(No Model.)

C. E. TOBIE.

AUTOMATIC REGULATOR FOR WINDMILLS.

No. 486,688. Patented Nov. 22, 1892.

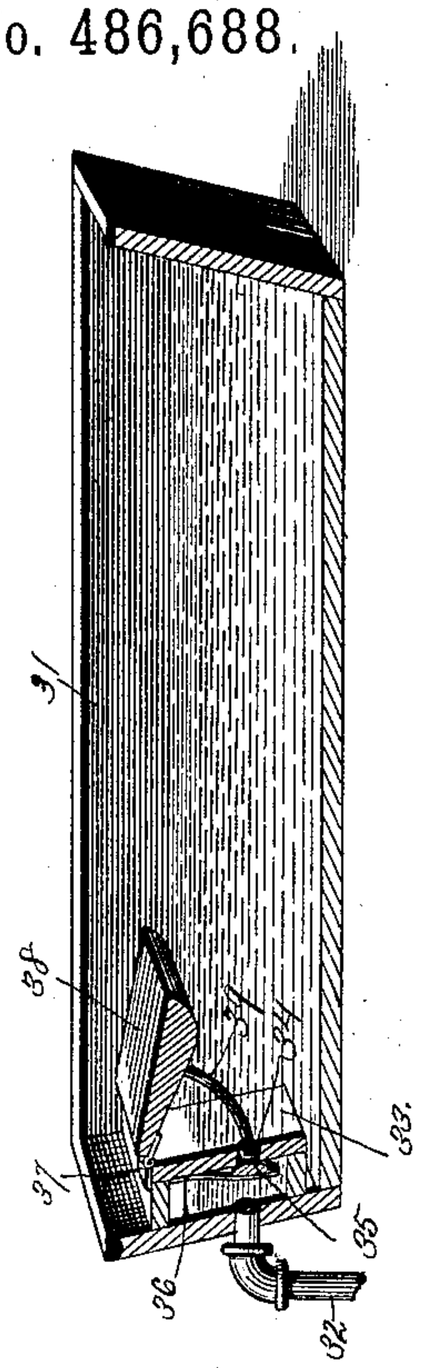

Fig. 3.

