Dec. 25, 1951 W. A. FRANK 2,579,813

APPARATUS FOR CLEANING PIPES

Filed March 27, 1947 2 SHEETS—SHEET 1

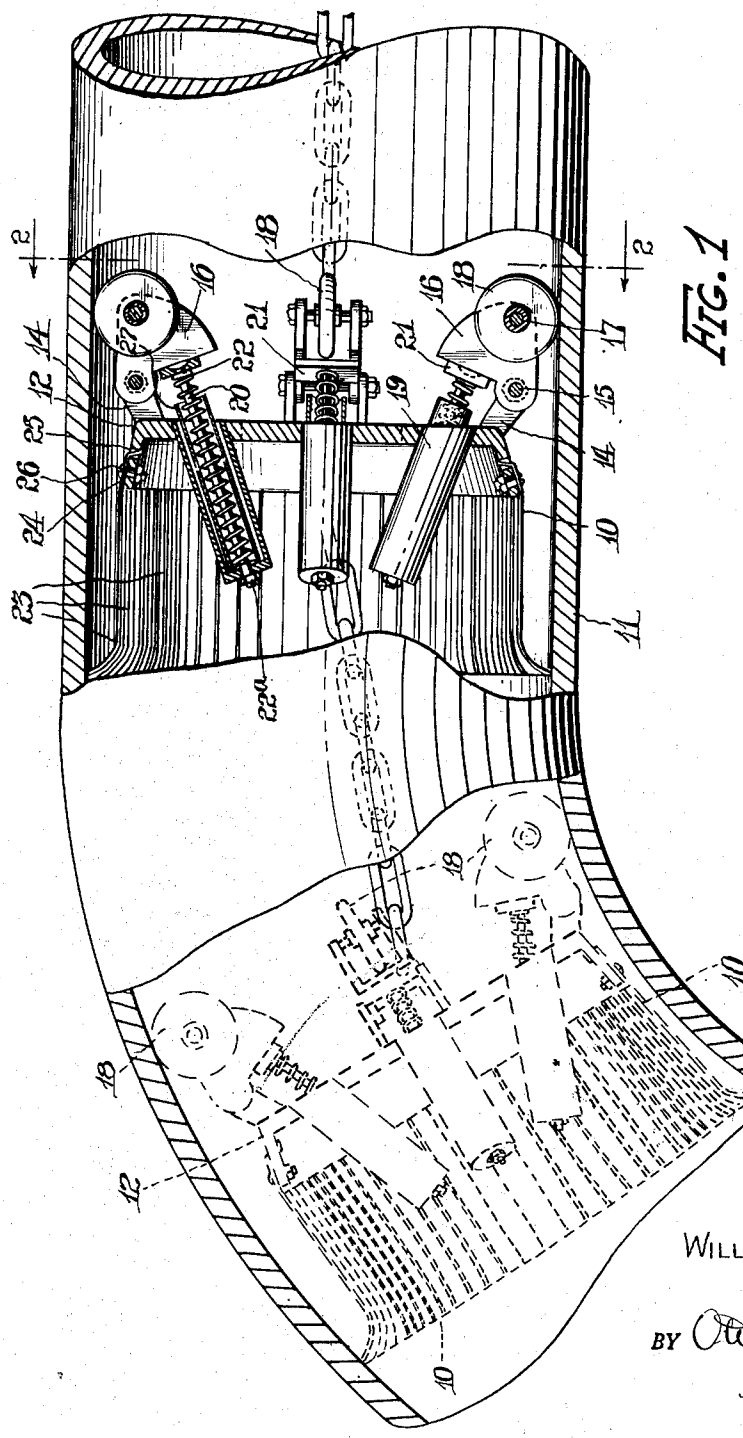


FIG. 1

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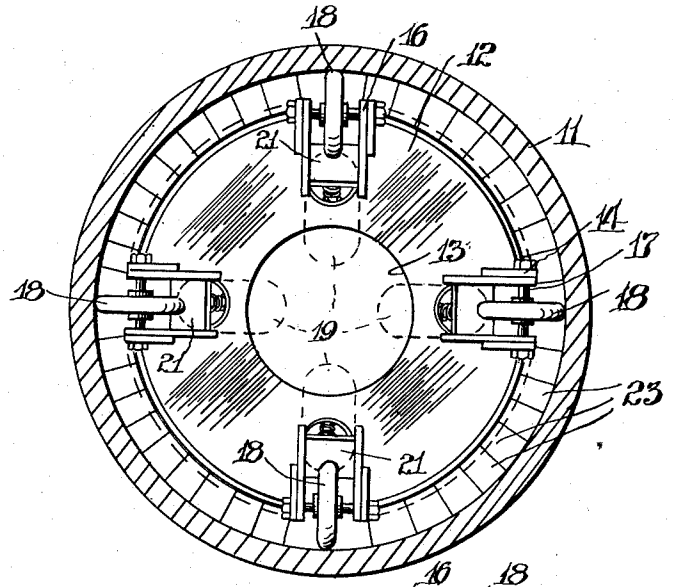
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FIG. 2



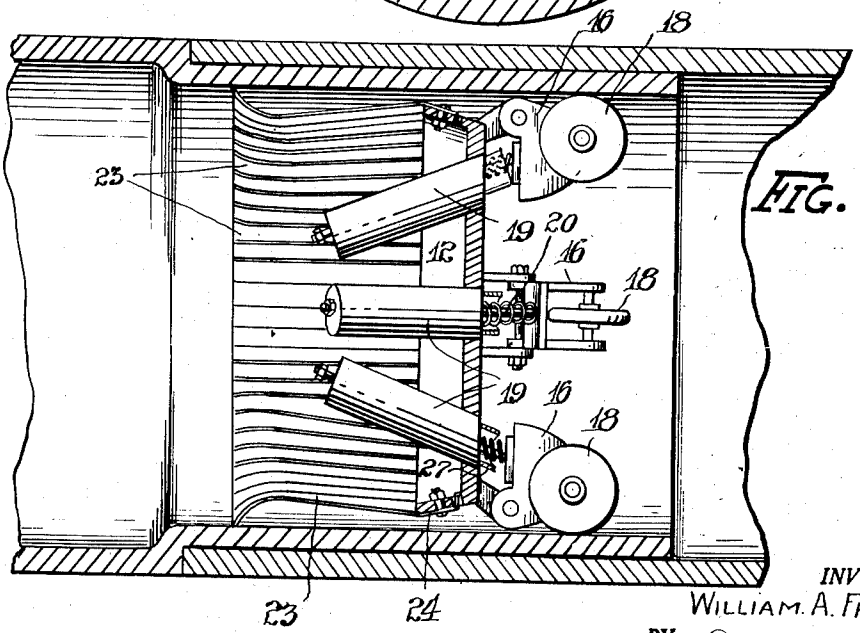


FIG. 3

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APPARATUS FOR CLEANING PIPES

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4 Claims. (Cl. 15—104.05)

1

The present invention relates to an improved apparatus for cleaning pipe lines or water mains and is more particularly concerned with improvements in pipe cleaning machines of the type wherein the scraping elements are disposed on a plurality of articulated sections which are drawn or otherwise moved by water pressure or the like while the scrapers perform a scarifying action on the interior of the pipe. Difficulties are sometimes encountered in the operation of such devices on striking an obstruction or repair projection causing the section to overarticulate and become located off center at a bias to the pipe being cleaned. Also it is desirable that the scraper head be centered in the pipe to provide a substantially equal annular orifice around the rigid portions of the machine to facilitate the passage of wash water for the removal of corrosion and other accumlated debris. It has been found that the accumulation of debris in the lower portion of the pipe tends to cause the scraper head to ride against the upper periphery of the pipe creating an abrading effect which frequently damages or destroys the scrapers and other machine elements of the cleaning tool before it is finally and immovably wedged in the pipe.

