

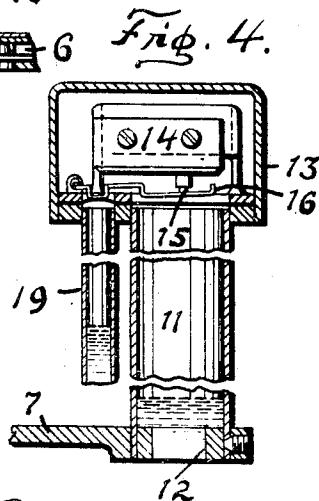
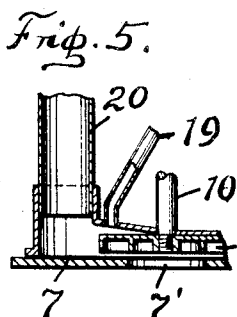
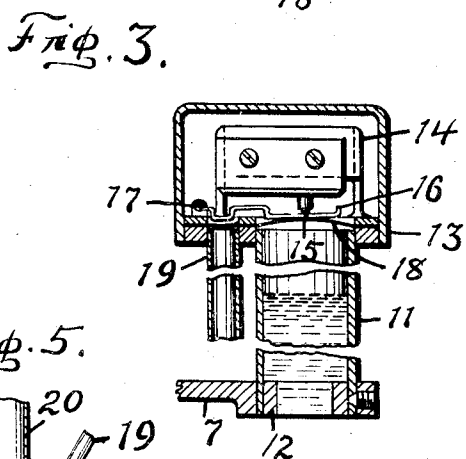
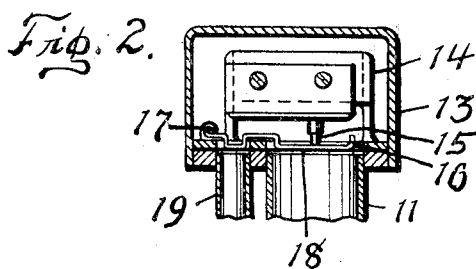
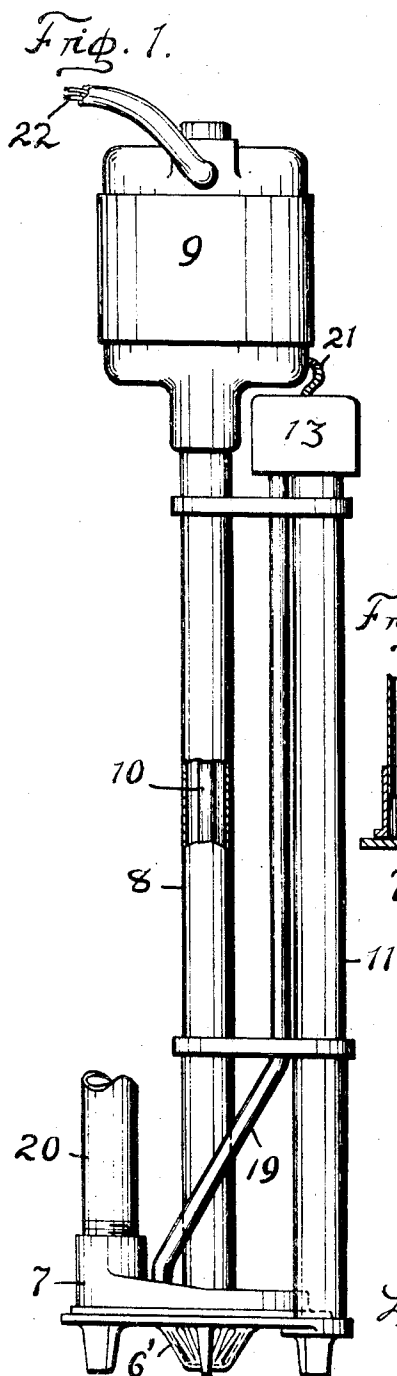
Nov. 15, 1949

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2,488,506

HYDROSTATIC CONTROL FOR PUMPS

Filed Aug. 28, 1948



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UNITED STATES PATENT OFFICE

2,488,506

HYDROSTATIC CONTROL FOR PUMPS

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Application August 28, 1948, Serial No. 46,680

4 Claims. (Cl. 103—25)

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This invention relates to improvements in a hydrostatic control for pumps of the motor-driven type adapted automatically to cause operation of the pump or discontinuance of its operation accordingly as the liquid in a sump to be pumped is accumulated therein, or shall have been removed therefrom by action of the pump.