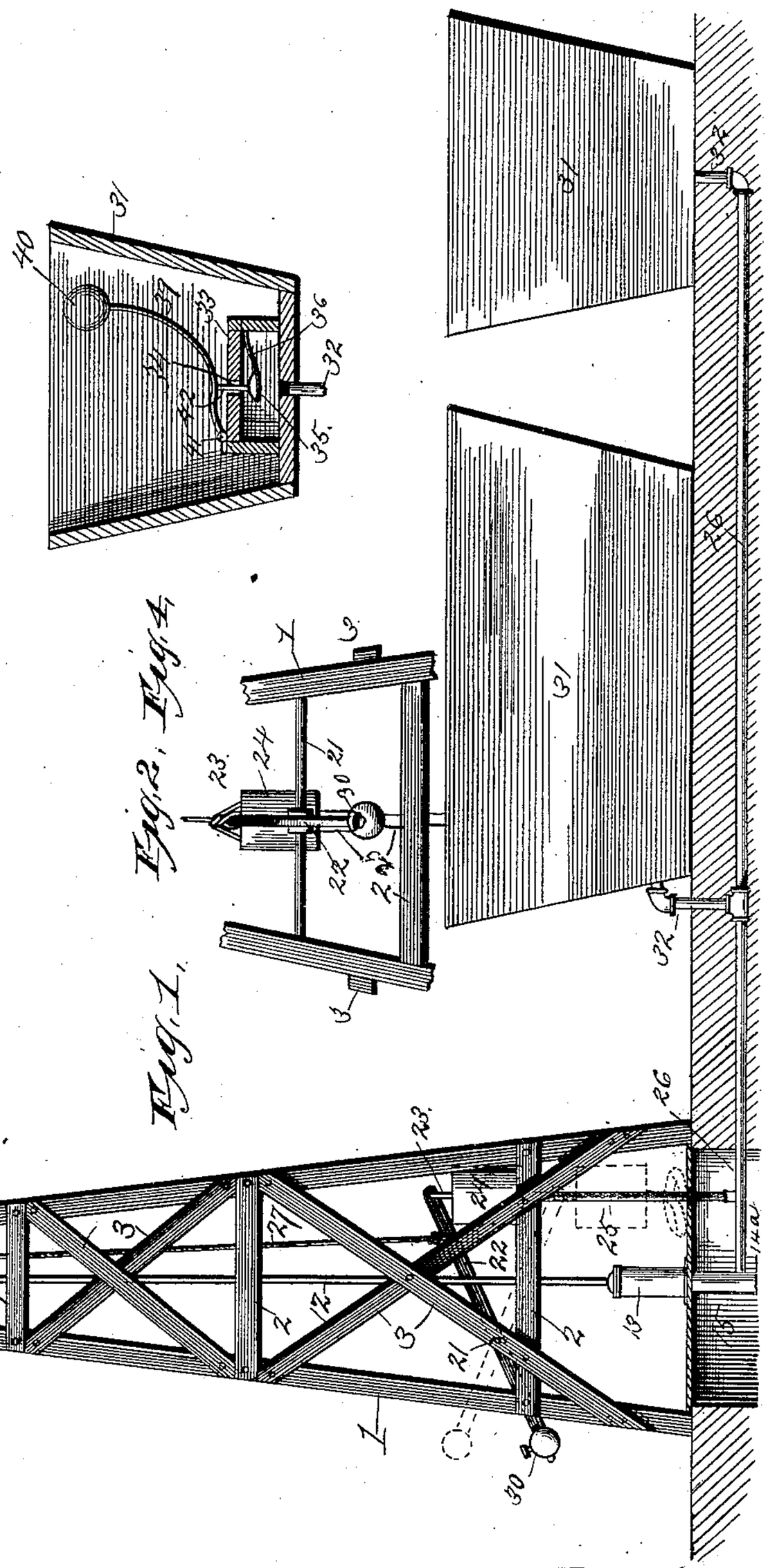

Fig. 2; Fig. 4.

