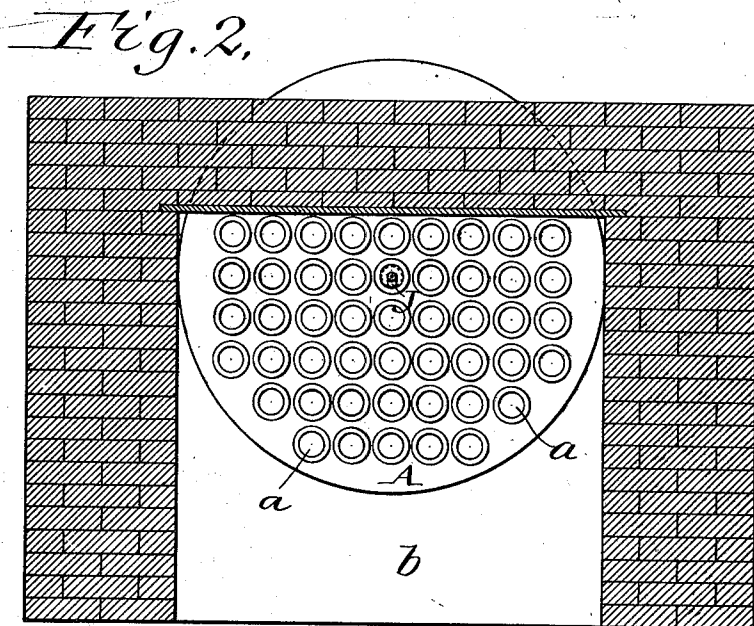
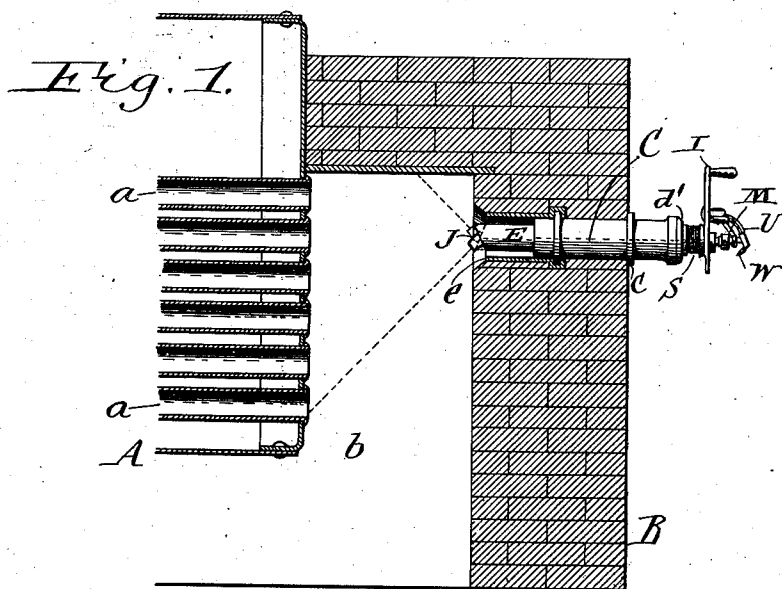


T. S. WALLER & J. V. CARR.
BOILER TUBE CLEANER.
APPLICATION FILED JAN. 6, 1909.

984,622.

Patented Feb. 21, 1911.

2 SHEETS—SHEET 1.



Witnesses:

Richard Sommer
Gustav W. Hora.

Inventors:

Thomas S. Waller
John V. Carr
by *Hayes & Potts*
Attorneys.

T. S. WALLER & J. V. CARR.
 BOILER TUBE CLEANER.
 APPLICATION FILED JAN. 6, 1909.

984,622.

Patented Feb. 21, 1911.

