

No. 776,877.

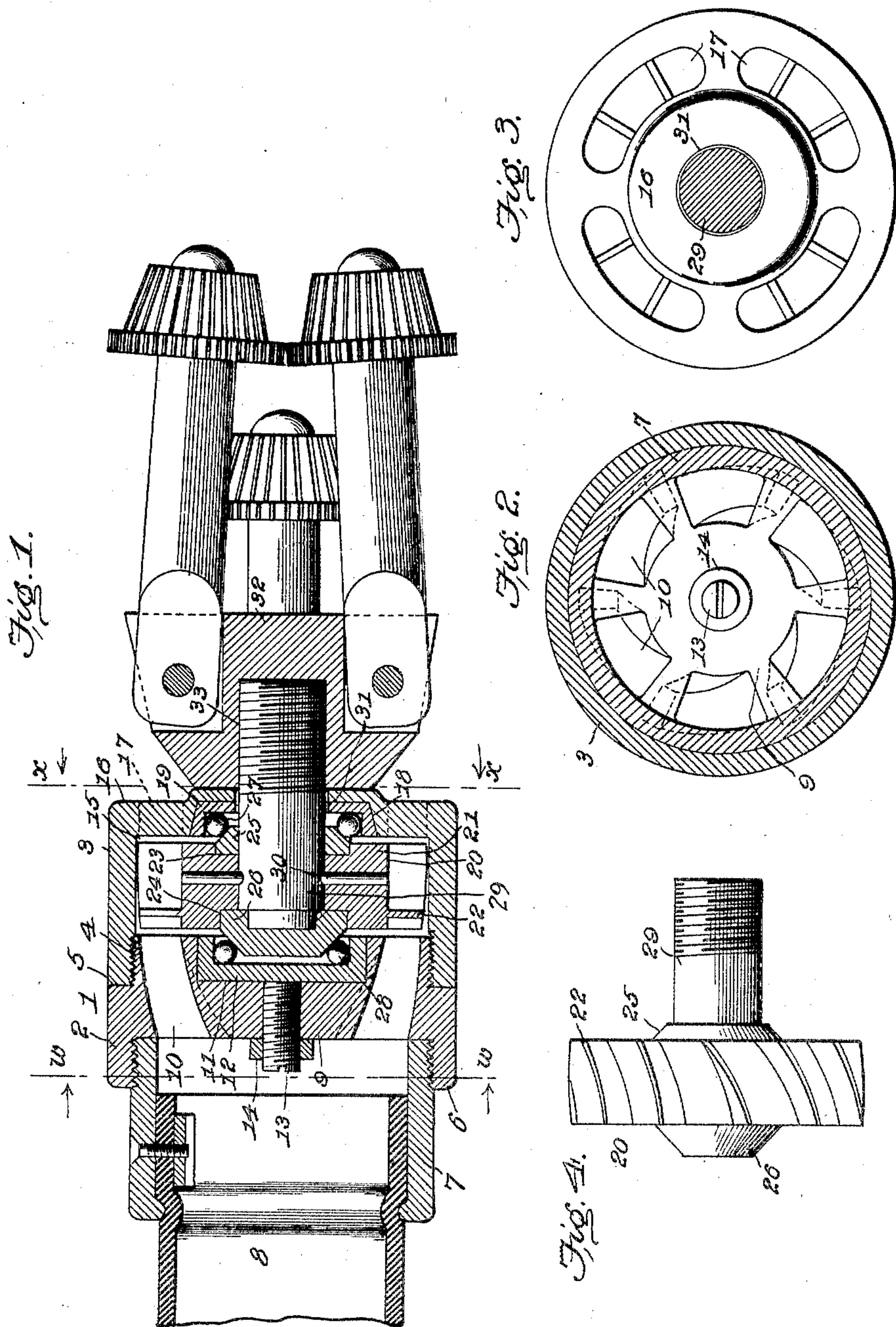
PATENTED DEC. 6, 1904.

H. F. WEINLAND.
TURBINE MOTOR FOR BOILER TUBE CLEANERS.

APPLICATION FILED MAR. 30, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

G. Howard Walmsley.
Will O'Laughlin

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INVENTOR.

