C. H. SHEPLER & J. W. SHEARER.

APPARATUS FOR CLEANING SMOKE TUBES OF MARINE AND OTHER MULTITUBULAR BOILERS.

APPLICATION FILED SEPT. 19, 1913.

1,139,910.

Patented May 18, 1915.

2 SHEETS—SHEET 1.

Fig. 5.

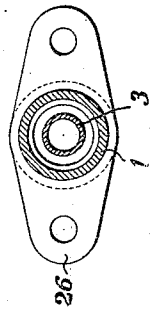


Fig. 4.

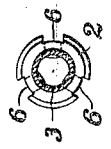


Fig. 3.

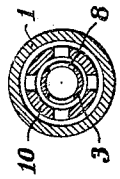


Fig. 1.

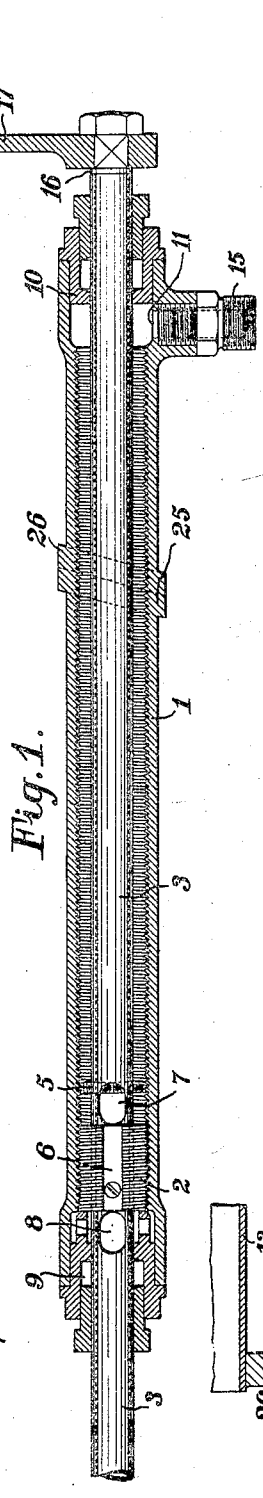


Fig. 2.

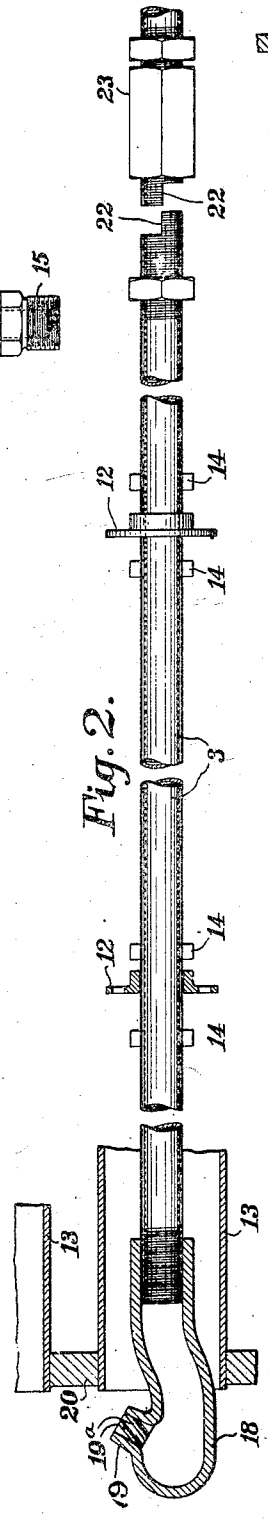
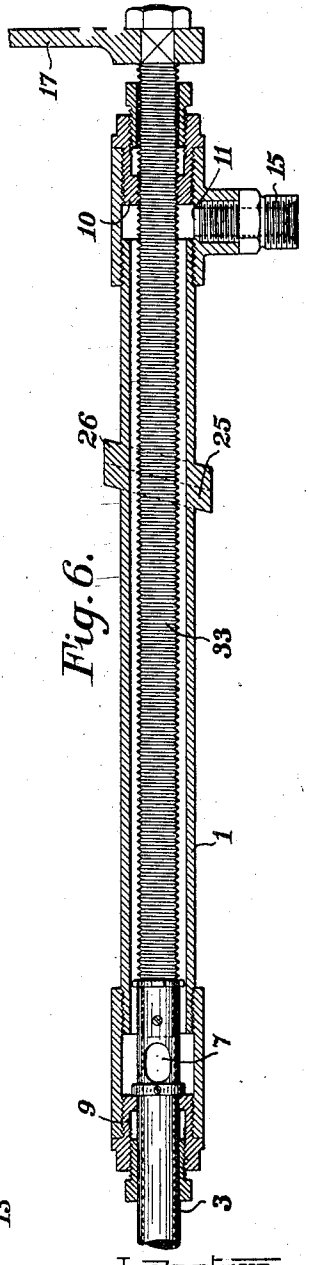