2 SHEETS—SHEET 2.

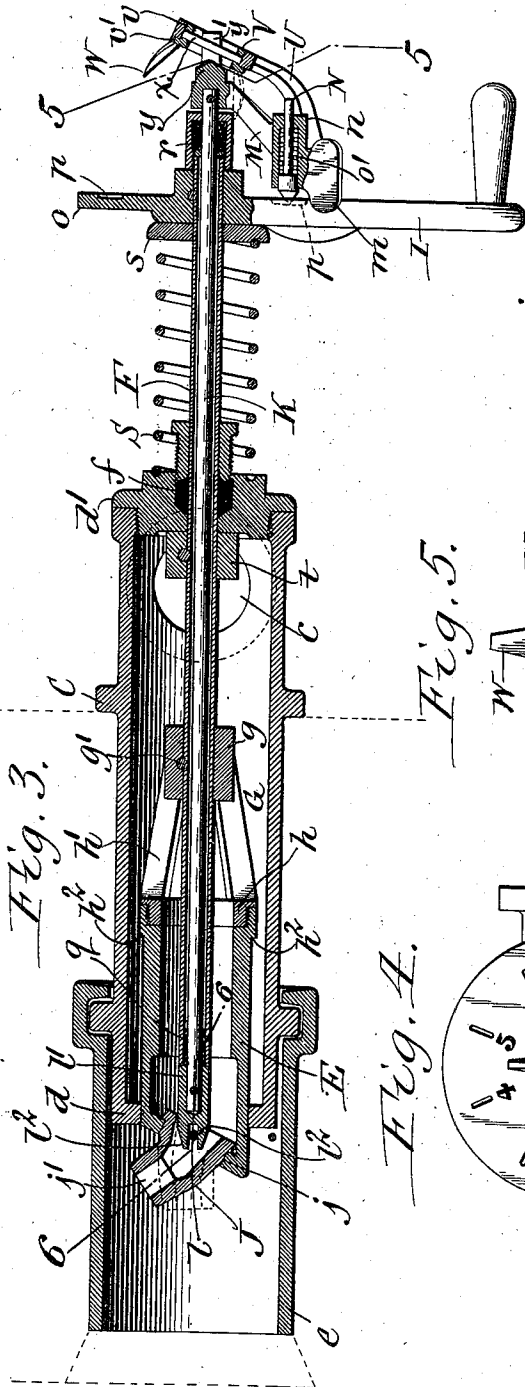


Fig. 3.

Fig. 4.

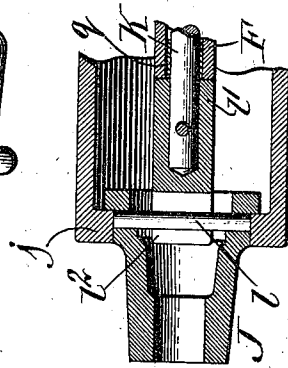
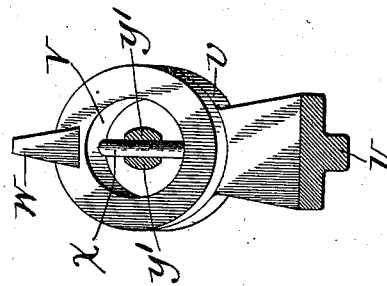
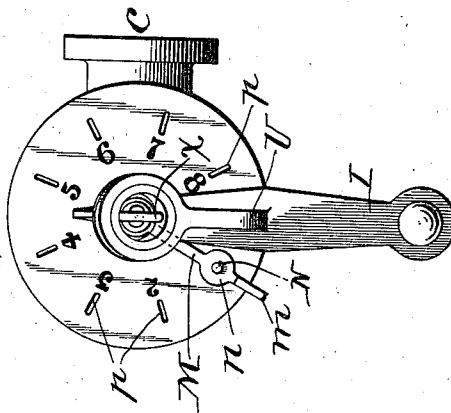


Fig. 6.

Witnesses:
 Richard Sommer
 Gustav W. Hora.

Inventors:
 Thomas S. Waller
 John V. Carr
 by Geyer & Popp
 Attorneys.

UNITED STATES PATENT OFFICE.

THOMAS S. WALLER AND JOHN V. CARR, OF DETROIT, MICHIGAN, ASSIGNORS TO
RAPHAEL HERMAN, OF DETROIT, MICHIGAN.

