

R. O. HODGE.
 BOILER FLUE CLEANER.
 APPLICATION FILED FEB. 26, 1909.

972,374.

Patented Oct. 11, 1910.

3 SHEETS—SHEET 1.

FIG. 1.

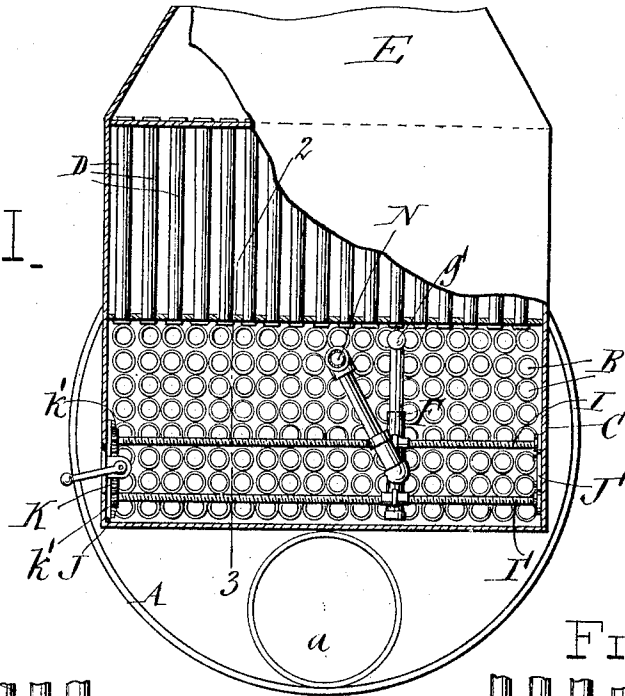


FIG. 2.

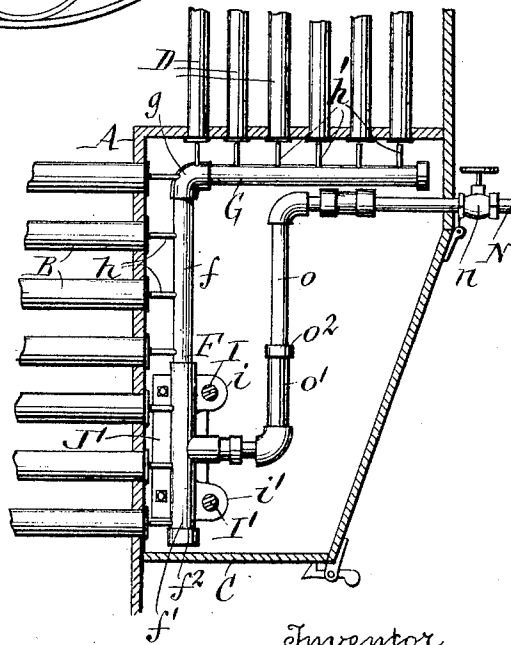
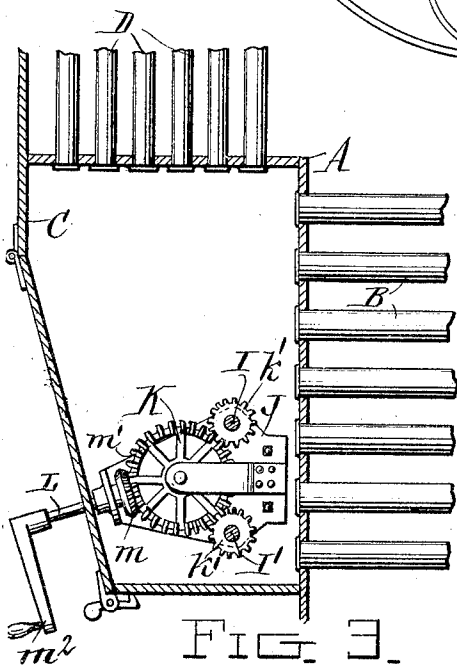


FIG. 3.



Witnesses
 J. Milton Jester.
 Richard Spumell.

Inventor
 Robert O. Hodge
 by Geyer & Papp
 Attorneys.

