Nov. 19, 1940. T. C. WILSON 2,221,853

TUBE CLEANER AND ELEMENT THEREOF

Filed July 1, 1936

Fig. 1

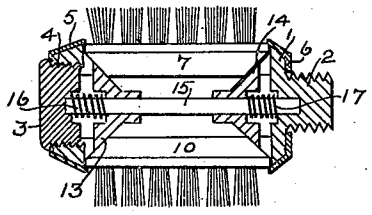


Fig. 2

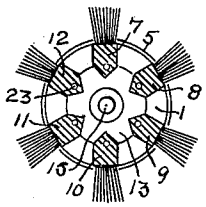


Fig. 3

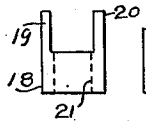


Fig. 4

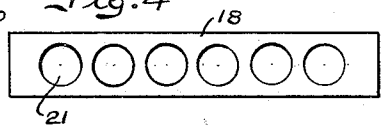


Fig. 5

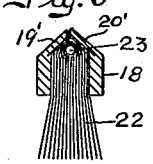


Fig. 6

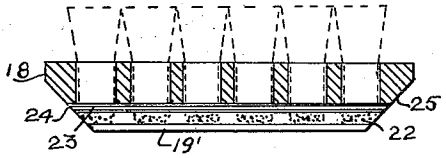


Fig. 7

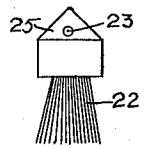


Fig. 8

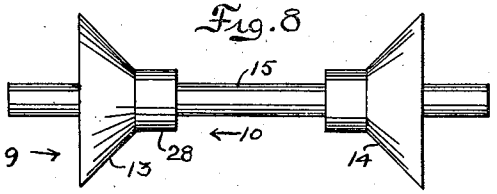


Fig. 9

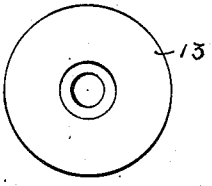


Fig. 11

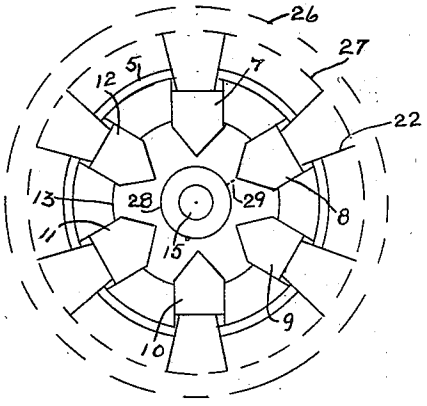
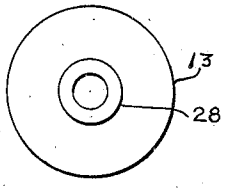


Fig. 10



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2,221,853

TUBE CLEANER AND ELEMENT THEREOF

Thomas C. Wilson, deceased, late of Rockville Centre, N. Y., by Martha A. Wilson, executrix, Rockville Centre, N. Y.

Application July 1, 1936, Serial No. 88,344

1 Claim. (Cl. 15—199)

The device the subject of this invention is a tube cleaner or tube brush similar in many respects to the tube cleaner described in the application for Letters Patent of the United States filed even date herewith and numbered 88,345, which describes and claims the tube cleaner wherein these elements are employed, but the particular object of this invention is to provide certain elements that go to make up the tube cleaner, and this application is directed more particularly to the construction and operation of such elements.

In a tube cleaner such as that is herein described, many conditions of operation germane to this device are important and certain of the conditions of major importance and the methods of accomplishing the desirable purposes occasioned by such conditions will be fully set forth as the specification progresses.

Among the important conditions may be briefly mentioned as the first, which required that the cleaning elements have the greatest possible flexibility, that is, that their radial movement be the maximum that can be obtained by the particular diameter of cleaner or brush, and this radial movement is important as it not only means a more thorough cleaning of the tubes, but it also means the least possible wear on the cleaning elements by contact with the tubes.

Another important condition that must be met, is that of wear and in this instance reference is made particularly to the wear of the parts occasioned by the movement of the cleaning elements radially.

These cleaners or brushes are subjected to varying conditions of operation. If inserted in very dirty tubes, the surfaces of which are roughened with scale, the cleaning elements should respond very quickly to the difference in diameter occasioned by the roughening and this ready response or change of diameter requires that the cleaning elements be moved outward and that they will be moved inward an indeterminable number of times, and therefore if the wearing or contact parts of the device are not properly designed and treated, such unusual wear may result as to make the device useless for the purposes intended and it will be appreciated that as a number of cleaning elements are operated simultaneously by a single mechanism which forces all cleaning elements radially outward, an uneven wear on the part of any element would result in loss of efficiency in the whole device, and so this application is directed particularly to the construction of the cleaning elements themselves and their treatment in conjunction with the mechanism which urges the cleaning elements into operative position.

The accompanying drawing should be referred to for a complete understanding of the specification which follows.

In the drawing:

Figure 1 is a sectional view partly in elevation of a tube cleaner of improved design.