Fig. 6.



Witnesses

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APPARATUS FOR CLEANING SMOKE TUBES OF MARINE AND OTHER MULTITUBULAR BOILERS.

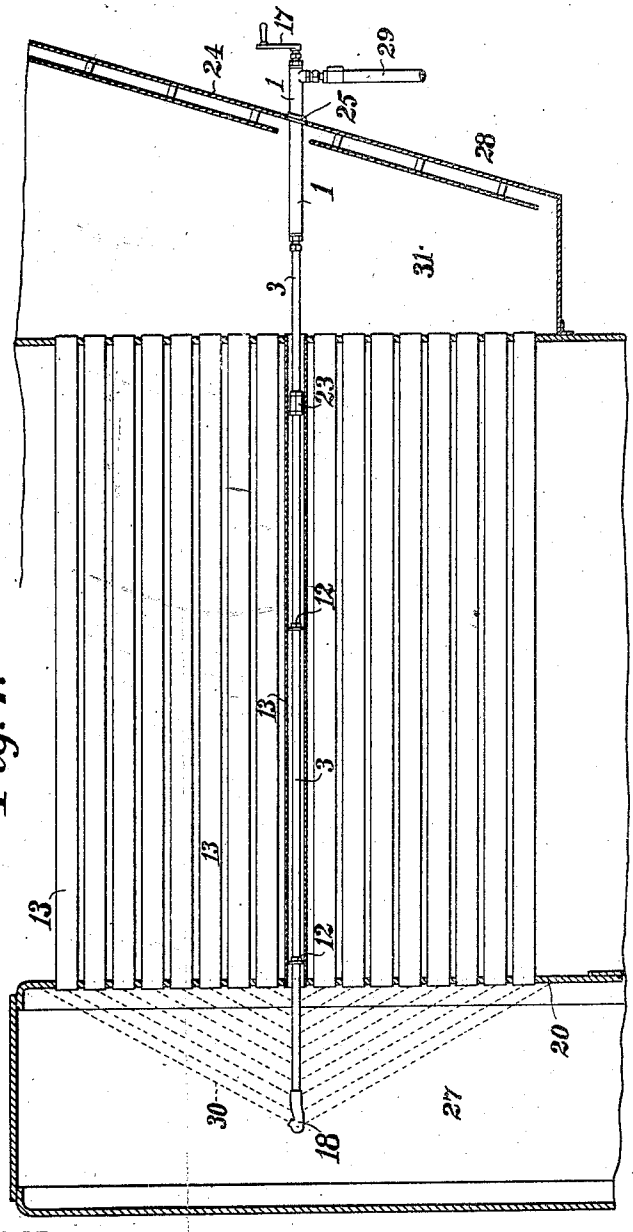
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Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CLEANING SMOKE-TUBES OF MARINE AND OTHER MULTITUBULAR BOILERS.

1,139,910. Specification of Letters Patent. Patented May 18, 1915.

Application filed September 19, 1913. Serial No. 790,692.