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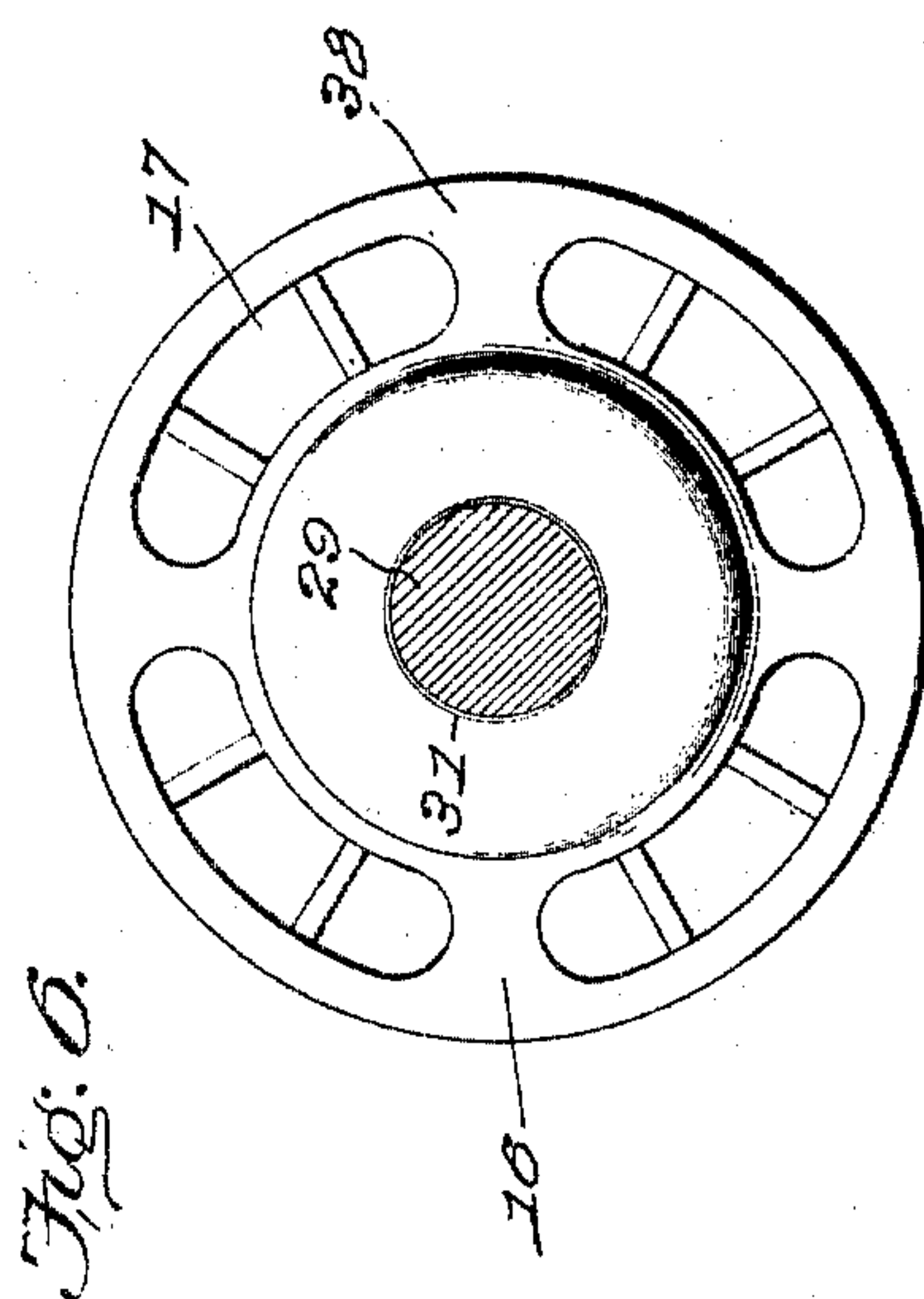
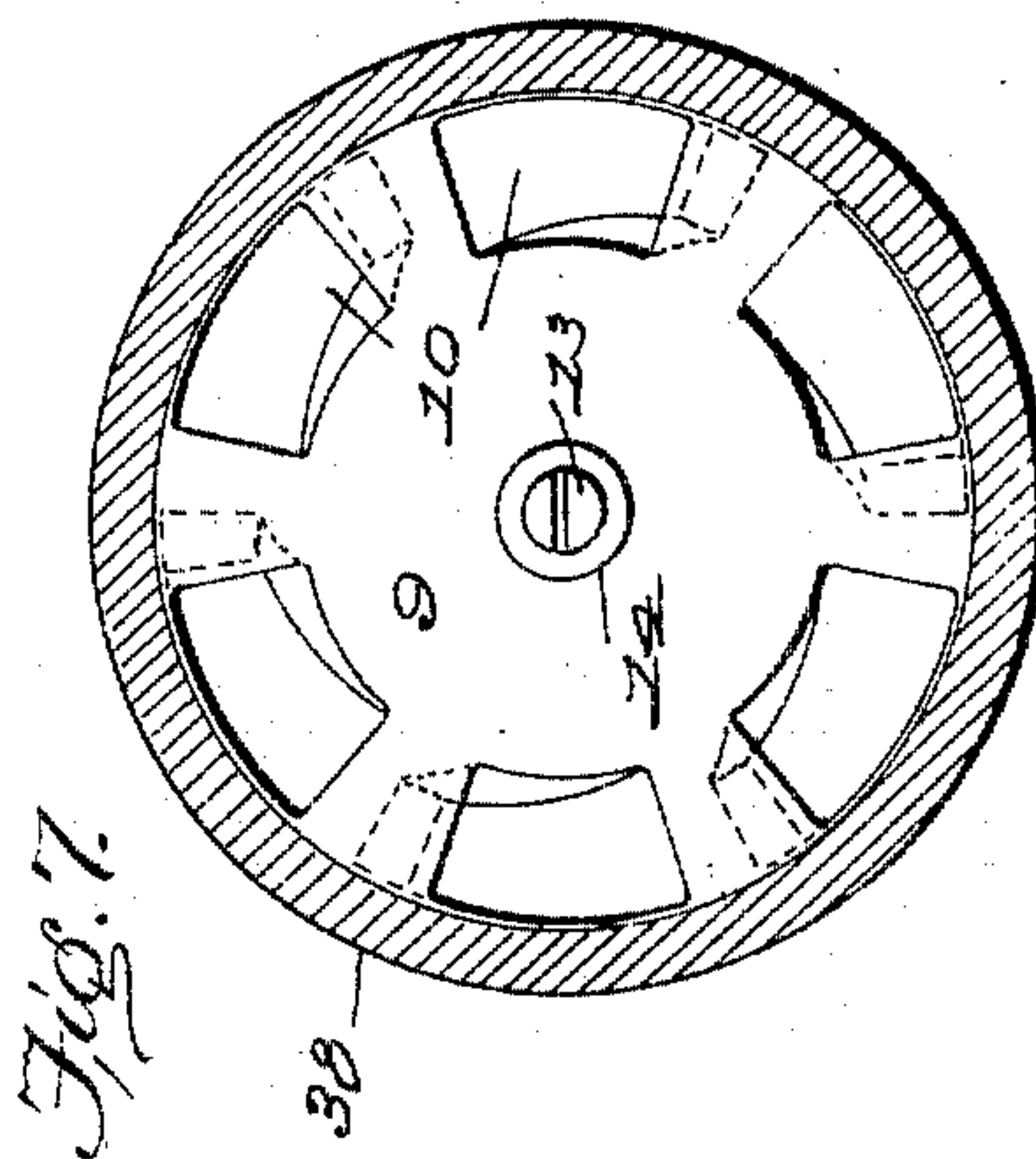
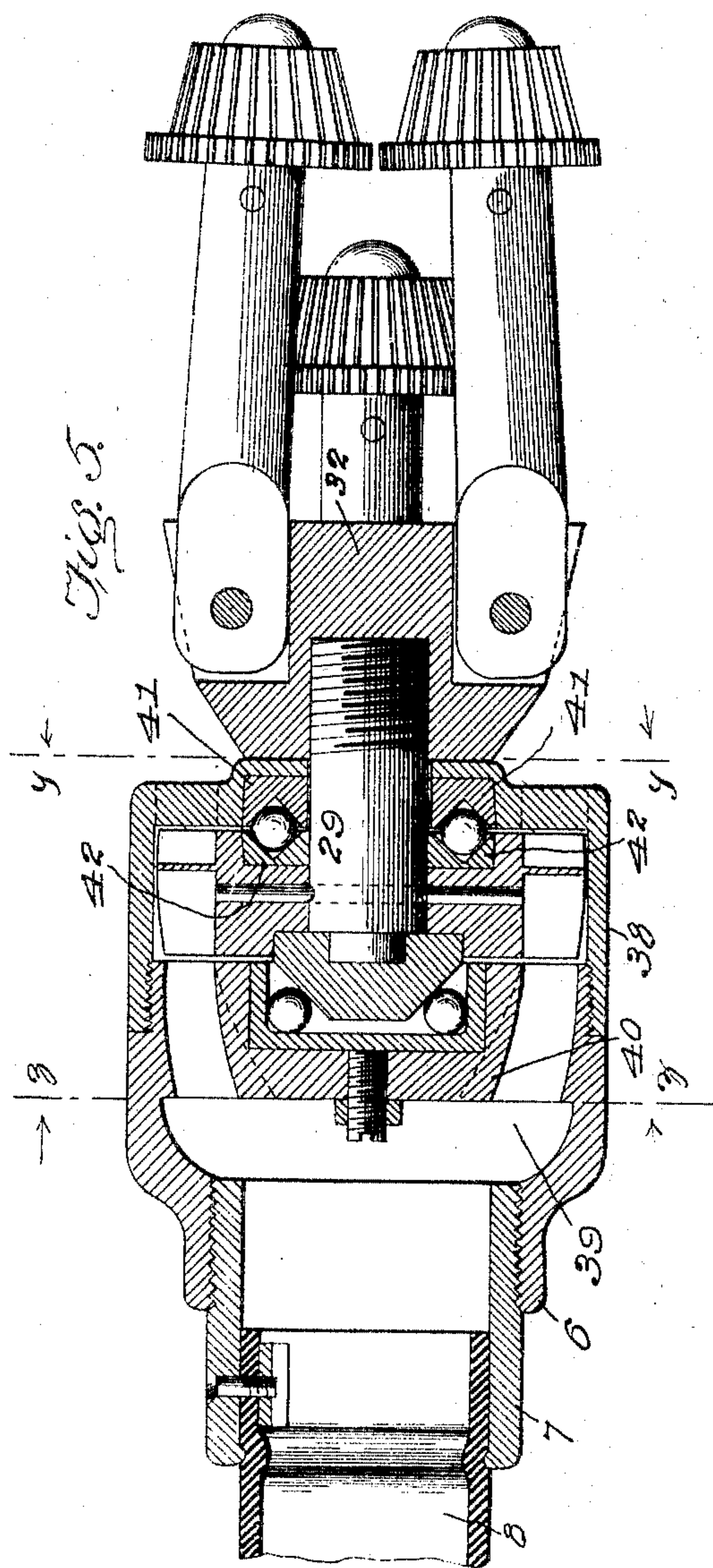
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Howard Walmsley
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UNITED STATES PATENT OFFICE.

