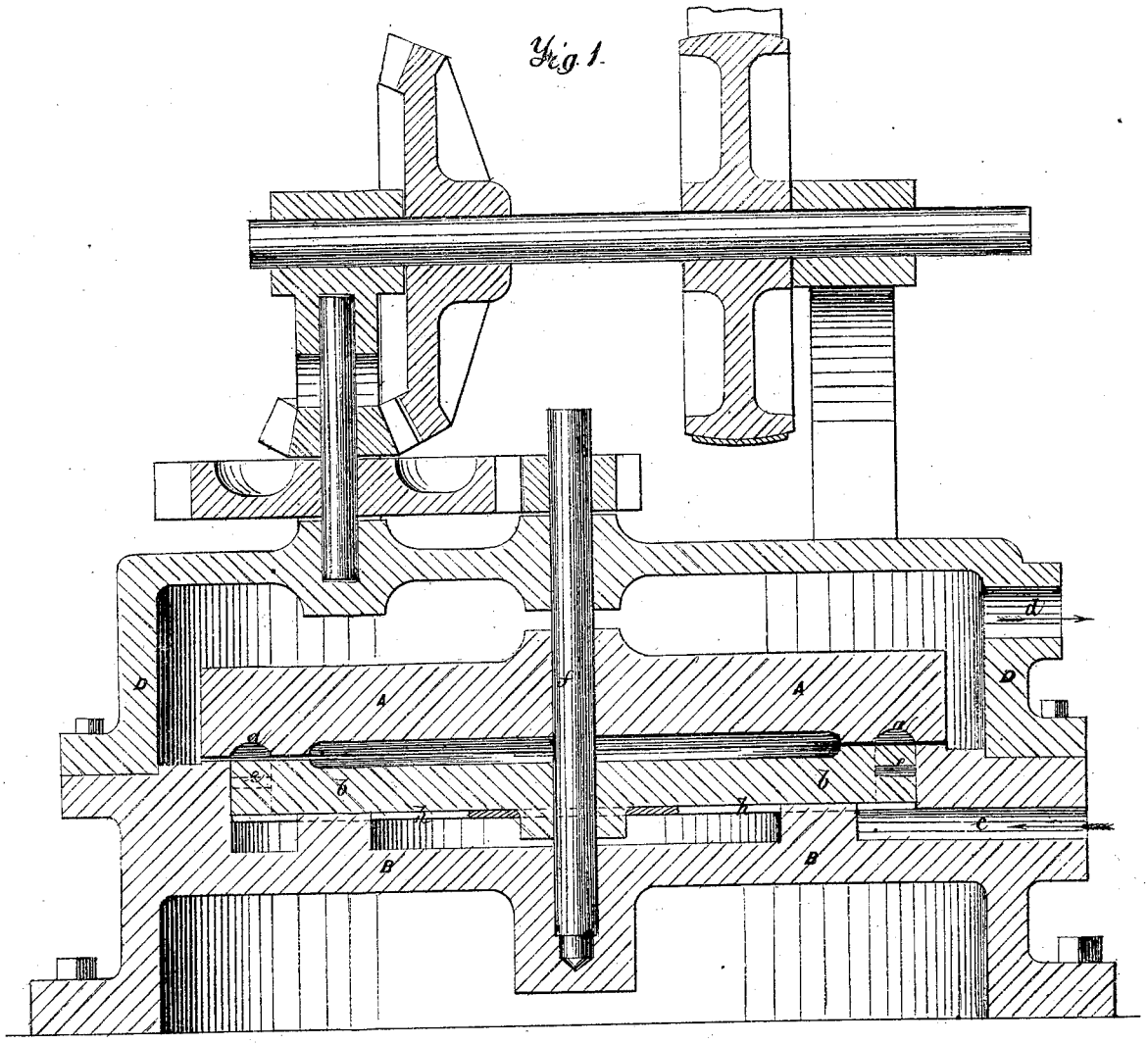
2 Sheets--Sheet 1.

THOMAS COOK & JOHN WATSON.

Improvement in Meters.

No. 114,267. Patented May 2, 1871.

Fig. 1.



Witnesses

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2 Sheets--Sheet 2.

THOMAS COOK & JOHN WATSON.

Improvement in Meters.

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Fig 2.

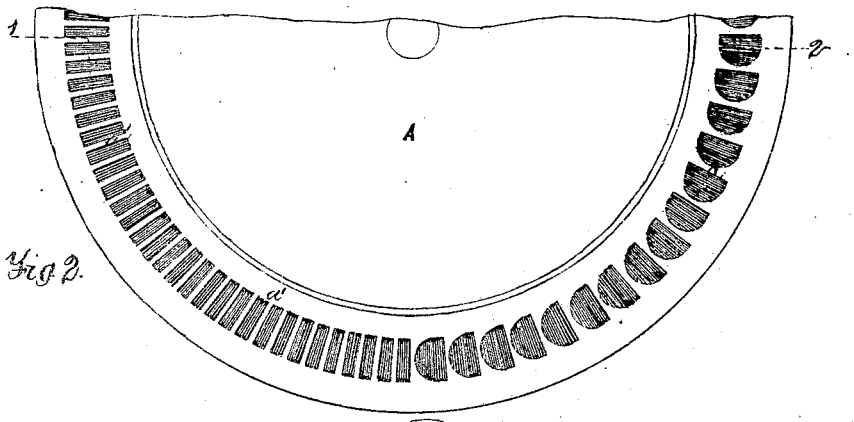


Fig 3.

