(Model.)

B. HOLLY.

Meter.

No. 241,217. Patented May 10, 1881.

Fig 1.

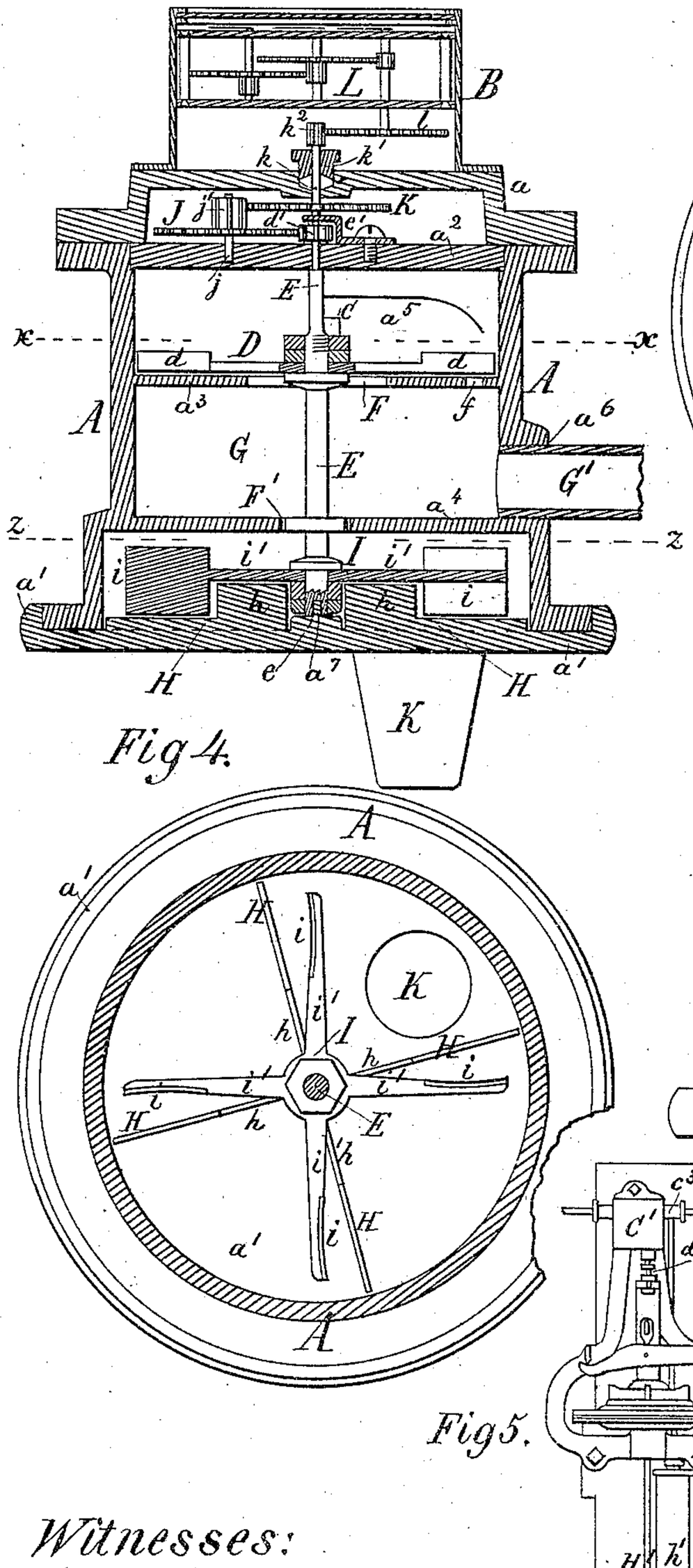


Fig 2.