An object of the present invention is to provide a construction of cleaning device in which the entire series of scrapers is flexibly supported in the tubular pipe so that the scraper sections are centered within the pipe irrespective of the presence of accumulated corrosion or other debris.

A further object of the invention is to provide an improved pipe cleaning device provided with means for automatically centering the scraper heads of said device to prevent said heads from becoming laterally displaced with respect to the pipe.

Another object of the invention is to provide a pipe cleaning machine which moves through the pipe on rollers so mounted as to be movable laterally as objects are encountered.

An additional object of the invention is to provide a pipe cleaning tool provided with means for resisting any tendency of the machine to become displaced with progressively increased resistance with respect to the degree of displacement.

Other objects and advantages of the invention will become more apparent upon considering the following detailed description of what presently constitutes a preferred embodiment of the invention together with the accompanying drawings wherein:

Figure 1 shows a schematic view partly in section of a pipe containing a preferred form of the present invention.

Figure 2 is a sectional view on the line 2—2 of Figure 1 and

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Figure 3 shows a sectional detail of a pipe containing one of the devices forming the subject of the invention.

The specific form of device shown in the drawing is one which may be propelled through the pipe by the pressure of water flowing through the pipe or be moved therethrough by a cable or other suitable means it being understood that the invention is not being limited to any particular means for advancing the cleaner through the pipe but may be employed in connection with any suitable means for this purpose.

In accordance with the present invention the difficulties normally inherent in devices of this character are overcome by providing the scrapers with a plurality of guide wheels or rollers directed toward the interior surface of the pipe and resiliently mounted or loaded to an amount greater than the weight of the machine so that the scraper sections remain roughly centered to the interior of the pipe even when irregularities are encountered on the interior of the pipe. In a preferred embodiment the guide wheels or rollers are pivotally mounted on the scraper heads and spring loaded into engagement with the pipe in such a way that any tendency of the machine to deviate from the center line of the pipe is resisted by spring pressure which progressively increases with the increase in degree of deviation.

Since in the normal progress of the cleaning tool through the pipe, foreign matter such as boulders, pick handles and like materials may be encountered, it is preferred to so mount the guide wheels or rollers to allow for endwise movement in order to facilitate movement of the device through the pipe.

In a preferred form the device embodies means to positively check the inward movement of the guide wheels or rollers beyond a predetermined limit so that under no condition is it possible for the scraper head to actually engage the interior of the pipe.

Referring to the drawing and in particular to Figure 1 a plurality of scraper elements or sections 10 are shown in progress around a curved section of tubular pipe or conduit 11. These sections in the form of a train may be connected together by chains or other suitable means and moved through the pipe in the manner described for example in my issued Patent 1,193,005 of August 1, 1916. Each of these elements 10 comprises a substantially cup shaped cleaner head or scraper support 12 provided with a relatively large central aperture 13 in its base or front wall for the accommodation of a shaft, chain or other suitably flexible means for connecting the elements together in articulated fashion. Mounted in front of the cleaner head or scraper support 12 and near the periphery thereof are pairs of bifurcated arms or supports 14 each pair of

said arms carrying a shaft 15 upon which is pivotally mounted a pair of frames or links 16 which in turn carry a stud shaft 17 for the guide wheel or roller 18. The guide wheel or roller 18 is mounted for free endwise movement on the stud shaft 17. In the illustrated embodiment the cleaner head or scraper support 12 is provided with a number of cylindrical spring sockets 19 corresponding in number to the rollers 18 and directed at an angle to the axis of the machine. Contained within each of the sockets 19 is an elongated bolt 20 engaging at one end an apertured plate or cross member 21 mounted on the rear or flat portion of the frames or links 16 and at its opposite end extending through the base wall of the socket 19 and provided with a check nut 22*a* to serve as a guide for a coilspring 22 which provides resilient loading for the pivotally mounted rollers 18 in an amount greater than the weight of the cleaner head or scraper support 12 when the entire weight must be taken by a single roller.

