No. 730,994. PATENTED JUNE 16, 1903.

H. F. WEINLAND.

BOILER TUBE CLEANER.

APPLICATION FILED JUNE 13, 1902.

NO MODEL.

FIG. 1.

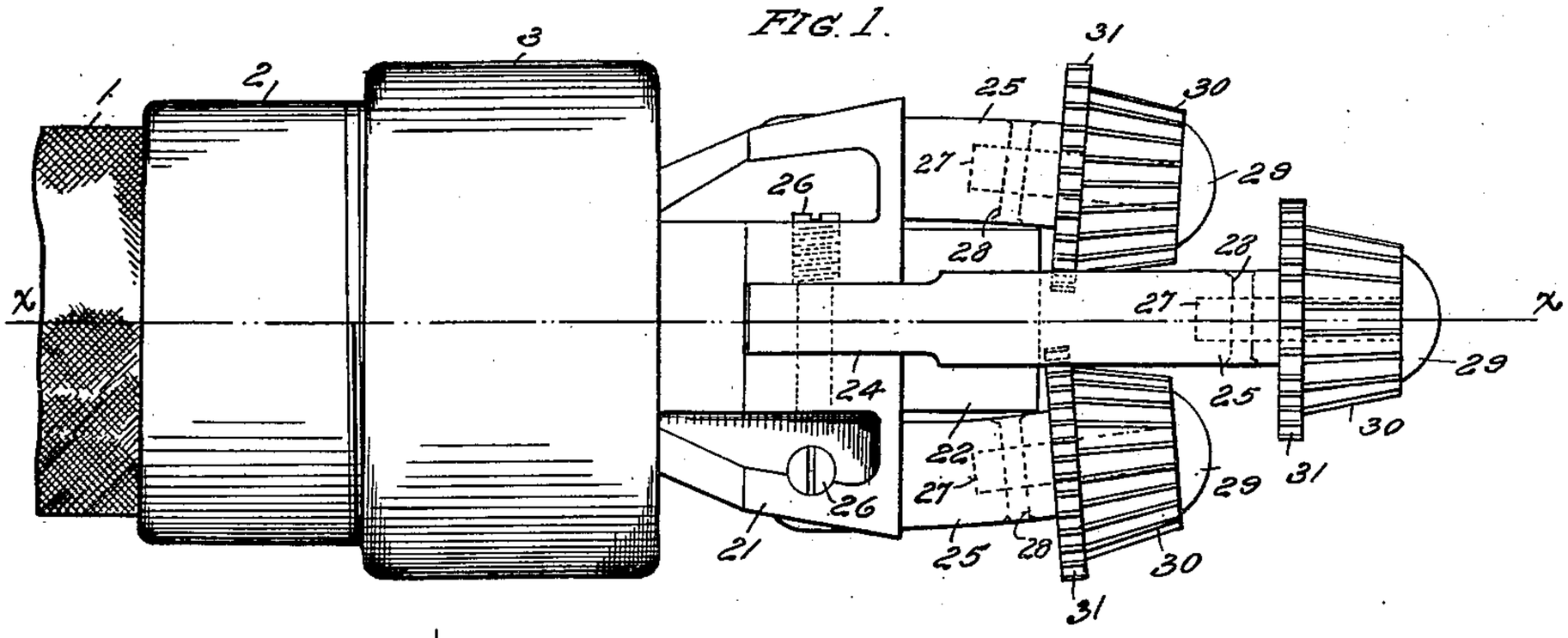


FIG. 2.

