

901,940.

Patented Oct. 27, 1908.

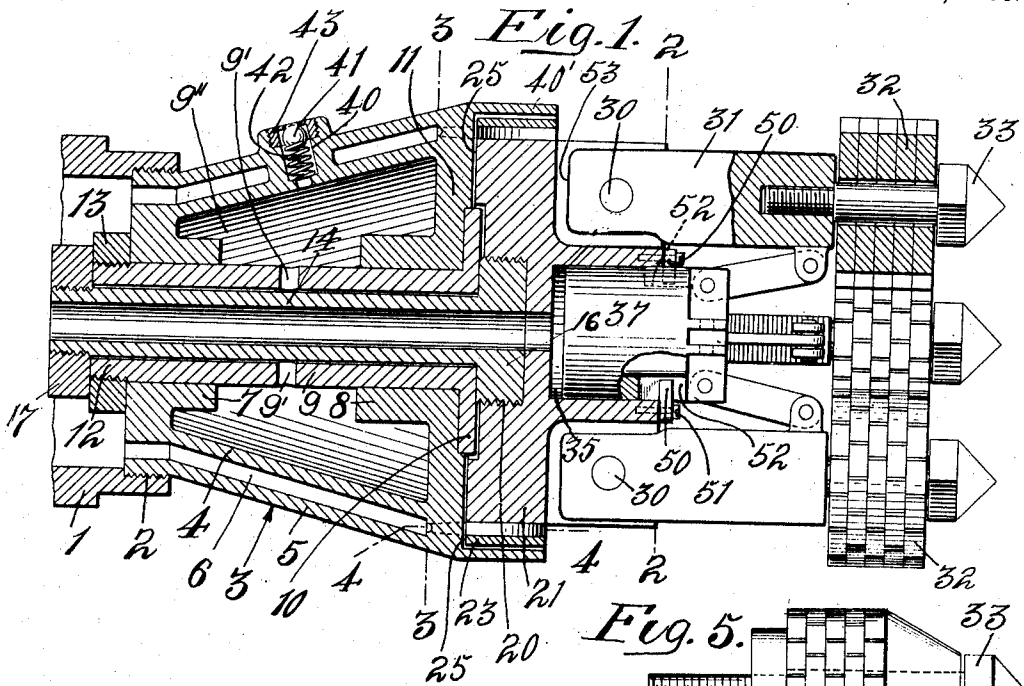


Fig. 2.

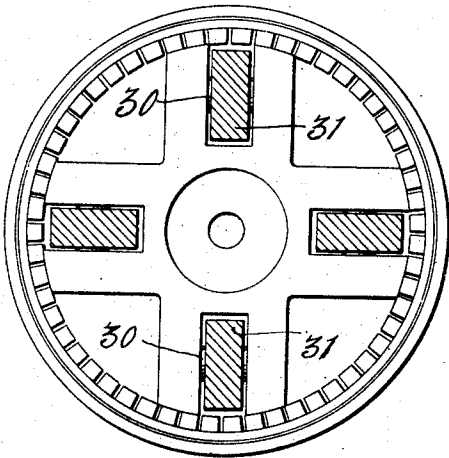
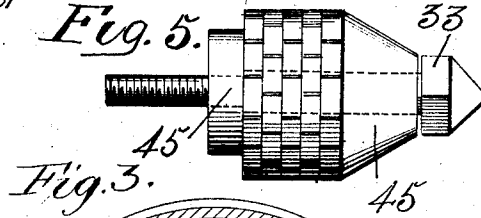
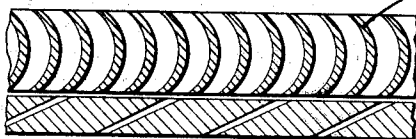


Fig. 5.



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UNITED STATES PATENT OFFICE.

THOMAS ANDREWS, OF ROCKAWAY, NEW JERSEY, ASSIGNOR TO THOMAS ANDREWS MANUFACTURING COMPANY, OF ROCKAWAY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TUBE-CLEANER.