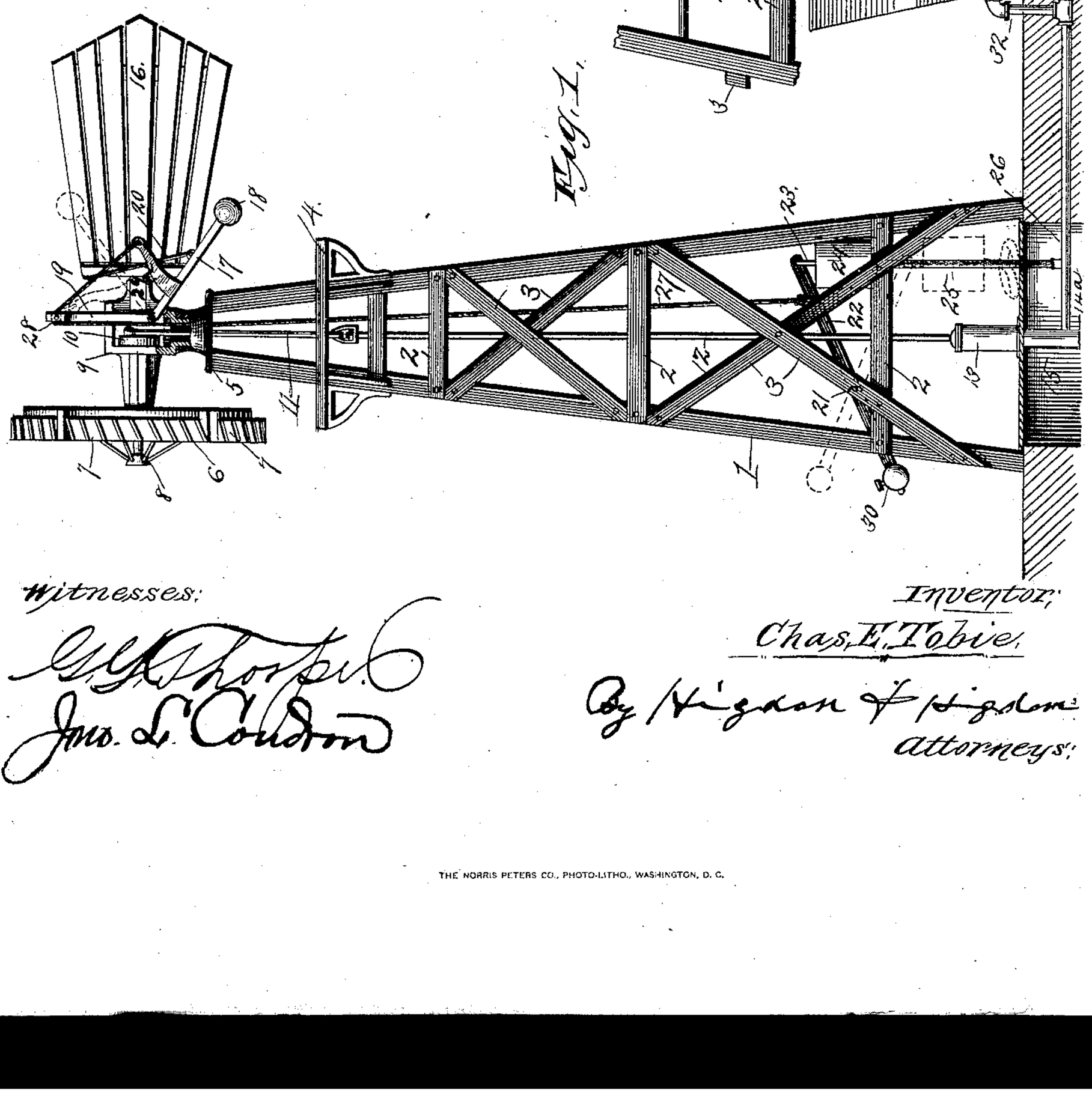

Fig. 1.

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UNITED STATES PATENT OFFICE.

CHARLES E. TOBIE, OF HIAWATHA, KANSAS.

AUTOMATIC REGULATOR FOR WINDMILLS.

SPECIFICATION forming part of Letters Patent No. 486,688, dated November 22, 1892.

Application filed September 28, 1891. Serial No. 407,029. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. TOBIE, of Hiawatha, Brown county, Kansas, have invented certain new and useful Improvements in Automatic Regulators for Windmills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to appliances for regulating the action of windmills which are employed in supplying water for watering stock and for other purposes; and the objects of my invention are to provide a valve mechanism which shall operate automatically to shut off the flow of water when the troughs or receptacles have been filled, and thus prevent overflow and waste of the water, and which shall automatically admit the flow as soon as the water-supply has been decreased by use and the floats of which shall be wholly separate from the valves so as to operate thereupon only by gravity to open the valves, the floats separating completely from the valves when rising, so as to be in no wise impeded or weighted by the valves while so rising.

To the above purposes my invention consists in certain peculiar and novel features of construction and arrangement, as hereinafter described and claimed.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a view, partly in side elevation and partly in vertical section, of a windmill and several watering-troughs with my improvements applied thereto. Fig. 2 is a side elevation of the lower part of the windmill-tower with certain of my improved attachments applied thereto. Fig. 3 is a vertical longitudinal section of a watering-trough with my improved valve mechanism applied thereto. Fig. 4 is a transverse vertical section of a watering-trough provided with a modified form of the valve mechanism.

In the said drawings, 1 designates the tower of a windmill, the said tower being shown as composed of a suitable number of upwardly-convergent supports connected together by suitable horizontal braces 2 and oblique braces 3, arranged in X form, and is provided near its top with a suitable platform 14 and also at its top with a cap 5. It is to be understood, however, that this tower may be constructed either in the manner described or that it may be of any other suitable or preferred type, as desired.

6 designates the wheel of the windmill, said wheel being shown as of the vertical type and as provided with fixed vanes 7. This wheel is also shown as mounted upon the outer end of a horizontal shaft 8, which is journaled in a revoluble supporting frame or head 9, which turns upon the cap 5, the inner end of the shaft 8 being also shown as carrying an eccentric 10, to which is connected the upper end of the pump-rod 11. The lower end of the pump-rod 11 is shown as connected to the upper end of the piston-rod 12 of a suitable pump 13, which latter communicates by a suitable tube with the interior of a well or cistern or other source of water-supply 15. The windmill shown is provided with a tail-vane 16, which is centered vertically in the frame or head 9, so as to project and swing horizontally from said head and thus serve to move the wheel 6 more or less edgewise relative to the wind, in order to prevent racing of the wheel or to entirely stop its revolution, as required. The head of this windmill is furthermore shown as provided with an arm or lever 17, carrying at its outer end a counter-weight 18 and pivoted at its inner end upon the lower part of a standard 19, which rises vertically from the frame or head 9. This arm or lever 17 is also shown as connected to the tail-vane 16 by a rod or link 20, one end of said rod or link being connected to the inner end of the tail-vane and the other end of said rod or link being connected to the arm or lever 17 at a point about midway of its length. The arrangement is such that when the arm or lever is raised it shall throw the tail-vane transversely to the axis of the wheel and thus cause the wheel to present its edge to the wind and consequently become stationary.