To all whom it may concern:

Be it known that we, CHARLES H. SHEPLER and JOSEPH W. SHEARER, the former a citizen of the United States, the latter a subject of the King of Great Britain, both residing at San Francisco, in the State of California, United States of America, have invented certain new and useful Improvements in Apparatus for Cleaning Smoke-Tubes of Marine and other Multitubular Boilers, of which the following is a specification.

This invention has for its object certain improvements in apparatus for cleaning the interior of the smoke tubes of marine and other multi-tubular boilers, the cleaning being effected by injecting a jet of steam or other fluid under pressure successively through each tube from the rear, to the smoke box at the front.

The invention is characterized by the feature that a hollow shaft or pipe passed through one of the smoke tubes and capable of being rotated and at the same time slowly advanced longitudinally, is provided at one end beyond the smoke tubes with a blower head projecting radially from the hollow shaft and adapted when the pipe is rotated to blow obliquely a jet of steam or other pressure fluid first into the tubes nearest to the one through which the hollow shaft is passed, and then by advancing the hollow shaft longitudinally so that the range of the nozzle is increased, and continuing to rotate it, the said nozzle will blow a jet of pressure fluid into all the other smoke tubes in turn, whereby the said smoke tubes or a series of them can be successively cleaned, without changing the center of rotation, or dismounting any of the parts.

In the accompanying drawings Figures 1 and 2 are longitudinal sections of the tube cleaner; Figs. 3, 4 and 5 are cross sectional detail views; Fig. 6 is a longitudinal section embodying a modification, and Fig. 7 is a general view partly in section showing our tube cleaner in use with a marine boiler.

A convenient way of carrying the invention into effect is shown in Figs. 1–5 and 7 wherein we provide a tubular member or barrel 1 which can be applied and fixed to some part of the boiler front and secured thereto in a suitable manner when it is required to clean the tubes. The bore of this barrel 1 is threaded inside to receive a cylindrical nut 2 which latter has its thread outside, so that it can be screwed into the threaded bore of the barrel 1, and is capable of being turned from end to end of the length of the barrel. Through this barrel and through the hollow nut is passed the hollow shaft or pipe 3. This hollow shaft 3 is a good deal smaller than the bore of the barrel 1 so as to leave plenty of clearance space between, for the passage of steam or other pressure fluid, but it fits tight into the center hole in the cylindrical nut 2. The nut is secured to the hollow shaft by set screws 4 riveted over so as to be a fixture, and therefore the rotation of the hollow shaft 3 will rotate the nut 2 and so advance the hollow shaft 3 longitudinally. Thus the nut 2 works solidly with the shaft 3 as regards both rotary and longitudinal movement. At the end of this nut 2, a port 7 is cut in the hollow shaft 3, so that steam or other pressure fluid may pass freely from the barrel into the hollow shaft, and a short distance in front of the nut a cross pin or abutment 5 is fixed to the hollow shaft, so as to project outside the same but within the barrel. The exterior of the nut 2 may have longitudinal channels 6 so that the pressure fluid may freely pass beyond the nut into the barrel at the other side. One object of this is to put the nut 2 more nearly in equilibrium. In this case a second port 8 may be cut in the hollow shaft 3 beyond the nut, so that pressure fluid passing through the channels 6 will enter the hollow shaft through this second port. At each end, the barrel 1 is provided with a stuffing box 9 with suitable packing through which the hollow shaft passes, thus not only affording lengthwise and rotary movement of the shaft while maintaining a fluid-tight joint about the moving part, but also forming bearings to support the hollow shaft in the central position within the barrel. This gives the hollow shaft a good bearing surface at the ends of the barrel, and provides adequate support thereto. A bush 10 in the stuffing box, acts as a check in connection with the traveler nut 2 or the cross pin 5 aforesaid, to prevent the admission port 11 for steam or other compressed fluid being blanked. At intervals beyond the barrel 1, the hollow shaft 3 is provided with collars 12 the same diameter as the interior of the smoke tube 13.