No. 901,940.

Specification of Letters Patent.

Patented Oct. 27, 1908.

Application filed March 18, 1907. Serial No. 363,092.

To all whom it may concern:

Be it known that I, THOMAS ANDREWS, a citizen of the United States, residing at Rockaway, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Tube-Cleaners, of which the following is a full, clear, and exact specification.

This invention relates to tube cleaners.

10 The objects of the invention are to improve and simplify the construction of such devices; furthermore, to increase their efficiency in operation, and to decrease the expense attending their manufacture.

15 With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter set forth, it being understood that changes in the precise embodiment of invention herein disclosed can be made within the scope of the following claims without departing from the spirit of the invention.

25 In the accompanying drawing forming part of this specification Figure 1 is a longitudinal section, partly in elevation, through a tube cleaner constructed in accordance with the invention. Fig. 2 is a transverse section on the line 2—2 of Fig. 1. Fig. 3 is a similar section on the line 3—3 of Fig. 1. Fig. 4 is a section on the line 4—4 of Fig. 1. Fig. 5 is a detail view of a modified means of securing the cutting disks in position.

35 Like reference numerals indicate corresponding parts in the different figures of the drawings.

The reference numeral 1 indicates a fluid chamber, which may be of any suitable form and construction and is adapted to be connected with any suitable source of fluid supply. Threaded into or otherwise connected with the fluid chamber 1 as indicated at 2, is a head which is designated generally by 3. The head 3 preferably is frusto-conical in shape and is formed with an inner wall 4, which preferably is annular in cross section and is flared from one end to the other, and an outer wall 5, which is parallel to the inner wall 4, and similarly shaped. The inner and outer walls 4 and 5 are separated from each other so as to provide a fluid passage 6, which communicates with the fluid chamber 1 and receives the fluid there-

from. The head 3 is provided with end bearings 7 and 8, the bearing 8 being at the inner end of the device, and the bearing 7 at the outer end thereof. Extending through the bearings 7 and 8, is a long, removable bushing 9, which is provided at its inner end with an integral flange or thrust-receiving member 10, which rests against the inner end 11 of the head and is partially seated in a shallow recess formed in said inner end 11. The opposite end of the long bushing 9 extends outward beyond the bearing 7 of the head, as indicated at 12, and is provided with a washer or thrust-receiving member 13, which is threaded on to or otherwise removably connected with the outer end of the bushing 9. The removable bushing 9 is formed intermediate its ends with one or more perforations 9', which communicate with an oil chamber 9". As shown in the drawing, the bushing 9 forms a portion of the inner wall of the oil chamber. Oil is supplied to the chamber 9" formed in the head 3 through a supply port 40, which is normally closed by a ball valve 41 pressed outward by a spring 42 against a removable cap 43. The supply port 40 extends outward through the walls 4 and 5 of the head and through the fluid supply passage 6, as shown clearly in Fig. 1.

Extending through the bushing 9 is a shaft 14, which is formed with a longitudinally-extending passage 15, so as to make it hollow. At its inner end the hollow shaft 14 is formed with an integral, thrust-receiving member 16, which is in contact with the integral thrust-receiving member 10 on the inner end of the bushing 9. At its outer end the hollow shaft 14 is provided with a nut or thrust-receiving member 17, which is threaded on to or otherwise suitably connected with the shaft 14 so as to be removable therefrom.

