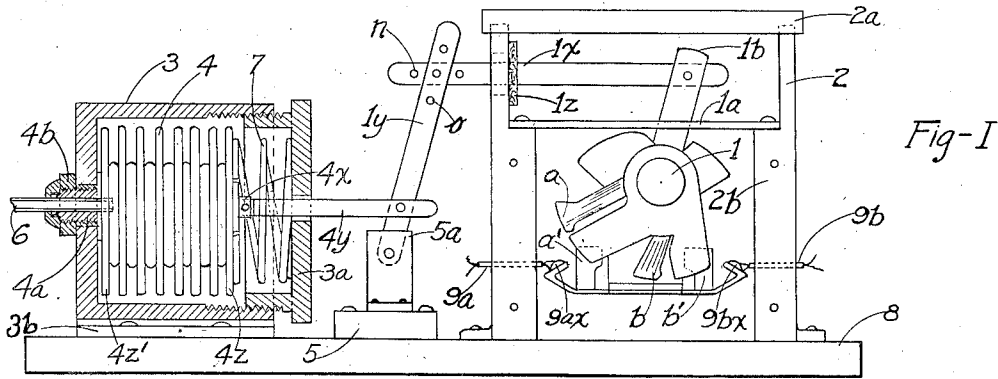
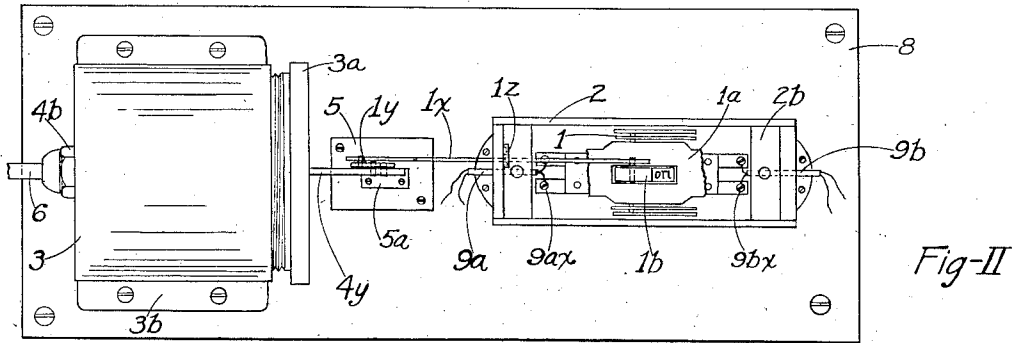
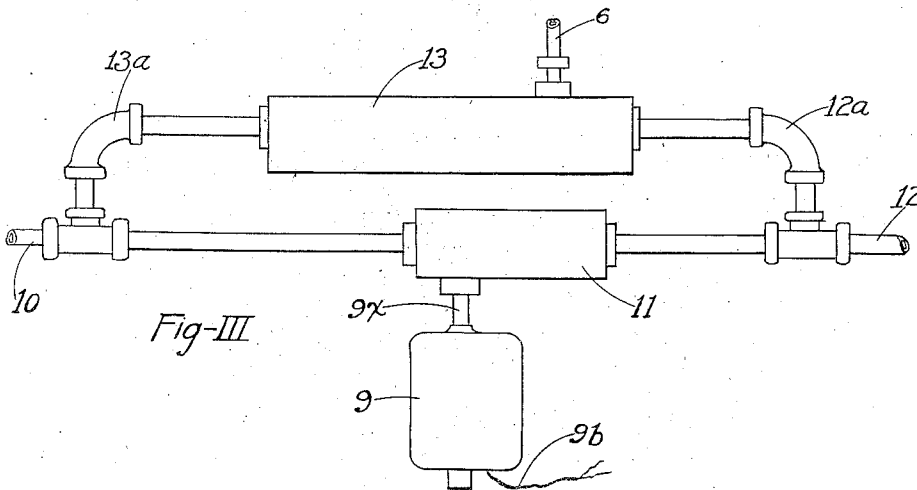
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R. R. EDRINGTON ET AL

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AUTOMATIC PRESSURE CONTROL FOR ELECTRIC PUMPS

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INVENTORS.

Ralph H. Edrington
 Wilton C. Watson

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AUTOMATIC PRESSURE-CONTROL FOR
ELECTRIC PUMPSRalph R. Edrington and Welton C. Watson,
Louisville, Ky.

