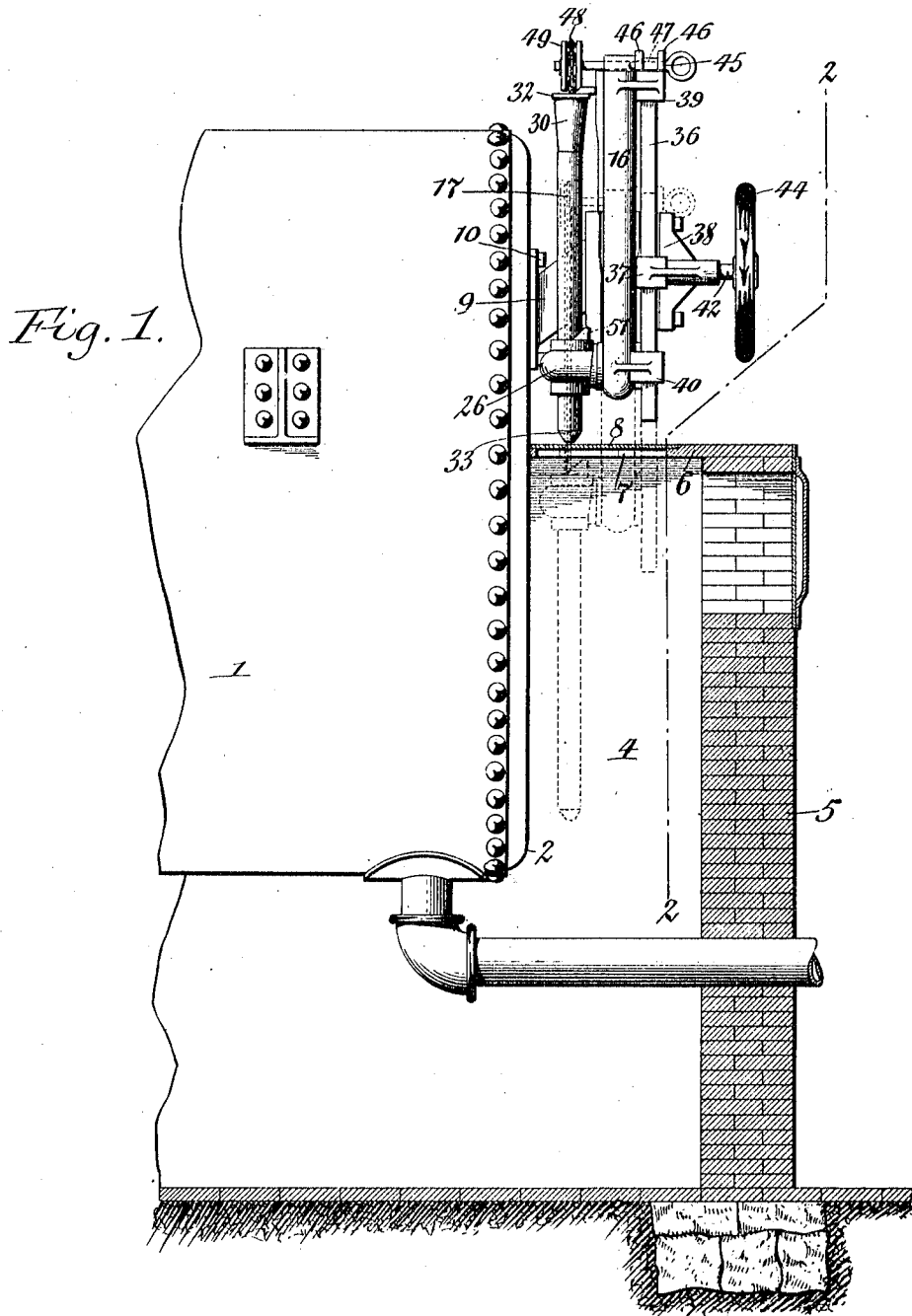


W. L. MIGGETT.
 BOILER TUBE CLEANER.
 APPLICATION FILED SEPT. 28, 1908.

978,326.

Patented Dec. 13, 1910.

3 SHEETS—SHEET 1.



Witnesses:
 Richard Sommer
 Gustav W. Hora.