BOILER-TUBE CLEANER.

984,622.

Specification of Letters Patent.

Patented Feb. 21, 1911.

Application filed January 6, 1909. Serial No. 470,967.

To all whom it may concern:

Be it known that we, THOMAS S. WALLER and JOHN V. CARR, citizens of the United States, and residing at Detroit, 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 which contains a rotatable body section connected with a steam supply and a steam delivery rotatable with said body and also capable of being adjusted into different angular positions relatively to the body section.

A boiler tube cleaner of this character is shown in an application for Letters Patent filed December 16, 1907, and serially numbered 406,675.

The object of the present invention is to improve this tube cleaner so as to prevent the pressure of the steam against the rotatable body section from breaking the connection between the same and its operating device; to provide a superior means for connecting the nozzle and its operating shaft so as to avoid breakage of this connection, and to provide reliable indicating means for determining externally of the boiler setting the position of the delivery nozzle and the direction in which the same delivers the steam.

In the accompanying drawings consisting of 2 sheets: Figure 1 is a fragmentary longitudinal sectional elevation of a stationary brick set boiler provided with our improved tube cleaner. Fig. 2 is a cross section thereof in line 2—2, Fig. 1. Fig. 3 is a vertical longitudinal section, on an enlarged scale, of the tube cleaner arranged in the rear wall of the combustion chamber of a boiler setting or housing. Fig. 4 is a rear end view of the same. Fig. 5 is a cross section, on an enlarged scale, in line 5—5, Fig. 3. Fig. 6 is a fragmentary horizontal section in line 6—6, Fig. 3.

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

A represents the rear part of a stationary boiler, *a* the horizontal flues or tubes thereof and B the rear brick wall of the housing arranged in rear of the boiler and separated therefrom by an intervening smoke box or combustion chamber *b*.

C represents the 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 or carrier 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 on the inner side of the wall B 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*¹ 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 or shank G which consists of a small collar *g* secured to the hollow shaft by a transverse pin *g*¹, as shown or otherwise, a large collar *h* secured to the rear end of the front body section by a screw joint, as shown, or otherwise, and inclined outwardly converging arms *h*¹ 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, 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*¹ 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 jet is turned

with its outlet at the greatest angle relatively to the axis of the nozzle and in dotted lines this jet is represented as having been shifted into a position in which the outlet is parallel with the axis of rotation of the nozzle. By thus turning the jet with the nozzle and also adjusting the jet so that its outlet is of different angles relatively to the axis of the nozzle, the blast of steam issuing from the jet may be distributed successively 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 effectively. 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 driving connection between the front end of the central shaft and the rear end of the nozzle, and a crank arm or handle M secured to the outer or rear end of the central shaft.

Heretofore the driving connection between the central shaft and the nozzle consisted of a pair of intermeshing gears but these were objectionable inasmuch as the teeth of the same would be liable to break upon operating the nozzle when the parts happened to stick or bind. To avoid such breakage an improved driving connection is provided in this place which comprises a transverse coupling pin *l* arranged diametrically at the rear end of the nozzle and secured at its opposite ends in openings formed in opposite sides of the nozzle and a fork having a hub *l*¹ which is secured to the front end of the central shaft and two prongs, jaws or fingers *l*² projecting forwardly from opposite sides of the hub and engaging opposite sides of the cross pin *l* on the nozzle. Upon turning the central shaft this motion is transmitted by the fork and pin connection to the nozzle so that the latter rotates in unison with the shaft. During the rotation of the nozzle its cross pin changes its angular position between the jaws of the fork but always remains in driving contact therewith in the manner of a universal coupling. This driving connection is very strong and durable and not liable to be broken inasmuch as the same is capable of withstanding the strains to which it is subjected in case the nozzle should stick or bind in its bearing.

