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ROOT CUTTING SEWER CLEANING DEVICE

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Fig. 1.

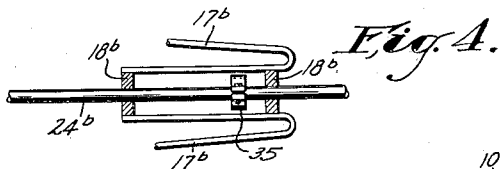
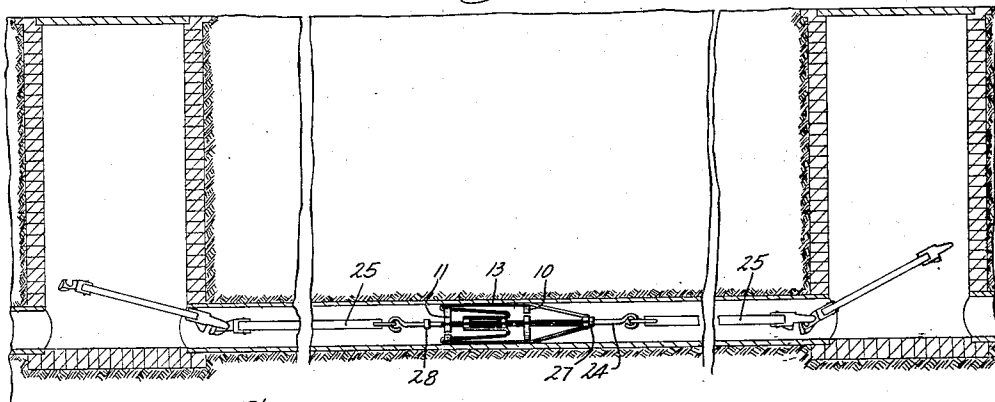


Fig. 2.

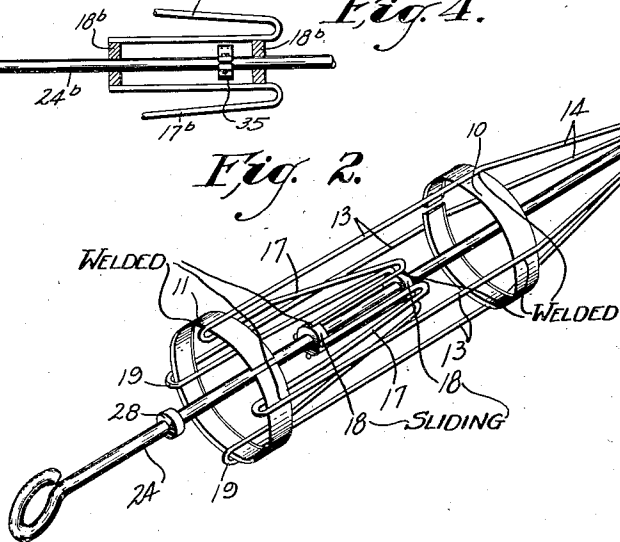
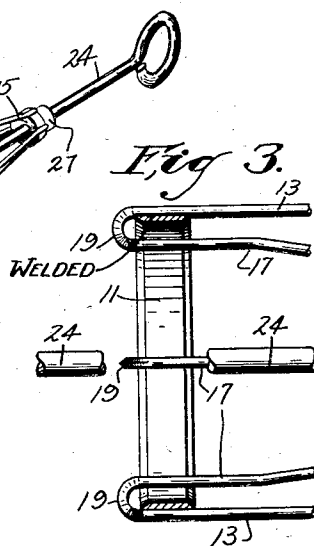


Fig. 3.



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ROOT CUTTING SEWER CLEANING DEVICE

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4 Claims. (Cl. 15—104.30)

My invention relates to improvements in root cutting sewer cleaning devices of the general type dependent upon reciprocation for cutting and cleaning operations.

5 The primary object of my invention is to provide a sewer cleaner having resilient arcuate cutter blades attached to an open skeleton frame which includes obliquely divergent blade supporting resilient arm portions and blade guiding runners which allow each blade and each end of 10 each blade to yield independently of the other end in a generally radial direction, said frame having associated means for reciprocating it in a series of quick or hammering impulses, where- 15 by the blades are adapted to cut and scrape material from a sewer wall while constantly disintegrating and breaking into small fragments the cut material by the vibratory movements of the blade toward and away from the axis of the 20 tool. The supports and actuating means are peculiarly adapted to facilitate dislodgment of material in such a manner that it can be readily flushed away from the tool, the blade supporting arms and the blades themselves being sub- 25 ject to violent vibratory strokes in both radial and longitudinal directions while the tool is being advanced in a series of impulses along the axis of the sewer.

