(No Model.)

W. G. PRICE.

CURRENT METER.

No. 582,874. Patented May 18, 1897.

Fig. 1.

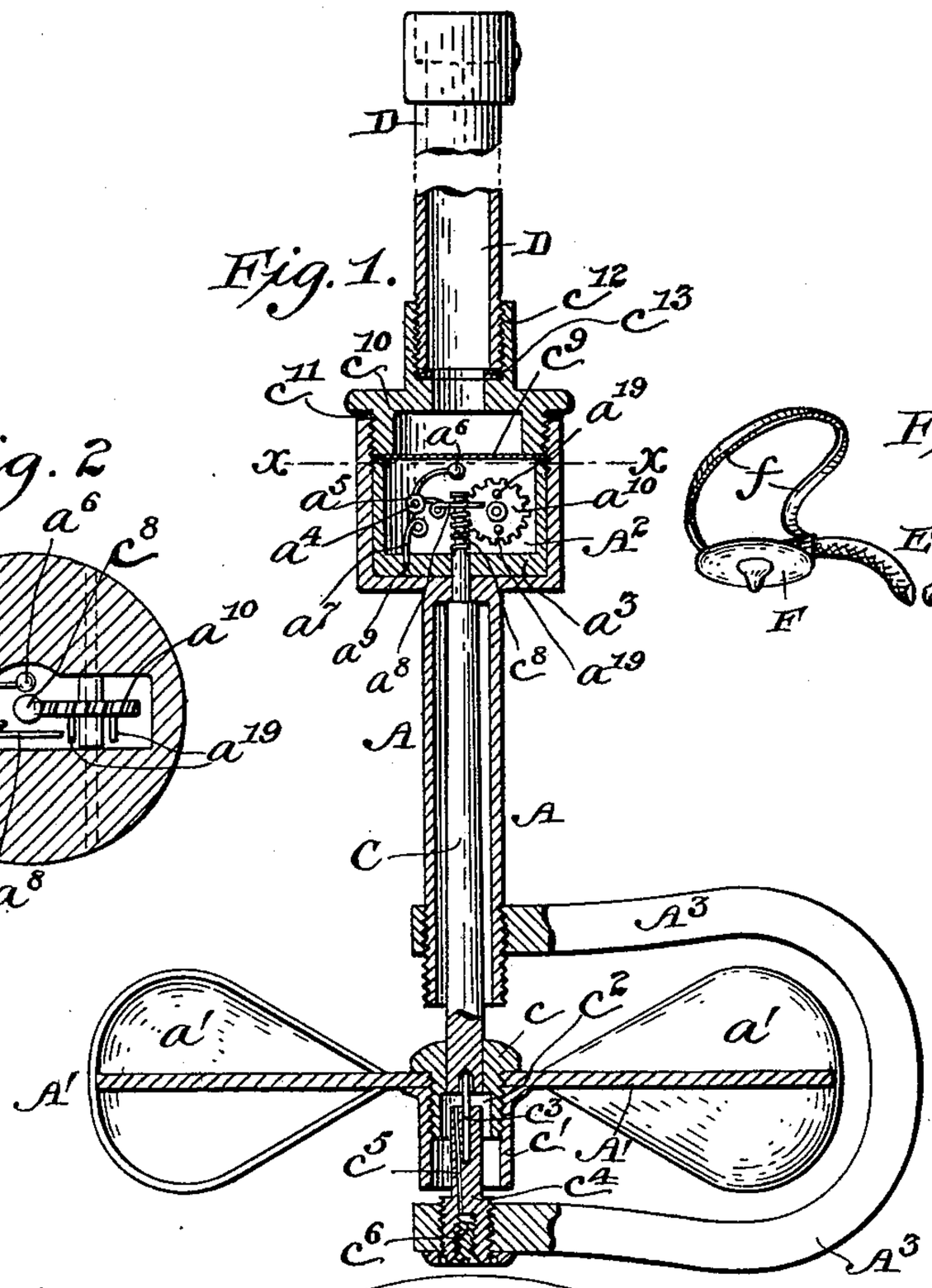
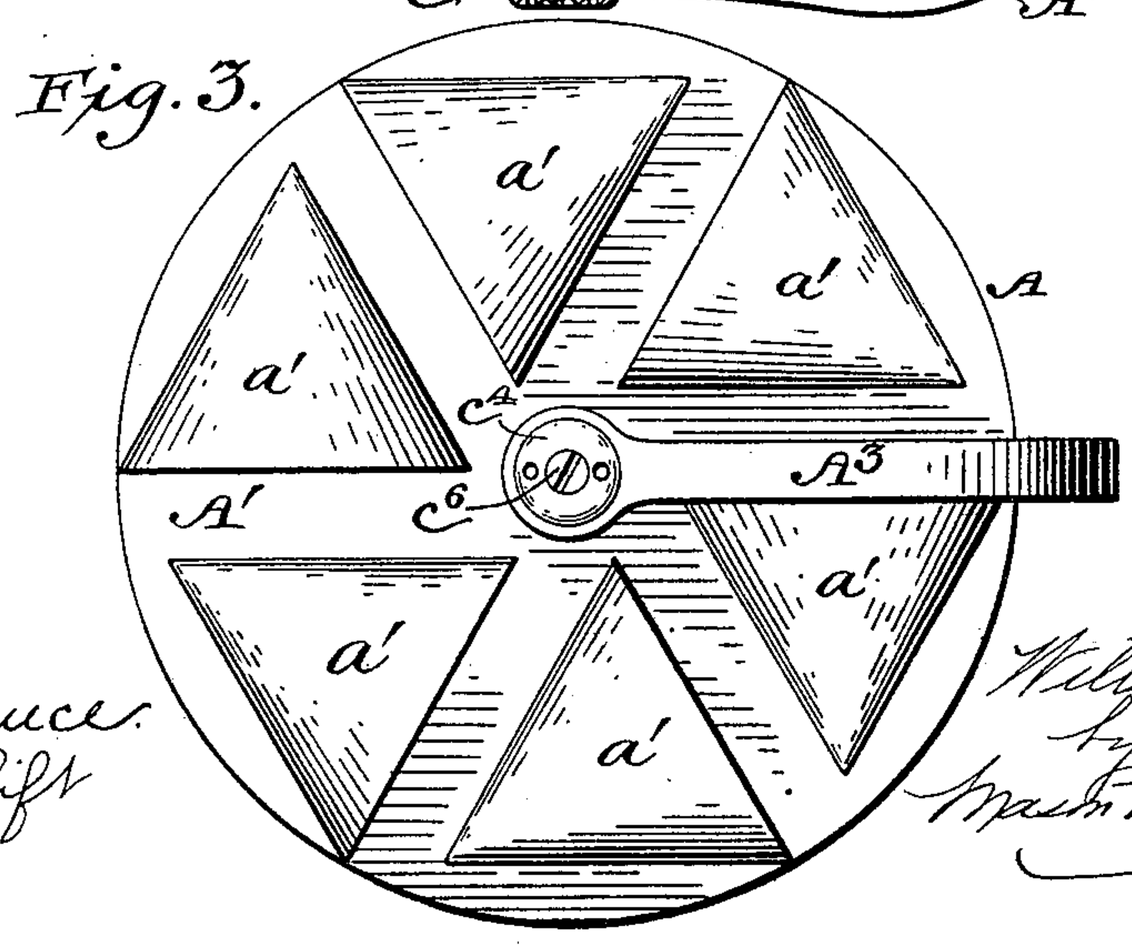


