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TUBE CLEANER

Filed July 21, 1928

Fig. 1.

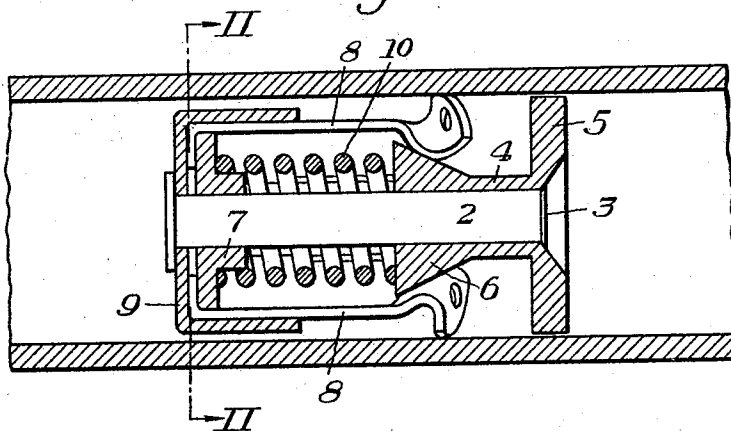


Fig. 2.

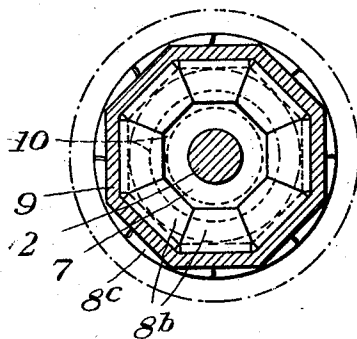


Fig. 4.

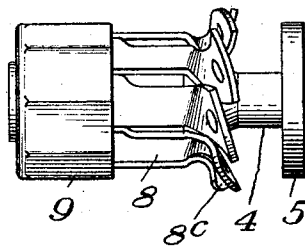
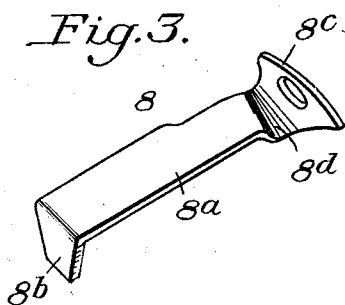


Fig. 3.



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TUBE CLEANER

Application filed July 21, 1928. Serial No. 294,390.

This invention relates to tube cleaners, and is for a tube cleaner primarily intended for use in the cleaning of the tubes of steam condensers. The invention is for a tube cleaner of the type wherein the cleaner is propelled through the tube by a fluid under pressure and the present cleaner is adapted for use where water is used as the medium for forcing the cleaner through the tube.

The invention constitutes an improvement on the cleaner disclosed in my pending application Serial No. 266,469, filed April 2, 1928. According to this invention there is provided a cleaner having an improved form of scraper. The cleaner is preferably so constructed as to allow the parts to accommodate themselves to irregularities in the tube being cleaned so that there is less danger of the cleaner becoming stuck in the tube.

The invention may be readily understood by reference to the accompanying drawings, wherein—

Figure 1 represents a longitudinally vertical section through a tube and tube cleaner;

Figure 2 is a transverse section through the tube cleaner in the plane of line II—II of Figure 1;

Figure 3 is a perspective view of one of the scrapers; and

Figure 4 is a side elevation of a portion of the cleaner.

The structure shown in the accompanying drawings constitutes a preferred embodiment of the invention. In the construction therein shown there is a central stem member 2 having a head 3 which is countersunk in an end member 4. The end member 4 has a flange portion 5 and a cone portion 6.

Near the other end of the stem 2 is a bushing 7. Arranged around the bushing 7 are a plurality of scrapers 8. The scrapers 8 are preferably of the construction shown in Figure 3, having a flat stem portion 8^a with an inwardly turned inner end 8^b and with an outwardly turned scraper portion 8^c. The scraper portion has the scraping edge thereof curved to conform substantially to the curvature of the tube in which the scraper is to be used, and the scraping edge, instead of being at right angles to the longitudi-

nal axis of the stem is at a slight pitch or angle. The scraper portion 8^c is of greater width than the width of the stem 8^a so that when the scrapers are placed side by side around the bushing 7 with the edges thereof substantially in contact, the scraping portions will overlap, as shown in Figure 4. The scraper portion 8^c is preferably formed to the stem portion 8 through an inwardly curved portion 8^d.

The scrapers are retained in position by means of a cup or thimble 9 fitting over the outside thereof, this thimble keeping the scrapers in their respective positions about the bushing 7. The thimble or cup 9 is preferably non-circular in cross section, as shown in Figure 2, so that it has a flat side adapted to engage each scraper. As shown in Figure 2, the inner end portions 8^b of the scrapers are beveled so that they will not interfere with one another when assembled about the bushing 7. Either the end member 4 or the bushing and thimble 7—9, or all of them, are slidable on the stem, whereby movement of member 4 toward and away from the member 7 can occur for the purpose hereinafter set forth.