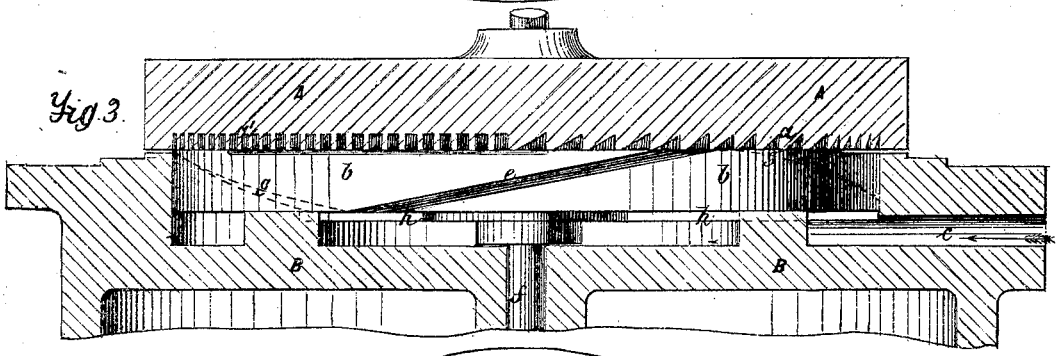
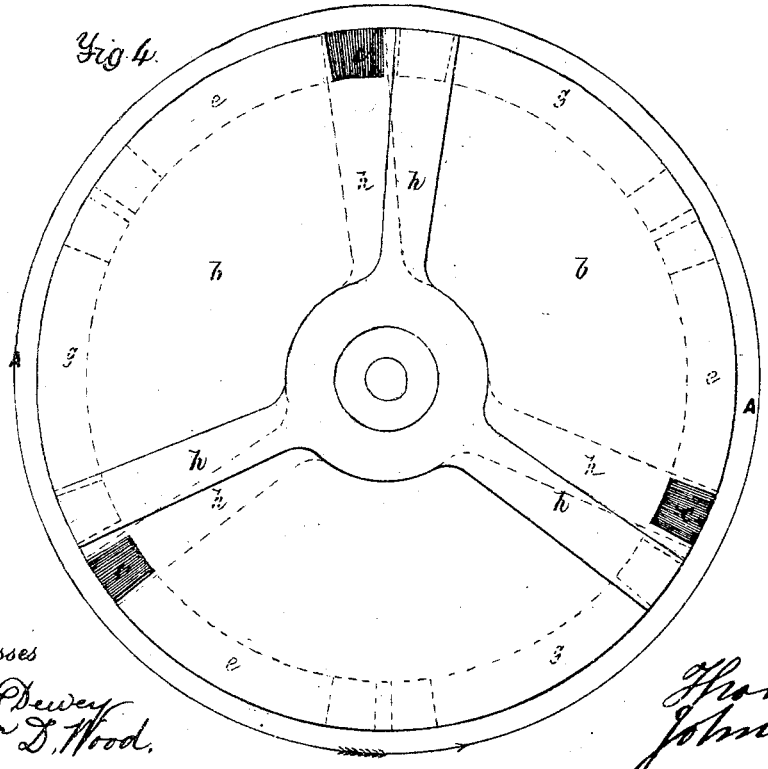


Fig 4.



Witnesses

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THOMAS COOK, OF OLD KENT ROAD, AND JOHN WATSON, OF VICTORIA CHAMBERS, WESTMINSTER, ASSIGNORS TO FLUID-METER COMPANY, OF LONDON, ENGLAND.

Letters Patent No. 114,267, dated May 2, 1871.

IMPROVEMENT IN METERS.

The Schedule referred to in these Letters Patent and making part of the same.

Be it known that we, THOMAS COOK, of Old Kent Road, in the county of Surrey, Engineer, and JOHN WATSON, of Victoria Chambers, Westminster, in the county of Middlesex, Engineer, both in that part of the United Kingdom of Great Britain and Ireland known as England, have invented new and useful "Improvements in Apparatus for Measuring the Flow of Gas and other fluids, also Applicable for Producing and Applying Motive Power;" and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making a part of this specification and to the letters and figures of reference marked thereon.

Our invention relates to an improved apparatus for operating as a motive power engine by use of gas, steam, water, or other fluid, and which is also adapted for measuring such gas or fluid when necessary or desirable.