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A CORPORATION OF OHIO.

TURBINE-MOTOR FOR BOILER-TUBE CLEANERS.

SPECIFICATION forming part of Letters Patent No. 776,877, dated December 6, 1904.

Application filed March 30, 1903. Serial No. 150,120. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. WEINLAND, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Turbine-Motors for Boiler-Tube Cleaners, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to turbine-motors for boiler-tube cleaners, and more particularly to that class of cleaners comprising a cutter-head, cleaning-cutters, preferably mounted on centrifugally-acting arms, and a motor comprising a head or casing containing a wheel of the turbine class, moving along with the cutter-head through the tube to be cleaned and supplied with water or other suitable motor fluid through a hose or pipe connected thereto.

The object of the present invention is to provide a compact, simple, and well-inclosed and protected construction for the water-wheel and its bearings, the parts being readily assembled or taken apart and those most subject to wear being separably renewable.

To these ends my invention consists in certain novel features, which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a structure embodying my invention on one form. Fig. 2 is a sectional view taken on the line *w w* of Fig. 1 and looking in the direction of the arrows. Fig. 3 is a sectional view taken on the line *x x* of Fig. 1 and looking in the direction of the arrows. Fig. 4 is a detailed view of the water-wheel and its shaft detached. Fig. 5 is a view similar to Fig. 1, illustrating a modification. Fig. 6 is a sectional view taken on the line *y y* of Fig. 5 and looking in the direction of the arrows, and Fig. 7 is a sectional view taken on the line *z z* of Fig. 5 and looking in the direction of the arrows.