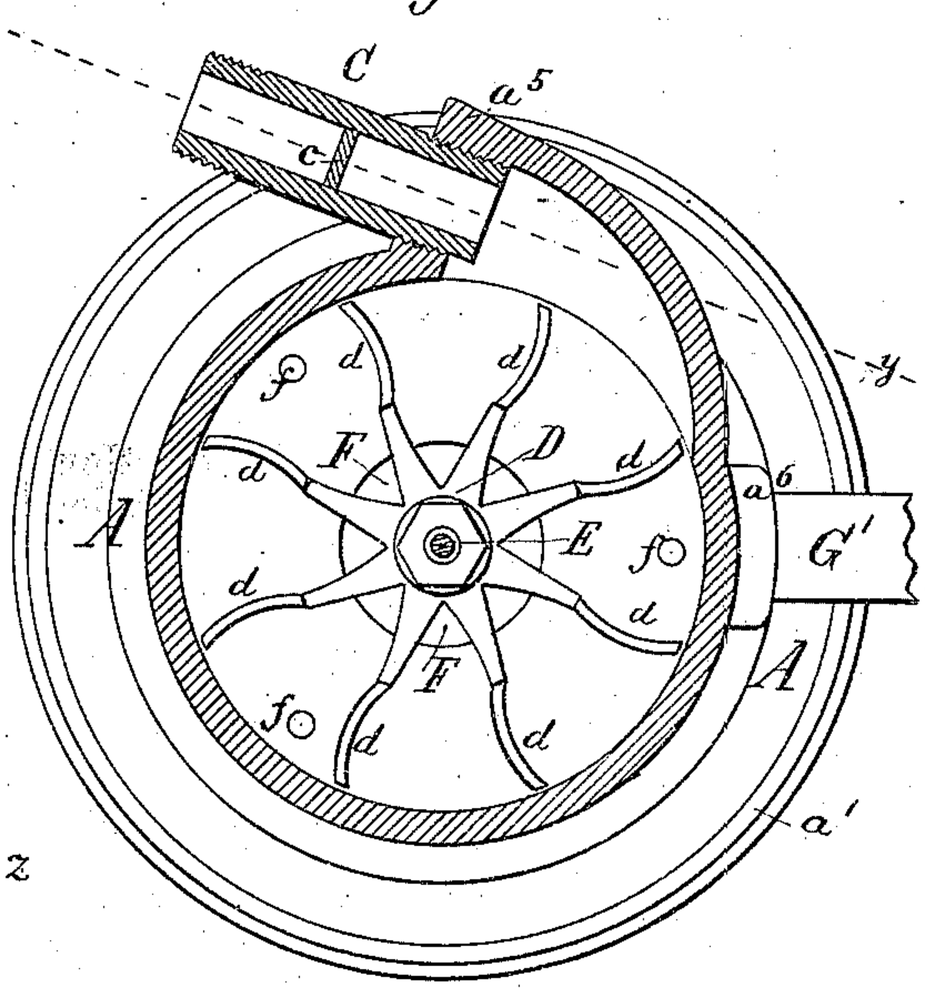


Fig 3.