Fig. 2.

Fig. 4.

Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM G. PRICE, OF CHICAGO, ILLINOIS.

CURRENT-METER.

SPECIFICATION forming part of Letters Patent No. 582,874, dated May 18, 1897.

Application filed August 4, 1896. Serial No. 601,661. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. PRICE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Current-Meters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in current-meters for measuring the velocity of the movements of waters of rivers or canals.

The invention consists of the combination with a suitable frame, a wheel mounted in the same and adapted to be turned by the movements of the water, and a sounding device for indicating the movements of the wheel, a sound-transmitter connected to said device, whereby the revolutions of the wheel may be counted above the surface of the water.

It also consists of certain other novel constructions, combinations, and arrangements of parts, all of which will be hereinafter more particularly set forth and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 represents a central vertical section through the devices embodying my invention. Fig. 2 represents a horizontal section through the same on line $x\,x$ in Fig. 1. Fig. 3 represents a bottom plan view of my said invention, and Fig. 4 represents a detail side elevation of the earpiece and tube.

A in the drawings represents the frame of my device; A′, the rotating current-wheel; C, the rotary shaft upon which said wheel is mounted; D, the connecting-tube, and E the flexible listening-tube. The wheel A′ comprises a frame a, upon which are mounted a number of conical cups a', the convex sides of the cups of course offering less resistance to the water than the concave sides, and thus causing rotation of said wheel in one direction only. This wheel is mounted upon the vertical shaft C by means of a collar c and a sleeve c', both said collar and said sleeve being screw-threaded, whereby they are secured together with the wheel between them. The collar c is rigidly secured to the lower end of the shaft C, said lower end being formed with a recess c^2 for receiving a supporting-pin c^3, which latter is mounted in a screw c^4, that is secured in the lower end of a yoke extension A^3 of the tubular frame A. This screw c^4 is of less diameter than either the interior of sleeve c' or collar c, so as to leave an annular air-trap formed by said sleeve and collar. The screw c^4 is provided with a longitudinal oil-passage c^5, closed at its lower end by a screw c^6. By means of this passage oil may be injected into the bearing at the top of pin c^2 without passing through the sleeve c' and lower portion of the collar c and collecting the sand or grit therein. The sleeve and collar also form an air-trap, so that the water cannot reach the bearing when the device is submerged. The upper part of the frame A is enlarged to form a chamber A^2 for containing the sounding mechanism. This mechanism comprises a cup-frame a^3, set within the chamber A^2 and having a lateral shaft a^4 secured between its walls. A sleeve a^5 is loosely mounted upon the shaft a^4 and is provided with a striker a^6 and two spring-arms a^7 and a^8, respectively. The free end of the arm a^7 projects into a recess a^9 in the cup a^3, and thus holds the sleeve a^5 in position under spring tension. The arm a^8 projects forward into the path of lugs a^{19}, mounted upon a gear-wheel a^{10}, said wheel being suitably journaled in the cup a^3. The upper end of the shaft C is reduced and formed with a worm-thread c^8, that engages the wheel a^{10}, said reduced portion passing through the frame and the bottom of the cup a^3. An air-trap is formed within the frame about the upper end of the shaft before the same enters the casing. A diaphragm c^9 is mounted upon the bottom of the threaded cap c^{10}, a suitable packing-ring c^{11} being interposed between the top of casing A and said cap. The connecting-tube D is screwed into a screw-threaded extension c^{12} of the cap and provided with a packing c^{13}. This tube D is preferably made in sections, so that it may be taken apart for transportation. The flexible listening-pipe E is preferably of rubber and is connected to the upper end of the tube D by a short curved pipe-section d. The earpiece F is attached to

the end of the flexible pipe D and is adapted to be secured to the listener's head by a flexible strap *f*. It will be observed that the backs of the conical cups offer less resistance to the water than the open front. Hence the running water causes the wheel to revolve.