In the said drawings the motor head or casing is indicated as a whole by the reference numeral 1 and is constructed in two

parts or sections, numbered, respectively, 2 and 3. The rear section 2 is reduced in diameter at its forward end, said reduced portion being threaded, as shown at 4, and terminating in a shoulder 5. The front section 3 is hollow and of an external diameter corresponding with that of the rear section, its internal diameter being such that its internally-threaded rear portion fits upon the thread 4, its end abutting against the shoulder 5. The rear section 2 is provided at its rear end with a threaded flange 6, adapted to receive a coupling 7, by means of which the hose 8 is connected thereto. Said rear section is also provided with a transverse diaphragm 9, through which are formed inclined passages 10, which serve to direct the motor fluid against the wheel at the proper angle. In the front face of the diaphragm 9 there is formed a central recess 11, in which fits snugly a bearing-cup 12, the fit being such as to prevent the cup from moving therein under ordinary circumstances, but permitting it to be readily adjusted or removed. The adjustment is effected by means of a screw 13 passing from the rear of the diaphragm 9 through a threaded aperture in said diaphragm, so that its front end bears against the back of the cup 11, while its rear end is readily accessible from the back of the motor head or casing when the coupling or hose is detached to permit the desired adjustment to be effected. A lock-nut 14 is mounted on the projecting end of the screw 13 and serves to hold the same in position after adjustment. The front section 3 of the casing is, as heretofore stated, hollow, so as to form a chamber 15 within which the water-wheel is mounted. This chamber is closed at the rear by the diaphragm 9 and at the front by a diaphragm 16, which forms the front end of the front section 3. The motor fluid is admitted to said chamber through the apertures 10 and passes out of said chamber through openings 17 in the part 16. Said diaphragm 16 is provided in its rear face with a recess 18, in which is seated a bearing-cup 19, which fits tightly in said recess, but is removable therefrom.

The water-wheel or turbine is indicated at 20, and comprises a body portion or hub 21 and marginal inclined blades or vanes 22. The body portion is provided in its front and rear faces with recesses 23 and 24, respectively, in which are seated bearing-cones 25 and 26, respectively. These cones fit said seats with sufficient exactness to be retained therein under ordinary conditions, but are capable of removal when necessary. The cone 25 coöperates with the cup 19 in the front section of the head or casing 1, while the cone 26 coöperates with the cup 12 in the rear section of the motor head or casing 1. A plurality of bearing-balls 27 is located between the cup 19 and cone 25, and a similar plurality of bearing-balls 28 is located between the cup 12 and the cone 26. The water-wheel is thus supported between ball-bearings which, along with the wheel itself, are inclosed within a chamber within the motor head or casing, and said head is separable, so as to permit ready access to the wheel and bearings, each section of the head carrying a member of one of the bearings, while the water-wheel carries one member of each bearing.

Secured to the water-wheel and rotating therewith is a shaft 29, which may be fastened to the shaft by means of a pin 30 passing through the body 21 of the wheel and through the shaft. Said shaft projects forward from the wheel through the cone 25 and cup 19 and through a central opening 31 in the diaphragm 16, which closes the front end of the front section 3 of the motor head or casing. The motor is especially devised for use with boiler-tube cleaners of the well-known type shown in the accompanying drawings, and in the present instance the projecting front end of this shaft is threaded to receive a cutter-head 32, having a threaded recess 33, into which the front end of the wheel-shaft 29 screws. Said cutter-head is preferably of increasing diameter forward, being contracted at the rear, so as not to obstruct the water as it issues from the openings 17, and serving by its outwardly-inclined sides to direct the issuing streams of water against the inner wall of the tube which is being operated on.

The general operation of this type of cleaner is well known, and therefore requires no description. It will of course be understood that the front bearing takes the thrust of the impact of the water against the water-wheel, while the rear bearing takes the thrust of the resistance which the scale offers to the advance of the cleaner. It will also be noted that this latter thrust is in the particular construction shown transmitted directly from the cutter-head to the rear bearing-cone, the said cone being for this purpose so constructed as to abut directly against the end of the shaft 29, being preferably made to fit over the reduced rear end thereof, as shown. It will be seen that the water-wheel and its bearings are

thoroughly inclosed and protected by the separable motor head or casing, while the sections of said head or casing may be readily separated to give access to the wheel and bearings. The parts subject to wear may thus be readily inspected, removed, and renewed, if necessary, and are thoroughly protected when in use. The enlarged forward end of the cutter-head further aids in protecting said parts from injury or clogging, and said cutter-head may be readily detached and replaced when necessary. The water-wheel and its shaft are so connected as to be readily removable together, and the shaft forms no part of, nor is it attached to, the motor-casing, a feature which is a material advantage in structures of this character. It will at once be seen that when the bearings become so worn as to need adjustment such adjustment may be readily effected as to both bearings by turning the adjusting-screw 13, to which access may be readily had when the casing 1 is disconnected from the coupling 7.