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1 Claim. (Cl. 200—83)

Our invention relates to pressure-operative electric switches in general but particularly to switching devices operative by means of a spring and liquid pressure. And the principal object of our invention is to develop a pressure-control for an electrically-driven pump in a gasoline-supply station so that the electric current to the pump-motor will be automatically cut out as soon as the pressure in the gasoline supply line runs up above the normal pressure required therein, generally 15 pounds, or any other predetermined normal pressure. Another object of our invention is to provide for the gasoline-supply line between the pump and the discharge valve in the delivery nozzle a pressure-controlling device installed at the pump and adapted to cut the current automatically from the pump-motor as soon as the service operator closes the discharge valve in the delivery nozzle, thus eliminating the necessity of an electric circuit from the pump-motor in the house to the service-cabinet in the yard.

With the above and other objects in view which will appear in the process of the description, we will say that our invention, the new and useful automatic-pressure-control for electric pumps, illustrated in the accompanying drawing which forms a part of this specification, is a practical device embodying the said novel means and other new and useful details of construction, arrangement and combination of parts, all of which together with their functions, will be described in detail with reference to said drawing and will be definitely pointed out in the claim that follows this description, so that any person skilled in the art may understand how to construct and use this device.

In said drawing, Fig. I is a side view, partly in elevation and partly in section, showing our pressure-operative switch in its open position and some of its parts and means of operation. The switch-box side has been removed.

Fig. II is a vertical projection of our device with the cover of the switch box removed, showing the relative position of the coating parts when the switch is closed.

Fig. III is a plan view of a portion of a gasoline-supply pipe of an ordinary gasoline-supply station and the electric pump in its casing in the pipe-line connected with its motor; and in this view, also, appears the by-pass valve-chamber of the line, with which our pressure-controlling device is connected on the dispensing-service side of the by-pass valve.

This invention has been designed and developed

in its various details for the desirable purpose of affording the service-operator at a gasoline-supply station efficient means of cutting the current automatically from the pump-motor when he closes the discharge-valve in the delivery nozzle. This fact not only prevents the excessive pressure of gasoline in the supply line, but also cuts out the useless loss of electricity in the pump-motor after the discharge-valve has been closed; and it, further, makes unnecessary the expense of running electric wires through under-ground conduits from the pump-motor in the house to the service-cabinets in the yard. And with these purposes and special objects aforesaid in view, we will now describe our invention at length, pointing out specifically the new and useful features and explaining the purposes and the operations of the individual parts and the combinations thereof in our invention, as illustrated in the drawing hereinabove described, in which similar letters and characters refer to similar parts throughout the several views.

In the design and construction of our new automatic pressure-controlling device, we have provided a strong, two-pole electric switch securely installed in a fume-proof metal casing provided with a tightly-fitting but removable cover 2a. In the ends of the switch casing 2 are reinforcing blocks 2b, 2b, across the tops of which are rigidly bolted the ends of the switch-yoke 1a to form a secure anchorage for the switch 1, which is operated through the switch-arm 1x, of which the inner end is fastened to the switch-handle 1b in a pintle-connection, while the outer end of the arm has an adjustable pintle-connection with the upper end of the swinging lever 1y, of which the lower end is held in a pintle-connection with the flat post 5a rigidly set in the base-block 5 which is bolted to the base-plate 8.

Near the switch 1 and adjacent to the swinging lever 1y, we have installed a cylindrical casing 3 having a closed outer end and an open inner end provided with an adjustable cap 3a threaded and screwed therein. Both the integral outer end and the adjustable cap 3a are provided with central borings adapted for the installation of a bellows 4 set longitudinally therein and operative by liquid pressure. A threaded nipple 4a is centrally installed in the back plate 4z' of the bellows 4 and extends out through the central boring in the outer end of the casing 3; and a threaded coupling 4b locks the back plate 4z' of the bellows 4 in its operative position against the closed end of the casing 3 and also couples the

gasoline pipe 6 to said threaded nipple to supply operative liquid to the bellows 4. Casing 3 is bolted to base-plate 8 through floor-flange 3b.

On the front plate 4z of the bellows 4 centrally-mounted is a post 4x with which a plunger 4y is connected in a pintle-joint, from which post said plunger extends out through the central boring in the casing-cap 3a far enough to make a pintle-connection with the swinging lever 1y in such a manner as to enable it to move the lever 1y forward toward the switch 1, to open it, as shown in Fig. I, when the bellows 4 is expanded by the rising pressure of gasoline entering the bellows through pipe 6.

Now, inside the casing 3 and between the front plate 4z of the bellows 4 and the end of the casing-cap 3a, is installed a helical compression spring 7, of a predetermined force-gradient designed to press continuously against the front plate 4z of the bellows and adapted to force the constriction of the bellows as the pressure of liquid therein falls below the pressure exerted by the spring 7; and when the liquid pressure on the bellows falls below a predetermined normal force, the spring 7 forces the bellows back to its normal position of rest; and the plunger 4y follows back, pulling back with it the swinging lever 1y, to which it is connected. This backward movement of the swinging lever 1y draws back with it the switch-arm 1x to which it is attached; and thus the switch 1 is automatically closed again, as shown in Fig. II.

