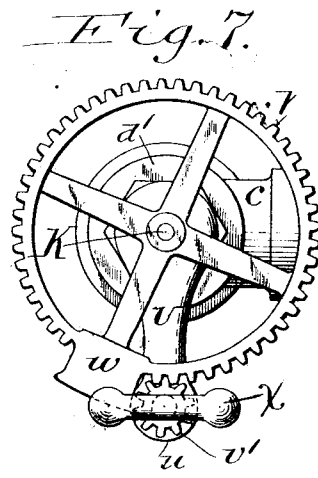
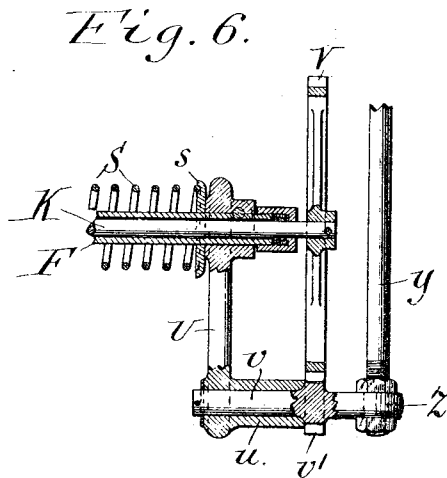
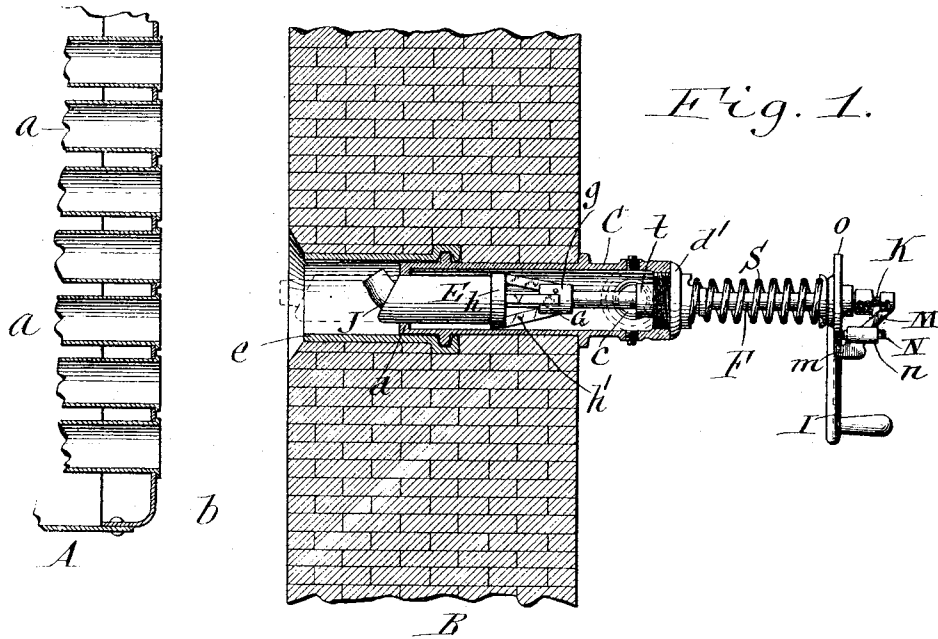


1,052,164.

Patented Feb. 4, 1913.

2 SHEETS—SHEET 1.



Witnesses:
Gustav W. Hora.
Richard Sommer.

