Feb. 21, 1933. J. SILBERGER 1,898,503

SEWER CLEANING DEVICE

Filed April 15, 1931

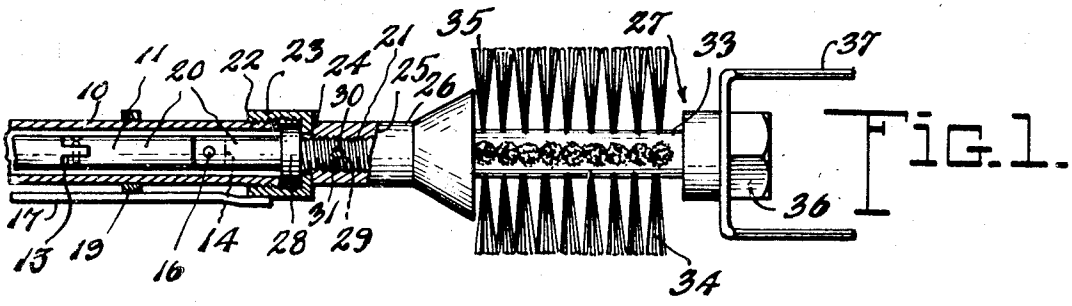
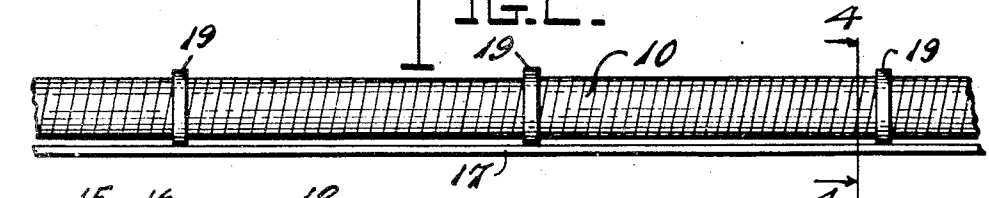


Fig. 1.

Fig. 2.



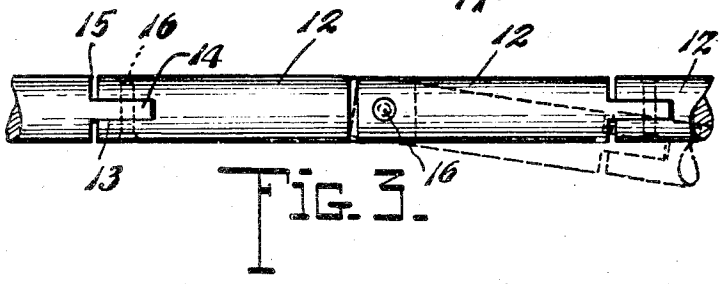


Fig. 3.

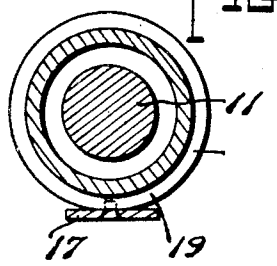


Fig. 4.

