

June 17, 1941.

H. CHRISMAN

2,245,759

FLUID METER IMPELLER

Filed Oct. 21, 1935

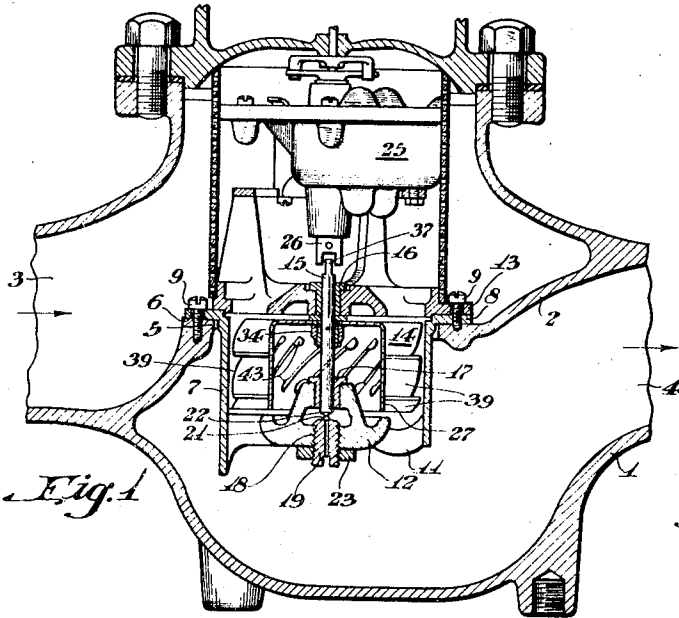


Fig. 1

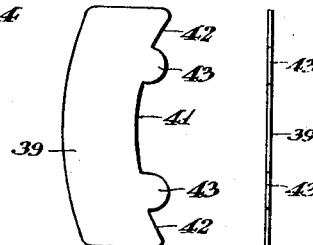


Fig. 6 Fig. 7

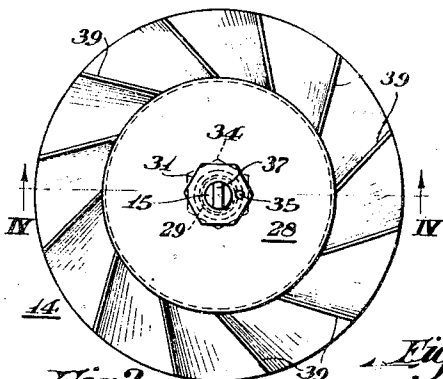


Fig. 2

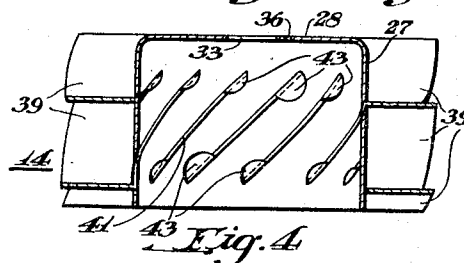


Fig. 4

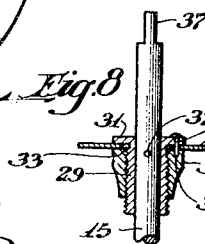


Fig. 8

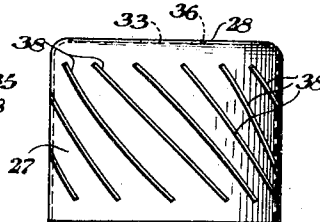


Fig. 5

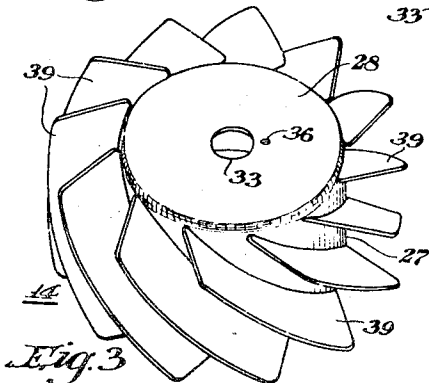


Fig. 3

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FLUID METER IMPELLER

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Application October 21, 1935, Serial No. 45,882

2 Claims. (Cl. 73-231)

This invention relates to fluid meters and relates particularly to improvements in the meter mechanism.

It is an object of the invention to provide a fluid meter suitable for measuring a variety of fluids, such as hot or cold water, oil, or gasoline, and thereby making it unnecessary for the manufacturer to carry in stock a variety of meters having impellers of different materials for the various kinds of fluids.

A further object is the provision of an impeller for fluid meters which is of light weight and sturdy construction, is easily repaired and is inexpensive to manufacture.