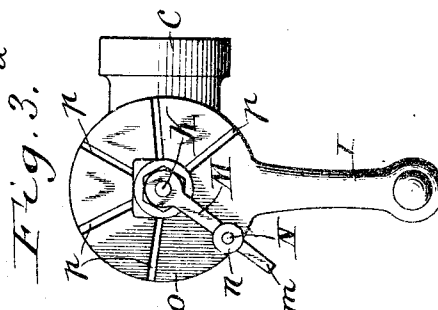
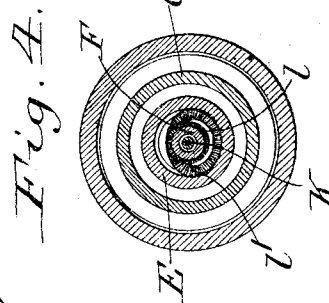
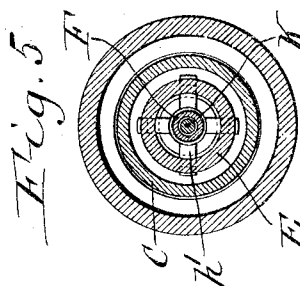
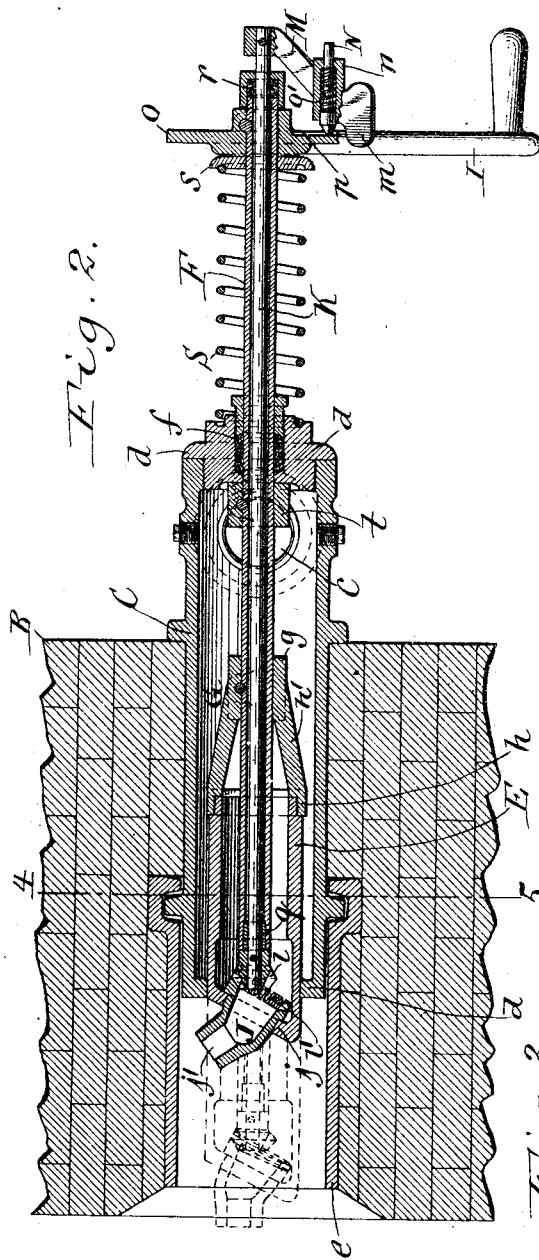
Inventor
William L. Miggett
by Geyer & Papp
Attorneys

W. L. MIGGETT.
BOILER TUBE CLEANER.
APPLICATION FILED DEC. 16, 1907.

1,052,164.

Patented Feb. 4, 1913.

2 SHEETS—SHEET 2.



Witnesses:
Gustav W. Hora
Richard Sommet

Inventor
William L. Miggett
by *Keyer & Tapp*
Attorneys

UNITED STATES PATENT OFFICE.

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

BOILER-TUBE CLEANER.

1,052,164.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Application filed December 16, 1907. Serial No. 406,675.

To all whom it may concern:

Be it known that I, WILLIAM L. MIGGETT, a citizen of the United States, and 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.

One object of this invention is to provide an improved boiler tube cleaner or flue blower and more particularly a blower of the type having a nozzle which is pivoted on a rotary carrier or section of the tubular body at an angle to the axis of the latter and which has its outlet arranged at an angle to the axis of its own pivot.

A further object is to so organize the blower that the nozzle-adjusting means are independent of the means for rotating the nozzle-carrier, thus enabling the nozzle to be adjusted to deliver the steam-blast into all of the tubes or flues and at the same time avoid blowing and destroying the arch and the sides of the combustion chamber or delivering the steam below the boiler and blowing smoke into the boiler room and interfering with the fire.