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The image contains two technical drawings. **Fig. 4** is a large, detailed cross-sectional view of a mechanical assembly, likely a part of a printing press. It shows a complex arrangement of components including a frame (G), a vertical support (F'), a horizontal bar (I), and various rollers and guides (f, f', h, h', i, i', s, s', t, t', u, v, w, x, y, z, a, a', b, b', c, c', d, d', e, e', f, f', g, g', h, h', i, i', j, j', k, k', l, l', m, m', n, n', o, o', p, p', q, q', r, r', s, s', t, t', u, u', v, v', w, w', x, x', y, y', z, z'). The drawing is labeled "FIG. 4" in the center. **Fig. 7** is a smaller, detailed cross-sectional view of a component, possibly a roller or a guide, showing its internal structure and the arrangement of its parts (F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, a, a', b, b', c, c', d, d', e, e', f, f', g, g', h, h', i, i', j, j', k, k', l, l', m, m', n, n', o, o', p, p', q, q', r, r', s, s', t, t', u, u', v, v', w, w', x, x', y, y', z, z'). It is labeled "FIG. 7" at the bottom.

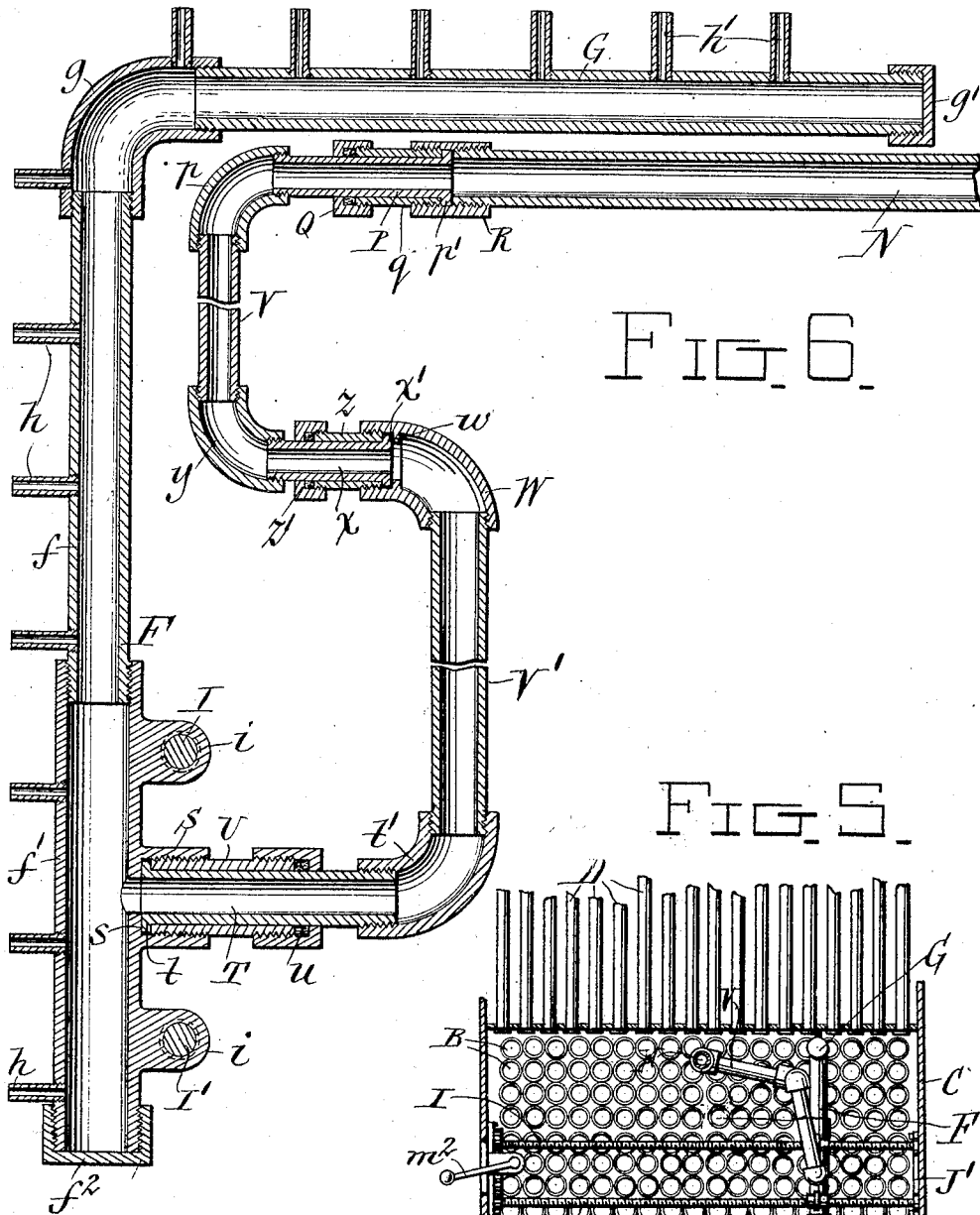
J. Milton Jester.
Richard Somwell

Inventor.
Robert C. Hodge
by Geyer & Poff
Attorneys.

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3 SHEETS—SHEET 3.



Witnesses.

J. Milton Jester.
 Richard Sommer.

Inventor.
 Robert O. Hodge
 by Geier & Popp
 Attorneys.

UNITED STATES PATENT OFFICE.

ROBERT O. HODGE, OF BUFFALO, NEW YORK.

BOILER-FLUE CLEANER.

972,374

Specification of Letters Patent.

Patented Oct. 11, 1910.

Application filed February 26, 1909. Serial No. 480,231.

To all whom it may concern:

Be it known that I, ROBERT O. HODGE, a citizen of the United States, and resident of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Boiler-Tube Cleaners, of which the following is a specification.

This invention relates to that class of boiler tube cleaners whereby a plurality or group of the tubes is operated upon at one time by steam jets for removing the accumulations of soot therein.

