

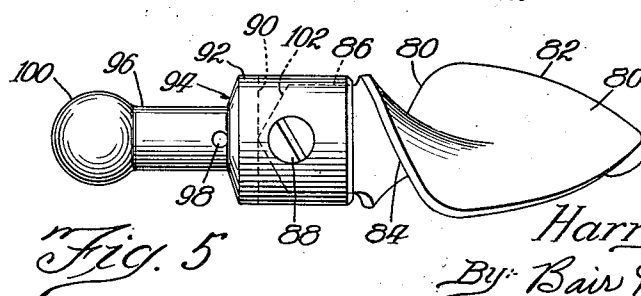
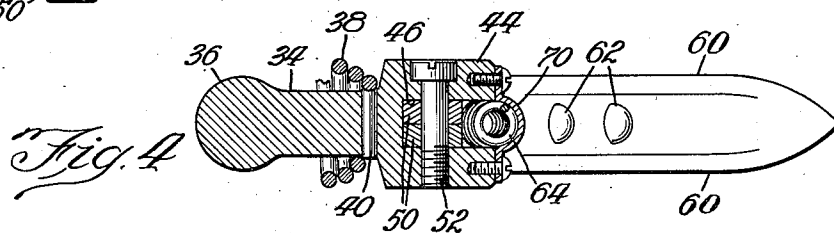
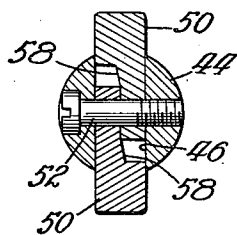
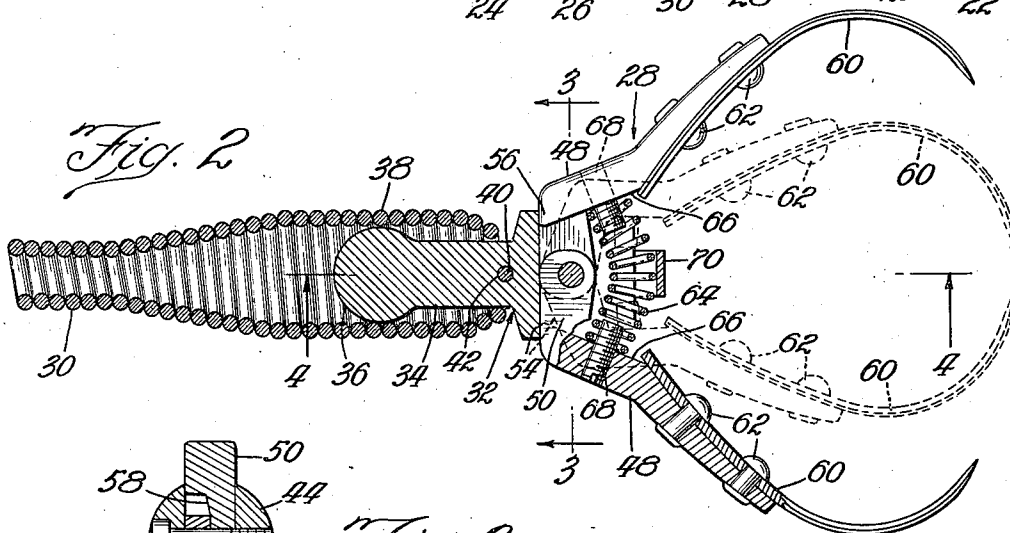
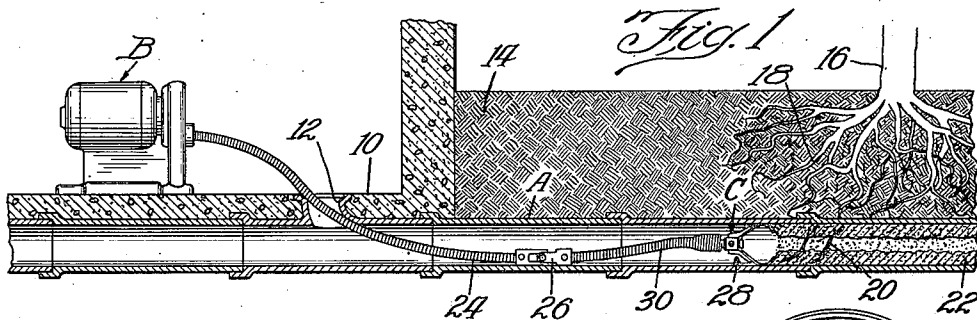
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DRAIN CLEANER