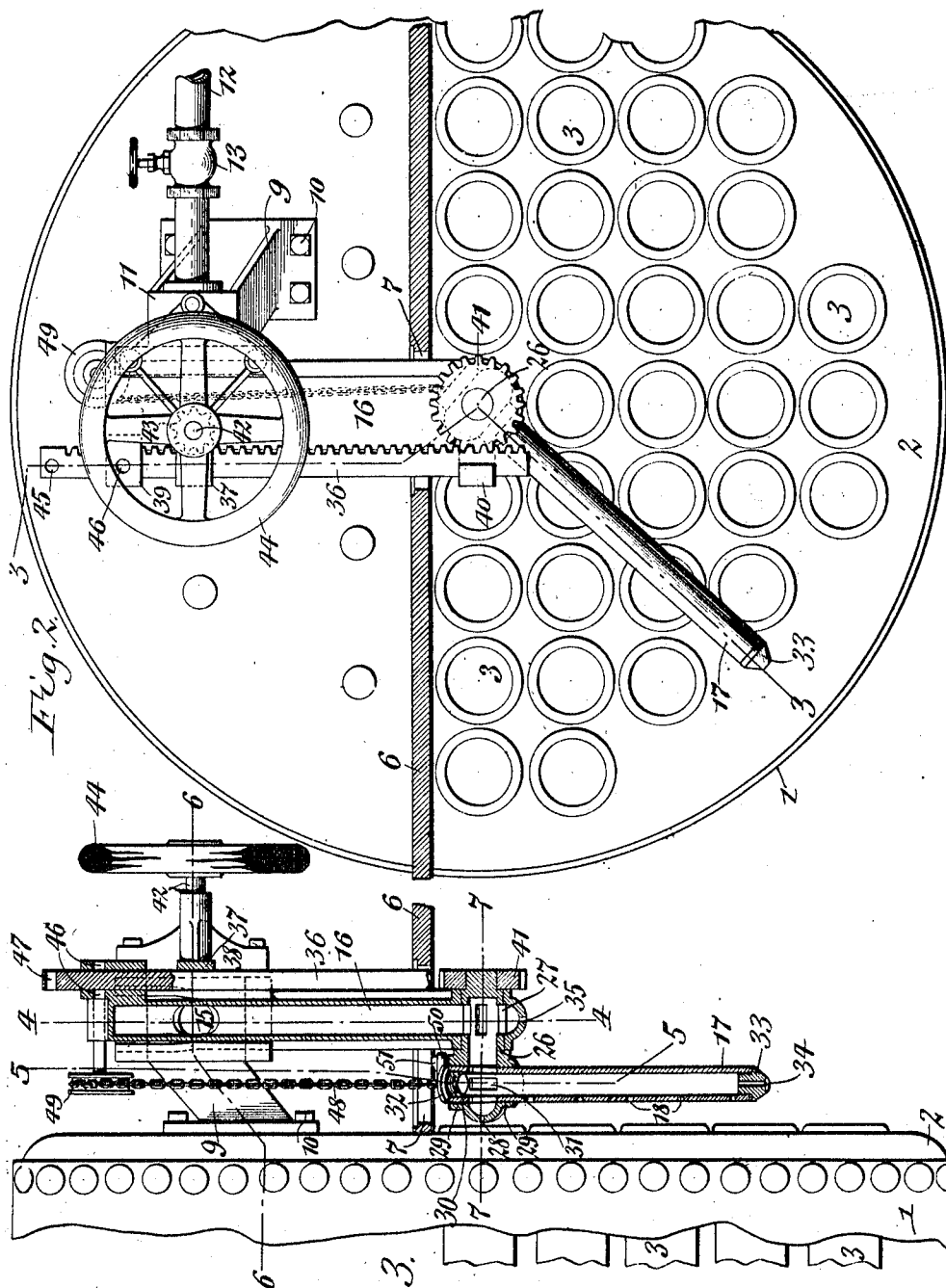
William L. Miggett
 by Geyer & Poff, Attorneys

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Witnesses:
Richard L. Muel
Gusta W. Hora.

Fig. 3.

