(No Model.)

F. W. HOOD.

WATER METER.

No. 585,757. Patented July 6, 1897.

Fig. 1.

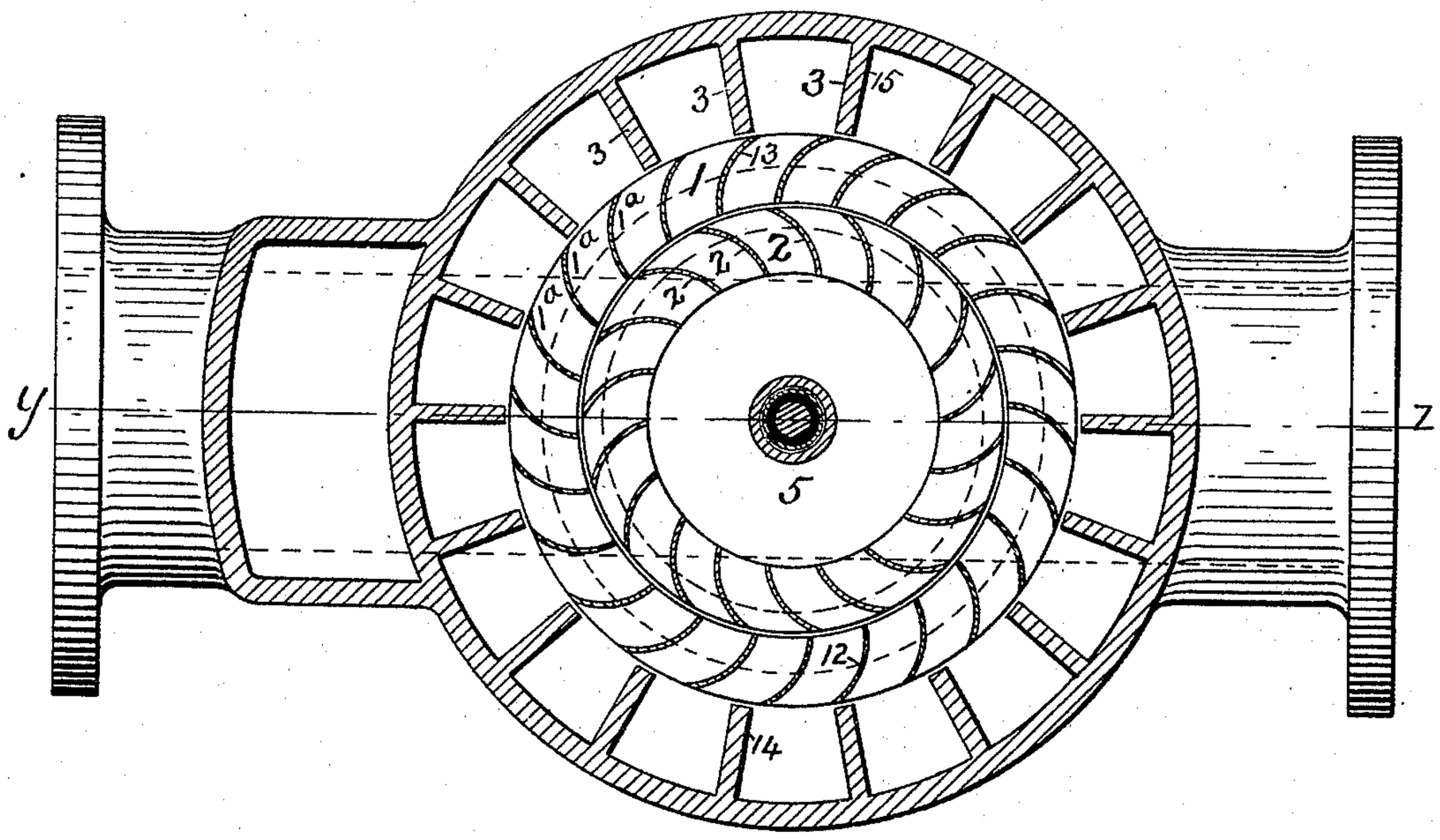
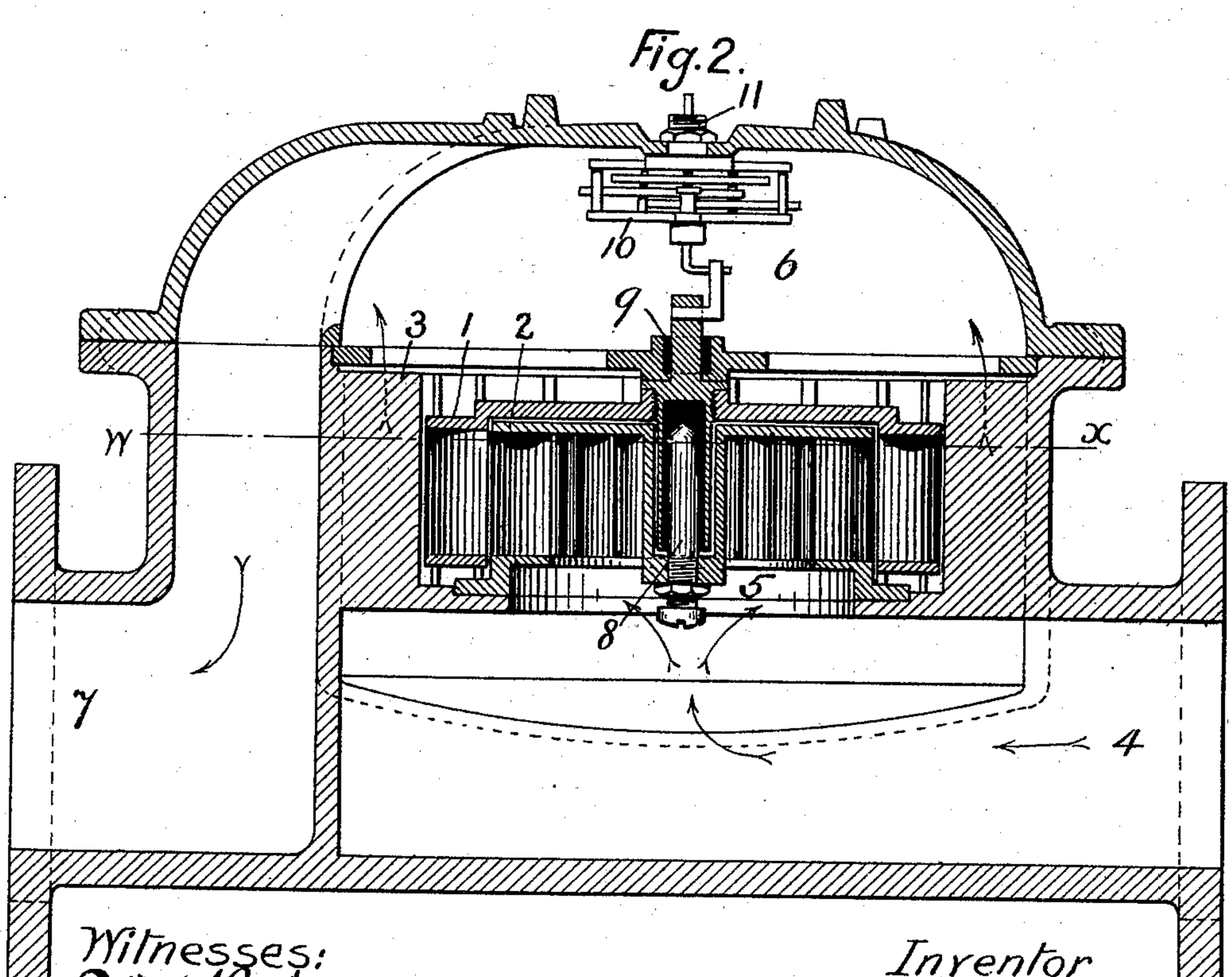