It is the object of this invention to provide a cleaner of this character which will effectually clean the tubes with a minimum expenditure of steam, which can be constructed at comparatively low cost and which is so constructed that the operator cannot move the cleaner too fast from one group of flues to another, thereby causing the steam to be directed into each tube a sufficient length of time to insure the removal of the soot therefrom.

In the accompanying drawings consisting of 3 sheets: Figure 1 is a front elevation of a marine boiler, partly in section, showing the same equipped with my improved tube cleaner. Figs. 2 and 3 are fragmentary vertical sections of the same, on an enlarged scale, taken in line 2—3, Fig. 1, and viewed in opposite directions. Fig. 4 is a vertical longitudinal section, on an enlarged scale, of the steam conduits of the tube cleaner detached from the boiler. Fig. 5 is a fragmentary sectional front elevation of a boiler showing the same provided with a modification of my improved tube cleaner. Fig. 6 is a vertical longitudinal section, on an enlarged scale, of the steam conduits of the tube cleaner shown in Fig. 5. Fig. 7 is a fragmentary sectional front elevation, on a reduced scale, showing a wide boiler provided with two fire tubes and two cleaning devices, each adapted to clean the return tubes corresponding to one of the fire tubes.

Similar letters of reference indicate corresponding parts throughout the several views.

Although my improved tube cleaner may be applied to boilers of various forms and types, that shown in Fig. 1 of the drawings is a marine boiler which has means for producing a forced draft and which comprises a shell or body A, a horizontal fire tube a, a plurality of main horizontal return tubes or flues B opening at their front ends into a

breeching or up-take C, and a plurality of upright auxiliary or forced draft tubes or flues D which open at their lower ends into the top of the breeching above the main flues while their upper ends open into the smoke stack E.

My improved cleaner shown in the drawings operates to direct the steam horizontally into the main flues and vertically into the auxiliary flues but may also be organized to direct the steam only horizontally into the horizontal tubes of the boiler when the same has no vertical flue.

