H. F. & H. G. WEINLAND.

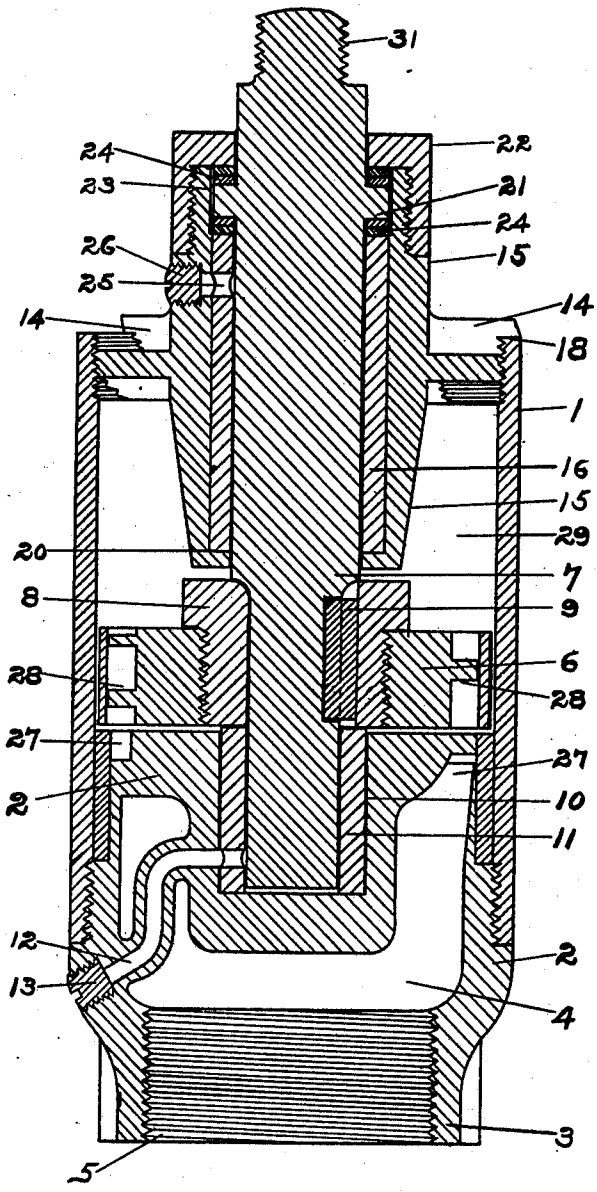
TURBINE FOR DRIVING BOILER TUBE CLEANERS.

APPLICATION FILED AUG. 12, 1908. RENEWED OCT. 21, 1910.

978,089. Patented Dec. 6, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

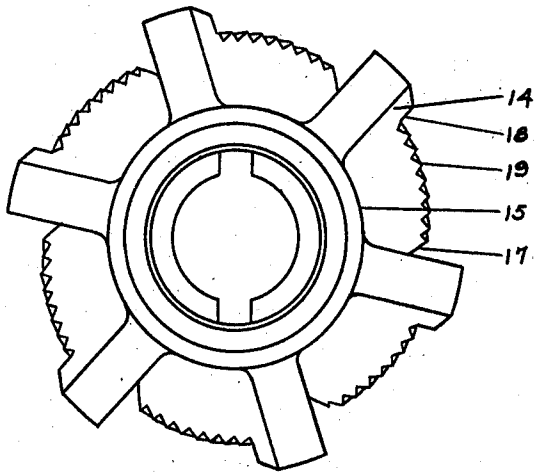


Fig. 4.

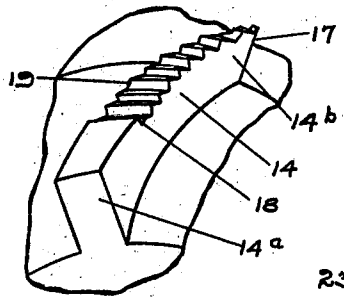


Fig. 5.