One of the objects of the instant invention is to afford a pumping apparatus that is automatically activated upon accumulation of liquid in the sump and which is thrown out of action automatically when the accumulation shall have been substantially reduced to a predetermined low level.

And another object of the invention is to provide a mechanism for automatically operating an electric switch that controls the motor for a pump, dependent upon the rise and fall of the liquid level in a sump with which the pump is connected.

Other objects and advantages of the invention appear in the following description.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which—

Fig. 1 is a side elevational view of a structure in which the invention is incorporated, parts being broken away;

Fig. 2 is a fragmentary side elevational view including an electric switch and activating mechanism therefor in normal open position, parts being shown in section;

Fig. 3 is a fragmentary side elevational view, partly in section, of the switch and activating mechanism therefor, shown as when the switch is initially closed;

Fig. 4 is a similar fragmentary side elevational view of the switch and operating mechanism therefor, including the hydrostatic pressure tube, the switch operating mechanism being in fully sustained switch closing position; and

Fig. 5 is another fragmentary side elevational view, partly in section, showing a pump in its housing, including the hydrostatic pressure tube connected therewith.

The illustrative embodiment of the invention consists of a pump mechanism for a sump, a motor for activating the pump, a switch for controlling the electric circuit for the motor, and a means for initially closing the switch automatically dependent upon the rise of liquid in the sump and for opening the switch automatically when the level of liquid in the sump shall have been lowered by action of the pump to a predetermined level in the sump.

In the construction shown there is provided a

pump 6, preferably of a common centrifugal type, enclosed in a housing 7 provided with a suction intake 7' covered by a screen 6', there being a tubular post 8 extending upwardly from the housing and upon the top of which is supported a motor 9 connected with the pump by a drive-shaft 10 extending concentrically up through the post. Supported on the housing is a stand-pipe 11, the lower end of which is open to receive flow of liquid from the sump (not shown) in which the housing 7 is positioned, and has secured in the lower end a choke-ring 12, having a bore of selected diameter, by which is predetermined the rate of flow of fluid into and out from the stand-pipe, the flow of liquid being occasioned by accumulation of the liquid in the sump or its withdrawal therefrom by action of the pump.

On the top of the stand-pipe is mounted an encasement 13 in which is disposed an electric switch 14 provided with an operating stem 15 by movement of which the switch is closed or opened accordingly as activated. Within the encasement is arranged a movable plate 16 hinged at one end as indicated by 17, or otherwise guided for vertical movement. The operating stem 15 for the switch has contact with the upper face of the movable plate and is activated thereby so that the switch is closed when the plate is raised, and opens when the plate resumes its normal position. On the bottom of the encasement beneath the plate 16 is secured an elastic diaphragm 18, by which said plate is activated. A portion of said diaphragm overlies and closes the upper end of the stand pipe 11, and another portion of the diaphragm overlies and closes the upper end of a hydrostatic tube 19, the lower end of which tube is connected with and has communication with the pump housing 7. The arrangement is such that when air pressure is raised in the stand-pipe due to inflow of liquid from the sump, that portion of the diaphragm overlying the stand-pipe is bulged upwardly, causing the plate 16 to bear against the stem 15, resulting in closing of the switch and consequent operation of the motor and the pump connected therewith, whereupon, the accumulation of liquid in the sump is impelled by action of the pump from the housing 7 out through a discharge pipe 20 for final disposal.

During operation of the pump the liquid pressure that occurs in the housing causes another portion of the diaphragm that overlies the tube 19, to rise and bear against the plate 16, thereby sustaining the switch in closed position and consequent continuation of operation of the motor and the pump, and removal of liquid from the

sump. As the liquid level in the stand-pipe recedes, that portion of the diaphragm overlying the stand-pipe, collapses to normal position while the plate 16 is sustained in switch closing position due to hydrostatic pressure in the tube 19 against that portion of the diaphragm overlying the top thereof. In this manner operation of the motor and the pump continues until the level of the liquid in the sump recedes to such low level that air is admitted into the pump housing resulting in exhaustion of the hydrostatic pressure in the tube 19, and collapse of the overlying diaphragm thus permitting the plate 16 to resume its normal position and consequent reopening of the switch and stopping of the pump.

