April 27, 1943. W. B. LINCOLN 2,317,542

DEVICE FOR CLEANING TUBES

Filed Aug. 11, 1941

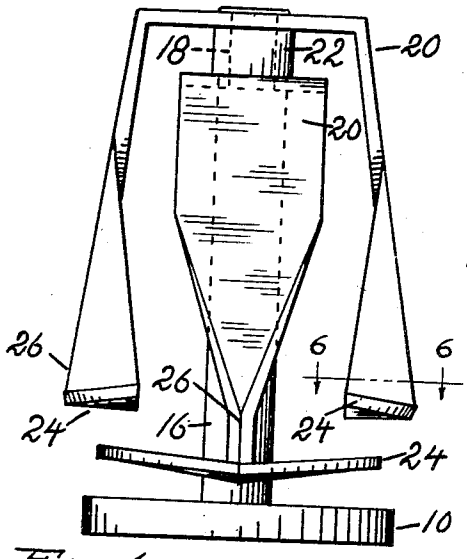


FIG. 1

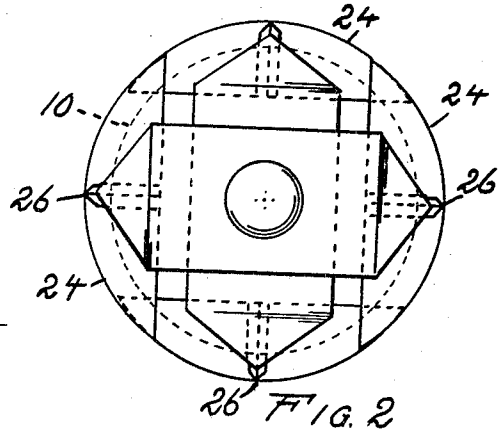


FIG. 2

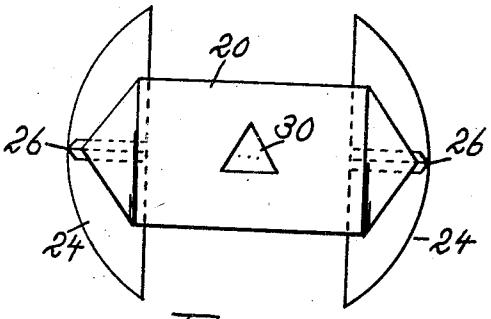


FIG. 3

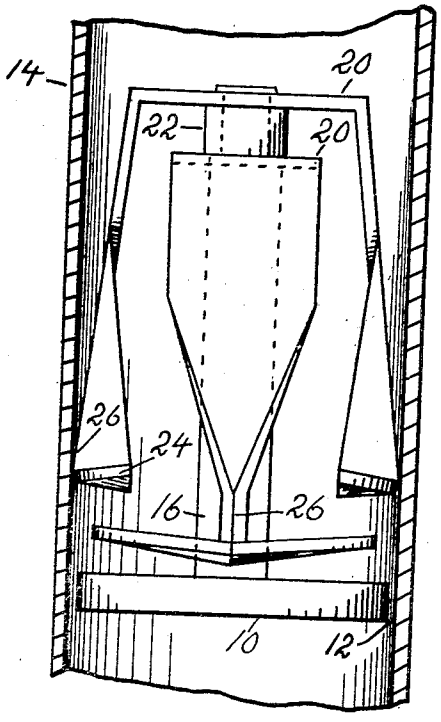


FIG. 5

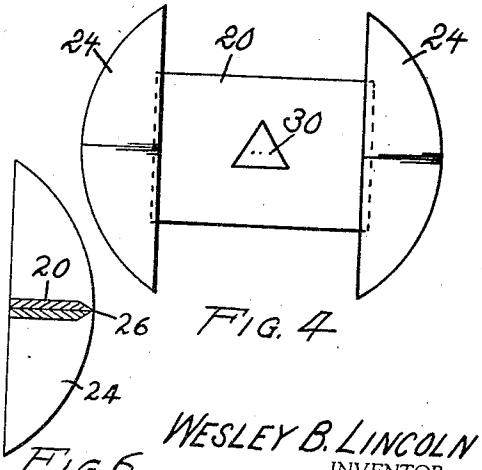


FIG. 4

FIG. 6

WESLEY B. LINCOLN
INVENTOR.

BY Leon V. Hopkins

ATTORNEY.

Patented Apr. 27, 1943 2,317,542

UNITED STATES PATENT OFFICE

2,317,542

DEVICE FOR CLEANING TUBES

Wesley B. Lincoln, Hammond, Ind., assignor to Bernard V. Brunt, Buffalo, N. Y.