The form of cleaner shown in Figs. 1-4, is constructed and operates as follows: F represents the upright lower part of a manifold or hollow steam distributing head which is arranged vertically in the breeching in front of the outlets of the horizontal flues and which is preferably constructed of a lower cast section *f* and upper section *f'* of ordinary piping connected with the lower section by a screw joint, as shown in Fig. 4. The lower section is preferably closed at its lower end by a screw cap *f''*. G represents the horizontal upper part of the manifold arranged lengthwise in the breeching below the inlets of the auxiliary boiler flues and preferably constructed of ordinary piping. At its rear end the upper horizontal manifold is connected with the upper end of the vertical manifold by an elbow *g* while its front end is closed by a screw cap *g'*. On its rear side the vertical part of the manifold is provided with a plurality of rearwardly projecting steam delivery nozzles *h* each of which is arranged horizontally in line with one of the horizontal rows of main flues and the horizontal part of the manifold is provided with a plurality of upwardly projecting steam delivery nozzles *h'* each of which is transversely in line with a transverse row of auxiliary flues. Upon supplying steam to the manifold and moving the same transversely in the breeching the horizontal and vertical nozzles will be brought successively into line or register with different groups or rows of main and auxiliary flues, whereby the steam issuing from the nozzle enters the flues and removes the soot therefrom.

The means for moving the manifold horizontally and transversely in the breeching may be varied but that shown in the drawings is suitable for the purpose and comprises two parallel horizontal screws or threaded shafts I, I' arranged transversely

in the breeching one above the other and journaled at their opposite ends in bearings arranged on brackets J, J^1 mounted on opposite side walls of the breeching, upper and lower screw nuts or internally threaded eyes i, i^1 arranged on the lower section of the upright part of the manifold and receiving the threaded shafts, a main gear wheel K journaled on one of the brackets, preferably the left one J , as shown, and meshing with two pinions k^1 on the adjacent ends of the screw shafts, and a manually operated longitudinal actuating shaft L journaled on the bracket J and projecting through the front wall of the breeching and provided within the breeching with a bevel pinion m which meshes with a bevel gear rim m^1 on the main gear wheel K and provided in front of the breeching with a handle or crank m^2 for turning the actuating shaft and the parts operatively connected therewith. Upon turning the crank by hand in one direction or the other the screw shafts are turned simultaneously, whereby the screw nuts i, i^1 in which these shafts work and cause the manifold to move transversely in the breeching and bring the nozzles thereof successively into line or register with the several main and auxiliary flues, thereby cleaning the latter by the stream directed into the same by the nozzles. The latter may by this means be carried back and forth across the main and auxiliary flues as often as necessary to keep the same clean. This means of shifting the nozzles renders it impossible for the operator to move the nozzles very rapidly, thereby insuring the retention of the nozzles opposite each group of flues a sufficient length of time to enable the steam to properly clean the tubes or flues which would not be the case if it were possible to move the nozzle quickly past the flues, inasmuch as such a quick movement of the nozzles would not direct the steam into the flues a sufficient length of time to properly clean the same.

Various means may be provided for supplying the manifolds with steam, those shown in Figs. 1-4 being constructed as follows:— N represents a stationary steam supply pipe which extends lengthwise through the upper part of the breeching and is provided with a hand valve n . The steam is conducted from the stationary supply pipe to the movable manifold by means of a telescopic and articulated intermediate pipe composed preferably of an upper inner section o which slides in a lower outer section o^1 , a tight joint being maintained between the two by a stuffing box o^2 arranged on the upper end of the lower section and surrounding the upper section. As shown in Fig. 4, these sections are capable of swinging vertically and transversely in the breeching by means of an upper swivel con-