Fig. 2.



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UNITED STATES PATENT OFFICE.

FREEMAN W. HOOD, OF NEWTON, MASSACHUSETTS, ASSIGNOR TO THE HERSEY MANUFACTURING COMPANY, OF BOSTON, MASSACHUSETTS.

WATER-METER.

SPECIFICATION forming part of Letters Patent No. 585,757, dated July 6, 1897.

Application filed February 18, 1896. Serial No. 579,764. (No model.)

To all whom it may concern:

Be it known that I, FREEMAN W. HOOD, a citizen of the United States, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Water-Meters, of which the following is a specification.

My invention relates to rotary-current meters, and has for its object generally to improve and simplify the construction of such meters with the view of increasing their sensibility, evenness of registration, and durability; and to these ends my invention consists in the various features substantially as hereinafter more particularly pointed out.

In the accompanying drawings I have illustrated one preferred embodiment of my invention, in which—

Figure 1 is a horizontal transverse section on the line *w x*, Fig. 2; and Fig. 2 is a vertical longitudinal section on the line *y z*, Fig. 1.

In order to accomplish the generally-stated objects of my invention, I provide a construction by which the wheel is balanced against both vertical and horizontal thrusts, resulting in a most perfect balance and consequent sensibility, durability, &c. Further, I provide a construction in which the impact of the water is distributed with equal force against opposite sides of the wheel, and such impulses occur at the same time on opposite sides, and at the same time the wheel is subjected to a series of maximum impulses and minimum impulses, succeeding one another and merging into each other in such a way as to constitute a practically continuous impulse of uniform force, and this conduces to sensibility, durability, evenness of registration, &c. In accomplishing these purposes I provide a construction which, among other things, insures the passage of the water through the wheel in a horizontal direction. I also provide a construction in which the directing and receiving vanes and the buckets in the wheel vary in number in certain relations, whereby the impact of the water, both in its delivery to the buckets and from the buckets, shall be distributed equally on all sides, and so that the wheel will be subjected to a series of maximum and minimum impulses at different parts at all times.

Referring more particularly to the drawings, it may be stated that as the general construction and operation of current-meters are well understood I do not deem it necessary to fully and particularly describe all the details thereof, but will point out more especially the novel features of construction embodying my invention.