Application August 11, 1941, Serial No. 406,304

5 Claims. (Cl. 15—104.06)

This invention relates to an improved device for cleaning tubes, pipes, and similar tubular elements, and has for one of its principal objects the economical production of a highly efficient and simple device. Additionally, the improved device of this invention is constructed of a limited number of co-acting and interdependent parts.

The improved device of this invention is adapted to be positioned in a tube to be cleaned with the scraper plates thereon engaging the inner surface of the tube and in this position be forced therethrough, preferably by a fluid under pressure, thus removing scale, rust corrosion, and other foreign matter from the interior surface of the tube.

Various devices have heretofore been produced for this work. However, each of the previous cleaning devices have had draw-backs and faults which presented problems to manufacturers and users. These faults ranged from costly production to inefficient results, additionally, some of the numerous parts of these previous constructions were apt to be easily misaligned or broken.

Applicant has here brought forth a sturdy and substantially indestructible device which is adapted to stand up and function properly under excessive use and abuse.

Another object of advantage and importance of the improved device of this invention resides in the provision of guide means for facilitating entry of the device into a tube. The guide means in no way interfere with the cleaning function of the improved device.

Another and further important object of advantage resides in the provision of means for positioning the segmentally shaped scraping elements on yieldable supports to provide a substantially fool-proof device.

Additional objects of advantage and importance will become apparent as the following detailed description progresses, reference being had to the accompanying drawing wherein—

Fig. 1 is an elevational view of a device for cleaning tubes which embodies the invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is a top plan view of a scraping element and yieldable support.

Fig. 4 is a bottom plan view of a scraping element and yieldable support.

Fig. 5 is an elevational view of the improved device positioned in a tube, portions thereof being broken away.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 1.

As shown in the drawing:

The reference numeral 10 indicates generally the base of the improved device of this invention. In the preferred embodiment of the invention the base 10 conforms in plan to the cross section of the tube or pipe it is adapted to be used in. However, the outer dimension of the base is slightly smaller than the interior dimension of the tube it is designed to clean. Thus in use a space 12 prevails between the outer edge of the base 10 and the inner surface of the tube 14 as is best shown in Fig. 5.

Extending upwardly from the base 10 is a standard 16. The standard 16 is preferably round, however, it may be of any other suitable or desirable shape.

Formed on the upper end of the standard is a restricted portion 18. The restricted portion, in the preferred embodiment, is triangular in section, as is clearly shown in the drawing. The triangular portion 18 prevents the independent rotation of parts which may be affixed thereon. It is apparent, however, that the restricted portion may be of any suitable shape.

Positioned on the restricted portion 18 of the standard 16 is a plurality of substantially U-shaped supporting elements 20. The closed ends of the U-shaped members 20 are positioned one above the other with a spacer 22 therebetween as is best shown in Figs. 1 and 5. The open portions of the U-shaped members 20 extend parallel to and are spaced from opposed sides of the standard 16. The U-shaped elements are preferably equally spaced radially to allow an overlapping concentric of the scraping elements as is clearly shown in the drawing. In the preferred embodiment shown in the drawing but two U-shaped elements 20 are shown. However, it will be apparent that additional elements may be employed where and when it is desired.

Positioned at the open ends of the U-shaped elements 20 and extending outwardly at right angles thereto are scraper members 24. The scraper members 24 are, preferably although not necessarily, tilted slightly as is best shown in Figs. 1 and 5. The tilt in the scraper members 24 allows the leading or cutting edge of the scrapers 24 to be slightly sharpened to facilitate loosening and removal of scale and foreign matter contacted in their passage through a tube.

Formed on the outer surface of each leg of the U-shaped member 20 and extending from the scraper 24 along the leg is a guide member 26. The outer surface of the guide member recedes as it progresses toward the closed end of the U-shaped member as is clearly shown in Figs. 1 and 5. The outerwardly projecting surface of each guide member 26 adjacent the peripheral edge of its associated segmental scraper 24 is substantially knife-edged as is clearly shown in the drawing. The knife-edge tapers outwardly as it progresses toward the closed end of the U-shaped member 20. This edge provides only a limited bearing surface between the legs of the U-shaped member 20 and the interior surface of

the tube being cleaned. The possibility of the guide **26** riding the scale and holding the scraper **24** from the surface of the tube is reduced to a minimum.