These collars form bearings for the hollow shaft when placed within a smoke tube. They are freely mounted on the hollow shaft, and their movement along the shaft longitudinally is limited by stop pins 14. Steam or other pressure fluid is admitted into the barrel 1 by a flexible pipe coupled to a suitable union 15 projecting from the barrel, preferably near its outer end.

The outer end of the hollow shaft is closed by a plug 16, and is provided on the outside with a handle 17 for rotating the tube 3. By turning this handle the hollow shaft 3 is rotated, and at the same time it is by means of the nut 2 slowly advanced longitudinally along the barrel 1. The inner end of the hollow shaft has a blower head 18 projecting radially from the shaft 3, and having a nozzle 19 projecting forwardly, *i. e.* toward the tube plate 20 but at an angle oblique to the axis of the hollow shaft 3. This nozzle has a series of coarse pitched grooves 19^a arranged to impart a whirling motion to the steam or other compressed fluid issuing at high velocity from the nozzle. The hollow shaft 3 is by preference made in two or more lengths so as to suit varying lengths of smoke tubes. These lengths are suitably coupled together at the adjacent ends, one length of hollow shaft being mounted in the barrel 1 as aforesaid with its two ends projecting out of the front and rear ends of the barrel, while another length carries the blower head 18 at its end. A convenient way of coupling the adjacent ends of the hollow shafts or pipes, is by means of a halving joint 22, so that the end of one length will lap onto the other length and be connected together by a union nut 23 screwed onto a thread cut on the adjacent ends, the thread on one length tallying with the thread on the other. Any suitable number of lengthening bars may be introduced, which bars are interchangeable, can be firmly coupled together, and at the same time can be readily uncoupled whenever desired.

The operation is as follows:—The barrel 1 is suitably fixed to the boiler front in line with the most central smoke tube, or the nearest possible to the most central. In connection with a marine boiler, the most convenient plan is to cut a hole in the center of the smoke box door 24 large enough to insert the barrel 1 into it, and provide a flange 25 on the outside of the barrel, arranged at an angle to correspond to the angle of the smoke box door. This flange is bolted to the door by the flanges 26 when the barrel is passed into the hole, so that the barrel 1 shall be fixed in position in line with the smoke tube 13. The hollow shaft 3 with the blower head 18 at the end is passed through the hole in the smoke box door 24 into a smoke tube 13, so that the nozzle projects a short distance beyond the back end of the smoke tube into the combustion chamber 27, and the barrel 1 at the front end is bolted as aforesaid to the smoke box door, the hollow shaft projecting somewhat at the stoke hold end 28. Then the flexible steam pipe 29 is coupled to the union on the barrel 1, and the apparatus is now in position for use. Steam or other compressed fluid, is turned on, and the operator turns the handle 17 at the front end, thus turning the blower head 18 at the rear end, and a jet of steam is blown into the smoke tubes 13. At the outset when the nozzle is close to the tube plate 20, the issuing jet of pressure fluid will only enter those smoke tubes nearest the axis of the hollow shaft 3, but the rotation of the handle not only turns the nozzle 18, but also advances the nozzle longitudinally, and consequently as the nozzle gets farther away from the tube plate 20, the range of the issuing jet 30 increases so that the steam or other pressure fluid, enters in turn those smoke tubes that are farther away from the hollow shaft 3, and so all the tubes are individually cleaned by the strong jet of steam blowing the soot outward from the rear into the smoke box 31 at the front, and with the assistance of the natural draft of the fires, most of this soot escapes into the atmosphere through the uptake. When all the smoke tubes have been cleaned, the handle 17 is turned the opposite way until the original position of the traveling nut 2 when starting, is reached, and the steam jet will now have gone twice over the entire range of the tubes and tube plate. The pressure fluid is now shut off, the apparatus pulled out of the smoke tube, the hole in the smoke box door closed, and the apparatus is then free for use in connection with another boiler or group of smoke tubes.