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## UNITED STATES PATENT OFFICE

2,275,850

## DRAIN CLEANER

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2 Claims. (Cl. 15—104.30)

My invention relates to drain cleaners and particularly those of a type which are suitable for cleaning drains of various sizes laid underground or in otherwise inaccessible locations.

Among the objects of my invention is the provision of a new and improved drain cleaner which is automatically self-adjustable in order to fit within drains of a variety of diameters within the limits of the device.

Still another object is the provision of a new and improved drain cleaner which is adapted to be attached to a flexible cable and rotated so as to scour the inside walls of a drain and which is furthermore provided with bowed or curved knife edges which when rotated within a drain are capable of cutting and scraping from the walls thereof roots and rootlets and other encrustations which ordinarily collect in such a place.

Still a further object is the provision of a drain cleaner of an extreme flexible character which is provided with a knife or cutting portion at the end pivoted with respect to the longitudinal axis of the cable to which it is attached in order that it may more easily be extended around corners in a drain line and which is additionally provided with a universal joint in the cable adjacent the cleaner so that the entire free end is allowed a maximum amount of lateral adjustment so that regardless of the direction a drain line might take the cleaner may be readily forced to follow it.

Another object is the provision of a novel cutting head for a drain cleaner provided with a double-edged knife so shaped that it may cut roots and debris from the inside of a drain regardless of whether it is being thrust forward or pulled rearward while being rotated.

With these and other objects in view my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 shows a longitudinal section of an underground drain line illustrating my drain cleaner at work therein.

Figure 2 is a longitudinal view of an adjustable type cutting head partly in section.

Figure 3 is a cross sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a longitudinal section taken on the line 4—4 of Figure 2.

Figure 5 is a modified form of cutting head.

When drain lines are laid underground, as is customarily the practice with tile drains used for sewage purposes, they are expected to comprise permanent installations. It is true, however, that no matter how well a tile drain may be laid there are always small fissures or cracks which may exist due to the porosity of the tile, and in the course of time tiny rootlets of vegetable origin extend themselves through the walls of the tile, or perhaps through the joints, in the direction of water which lies within the drain. Once these tiny rootlets have gained admittance to the inside of the drain they proceed to grow as a result of being nourished by the water within the drain and eventually reach a considerable size.

When these rootlets collect on the inner walls of a drain they form obstructions to the passage of many substances which ordinarily pass down the drain and cause them to collect along the walls to such an extent that they eventually obstruct, or at least seriously hinder the flow of sewage therethrough. This is especially true when drains are laid on a relatively gentle grade so that the flow of water through them is not rapid.

In order that such drains may be properly cleaned without it being necessary to uncover them piece by piece a cleaning apparatus must be supplied which can be inserted into them at a trap, a T or some similar opening, and pushed through them for distances sometimes as much as 150 feet to a point where these smaller drains empty into a large trunk sewer. When drains are laid originally they are frequently bent in direction so that there is considerable curvature between the starting point and the end of the drain, a factor which makes cleaning them a more than ordinarily difficult problem. Whatever the drain cleaner used for such a job it must be capable of varying its size automatically and of being extended around corners, sometimes very sharp, without jamming between the walls on opposite sides at a corner.