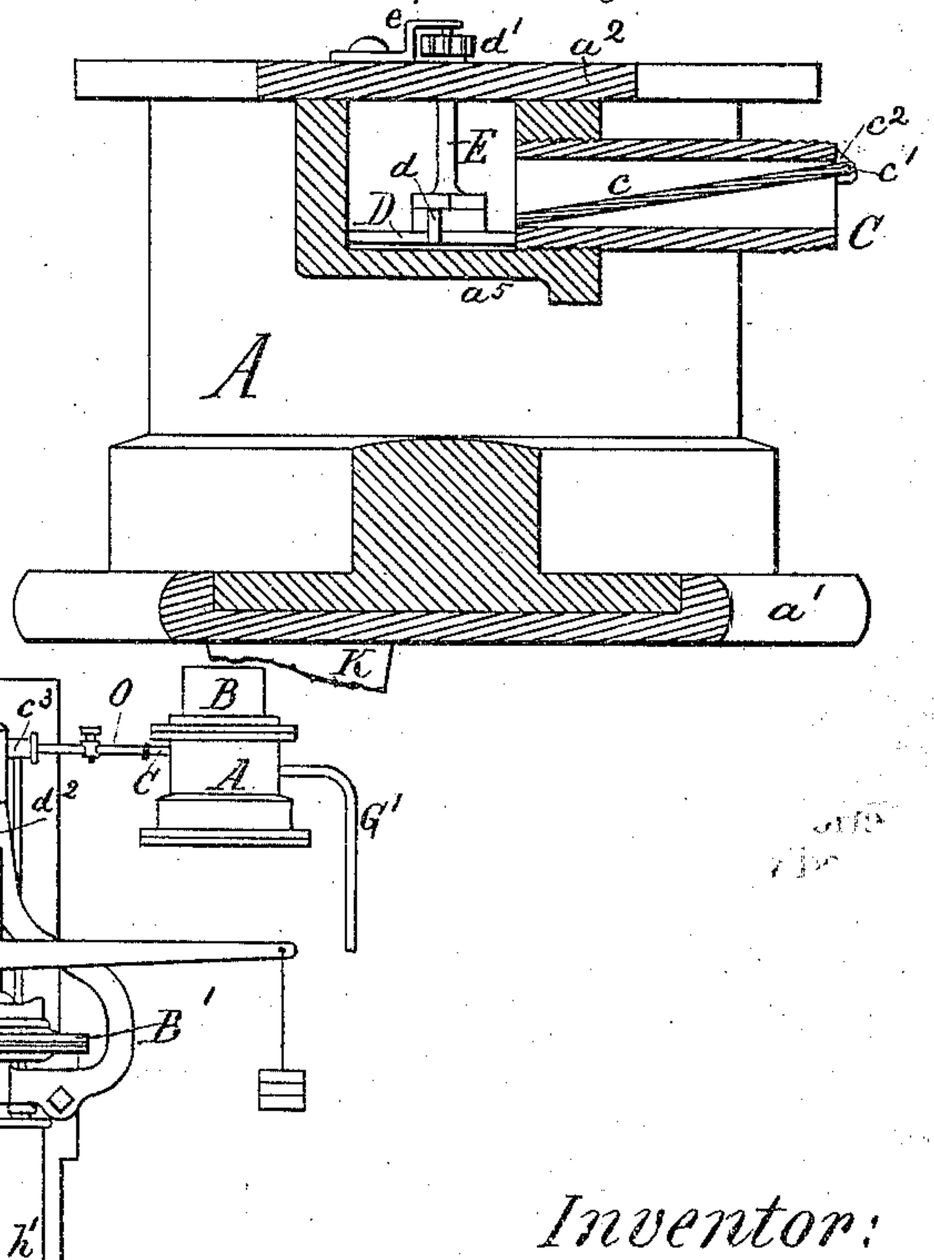
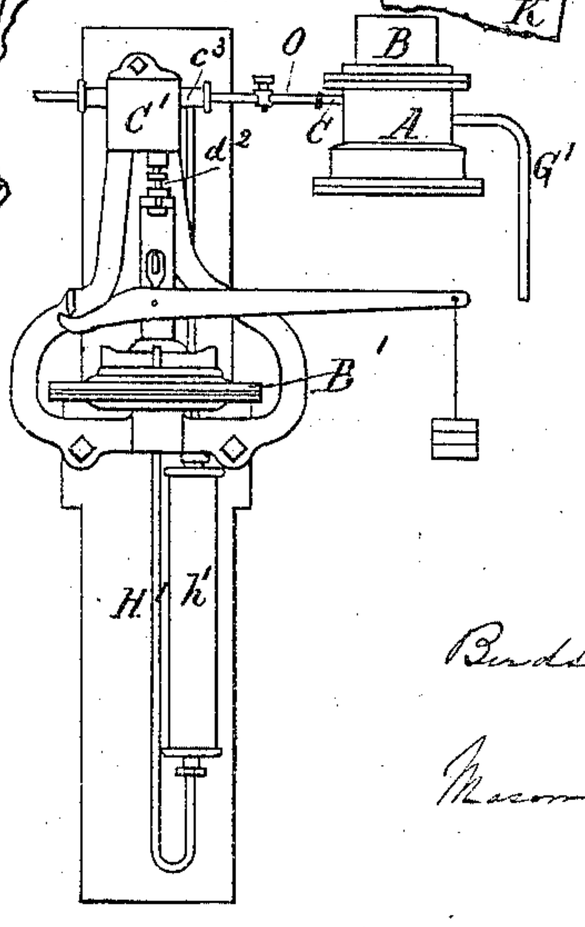


Fig 4.