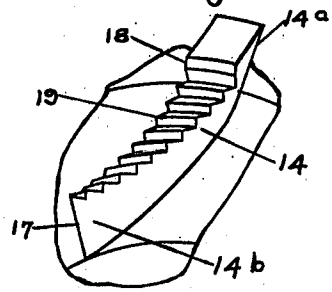
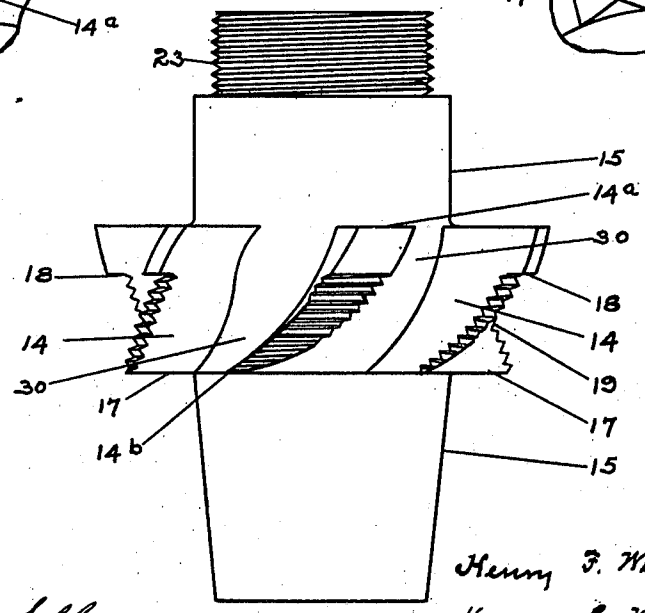


Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY F. WEINLAND AND HERMON G. WEINLAND, OF SPRINGFIELD, OHIO, ASSIGNORS TO THE LAGONDA MANUFACTURING COMPANY, OF SPRINGFIELD, OHIO, A CORPORATION OF OHIO.

TURBINE FOR DRIVING BOILER-TUBE CLEANERS.

978,089. Specification of Letters Patent. Patented Dec. 6, 1910.

Application filed August 12, 1908, Serial No. 448,142. Renewed October 21, 1910. Serial No. 588,370.

To all whom it may concern:

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

Our invention relates to turbines for driving boiler tube cleaners and more particularly to a turbine that is carried through the tube with the cleaner, although it may be used for other purposes. In turbines of this class, where a front bearing is employed, it is necessary to provide openings through the head for the discharge of the motive fluid and it follows that the bearing must be carried by ribs or webs and obviously, unless other means are employed, said ribs or webs must be of sufficient length to give the necessary strength to answer the purpose for which they are provided; but in practice we have found that by elongating the webs the increased length of the discharge openings formed thereby causes so much friction as to seriously impair the efficiency of the turbine, it being very essential that the discharge from the turbine be as free as possible.

The object of our invention is to provide an improved bearing of such construction as to withstand the shocks and jars incident to its use and at the same time admit of a free discharge of the motive fluid with the least possible friction.

A further object is to provide improved means for mounting the runner on the shaft.

A further object is to provide a thrust bearing in the front end of the turbine to take the end thrust in both directions and in practice we have found this construction gives improved results.

With these and other objects in view our invention consists of the constructions and combinations hereinafter described and set forth in the claims.

In the accompanying drawings Figure 1 is a longitudinal section of a turbine embodying our invention. Fig. 2 is an enlarged front view of the discharge head. Fig. 3 is a side view of the same and Figs. 4 and 5 are details showing different views of the arms of the discharge head, said views being taken in opposite directions.

Like numerals represent the same parts in the several views.

In the drawings 1 represents the casing of a turbine and 2 a feed head therefor secured to the casing by screw threads as shown. Said head has a rearward extension 3 and a chamber 4 with a screw threaded inlet 5 to which the feed hose can be attached. A runner 6 is mounted on a shaft 7 and we preferably provide said runner with a hub 8 screw threaded therein as shown, made of harder material than the runner to withstand the chatter and wear on it by the key 9 which secures it to the shaft. A recess 10 in the feed head 2 which is preferably provided with a bushing 11, forms a rear bearing for the shaft; and a conduit 12 with a screw cap 13 provides means for lubricating said bearing.