Now, at ordinary gasoline-supply stations the supply of gasoline is usually kept in a large tank set underground and one or more service-cabinets are stationed out in the yard near the street at convenient locations for serving patrons in automobiles. And each service-cabinet is usually equipped with a gage-cup and a flexible service-hose having a delivery nozzle provided with a discharge valve installed therein.

Now, a gasoline-supply pipe 10, in Fig. III, is laid from the storage tank to a pump 11 for each service-cabinet of the station; and each pump 11 is usually driven by an electric motor 9 energized through the electric wire 9b of Fig. III, and shown, also, in Figs. I and II where its current has to pass intermittently through the switch 1 in the pressure-control of the gasoline in the supply-line 12 to its respective service-cabinet in the yard where the gasoline may be dispensed. Switch 1 has movable contacts a, b, and stationary contacts, a', b'.

Now, by means of the electric pump 11 the gasoline-supply is drawn from its storage tank in the ground and forced out through pipe 12 to a gage-cup in the service cabinet in the yard, where the gasoline is held for ready service under a predetermined pressure, generally 15 pounds. Now unless the electric pump 11 is stopped when the gasoline in the gage-cup reaches the predetermined pressure, the pressure in the supply line 12 between the pump and the closed discharge valve in the delivery nozzle of the supply line, would run up dangerously high if a by-pass valve adapted to open on excessive pressure had not been placed in the by-pass-chamber 13 installed alongside the pump-chamber 11 on the supply-line, as shown in Fig. III, where the by-pass-chamber 13 is shown connected up through pipe 12a to the delivery pipe 12 of the pump-line and, also, connected up through pipe 13a to the intake side 10 of the pump-line.

At the present time in gasoline-supply stations not using our automatic pressure-control for elec-

tric pumps, each service-cabinet is provided with a manually-operative electric switch connected up with its respective pump-motor, so that the service operator may switch in his electric pump when he is ready to dispense gasoline and switch out the pump again as soon as he can return to the switch in the cabinet after he has dispensed to the patron the required amount of gasoline.

Under these conditions of present equipment it can readily be seen that after the service-operator has switched in his electric pump, some minutes must elapse before he can walk round and insert the delivery nozzle into the automobile-tank and open his discharge valve to deliver the gasoline; and, also, after the required amount of gasoline has been dispensed and the discharged valve is closed, some minutes must necessarily pass before the operator can walk round to the switch in his service-cabinet and switch out his electric pump. And even though the ordinary by-pass valve relieves the dangerously high pressure in the supply-line 12, all through this lapse of time at both ends of said service, the electric pump continues running until its motor is cut out by means of the manually-operative switch in the service-cabinet, a fact which constitutes a useless waste of electric current at each repetition of ordinary service.

Whereas with the installation and use of our automatic pressure-control for electric pumps at gasoline-supply stations, both the action and the results are very different. In the dispensing of gasoline it is well known that the pump should run only when the gasoline is running from the delivery nozzle into the car-tank or other receptacle; and this result we bring about in the following way with our automatic pressure-controlling device.

We do not make any change in the present gasoline-supply system. We merely install our automatic pressure-control for electric pumps near the pump 11; and connect the intake end of our gasoline-pressure pipe 6 with the by-pass chamber 13, as shown in Fig. III; and with the coupling 4b we join the other end of pipe 6 with the bellows 4 installed in the cylindrical casing 3, so that the toggle switch 1 may be operated by the rise and fall of the gasoline pressure in the longitudinally-operative bellows 4, through the intermediate, coacting parts, 4y, 1y and 1x, as hereinabove described. We then eliminate the electric switch now used in the service-cabinet and also the electric circuit thereto; and connect the electric wires 9a which lead from the source of the current to the binding posts, 9az, 9ax, on the front side of the two-pole switch 1. And the two wires 9b of the pump-motor 9 shown in Fig. III, we extend and couple to the two wires 9b severally connected with the two binding posts, 9bx, 9bz, of the bipolar switch 1 shown in Fig. II. The shaft 9x of the pump-motor 9, runs in a liquid-tight bearing set in pump-chamber 11. And the fume-proof switch-box 2 slotted for the operation of arm 1x, is provided on the inside with a heavy felt pad 1z so installed and slotted as to prevent the ingress of any surrounding fumes in the operation of arm 1x, to avoid explosion from the switch-spark.

