Aug. 30, 1932. F. C. AREY 1,874,151

MEANS FOR SUPPORTING SOOT CLEANER HEADS

Filed Sept. 4, 1930 4 Sheets-Sheet 1

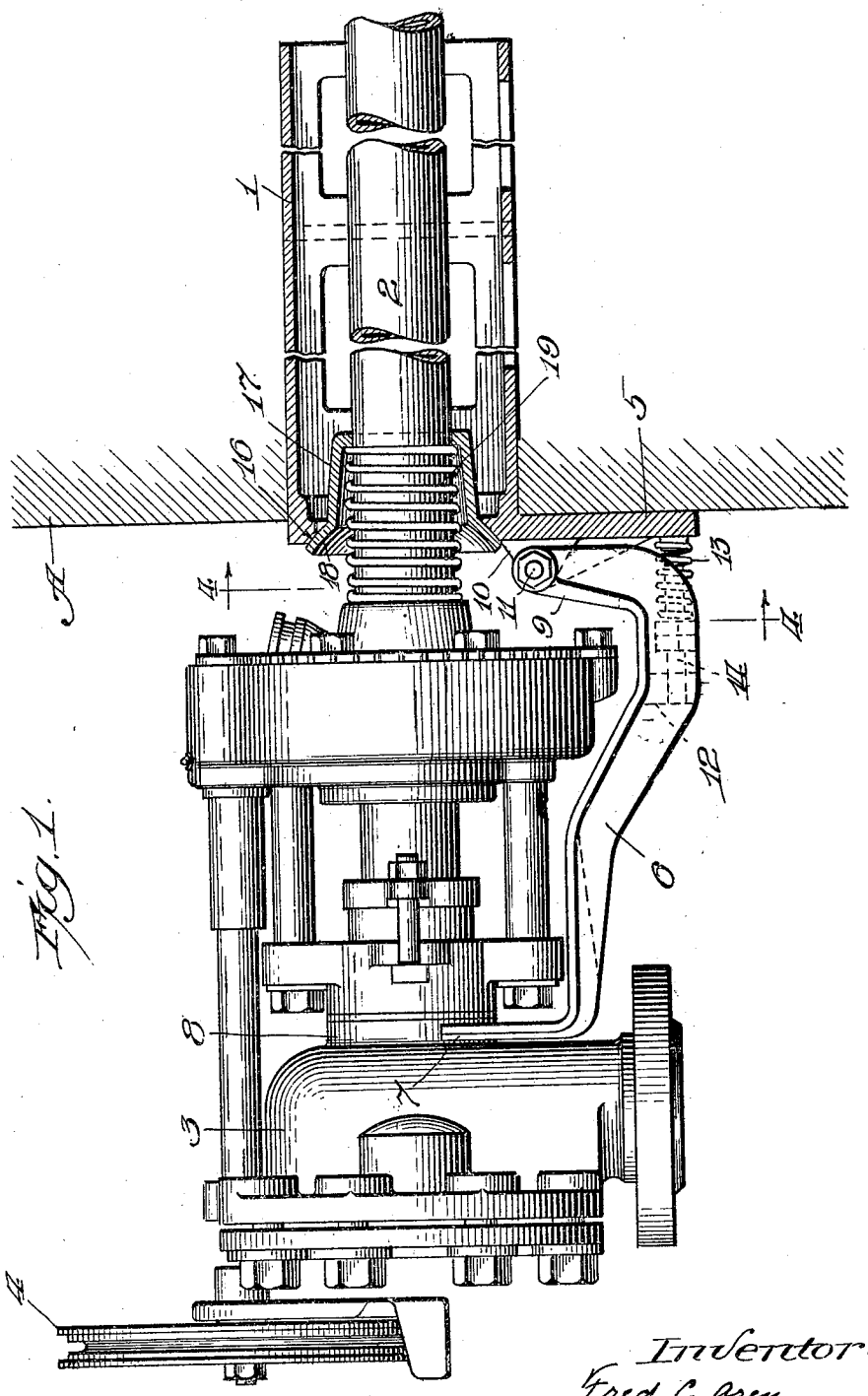


Fig. 1.