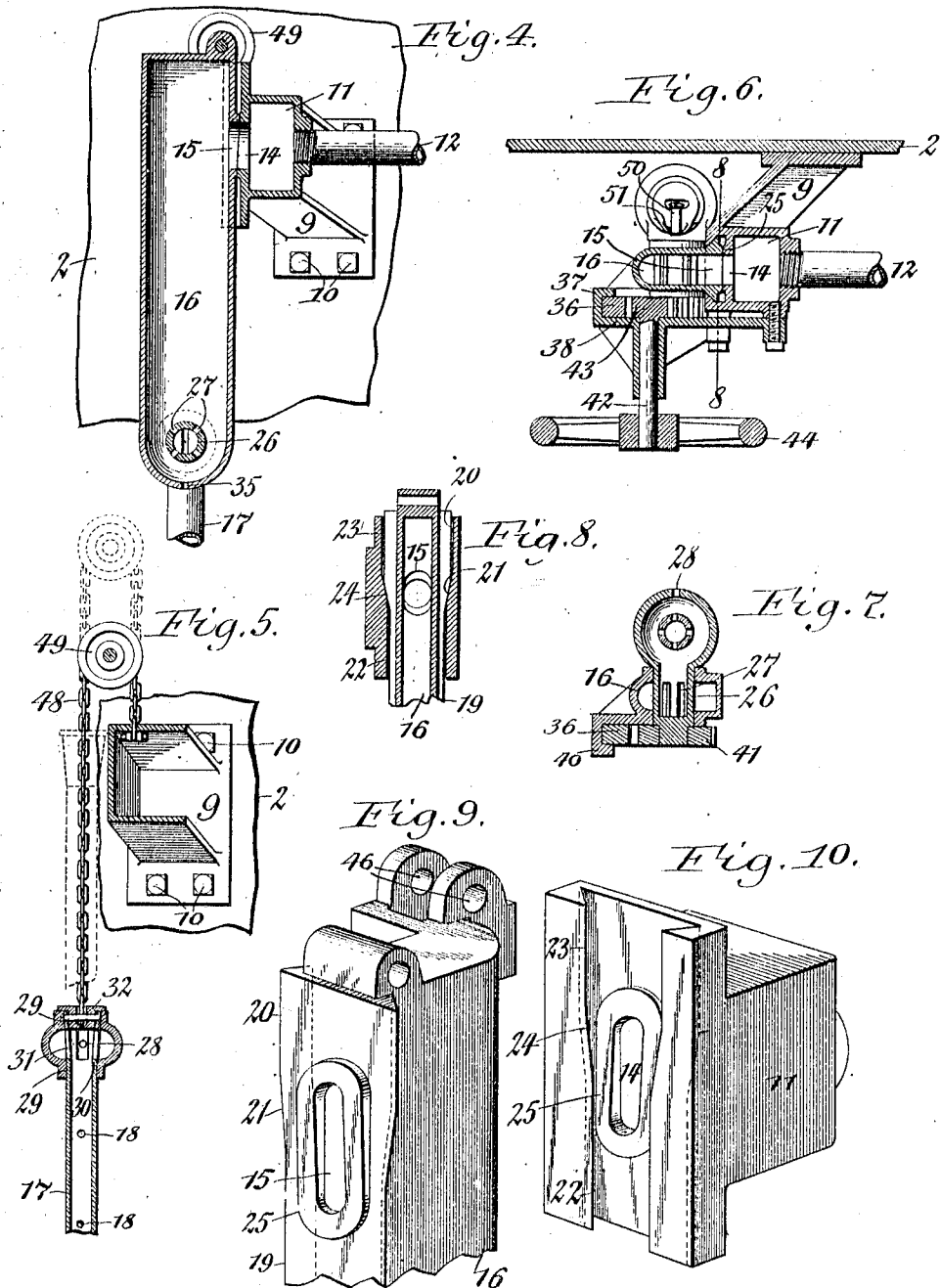
William L. Miggett
Inventor
by E. J. Papp
Attorneys.

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3 SHEETS—SHEET 3.



Witnesses.
Richard L. Soumes
Gustav W. Hora.

Inventor
William L. Miggett
by Geyer & Popp
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM L. MIGGETT, OF ANN ARBOR, MICHIGAN, ASSIGNOR TO RAPHAEL HERMAN, OF DETROIT, MICHIGAN.

BOILER-TUBE CLEANER.

978,326.

Specification of Letters Patent.

Patented Dec. 13, 1910.

Application filed September 28, 1908. Serial No. 455,054.

To all whom it may concern:

Be it known that I, WILLIAM L. MIGGETT, a citizen of the United States, residing at Ann Arbor, in the county of Washtenaw and State of Michigan, have invented a new and useful Improvement in Boiler-Tube Cleaners, of which the following is a specification.

This invention relates to a boiler tube cleaner of that type in which a plurality of boiler tubes are simultaneously acted upon by steam jets and in which the steam delivery nozzle and connecting parts may be projected into the combustion chamber when it is desired to clean the tubes and wholly retracted from said chamber after the cleaning operation has been completed, so as to avoid unnecessary burning of the parts.

It is the object of this invention to provide an efficient boiler tube cleaner of this character which is simple and compact in construction, which can be easily and conveniently operated and which is self-contained, so that but one support for the same and a connection with the steam supply is necessary.

In the accompanying drawings consisting of 3 sheets: Figure 1 is a fragmentary vertical longitudinal section of the rear end of a tube boiler and combustion chamber provided with my improved boiler tube cleaner, the movable parts of the latter being represented in the position which they occupy when the cleaner is not in use. Fig. 2 is a fragmentary vertical transverse section taken in line 2—2, Fig. 1 and showing the movable parts of the cleaner in the position which they occupy while the same is in use. Fig. 3 is a vertical longitudinal section taken substantially in line 3—3, Fig. 2. Figs. 4 and 5 are fragmentary vertical transverse sections taken in the correspondingly numbered lines in Fig. 3. Figs. 6 and 7 are horizontal sections in the correspondingly numbered lines in Fig. 3. Fig. 8 is a fragmentary vertical transverse section taken in line 8—8, Fig. 6. Figs. 9 and 10 are fragmentary perspective views of parts of the cleaner.