nection between the upper telescopic pipe section and the steam supply pipe and a lower swivel connection between the lower telescopic pipe section and the lower manifold. The upper swivel connection comprises a longitudinally horizontal nipple P connected at its rear end with the upper end of the upper telescopic pipe by an elbow p while its front end is provided with an external flange p^1 bearing against the rear end of the steam supply pipe, a bearing sleeve q surrounding the nipple and bearing at its front end against the rear of the flange p^1 , a coupling sleeve R surrounding the opposing ends of the steam supply pipe and the bearing sleeve and connected at opposite ends with the same by screw joints, and a stuffing box Q applied to the inner or rear end of the bearing sleeve around the nipple P . The lower swivel connection comprises a forwardly projecting socket S formed on the lower section of the vertical part of the manifold and provided with a forwardly facing shoulder s , a horizontal longitudinal swivel nipple T arranged in said socket and provided at its rear end with an external annular flange t which bears with its rear side against the shoulder s while its front end is connected by an elbow t^1 with the lower end of the intermediate pipe section o^1 , a bearing sleeve U surrounding the lower nipple and engaging at its rear end with the front side of the lower nipple flange and also connected with the bore of said socket by a screw joint, and a stuffing box u arranged at the front end of the lower bearing sleeve around the lower nipple. Upon moving the manifold transversely back and forth in the breeching for causing the nozzle thereof to deliver the steam into different groups of the flues or tubes the upper telescopic pipe section turns on the steam pipe, the lower telescopic pipe section turns on the lower manifold and the two telescopic pipe sections slide relatively to each other in adapting the position and length of the intermediate pipe to the changing position of the manifolds and still maintaining a steam tight connection between the supply pipe and the manifolds.

Instead of employing a telescopic intermediate pipe for connecting the steam supply pipe with the manifold, as shown in Figs. 1-4, the same effect may be obtained by means of a swivel connection between the upper and lower intermediate pipe sections V, V^1 which is shown in Figs. 5 and 6 and constructed as follows:— W represents an elbow connected at its lower end with the lower intermediate pipe section and provided at its upper end with a vertical shoulder w , x indicates a horizontal longitudinal intermediate nipple provided at one end with an external annular flange x^1 which bears against the shoulder w and connected

at its opposite end by means of an elbow y with the lower end of the upper intermediate pipe section V. z represents a bearing sleeve surrounding the intermediate nipple and bearing at one end against the outer side of the flange x^1 and connected by a screw joint with the bore of the upper end of the lower elbow W. z^1 indicates a stuffing box which is arranged at the opposite end of the intermediate bearing sleeve around the intermediate nipple. As the manifold moves transversely in the breeching the upper and lower intermediate pipe sections turn relatively to each other by means of the intermediate swivel joint and also turn upon the steam supply pipe and lower part of the manifold in adapting themselves to the position of the manifold.

In applying my improved tube cleaner which does not employ the auxiliary or vertical tube for producing a forced draft, the upper horizontal section of the manifold and its nozzles may be omitted and the upper end of the vertical section closed by any suitable means.

It will be noted that in my improved tube cleaner the screw shafts not only propel the manifold transversely in the breeching but also operate as a support and guide for the manifold.

When a boiler is comparatively wide and has more than one fire tube a my improved cleaner may be constructed in sections each of which is similar to that shown in Fig. 1-4 and adapted to clean those return tubes or flues corresponding to one of the fire tubes. As shown in Fig. 7, the boiler is provided with two fire tubes a^1, a^2 and two sections of my improved cleaner are employed side by side for cleaning the same. By this arrangement one section of the boiler tubes may be cleaned while the other section remains in full operation, thereby avoiding undue lowering of the steam pressure while cleaning the tubes.

I claim as my invention:

1. A boiler tube cleaner comprising a manifold having a plurality of outlets, and means for moving said manifold horizontally rectilinearly past the ends of the boiler tubes.

2. A boiler tube cleaner comprising a manifold having a vertical portion provided with outlets adapted to be arranged opposite the ends of horizontal boiler tubes and a horizontal portion provided with outlets adapted to be arranged opposite the ends of vertical tubes, and means for moving said manifold transversely rectilinearly relatively to said tubes.

3. A boiler tube cleaner comprising a manifold having a vertical portion provided with outlets adapted to be arranged opposite the ends of horizontal boiler tubes and a horizontal portion provided with outlets

adapted to be arranged opposite the ends of vertical tubes, means for moving said manifold transversely rectilinearly relatively to said tubes, and means for supplying steam to said manifold.

4. A boiler tube cleaner comprising a manifold having a vertical portion provided with outlets adapted to be arranged opposite the ends of horizontal boiler tubes and a horizontal portion provided with outlets adapted to be arranged opposite the ends of vertical tubes, means for moving said manifold transversely rectilinearly relatively to said tubes, a stationary steam supply pipe, and an articulated conduit connecting said supply pipe and manifold.