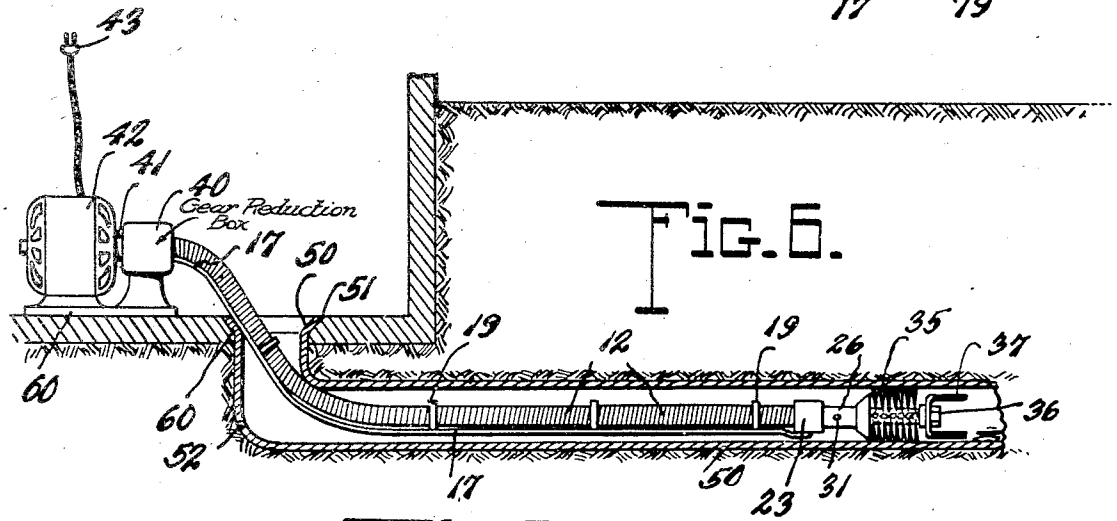


Fig. 6.

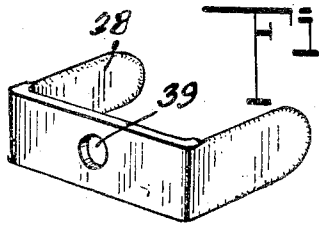


Fig. 5.

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UNITED STATES PATENT OFFICE

JULIUS SILBERGER, OF CLEVELAND, OHIO

SEWER CLEANING DEVICE

Application filed April 15, 1931. Serial No. 530,356.

The present invention relates to cleaning apparatus and more particularly to apparatus adapted for use in cleaning sewer pipes, drains, or the like, through which waste material flows. While the principles of the invention are applicable to a device for cleaning the interior of any pipe which conveys waste material, the same is particularly applicable to the cleaning of household drains which usually lead from the basement of the dwelling house to the city sewer mains.

The invention contemplates the provision of a flexible casing through which there extends a flexible shaft carrying at one end a combined rotary sludge cutting and sweeping device and connected at the other end to a motor through a suitable speed reducing device. The flexible casing, together with its internal flexible shaft, is adapted to be inserted in one end of a sewer pipe and forced into the sewer pipe manually while in operation, so that the sludge and other foreign matter in the sewer may be loosened by the cutting instrumentality and carried forwardly by the sweeping instrumentality. Means is also provided for preventing ingress of liquid into the flexible casing itself or to the flexible shaft contained therein.

The invention is extremely simple in its nature and consequently may be manufactured at an extremely low cost. Convenience of arrangement of parts, ruggedness and durability, ease of assembling for cleaning purposes, and comparative simplicity of operation are further desirable features that have been borne in mind in the production and development of the present invention.

In the accompanying single sheet of drawings forming a part of this specification is shown the preferred form of the invention, in which drawing

Fig. 1 is a detailed view partly in section showing the sludge cutting and sweeping device secured to one end of the flexible shaft and showing its operative connection with the flexible casing;

Fig. 2 is a fragmentary side elevation of the flexible casing, together with a guiding means for facilitating introduction of the casing into a sewer pipe;

Fig. 3 is a fragmentary side elevation of the flexible shaft which is employed in connection with the present invention;

Fig. 4 is a sectional view taken substantially along the line 4—4 of Fig. 3;

Fig. 5 is a perspective view of the sludge cutting instrumentality employed in the present invention;

Fig. 6 is a detailed sectional view taken longitudinally through a household sewer drain, showing the cleaning apparatus in actual operation within the sewer drain and also showing the driving mechanism for effecting operation of the apparatus.