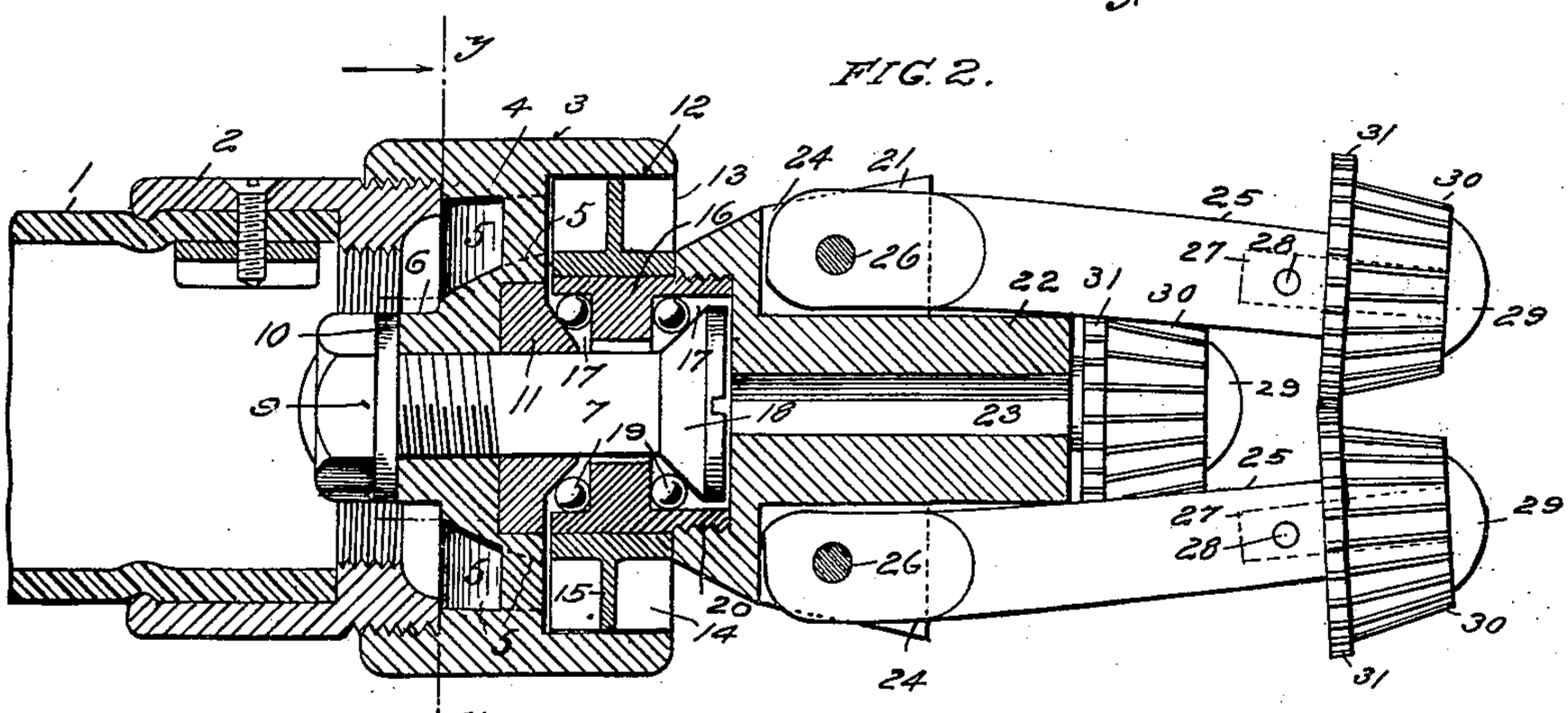


FIG. 3.

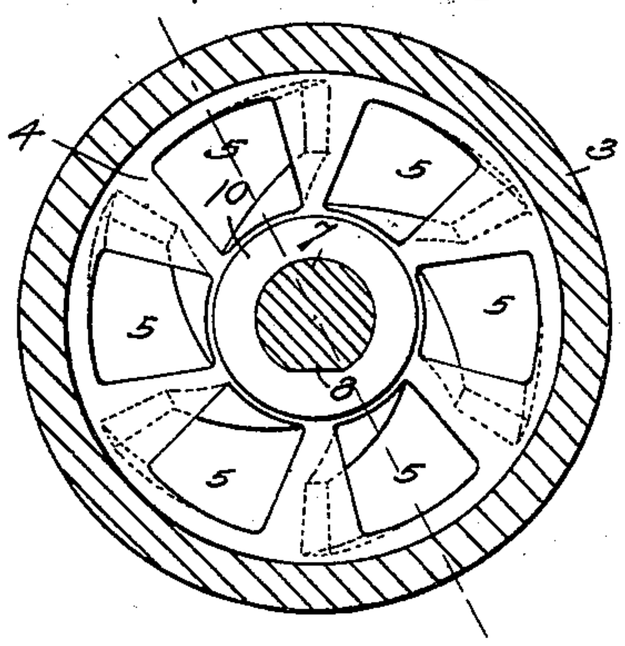
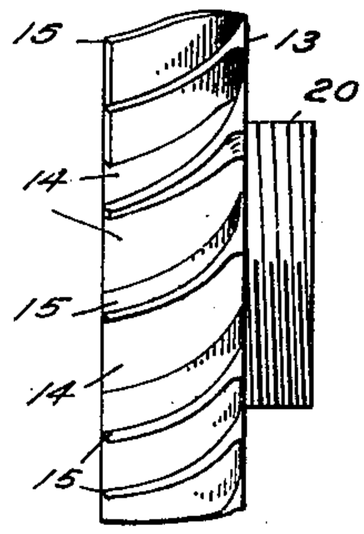


FIG. 4.