In the lower part of the windmill-tower is mounted a horizontal rock-shaft 21, upon which a rock-arm 22 is shown as mounted, the said rock-arm extending oppositely from its point of attachment to the rock-shaft. A bucket or receptacle 24 is shown as connected to one end of this rock-arm by a bail 23. From the bottom of this receptacle a pendent

flexible tube 25 is shown as leading, the opposite end of which is shown as connected to a supply-pipe 26, which is connected to the pump 13. To the rock-arm 22, at a point between its point of connection with the rock-shaft and that end to which the receptacle 24 is attached, is shown as connected the lower end of a rope, cord, or other flexible connection 27. This flexible connection 27 is shown as leading upward over a pulley 28, which is journaled in the upper end of the vertical standard 19, and the opposite end of said flexible connection is shown as attached to the outer end of an arm 29, which projects laterally from the arm or lever 17 at a point between its two extremities. A counter-weight 30 is shown as mounted upon the opposite extremity of the rock-arm 22 from that which carries the receptacle 24, the purpose of this counter-weight being hereinafter explained.

31 designates two troughs which are designed to receive water from the pump 13 and each of which is connected to the main supply-pipe 26 by a branch supply-pipe 32. These troughs are shown as of oblong rectangular form, but they may be of any other suitable or preferred form, and any other character of receptacles may be substituted for the troughs, as circumstances may require. Moreover, but one trough or receptacle may be employed or any desired number of such troughs or receptacles may be provided and connected to the main 26, as circumstances may require.

Referring now to Fig. 3, 33 designates a casing which is secured within the trough or receptacle 31, so as to surround the inlet to which the branch supply-pipe 32 is connected. In its inner vertical wall this casing is formed with an inlet-opening 34, which establishes communication between the interior of the trough or receptacle 31 and the interior of the space inclosed by the casing 33. This inlet-opening is normally closed by a valve 35 which may be of any suitable or preferred form and which may be made of rubber or any other suitable or preferred material. This valve is shown as carried at the lower end of a spring-arm 36, the upper end of said arm being suitably secured to that side of the casing which is adjacent to the branch supply-pipe 32. To the upper end of this casing is secured by any desired number of suitable hinges 37, a float 38, from the under side of which extends a curved arm 39, the lower end of said arm being arranged to enter the inlet-opening 34 at times and thus unseat the valve 35 from said opening, as hereinafter more fully explained. In Fig. 4 I have shown a slightly modified form of this valve mechanism. In this instance, the casing 33 is employed, but is mounted upon the bottom of the trough or receptacle 31, the inlet-opening 34 being formed in the top of the casing. The valve 35 and spring-arm 36 are also here used, the spring being, in this instance, placed horizontally and secured to the under side of that part of the casing which is provided with the inlet-opening 34. In this instance, also, a float 40 of spherical form is used instead of the float 38, before described, and this float is carried at the upper end of a laterally and upwardly extending curved arm 39, which is attached by a suitable hinge 41 to the top of the casing 33. A rod 42, in this instance, projects downwardly through the feed-opening 34 and at times presses at its lower end upon the valve 35, so as to hold the valve unseated or in open or depressed position, the precise operation of said arms 39 upon the valves 35 being hereinafter more particularly and fully explained.