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

The boiler shown in Figs. 1, 2 and 3 of

the drawings in connection with my improved cleaner comprises a horizontal cylindrical body 1, a vertical transverse flue sheet or head 2 applied to the rear end of the body, and a plurality of horizontal longitudinal tubes or flues 3 connected at their rear ends to the rear flue sheet and opening with their mouths into the combustion chamber 4 arranged in rear of the boiler. In the construction shown in the drawings, this combustion chamber is formed partly by an upright transverse rear wall 5 arranged at a distance from the rear end of the boiler and a roof or top 6 extending horizontally from the top of the rear wall to the flue sheet above the flue area. The top or roof of the combustion chamber is provided with an opening 7 adjacent to the upper central part of the flue area through which parts of my improved cleaner are moved into and out of their operative position, this opening being closed by a door, slide or cover 8 when the cleaner is withdrawn from the combustion chamber and not in use.

My improved cleaner is constructed as follows:

9 represents a bracket or support which is rigidly secured in place above the roof of the combustion chamber adjacent to the cleaning opening thereof. As shown in the drawings, this bracket is preferably secured to the outer side of the rear flue sheet of the boiler by bolts 10 and forms the sole means of supporting the various working parts of the cleaner, so that but one attachment of the cleaner is required for installing the same on a steam boiler. At its rear end the bracket 9 supports a steam supply chamber 11 which is preferably formed integrally therewith and which receives steam from any suitable source but preferably through a pipe 12 connecting with one of the upright lateral sides of the supply chamber and provided with a hand controlling valve 13. On its opposite lateral side the steam supply chamber is provided with an outlet port, passage or opening 14 which is adapted to register with an inlet port, passage or opening 15 arranged on the upper end of the opposing lateral side of an intermediate steam conduit or extension chamber 16. The latter is vertically movable and carries

at its lower end a steam delivery pipe or nozzle 17 which is in communication with the intermediate conduit and pivoted thereto, so as to be capable of turning in a vertical plane parallel with the flue sheet or transversely past the mouths of the tubes. The intermediate conduit and delivery nozzle are capable of being moved vertically through the cleaner opening of the combustion chamber into and out of the same. While in its lower position the inlet port of the intermediate conduit registers with the outlet port of the steam supply chamber so as to receive steam therefrom but when the intermediate conduit is raised into its inoperative position, its inlet port 15 is out of register with the outlet port 14 of the steam supply chamber, at which time the valve 13 is closed to prevent the escape of steam. When the nozzle is in its lower operative position it is in communication with the interior of the intermediate conduit and receives steam therefrom and it may be turned on the latter so that the nozzle sweeps over the entire flue area at the rear ends of the flues, thereby causing the steam issuing from a longitudinal row of steam outlet openings 18 in the rear side thereof to be directed successively into the mouths of the several flues of the boiler for removing the soot and other accumulations therefrom and carrying the same forwardly to the smoke stack.

The means for guiding the intermediate conduit 16 on the bracket 9 and connecting and disconnecting the interior of the same with the interior of the supply chamber may be varied but the means for this purpose shown in the drawings are suitable and are constructed as follows: On the side of the intermediate conduit facing the supply chamber the same is provided with a dove-tail rib or tenon the lower part 19 of which is narrow while its upper part 20 is wide and merges into the lower part by an intermediate part 21 having the form of a downwardly-tapering wedge. The opposing side of the steam supply chamber is provided with a dove-tail socket or guide which receives the dove-tail rib of the intermediate steam conduit, and which has a narrow lower part 22 and a wide upper part 23 which merges into the lower part by an intermediate part 24 having a downwardly-tapering or wedge form. In the raised position of the intermediate conduit, only the lower narrow part of its dove-tail rib engages with the lower narrow part of the dove tail socket, the fit between the parts at this time being comparatively loose to permit the conduit and the parts mounted thereon to be raised and lowered easily. When, however, the intermediate conduit is dropped into its lowermost position the downwardly-tapering part of the dove-tail

rib engages with the correspondingly-shaped part of the socket of the steam supply chamber, whereby these parts are tightened relatively to each other in a direction lengthwise of the boiler tubes. At the same time that the tapering portion of the dove-tail rib on the intermediate conduit engages with the dove-tail portion of the socket on the chamber, the conduit and chamber are tightened upon each other in a direction lengthwise of the axis of the ports 14 and 15 thereof, for producing a steam tight joint between the chamber and the conduit. This may be effected in various ways but preferably by providing the opposing sides of the chamber and conduit around their ports with raised rims, the faces 25 of which are inclined or beveled vertically in opposite directions, as shown in Figs. 4, 9 and 10, so that when the intermediate conduit is dropped into its lowermost position these incline faces engage each other and cause the intermediate conduit to be tightened on the steam supply chamber in a direction parallel with the axes of their ports, and thus prevent the escape of steam through the joint between the same while the cleaner is in use.

