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S. S. SMITH

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PIPELINE CLEANER

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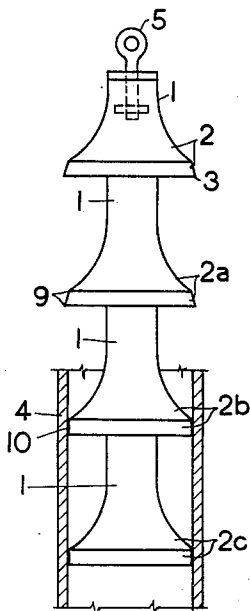


Fig.-I

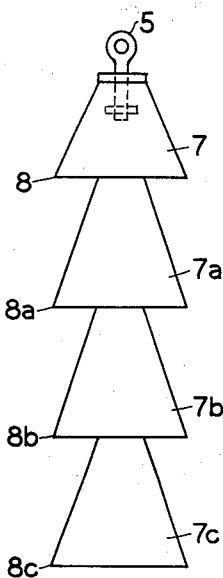


Fig.-II

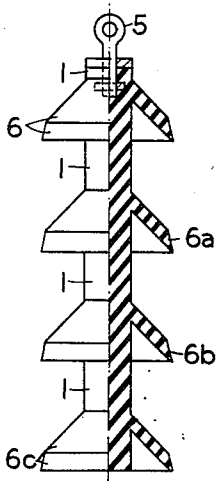


Fig.-III

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PIPE-LINE CLEANER

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2 Claims. (Cl. 15—104.06)

This invention relates to a new and useful improved cleaning device for the internal cleaning of tubes, conduits, pipes and the like.

An object of the instant invention is to provide an improved device for cleaning and/or scraping the bore of a pipe or other tubular element, which is simple and economical to manufacture and efficient in operation.

Another object of the present invention is to provide an improved pipe cleaning device which is completely flexible whereby the cleaner may pass bends and curves in the pipe while maintaining scraping contact with the wall of the pipe bore, this construction also permitting the cleaner to pass obstructions or projections on the inside wall of the pipe.

It is also an object of this invention to provide a pipe cleaner particularly adapted for use in pipelines carrying hydrocarbons and especially gasoline pipelines, which, even though the cleaner should become lodged in a section of the pipeline for one reason or another, may be easily removed without cutting into the pipeline.

As is well known, fluid-carrying pipes and the like are usually subject to internal corrosion and scale and rust formation due to the presence of water and oxygen therein in sufficient quantities to be conducive to corrosion or for any of numerous other reasons. It is, at present, a common practice to endeavor to minimize such corrosion and scale formation as much as possible either by addition of chemical corrosion inhibitors or by the use of mechanical scrapers or both. The mechanical scrapers or cleaners in common use at present are usually provided with a number of metal scraper blades and/or spurred wheels which serve to cut and scrape the corrosion products from the pipe wall.

The accepted method of using such cleaners, particularly in the case of pipe lines, is to insert the cleaner in the pipe line and force the same therethrough by means of the fluid passing through the pipe line, the cleaner being provided with a piston element for this purpose. The present invention embodies an improved form of such mechanical scrapers which is particularly suitable for use where the severe scraping and cutting action of the metal cleaners described above is not necessary and which has certain other advantages when used in hydrocarbon-carrying pipelines which will be hereinafter emphasized.

In the drawing, Figure I is an elevation of a preferred embodiment of the invention showing a trailing section of the cleaner in operating

condition in a section of pipe, the pipe being shown in a sectional elevation. Figure II is an elevation of a modified form of cleaner according to the invention and Figure III is a second modification shown in elevation, partially sectional.

In Figure I, the cleaner may be described as being formed of an elongated body member 1 having radially extending members 2, 2a, 2b, 2c. At its greatest diameter, namely at the greatest outer circumference of members 2, 2a, 2b, 2c, as for example at 3, the diameter of the cleaner is slightly greater than the internal diameter of the pipe 4 through which it is to pass. An eye-bolt 5 may be provided, if desired, to assist in removing the cleaner from a pipe. It is apparent that the cleaner may also be described as being a series of symmetrical truncated members, the apex of each member being centered against the base of the next leading member, that end including eye-bolt 5 being at the leading end of the device.