For a drain cleaner embodying these necessary requirements I have provided a flexible cable fed from a drum which is attached to a machine adapted to continually rotate it, and on the free end of the cable there is supplied a cutting head pivoted with respect to the cable, and a universal joint in the cable a short distance behind the head so that there may be a maximum amount of freedom of lateral movement at the free end.

In the drawing the character A represents a tile drain laid underground, the character B a

combined motor and drum for a flexible cable, and the character C indicates a drain cleaner.

Lying beneath the concrete cellar floor 10 is the drain line A provided with a tile having a lateral opening 12 by means of which water from the cellar enters the drain. Outside the building structure the ground level 14 is considerably above the drain and in the ground are found trees and shrubs, such as 16, growing, whose roots 18 extend downward to a distance wherein some roots 20 are enabled to enter within the walls of the drain and there grow large. Debris and other refuse collecting within the drain is indicated by the numeral 22.

A length of cable 24 comprises part of the drain cleaner, which in some cases is as long as 150 feet and is capable of being fed out from the combined motor and drum into a drain line while at the same time being rotated by the motor. A universal joint 26 is provided near the free end of the cable and at the very end a cutting head 28 is attached.

The cutting head 28 includes a body member or knife holder 32 provided with a shank 34 tipped by a rounded end 36 extending within the open end of the flexible cable 30 at an enlarged portion thereof indicated by the numeral 38. An end 40 of the flexible cable is inserted into a suitable aperture 42 in the shank in order to securely attach the cutting head to the cable. At the other side the knife holder is provided with an exterior portion 44 milled out at the center forming a slot 46 therein, which slot extends from one side to the other of the exterior portion.

Pivotally mounted within the slot are a pair of knife mountings 48 identical in shape and size, formed somewhat like the letter L, each having a horizontal leg 50 extending from opposite sides into the slot, the horizontal legs being pivoted at the center of the slot and secured therein by means of a screw 52. At the bottom of the horizontal legs 50 is a straight section 54, the outer portion of which might be considered as a shoulder and which when the parts are assembled in the manner shown is designed to abut the bottom of the slot 46 whenever the attached knife mounting 48 is extended to its outermost position. Contrarily, when the knife mounting is drawn inward the shoulder is raised from the bottom of the slot leaving a space therebetween indicated by the numeral 56 as shown by dotted position of the mounting 48 in Figure 2. In Figure 3 the construction of the identical horizontal legs 50 is more clearly shown and illustrates a cut away portion 58 adjacent the end in order that the opposed portions may overlap while still leaving a space between them to permit complete freedom of movement between the opposed parts.

To complete the cutting head a cleaning and cutting device comprising a pair of double-edged arcuate knives 60 are attached, one on each knife mounting, by means of the rivets 62. These knives are provided with sharpened edges on both sides of the arcuate portion so that they may cut when the cutting head is rotated whether it is being extended in a forward direction or withdrawn in a rearward direction.

Resiliency and automatic adjustment for the cutting head is supplied by means of a coil spring 64 which bears against flat faces 66 of the vertical legs of the L-shaped knife mountings whereon it is secured by means of threaded plugs 68 which protrude within the coils of the spring. The spring normally operates in a somewhat arcuate position as shown in Figure 2, and as a

safeguard to prevent the spring from popping out of its position in the slot 46 between the opposite knife mountings there is supplied a bracket 70 secured to the sides of the external portion and bridging over the slot within the space formed between the opposite knife mountings.

In operation the cutting head is attached to the flexible cable and pushed downward through the opening 12 into the drain line A. This is possible even though the opening 12 may be of a smaller diameter than the drain line, since the arcuate or bowed knife blades 60 may be compressed together as shown in the dotted line position of Figure 2. When the blades are in closed position, however, there still remains a measure of flexibility between the knife blade mountings and the body by reason of the fact that the shoulder-like portion 54 is lifted clear of the bottom of the slot when the tips of the knife blades touch. This being the case, the knife blades may be pivoted as a unit laterally with respect to the body an angular distance equal to the angle between the bottom of the slot and the shoulder-like portion 54.