It must be understood that instead of there being only one nozzle in the blower head, such head may have two or more nozzles if desired. Furthermore the nut might be so arranged that the hollow shaft moves longitudinally while the nut does not. This might be arranged by screw-threading the center hole in the bush 10 of the stuffing box at the stoke-hole end of the barrel 1 (Fig. 6) so that a threaded rod 33 can be screwed through them, the said bush forming the nut. At the outside end of the rod 33 the operating handle 17 would be secured, while the other end is secured to the hollow shaft 3 on the inside of the barrel 1. By this arrangement the turning of the handle 17 will rotate the hollow shaft, and advance or withdraw it by means of the stationary nut or bush 10, the said bush 10 being made substantial and longer than the bushes usually used in stuffing boxes. At or near the place where the screwed rod 33 is secured to the hollow shaft, the steam port

34 would be cut. The barrel 1 may either be of cast metal or made of wrought iron or steel tubing.

We declare that what we claim is:—

1. Apparatus for cleaning smoke tubes comprising in combination a hollow shaft adapted to be passed through one of the smoke tubes, a blower head projecting radially therefrom at one end and adapted to blow a jet of pressure fluid toward the tubes, and means for advancing the hollow shaft longitudinally and at the same time rotating it, so that the range of the nozzle with respect to the smoke tubes can be increased without changing the center of rotation.

2. Apparatus for cleaning smoke tubes comprising in combination, a tubular member or barrel adapted to be clamped to a part of the boiler front, a hollow shaft passed through the barrel and so journaled therein as to be central with respect to the barrel and in line with a smoke tube, a forwardly projecting nozzle at the rear end of the hollow shaft located exteriorly of the barrel so as to discharge toward the barrel, means for causing the hollow shaft to move longitudinally when rotated, and manually actuated means for operating the hollow shaft.

3. In apparatus for cleaning smoke tubes, a hollow shaft adapted to be passed through the smoke tube, a barrel adapted to be clamped in a fixed position to the boiler front and having a screw thread inside thereof, a cylindrical nut fixed to the hollow shaft and screwed into the threaded bore of the barrel so as to be capable of being turned from end to end thereof, and a handle at the front end of the hollow shaft, whereby the turning of the handle simultaneously rotates the shaft and traverses it longitudinally.

4. Apparatus for cleaning smoke tubes comprising in combination, a hollow barrel adapted to be fixed to the boiler front in line with a smoke tube, a hollow shaft journaled in the said barrel and adapted to be traveled longitudinally through the smoke tube, a rotary nozzle at one end of the shaft, a nut threaded externally and secured to the shaft within the barrel so as to engage screwed threads on the inside of the barrel, there being a port in the shaft at each side of the nut and said nut having longitudinal channels in the exterior thereof through which pressure fluid can pass to either side of the same so as to balance the nut.

5. In a tube cleaner, a steam conductor having a discharge, and means to both rotate and simultaneously move said conductor in step-by-step order longitudinally of the tube in a single operation, said means when rotated in one direction moving the conductor continuously inward and when rotated in the opposite direction moving the conductor continuously outward.

6. In a tube cleaner, a rotatable element having a discharge nozzle adapted to be projected from the front end of a tube to be cleaned through the tube to cause the nozzle to extend beyond the rear end of the tube and to face said rear end of the tube, means to both positively rotate and longitudinally move said element while in the tube, and means to supply steam to said element from the front end of the tube.

7. In a tube cleaner, rotatable means having a discharge, means to feed cleansing fluid under pressure to said rotatable means, and means whereby rotation of said rotatable means will simultaneously therewith and in the same operation advance same when rotated in one direction and cause retrogression when rotated in the opposite direction whereby upon progression the range of the jet issuing from the discharge increases and upon retrogression the range of the jet in step-by-step order decreases to thus effect variation of range of the jet and of direction of rotation of the jet both on the in and out movements of said rotatable means.

In witness whereof, we have hereunto signed our names this 25th day of August 1913, in the presence of two subscribing witnesses.

CHARLES H. SHEPLER.
JOSEPH W. SHEARER.

Witnesses:
O. A. EGGERS,
GEO. T. ONTENT.