Applications for patents disclosing this invention have been filed in Austria February 22, 1907, application No. 1225, in Hungary February 25, 1907, application No. 3007, Patent No. 39552; and in Mexico September 25, 1907, application No. 9435, patent dated October 8, 1907, No. 7320.

In the accompanying drawings consisting of 2 sheets: Figure 1 is a fragmentary longitudinal sectional elevation of the stationary brick set boiler provided with my improved tube cleaner. Fig. 2 is a similar view of the same, on an enlarged scale. Fig. 3 is an end elevation of the cleaner. Figs. 4 and 5 are vertical cross sections of the cleaner taken in line 4—5, Fig. 2, looking in opposite directions, respectively. Fig. 6 is a fragmentary vertical section showing a modification of the means for operating the cleaner. Fig. 7 is an end elevation of the same but showing a different form of handle.

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

A represents the rear part of the station-

ary boiler, *a* the horizontal flues or tubes and B the brick wall arranged in rear of the boiler and separated therefrom by an intervening smoke box or combustion chamber 5.

C represents the shell or outer stationary section of the tubular body of the cleaner which is arranged horizontally in an opening extending through the rear wall B and provided at its inner or front end with a head *d* having a central opening. Near its outer end this body section is provided with a lateral branch *c* whereby the same is connected with a steam supply.

E represents the cylindrical front section of the tubular body which is capable of both a longitudinally reciprocating and a rotary movement in an opening in the inner head *d* of the outer body section.

The front end of the fixed section of the tubular body is arranged some distance from the inner side of the combustion chamber or smoke box forming a recess which preferably has a tubular casing or lining *e*.

F represents a hollow outer shaft arranged axially within the body sections and passing lengthwise through a stuffing box *f* arranged in a head *d'* which closes the outer end of the outer body section. Near its inner or front end this hollow shaft is connected with the rear or outer end of the front body section by means of a spider G which consists of a small collar *g* secured to the hollow shaft by a transverse pin or otherwise, a large collar *h* secured to the rear end of the front body section by a screw joint or otherwise, and inclined arms *h'* connecting said collars, as shown in Figs. 1, 2 and 5.

I represents a crank arm or handle which is secured to the outer end of the hollow shaft and whereby the front body section and the parts mounted thereon may be turned.

J represents a tubular nozzle which is pivoted at its outer or rear end in an opening formed in the inclined front head *j* of the front body section or nozzle carrier, the axis of this pivotal connection between the nozzle and said body section being arranged at an angle to the axis of the latter. The front or delivery end *j'* of the nozzle is arranged at an angle to the axis of the pivot about which it turns on the movable body

section. By this means the nozzle may be turned on the movable body section so that the steam is delivered at different angles to the axis of rotation of the movable body section. In the position shown in full lines in Fig. 2 the nozzle is turned with its outlet at the greatest angle relatively to the axis of said body-section and in dotted lines this nozzle is represented as having been shifted into a position in which the outlet is parallel with the axis of rotation of the body-section. By thus turning the nozzle with the body-section and also adjusting the nozzle so that its outlet is at different angles relative to the axis of said section the blast of steam issuing from the nozzle may be moved in circular paths of different diameters over the entire flue area and thus concentrate the effect of the steam blast on a few flues at a time, thereby cleaning the same more effectually.

The means for turning the nozzle relatively to the front body section comprises an inner or central longitudinal shaft K arranged lengthwise within the outer hollow shaft, a bevel gear pinion *l* mounted on the inner or front end of the central shaft and meshing with a gear rim or wheel *l'* on the rear end of the nozzle, and a crank arm or handle M secured to the outer or rear end of the central shaft.