In all of the above described views like characters of reference are employed to designate like parts throughout and the device involves in its general organization a flexible casing 10 in the form of an elongated tubular member formed in any suitable manner and of any suitable waterproof material. Contained within this casing 10 is a flexible shaft 11 comprised of a plurality of sections 12, having slots 13 formed in one end thereof and ears 14 projecting from the other end thereof. The sections 12 of the flexible shaft 11 are mated at their ends, so that the ears 14 of each section enter the slots 13 of each adjacent section. The sections are hinged together by means of through-bolts 16 in the form of rivets which extend through the ends of the sections and through the ears of the adjacent sections, there being left a clearance 15 between the sections for pivotal movement of one section upon its adjacent section in one plane. The sections are arranged in pairs in such a manner that when the sections of one pair are adapted to swing upon each other in a horizontal plane, the sections of adjacent pairs are adapted to swing upon each other in a vertical plane, or in other words the sections of adjacent pairs are adapted to swing upon each other in a plane at right angles to the plane of movement of adjacent pairs of sections. Thus, the shaft is universally flexible throughout its length.

A strip of flexible resilient material 17 extends longitudinally of the flexible casing 10 and is secured thereto at spaced points therealong by straps 19 which encircle the flexible

casing 10 to hold the strip 17 in transverse tangential relation, see Figure 4, with the casing 10 and which are riveted to the resilient strip 17. This strip 17 serves to strengthen the casing as it is introduced into a pipe, and prevents rotation of the casing during operation of the device. The sections 12 are substantially identical in form, but a forward section 20 is provided with the usual slot 13 for the reception of the ear 14 on the next adjacent section. The forward end of this section 20 is threaded as at 21. The forward end of the flexible casing 10 is externally threaded as at 22 and receives thereon a cap 23 in the form of a cup-shaped member having an opening 24 extending therethrough. The threaded portion 21 of the member 20 projects through this opening 24 and receives thereon a threaded socket 25 formed in a shank 26 of the sludge cutting and cleaning unit which is designated in its entirety at 27. The member 20 is provided with an integrally formed collar 28 centrally thereof. This collar is slightly larger in diameter than the internal diameter of the flexible casing 10 and one side of the collar bears against the bottom of the cup-shaped member 23 and is adapted upon rotation of the flexible shaft 11 to rotate within the space between the bottom of the cup-shaped member 23 and the end of the flexible casing 10. The shank 26 of the sludge cutting and sweeping device is provided with a pair of aligned apertures 29, while the threaded portion 21 of the section 20 of the flexible shaft 11 is provided with a transverse bore 30, and extending through the aligned apertures 29 and the transverse bore 30 is a bolt 31 which prevents relative rotation between the end section 20 of the flexible shaft 11 and the sludge cutting and sweeping unit.

The sludge cutting and sweeping unit comprises a core 33 from which project radially extending bristle units 34 which collectively cooperate to form a sweeping unit 35. The bristle units 34 are preferably formed of wire or other wear resisting or abrading material. These units are arranged on the core 33 so that rotation of the sweeping unit in the proper direction will sweep the sludge forwardly of the sewer pipe to be cleaned. Secured to the forward end of the core 33 by a suitable nut and collar arrangement 36 is a sludge cutting device 37 in the form of a U-shaped member having parallel blades 38 sharpened at their ends and sides. The base of the sludge cutting element is provided with an aperture 39 therethrough through which the core 33 extends, as clearly shown in Fig. 1.