Whenever the sump becomes refilled, pressure within the stand-pipe occasioned by the rise of the liquid level therein causes automatic closing of the switch and resumption of the pumping operation followed by automatic closing of the switch and consequent stoppage of the pump, without the attendance of an operative.

The switch 13 is connected in the motor circuit in the usual manner as indicated at 21, and the motor is energized by current supplied by conductors 22 that are connected with a suitable source of energy (not shown). By this arrangement the pump is operated dependent upon closing of the switch when the sump becomes filled with liquid, which operation is protracted until the sump is substantially emptied of its contents, whereupon the switch is permitted to return to its open position.

An important feature of the invention is that the switch is initially closed due to influx of liquid into the sump, followed by operation of the pump and development of hydrostatic pressure in the tube 19, causing the switch to be sustained in closed position and consequent continued operation of the pump until the sump is emptied and pressure in the tube 19 is relieved, thus allowing the switch to re-open. In this manner the operations of initially closing and subsequently reopening the switch are independent of each other, the closing and re-opening operations being sequential and respectively incidental to filling and emptying of the sump.

Variations from the particular construction above disclosed may be resorted to by the exercise of skill in the art, without departure from the spirit or scope of the invention.

What I claim is:

1. An automatically operated apparatus for controlling a motor driven pump, said apparatus consisting of a switch connected in the energizing circuit for the motor, a movable plate engageable with the operating stem of said switch, a diaphragm operatively engaging said plate to activate it, a stand-pipe the lower end of which is open and its upper end closed by said diaphragm, a secondary pipe connected at one end thereof with the pump housing, its upper end being closed by said diaphragm apart from the stand-pipe, and means for energizing the pump motor, so that when the stand-pipe and pump housing are submerged in liquid, pressure in the stand-pipe is occasioned thereby, accompanied by closing of the switch, sequential operation of the pump and development of pressure by said pump whereby the switch is sustained in its closed po-

sition and consequent continued operation of the pump until pressure in said secondary pipe is exhausted when the liquid being pumped recedes to the level of the suction intake of the pump.

2. An automatically operated pumping mechanism including a motor-driven pump, provided with an energizing circuit for the motor, a switch connected in the motor circuit, a stand-pipe, open at its lower end and having supported connection with the switch, an auxiliary pipe connected with the pump housing, a diaphragm closing the upper ends of the stand-pipe and said auxiliary pipe, and a movable plate activated by said diaphragm and operatively engageable with the operating stem of said switch whereby said switch is initially closed and subsequently sustained in closed position when the stand-pipe and pump housing are submerged and pressure is raised in the stand-pipe upon submergence, and pressure is developed in said auxiliary pipe upon operation of the pump.

3. A pumping mechanism in which is included a pump provided with an activating motor therefor, a switch controlling circuit for said motor having a casing enclosing it, a stand-pipe the bottom of which is open and the top of which extends into said casing, another pipe connecting the pump housing and said casing, and a diaphragm individually closing the stand-pipe and said other pipe having means in operative connection therewith engageable with the stem of said switch to activate the switch, the parts being arranged so that, when the pump is submerged, liquid enters the stand-pipe causing pressure therein, movement of the diaphragm, closing of the switch, consequent energizing of the motor and activation of the pump, whereupon pressure is raised in said other pipe causing movement of said diaphragm whereby the switch is maintained in closed position until pressure in said stand-pipe and said other pipe is relieved.

4. A sump pump having a motor-driven pump, a switch controlling the circuit for the pump motor, a stand-pipe open at its bottom, another pipe connected with and extending upwardly from the pump housing, and a diaphragm individually closing said stand-pipe and said other pipe at the upper ends thereof and having means in connection therewith engageable with the stem of said switch, so that when the pump becomes submerged by influx of liquid into the sump the liquid rises in the stand-pipe causing movement of the diaphragm, closing of the switch and consequent operation of the pump, whereupon pressure is created in said other pipe causing a secondary movement of the diaphragm by which the switch is sustained in closed position and consequent continuation of the pump operation until pressure in said other pipe is relieved.

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