In carrying out the invention we provide a closed chamber, into which the gas, water, or other fluid to be measured is introduced by a suitable pipe. The top side of this chamber is provided with three or more passages for the exit of the gas or water, which passages or ports are placed in a circle, and lead from the chamber in an inclined direction at any suitable angle, and open out beneath a wheel placed horizontally and resting on the top of the closed chamber. This wheel is mounted on a vertical axis, and its under surface is provided with a number of cells or recesses of suitable form and size formed near the circumference of the wheel. These cells, when the wheel is rotated, will pass successively over the inclined ports above mentioned, so that when gas, water, or other fluid under pressure is projected from the closed chamber through the inclined ports it will fill the cells contained in the wheel and at the same time rotate the same by impinging on the sides of the cells.

The wheel is inclosed in a suitable casing provided with an escape-pipe, and as, in order to escape, the gas or water must pass from under the wheel, the latter will, when rotated, be lifted completely off the surface on which it rests when not in motion, and will be supported only on a film of the fluid to be measured and forming the motive power, thus reducing the friction to a minimum.

The number of revolutions of the wheel and consequently the flow of gas or water is registered by a suitable indicator, and we apply pallets or blades to the upper surface of the wheel to check its too rapid rotation if necessary.

In order to cause the wheel to rotate in a reverse direction we provide additional ports acting either on the same circle of cells in the wheel (if these are rectangular cavities) or on another series formed within the first. These additional ports are inclined in the reverse direction to the first, and communicate with the same closed chamber, in which case a suitable valve would be employed to close one set of ports while the other set is open; or separate chambers may be provided for each set.

The weight of the wheel which acts as a fly-wheel is in all cases proportioned to the pressure of the steam, water, or other motive power employed.

Description of Drawing.

Figure 1 of the drawing shows a central vertical section of the apparatus;

Figure 2 is a part plan of the under surface of the wheel; while

Figure 3 is a section of the same and of the gas, water, or other chamber taken on line 1 2, fig. 2, showing the direction in which the fluid issuing from the ports acts on the cells in the wheel.

Figure 4 is an under-side view of the top *b* of the closed chamber above which the wheel rotates, showing the disposition of the ports therein.

Of course when used as a meter suitable indicator gearing would be employed in connection with, or be substituted for, the toothed gearing shown in the drawing.

A is a horizontal wheel, on the under surface of which one or more series or circles of cells, *a*, are formed near the circumference of said wheel A. This wheel is provided with a vertical axis, *f*, and its under surface rests upon the top of a closed chamber, B, into which the gas, water, or other fluid to be measured is first introduced by a passage, *c*, the wheel A being inclosed in a suitable casing, D.

Through the top *b* of this chamber B three or more passages or ports, *e*, are formed for the exit of the gas or other fluid from chamber B. These ports *e* are placed in a circle corresponding to the circle of cells *a* in the wheel A, directly beneath which they open out, said ports leading from the chamber B in an inclined direction, as shown in fig. 3.

It will thus be seen that when the gas or other fluid under pressure to be measured or constituting the motive power escapes from the chamber B through the inclined ports *e* it will fill the cells *a*, and at the same time rotate the wheel A by impinging on the sides of cells *a* as they pass in succession over the ports *b*. As there is no other outlet from the cells *a* the steam or other fluid, in order to escape from under the wheel A, must pass between the top of the chamber B and the under surface of the wheel. The latter, when rotated by the steam or other fluid, will be thus lifted completely off the top of chamber B, (the surface upon which it rests when stationary,) and will be supported only on a film of fluid as it escapes from

under it into chamber D, whereby all friction between the wheel and the surface upon which it is placed is prevented. The flow of the fluid at each revolution having been previously ascertained by experiment or otherwise, the number of revolutions of wheel A, and consequently the flow of fluid, is registered by any suitable indicator connected to axis *f* of wh el A in place of the gearing shown.

The casing or chamber D inclosing the wheel A is furnished with an escape passage, *d*, for the exit of the fluid. Any suitable gearing for transmitting power may be connected to the axis *f* of wheel A, as shown, or in any other convenient manner.

In order to reverse the motion of the engine by causing the wheel A to rotate in the contrary direction to that indicated by the arrow in fig. 4, additional ports *g* are provided in the top *b* of chamber B, inclined in the reverse direction to the ports *e* first described. The steam or other fluid when caused to issue from these ports *g* will act on a second circle of cells formed in wheel A within the circle of cells *a*, and inclined in the contrary direction thereto, the reversing ports *g* being also formed nearer the center of plate *b* to coincide with the additional circle of cells; or the steam may act on the same circle of cells for rotating wheel A in either direction when said cells are made in the form of rectangular cavities, as shown at *a'*, figs. 2 and 3.

The exit of steam through ports *e* and *g* is governed by means of a plate, *h*, which, when in the line position shown in fig. 4, closes ports *g*, and at the same time opens a passage for the steam through the other set *e*, and *vice versa* when moved to the dotted position. The position of this plate *h* is adjusted by hand by any suitable device.

What we claim as our invention, and desire to secure by Letters Patent, is—

The improved apparatus herein described, consisting of the horizontal wheel A provided with cavities or cells on its under side, the reversely-inclined ports *e* and *g*, plate *h*, and casing D, substantially as shown and described.

THOMAS COOK.
JOHN WATSON.

Witnesses:
J. O. DEWEY,
W. D. WOOD.