When the meter is lowered into the water, the air-traps of course fill with air, and as long as the meter is held right side up the air cannot escape and keeps the water from the bearings. It is necessary for accurate work that the friction of the bearings of a meter-wheel be a constant quantity, and in this meter this result is attained by excluding the water with the grit and other matter it often carries in suspension. The usual way of oiling the lower bearing of these meters has been to turn the meter bottom side up and pour some oil into the lower end of the tube, but small particles of sand frequently collect around the lower end of this tube, which are carried by the oil up to the bearing. The new method of oiling is through the oil-passage, which carries the oil up close to the bearing before it escapes into the space surrounding the bearings. The spring a^7 is much weaker than the spring-arm a^8, and when the gear-wheel a^{10} is revolved in the direction of the arrow the spring-arm a^8 does not bend at all, but when the gear-wheel a^{10} is revolved in the direction opposite to that of the arrow, as may be done by turning the meter-wheel by hand in the wrong direction, the hammer a^6 is pressed against the diaphragm c^9, and the spring-arm a^8 bends up till one of the lugs a^9 passes by the end of it, and in this case the spring in the arm a^8 saves it from being broken. It is evident that this instrument can also be used as a log for measuring the velocity of movement of ships, and when used for this purpose it would be placed in the water alongside of the ship or be pushed down into the water through a tube having suitable valves in the bottom of the ship. The counting mechanism and bearings being removed from the water and the grit it often contains, the friction becomes a constant quantity, and hence it measures velocities with much greater precision.

These meters are first rated in still water to determine the rate of revolution of the wheel per second which corresponds to different velocities of the water in feet per second. In using the meter it is necessary to measure with a watch the time of a certain number of revolutions of the wheel.

When the wheel revolves, the worm turns the gear-wheel in the direction of the arrow, and the lugs upon said wheel each in succession press down the spring-arm a^8 and release it, causing the hammer a^6 to strike the diaphragm and the sound thus produced to be transmitted through the tube to the ear of the observer. As the gear-wheel has twenty teeth the hammer will strike the diaphragm at the end of every ten revolutions of the meter-wheel, which makes it very easy to count any multiple of ten revolutions.

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

1. The combination with a suitable frame, of a wheel mounted in the same and adapted to be turned by the movements of the water, a sounding device for indicating the movements of the wheel and a sound-transmitter connected to the said device whereby the revolutions of the wheel may be counted above the surface of the water, substantially as described.

2. The combination with a suitable frame, of a wheel mounted in the same and adapted to be rotated in one direction only by the movements of the water, a shaft revolved by said wheel, a diaphragm, a hammer connected to the shaft and adapted to strike the diaphragm and a tube to convey the vibrations of said diaphragm up to a listener above, substantially as described.

3. The combination with a suitable frame, of a wheel mounted in said frame, air-traps for protecting the bearings of said wheels from water and a sounding device connected to said wheel and adapted to indicate the velocity of its revolutions at a distance, substantially as described.

4. In a water-current meter the combination of a wheel which is turned by the movement of the water, a supporting-tube having a diaphragm on its lower end, a hammer and means provided which causes the hammer to strike the diaphragm as the meter-wheel revolves, substantially as described.

5. In a current-meter the combination of a wheel which is turned by the movement of the water, a shaft formed with a worm, a gear-wheel which carries one or more lugs, a hammer operated by said lugs and a diaphragm which is struck by said hammer, substantially as described.

6. In a meter for determining the velocity of moving water, the combination of means for producing sound in an air-space under water, said means being operated by the action of the water, and means connected to said air-space for transmitting the sound to the surface of the water.

7. In a current-meter the combination of a frame, of a wheel mounted on a vertical shaft, a supporting-pintle which projects up into a tube or sleeve on said wheel partially excluding water by the air contained therein and means of oiling said bearing by a hole through said pintle substantially as described.

8. In a current-meter the combination of a supporting-tube from which water is excluded, an air-chamber containing mechanism for producing sound the tube and air-chamber being separated by an air-tight partition and a water-wheel for causing the production of sound in said air-chamber, substantially as described.

9. In a current-meter the combination with a frame, of a yoke at the lower end of the same, a wheel having conical blades and

mounted in said yoke, a shaft connected to said wheel, devices connected to said shaft and adapted to produce a sound in an air-chamber in said frame and means for conveying said sound to the surface of the water, substantially as described.

10. In a current-meter the combination with a frame, of a wheel mounted therein, a shaft rotated by said wheel, a diaphragm, a hammer for striking said diaphragm, devices connecting the shaft and hammer, and means for conveying the sound of the vibrations of the diaphragm to the surface of the water, substantially as described.

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

WILLIAM G. PRICE.

Witnesses:

GEO. O. NAGLE,

HENRY BROWN.