Inventor:
Fred C. Arey,
By Wm. F. Freudenreich,
Atty

Aug. 30, 1932. F. C. AREY 1,874,151

MEANS FOR SUPPORTING SOOT CLEANER HEADS

Filed Sept. 4, 1930 4 Sheets-Sheet 2

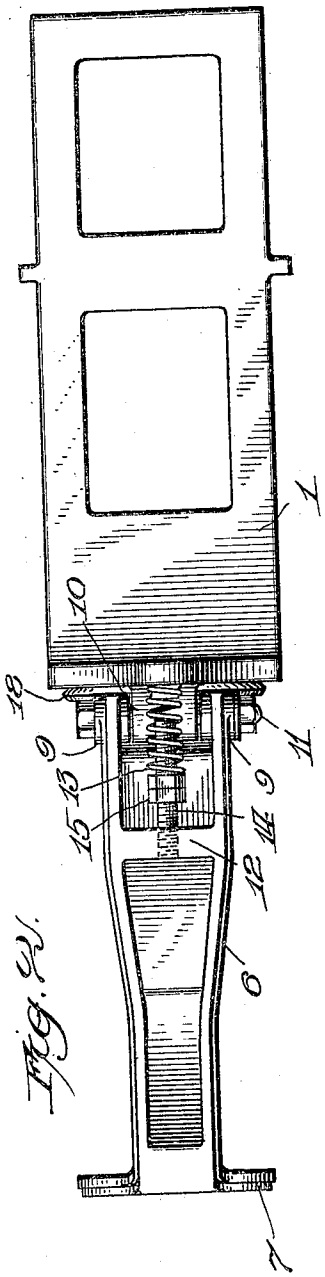


Fig. 3.

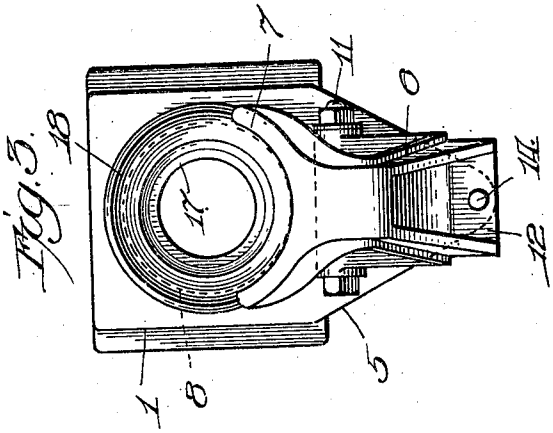
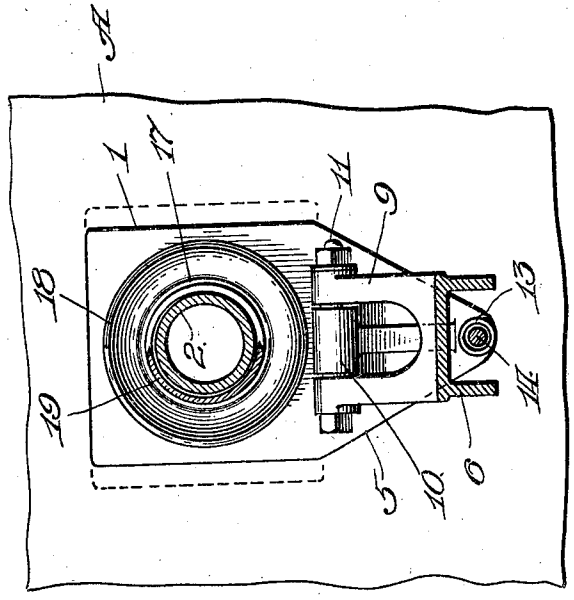


Fig. 4.



Inventor:
Fred C Arey,
By Wm F Freudenreich Atty.