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, 3 and 4 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*¹

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 the other of which is adapted to be engaged by the operative end of the catch. The arm M and hub *o* thus form the pointer and dial of an indicating device for determining the relative position of the rotatable body section and the nozzle on the exterior of the boiler setting or housing. The front end of the catch N is tapered and held frictionally in engagement with one of the seats or grooves by the spring *o*¹. 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 or dial *o*. 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 Fig. 3, 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 relatively to the movable body section will be increased step by step until the catch N reaches the last seat *p*, whereby the steam is 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 handle operates as a stop for engaging opposite sides of the crank arm I and thus limit the same to making less than a complete turn in either direction relatively to the crank arm I.

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 journal for the outer end and 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 or dial *o* of the crank arm I.

The steam 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 in Fig. 1. The forward movement of these parts is limited by a forwardly facing shoulder h^2 engaging with the internal shoulder formed by the inner side of the front head d of the movable 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 the steam has been played a sufficient length of time against one section of the flue area, 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 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 rearwardly 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 d^1 at the outer end of the same.

Heretofore the forward movement of the front body section was limited by the front collar h of the spider or shank bearing against the front head d of the fixed body section. This is objectionable because the steam pressure against the movable body section is liable to break the screw joint between the movable body section and the spider or shank and thus render the tube either inoperative or impair its efficiency. In the present construction, the shoulder h^2 which limits the forward movement of the front body section is formed by means of an annular integral enlargement or collar on the exterior of the rear end of this body section. By this means the pressure which is exerted by the steam against the movable body section is taken up by the latter bearing directly against the front head of the fixed body section, thereby relieving the joint between the movable body section and the shank from these strains and insuring the tube cleaner against breakage.

It is desirable for the operator to know the position of the delivery nozzle and the direction of the steam issuing therefrom, so as to utilize the steam judiciously for cleaning the boiler tubes and also avoid directing the steam against the roof or top of the combustion chamber or smoke box which otherwise not only causes a waste of steam but is also liable to wear away and weaken said roof.

In order to enable the operator to determine the position of the nozzle relatively to the boiler tubes and combustion chamber from the interior of the boiler housing or setting, an automatic indicating device is provided which is constructed as follows:— U represents a bracket arranged on the outer side of the handle or arm I and extending past the outer ends of the central and hollow shafts K, F. V represents a rotatable indicator ring journaled in a bearing v in the outer end of the bracket and having an annular outwardly facing shoulder v^1 which engages with the inner side of said bearing and limits the outward movement of the indicator ring in its bearing. The center of the indicator ring is in line with the axes of the shafts K, F and the axis and plane of rotation of this ring are parallel with that of the nozzle, as shown in Fig. 3. W represents a pointer which projects inwardly from one part of the indicator ring at the same angle relatively to the axis of this ring as the angle at which the outlet end of the steam delivery nozzle stands relatively to its pivot on the movable body section. The indicator ring and pointer are caused to turn in unison with the nozzle by means of a universal coupling which connects the ring with the outer end of the central shaft and which preferably consists of a transverse pin w arranged diametrically across the indicator ring and secured at its opposite ends in openings formed in said ring and a coupling fork having a hub y secured to the outer end of the central shaft and provided with two parallel outwardly projecting jaws, prongs or fingers y^1 , y^1 which engage with opposite sides of the pin w . As the central shaft is turned by the handle M the rear universal coupling between the same and the indicator ring causes the same to turn in the bracket at the same time that the nozzle is turned by the central shaft through the medium of the front universal coupling. During this turning movement of the nozzle and indicator ring the pointer and nozzle outlet change their angular position relatively to the axes of the shafts K, F and body sections. When the outlet of the nozzle is nearest to the rearmost part of the bearing on the inclined front head of the movable body section and the pointer W is nearest the rearmost part of the bearing on the bracket U, as shown in full lines in Fig. 3, then the outlet of the nozzle stands at the greatest angle relatively to the boiler tubes. While in this position the steam issues therefrom at the greatest angle and is delivered into the outermost tubes or flues of the boiler by rocking the movable body section so as to direct the steam only into the outermost tubes and not upwardly against the roof of the combustion chamber which would occur if the movable body section at this time