Figure 2 is a transverse sectional view taken at about midlength the device shown in Figure 1.

The remaining figures are on a much larger scale.

Figure 3 is an end elevation of the channel bar which supports the brushes.

Figure 4 is a plan view thereof.

Figure 5 is a sectional view with a brush inserted.

Figure 6 is a longitudinal sectional view of the complete element.

Figure 7 is an end view thereof.

Figure 8 is a view in elevation of the devices which urge the cleaner element radially.

Figure 9 is a view of one of the pusher members taken in the direction of the arrow 9 in Figure 8.

Figure 10 is a view of the pusher taken in the direction of the arrow 10 in Figure 8.

Figure 11 is a diagrammatic view indicating the operation of the cleaner elements and the parts which operate it.

Similar reference numerals indicate like parts in all the figures where they appear.

The completed brush consists of a body member 1 having a screw threaded projection formed integrally therewith and a cap 3 at the opposite end of the body member which is screw threaded as at 4 into the body member. A retaining ring 5 is held in position by the cap 3 and a second retainer ring 6 is held in position by a fitting which will be attached to the screw threaded projection 2.

Arranged in the caps 5 and 6 are a plurality of cleaner elements and in the brush shown six such elements are employed and these elements are indicated at 7, 8, 9, 10, 11 and 12 in Figures 2 and 11. The outward movement of these cleaner elements is limited by the rings 5 and 6 and these elements are urged outward by certain frusto-conical members shown at 13 and 14 which operate upon a guide rod 15. The cone members are forced toward each other by springs as shown at 16 and 17.

Each of the cleaner members is constructed with a channel bar and to described the con-

struction of these cleaner members, a new set of reference characters will be used as though these cleaner members had not been previously referred to, but it will be understood that the cleaner members about to be described are those previously referred to by the reference characters 7 to 12 inclusive.

The channel bar as a whole is shown at 18 and is provided with two projections or sides as shown at 19 and 20, each channel bar is drilled to receive the cleaning fagots. The fagot holes being indicated at 21 extend through the body of the bar and into the channel. Because these channel bars each carry a plurality of cleaning fagots, reference is made to these channel bars as cartridges.

Each fagot, one of which is shown at 22 in Figures 5 and 7 consist of a plurality of looped wires of a predetermined diameter, the loop of the wires being inserted into the perforations 21 to be retained therein by a hardened steel rod as shown at 23 and thereafter the sides 19 and 20 are bent inward upon the groups of wires 22 of the rod 23 as shown at 19' and 20' in Figures 5 and 7. This bending inward of the channel sides is accomplished in such a manner that the sides are smooth and even and are caused to closely and forcibly impinge upon the loops of the group of wires 22 and thereafter the ends of the bar 18 are ground away as shown at 24 and 25 and upon a predetermined angle which should be an angle of about 45 degrees and for a purpose that shall appear later.

It is desirable that these ends be cut away by grinding as it is the inventor's intention that the rod 23 be hardened steel as this rod really becomes the wear surface of these bars. The channel bar 18 must of course be made of steel sufficiently mild to allow of drilling and bending and as it cannot be hardened after the introduction of the fagots or wires 22, a hardened wear surface is obtained only through the medium of the rod 23.

Figure 8 shows the members 13, 14 and 15 on a large scale. The members 13 and 14 are formed as frustums and the angulation of these cone members should correspond to the angulation of the ground away portions 24 and 25 of the bar 18, as it is between these angular portions of the members 13 and 14 that the bar 18 will operate. The movement of these members inward toward each other by reason of the springs 16 and 17 serves to force the bar 18 radially outward.

As the wear surface provided by the end of the rod 23 is hard, so it is desirable and even quite necessary that the cone members 13 and 14 also be hardened and the hardening of these respective members is what is depended upon to prevent undue wearing away of the respective parts.

As previously stated it is desirable that the brush or cleaning elements as a whole be so constructed as to make possible the maximum of radial movement and this is accomplished by the particular construction of the parts and more particularly by bending in the projecting portions 19 and 20 of the channel member 18 and this will be well understood by reference to the large diagrammatic Figure 11 where the dotted line 26 indicates the original or maximum diameter of the brush or cleaning elements, the dotted line 27 indicates the position to which the cleaning elements have been depressed and yet by referring to the figure it will be noted that there is still further possible movement of these members inward, in fact their maximum movement would be reached only when the tip ends of the depressed sides 19 and 20 of the bars 18 reach the guide portion 28 of the cone members 13 and 14. The additional possible movement is indicated by the dotted line 29.

Having carefully and fully described the invention, what is claimed and what is desired to be obtained is:

An element for boiler tube cleaners comprising a bar, a channel in one side of said bar and a plurality of holes in said bar alined with said channel, a plurality of tufts of looped bristles arranged in each said hole with their looped portions in said channel, a stiff rod extending through said channel and through all of said looped portions and the edges of said channel bent sharply inward upon said rod and the looped portions of said wires for the full length of said edge.

MARTHA A. WILSON,
Executrix of the Estate of Thomas C. Wilson, Deceased.