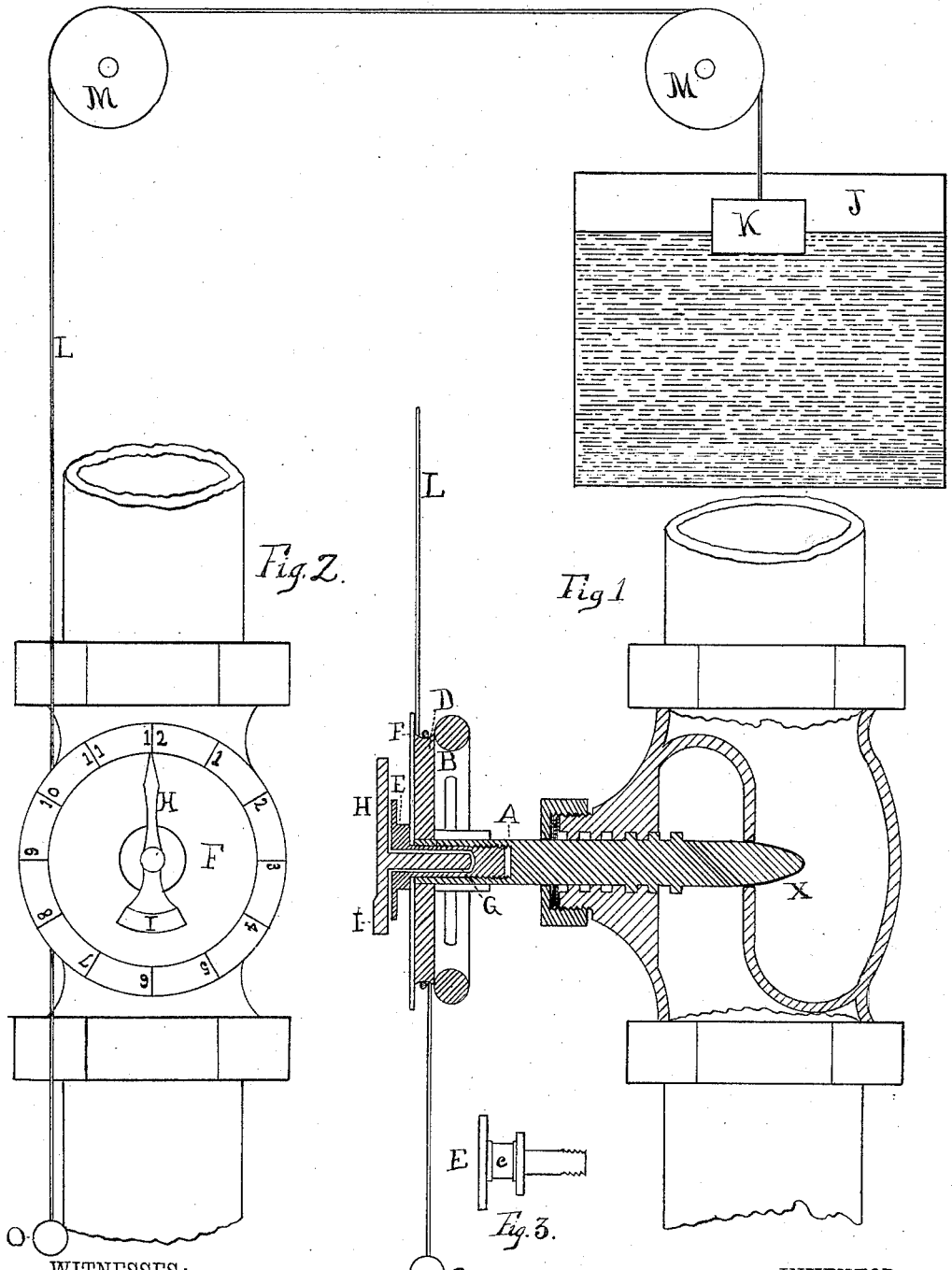
(No Model.)

W. L. FITCH & W. D. SMITH.

AUTOMATIC STEAM PUMP REGULATOR AND WATER INDICATOR.

No. 301,105. Patented July 1, 1884.