In the embodiment shown in Figure II it will be apparent that the cleaner takes the form of a plurality of true cone frustrums, 7, 7a, 7b, 7c, with their apexes centered in the base of the next leading member and facing the leading end of the cleaner, the outer circumference of base 8, 8a, 8b, 8c, corresponding to 3 of Figure I.

In Figure III, radially extending members 6, 6a, 6b, 6c are formed as integral parts of elongated body member 1, these extending members corresponding to members 2, 2a, etc. of Figure I and 7, 7a, etc. of Figure II.

The entire cleaner device, with the exception of eyebolt 5 which serves no cleaning purpose and may be modified as desired, is formed as an integral unit of an "elastomer." The term "elastomer" as used herein is defined in Industrial and Engineering Chemistry, volume 31, page 941, and is meant to include those natural and synthesized compounds having rubberlike properties, as for example the diene polymers, polyisobutylenes, polyalkylene sulphides, plasticized vinyl chloride, natural and compounded natural rubbers, products sold under the well known trade names of Thiokol, Koroseal, etc.

A slight bevel as at 9 (Figure I) is preferably provided at the greatest diameter of each extending member 2, 2a, etc., the bevel being toward the leading end of the cleaner. In this manner a flat surface contact, as at 10, between the cleaner and the inner pipe wall will be formed when the extending members are compressed and/or distorted after insertion in the pipe, which, as has been mentioned above, has a

lesser internal diameter than the greatest external diameter of the cleaner.

It will be seen that the various modifications of the pipe cleaner shown have the same basic structure, i. e. an elongated body member and a plurality of extending members forming, in effect, a disk around the elongated body member, the extending members and the elongated body member being in each case formed as a single, integral piece, entirely composed of an elastomer as defined above. A pipe cleaner made according to the present invention costs but a fraction of the cost of the conventional, more or less complicated and difficult to fabricate metal pipe cleaners. Further, the upkeep cost of pipe cleaners as herein disclosed is negligible in comparison with that of the metal type, which must be overhauled after each run. Pipe cleaners fabricated as disclosed above, when worn to the point where they no longer properly clean a given pipe size are merely cut down to fit a smaller size pipe; eventually, after repeated use and resizing they are reclaimed for their elastomer content.

A particular advantage of the instant pipe cleaners as applied to gasoline or other hydrocarbon pipe lines lies in the fact that they may be formed of a material which is slowly soluble in hydrocarbons, as for example compounded natural rubber compositions. During pipe line cleaning operations the pipe cleaners occasionally lodge fast in a section of the pipe line due to unduly large scale formations and the like. When this occurs, while using a metal cleaner, the only remedy is to locate the cleaner and cut the pipe line at that point in order to remove it, a dangerous, time-consuming and costly procedure. It will be seen, however, that a pipe

cleaner formed of a material which is somewhat soluble in hydrocarbons will, in a relatively short period of time, soften sufficiently to permit its passing any obstruction that may temporarily halt its passage.

The presently described pipe cleaners have been found to have ample flexibility, due to the inherent resiliency and flexibility of the elastomers of which they are formed, to negotiate all bends and curves encountered in ordinary pipeline practice. Further, they have been found to be sufficiently unyielding for their intended use, e. g. in conjunction with chemical corrosion inhibitors and in pipelines where corrosion does not exist to an advanced degree.

I claim as my invention:

1. A device for internal cleaning of tubular members comprising a plurality of symmetrical tapered truncated members having a base normally slightly larger in diameter than the internal diameter of said tubular member and a truncated apex, said truncated members being disposed to form an elongate unit, the truncated apex of each member being centered against the base of the next leading truncated members, said truncated apexes all being disposed towards the leading end of said elongate unit, the diameter of said elongate unit through said truncated apexes being substantially less than the greatest diameter of said elongate unit whereby a characteristic flexibility is imparted thereto, said elongate unit being formed of an elastomer as an integral unit.

2. The device according to claim 1 wherein the elongate unit is formed of an elastomer slowly soluble in hydrocarbons.

SYDNEY S. SMITH.