It will be noted that when the tube cleaner is being forced into a boiler tube having a heavy scale so that the thrust on the shaft 14 is in an outward direction, said thrust will be taken up by the thrust-receiving members 10 and 16, and when the tube cleaner is either removed from the boiler tube or else encounters no resistance, so that the fluid passing through the fluid passage 6 and striking the turbine causes the thrust on the shaft 14 to be in the opposite direction,

said thrust is taken up by the thrust-receiving members 13 and 17, as well as by the thrust-receiving portion 12 of the bushing 9, it being understood that the thrust-receiving member 17, as shown clearly in Fig. 1, is adapted to contact both with the end portion 12 of the bushing 9, and with the thrust-receiving member 13. In the event that either the bushing 9 or the shaft 14, or both, should become worn, these parts can be removed and replaced by taking off the thrust-receiving members 13 and 17, as will be obvious.

Detachably connected in any suitable manner, such as by screw threads 20 with the inner end shaft 14, so as to cover the same, is a turbine 21 having turbine blades 22, as shown in Fig. 4, around which blades is shrunk a metal band 23. As shown in Fig. 1, the inner end of thrust-receiving member 16 of the shaft 14 is threaded into a suitable socket in the turbine 21.

For the purpose of causing the motive fluid from the chamber 1 and flaring fluid passage 6 to impinge against the blades 22, a number of inclined fluid passages 24 are cut through the inner end 11 of the head 3, as shown clearly in Figs. 1 and 3 of the drawing.

The turbine 21 preferably is out of frictional contact with the end 11 of the head 3, as indicated at 25, for which reason there will be no friction or wear between the turbine 21 and the end 11 during the rotation of the turbine; but on the contrary, all the friction or wear will be taken up by the thrust-receiving members 10, 16, 12, 13, and 17, together with the shaft 14 and bushing 9, all of which parts can be readily replaced when worn, as previously described.

Pivotally connected in any suitable manner with the turbine 21, as indicated at 30, is a plurality of swinging arms, with each of which swinging arms is connected a plurality of cutting devices or disks 32, the disks 32 being secured on the swinging arms 31 preferably by means of bolts 33, threaded into the arms 31, and being readily removable, so that when the innermost disks 32 become worn, they can be shifted upon the bolts 33 so as to bring unworn disks into position on the inner ends of said bolts 33. In the modified construction shown in Fig. 5, the bolts 33, are provided with nuts 45 to hold the cutting disks in position.

In tube cleaners as generally constructed, it is customary to rely upon centrifugal force for throwing the arms 31 outwardly to bring the disks 32 into cutting position.

It is one of the objects of my invention to provide fluid-operated means for positively throwing the disks or cutting devices 32 into position. For the purpose of providing such fluid-operated means, the turbine 21 is formed with a chamber 35, which communicates through a passage 36 with the hollow

shaft 14. Slidably mounted in the chamber 35 is a piston 37, which is suitably connected by means, such as links 38, with the swinging arms 31. The turbine 21 is preferably housed within a tubular extension 40' formed on the inner end of the head 3.

When the device is in operation, it will be obvious that fluid, such as water, steam, and the like, passing outward through the flaring annular fluid passage 6, will strike and rotate the turbine 21. At the same time the fluid will pass through the hollow shaft 14, and will move the piston 37 inward so as positively to expand the arms 31, and thus throw the cutting devices 32 into position. For the purpose of limiting the outward movement of the arms 31, in the event that the power should be turned on before the cleaner should be inserted in the boiler tube, lugs or arms 50 are removably secured to the walls of the expansion chamber 35 by screws 51. The arms 50 project into slots 52 cut into piston 37 so as to limit the endwise movement of the piston, and thus limit the outward movement of arms 31. To aid this result further, the ends 53 of the arms 31 are so shaped as to be parallel with the adjacent portions of the turbine and expansion chamber, so as to contact therewith when the arms have moved outward a certain distance.

In tube cleaners as generally constructed, a very short bearing is provided for the shaft 14. As practically all the strain of the rotating cutting devices falls upon the shaft 14, a short shaft will become readily worn and will soon wobble in its bearing. In my device, on the contrary, I provide a shaft 14 and a bushing 9 which are of approximately the same length as the distance from the outer face of the turbine 21 to the innermost cutting disk 32, whereby the shaft 14 has a long bearing to support the lateral strains which fall thereon, and the strength of the tube cleaner is therefore materially increased.