were rotated through a complete circle, thereby avoiding waste of steam and also the destructive action which occurs when steam is delivered against the roof of the combustion chamber. After the outermost tubes have been cleaned the nozzle is adjusted so that its outlet is more nearly parallel with the axis of the movable body section, as shown by dotted lines in Fig. 3, whereby the steam is delivered into the inner tubes. By adjusting the nozzle in this manner the entire flue or tube area of the boiler may be successively covered by the jet of steam from the nozzle. When the nozzle has reached a position so nearly parallel with the axis of the movable body section that the steam no longer strikes the roof of the combustion chamber, then the nozzle and the movable body section carrying the same may be rotated a complete circle for cleaning the tubes on the central part of the tube area. It will now be apparent that by observing the angular position of the external pointer which at all times harmonizes with that of the outlet of the steam delivery nozzle, the operator is able to direct the steam into any particular tube or tubes of the boiler and so manipulate the cleaner as to save the roof of the combustion chamber from undue wear. Inasmuch as the position of the pointer W can be felt it is possible to determine the position of the nozzle and to operate this tube cleaner in the dark or poorly lighted places, where the same are often stalled, as well as in the light.

We claim as our invention:

1. A boiler tube cleaner comprising a rotatable body or carrier, means for supplying steam thereto, a steam delivery nozzle mounted on said body and capable of being moved into different positions relatively to said body, an adjusting member, and a universal coupling connecting said adjusting member and said nozzle and comprising a pin arranged transversely on one of said parts and a longitudinally slotted coupler arranged on the other part and receiving said pin.

2. A boiler tube cleaner comprising a rotatable body or carrier, means for supplying steam thereto, a steam delivery nozzle mounted on said body and capable of turning on the body at an angle to the axis of the latter, an adjusting shaft arranged axially in line with said body, and a universal coupling connecting said shaft and nozzle comprising a pin arranged transversely on the nozzle and a coupler arranged on said shaft and provided with a longitudinal slot which receives said pin.

3. A boiler tube cleaner comprising a rotatable body or carrier, means for supplying steam thereto, a steam delivery nozzle mounted on said body and capable of being moved into different positions relatively to

said body, an adjusting member, and a universal coupling connecting said adjusting member and said nozzle and comprising a cross pin mounted on one of said members and a fork mounted on the other member and having its jaws embracing said pin.

4. A boiler tube cleaner comprising a rotatable body or carrier, means for supplying steam to said body, a steam delivery nozzle pivoted on the body at an angle to the axis of the latter and having its outlet arranged at an angle to the axis of its pivot, an adjusting shaft arranged axially in line with said body, and a universal coupling connecting said shaft and nozzle and comprising a transverse pin arranged diametrically on the nozzle and a fork arranged on said shaft and having jaws engaging with opposite sides of said pin.

5. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of longitudinal and rotary movement relatively to the fixed body section when operating the cleaner and provided with an integral shoulder adapted to bear against a shoulder on the fixed body section, and a steam nozzle mounted on the movable body section and capable of adjustment relatively thereto.

6. A boiler tube cleaner comprising a fixed body section having a steam inlet, a movable body section capable of longitudinal and rotary movement relatively to the fixed body section when operating the cleaner and provided with an integral shoulder adapted to bear against a shoulder on the fixed body section, and a steam delivery nozzle pivoted on said movable body section at an angle to the axis of the latter and having its outlet arranged at an angle to its pivot.

7. 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 and having an external integral shoulder which is adapted to engage with an internal shoulder on said fixed section for limiting the forward movement of said movable body section, a hollow shaft extending through said fixed section, a shank secured to said hollow shaft and connected with said movable body section, a steam delivery nozzle movable relatively to the movable body section, and an adjusting shaft arranged in the hollow shaft and operatively connected with said nozzle to permit of adjusting the latter.

8. A boiler tube cleaner comprising a rotatable body or carrier having a steam supply, a steam delivery nozzle mounted on said body and capable of being moved into different angular positions relatively to said body, a pointer capable of being moved into different angular positions relatively to the body, and means for causing said nozzle and pointer to move in unison so that the nozzle

and pointer are always arranged at the same angle.