In the preferred embodiment of the invention the U-shaped member **20**, the segmentally shaped scraping members **24**, and the guide member **26** may be formed from a single blank preferably of spring steel. Where the U-shaped elements **20** are constructed from a single blank the central portion thereof which is flat is perforated as at **30**. The outer portions of the blank are turned at right angles to the flat portion to form the U-shaped member. The ends of the legs of the U-shaped member are preferably split and portions thereof are turned upon themselves. The edges of the split portions may be pressed or otherwise treated to form a knife-edged guide **26**. The extreme ends of the legs of the U-shaped member **20** are turned outwardly and the outer edges thereof are shaped as desired to form scrapers **24**. However, where it is so desired the members or any of them may be produced separately.

Formed in the closed end of the U-shaped member **20** is a supporting standard receiving opening **30**. The edges of the opening are adapted to agree in contour with the perimeter of the attaching portion of the standard **16**.

The operation of the improved device of this invention is extremely simple. The device is positioned in the end of a tube to be cleaned. As the device is inserted the guide members **26** engage the edge of the tube thus slightly closing the open end of the U-shaped members **20**. Consequently, the cutting edges of the scraping members do not forcibly contact the end of the tube. A nozzle is then affixed to the end of the tube and the device is driven through the tube by a liquid under pressure. As the device moves through the tube a portion of the liquid passes through the space **12**, and conveys loosened scale and other foreign matter through the tube ahead of the device. The water or other fluid passing through the passageway **12** is by contact with the bottom of one blade directed over and across the top of the adjacent blade to carry away sludge, scale, and the like which may be thereon. When the device is removed from the opposite end of the tube the guide members **26** prevent forcible engagement between the cutting edges of the segmental scrapers and the shoulder of a packing nut. Thus injury to the cutting edges of the scraping elements in the insertion and removal of the device from a tube are held to a minimum.

It is to be noted that there is no turned up portion or any other obstruction between the outer scraping edges and the inner edges of the scraping blades. Consequently sludge and scale removed from the tube by the scraping edge may move over the blade directly toward the center of the tube to be there contacted and washed away by the driving fluid. Additionally sludge, scale, and other foreign matter cannot pack on the blade and hold the cutting edge from the interior surface of the tube.

It will be apparent from the foregoing that herein is provided an efficient sturdy and substantially fool-proof device which may without impairment be used over a long period of time.

Additionally, the improved device of this invention may because of its simplicity and limited number of parts be economically produced and marketed.

It will also be apparent to those skilled in the art to which the improved device of this invention appertains that numerous changes in construction and design may be made without departing from the spirit or scope of this invention. Accordingly, the patent granted hereon is not to be limited to the preferred embodiment here disclosed or any other manner except as is necessitated by the terminology of the appended claims when given the range of equivalents to which they may be entitled.

I claim as my invention:

1. In a device for cleaning tubes, a base, a standard secured to said base, a substantially U-shaped member positioned on said standard, the end of each leg of said U-shaped member being notched centrally thereof, the intermediate portion of each leg having sides turned radially inwardly and converging progressively inwardly and toward the free end of said leg, end portions extending at right angles to said converged portion, and the outer edge of said converged portion shaped to form a guide.

2. In a device for cleaning tubes, a base, a supporting element extending from said base, a plurality of scraping elements in yieldable association with said supporting element, said scraping elements comprising inverted substantially U-shaped members, each leg of said U-shaped member being kerfed substantially centrally and inwardly of its end, the two members thus formed having an intermediate portion in which said members are rotated from the plane of said leg into contiguous parallel planes, end portions extending at right angles to said members, said intermediate portion being sharpened at its outer edge to form a guide.

3. In a device of the kind described, a plurality of substantially U-shaped elements, the end of each leg of said elements being kerfed substantially centrally and inwardly from the free end thereof, the two members thus formed having an intermediate portion in which they are rotated from the plane of the leg into contiguous parallel planes, and end portions extending at right angles to said members.

4. In a device of the kind described, a substantially U-shaped member, each leg of said member having a portion cut away inwardly and substantially centrally of its end, the free end portion of each leg having sides turned radially inwardly and being progressively converged in a direction toward the free end of said leg to bring said sides into parallel planes, end portions extending at right angles to said converged sides, and the outer edge of said converged portion being formed to provide a guide.

5. In a device of the kind described, a U-shaped element, each leg of said element being kerfed substantially centrally and inwardly from the free end, the two members thus formed having an intermediate portion in which they are rotated from the plane of the leg into contiguous parallel planes, a part of the outer edge of said intermediate portion being sharpened to form a guide, and end portions extending at right angles to said members.

WESLEY B. LINCOLN.