A more particular object is to provide means 30 for positively actuating a set of resilient cutter rings in one direction with an expanding tendency, and in the opposite direction with an inwardly drawing tendency upon application of force to the rings through an actuating rod and 35 resilient bars forming an open skeleton frame adapted for quick vibratory movements under hammering impulses, whereby adherent material cut from the wall of the sewer may be additionally broken up and dislodged from the cutters and 40 from the frame in a condition to be radially carried away from the mechanism by a current of water delivered into the sewer for that purpose.

Further objects of my invention are to provide 45 an efficient tool having cutting devices adapted to yield upon encountering irregularities or contracted areas in the wall of the sewer; to provide a yielding cutter which may be propelled by sewer push rods connected with the respective ends of the tool and adapted to be actuated from adja- 50 cent man holes in a succession of impulses originated alternately from man holes at opposite ends of the length of sewer within which the tool is being operated.

It is also an object of my invention to provide 55 a sewer cleaning tool with arcuate cutter blades yieldingly supported from an end portion or axial portions of the tool by elongated arms extending from suitable supports along the axis and connected with the cutters in such a manner as to allow them to expand and contract in

accommodation to the contour of the sewer wall; also to provide means whereby some of the cutter supporting arms may serve as spacing runners to support the cutter blades in proximity 65 to the wall of the sewer without allowing the blades to actually contact with such walls; also to provide a tool which can be operated without clogging the cutters and their supports.

In the drawing:

Figure 1 is an illustration of my improved 70 tool as it is being operated in a sewer, fragments of which are shown in vertical section between successive man holes.

Figure 2 is an enlarged view of my improved 75 tool showing the same in perspective.

Figure 3 is a fragmentary sectional view of that portion of the tool which may ordinarily be regarded as the forward end.

Figure 4 is a detail showing a modified actuating means. 80

Like parts are designated by same reference characters throughout the several views.

A set of blades 10 and 11 have the form of split sleeves or rings provided with convergent or beveled margins adapted to serve as cutting edges. 85 These blades are supported from the central or axial portion of the tool by resilient runners 13 which are secured preferably by welding to the outer surfaces of the blades, and are adapted to hold the blades in spaced relation to the wall of 90 the sewer.

These runners 13 preferably have supporting portions 14 which extend obliquely from a collar 15 to the vicinity of the blade 10 and thence the runners 13 as such extend parallel with the axis 95 to the blade 11.

The blade 11 is also supported by a set of resilient interior arms 17 connected with a sleeve-like or skeleton collar 18 and extending obliquely along the axis to points in the vicinity of the blade 11 and thence parallel with the axis 100 through the ring-like blade to the inner surface of which these arms 17 are secured.

The arms 17 may be formed integrally with the runners, in which event they will extend 105 through the cylindrical space enclosed by the blade 11 and be reversely bent at 19 and extended in the other direction as runners.

The collars 15 and 18 with the associated runners 13 and oblique resilient supporting arms 14 110 and 17 form a resiliently yielding skeleton frame to carry the resiliently yielding cylindrically curved blades in cutting relation to materials projecting inwardly from a sewer wall. The members of this skeleton frame cooperate with 115 each other and with the blades in breaking or cutting such materials into small fragments which may be carried off by a current of water passing through the sewer. Preferably the reversely bent portions 19 which connect the run- 120

ners 13 with the supports 17 are provided with sharp edges as clearly shown in Figure 3.

To actuate the tool, an axially disposed rod 24 is extended through the collar 15 and the sleeve-like collar 18 and provided at its ends with coupling members 25 similar to the coupling members disclosed in Letters Patent of the United States #1,807,782, granted to Turbine Sewer Machine Company, June 2, 1931, whereby push rod sections similar to those disclosed in said patent may be connected to both ends of the tool and actuated from adjacent man holes to reciprocate the tool in that portion of the sewer between the man holes.