Still another object is the provision of a fabricated impeller from commercially available materials, which is durable and provides smooth reacting walls for passage of fluid.

The meter impeller constructed according to the present invention comprises a cylinder of metal, or other suitable material, having separate blades secured thereto at their inner edges. Preferably, the blades are plane and have their inner edges curved so that when placed axially inclined on the outer surface of the cylinder the inner edges of the blades conform closely to a surface of the cylinder. The outer edges of the blades also preferably are curved to lie in the circumference of an imaginary outer concentric cylinder with the outer advance edge of one vane overlapping the outer rear edge of the next adjacent vane. The cylinder may be formed from sheet material by a drawing, stamping or spinning process, and the head or closing wall of the cylinder is preferably integral therewith. A suitable center shaft is secured to the cylinder head to rotatably support the impeller in the meter.

The blades may be secured to the cylinder in any suitable manner, the preferred construction consisting of a plurality of slots cut through the cylinder wall and terminating short of the ends of the cylinder through which extend suitable lips integral with the blades. Preferably the portion of the inner edges of the blades between the lips extends through the slots and conforms to the internal surface of the cylinder, and the portion of the inner edges outside of the lips conforms to the outer surface of the cylinder. The lips are bent over in the interior of the cylinder, preferably in opposite directions, to firmly secure the blades in proper position. The impeller then may be dipped into molten tin to coat the same and solder the blades to the cylinder, the tin penetrating the slots to better bind the blades to

the cylinder, excess tin being wiped or thrown off in any suitable manner.

The invention will be described in greater detail in connection with the accompanying drawing in which:

Figure 1 is a vertical section of a preferred embodiment of the invention, portions of the meter case being broken away;

Figure 2 is a plan view of the impeller embodying a preferred construction;

Figure 3 is a perspective view of Figure 2;

Figure 4 is a vertical section taken on line IV—IV of Figure 2;

Figure 5 is a side elevation of the slotted cylinder ready to receive the blades;

Figure 6 shows a lay out of a blade on a plane surface according to a preferred modification;

Figure 7 is a side elevation of Figure 6; and

Figure 8 is a fragmentary section showing the preferred manner of securing the vertical shaft to the impeller.

Referring to the drawing, Figure 1, there is shown a portion of a meter embodying the present invention. The meter housing 1 has a partition 2 separating the inlet 3 from the outlet 4, and a hole 5 bored therethrough is surrounded at one end by a machined surface 6 formed on the partition. A flanged tube 7 constituting the working chamber is inserted in the bore 5, the flange 8 resting on the machined surface 6 and being secured thereto in fluid tight relation by cap screws 9 or other suitable means. The tube 7 has radial ribs 11 which support a central deflector 12, and at its top a bearing support 13 is secured in any suitable manner.

An impeller indicated generally by the numeral 14 is located in tube 7 and has a central shaft 15 which is journaled at its top in bushing 16 suitably inserted into a bore in bearing support 13, and at its bottom in a bushing 17 inserted into a bore in deflector 12. The deflector 12 is bored and threaded at 18 to receive an adjustable jewel screw 19 having a jewel thrust bearing 21 at its end upon which the rounded end 22 of the shaft 15 is supported, a nut 23 locking the jewel screw in adjusted position. The reduction gearing chamber 25 is suitably supported on bearing support 13 with the driven shaft 26 in alignment with the impeller shaft 15.

The impeller 14 comprises a hollow metal cylinder 27, which has a metal head 28 preferably integral therewith. The cylinder 27 and head 28 may be formed from sheet metal by a drawing, stamping or spinning operation or in any other suitable manner. An externally threaded

bushing 29 with a hexagonal flange 31 at one end is pinned about midway of shaft 15 by a pin 32, and a hole 33 is formed in the impeller head 28 to receive the bushing 29 and shaft 15. A nut 34 threads onto the end of bushing 29 to clamp the bushing in place, and a pin 35 is driven into a hole 36 extending through the bushing flange 31, impeller head 28 and nut 34 to prevent loosening of the bushing. The upper end of shaft 15 may be flattened as indicated at 37 to form a driving member for the reduction gearing shaft 26. It will be understood that the shaft 15 may be secured to the cylinder 27 in any other suitable manner.