Fig 5.



Witnesses:

J. T. Theodore Lang

N. A. Hall

Inventor:

Burdill Holly

by his attys

Mason Fenwick & Lawrence

UNITED STATES PATENT OFFICE.

BIRDSILL HOLLY, OF LOCKPORT, NEW YORK.

METER.

SPECIFICATION forming part of Letters Patent No. 241,217, dated May 10, 1881.

Application filed November 29, 1880. (Model.)

To all whom it may concern:

Be it known that I, BIRDSILL HOLLY, a citizen of the United States, residing at Lockport, in the county of Niagara and State of New York, have invented a new and useful Meter, of which the following is a specification.

My invention relates to improvements in meters for steam or other fluids, in which a paddle-wheel is rotated by the impact of steam or other fluid and the number of its rotations counted and recorded by a counting and recording mechanism similar to the mechanism in gas-meters, the steam or other fluid being guided to the paddle-wheel by a self-adjusting guide and the movement or rotation of the paddle-wheel regulated or controlled by the application of a hydraulic brake, as hereinafter described.

In the drawings, Figure 1 is a vertical section of my improved meter. Fig. 2 is a horizontal section in the line *x x* of Fig. 1. Fig. 3 is a vertical section in the line *y y* of Fig. 2. Fig. 4 is a horizontal section in the line *z z* of Fig. 1, and Fig. 5 is a diagram showing the meter in connection with a steam-regulator of my construction.

In the several figures, A indicates a vessel, preferably of cylindrical form, containing the meter mechanism, and B a vessel containing the counting mechanism. The vessel A is provided with a removable lid, *a*, and bottom *a'*, three diaphragms, a^2 a^3 a^4, a steam-inlet, a^5, and outlet a^6. The steam-inlet a^5 is made to join the vessel A between the diaphragms a^2 a^3, and is provided with an induction-pipe, C. This induction-pipe is made with a square bore, and provided with an inclined self-adjusting valve, *c*, which extends from the upper part of the outer termination of the pipe to the bottom of the inner termination thereof, as shown, the valve being pivoted to the induction-pipe C by means of a transverse pin, *c'*, and two lugs, one of which lugs only, as at c^2, is shown in Fig. 3. This valve *c* in its normal position, as seen in Fig. 3, closes the passage of the induction-pipe; but when steam is admitted it is raised higher or lower, according to the amount of the steam delivered. In all positions except the highest or that of a full throw (but which the valve in operation will seldom occupy) the valve inclines downwardly to the diaphragm a^3, and thus directs the steam-current against curved or spoon-shaped paddles *d* of a paddle-wheel, D, which is thereby revolved. The wheel D is suitably fastened to a central vertical shaft, E, hung between the diaphragm a^2 and bottom *a'*, its lower bearing consisting of a socket-hole, *e*, into which a vertical center-pin, a^7, of the bottom *a'* is fitted.

In operation the steam, having imparted power to the wheel D, now mainly escapes into the chamber G below through a central aperture, F, in the diaphragm a^3, while such portions of steam as are prevented by the centrifugal action of the wheel from readily escaping at F flow down into the chamber G through openings *f* arranged around the main aperture F in the diaphragm a^3, and thus no steam which has expended its impact force upon the wheel is left to impede or weaken the impact of the fresh steam upon the paddles of the wheel D. The steam which has thus entered the chamber G between the diaphragms a^3 a^4 is now let off by means of a service-pipe, G', in the outlet a^6 to the several radiators, stoves, steam-engines, &c., which may be in the building to which the meter belongs. The water of condensation which accumulates upon the diaphragm a^4 descends into the space below said diaphragm through a central aperture, F', around the shaft E, and is collected in said space and on the bottom *a'* of the meter. This bottom *a'* is provided, as shown, with a number of radial upright rigid plates, H, of a suitable height, and above these plates a brake paddle-wheel, I, is fastened to the shaft E, the paddles *i* of which wheel pass freely over, but in close contiguity to, the plates H. Below the arms *i'* of the paddle-wheel I the plates H are extended upwardly in the shape of a step, as at *h*, so as to nearly touch the arms *i*, and thus the plates H prevent the water of condensation from rotating with the wheel I.