Various modifications in the details of construction may be made without departing from the principle of my invention. For instance, I have shown in Figs. 5, 6, and 7 a structure similar in its general character to that just described, but adapted for tubes of larger diameter. In this construction the motor-casing (indicated at 38) is enlarged immediately in front of its connection with the coupling, thus forming a water-chamber 39 back of the diaphragm 40 and permitting the use of a larger and more powerful water-wheel. I have also shown in this construction a modification of the ball-bearing, said modification being illustrated in Fig. 5 as applied to the front bearing. In this construction I employ instead of a cup and cone two bearing-cups 41 and 42, which have a V-shaped groove. This simply amounts to the substitution of a four-point bearing for the three-point bearing, and either form may be used in either of the two bearings. In view of these obvious modifications and others, which will readily suggest themselves to those skilled in the art, I do not wish to be understood at limiting myself to the precise details hereinbefore described, and shown in the accompanying drawings.

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

1. A turbine-motor for boiler-tube cleaners, comprising a head or casing consisting of two separable sections, the rear section having at its front end a diaphragm with passages there-through to direct the motor fluid against the wheel, the forward section having at its front end a diaphragm with openings for the passage of the motor fluid, said diaphragms defining the front and rear ends of a chamber within said casing, a turbine-wheel located in said chamber and supported directly on front

and rear bearings carried by the front and rear diaphragms respectively, and a shaft fixedly connected with said wheel, projecting loosely through the front diaphragm, and adapted to receive a cleaner-head on said projecting end, substantially as described.

2. A turbine-motor for boiler-tube cleaners, comprising a head or casing consisting of two separable sections, the rear section having at its front end a diaphragm with passages there-through to direct the fluid against the wheel, the forward section having at its front end a diaphragm with openings for the discharge of the motor fluid, said diaphragms defining the front and rear ends of a chamber within said casing, a turbine-wheel located in said chamber, each diaphragm having a removable ball-cup mounted therein, the wheel carrying cooperating bearing members removably mounted on its opposite sides, a plurality of bearing-balls mounted in each cup, and a shaft fixedly connected with said wheel, projecting loosely through the front diaphragm, and adapted to receive a cleaner-head on said projecting end, substantially as described.

3. A turbine-motor for boiler-tube cleaners, comprising a head or casing consisting of two separable sections, the rear section open at its rear end to receive a supply connection and having at its front end a diaphragm with passages therethrough to direct the motor fluid against the wheel, the forward section having at its front end a diaphragm with openings for the discharge of the motor fluid, said diaphragms defining the front and rear ends of a chamber within said casing, a turbine-wheel located in said chamber, each diaphragm having a removable ball-cup mounted therein, the wheel carrying cooperating bearing members removably mounted on its opposite sides, a plurality of bearing-balls mounted in each cup, an adjusting-screw passing axially through the rear diaphragm and bearing against the rear cup at its front end, its rear end being accessible for adjustment through

the opening at the rear end of the head, and a shaft fixedly connected with the wheel, projecting through the front diaphragm, and adapted to receive a cleaner-head on said projecting end, substantially as described.

4. A turbine-motor for boiler-tube cleaners of the character described, comprising a separable two-part casing having apertured diaphragms provided with bearing-cups, a plurality of bearing-balls in each cup, a turbine-wheel located in the chamber between the two diaphragms, said wheel carrying on its opposite sides bearing members cooperating with those of the diaphragms, and a shaft extending through the front diaphragm, adapted to receive a cleaner-head on its projecting end, and having its rear end extending through the wheel and abutting directly against the rear bearing member carried by said wheel, substantially as described.

5. A turbine-motor for boiler-tube cleaners, comprising a separable two-part casing having apertured diaphragms provided with bearing-cups, a plurality of bearing-balls in each cup, a turbine-wheel located in the chamber between the two diaphragms, said wheel carrying on its opposite sides bearing members cooperating with those of the diaphragms, a shaft extending loosely through the front diaphragm, adapted to receive a cleaner-head on its projecting front end, and having its rear end fixedly connected with the wheel, an adjusting-screw passing axially through the rear diaphragm, accessible at its rear end through the open rear end of the head and bearing at its front end against the rear bearing-cup, whereby the thrust of said screw may be transmitted directly to said shaft, substantially as described.

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

HENRY F. WEINLAND.

Witnesses:

WM. W. FETTER,
E. G. GROSS.