Although 4 guide wheels or rollers 18 are shown in the illustrated embodiment of the invention, any number of such rollers may be provided according to the particular application and type of cleaner. In most cases, it is desirable to provide at least 3 rollers mounted at an equal distance around the periphery of the cleaner head or scraper support 12 to positively center the scraper head within the pipe and to allow the continued movement of the machine when obstacles are encountered. The spring pressure for each roller may be less when the number of rollers are increased.

Mounted to the rear of the guide wheels 18 on the cleaner head or scraper support 12 are a plurality of scraper members 23 comprising steel blades curved outwardly toward the inner surface of the pipe at the trailing end of the scraper head to act on and scarify the encrustation or corrosion on the interior of the pipe. The opposite end 24 of the scraper members 23 are adapted to be held in the flanged portion of the scraper head 12 and for that purpose such end is made angular in cross section so as to pass through apertures or openings 25 in the scraper head 12 and is positively locked in this position by the provision of bolts 26.

It will be obvious that as the series of articulated cleaning elements move or are drawn through the pipe the resiliently mounted guide wheels or rollers 18 cause the cleaning elements to move along the center line of the pipe until some obstacle or irregularity is encountered on the interior of the pipe when the center line will be slightly modified but in such a way as to vary the position of the entire cleaner head or scraper support 12.

The result of this shifting action is to avoid abrasive contact of the scraper head with the interior surface of the pipe to preserve and maintain a substantially annular passage around the periphery of the scraper head to facilitate the passage of wash water for the removal of accumulated debris and scale from the scraper elements. In order to limit movement of the guide wheels or rollers 18 toward the center line the sleeves 27 are provided for the springs 22 so as to limit the pivotal or angular movement of the frames or links 16 toward the center line. A similar action may be provided by adjusting the size of the spring so that further inward movement is prevented when adjacent convolutions of the spring touch.

I claim:

1. A machine for cleaning the interior of pipe comprising a scraper head, flexible scrapers extending from one end of said head, wheels yieldingly carried by the other end of said head by means of pivotal wheel carriers and being independently movable with respect to said head, said head being centrally, resiliently supported between said scrapers and said wheels, a cylinder in said head adjacent each wheel, a spring in said cylinder bearing against one of said wheel carriers to urge said carrier radially outwardly independently of said other carriers, movable stop means supported by each cylinder and engaging said pivotal wheel carrier to limit the outward radial extension of said wheels, and stop means within each cylinder independent of said first stop means, for limiting the radial retraction of said wheels.

2. A machine for cleaning the interior of pipes comprising a scraper head, means on said head for supporting said head centrally within the pipe comprising flexible scraper blades extending from one end thereof and bearing against the bore of the pipe, and wheels yieldingly supported from the other end thereof, said head being supported between said scrapers and said wheels, said wheel support comprising wheel carrying arms pivotally mounted on said head, movable stop means connected to said arms and limited in its outward radial movement by said head to limit the radial extension of said wheels, and means about said movable means for limiting the radial retraction of said wheels.

3. A machine for cleaning the bore of pipe comprising a scraper head, means on said head for supporting said head centrally within said bore comprising flexible scraper blades extending from one end thereof and bearing against said bore and wheels yieldingly supported from the other end thereof and bearing against the bore, said head being supported between said scraper and said wheels, said wheel support comprising arms fixed to said head and wheel carrying members pivotally mounted on said arms; a cylinder on said head adjacent each arm having an apertured bottom, and stop means extending through said cylinder, limited in one direction of movement by the bottom thereof, and being fixed at one end to said arm, a spring around said stop means urging said wheel support radially outwardly against the pipe bore, said stop means limiting the radial movement of said wheel support.

4. A machine according to claim 3, in which a sleeve forming a second stop means is positioned in said cylinder about said spring to limit the radial retraction of said wheel support to a diameter not less than the diameter of said head.

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