To form a front bearing for the shaft and at the same time give a free discharge for the turbine we provide a discharge head in the form of a spider having arms 14 and oppositely extending hubs 15, preferably provided with a removable bushing 16, to carry the shaft. The oppositely extending hubs give increased strength and stability to the bearing without impairing the freedom of discharge. And further, we have found that when the discharge openings through the head are parallel with the axis of the turbine the water strikes the side walls of the openings, rebounds, forms eddies and interferes with the discharge; and for this reason we preferably arrange the arms 14 so as to form the discharge openings 30, between the same, at an inclination to longitudinal lines of the turbine; and said openings are preferably curved forming a spiral discharge as particularly shown in Figs. 2 and 3; and further, we taper the arms 14 from their discharge ends 14^a toward their receiving ends 14^b and preferably sharpen the receiving edges 17 of the arms as particularly shown in Figs. 4 and 5, whereby the water as it comes from the runner is received and pours through the discharge openings in an uninterrupted current with the least possible friction. Shoulders 18 are formed on the arms 14 and the reduced portions 19 of the arms are screw threaded into corresponding screw threads of the casing 1, with the shoul-

ders 18 against the end of the casing. It will be further seen that by inclining the arms as shown the screw threaded connection with the casing is substantially continuous in planes transverse to the axis of the turbine, which secures the head to the casing more firmly than if the discharge openings were longitudinal with the axis of the turbine.

The bushing 16 abuts at its rear end on an internal shoulder 20 of the hub and receives the end thrust on the shaft collar 21 in one direction; and a cap 22 screw threaded on a reduced portion 23 of the hub receives the end thrust in the opposite direction, the disks or washers 24 being preferably interposed between the collar and bushing and the collar and cap as shown. A conduit 25 having a cap 26 provides means for lubricating the front and thrust bearings.

The actuating medium passes through the inlet 5, the chamber 4 and ports 27 of the feed head 2 to buckets 28 of the runner 6 in a well known manner and is discharged through the chamber 29 and inclined openings 30 of the discharge head as hereinbefore described.

The flue cleaner or other machine to be driven can be secured to the screw threaded end 31 of the shaft.

Having thus described our invention, we claim:

1. In a turbine such as described, a casing, a runner, a driving shaft, a feed head, a discharge head having openings therethrough, one of said openings being formed with a shoulder, a bushing in said opening in which said shaft is journaled, said bushing being held against longitudinal movement by abutting at one end against said shoulder and means constantly engaging the opposite end to form a thrust bearing, substantially as described.

2. In a turbine such as described, a casing, a runner, a driving shaft having a collar thereon, a feed head, a discharge head having openings therethrough, one of said openings being formed with a shoulder, a bushing in said opening in which said shaft is journaled, said bushing being held against longitudinal movement by abutting at one end against said shoulder and means to hold said collar constantly against the other end of said bushing forming a thrust bearing to take the end thrust in both directions, substantially as described.

3. In a turbine such as described, a casing, a runner, a driving shaft having a collar thereon, a discharge head having central oppositely extending hubs with an opening therethrough and an inwardly extending flange projecting from the rearwardly extending hub forming a shoulder in said opening, a bushing in said opening in which said shaft is journaled, said bushing resting at one end against said shoulder and means to hold said collar constantly against the other end of said bushing to form a thrust bearing to take the end thrust in both directions, substantially as described.

4. In a turbine such as described, a casing, a runner, a driving shaft having a collar thereon, a discharge head having an opening with a shoulder and a bushing therein abutting on said shoulder in which said shaft is journaled, said collar bearing against the opposite end of said bushing to take the end thrust in one direction and a removable member secured to said head bearing constantly against the opposite side of said collar to take the end thrust in the opposite direction, substantially as described.