Once the cutting head has been inserted within the horizontal drain the blades are immediately extended outward by operation of the coil spring 64 until they scrape the inside walls of the drain line A. The cutting head is then pushed through the horizontal drain manually by means of the cable 24 which is at the same time rotated by the motor B. As the cutting head progresses through the drain it scrapes and cleans the inside walls and cuts therefrom the roots and root-lets 20 by operation of the sharp edges of the knife blades. Where a special obstruction is met, the cutting head can be drawn backwards and pushed forwards repeatedly until the space seems to be entirely clear. Due to the fact that the blades can contract one against the other, when a root or obstruction is encountered too formidable to be cut in the first instance, the blades will be pressed toward each other and slide over the root rather than remain pressed against it until broken off by continued rotation of the cable.

On occasions where a drain might be very badly clogged, a smaller cutting head may advantageously be employed to initially open a small passage through the drain in order that the larger adjustable cutting head may be subsequently used. Such a smaller cutting head is shown in Figure 5 and comprises a cutting device here having the form of a knife blade 80 provided with a double cutting edge 82 and curved in a somewhat propeller-like shape so that a knife edge 84 is present on each side facing in a direction opposite from the blades 82. A base 86 of the blade is pivotally secured by means of a screw 88 within a slot 90 formed in an external portion 92 of a knife holder 94.

The knife holder is in turn provided with a shank 96 having a perforation 98 adapted to receive a strand of the flexible cable, and a rounded end portion 100 similar to the modification shown in Figure 2. The base 86 of the blade is in this instance also provided with a shoulder portion 102 on each side which is adapted to contact the bottom of the slot 90 in order to limit the distance through which the knife blade 80 may be pivoted from side to side relative to the longitudinal axis of the cable.

A reasonable amount of pivoting is desirable in order to permit this modified form of a cutting head to extend around corners but a limit

to the pivotal movement should be provided in order that the device may function properly.

When this device is used to open an initial hole through a drain the cutting head is attached to a flexible cable in the same manner as the modification shown in Figure 2, and is extended through a drain line. Due to the fact that there is provided upon it double cutting edges facing in both directions this cutting head may be extended forwardly or rearwardly while being rotated and in so doing is enabled to cut in both directions.

By use of a device of this sort, a central way is readily opened through a drain line which will subsequently permit the reception of a larger cutting head adjustable to a width equal to the full inside diameter of the drain line.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. A drain pipe cleaning device adapted for use with a source of power having a flexible cable attached thereto and adapted to be rotated comprising a cutting head operable when attached to a free end of the cable to be rotated while being passed through a drain, said cutting head including a body portion having a shank extending into contact with said free end of the cable to a point inward from the end and secured at the end thereof and having a slotted exterior, a knife

member positioned in said slot and pivotally connected therein to the body so as to pivot in a direction angularly with respect to the longitudinal axis of the body, a pair of shoulders at opposite sides on the inner end of the knife member having each a straight edge engageable with the body to limit the pivotal movement, said knife member having sides forming an angle with the respective shoulders and a curved edge knife blade at each side adapted to be projected rotatably through a tortuous drain to cut and clean debris therefrom.

2. In a drain pipe cleaning device including a source of power, a tubular cable of flexible wire attached thereto adapted to be rotated, and a universal joint near the free end to supply added lateral movement to the free end when extended around a corner, the combination of a cutting head attached to the free end adapted to be rotated by the cable while being passed through a drain comprising a body portion having a rounded shank extending into the free end of the cable in contact with the sides thereof a distance substantially greater than its width for straightening the flexible cable immediately adjacent the head and secured by the end strand of said cable, said cutting head having a slotted exterior, a cleaning device positioned in said slot and connected therein and mounted for cross-wise pivotal movement with respect to the body, said cleaning device having a curved edge blade adapted to be projected through a drain to cut and clean debris therefrom when passed rotatably in either direction.

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