In addition to pivoting the nozzle on the intermediate conduit, the same is also capable of moving lengthwise thereof into and out of its operative position, so as to permit of retracting the nozzle out of the combustion chamber without necessitating an undue movement of the intermediate conduit and the parts connected therewith. The preferred means for thus connecting the nozzle with the intermediate conduit which are shown in the drawings are constructed as follows: 26 represents a hollow pivot or spindle which is journaled horizontally and lengthwise of the boiler tubes in a bearing at the lower end of the intermediate conduit and is provided within the latter with one or more openings 27 extending from the bore to the periphery of the spindle, so that the interior of the latter is constantly in communication with the interior of the intermediate conduit in all positions which the spindle may occupy upon being rotated. The front part of the hollow spindle projects beyond the front side of the intermediate conduit and is provided at its front end with an axial steam outlet opening 28 which is preferably arranged opposite the inlet or rear end of the central flue of the uppermost row of the boiler when the cleaner is in its inoperative position, so that the steam issuing from this opening enters the respective flue and removes the soot and other accumulations therefrom. Between the front end of the hollow spindle and the front side of the intermediate conduit, the hollow spindle is provided on diametrically opposite sides with openings 29 which together form a

socket which is preferably of conical or downwardly-tapering form, as shown in Figs. 3 and 5. Through this socket the nozzle is adapted to slide transversely upon being moved into and out of its operative position relatively to the spindle. The upper or inner end of the delivery nozzle is preferably made of conical or tapering form, as shown at 30, and fits tightly into the correspondingly-shaped socket of the spindle when the delivery nozzle is moved into its lowermost or operative position therein, thereby forming a steam-tight joint between these parts at this time. Communication with the interior of the spindle and the interior of the nozzle is established when the nozzle is in its lowermost position by means of one or more ports 31 formed in the upper conical part of the nozzle within the spindle and extending from the bore to the periphery thereof. The upper or rear end of the nozzle is preferably closed by a plug or cap 32 which is screwed into the same and the lower or front end of the nozzle is also closed by a plug or cap 33 which is screwed into the same. The lower or outer plug of the nozzle is preferably provided with a steam outlet opening 34 arranged lengthwise of the nozzle or radially with reference to the axis of rotation of the spindle and nozzle. The lower end of the intermediate conduit is also provided with a steam outlet opening 35. When the cleaner is in operation, the steam issuing from the openings 34 and 35 is directed toward different parts of the bottom of the combustion chamber, thereby stirring up any soot lying on the bottom, so that the same will be lifted and ejected forwardly through the flues of the boiler by the combined carrying effect of the furnace flames and the steam jets issuing from the front side of the nozzle when the boiler furnace is in operation or solely by the front steam jets when the furnace is not in operation and the steam is being supplied from another boiler.

When the intermediate conduit and the nozzle are in their operative position, the lower end of the conduit projects into the upper part of the combustion chamber and the nozzle is wholly within the front combustion chamber, as shown in Figs. 2 and 3. Upon turning or swinging the nozzle at this time about half a circle from one side of the center of the boiler to the other one or more times, the steam issues from its front delivery openings over the entire flue area and successively enters the rear ends or mouths of different groups of tubes, so that all of the tubes or flues are reached and effectively cleaned by the direct action of the steam. After the flues or tubes have been cleaned, the intermediate conduit is raised out of the combustion chamber until its lower end is above the top of said cham-

ber and the nozzle is also moved upwardly through the socket in the hollow spindle until its lower end is above the top of the combustion chamber, as shown in Fig. 1. This upward movement of the nozzle independent of the intermediate conduit permits of reducing the aggregate movement of the cleaner when retracting the same from the combustion chamber and also renders the device more compact which is particularly desirable when the available space above the boiler is limited. The means shown in the drawings for thus moving the cleaner into and out of its operative position and also turning the nozzle while the same is opposite the flues are constructed as follows: 36 represents an upright, vertically-movable gear rack which slides with its intermediate part through a guide 37 on a transverse arm 38 secured to the rear end of the bracket 9, while its upper and lower ends slide in guides or ways 39, 40 at the upper and lower ends of the intermediate steam conduit. 41 represents a gear wheel secured to the rear end of the hollow spindle which projects beyond the front side of the intermediate conduit and meshes with the teeth on the adjacent lower part of the gear rack. 42 represents a horizontal shaft journaled lengthwise in a bearing on the supporting arm 38 and provided at its front end with a pinion 43 meshing with the teeth on the adjacent upper part of the gear rack while its rear end is provided with a handle or hand wheel 44 for turning this shaft.