An adjustable connection is provided between the crank arms M and I which permits of adjusting the nozzle relatively to the front body section and after such adjustment to cause the nozzle and front body section to turn in unison. The means shown in Figs. 1, 2 and 3 for this purpose consists of a pawl, catch or pin N guided in a socket *n* on the crank arm M parallel to the shafts and yieldingly pressed forwardly toward the hub *o* of the crank arm I by a spring *o'* interposed between a shoulder on said catch and the bottom of the guide socket *n* and a circular row of seats or grooves *p* which are formed on the outer side of the hub *o*, one or another of which is adapted to be engaged by the operative end of the catch. The front end of the latter is tapered and held frictionally in engagement with one of the seats or grooves by the spring *o'*. For the purpose of adjusting the nozzle relatively to the movable body section, the crank arm M is pressed laterally sufficiently to disengage its catch from the seat on the hub of the crank arm I with which it engages and it is then turned and engaged with another seat *p* of the hub *o* which latter serves as a dial. The seats *p* are so spaced that when the catch engages with the first seat of the series the nozzle will be so shifted that the steam jet issuing therefrom will be trained on the central tubes of the tube area, as shown by dotted lines in Figs. 1 and 2, while upon engaging the catch

successively with the other seats of the dial the nozzle will be turned so that the angle of its outlet relative to the movable body section will be increased step by step and cause the steam to be delivered against the tube area in circles of successively increasing diameter and thereby bring the cleaning effect of the steam jet to bear on all of the tubes.

The finger piece *m* of the crank arm M preferably projects rearwardly into the path of the crank arm I whereby this piece operates as a stop which engages opposite sides of the crank arm I and thus limits the arm M to making less than a complete turn in either direction relative to the crank arm I. The gear pinion *l* and rim *l'* are so proportioned that when the crank arm M is moved on the crank arm I from one extreme position to the other the nozzle will be shifted from one extreme position to the other relatively to the movable body section.

The front end of the hollow shaft terminates near the front end of the nozzle and is provided with a bearing *q* in which the front end of the central shaft is journaled. At its outer end the hollow shaft is provided with a stuffing box *r* which surrounds the central shaft and forms a tight joint between these shafts at this point and also a bearing for the outer end of the central shaft.

S represents a retracting spring surrounding the outer end of the hollow shaft and bearing at its front end against the outer head of the fixed body section and at its rear end against a washer *s* engaging with the front side of the hub of the crank arm I.

Upon turning on the steam the same upon entering the fixed body section presses against the movable body section and pushes the latter forwardly together with the nozzle, central and hollow shafts and their crank arms until the nozzle projects into the combustion chamber, as shown by dotted lines in Figs. 1 and 2. The forward movement of these parts is limited by the large collar *h* of the spider engaging with the inner side of the front head *d* of the stationary body section. The steam also passes through the spider, front body section and the nozzle and is delivered from the outlet end of the latter toward the flue area. While the nozzle and front body section are thus projected toward the flues the same are turned together by means of the crank arm I. After each rotation the nozzle is adjusted relatively to the front body section by shifting the crank arm M relatively to the crank arm I, as before described, for causing the steam to be directed by the nozzle against different circular sections of the flue area. Upon turning off the steam, the shafts, front body section and nozzle and associated parts are automatically retracted or moved rear-

wardly by the spring S, so that said nozzle and section are within the casing, whereby they are protected from the effects of the heat or fire in the combustion chamber when not in use. This retracting movement of these parts is limited by means of a stop or collar *t* secured to the hollow shaft within the fixed body section and engaging with the inner side of the head at the outer end of the same.

By providing the nozzle with adjusting means independent of the means for turning the rotary body or nozzle-carrier E, the nozzle can not only be adjusted at different angles to the carrier to cause the steam-blast by the rotation of the carrier to traverse different circular paths or zones of the flue area but the angle of the nozzle can be changed at different points in the rotation of the carrier to prevent the blast from passing beyond the top and sides of the flue area, thus avoiding gradual destruction of the fire clay between the bricks of the arch and the side walls of the boiler-setting and disintegration of the latter which ultimately occurs when the steam is blown against the brick work. This independent adjusting capacity of the nozzle likewise permits its angle to be changed to avoid delivering the steam-blast below the boiler, which results in disturbing the fire and blowing the smoke and flames through the furnace doors into the furnace room. In this connection, it will be observed that the mechanism M serves not only as a handle for adjusting the nozzle, but in conjunction with the dial *a* also acts as an index or indicator which by its location on the dial shows the different angular positions of the nozzle and the particular zone or portion of the flue area against which the steam jet is being trained, giving the operator full control of the jet.