Interposed between the bushings 7 and the end member 4 is a compression spring 10. The compression spring urges the member 4 to the right, as viewed in Figure 1, while the tube cleaner is adapted to be moved by pressure toward the left as viewed in this figure. The inwardly bent or curved portions 8^d of the scrapers are adapted to rest on the cone 6 of the member 4 and be supported thereby. Since the spring 10 serves to urge the cone to the right, the cone normally holds the scraping portions 8^c against the inside surface of the tube to be cleaned.

If, in the travel of the cleaner through the tube, any of the scraper portions 8^c catch against an irregularity or obstruction which the cleaner can not remove, the pressure of the fluid which propels the cleaner forces the end member 4 to the left as viewed in Figure 1, against the compression spring 10. The scrapers riding on the conical surface 6 during any such movement are permitted to move inwardly and thus to pass over the ob-

struction. When the scrapers have cleared the obstruction and the cleaner begins to move through the tube, the spring 10 restores the member 4 to normal position and the scrapers are again moved out into engagement with the walls of the tube. In this manner the tube cleaner is made self-adjusting.

The various parts are light weight and in assembly none are rigidly held with respect to other parts. This, together with the spring which provides a cushioning effect, makes a construction which well withstands the rough usage which condenser cleaners are subjected to, as for example when they are expelled from the tube with considerable velocity and strike against the iron condenser head.

The device can be manufactured relatively cheap. By using a plurality of relatively small scrapers extending through only a short arc considerably less than 90°, more effective cleaning is obtained than where the scrapers extend through a considerable arc. This is for the reason that if one scraper is forced in by some irregularity in the tube only a relatively small area will be missed, whereas, with a longer scraper a proportionately greater area of the tube will not be scraped.

The flange 5 of the end 4 is made large enough that it will fit the tube with relatively small clearance. This is so that it will act as a piston and prevent an excess of fluid from leaking past. Sufficient clearance is provided, however, to permit it to pass irregularities and to permit enough leakage to wash away the dirt as the scrapers cut it loose and thus prevent clogging of the cleaner. The holes in the scrapers are to allow the fluid to flow away and prevent back pressure on the flange 5.

While I have described a preferred embodiment of my invention, it will be understood that the invention can be otherwise embodied and it is not confined to the particular construction and arrangement of parts herein specifically described.

I claim:

1. A tube cleaner comprising a central stem member having a head member at one end thereof and having an end member with a conical surface slidably mounted on the other end thereof, a compression spring interposed between the end member and the head member, and a plurality of scrapers surrounding the stem, said scrapers having stem portions and scraper portions, the end of the stem portions being secured about the head member, the scraper portions being in cooperative engagement with the cone of said end member.

2. A tube cleaner adapted to be propelled through a tube by fluid pressure applied to the rear end thereof comprising a central stem member having a head member at the forward end thereof and having an end mem-

ber at the rear end thereof on which is a tapered surface that tapers inwardly toward the rear, said central stem being slidable through at least one of said members, a compression spring surrounding the stem interposed between the two members, and a plurality of scraping elements secured to the head member, said scraper elements having a portion thereof in contact with the tapered surface of the end member.

3. In a tube cleaner, a stem member having a head at one end thereof, a plurality of relatively thin flat sheet metal scraper elements having terminal portions that hook over the head member, and a thimble fitted over the scrapers for clamping them on to the head member, each of said scrapers having an outwardly turned tube scraping surface, said thimble being polygonal in cross-section and having a flat side face thereon for engaging each scraper.

4. In a tube cleaner, a body having a plurality of scrapers of uniform length supported thereabout, said scrapers being formed of thin flat strips of metal having stem portions and upstanding scraper portions, the scraper portions being wider than the stem portions and being inclined at an angle to the longitudinal axes of the stem portions and to a plane transverse to the longitudinal axes of the stem portions whereby the scraper portions overlap each other and form a substantially continuous scraping surface.

5. In a tube cleaner, a body having a plurality of scrapers supported thereabout, said scrapers being formed of thin flat strips of metal having stem portions and upstanding scraper portions, the scraper portions being wider than the stem portions and being inclined at an angle to the longitudinal axes of the stem portions and to a plane transverse to the longitudinal axes of the stem portions whereby the scraper portions overlap each other and form a substantially continuous scraping surface, each scraper having a sharply bent inwardly curved portion between the stem and the scraper portion.

6. In a tube cleaner adapted to be propelled through a tube by fluid pressure applied to the rear end thereof, a plurality of yielding scrapers movable into and out of tube wall engaging position, means for normally supporting the scrapers in tube engaging position movable forwardly relatively to the scrapers under fluid pressure out of such position, and a spring for opposing such movement whereby the said means may move forwardly to relieve the scrapers when the fluid pressure exceeds the spring pressure.

7. In a tube cleaner adapted to be propelled through a tube by fluid pressure, a body, scrapers on the body yielding radially whereby they can move in and out with re-

spect to the interior of the tube being cleaned,
a fluid pressure actuated member normally
supporting the scrapers against radial move-
ment and movable under fluid pressure to a
position where the scrapers may move ra-
dially inwardly, and a spring for resisting
movement of said member from normal po-
sition.

In testimony whereof I have hereunto set
my hand.

CECIL M. GRIFFIN.