5. In a turbine such as described, a casing, a runner, a driving shaft having a collar thereon, a feed head, a spider removably secured to the discharge end of the casing and having oppositely extending hubs, said hubs having an opening with a shoulder and a bushing therein abutting on said shoulder forming a bearing for the shaft, a reduced portion on said hub, a cap secured thereto and spacing rings between the bushing and collar and between the collar and cap, substantially as described.

6. In a turbine such as described, a casing, a runner, a driving shaft, a feed head, a discharge head forming a bearing for the shaft and having discharge openings at an inclination to longitudinal lines of the turbine, the walls between said openings being tapered toward their receiving ends, substantially as described.

7. In a turbine such as described, a casing, a runner, a driving shaft, a feed head, a discharge head forming a bearing for the shaft having curved discharge openings at an inclination to longitudinal lines of the turbine, with the receiving edges of the walls of the openings sharpened, substantially as described.

8. In a turbine such as described, a casing, a runner, a driving shaft, a feed head, a discharge head having a removable bushing forming a bearing for the shaft and discharge openings at an inclination to longitudinal lines of the turbine, the walls between said openings being tapered toward their receiving ends, substantially as described.

9. In a turbine such as described, a casing, a runner, a driving shaft, a feed head, a discharge head having a removable bushing forming a bearing for the shaft and discharge openings at an inclination to longitudinal lines of the turbine with the receiving edges of the walls of the openings sharpened, substantially as described.

10. In a turbine such as described, a casing, a runner, a driving shaft, a feed head, a discharge head with oppositely extending

hubs forming a bearing for the shaft and discharge openings at an inclination to longitudinal lines of the turbine, the walls between said openings being tapered toward their receiving ends, substantially as described.

11. In a turbine such as described, a casing, a runner, a driving shaft, a feed head, a discharge head with oppositely extending hubs, a removable bushing therein forming a bearing for the shaft and discharge openings at an inclination to longitudinal lines of the turbine, the receiving edges of the walls of the openings being sharpened, substantially as described.

12. In a turbine such as described, a casing, a runner, a driving shaft having a collar thereon, a feed head, a discharge head with oppositely extending hubs removably secured to the casing and having discharge openings at an inclination to longitudinal lines of the turbine with the receiving edges of the walls of the openings sharpened, said hubs having an opening with a shoulder and a bushing therein abutting on said shoulder forming a bearing for the shaft, a reduced portion on said hub, a cap secured thereto and spacing rings between the bushing and collar and between the collar and cap, substantially as described.

13. In a turbine, a casing having an internal screw thread, a runner, a driving shaft, a feed head, a discharge head comprising a central hub forming a bearing for the shaft, said hub having arms inclined to longitudinal lines of the turbine forming discharge openings, said arms having screw threaded reduced portions and shoulders, the screw threaded portions securing the head to the casing with the shoulders bearing against the end of the casing, substantially as described.

14. In a turbine such as described, a casing, a runner, a feed head and a discharge head having a plurality of openings forming a spiral discharge, the walls between said openings being tapered toward their receiving ends, substantially as described.

15. A turbine having a casing of suitable diameter for insertion in a boiler tube, a runner, a driving shaft having a collar thereon, a feed head, a discharge head having central oppositely extending hubs with an opening therethrough and an inwardly extending flange projecting from the rearwardly extending hub forming a shoulder in said opening, a bushing in said opening abutting said shoulder forming a bearing for said shaft, a cap secured to a reduced screw threaded portion of the forwardly projecting hub, with its outer surface flush with the outer surface of said hub, affording a free discharge from the discharge openings which extend through the discharge head outside said hub, spacing rings between said bushing and collar and between said collar and cap, substantially as described.

In testimony whereof, we hereunto affix our signatures in the presence of two witnesses.

HENRY F. WEINLAND.
HERMON G. WEINLAND.

Witnesses:
MAURICE M. SELLERS,
CARL CASKEY.