F. ZLATNIK.

TUBE CLEANER.

APPLICATION FILED MAY 14, 1919.

1,355,726.

Patented Oct. 12, 1920.

2 SHEETS—SHEET 1.

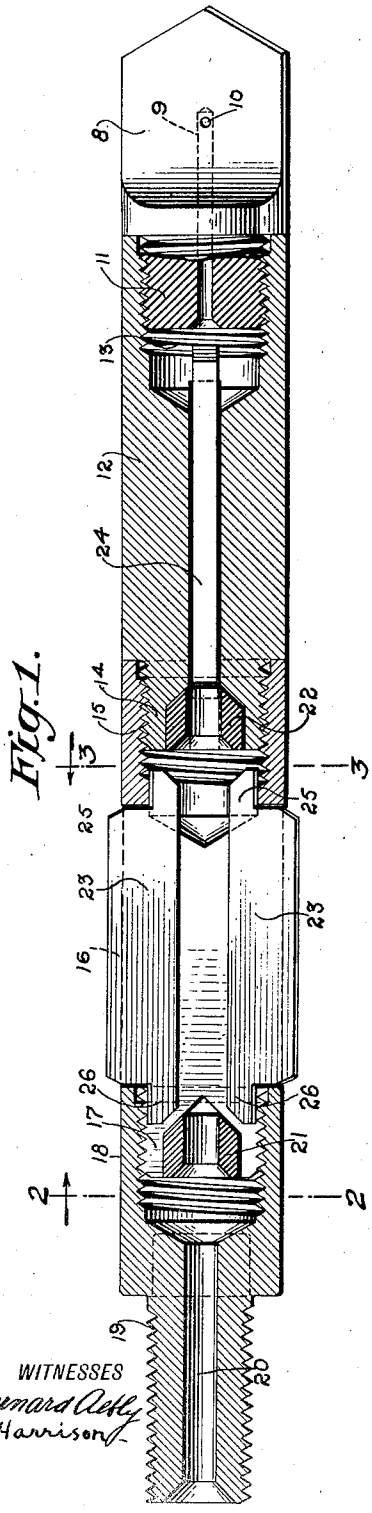


Fig. 1.

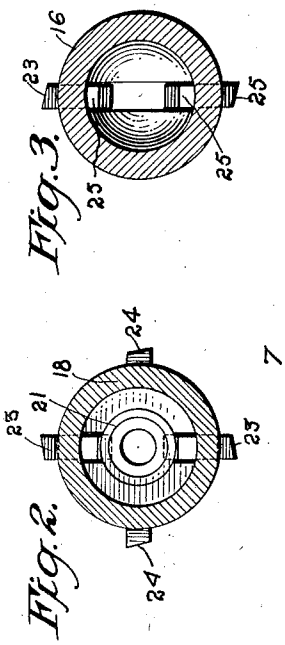


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 7.

Fig. 6.

WITNESSES

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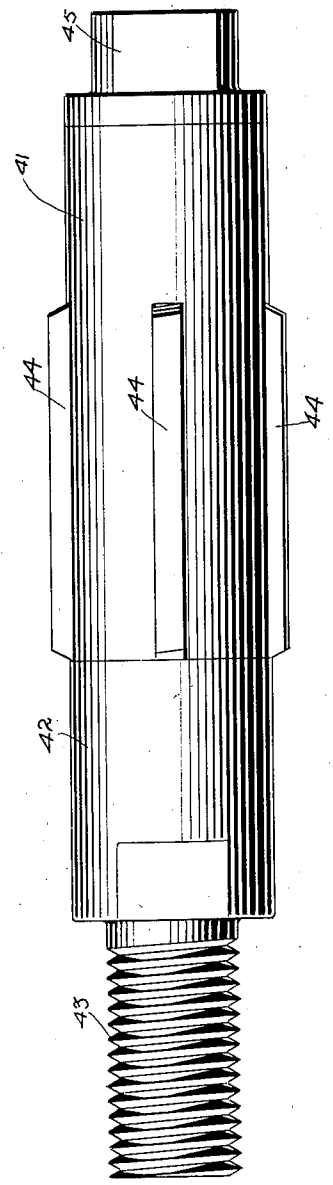


Fig. 8.

WITNESSES

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TUBE-CLEANER.

1,355,726. Specification of Letters Patent. Patented Oct. 12, 1920.

Application filed May 14, 1919. Serial No. 297,042.

To all whom it may concern:

Be it known that I, FRANK ZLATNIK, a citizen of the United States, and a resident of Miami, in the county of Gila and State of Arizona, have invented a new and Improved Tube-Cleaner, of which the following is a full, clear, and exact description.

My invention relates to tube cleaners of a type suitable for scraping the interior of condenser tubes and analogous structures.

More particularly stated my invention comprehends a tube cleaner in which there is a tubular body to be thrust into the tube and turned, this tubular body carrying scraper blades mounted loosely in relation to it, and movable within certain limits for the purpose of enabling them to adjust themselves to compensate for irregularities of the inner surfaces of the tubes, and means for subjecting said scraper blades directly to the action of hydraulic pressure for the purpose of forcing the blades radially outward.

My invention further comprehends the use of a pilot drill so arranged as to be lubricated by the supply of water thus used for forcing the scraper blades outwardly.

My invention further contemplates arranging the scraper blades in pairs, each pair being mounted in a different section of the tube cleaner.

In addition my invention comprehends the use of springs in connection with the blades for forcing the springs outwardly in the event that the pressure of the water is too weak for this purpose.

My invention further contemplates various structural improvements in tube cleaners and in the arrangement of the parts thereof.

Reference is made to the accompanying drawings forming a part of this specification and in which like reference characters indicate like parts throughout the several figures.