Aug. 30, 1932. F. C. AREY 1,874,151

MEANS FOR SUPPORTING SOOT CLEANER HEADS

Filed Sept. 4, 1930 4 Sheets-Sheet 3

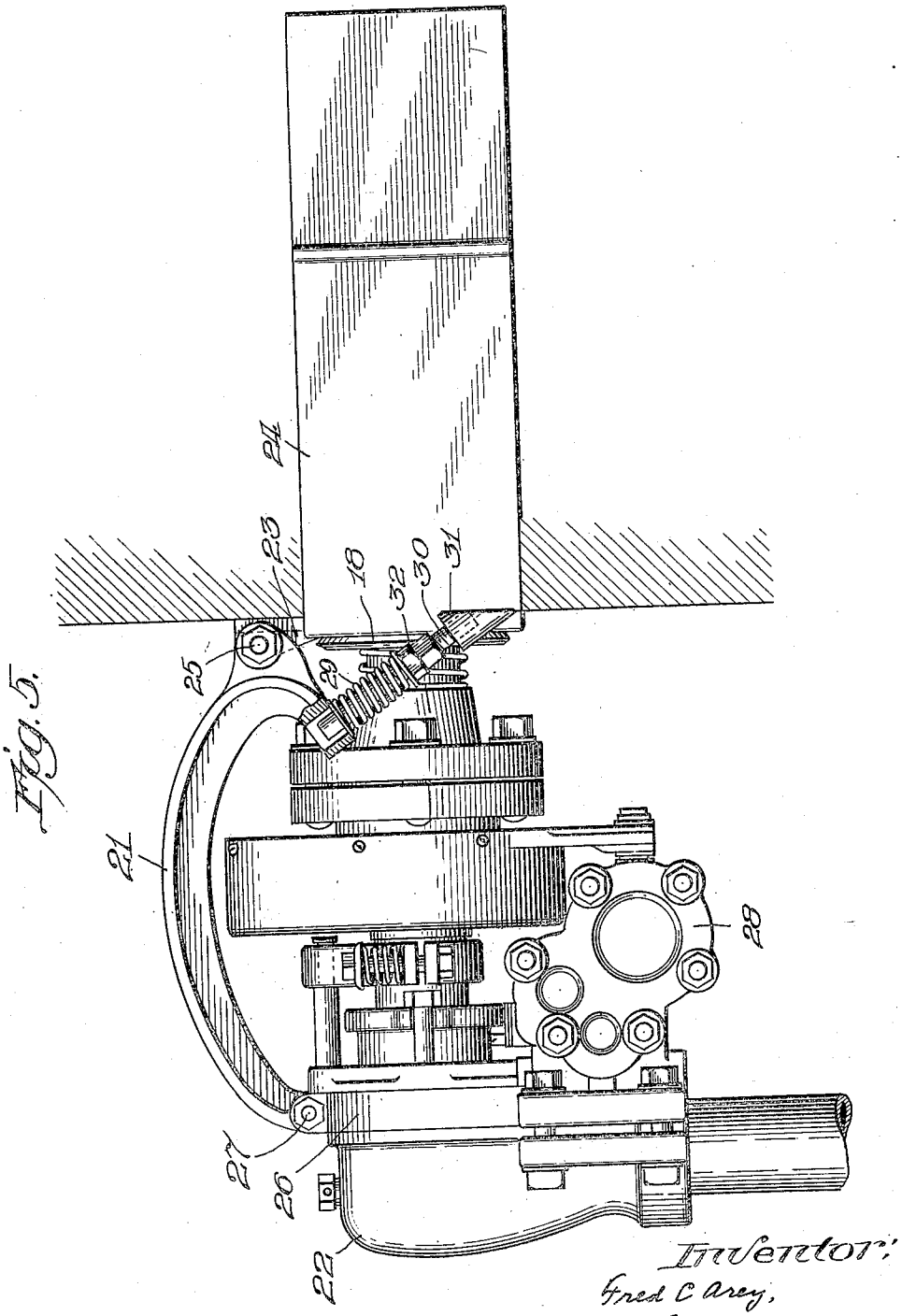


Fig. 5.

Inventor:
Fred C Arey,
By Wm F. Freudenreich, Atty.

Aug. 30, 1932. F. C. AREY 1,874,151

MEANS FOR SUPPORTING SOOT CLEANER HEADS

Filed Sept. 4, 1930 4 Sheets-Sheet 4

Fig. 6.