WITNESSES:
J. A. Dewey
Wm. O'Laughlin

INVENTOR,
Henry F. Weinland
F. A. Fowler
ATTORNEY.

No. 730,994. Patented June 16, 1903.

UNITED STATES PATENT OFFICE.

HENRY F. WEINLAND, OF SPRINGFIELD, OHIO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE LAGONDA MANUFACTURING COMPANY, OF SPRINGFIELD, OHIO, A CORPORATION OF OHIO.

BOILER-TUBE CLEANER.

SPECIFICATION forming part of Letters Patent No. 730,994, dated June 16, 1903.

Application filed June 13, 1902. Serial No. 111,440. (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 Boiler-Tube Cleaners, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to boiler-tube cleaners, and more particularly to that class of cleaners comprising a rotary water-motor or turbine, a hose for supplying the water, and arms connected to and rotating with the turbine, said arms being free to swing outward under the action of centrifugal force and carrying cutters whereby the scale is removed.

My present invention relates more particularly to the construction and mounting of the turbines and cutters, and has for its object to provide an improved bearing for the water-wheel, an improved type of cutter, and an improved connection between the cutters and water-wheel.

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 an elevation of a cleaner embodying my invention. Fig. 2 is a sectional view of the same, taken on the line $x\ x$ of Fig. 1. Fig. 3 is a sectional view taken on the line $y\ y$ of Fig. 2 and looking in the direction of the arrows, and Fig. 4 is an elevation of the water-wheel detached.

In said drawings, 1 indicates a hose or flexible water-supply pipe of any suitable construction, and 2 a coupling-sleeve, the connection between the two being preferably that set forth in Letters Patent No. 696,038, granted March 25, 1902, to Elmer E. Grove, assignor to The Lagonda Manufacturing Company. This coupling-sleeve is externally threaded at its forward end to receive a head 3, which screws thereon or is otherwise suitably connected thereto. This head has a central diaphragm 4, through which are formed water-passages 5, inclined in the manner usual in turbines of this class and forming the fixed or non-rotating portion of the turbine. The head is also provided with a central boss or cup 6, in which is mounted a spindle 7, flattened on one side, as indicated at 8, to prevent its rotation and secured in position by a nut 9 and washer 10 on its rear end.

11 indicates a bearing-cone seated and secured in the front end of the hub of the head 3, which head is provided with a recess 12 to receive the turbine or water wheel 13, which latter is provided with the usual inclined water-passages 14 and intermediate blades 15. The turbine is preferably constructed in two parts, the main or body portion constituting the wheel proper, while the central portion consists of a collar 16, having ball-races 17 formed in its opposite faces. The body of the water-wheel is separable from the collar 16, the two being united in any suitable manner for this purpose—as, for instance, a driving fit. The spindle 7 is provided at its outer end with a bearing-cone 18, and two sets of balls 19 are employed, located in the ball-races 17 between said races and the cones 11 and 18, respectively. The hub of the water-wheel is provided with a forwardly-extending threaded portion 20, on which is screwed a cutter-head 21 of forwardly-increasing diameter as to its body portion, its maximum diameter near its outer end being almost equal to that of the main head 3. This cutter-head is provided with a forward extension 22, and a lubricating-passage 23 extends through said extension and the body of the cutter-head, so as to permit lubrication of the bearings of the water-wheel. The forwardly-extending threaded portion 20 forms a part of the collar 16, and the rear end of the cutter-head is recessed, as shown, so that there is formed a chamber inclosing the bearing-cone 18 and bearing-balls 19, which chamber is supplied with lubricant through the passage 23, said lubricant passing to the bearing on the other side of the

water-wheel through the space between the fixed spindle and the collar 16. The cutter-head 21 is radially slotted at its margin, as indicated at 24, and in these slots are pivoted the cutter-arms 25. The pivot-pins are indicated at 26 and are, it will be noted, transverse to the axis of rotation of the cutter-head. The arms are preferably of different lengths, and in the present instance I have shown four cutter-arms, two of which are relatively short, while the other two are relatively long. Each cutter-arm is provided at its forward end with a cutter-spindle 27, secured in place by a pin 28 and provided with an enlarged head 29 at its forward end. On the projecting part of this spindle is mounted so as to rotate thereon the cutter, which consists of two independent parts, comprising a forward portion 30, having the form of a truncated cone with radial cutting-teeth, and a rear portion 31 in the shape of a disk or section of a cylinder of greater diameter than the base of the cone constituting the forward portion, and also provided with radial cutting-teeth on its periphery.