The end of the flexible shaft 11 remote from the sludge cutting and sweeping unit is connected in any suitable manner to a speed reducing device 40 which in turn is connected to the motor shaft 41 of an electric motor 42 driven from any suitable source of power through plug 43. In actual operation the end of the flexible shaft 10 which carries the sludge cutting and cleaning unit is inserted into a sewer pipe 50. This sewer pipe usually extends to the sewer main from an opening 51 in the floor of the basement of a dwelling house. The sewer pipe 50 is provided with a right angle bend 52 just below the surface of the floor and from thence the sewer pipe extends either in a straight line or with whatever curves are necessary to the sewer main (not shown) of the city. The flexible strip 17 being of flat form, rests against the edge 60 of the drain opening 51 and because of the binding engagement between the flexible casing 10 and the straps 19, the flexible casing is relieved of the torsional stresses that would ordinarily be applied to the same due to friction occurring between this casing and the flexible shaft. The flexible shaft, because of the speed reducing device 40, rotates comparatively slowly and the flexible casing, together with its internal shaft and the sludge cutting and cleaning device, is advanced slowly through the sewer pipe. The knife blades 38 serve to loosen any solid material in the sludge while the sweeping device 35 carries the liquid and such solid material as may be contained therein forwardly. The connection, consisting in the cup-shaped cap 23, the collar 28 and the socket 25 of the shank 26 comprises a fluid seal against ingress of the fluid to the interior of the flexible casing. The motor 42 and speed reducing device 40 may be mounted upon a single standard 60 which may be portable. The flexible casing 10 may be initially coiled upon the floor of the basement and fed from the coil into the interior of the sewer pipe as desired.

After the cleaning operation has been performed the motor may be shut off and the flexible casing, together with its contained shaft may be withdrawn from the sewer pipe. The sludge cutting and cleaning device may be readily removed by withdrawal of the pin 30 from the aligned apertures in the shank 26 and in the section 20 of the flexible shaft 11. The flexible shaft may be readily removed from the flexible casing by simply slipping the casing off of this shaft and in this manner repairs may be easily made.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawing or described in this specification, as various changes in the details of construction and in the manufacture of the apparatus are contemplated. Furthermore, it is contemplated that the apparatus may be put to other uses than that of cleaning sewer pipes. The apparatus is admirably adapted for use with interchangeable, internally operating abrading elements

which may be substituted for the sludge cutting and sweeping device. Only insofar as the invention has been particularly pointed out in the accompanying claims is the same to be limited.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a cleaning device of the character described, a cutting head, a flexible casing, a flexible shaft rotatably mounted within the casing and coextensive therewith, a cleaning element on one end of the shaft, means for rotating the shaft, and a flat straight guiding element secured to the casing exteriorly thereof and extending along the casing parallel to the longitudinal axis thereof for guiding the casing through a pipe to be cleaned and for preventing rotation of the casing during operation of the device.

2. In a cleaning device of the character described, a flexible cylindrical casing, a flexible shaft rotatably mounted within the casing and coextensive therewith, a cleaning and cutting element on one end of the shaft, means for rotating the shaft and element, and a guiding strip secured to the flexible casing exteriorly thereof, the said guiding strip being a substantially straight flat strip extending along the casing parallel to the longitudinal axis thereof, and being of sufficient transverse flexibility to assume the configuration of the casing as the casing passes through a pipe to be cleaned, the said strip guiding the casing through the pipe to be cleaned, and preventing rotation of the casing due to tortional stresses existing between the casing and the rotatable shaft contained therein.

3. In a sewer cleaning apparatus of the character described, a flexible cable adapted to be inserted within a pipe to be cleaned, a flexible shaft rotatably mounted within the cable, a supporting structure secured to one end of the shaft, a brush rotatably mounted on the supporting structure, rotatable knife blades also mounted on the supporting structure and operating in advance of the brush for penetrating and cutting through obstructing sledge and the like in the sewer, the said supporting structure, brush, and cutting blades rotating with the rotation of the shaft, and means for preventing twisting of the cable through tortional stresses set up between the said cable and shaft during operation of the latter.

4. The combination with the end of a tubular cable having an externally threaded end and a shaft extending completely through said cable, of a collar on said shaft, one side of said collar engaging the end of said cable but rotatable thereon, a cap member in the form of a cup having an aperture therethrough, said cap member being internally threaded and threadedly receivable on the threaded end of said cable, the other side of said collar bearing against the bottom of said cap and closing the aperture therethrough, said shaft having a threaded end extending through the aperture in said cap member, and a cleaning element having a shank provided with a socket therein threadedly receivable on the threaded end of the shaft.

In testimony whereof I affix my signature.

JULIUS SILBERGER.