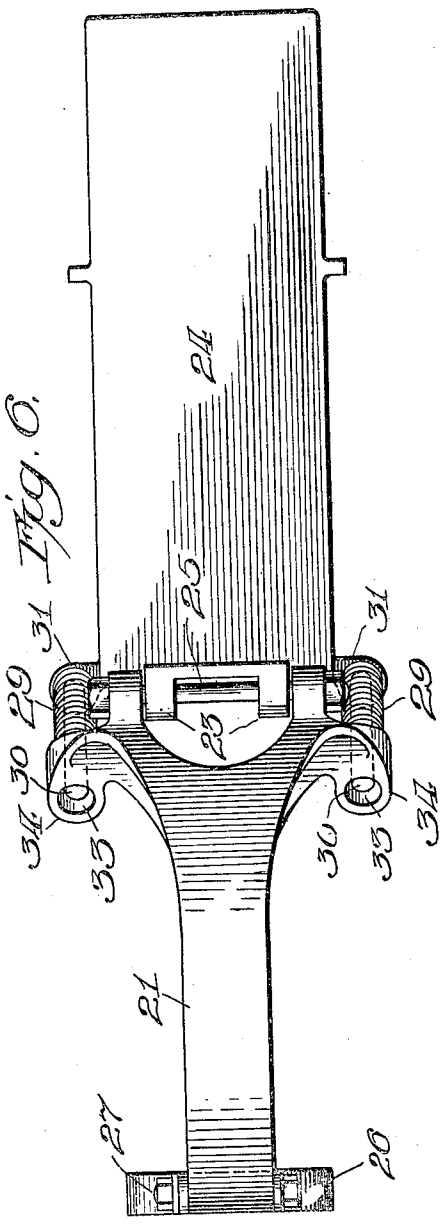
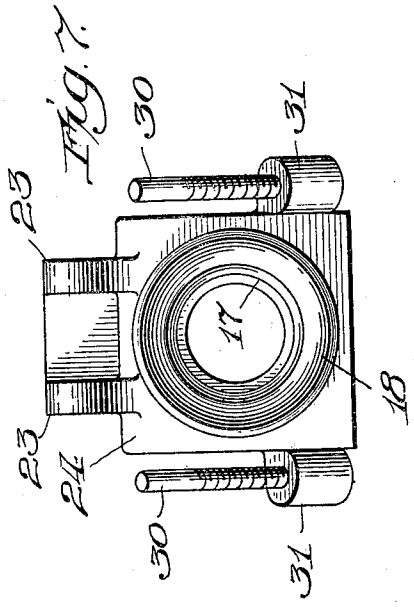


Fig. 7.



Inventor:
Fred C. Arey,
By Wm. F. Freudenreich,
Atty

Patented Aug. 30, 1932 1,874,151

UNITED STATES PATENT OFFICE

FRED C. AREY, OF OAK PARK, ILLINOIS, ASSIGNOR TO VULCAN SOOT CLEANER COMPANY, OF DU BOIS, PENNSYLVANIA, A CORPORATION OF DELAWARE

MEANS FOR SUPPORTING SOOT CLEANER HEADS

Application filed September 4, 1930. Serial No. 479,645.

It is common to provide boilers of the water tube and return tube types, superheaters and economizers with permanent tubular soot cleaning elements. In order to keep the number of distributing elements required as low as possible, they must be operated, while delivering steam, so that each will distribute its jets of steam over a number of the tubes to be cleaned. For this purpose each cleaning element has thereon, outside of the furnace or boiler setting, a head by means of which the element may be rotated or oscillated, either by power or manually. The cleaning elements are usually fastened to some of the tubes to be cleaned so as to maintain them in proper position with respect thereto. However, due to the difference in expansion and contraction between the boiler tubes and the boiler setting, there must be room for vertical play between the cleaning elements which are attached to the boiler tubes and the boiler setting. Consequently, the cleaner heads cannot be fixed to the boiler setting and have heretofore constituted a dead weight on the outer ends of the cleaner elements. The cleaner elements become very hot during the times no steam is flowing through them and, as the heads thereon are quite heavy, the weight of the heads frequently causes the cleaner elements to bend and bind in their supports when it is attempted to turn them, thus rendering the cleaner elements inoperative.

The object of the present invention is to overcome the objection just noted. I accomplish this by supporting the cleaner head from the boiler or furnace setting in such a way that the cleaning element is relieved from carrying the whole or the greater part of the weight thereof while at the same time the head may move up and down to compensate for a difference in expansion or contraction between the tubes to be cleaned and the boiler setting.