The operation of the cleaner will be well understood by those skilled in the art, the cleaner being attached to the end of the hose and introduced into the boiler-tube, in which it advances as it cuts away the scale, the cutters being thrown outward by centrifugal force as they rotate.

I have found by experience that the particular form of cutter set forth is of high efficiency, the truncated shape of the forward part operating to cut in a path of gradually-increasing diameter and the work being finished by the disk-shaped rear portion of the cutters. The cutters and their spindles are readily removed from the cutter-arms by taking out the pins 28 and the cutter-arms themselves are readily removed from the cutter-head by taking out the pins 26. The cutter-head itself can be readily detached from the water-wheel by simply unscrewing it. It will thus be seen that the several parts most subject to wear are readily removable piece by piece, so that any worn part may be removed and replaced without affecting the other parts, while the entire cutter-head may be removed and replaced when necessary. It will be understood, of course, that these parts are much more subject to wear than the main head or water-wheel and require more frequent renewal. The enlarged diameter of the forward end of the cutter-head protects the water-wheel and main head from injury in an obvious manner. The double ball-bearings provided for the water-wheel serve to relieve the friction arising from the thrust in both directions, the forward thrust being due to the friction of the water and the rearward thrust being due to the resistance of the scale. The several parts of the bearing are readily separable and may be renewed when worn without the necessity of discarding the water-wheel or main wheel, which are less subject to wear.

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

1. A boiler-tube cleaner of the character described, comprising a main head having a transverse diaphragm provided with water-passages, said head having a recess in its forward end in front of said diaphragm, and the front face of the diaphragm having a removable bearing-cone mounted therein, a removable non-rotating spindle mounted in said diaphragm and projecting forward therefrom, its front end being provided with a reverse bearing-cone, a water-wheel mounted to rotate in the recess in the head and provided with a removable hub having ball-races in its opposite faces and a threaded forward extension, and a cutter-head provided with centrifugally-acting cutter-carrying arms and having in its rear face a threaded recess to receive the hub extension and inclose the front bearing, substantially as described.

2. A boiler-tube cleaner of the character described, comprising a main head having a transverse diaphragm provided with water-passages, said head having a recess in its forward end in front of said diaphragm, and the front face of the diaphragm having a removable bearing-cone mounted therein, a removable non-rotating spindle mounted in said diaphragm and projecting forward therefrom, its front end being provided with a reverse bearing-cone, a water-wheel mounted to rotate in the recess in the head and provided with a removable hub having ball-races in its opposite faces and a threaded forward extension, and a cutter-head provided with centrifugally-acting cutter-carrying arms and having in its rear face a threaded recess to receive the hub extension and inclose the front bearing, said recess forming an oil-chamber, and the cutter-head being provided with a forward extension having a lubricating-passage communicating with said oil-chamber, substantially as described.

3. A boiler-tube cleaner of the character described, comprising a main head having a transverse diaphragm provided with water-passages, said head having a recess in its forward end in front of said diaphragm, and the front face of the diaphragm having a removable bearing-cone mounted therein, a removable non-rotating spindle mounted in said diaphragm and projecting forward therefrom, its front end being provided with a reverse bearing-cone, a water-wheel mounted to rotate in the recess in the head and provided with a removable hub having ball-races in its opposite faces and a threaded forward extension, and a cutter-head provided with centrifugally-acting cutter-carrying arms and having in its rear face a threaded

recess to receive the hub extension and inclose the front bearing, said cutter-head having a body portion fixed relatively to the water-wheel and of forwardly-increasing diameter, substantially as described.

4. In a boiler-tube cleaner, the combination, with a rotating cutter-head, of centrifugally-acting arms pivoted thereon, and cutters rotatably mounted on the free ends of said arms, each cutter comprising two independently-rotating sections, the forward section of truncated conical shape and the rear section of disk shape and of greater diameter than the forward section, each section being provided with radial peripheral cutting-teeth, substantially as described.

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

HENRY F. WEINLAND.

Witnesses:
E. O. HAGAN,
IRVINE MILLER.