5. A boiler tube cleaner having a steam delivery device adapted to move past the ends of the boiler tubes and provided with a screw nut, and a screw for shifting said delivery device engaging with said nut.

6. A boiler tube cleaner having a steam delivery device adapted to move past the ends of the boiler tubes and provided with a pair of screw nuts, and a pair of parallel screws for shifting said manifold engaging with said nuts.

7. A boiler tube cleaner having a steam delivery device adapted to move past the ends of the boiler tubes and provided with screw nut, a screw for shifting said delivery device engaging with said nut, and a manually operated gearing connected with said screw.

8. A boiler tube cleaner having a steam delivery device adapted to move past the ends of the boiler tubes and provided with a pair of screw nuts, a pair of parallel screws for shifting said manifold engaging with said nuts, pinions arranged on said screws, a main gear wheel meshing with said pinions, a crank shaft, and a bevel gear wheel arranged on the crank shaft and meshing with a bevel gear rim on said gear wheel.

9. A boiler tube cleaner comprising a manifold movable past the ends of the boiler tubes and having a plurality of outlets, a stationary steam supply pipe, and means for conducting the steam from said supply pipe to said manifold comprising two pipe sections which have their opposing ends connected with each other while their extremities are pivotally connected with said steam supply pipe and said manifold, respectively.

10. A boiler tube cleaner comprising a manifold movable past the ends of the boiler tubes and having a plurality of outlets, a stationary steam supply pipe, and means for conducting the steam from said supply pipe to said manifold comprising two pipe sections which have their opposing ends connected with each other while their extremities are pivotally connected with said steam supply pipe and said manifold, each of said

pivotal connections comprising a nipple connected with one of the respective pipe sections and having an external flange bearing against the member with which said section is coupled, a bearing sleeve surrounding the nipple and engaging the back of said flange and connected with the member with which the respective pipe section is coupled, and a stuffing box arranged on the bearing sleeve around the nipple.

11. A boiler tube cleaner comprising a manifold movable past the ends of the boiler tubes and having a plurality of outlets, a stationary steam supply pipe, and means for conducting the steam from said supply pipe to said manifold comprising two pipe sections which have their opposing ends slidable one within the other, while their extremities are pivotally connected with said steam supply pipe and said manifold.

12. The combination with a steam boiler having a plurality of horizontal tubes, a manifold movable horizontally rectilinearly past the ends of said tubes and provided with a plurality of outlets adapted to register with successive groups of said tubes, and means for supplying steam to said manifold.

13. The combination with a steam boiler having a plurality of horizontal tubes, a plurality of vertical tubes, a breeching connecting the adjacent ends of said horizontal and vertical tubes, a manifold movable horizontally in said breeching and provided with an upright portion having a plurality of outlets adapted to register with the horizontal tubes and a horizontal portion provided with a plurality of outlets adapted to register with the vertical tubes, and means for supplying steam to said manifold.

14. The combination with a steam boiler having a plurality of horizontal tubes, a manifold movable horizontally past the ends of said tubes and provided with a plurality of outlets adapted to register with successive groups of said tubes, a horizontal screw shaft working in a screw nut arranged on said manifold, and means for turning said shaft and means for supplying steam to said manifold.

15. The combination with a steam boiler having a plurality of horizontal tubes, a manifold movable horizontally past the ends of said tubes and provided with a plurality of outlets adapted to register with successive groups of said tubes, a pair of horizontal screw shafts working in screw nuts arranged on said manifold, means for turning said shafts in unison, and means for supplying steam to said manifold.

16. The combination with a steam boiler having a plurality of horizontal tubes, a manifold movable horizontally past the ends of said tubes and provided with a plurality of outlets adapted to register with successive groups of said tubes, a pair of horizontal screw shafts working in screw nuts on said manifold, pinions arranged on said shafts, a main gear wheel meshing with said pinions, a crank shaft, and a bevel pinion arranged on the crank shaft and meshing with a bevel gear rim on said gear wheel, and means for supplying steam to said manifold.

Witness my hand this 24th day of February, 1909.

ROBERT O. HODGE.

Witnesses:

THEO. L. POPE,
ANNA HEIGIS.