My improved blower is especially desirable for large boilers and such as have an oblong flue area of considerable width in proportion to its height, inasmuch as the nozzle may be adjusted to reach and clean the marginal and corner tubes or flues of the boiler and still practically confines its action to the limits of the flue area.

Instead of employing the device shown in Figs. 1, 2 and 3 for adjusting the nozzle relatively to the front body section, that shown in Figs. 6 and 7 may be used for this purpose, this last mentioned device being constructed as follows: U represents a rotatable arm secured to the outer end of the hollow shaft F and provided at its free end with a bearing *u*. In the latter is journaled the pivot or pin *v* of a planet gear pinion *v*¹ which meshes with a sun gear wheel V secured to the outer end of the central shaft K. Upon holding the planet pinion against turning about its own axis and moving the same bodily around the sun gear wheel the

inner and outer shafts are turned in the same direction but at different speeds, thereby causing the nozzle and front body section to turn together about the axis of the latter and at the same time the nozzle is turned about its own axis on said section, thereby causing a constant change in the relative position of the nozzle to said body section which has the effect of delivering the steam over the flue area in a spiral line. At one point on its periphery the sun gear wheel is provided with a stop lug *w* which is adapted to engage with one side or the other of the planet pinion and thereby limit the rotary movement of the gear wheel in either direction relatively to the pinion, this movement being somewhat less than a complete turn of the gear wheel. The relation of these gears is so determined that when the stop *w* of the sun gear wheel is moved from one side of the planet pinion to the other side thereof the nozzle will have been shifted from one extreme position to the other relatively to the movable body section, thereby enabling the operator to know when he has turned these parts sufficiently to deliver the steam into all of the flues of the boiler.

If desired, the planet pinion may be provided with a handle *x*, as shown in Fig. 7, for manipulation by the operator when sufficient room is available for this purpose, but when there is no spare room adjacent to the wheel V and pinion *v*¹ to permit of operating the same by hand, a rod *y* is provided which is attached at one end to a lug *z* at the side of the gear pinion, as shown in Fig. 6, while its opposite end extends laterally therefrom to a point within convenient reach of the operator.

I do not wish to be limited to the particular embodiments of the blower herein shown and described, as the same may be obviously modified within the scope of the appended claims without departing from the invention.

I claim as my invention:

1. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of longitudinal and rotary movement in the fixed section, a hollow shaft connected with said movable section and extending through said fixed section and having a longitudinal and rotary movement with said movable body section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a central shaft arranged lengthwise in the hollow shaft, and means operatively connecting said central shaft and said nozzle for adjusting the latter, substantially as set forth.

2. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of longitudinal-

nal and rotary movement in the fixed section, a hollow shaft connected with said movable section and extending through said fixed section and having a longitudinal and rotary movement with said movable body section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a central shaft arranged lengthwise in the hollow shaft, and means operatively connecting said central shaft and said nozzle and adjusting the latter and consisting of a gear pinion arranged on the central shaft and meshing with a gear rim on the nozzle, substantially as set forth.

3. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of longitudinal and rotary movement in said fixed section, a hollow shaft extending through said fixed section and having a longitudinal and rotary movement with said movable body section, a spider connecting the hollow shaft and said movable section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, and a central shaft arranged within the hollow shaft and operatively connected with said nozzle for adjusting the latter, substantially as set forth.

4. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of longitudinal and rotary movement in the fixed section, a hollow shaft connected with said movable section and extending through said fixed section and having a longitudinal and rotary movement, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a central shaft arranged lengthwise in the hollow shaft, means operatively connecting said central shaft and said nozzle, and a spring operating to hold the hollow shaft and the parts connected therewith yieldingly in a retracted position, substantially as set forth.

5. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of rotary movement in the fixed section, a hollow shaft connected with said movable section and extending through said fixed section and having a rotary movement, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a central shaft arranged lengthwise in the hollow shaft, means operatively connecting said central shaft and said nozzle, and means for turning the hollow and central shafts operatively connected with the outer ends thereof, substantially as set forth.

6. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of rotary movement in said fixed section, a nozzle mounted on the inner or front end of said movable section and capable of being moved into different angular positions relatively to the movable body section, a central shaft operatively connected at its inner or front end with said nozzle, and a hollow shaft capable of rotary movement receiving said central shaft and arranged within said body sections and provided at its inner end with a bearing in which the central shaft is journaled, substantially as set forth.

7. A boiler tube cleaner comprising a carrier or body section having a steam supply and capable of rotary movement, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, and means constructed to permit of shifting the nozzle and movable section one independently of the other, substantially as set forth.

8. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of rotary movement relatively to said fixed section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a hollow shaft connected with the movable section, a central shaft arranged in the hollow shaft and operatively connected with the nozzle, and means for connecting and disconnecting said shafts so as to permit of shifting them together or to permit of shifting one independently of the other, substantially as set forth.

9. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of rotary movement relatively to said fixed section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a hollow shaft connected with the movable section, a central shaft arranged in the hollow shaft and operatively connected with the nozzle, crank arms connected, respectively, with the outer ends of said shafts, and means for connecting and disconnecting said arms, substantially as set forth.

10. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of rotary movement relatively to said fixed section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a hollow shaft connected with the movable section, a central shaft arranged in the hollow shaft and operatively connect-

ed with the nozzle, and means for coupling said shafts in different circular positions relatively to each other, substantially as set forth.

- 5 11. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of rotary movement relatively to said fixed section, a nozzle mounted on said movable section
10 and capable of being moved into different angular positions relatively to the movable body section, a hollow shaft connected with the movable section, a central shaft arranged in the hollow shaft and operatively
15 connected with the nozzle, and means for coupling said shafts in different circular positions relatively to each other consisting of an arm connected with the outer end of said hollow shaft and having its hub provided with a circular row of seats, an arm
20 connected with the outer end of the central shaft, and a spring catch mounted on said last mentioned arm and adapted to engage with one or the other of the seats in the hub
25 of the first mentioned arm, substantially as set forth.

12. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of rotary movement relatively to said fixed section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a hollow shaft connected with the
30 movable section, a central shaft arranged in the hollow shaft and operatively connected with the nozzle, an arm secured to one of said shafts, a pinion mounted on said arm, and a gear wheel secured to the other shaft and meshing with said pinion, substantially
40 as set forth.

13. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of rotary movement relatively to said fixed section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a hollow shaft connected with the movable section, a central shaft arranged in the hollow shaft and operatively
50 connected with the nozzle, an arm secured to one of said shafts, a pinion mounted on said arm, and a gear wheel secured to the other shaft meshing with said pinion, and a handle arranged on said pinion, substantially as set forth.

14. A boiler tube cleaner comprising a fixed body section having a steam inlet,
60 a movable body section capable of rotary movement relatively to said fixed section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a hollow shaft connected

with the movable section, a central shaft arranged in the hollow shaft and operatively connected with the nozzle, an arm secured to one of said shafts, a pinion mounted on said arm, and a gear wheel secured to the other shaft meshing with said pinion, and a stop arranged on said wheel and adapted to limit the rotary movement of the same relatively to said pinion, substantially as set forth.

15. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of rotary movement relatively to said fixed section, a nozzle mounted on said movable section and capable of being moved into different angular positions relatively to the movable body section, a hollow shaft connected with the movable section, a central shaft arranged in the hollow shaft and operatively connected with the nozzle, an arm secured to the outer end of the hollow shaft, a pinion mounted on said arm and provided with a handle, and a gear wheel secured to the outer end of the central shaft and meshing with said pinion and provided with a stop adapted to engage with said pinion for limiting the rotary movement of said gear wheel relatively to the pinion, substantially as set forth.