When the cleaner is wholly retracted from the combustion chamber, as shown in Fig. 1, the gear rack is coupled with the intermediate conduit, so that these parts are compelled to move together, this coupling being preferably effected by means of a horizontal pin 45 passing through perforated ears or lugs 46 at the upper end of the intermediate conduit and an opening 47 in the upper end of the gear rack, as shown in Fig. 1. Upon turning the hand wheel in the direction of the arrow indicated in Fig. 1, while the gear rack and intermediate conduit are thus coupled, these members and the parts connected therewith are moved together downwardly through the cleaning opening in the roof of the combustion chamber. After the intermediate conduit has reached its lowermost position, the coupling pin 45 is withdrawn, so as to disconnect the gear rack from the intermediate conduit. Upon now oscillating the hand wheel and the pinion 43, it raises and lowers the gear rack independently of the intermediate conduit, thereby causing the delivery nozzle to swing transversely back and forth past the mouths of the boiler tubes for the purpose hereinbefore described. For again withdrawing the intermediate conduit from the combustion chamber, the hand

wheel 44 is first turned, so as to bring the coupling opening 47 of the gear rack in line with the openings of the coupling ears 46 after which the coupling pin 45 is pushed through these openings, whereby the gear rack and the intermediate conduit are coupled and these parts may be lifted out of the combustion chamber by turning the hand wheel in a direction opposite to that indicated by the arrow in Fig. 1.

When raising and lowering the intermediate chamber or conduit out of and into its operative position, the delivery nozzle is automatically moved upwardly and downwardly through the pivot spindle by means of an upright doubled chain 48 or other flexible member which passes with its bight or upper part over a pulley, wheel or other member 49 on the upper part of the intermediate conduit while its opposite ends are secured respectively to the bracket 9, as shown in Fig. 5, or other stationary part, and to the plug at the upper end of the nozzle or other part connected therewith. When the intermediate conduit is in its highest position, the pulley 49 doubles the chain to its greatest extent, thereby holding the nozzle in its highest position, as shown in Fig. 1. Upon lowering the intermediate conduit, the pulley pays out or reduces the amount of doubling of the chain, thereby permitting the nozzle to descend by gravity simultaneously with the downward movement of the intermediate conduit but at a greater rate, the parts being so proportioned that when the intermediate conduit reaches its lowermost position the nozzle is also in its lowermost position and seated with its upper portion in the cooperating socket on the hollow spindle. Upon raising the intermediate conduit after the cleaning operation, the doubling of the chain is increased by the pulley, thereby causing the nozzle to be raised with the intermediate chamber but at a greater rate, so that when the intermediate conduit reaches its uppermost position above the top of the combustion chamber, the lower end of the nozzle has also cleared the top of the combustion chamber, as shown in Fig. 1.

Means are provided for causing the nozzle when in its lowered position to face with its longitudinal row of perforations forwardly or toward the mouths at the rear ends of the boiler tube, so as to deliver the steam properly into the same which means preferably consist of a horizontal centering or guide pin 50 arranged on the upper plug or cap of the nozzle and adapted to engage with a V-shaped notch or recess 57 on the adjacent part of the hollow spindle, the sides of said notch converging downwardly to the bottom of the same. If the nozzle while being lowered is slightly out of alinement with its front discharge openings relatively to

the boiler tubes, the centering or guide pin 50 on its upper head will engage either one of the two inclined sides of the guide notch 51 and be directed by the same to the center of the notch when the nozzle reaches the end of its downward movement, and thereby turns the nozzle so that its front discharge openings face forwardly or axially toward the boiler tubes when the cleaner is ready for use.

The relative location of the opening in the gear rack and the perforated ears of the intermediate conduit is such that when these openings are in line for the reception of the coupling pin, the nozzle will invariably be in a vertical or pendent position, so that the same can be withdrawn from the combustion chamber and also be lowered into the same without interfering with the roof of the combustion chamber.

I claim as my invention:

1. The combination of a steam boiler having tubes, and a combustion chamber provided with an opening leading from the interior to the exterior thereof, a steam supply conduit movable through said opening from the exterior to the interior of said chamber and vice versa, and a steam delivery nozzle rotatable on said supply conduit on an axis arranged at right angles to the direction of movement of the conduit and transversely past the ends of said tubes.
2. The combination of a steam boiler having tubes, a combustion chamber provided with an opening leading from the interior to the exterior thereof, a movable cover for said opening, a steam supply conduit movable through said opening from the exterior to the interior of said chamber and vice versa, and a steam delivery nozzle rotatable on said supply conduit on an axis arranged at right angles to the direction of movement of the conduit and transversely past the ends of said tubes.

3. The combination with a steam boiler having tubes or flues, a combustion chamber and an opening from the interior to the exterior of said chamber, of a steam conduit movable lengthwise through said opening into and out of the combustion chamber and adapted to remain stationary while in its inner operative position relatively to the boiler tubes, and a nozzle pivoted on said conduit on an axis arranged at right angles to the direction of movement of the conduit so as to sweep past the mouths of the boiler tubes and provided on its side with openings through which steam is delivered into the mouths of said tubes.