Because of the need for permitting relative vertical movements between the cleaning elements and the boiler or furnace setting, a closure must be provided for the large opening or window in the latter through which the cleaning element passes. A further object of the present invention is to produce a simple and novel closure for this purpose.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a view partly in elevation and partly in vertical section showing the head end of a cleaning unit embodying my invention and a fragment of the boiler or furnace setting; Fig. 2 is a bottom plan view of the bushing or casing that is set in the furnace wall for the passage of the cleaner element, together with the support for the head; Fig. 3 is an end view of the devices shown in Fig. 2; Fig. 4 is a section on line 4—4 of Fig. 1; Fig. 5 is a view similar to Fig. 1, showing a modification; Fig. 6 is a top plan view of the bushing or sleeve and the support for the head, as they appear in Fig. 5; and Fig. 7 is an end view of the bushing or sleeve of Figs. 5 and 6.

Referring to Figs. 1 to 4 of the drawings, A represents a boiler or furnace setting in which is fixed a bushing or open-ended casing 1 through which passes a tubular cleaning element 2 much smaller in diameter than the transverse internal dimensions of the casing. On the outer end of the cleaning element is a head 3 of any usual or suitable construction, shown as being of the manually operated type having a wheel 4 to receive an operating chain or the like. The member 1 has a wing or flange 5 extending downwardly from the outer end of the same along the face of the boiler or furnace setting. Hinged to this flange is a bracket 6 that extends outwardly under the head and has at its free end a saddle-like part 7 in which rests a part 8 of the head. In the arrangement shown, the bracket is more or less U-shaped, the saddle being at the upper end of the outer arm, whereas the inner arm 9 is bifurcated at its upper end to receive an ear 10 on the flange 5

allowing space for slight lateral movement. A bolt 11 passes freely through the arm 9 and the ear 10. Between the lower part of the flange 5 and a cross piece 12 on the under side of the bracket is a compression spring 13 that normally tends to raise the free end of the bracket. On the cross piece 12 is a stud 14 that extends lengthwise through the spring and has thereon a nut or nuts 15 engaged with the outer end of the spring. By adjusting the nuts the position which the bracket tends to assume when unloaded may be regulated.

The parts are so proportioned that the saddle supports the head at about the center of gravity of the latter if the entire weight of the head is to be borne by the bracket, thereby causing the head to be balanced on the bracket and its weight removed from the cleaning element.

The mouth at the outer end of the bushing or casing 1 has therein a seat 16 that is part of a spherical surface whose center is at a considerable distance outward therefrom. Extending through the open outer end of the casing or bushing is a cup-shaped member 17 having in the bottom an opening through which the cleaning element passes, the opening being only large enough to receive the cleaning element without leaving any material open space around the same. At the mouth of the cup is a flange 18 shaped to fit the spherical seat 16. There is a compression spring 19 interposed between the head and the bottom of the cup to hold the flange tightly against its seat. The cup therefore has a ball and socket joint with the bushing or casing, and can swing in any direction about the center of the spherical bearing surfaces, the bearing surfaces being held in contact with each other, however, by the spring 19.

It will be seen that if the right hand end of the cup, as viewed in Fig. 1, swings downwardly, there is a bodily downward movement of the cup because all parts thereof are spaced apart from the center about which the turning movement can take place. In the same way, if the cup swings up, there is a bodily upward movement. In short, when the cup turns in any direction, there is a bodily movement of the cup in that direction. The result is that when the cleaning element must move up or down or in any direction transversely thereof with respect to the bushing or casing, it is entirely free to do so without uncovering the mouth of the bushing or casing. Furthermore, since the weight of the head balances the pressure of the spring 13, the head can move up and down with the cleaning element without stressing the same. At all times, however, the weight of the head is carried by the bracket, so that it can exert no tendency to bend the cleaning element when the latter has been heated to a point where it will be soft enough to bend when sustaining the weight of the head from its outer end.

The casing or bushing, the cup, and the bracket may all be in the form of castings that require no machining except to provide the bolt holes, and the cost of manufacturing them is therefore small.