The operations of the above-described devices are as follows: Normally the tail-vane of the windmill extends outward at right-angles to the wind-wheel, and as the wheel faces the wind and revolves the corresponding revoluble movement of the windmill-shaft 8, acting through the eccentric 10 and pump-rod 11, operates the pump and causes the latter to force the water out of the well, cistern, or other source 15 of supply into the supply-main 26, and through the latter and the branch pipes 32 into the troughs or other receptacles 31. Simultaneously, with this flow of water into the troughs or other receptacles 31, the water rises in the flexible tube 25 and gradually fills the receptacle 24, said receptacle being held normally in raised position by the weighted arm or lever 17 and the counter-weight on the rock-arm 22. At the instant when the troughs or other receptacles 31 become filled the receptacle 24 also becomes filled, and its weight when so filled overbalances the counter-weights 18 and 30, and the said receptacle consequently automatically falls, tilting the corresponding end of the rock-arm 22 downward. This downward movement of the rock-arm 22, operating through the flexible connection 27, raises the lever or arm 17, and this movement of the said arm or lever 17, acting through the rod or link 20, moves the tail-vane 16 parallel with the wheel 6, so as to throw the latter edgewise to the wind and stop its rotation. The result of this operation is that the action of the pump 13 is instantly arrested and the supply of water to the troughs 31 instantly ceases. As soon as any considerable quantity of water is removed from the troughs or other receptacles 31, for instance, by the drinking animals, the quantity of water in the receptacle 24 is correspondingly lessened, and this causes the counter-weights 18 and 30 to raise the rock-arm 22, and consequently the receptacle 24, and also to depress the the arm or lever 17, and to move the tail-vane 16 into normal position at right angles to the wheel 6, thus bringing said wheel with its face to the wind and starting its revolution. As soon as the wheel begins to revolve, the water is again forced into the troughs or receptacles 31, and the subsequent operations are repetitions of those before described. It is to be

observed that the principal purpose of the counter-weight 30 is to neutralize the weight of the receptacle 24 when said receptacle is empty.

In order to prevent all overflow of the troughs or other receptacles 31, as well as to maintain the water-supply therein, the valve mechanism above described is employed, and it will be seen that as the windmill operates the water-level in said receptacles rises until it reaches either the float 38 or 40, the valve 35 having previous to this moment been held open by the weight of the float acting upon the valve through the arm 39 or the steam 41. As soon as the water-level rises sufficiently to buoy up the float 38 or 40, this pressure is removed and the spring 36 automatically closes the valve 35 upon the feed-opening 34, and consequently cuts off the supply of water. As soon as any considerable quantity of water is removed from the troughs or other receptacles 31, so as to lower the level of water therein, the pressure due to the weight of the float will again open the valve 35 and the supply of water will be automatically continued. The subsequent operations of the valve mechanism are repetitions of those just described.

It is to be particularly observed, first, that the lower ends of the arms 39 are entirely separate from the valves, and said valves are seated in the valve-openings or feed-openings of the troughs 31 solely by the said springs 36. When there is little or no water in the troughs, the weight of the floats brings the free ends of the arms 37 into contact with the valves, unseating them against the pressure of their springs and thus permitting the water to enter the trough. As soon as the water reaches the required level or height the arms 39 are withdrawn from contact with the valves, thus allowing the springs to seat the valves and shut off the flow of water. In the form shown in Fig. 4 the strength of the spring is of course rendered sufficient by reason of its temper to prevent any possibility of the valve dropping in the event of the supply being lowered, and in the form shown in Fig. 3 the tension of the spring acts similarly, the valves in neither case being of material of any considerable weight.

From the above description it will be seen that I have provided appliances whereby the operation of a windmill are automatically arrested and started according to the condition of the water-level, the said appliances being simple, durable, and inexpensive in construction and entirely automatic in operation. It will be seen further that the valve operating mechanism is also entirely automatic in its operation, and that it effectually prevents all possibility of overflow and consequent waste of water, and at the same time insures an ample supply of water, to the troughs or other receptacles.

I desire it to be particularly understood, that while I have shown the regulator as applied to a windmill, I contemplate its application to engines and other motors generally, and also that while the valve mechanism is peculiarly adapted for the operation in connection with the windmill-regulator described, it can be applied to windmills which are not provided with the regulator, and that it can also be applied to fountain sources of supply generally.

I desire it to be still further understood that the precise form and material of the valve is not essential to my invention, and that spiral and other springs may be used instead of the spring-arms described for supporting and closing the valves, and, finally, that the casings 33 can be placed outside of the troughs or other receptacles instead of within the same, all without departing from the essential spirit of my invention.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

A windmill-regulator comprising a trough or a similar receptacle connected to the supply-pipe from the pump and provided with an internal casing surrounding the trough-inlet and having an inlet-valve opening, a spring-arm carrying a valve and exerting its pressure to seat the valve in said opening, a pivotally-acting float attached to the casing, an arm carried by the float and separate from the valve, the said arm being arranged to come into contact with the valve and unseat or open the same when the float falls and to separate from said valve when the valve rises, so as to permit the spring-arm of the valve to seat or close the same independently of the float, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHAS. E. TOBIE.

Witnesses:
JNO. L. CONDRON,
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