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WILLIAM L. FITCH, OF CHICAGO, AND WILLIAM D. SMITH, OF KEITHSBURG, ILLINOIS.

AUTOMATIC STEAM-PUMP REGULATOR AND WATER-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 301,105, dated July 1, 1884.

Application filed November 16, 1882. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM L. FITCH and WILLIAM D. SMITH, citizens of the United States, and residing, respectively, at Chicago, in the county of Cook and State of Illinois, and at Keithsburg, in Mercer county, in said State, have invented certain new and useful Improvements in an Automatic Steam-Pump Regulator and Water-Indicator, which are fully set out in the annexed drawings and specifications, by reference to which one familiar with the art to which the same pertain may be able to make and use the same.

The purpose of our invention is to provide means whereby a water-supply maintained by a steam-pump and subject to irregular draft at varying intervals may be kept at a substantially constant height, notwithstanding the irregularity of the drafts upon it. All devices with which we are familiar heretofore employed for such purpose have been such as to cause sudden and violent changes in the speed of the supply-pump at certain maximum and minimum heights of water in the tank, instead of the gradual, though prompt and certain, change which is desirable, and which results from a sensitive connection between the pump and the water in the tank. Such sensitive connection we effect by means of the device shown in the accompanying drawings, in which like parts are similarly designated.

Figure 1 is a vertical section of our combined regulator and indicator attached to the throttle-valve of a steam-pump. Fig. 2 is a front elevation of the same similarly attached. Fig. 3 is a modified form of a certain clamp-screw employed in our device.

A is the valve-stem of a common screw-down throttle-valve, X, of a steam-pump. B is the handle of such valve in its most common form.

D is a groove-edged pulley or sheave, secured at its center by means of the clamp-screw E to the handle B or directly to the valve-stem A. Upon the outer face of the sheave D is mounted the dial F, graduated by division into equal spaces corresponding to the number of inches or other unit of measure in the circumference of the sheave. The clamp-screw is shown annular in form—that is to say, it has a central longitudinal bore to receive the spindle G of the index-finger H. We do not, however, confine ourselves to this structure, for the finger H may be constructed to be hung upon instead of within the clamp-screw E, which may be then made in the form shown in Fig. 3, the finger without the spindle hanging upon the neck E between the clamp-shoulder and the thumb-nut. The finger H has a counter-weight, I, which is made heavy enough to cause the finger, when hung free by its spindle within or otherwise upon the clamp-screw E, to assume a vertical position, pointing upward.

J is a tank supplied by the steam-pump, which the throttle-valve X controls.

K is a float upon the water in the tank J, and is connected by the cord L over pulleys M to the sheave D, around which the cord passes a sufficient number of times to give it a firm hold.

O is a counter-weight attached to the end of the cord L below the pulley D, or may be led off over pulleys out of the way. It may often be found more convenient to employ separate cords from the sheave—one to the float and one to the weight—each having an end fastened to the sheave, instead of a single continuous cord. The float K, in air, is enough heavier and in water is enough lighter than the ball O, so that the difference will actuate, through the connecting-cord L, over pulleys M and sheave D, the valve-stem A, opening or closing the valve—that is to say, the weight of the water which K displaces is twice the force necessary to actuate the valve, the difference between the weights in air of K and O (K being the heavier) being once that force. This exact relation it is not necessary to preserve; but the difference between the weight of K and that of O must always be enough to actuate the valve, and the difference between that difference and the weight of the water displaced by the float K must likewise be sufficient to actuate the valve.

In using our invention the throttle-valve being closed, the cord L, attached to the float