Figure 1 is a substantially central horizontal section through my improved tube cleaner when arranged in tandem;

Fig. 2 is a section on the line 2—2 of Fig. 1 looking in the direction of the arrow;

Fig. 3 is a section on the line 3—3, Fig. 1, looking in the direction of the arrow;

Fig. 4 is an end elevation of the structure shown in Fig. 1;

Fig. 5 is a cross section through another form of my invention in which the mounting of the scraper blades is different from that shown in the other figures;

Fig. 6 is a substantially central longitudinal section through another form of my device;

Fig. 7 is a section on the line 7—7 of Fig. 6 looking in the direction of the arrow;

Fig. 8 is a side elevation showing another form of my invention.

A drill bit is shown at 8 and is provided with a longitudinal passage 9 and a pair of short passages 10 extending laterally from the longitudinal passage through the bit as may be understood from Fig. 1. The drill bit is provided with a threaded portion 11 of reduced diameter, the portion 11 extending into an opening 13 in a shaft section 12, this opening being threaded so that the drill bit is secured firmly upon the adjacent end of the shaft section 12. This shaft section 12 is provided with a threaded portion 14 which engages a mating threaded portion 15 with which another section 16 is provided. The section 16 carries a threaded portion 17 of reduced diameter which fits into a head 18, this head being provided with a stem 19. The stem 19 is threaded for the purpose of facilitating its coupling with a hollow spindle, of the usual or any desired construction, whereupon my device is to be mounted. The head 18 with its reduced portion 19 is provided with a passage 20 extending through it. Mounted within the head 18 is a ring 21 and similarly mounted within the portion 14 of the section 12 is a ring 22. These rings are for the purpose of preventing the scraper blades, which are shown at 23, 24, from being displaced beyond certain limits. The scraper blades 23 are like the scraper blades 24 but the plane of the blades 23 crosses the plane of the blades 24 as indicated in Figs. 1 and 2. Each scraper blade 23 is provided with projecting end portions 26 to prevent the removal of the scraper blades except when the sections are taken apart to permit such removal. The construction and action of the scraper blades 24 are otherwise the same as that of the scraper blades 23.

The parts thus far described being assembled as shown, the structure as a whole is mounted upon a spindle of tubular form, the latter being connected with a hydraulic supply. The spindle with the tube cleaner

is thrust into a tube and is turned. Water being forced through the spindle and into the tube cleaner is unable to escape with sufficient freedom to diminish its pressure beyond a predetermined normal limit. Since, however, the water escapes through the small passages 10 and to some extent finds its way out around the scraper blades a flow of water into the tube is thus insured. The water thus flowing into the tube serves as a lubricant for the drill bit 8 and also for the scraper blades 23, 24. The hydraulic pressure within the tube cleaner forces the scraper blades outwardly so that they press against the adjacent internal surface of the tube. As the tube cleaner continues to rotate the scraper blades cut away the scale, dirt and waste from the interior of the tube and the debris thus formed is washed out and carried away by the water.

In some instances, I make a section having the form shown at 26 in Fig. 5 and provided with slots forming a cross 27 as seen in cross section. In this instance, the scraper blades appear as indicated at 28. The structure and action in this device as shown in Fig. 5 are otherwise the same as above described with reference to Fig. 1.

In instances where the pressure of the water may not be adequate to actuate the scraper blades as above described, I employ the arrangement shown in Figs. 6 and 7. The shaft sections are shown at 28, 29 and are fitted with rings 30, 31 similar to the rings 21, 22 above described. The scraper blades appear at 32, 33 and 35. The blades 32 engage a leaf spring 34 of arcuate form whereby they are pushed apart as may be understood from Fig. 7 and from the left hand portion of Fig. 6. A similar spring 36 is employed in the section 33.

In some instances I use scraper blades of the type shown at 38, these blades being provided with notches 39, the purpose of which is obvious. If desired, instead of a drill bit 8 there may be employed a plug 40 which simply closes one end of the tube cleaner.

The leaf springs 34, 36 may, if desired, be used in connection with the water pressure. This is the arrangement shown in Fig. 6.

In Fig. 8 is shown my device as used with a single cutting section provided with a closure plug. A section 41 is provided with a detachable portion 42 carrying a threaded stem 43. Blades are shown at 44 and extend into the section 41. The end of this section is closed up in a plug 45. Except as just described the structure in Fig. 8 is similar to that of the other figures.

While I preferably use water for the purpose of forcing the scraper blades outwardly and of lubricating the apparatus generally, it should be understood that other fluid mediums such as air or steam may sometimes be employed instead.

It should also be noted that by using four scraper blades instead of two in each section of the tube cleaner, the scale is removed much more rapidly.

Owing to the fact that the scraping cutters can yield to obstacles encountered in the tube, it is obvious that they may be forced through portions of the tube where owing to the presence of excessive quantities of scale or the like, the real diameter of the tube is considerably less than the maximum diameter of tube which can be scraped by the device.

I do not limit myself to the precise mechanism shown as variations may be made therefrom without departing from the spirit of my invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is as follows:

1. A flue cleaner consisting of a hollow body having radial slots extending from the opposite sides thereof, a plurality of cleaner blades freely slidable in said slots and each having extensions on its ends adapted to bear against the inner surface of said body, a leaf spring having its ends bearing against one of said blades and its body portion bearing against an oppositely located blade, and a fluid supply means connected with said body and adapted to exert pressure directly against the entire inner edge of said blades.

2. A flue cleaner consisting of a hollow body having radial slots extending from the opposite sides thereof, a plurality of floating or yielding scraper blades freely slidable in said slots and each having extensions on its ends adapted to limit the outward movement of said blades by contact with the inner surface of the body, and a fluid supply means connected with said body and adapted to exert pressure directly against the entire inner surface of said blades.

FRANK ZLATNIK.