K indicates a well, which communicates with the space immediately above the interior surface of the bottom *a'* of the meter, and into which well the dirt in the water of condensation will become collected. This well may be provided with a cock in any suitable manner, through which such dirt may be blown out at times, and so prevent clogging of the meter.

In operation the space between the dia-

phragm a^4 and bottom a' becomes filled with the water of condensation, and the paddles i rotate therein; but inasmuch as the water is prevented by the plates H from altogether revolving in concert with the wheel I, the water serves to retard the revolution of this wheel, and thus the water and the wheel I act as a hydraulic brake or regulator to govern and restrain a too rapid revolution of the wheel D under the impact action of the steam.

The upper end of the shaft E extends through and beyond the diaphragm a^2, and is provided with a pinion, d', which gears into a wheel, J, on a stud, j, of said diaphragm. The upper extremity of the shaft E bears against a bearing-plate, c', suitably secured to the diaphragm a^2, whereby the shaft E is prevented from being casually lifted off its foot-bearing and a step-bearing is formed for the shaft k. The wheel J is provided with a pinion, j', which gears into a wheel, K, on a shaft, k. The shaft k passes through a stuffing-box, k', in the lid a, and above the lid is provided with a pinion, k^2, which drives a wheel, l, of the counting mechanism L in the vessel B, whereby the number of cubic feet of steam passing through the impact-wheel D is recorded by dials and revolving pointers from units up to hundreds of thousands, as is usually done.

This meter being well adapted for use in connection with my improved steam-pressure regulator for which I have filed an application for a patent on an even date herewith, I have by the diagram, Fig. 5, represented its connection therewith, C′ in said figure indicating the valve-chest of the steam-pressure regulator, d^2 its valve-stem, H′ the connecting-pipe between the outlet c^3 of the valve-chest and the diaphragm B′, and h' the water-reservoir, the outlet c^3 of the regulator being connected with the inlet C of the meter by means of an ordinary pipe, O.

It will be understood that not only steam, but also liquids, may be measured by my improved meter above described; and if at any time hot air instead of steam is used for warming and other purposes and for furnishing power the vessel A will be provided with a suitable inlet and cock or valve, through which to supply the chamber which contains the brake-wheel I with the fluid, (either water, oil, or other proper liquid,) whereby the desired operation of the wheel I and impact-wheel D can be secured.

In constructing the impact-wheel D, I make the blades d thereof about one-third the height of the blades i of the brake or regulator wheel I, and of a less height than the vertical diameter of the induction-pipe C, and by this means I secure a very perfect regulation of the mechanism of the meter; and, also, in the event that the valve c should be suddenly moved to a horizontal position by the steam, and thus stand at a higher elevation than the top of the blades d of the impact-wheel D, the surplus steam will pass over the blades d without exerting an impact force thereon, and consequently there will be no material change in the previously-determined quantity of steam to be registered against the consumer.

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

1. In a meter for measuring fluids, the self-adjusting valve c, pivoted to the upper side of a square-bore induction-pipe, C, in combination with the impact-wheel D, having blades d of less height than the vertical diameter of the delivery end of the induction-pipe, substantially as and for the purpose described.

2. In a meter for measuring fluids, the combination of an impact-wheel, a hydraulic brake or regulator wheel, and a counting mechanism, substantially as described.

3. The diaphragm a^3, having a central aperture, F, and openings f, in combination with the impact-wheel D, substantially as and for the purpose described.

4. The combination of the hydraulic brake or regulator wheel I, having paddles i, and the rigid plates H, substantially as and for the purpose described.

5. In combination with the diaphragm-case A, the impact-wheel D and the brake or regulator wheel I, the paddles of the wheel D being of relatively less height than the paddles of the wheel I, substantially as described.

6. The combination of the meter provided with the wheels D and I with valve-chest C′ of a steam-pressure regulator, substantially as described.

BIRDSILL HOLLY.

In presence of—
D. F. BISHOP,
B. D. HALL.