The improved device is strong, simple, durable, and inexpensive in construction, as well as thoroughly efficient in operation.

Matter shown and described herein and not specifically claimed is reserved, being claimed in copending application Serial Number 359,947, bearing date of February 28, 1907.

What is claimed is:

1. A tube cleaner having cleaning devices and a head, with an oil chamber therein, and a bushing forming part of the inner wall of said oil chamber and having a perforation therein.

2. A tube cleaner having a head; a perforated bushing therein, a shaft in said bushing having cutters connected therewith, said head also having therein fluid-supply passages and an oil chamber, the latter being interposed between said bushing and said

fluid-supply passages, the inner wall of said head forming a portion of the wall of the chamber.

3. A tube cleaner having a head, with an oil chamber therein, a bushing forming part of the wall of said oil chamber and having a perforation therein, a shaft extending through said bushing, and cleaning devices connected with said shaft.

4. A tube cleaner having a head, with an oil chamber therein, a bushing forming a portion of the wall of said oil chamber and having a perforation therein, thrust-receiving members connected with the ends of said bushing, a shaft extending through said bushing and having thrust-receiving members at the ends thereof, and cleaning devices connected with said shaft.

5. A tube cleaner having a head, with a frusto-conical oil chamber therein, a bushing forming a portion of the inner wall of said oil chamber and having perforations intermediate the ends thereof, thrust-receiving members connected with the ends of said bushing, a shaft extending through said bushing and having thrust-receiving members co-acting with the thrust-receiving members of said bushing, a turbine connected with said shaft, cleaning devices connected with said turbine, and an annular fluid passage extending around said oil chamber.

6. A tube cleaner having a head, a bushing mounted in said head and having thrust-receiving members at both ends thereof, a shaft extending through the head and having a fluid-pressure chamber therein, a fluid-operated device operated by the pressure in the pressure chamber of said shaft, and cleaning devices connected with said fluid-operated device, substantially as described.

7. A tube cleaner having a head, a relatively-long bushing removably mounted in the head and having thrust-receiving members at both ends thereof, a shaft extending through the bushing and having a fluid-pressure passage therein, cleaning devices connected with said shaft, a cylinder connected with said shaft and communicating with the fluid-pressure passage therein, a piston in said cylinder, and means connecting said piston with said cleaning devices for throwing them positively outward.

8. A tube cleaner having a head, a bushing mounted in said head and having thrust-receiving portions at both ends thereof, a shaft extending through said bushing and having thrust-receiving portions to co-act with the thrust-receiving portions of the bushing, said shaft having a fluid passage therethrough, cleaning devices connected with said shaft, a cylinder connected with said shaft and communicating with the fluid passage thereof, and a piston mounted in said cylinder and means connecting said piston with said cleaning devices for throwing them positively outward.

9. A tube cleaner having a head, a bushing mounted in said head and having thrust-receiving members at the ends thereof, one of said thrust-receiving members having a threaded connection with said bushing, a shaft extending through said bushing and having thrust-receiving members at the ends thereof, one of said thrust-receiving members having a threaded connection with said shaft, a turbine having a threaded connection with said shaft, and cleaning devices connected with said turbine.

10. A tube cleaner comprising a head having an oil chamber and a fluid-supply passage, a bushing removably mounted in said head and having perforations therein communicating with said oil chamber, a shaft extending through said bushing, a turbine detachably connected with said shaft, arms pivotally connected with said turbine, and having portions thereof in parallelism with the adjacent portions of the turbine to limit the outward movement of said arms, said turbine having a chamber with lugs mounted on the walls thereof, a piston slidably mounted in said chamber and having slots to receive said lugs, links connecting said piston with said pivotally mounted arms, and cleaning devices detachably connected with said pivotally mounted arms.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

THOMAS ANDREWS.

Witnesses:

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