4. The combination of a steam boiler having tubes, and a combustion chamber provided with an opening leading from the interior to the exterior thereof, a stationary steam conduit arranged outside of the combustion chamber, a longitudinally movable

steam conduit having a sliding connection with said stationary conduit and movable through said opening into and out of said chamber, and a steam delivery nozzle pivoted on said longitudinally movable conduit on an axis arranged at right angles to the direction of movement of the conduit and adapted to sweep past the ends of said tubes and having a plurality of outlet openings in its side facing the ends of said tubes.

5. A boiler tube cleaner comprising a stationary steam chamber having a steam outlet opening, an intermediate steam conduit having a steam inlet opening and movable for bringing its opening into or out of line with the opening of the stationary chamber, and a delivery nozzle pivoted to said intermediate conduit.

6. A boiler tube cleaner comprising a stationary steam chamber having a steam outlet opening, an intermediate steam conduit having a steam inlet opening and movable for bringing its opening into or out of line with the opening of the stationary chamber, a delivery nozzle pivoted to said intermediate conduit, and means for guiding the intermediate conduit on said supply chamber.

7. A boiler tube cleaner comprising a stationary steam chamber having a steam outlet opening, an intermediate steam conduit having a steam inlet opening and movable for bringing its opening into or out of line with the opening of the stationary chamber, a delivery nozzle pivoted to said intermediate conduit, and means for guiding the intermediate conduit on said supply chamber comprising a dove-tail rib arranged on the intermediate conduit and slidable in a correspondingly-shaped way on the supply chamber.

8. A boiler tube cleaner comprising a stationary steam chamber having a steam outlet opening, an intermediate steam conduit having a steam inlet opening and movable for bringing its opening into or out of line with the opening of the stationary chamber, a delivery nozzle pivoted to said intermediate conduit, and means for guiding the intermediate conduit on said supply chamber comprising a dove-tail rib arranged on the intermediate conduit and having a narrow lower part and a wide downwardly-tapering upper part, and a dove-tail guideway formed on the stationary chamber and having a narrow lower part which is adapted to receive the narrow lower part of said rib and an upper downwardly-tapering wide part adapted to receive the upper tapering part of said rib.

9. A boiler tube cleaner comprising a stationary steam chamber having a steam outlet opening, an intermediate steam conduit having a steam inlet opening and movable for bringing its opening into or out of line

with the opening of the stationary chamber, a delivery nozzle pivoted to said intermediate conduit, means for guiding the intermediate conduit on the stationary conduit, and means for pressing said conduit and chamber together when said openings thereof are in register.

10. A boiler tube cleaner comprising a stationary steam chamber having a steam outlet opening, an intermediate steam conduit having a steam inlet opening and movable for bringing its opening into or out of line with the opening of the stationary chamber, a delivery nozzle pivoted to said intermediate conduit, means for guiding the intermediate conduit on the stationary conduit, and means for pressing said conduit and chamber together when said openings thereof are in register, consisting of raised rims formed on the opposing sides of the steam chamber and conduit around the inlet and outlet openings thereof and having cooperating inclined faces.

11. The combination of a steam boiler having tubes, and a combustion chamber provided with an opening leading from the interior to the exterior thereof, a steam conduit movable through said opening from the exterior of said chamber to the interior thereof, a steam delivery nozzle adapted to sweep past the ends of said tubes and having a plurality of outlet openings on the side next to the ends of the tubes, and a hollow pivot connecting said nozzle and steam conduit on an axis arranged at right angles to the direction of movement of the conduit and forming a passage connecting said conduit and nozzle.

12. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, a hollow spindle pivoted on the conduit and having an opening in its side whereby the interior of the same is placed in communication with the interior of the conduit and also having a transverse socket on one side of the conduit, and a nozzle arranged in said socket and provided in its side with an opening whereby the interior of the nozzle is placed in communication with the interior of the spindle.

13. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, and a steam delivery nozzle mounted on said conduit so as to be capable of both a longitudinal movement thereon and also a rotative movement thereon on an axis arranged at right angles to the direction of movement of said conduit.

14. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, a hollow spindle pivoted on the conduit and having an opening in its side whereby the

interior of the same is placed in communication with the interior of the conduit and also having a transverse socket on one side of the conduit, and a nozzle slidable transversely through said socket into and out of its operative position.

15. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, a hollow spindle pivoted on the conduit and having an opening in its side whereby the interior of the same is placed in communication with the interior of the conduit and also having a transverse socket on one side of the conduit, and a nozzle slidable transversely through said socket into and out of its operative position and provided with an opening in its side which registers with the interior of the spindle in the operative position of the nozzle.

16. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, a hollow spindle pivoted on the conduit and having an opening in its side whereby the interior of the same is placed in communication with the interior of the conduit and also having a transverse socket on one side of the conduit, and a nozzle slidable transversely through said socket into and out of its operative position and provided with an opening in its side which registers with the interior of the spindle in the operative position of the nozzle, said socket and that part of the nozzle engaging with the socket in the operative position of the nozzle being of tapering form.