The rod 24 is provided with abutment projections 27 and 28. In the construction illustrated these projections have the form of collars or flanges preferably welded to the rod 24 at a distance from each other greater than the spacing of the collars 15 and 18 of the tool, whereby the rod 24 may be reciprocated freely for a predetermined distance within the collars 15 and 18 before one of the projections 27 (or 28) will strike its associated tool supporting collar. Therefore, the push rods may acquire considerable momentum in a free movement through the tool and when the projection 27 strikes the associated tool supporting collars (15 or 18), the tool will be driven by a hammering blow which is found very effective for cutting roots and other obstructions, and the reducing or disintegrating fragments of cut material.

Ordinarily the end of the tool occupied by the blade 11 will be regarded as the forward end. When this blade encounters a root or other obstruction which can not be severed by merely pushing the blade against it, the tool may be slightly retracted by a reverse movement of the push rod of sufficient length to bring its projection 28 in contact with the forward end of the sleeve collar 18. Thereupon the push rods will be actuated to move the rod 24 rapidly through the tool until the projection 27 violently strikes the collar 15, thereby driving the blade 11 against the material to be cut thereby. This operation will be repeated until the obstruction has been completely severed.

In Figure 4 a slight modification of the Figure 2 type is illustrated in which a single collar 35 is clamped to a sliding actuator rod 24b between two connected collars 18b associated with tool supporting bars 17b. The distance between the collars 18b determines the free stroke of the actuating rod, the clamping member 35 being adapted to strike the collars 18b in alternation when the rod is reciprocated.

I claim:

1. A sewer cleaning tool provided with resiliently yielding runners adapted to travel along the walls of a sewer, in combination with resiliently yielding split ring cutters connected with said runners and spaced by the runners from the wall of the sewer, said cutters having resilient end portions free for radial movement, an axially disposed actuating rod, collars loosely embracing the actuating rod, resilient arms connecting the collars with the cutters and having portions extending lengthwise of the actuating rod and divergently therefrom in positions to permit the cutters to freely yield and swing inwardly at their said ends and at their points of connection with the respective rods, and fixed abutments on the actuating rod spaced axially from the collars and in position for alternate

engagement with said collars when said rod is reciprocated, the cutters, runners and their resilient supports constituting an open skeleton structure adapted to vibrate in a series of chopping and radially vibrating debris dislodging movements when the cutters are driven against resistant material under impulses derived from the actuating rod.

2. In a sewer cleaner, the combination of spaced arcuate resilient cutter blades having free circumferential end portions, collars having resilient arms connected with the cutter blades at points axially and radially distant from the collars and adapted to allow the cutter blades to yieldingly move toward and away from a central axial line, said end portions being free for radial movement independently of each other, an actuating rod extending through said collars and provided with collar engaging projections adapted to allow an independent axial movement of the rod in opposite directions preparatory to a hammering engagement of one of the projections with an associated collar, said arms and cutter blades forming a resilient open skeleton radially vibratory structure adapted, when driven by said hammering projections into engagement with resistant material, to cut such material from a sewer wall, disintegrate it by vibratory movement and release the debris from the frame in a manner to facilitate flushing and self-clearing operations.

3. In a sewer cleaner, the combination of spaced arcuate cutter blades having in general the form of split rings, collars having resilient arms connected with the cutter blades at points radially and axially distant from the collars and also distant from the circumferential end portions of the blades, a central actuating rod extending through said collars, said rod being free for limited sliding movement in the collars and provided with means for imparting hammering impulses to the collars at the ends of such limited movements in opposite directions, said collars, arms and cutters constituting an open vibratory skeleton frame adapted by its resilience to disintegrate and throw inwardly the material removed from a sewer wall by said cutters, said frame being also contractible when drawn by said rod in a direction of resilient arm convergence toward the collars with which the arms are connected.

4. In a sewer cleaner, the combination with an actuating rod provided with loose collars and fixed projections mutually engageable and positioned to allow limited reciprocable movements of said rod preparatory to such mutual engagement, a plurality of split rings provided with marginal cutting edges, resilient arms connecting the collars with the split rings at opposite sides of the circumferential end portions of the rings, said end portions being free for independent direct radial vibration and said arms having portions extending in a generally radial and axial direction and adapted for free resilient yielding movements in radial planes, runners connecting the outer surfaces of the rings and adapted to space them from a sewer wall, and means for reciprocating the actuating rod to transmit violent impulses through said projections and collars to the split rings, said resilient arms and rings being adapted to operate upon material in the sewer in a series of chopping and radially vibrating movements.

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