16. A boiler tube cleaner comprising a rotary body or carrier, means for supplying steam thereto, a steam-delivery nozzle mounted on said body and capable of being moved into different angular positions with relation to the axis of the body, means for rotating said body, and adjusting means independent of said body-rotating means for shifting the nozzle relatively to the body.

17. The combination of a steam boiler having horizontal tubes, a wall opposite the ends of the boiler-tubes having an opening extending lengthwise of the tubes, a body or carrier rotatably arranged in said opening, means for supplying steam to said body, a steam delivery nozzle mounted on said body and capable of being moved into different angular positions relatively to the axis of the body, means exterior to said wall for rotating said body, and means independent of said body rotating means and exterior of said wall for adjusting said nozzle with reference to the body.

18. The combination of a steam boiler having horizontal tubes, a wall opposite the ends of the boiler-tubes having an opening extending lengthwise of the tubes, a body or carrier rotatably arranged in said opening, means for supplying steam to said body, a steam delivery nozzle mounted on said body and capable of being moved into different angular positions relatively to the axis of the body, means exterior to said wall for rotating said body, an adjusting shaft for said

nozzle extending lengthwise of said body and provided exterior to said wall with an operating device independent of said body rotating means, and means for operatively
5 connecting the nozzle with said shaft.

19. A flue cleaner comprising a movable member with means for moving the member, a nozzle at the end of said member and movable therewith, and means independent
10 of said other moving means for differentially adjusting the nozzle.

20. A flue cleaner comprising a movable member with means for moving the member, a nozzle at the end of said member and
15 movable therewith, means for differentially adjusting the nozzle, and means for maintaining the nozzle in adjusted position.

21. In a boiler flue cleaner, the combination with a member, and means for turning
20 the member, of a nozzle associated with said member arranged to be moved thereby, and independent means for adjusting the nozzle.

22. In a boiler flue cleaner of the character described, the combination with a carrier member, means for axially moving the carrier member, an adjustable nozzle associated with the carrier member, and means
25 independent of the carrier moving means for adjusting the nozzle, substantially as described.

23. In a boiler flue cleaner, the combination with a movable member, of a jet nozzle associated therewith, means for supplying
30 steam to the nozzle, means for moving the movable member for changing the direction of the issuing jet, and independent means for adjusting the nozzle.

24. A boiler-tube cleaner comprising a rotary body having means for rotating the same, a nozzle adjustably mounted on said
40 body, means independent of said body rotating means for adjusting the nozzle, and

means for indicating the position of the nozzle.

25. A boiler-tube cleaner, comprising a rotary body having means for rotating the same, a nozzle adjustably mounted on said body, means independent of said body rotating means for adjusting the nozzle, and
50 means associated with said nozzle-adjusting means for indicating the position of the nozzle.

26. A boiler-tube cleaner comprising a rotary body, means for rotating said body
55 carrying a dial, a nozzle adjustably mounted on said body, and nozzle-adjusting means independent of said body-rotating means, including a member arranged to traverse said dial.

27. A boiler tube cleaner, comprising a rotary body having means for delivering a steam-jet at different angles to the axis of said body, means for controlling the delivery-angle of the jet, means for rotating
60 said body, a shaft operatively connected with said controlling means, extending lengthwise of said body and rotatable independently thereof, and means for coupling said shaft to said body-rotating means.

28. A boiler tube cleaner comprising a rotary body, means for rotating said body having a circular row of retaining seats, a nozzle adjustably mounted on said body, an adjusting shaft for said nozzle extending
75 lengthwise of said body and rotatable independently thereof, and an operating arm mounted on said shaft and carrying a catch adapted to engage one or another of said seats.

Witness my hand this 10th day of December, 1907.

WILLIAM L. MIGGETT.

Witnesses:

HARRY C. TURNER,
JOHN H. STEVENSON.