9. The combination with a boiler having tubes and a wall arranged in rear of the boiler of a tube cleaner comprising a rotatable body arranged in an opening in said wall and having a steam supply, a rotatable nozzle mounted on said body and capable of being moved so as to stand at different angles relatively to the axis of said body, a pointer arranged outside of said wall and capable of being moved so as to stand at different angles relatively to the axis of said body, and means for causing said nozzle and pointer to move in unison so that the nozzle and pointer are always parallel.

10. A boiler tube cleaner comprising a rotatable body having a steam supply, a steam delivery nozzle pivoted on said body at an angle to the axis of the latter and having an outlet which is arranged at an angle to said pivot, a rotatable indicator having its axis parallel with that of the nozzle and having a pointer which is parallel with the outlet of said nozzle, and means for causing said nozzle and indicator to rotate in unison so that the nozzle and pointer are always parallel.

11. A boiler tube cleaner comprising a rotatable body having a steam supply, a steam delivery nozzle pivoted at an angle on said body and having an outlet which is arranged at an angle to said pivot, a rotatable indicator having its axis parallel with that of the nozzle and having a pointer which is parallel with the outlet of said nozzle, a bracket having a bearing in which said indicator is journaled, and means for causing said indicator and nozzle to turn in unison.

12. A boiler tube cleaner comprising a rotatable body having a steam supply, a steam delivery nozzle pivoted at an angle on said body and having an outlet which is arranged at an angle to said pivot, a rotatable indicator having its axis parallel with that of the nozzle and having a pointer which is parallel with the outlet of said nozzle, and means for causing said nozzle and indicator to rotate in unison so that the nozzle and pointer are always arranged at the same angle comprising a shaft, a pin arranged transversely on the indicator, and a fork arranged on the shaft and embracing said pin.

13. A boiler tube cleaner comprising a ro-

tatable body having a steam supply, a steam delivery nozzle pivoted on said body at an angle to the axis of the latter and having an outlet which is arranged at an angle to the axis of the nozzle, a hollow shaft connected with said body, a central shaft arranged within the hollow shaft and operatively connected with said nozzle, an operating arm arranged on the outer end of the hollow shaft, an adjusting arm connected with the outer end of the central shaft, a bracket arranged on the operating arm, an indicator having a ring journaled on said bracket at an angle parallel with the axis of the nozzle and having a pointer arranged at an angle parallel with the outlet of the nozzle, and means for operatively connecting said indicator and central shaft comprising a coupling pin arranged diametrically on the indicator ring and a fork arranged on the central shaft and engaging with opposite sides of said pin.

14. A boiler tube cleaner comprising a rotatable body having a steam supply, a steam delivery nozzle pivoted on said body at an angle to the axis of the latter and having an outlet which is arranged at an angle to the axis of the nozzle, a hollow shaft connected with said body, a central shaft arranged within the hollow shaft and operatively connected with said nozzle, an operating arm arranged on the outer end of the hollow shaft, an adjusting arm connected with the outer end of the central shaft, a bracket arranged on the operating arm, an indicator having a ring journaled on said bracket at an angle parallel with the axis of the nozzle and having a pointer arranged at an angle parallel with the outlet of the nozzle, means for operatively connecting and disconnecting said arms, and means for operatively connecting said indicator and central shaft comprising a coupling pin arranged diametrically on the indicator ring and a fork arranged on the central shaft and engaging with opposite sides of said pin.

Witness our hands this 31 day of December, 1908.

THOMAS S. WALLER.
JOHN V. CARR.

Witnesses:

G. W. BAUDINOT,
W. L. NUGGETT.

It is hereby certified that in Letters Patent No. 984,622, granted February 21, 1911, upon the application of Thomas S. Waller and John V. Carr, of Detroit, Michigan, for an improvement in "Boiler-Tube Cleaners," an error appears in the printed specification requiring correction as follows: Page 3, line 69, the word "interior" should read *exterior*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 14th day of March, A. D., 1911.

[SEAL.]

E. B. MOORE,
Commissioner of Patents.