

May 21, 1963

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3,090,260

APPARATUS FOR FORMING HOLES IN SEWER MAINS

Filed June 20, 1960

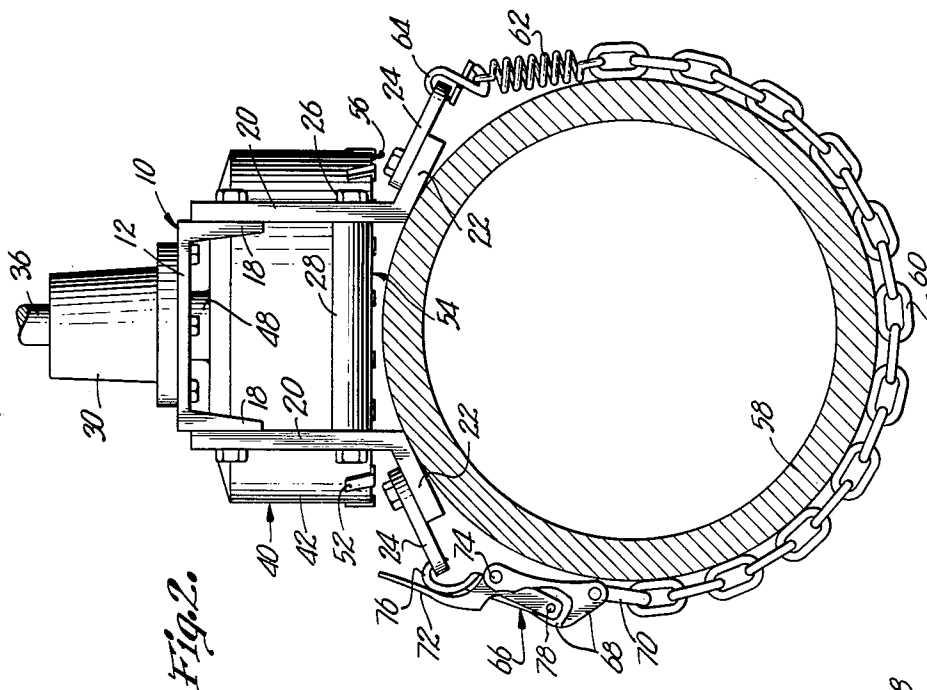


Fig. 2.

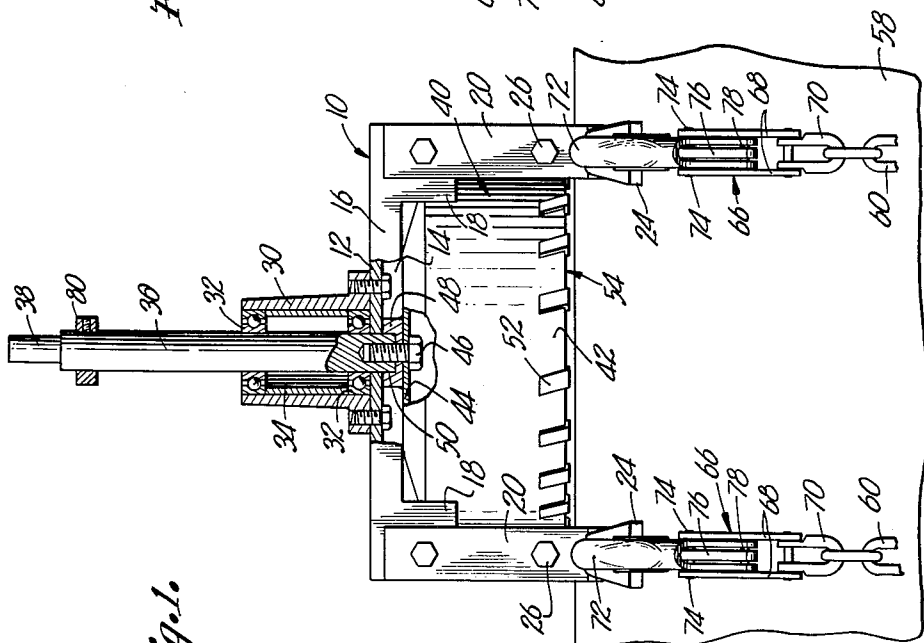


Fig. 1.