A series of axially inclined slots 38 are cut in the cylinder 27, these slots preferably terminating short of the top and bottom of the cylinder to avoid unduly weakening the cylinder, the slots preferably being of such form that if extended they would cut the cylinder to form a frustum. These slots are conveniently formed by a rotary saw cutter by inclining the axis of the cutter to the axis of the cylinder and moving the cylinder into contact with the cutter in a plane normal to the axis of the cutter. A plurality of metal vanes 39 punched or otherwise formed out of flat sheet metal have a portion of their inner edges 41 cut on a curve to conform to the inner surface of the cylinder 27, and another portion 42 set back and cut on a curve to conform to the outer surface of the cylinder. Lips 43 project from the inner edge, and the edge 41 and lips 43 are inserted through a slot 38, the lips then being turned over on the interior of the cylinder. The edge 41 and bent over lips maintain the blades in correct position, and they may be securely held in place by lead or tin solder, or by any other suitable means. This is conveniently done by dipping the impeller in a bath of molten tin, the excess tin being removed by shaking, centrifuging, or in any other manner.

The preferred method of manufacture and assembly is as follows: The cylinder 27 and head 28 are formed integral from a sheet of copper or bronze by a cold drawing operation, the hole 33 preferably being formed in the drawing operation. The slots 38 then are cut in the cylinder wall. A vane is punched from thin sheet copper or bronze, and the lips of the vane are then inserted through a slot 38, the portion of the inner edge of the vane between the lips extending through the slot. When all the vanes are thus in place the impeller is placed in a suitable cylinder or clamp while the lips are bent over in any suitable manner, as by a spinning operation, into locking position in the interior of the cylinder or clamp while the lips are bent over in any the impeller. The impeller is then dipped in a molten tin bath thus sealing the blades rigidly in place. The shaft 15 is then pinned to bushing 29, and the bushing is inserted through the hole 33 and clamped in place by nut 34. The hole 36 is then bored through the flange 31, head 28 and into nut 34, and the pin is driven into this bore, thus securing the shaft permanently in place. The impeller is then inserted in the meter.

In operation, liquid to be metered enters the inlet 3 and passes downward through bearing support 13 and between the blades 39 of the impeller 14, the reaction against the blades causing the impeller to rotate. A portion of the liquid

is deflected upwardly by deflector 12 to partially balance the weight of the impeller. The impeller being very light in weight and having smooth reacting surfaces, offers very little resistance to the passage of fluid. As a result, the capacity of the meter and its sensitivity at small flows is increased. Furthermore, the impeller is not deleteriously affected by hot or cold water, gasoline, oil and other fluids and consequently a meter having this impeller can be used to measure a variety of fluids.

It will be understood that the cylinder 27 and head 28 as well as the shaft 15 may be cut from bar stock, or may be formed of suitable thinness by die forging or die casting. Or the cylinder alone may be formed from metal tubing cut to suitable length and the head or division wall 28 formed separately and soldered or otherwise secured thereto. However, for the sake of economy, lightness and rigidity, I prefer to form the cylinder and head integral from spun or drawn sheet metal as hereinbefore described.

Should any of the impeller blades become damaged in service they can be readily replaced or repaired, thereby avoiding replacement by a new impeller. Furthermore, the impeller constructed according to the present invention may be used to replace worn or broken impellers of the type previously employed, or to change such meters over for measuring various kinds of fluids.

The invention may be embodied in other specific forms without departure from the spirit or essential characteristics of the present invention. The specific form described herein therefore is to be considered in all respects as illustrative and not restrictive of the invention.

What is claimed and desired to be secured by United States Letters Patent is:

1. A meter impeller comprising a hollow cylinder formed of sheet metal having an integral head, inclined slots formed in the cylinder wall terminating short of the ends of the cylinder, a plurality of blades formed from sheet metal having lips projecting from the inner edges through the slots, the inner edges of the blades between the lips projecting into the slots and substantially conforming to the interior of the cylinder, the lips being bent over in the interior of the cylinder, and a central shaft supported by the cylinder head.

2. A meter comprising a casing having inlet and outlet connections and a dividing wall, a cylindrical working chamber in the dividing wall, and a fluid impeller in the working chamber, said fluid impeller comprising a hollow cylinder formed of sheet metal having an integral head, inclined slots formed in the cylinder wall terminating short of the ends of the cylinder, a plurality of blades formed from sheet metal having lips projecting from the inner edges through the slots, the inner edges of the blades between the lips projecting into the slots and substantially conforming to the interior of the cylinder and the outer edges of the blades conforming substantially to the cylindrical working chamber, the lips being struck over in the interior of the cylinder, and the blades being soldered to the cylinder, and a central shaft supporting the cylinder head.

HORACE CHRISMAN.

CERTIFICATE OF CORRECTION.

Patent No. 2,245,759.

June 17, 1941.

HORACE CHRISMAN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 57, strike out "or clamp while the lips are bent over in any" and insert instead the comma and words --, thus insuring a uniform outer diameter for--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of September, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.