K, resting on the surface of the water in the tank, which has been filled to the highest point to which the water is ever allowed to rise, is drawn over the pulleys M and around the sheave D, which stands in such position that the dial-finger H points to the maximum stage of water, the clamp-screw E being set, securing the sheave D to the valve-handle B, or directly to the valve-stem A. The circumference of the sheave D should be such as, multiplied by the number of turns necessary to completely close the valve, will equal the distance between the highest and lowest stage of water in the tank. It will then result that as water is drawn from the tank the float K will fall, causing the index-finger H to indicate on the dial the exact stage of water, and opening the throttle-valve and permitting the pump to run at a speed precisely corresponding to the rate at which the water is being drawn from the tank, or, rather, to the difference between the water-level and high-water mark; and it is evident that if the water be drawn at a greater rate than the pump is supplying it to the tank the consequent falling of the water-level will cause the throttle-valve to be opened wider and the speed of the pump to increase in a corresponding degree, and if the capacity of the pump is equal to the demand the water will be maintained at nearly full height; but in case of a sudden and large draft of water from the tank, the lowering of the water-level will be only temporary, since the speed of the pump will be increased in proportion, and will soon restore the desired level; and if water should cease to be drawn from the tank the pump will continue in action until the water reaches the maximum stage, and the throttle-valve will then be found closed and the pump will cease action until water is again drawn, then resuming as before, in consequence of the subsidence of the water and resulting fall of the float. The index-finger H will indicate to the extent of one complete turn of the dial the height of water in the tank; and in practice the dial will not make more than one turn if the pump has suitable capacity for the situation—that is to say, the water-level will never fall so far as to make it necessary to open the throttle-valve more than by one turn of the stem in order to restore the supply; but if more than one turn should be made a knot on the cord will sufficiently indicate that fact and prevent any mistake in reading the dial.

The special use to which we apply our invention is upon pump and tank employed in running "hydraulic elevators," so called, wherein the tank placed at the top of a building affords, by the water discharged from it, power for running the elevator, and is kept supplied with water by a steam-pump located more conveniently in the lower part of the building. The use of the elevator being irregular and intermittent, the action of the pump in the absence of our invention, even when provided with any of the common forms of regulators hitherto in use, is so uneven as to very greatly increase the wear, diminish the efficiency, and add to the cost of running both pump and elevator; and, further, by reason of the distance of the tank from the pump which supplies it, the connection for the purpose of regulating cannot be made by rigid parts, as shafts and levers.

We are aware that a float connected by intervening shafts and levers with the throttle-valve of a pump has been heretofore employed in a steam-boiler to regulate automatically the supply of water for such boiler.

We are also aware that a float in a reservoir has been employed connected by a cord over pulleys with lever or levers attached to a butterfly valve or sheave on the stem of a flat-faced valve, controlling the action of a steam-injector or water-induct pipe which supplies such tank with water, whereby the rise of the water to the maximum height closes the steam-passage and stops the water supply, and the fall of the water below that point causes the valve to be open wide and the water to be restored again to the maximum level; and, in particular, we are familiar with patent to J. L. Thomas, No. 83,108, and with English Patents No. 630 of 1852 and No. 4,166 of 1876; but in all these devices a slight change in the water-level is sufficient to open wide the valve. The effect of them all, when applied to a steam-pump, is to cause the pump to work intermittently and spasmodically, running at high speed when it does run and at the intervals standing still, starting and stopping suddenly, to the damage of the machinery.

We do not claim, broadly, the connecting of a float with the controlling-valve of a steam-pump for the purpose of regulating the action of such pump, nor anything shown in any of the patents mentioned; but

We claim as our invention and desire to secure by Letters Patent—

1. The combination, with a steam-pump and the reservoir fed by it, and a screw-down throttle-valve controlling the flow of steam to it, of a sheave-pulley rigidly connected to the valve-stem, a float in the reservoir, a cord passing over suitable guide-pulleys from the float and around the sheave-pulley, and a counter-weight attached to the free end of the cord, all arranged to co-operate substantially as and for the purpose set forth.

2. In a steam-pump regulator, the combination of the sheave D, arranged to be actuated as set forth, with the valve-stem A and clamp-screw E, substantially as and for the purpose set forth.

3. In a steam-pump regulator, in combination with the actuating-stem of the throttle-valve of the pump, a sheave rigidly connected thereto and actuated as set forth, a dial upon or attached to and rotating with such sheave,

and a counter-weighted finger pivoted concentrically with such sheave, substantially as and for the purpose set forth.

4. The sheave D and the dial F, actuated as described, in combination with the valve-stem A and the clamp-screw E, as and for the purpose set forth.

In testimony whereof we have hereunto set our hands in the presence of two witnesses.

WM. L. FITCH.
WM. D. SMITH.

Witnesses:
W. L. PARKER,
CHAS. S. BURTON.