We have provided an adjustable cap 3a for the bellows-casing 3 because said cap, which acts as the abutment for the outer end of spring 7, can be readily screwed in or out to adjust the tension of spring 7 so it will act on the front plate of said bellows at any desirable pressure prescribed at any gasoline-supply station. By this means,

therefore, adjustments in the force of spring 7 can be easily made to cooperate effectively with the counter-force of the bellows 4, which normally rests expanded under a predetermined internal pressure of gasoline, holding the switch 1 open, but recoils again under the force of spring 7 as the pressure in the bellows falls below the pressure of the spring. If the pressure in the bellows falls below a certain predetermined amount, the spring 7 will force the switch to close and the electric pump will start and operate until the pressure in the bellows returns again to the normal of rest. But if the bellows-pressure falls intermittently more or less and does not fall below the predetermined amount, then the plunger 4y will move intermittently back and forth operating the coacting members 1y and 1x so that the switch handle 1b will oscillate back and forth without shifting the contacts a and b of the switch to make or break the circuit to the motor 9; for the two-pole switch 1 is of the toggle type and its handle has a broad margin of oscillation before the contact shift and is well adapted for use in this place where a variety of preliminary pressures in the gasoline-supply line may occur before it becomes necessary to switch on or off the pump-motor. The predetermined pressure of gasoline in the supply line varies more or less in different gasoline-supply stations. And to compensate for this variation we have not only provided for the adjustment of the spring 7, as hereinabove mentioned; but we have also provided the extra pintle holes n, n, in the switch-arm 1x and the extra pintle holes o, o, in the swinging-arm 1y, for the purpose of changing the leverage in those parts coacting with the bellows 4 and the spring 7; and, also, for readily adjusting the extent of oscillation in the switch handle to cause normal operation of the switch 1 under the conditions of different normal pressure, as used at different stations.

It is, also, true that if there is a leak on the gasoline-supply line 12, even though small and hidden, our automatic pressure-controlling device will disclose this fact; for, as the pressure in the supply-line falls below the normal of the line, our pressure-controlling device will close the switch 1 and start the pump automatically and force the pressure up to normal again. So, also, with our pressure-control, if the gasoline, standing long in the supply-line 12 or in the gage-cup in the service-cabinet in cold weather, shrinks so that the pressure in the line falls below the normal, the pump will start automatically and fill the line and gage-cup to their normal condition and the switch will be automatically thrown open again, as previously described.

But it should be understood that the specific detail of parts of our invention which we have herein illustrated and described, are not to be considered as limitations of our practical mechanism; and that, while keeping within the scope of our invention and claim, any desired modification of these details may be made to facilitate production or economize in the fabrication of the parts, provided we keep within the spirit of the invention.

And, now, having thus described the various features of our invention, the detail construc-

tion, arrangement and combination of its parts as well as its functions and its purposes and means of operation; those features and combinations of our invention that we consider new and useful in the way of economy and efficiency in the dispensation of gasoline, and on which we desire Letters Patent granted to us, we have herein below set forth specifically in the following claim:

We claim:—

An automatic pressure-control for electric motor-driven pumps, of the character described, comprising: an oblong base-plate; a fume-proof switch-casing securely mounted thereon; a two-pole electric switch, toggle-operative, in the circuit of said motor, installed in said casing and provided with a long, operative handle adapted to oscillate back and forth a considerable distance without shifting the contacts to open or close the switch; a long, thin switch-arm having a pintle-attachment to the outer end of said switch-handle and extending out through a narrow slot in said switch-casing; a plurality of pintle-attachment holes in the outer end of said switch-arm for adjustment in length; slotted means fastened over the arm-slot in said casing to prevent the ingress of gas to the switch-casing to reduce the danger of an explosion from the switch-spark in operation; a cylindrical bellows-case mounted on said base-plate adjacent to said switch-casing; a bellows provided with front and back plates and operatively installed in said case and adapted to be expanded by means of internal liquid pressure; means for expanding said bellows intermittently in normal operation to open said switch; means for holding the back end of said bellows immovably against the inside back end of said case; an adjustable threaded cap fitted into the front end of said case and provided with a central bore there-through; a short central post fixed into the front plate of said bellows; a plunger-rod attached to said post with a pintle-hinge and adapted to extend out through the central bore in the threaded cap of said case and to connect in a pintle-hinge with a swinging lever having its lower end hinged in a low post fixed in said base-plate, between said switch casing and said bellows-case and its upper-end attached to the outer end of said switch-arm to close said switch when said bellows expands and to open the switch when the bellows is forced back; means in the upper end of said swinging lever for adjusting its length in making the attachment to said switch-arm to maintain normal working efficiency in said switch in the event of predetermined variation in the normal working pressure in said bellows; and a helical spring of predetermined force-gradient installed in said bellows-case between said bellows and said threaded cap and adapted to be graduated in its predetermined, normal operative pressure by said adjustable cap and designed to exert a continuous pressure on the front end of said bellows to push it back when the liquid pressure in said bellows falls below a predetermined force, to open said switch again, as described.

RALPH R. EDRINGTON.
WELTON C. WATSON.