Within any suitable case is arranged an annular wheel 1, provided with a series of buckets 1^a, the buckets being curved in plan, as seen in Fig. 1, and straight vertically, as seen in Fig. 2. Arranged in connection with this wheel are the directing-vanes 2, and these are likewise curved in plan and straight in vertical section, they being curved in a direction opposite to the curves of the buckets in the wheel 1. These vanes are stationary and are for the purpose of directing the water into the buckets. Arranged outside of the wheel is a series of receiving-vanes 3, and these are straight, both in plan and vertical section, and receive the jet or discharge of water from the buckets of the wheel.

I may say here that while I have shown the directing-vanes as curved and the receiving-vanes as straight and the buckets as curved, and while this is the preferred form, it is not absolutely important in order to attain the advantages of my invention to a greater or less extent that they should be so arranged, as under some conditions they may be all straight or all curved, or one or more straight or curved and the others curved or straight.

The wheel 1 is carried in the present instance on a step 8 and is steadied by the bearing 9, and the rotations of the wheel are communicated to an intermediate gearing 10 and by this through a stuffing-box 11 to a dial or other indicating device (not shown) in the usual manner.

Such being the general construction and arrangement of the device the operation will be readily understood, and it will be seen that water enters at the inlet 4, following the course indicated by the arrows. It passes up into a distributing-chamber 5 within the directing-vanes, and from thence passes horizontally through the directing-vanes 2, impinging substantially at right angles against the buckets 1^a of the wheel, and from the

wheel it is delivered substantially at right angles against the receiving-vanes 3 and passes through the recesses between these vanes and is discharged vertically into a receiving-chamber 6, and from thence down and out of the meter through the outlet 7. The result of this construction and arrangement is that the wheel is perfectly balanced in a vertical direction, because there is no impinging of the water in a vertical direction against the wheel or against any portion of it. Further, the current of the water through the wheel is entirely in a horizontal direction, and this insures the permanency of the bearings which take up the weight and thrust. Further, the wheel is balanced in a horizontal direction on account of the relative arrangement of the directing and receiving vanes and the buckets, and it will be seen that in the present instance I have shown eighteen directing-vanes and eighteen receiving-vanes and twenty-four buckets, although, of course, I am not limited to this particular number and relative arrangement. I find, however, it is desirable that the numbers of the buckets and vanes should be divisible by the same prime numbers, as by two and by three, and that one should not be a multiple of the other. The effect of this arrangement is to distribute the impact of the water as delivered by the directing-vanes with equal force against the opposite sides of the wheel. For instance, on reference to the drawings it will be seen that practically a full jet of water is being delivered against the bucket at 12 and at the diametrically opposite side of the wheel against the bucket at 13, and these two buckets are in full operation, and that the relation of these directing-vanes and buckets is identical. Precisely the same relation exists between the buckets at 14 and 15 and their respective receiving-vanes on opposite sides of the wheel against which they are discharging. If any part of the wheel is examined with reference to the directing and receiving vanes, precisely the same relations will be found on the diametrically opposite sides. This feature insures the permanency of the bearings in a horizontal direction and the general durability of the meter.

While it is true that this feature of balancing the piston in a horizontal direction could be obtained in a structure where the directing and receiving vanes and the buckets are of the same number, or one the multiple of the other, by arranging them as above described, I not only obtain the results above set forth, but, further, obtain great sensibility and evenness of registration by preferably making them uneven in number, one not the multiple of the other and yet multiples of the same prime number, so as not to affect the balancing feature just referred to. Thus if the vanes and buckets were of the same number or one the multiple of the other the wheel would be subjected to a series of maximum and minimum impulses, which would result in uneven operation, whereas by making them uneven in number, as just described, a certain number of buckets are exposed to the maximum impulses and a certain number to the minimum impulses and others to intermediate impulses at one time, these impulses succeeding one another and merging into each other in such a way as to be a practically continuous impulse of uniform force, resulting in great evenness of rotation of the wheel, and consequently of registration and operation of the meter.

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

1. In a rotary-current water-meter the combination of a horizontal annular wheel provided with buckets, an annular series of directing-vanes and an annular series of receiving-vanes, the wheel being disposed between said vanes in such a manner that the water passes through said wheel in a horizontal direction without impinging against it in such a way as to produce thrust in a vertical direction, substantially as described.

2. In a rotary-current water-meter the combination with an annular wheel provided with buckets, of an annular series of directing-vanes and an annular series of receiving-vanes, the said annular directing-vanes and receiving-vanes being so related to the buckets of said wheel numerically that the impulses on opposite sides of the wheel shall occur at the same time so as not to produce horizontal thrust, substantially as described.

3. In a rotary-current water-meter the combination with an annular wheel provided with buckets, of an annular series of directing-vanes and an annular series of receiving-vanes, the said annular directing-vanes and receiving-vanes being so related to the buckets of said wheel numerically that the wheel will be subjected to a series of maximum and minimum impulses at different parts of the wheel, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREEMAN W. HOOD.

Witnesses:
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