In Figs. 5 to 7 I have shown a slight modification in which there is a supporting bracket 21 overlying the head 22; one end of the bracket being hinged to an ear 23 on the bushing or casing 24, by means of a bolt 25 passing through the bracket and the ear; and the other end of the bracket being connected to a strap 26 that encircles a part of the head. In the arrangement shown, the free end of the bracket is interposed between the ends of the strap and is secured thereto by a bolt 27 passing through the bracket and the ends of the strap. The head shown in this form of my invention is one adapted to be operated by power as, for example, a steam engine 28. This head is shown simply by way of illustration, however, as the details thereof form no part of the present invention.

The weight of the head is borne upon a pair of compression springs 29. These springs are shown as surrounding a pair of studs 30, each fixed at its lower end to and extending upwardly and outwardly from a lug 31 cast integral with the casing or bushing at opposite sides thereof and at the outer end. On each stud are a nut or nuts 32 on which the corresponding spring rests. The upper end of each stud extends through an opening 33 in the ear 34 on the bracket. As in the other form of my invention, by adjusting the nut or nuts 32 the weight of the head may be transferred to the springs after the assembly has been made.

It will thus be seen that I have produced a simple and novel means for overcoming one of the principal objections to permanently installed soot cleaners, namely the bending of the cleaning elements, when highly heated, through the weight of the operating heads thereon. It will also be seen that I have produced a simple and novel closure for the opening in the wall through which the cleaning element passes, and one that is rugged and not apt to get out of order.

While I have illustrated and described with particularity only a single preferred form of my invention, with a slight modification, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:

1. The combination with a cleaning element passing through a wall with respect to which it has relative vertical movements and

having a head including means for turning the cleaning element at the outer end, of means for supporting the weight of the head independently of the said element while permitting the head to move vertically.

2. The combination with a cleaning element passing through a wall with respect to which it has relative vertical movements and having a head at its outer end, of a yielding support at about the center of gravity of the head balancing the weight of the head and permitting the head to move vertically in unison with the cleaning element without imposing its weight on the latter.

3. In an apparatus of the character described having a cleaning element provided at one end with a head including means for turning the cleaning element for operating the same, means for balancing the weight of the head independently of the cleaning element and permitting the head to rise and fall as the cleaning element moves up and down.

4. The combination with an apparatus of the character described having a cleaning element required to have capacity for vertical movements relative to the boiler or furnace setting and provided at its outer end with a head, including means for turning the cleaning element, of means for imposing the weight of the head on the said setting independently of the cleaning element while permitting vertical movements of the head.

5. The combination with an apparatus of the character described having a cleaning element required to have capacity for vertical movements relative to the furnace or boiler setting, which cleaning element is provided with a head including means for turning the cleaning element, of spring means interposed between the head and the said setting to sustain the weight of the head independently of the cleaning element while permitting it to move vertically.

6. The combination with an apparatus of the class described having a cleaning element required to have capacity for vertical movements relative to the furnace or boiler setting, of a bracket hinged at one end to the said setting and having its other end in supporting relation to the said head at about the center of gravity of the latter, and spring means between the bracket and said setting to take the weight of the head while permitting the bracket to swing and allow the head to rise and fall.

7. The combination with a cleaning element passing through a wall with respect to which it has relative vertical movements and having at its outer end a head including means for turning the cleaning element, of a vertically yieldable element supported by said wall and supporting said head at about the center of gravity of the head, whereby the weight of the head is balanced independently of the cleaning element.

8. In an apparatus of the character described, a wall having an opening therethrough, a cup-shaped member smaller in diameter than the opening extending into the opening and having an enlarged portion at the open outer end engaged with said wall around the said opening, the enlargement on said member and said wall engaging each other along bearing surfaces forming a ball and socket joint the center of whose spherical surface lies outwardly from said wall, a cleaning element smaller in diameter than said cup-shaped member extending through the same and through a hole in the bottom thereof of about the same diameter as the cleaning element, and a spring acting on said member to hold said bearing surfaces together; whereby said cleaning element may move bodily in directions at right angles to its longitudinal axis while said member turns about the center of said spherical surfaces and maintains a tight joint.

In testimony whereof, I sign this specification.

FRED C. AREY.