17. The combination of a steam boiler having horizontal tubes, a combustion chamber arranged opposite the ends of the tubes and provided in its top with an opening, a support movable vertically through said opening into and out of said chamber, and a steam delivery nozzle pivoted on said support on an axis arranged at right angles to the direction of movement of said support and movable through said opening into and out of said chamber and rotatable past the ends of said tubes.

18. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, a stationary support on which said conduit is mounted, a steam delivery nozzle pivotally supported on said conduit and receiving steam therefrom, and means for shifting said conduit comprising a gear rack connected with the conduit, and a pinion mounted on said support and meshing with said rack.

19. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, a stationary support on which said conduit is mounted, a steam delivery nozzle pivotally supported on said conduit and receiving

steam therefrom, and means for shifting said conduit comprising a gear rack connected with the conduit and a shaft journaled on said support and having a handle and a pinion meshing with said rack.

20. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, a stationary support on which said conduit is mounted, a steam delivery nozzle pivotally supported on said conduit and receiving steam therefrom, and unitary means for shifting said conduit and turning said nozzle.

21. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, a stationary support on which said conduit is mounted, a steam delivery nozzle pivotally supported on said conduit and receiving steam therefrom, and means for shifting said conduit and turning said nozzle comprising a gear wheel connected to the pivot of the nozzle, a gear rack meshing with the gear wheel and slidably guided on said support, a pinion mounted on said support and meshing with said rack, and means for coupling and uncoupling said rack and conduit.

22. A boiler tube cleaner comprising a steam conduit adapted to be moved into and out of the combustion chamber of a boiler, a stationary support on which said conduit is mounted, a steam delivery nozzle pivotally supported on said conduit and receiving steam therefrom, and means for shifting said conduit and turning said nozzle comprising a gear wheel connected to the pivot of the nozzle, a gear rack meshing with the gear wheel and slidably guided on said support, a pinion mounted on said support and meshing with said rack, and means for coupling and uncoupling said rack and conduit consisting of a pin adapted to pass through openings in the rack and the conduit.

23. A boiler tube cleaner comprising a stationary support, a steam conduit movable on said support into and out of the combustion chamber of a boiler, a pivot journaled on said conduit, a steam delivery nozzle capable of sliding transversely on said pivot and also turning therewith, and means for automatically effecting the sliding movement of the nozzle while moving the conduit into and out of its operative position.

24. A boiler tube cleaner comprising a stationary support, a steam conduit movable on said support into and out of the combustion chamber of a boiler, a pivot journaled on said conduit, a steam delivery nozzle capable of sliding transversely on said pivot and also turning therewith, and means for automatically effecting the sliding movement of the nozzle while moving the conduit into and out of its operative position consisting of a wheel or member mounted on the conduit, and a chain or member pass-

ing over said wheel and having its opposite ends connected respectively with said support and said nozzle.

25. A boiler tube cleaner comprising a steam conduit movable into and out of the combustion chamber of a boiler, a spindle pivoted in said conduit, a steam delivery nozzle capable of sliding transversely on said spindle and also turning therewith and provided in its side with a longitudinal row of outlet openings, and means for centering said nozzle on said spindle so as to cause the outlet openings of the nozzle to face the mouths of the boiler tubes in the operative position of the nozzle.

26. A boiler tube cleaner comprising a steam conduit movable into and out of the combustion chamber of a boiler, a spindle pivoted in said conduit, a steam delivery nozzle capable of sliding transversely on said spindle and also turning therewith and provided in its side with a longitudinal row of outlet openings, and means for centering said nozzle on said spindle so as to cause the outlet openings of the nozzle to face the mouths of the boiler tubes in the operative position of the nozzle consisting of a pin arranged on the nozzle and engaging with a V-shaped recess or notch on the spindle.

27. A boiler tube cleaner comprising a steam conduit movable into and out of the

combustion chamber of a boiler, and a steam delivery nozzle pivoted on said conduit and having a longitudinal row of outlet openings on its front side and a steam outlet opening at its outer end.

28. A boiler tube cleaner comprising a steam conduit movable into and out of the combustion chamber of a boiler, a hollow spindle pivoted on the conduit and communicating therewith and having a steam outlet opening at its front end, and a steam delivery nozzle mounted on said spindle and provided on its side with steam outlet openings.

29. A boiler tube cleaner comprising a steam conduit adapted to be vertically moved into and out of the combustion chamber of a boiler and having a steam outlet opening directed toward the bottom of said chamber, and a steam delivery nozzle pivoted on said conduit to swing transversely past the mouths of the boiler tubes and provided on its front side with a longitudinal row of steam delivery openings.

Witness my hand this 22nd day of September, 1908.

WILLIAM L. MIGGETT.

Witnesses:

C. E. BARTHELL,
WYLIE R. GRIFFIN.