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Filed June 20, 1960, Ser. No. 37,255
2 Claims. (Cl. 77-14)

This invention relates to an apparatus for cutting a hole in the side of a pipe, and more particularly to a cutting assembly that may be clamped rigidly to an underground sewer main whereby to form a hole therein and permit the connecting of a lateral to the main.

It is the most important object of the present invention to provide apparatus of the aforementioned character that includes a support adapted for attachment to the pipe to be cut, and which support holds a cutter in place through the provision of a rotatable and reciprocable shaft attached to the cutter and journaled in bearing means carried by the support.

Another important object of the present invention is to provide quickly releasable, spring-loaded pipe-impaling means for facilitating the attachment of the apparatus to the pipe.

In the drawing:

FIG. 1 is a fragmentary, side elevational view of apparatus for forming holes in sewer mains made according to the present invention, parts being broken away and in section for clearness; and

FIG. 2 is a fragmentary, end elevational view thereof showing the sewer main upon which the apparatus is mounted in transverse cross section.

A support 10 is channel-shaped, presenting a rectangular plate 12 and a pair of longitudinal flanges 14 and 16, each of which are in turn provided with a pair of projections 18. A leg 20 is fastened to each projection 18 respectively, and each leg 20 is in turn provided with a lateral extension to present a foot 22. Feet 22 each have an eye element 24 mounted thereon, and the legs 20 are interconnected in pairs by crossbolts 26 and held apart by spacers on the bolts 26, one of which can be seen in FIG. 2 and designated by the numeral 28.

A tubular housing 30 is attached to the outer face of the plate 12 and provided with a pair of bearings 32 held apart by a spacer 34 within the housing 30. The bearings 32 journal a shaft 36 that is also reciprocable relative to bearings 32 along the longitudinal axis of shaft 36. A reduced end 38 on the shaft 36 permits attachment thereto of power means to drive the shaft 36. This may consist of the chuck of an ordinary hand drill, or any other coupling on a flexible shaft leading from an electric motor or other prime mover. Or, conceivably, the shaft 36 could be driven by hand merely by attaching a handle or other lever element to the reduced portion 38 of shaft 36.

A cutter, broadly designated by the numeral 40, substantially embraced by the legs 20, is provided with a cylindrical wall 42. A wall 44 closes one end of the cutter 40 and is attached directly to the proximal end of shaft 36 by a fastener 46. A boss 48 rigid to wall 44 has a recess 50 receiving the shaft 36 and FIG. 1 of the drawing illustrates the way in which the bolt 46 passes through the wall 44 and the boss 48 into the shaft 36.

Boss 48 limits the extent of outward movement of the shaft 36 and avoids contact between the cutter 40 and the support 10. The recess 50 may be polygonal and complementally receive the shaft 36 to prevent relative rotation between shaft 36 and cutter 40.

The cutting means for the cutter 40 takes the form of a plurality of polygonal, hardened blocks 52 press-

fitted into notches extending upwardly from the innermost circular edge 54 of wall 42. The thickness of each block 52 is slightly greater than that of the material from which wall 42 is made and the outermost end of each block 52 projects slightly beyond the peripheral edge 54. It is to be noted that cutter blocks 52 are tipped slightly so that its outermost leading edge 56 forms a cutting or shaving edge acting on pipe 58 when the apparatus is placed in use.

Pipe-impaling means are employed to hold the feet 22 in engagement with the outer face of pipe 58 and each includes a chain 60 having a spring 62 attached thereto. A hook 64 attaches each chain 60 respectively to a corresponding eye element 24.

A quickly releasable take-up coupling 66 is provided for each chain 60 respectively. Each coupling 66 includes a pair of plates 68 attached to the corresponding chain 60 by a clevis 70. A trigger element 72 between plates 68 has connection with the latter through pivot pins 74, trigger element 72 being bifurcated to receive a hook 76 therebetween. Hook 76 is attached to trigger element 72 by a pivot pin 78 and engages the proximal eye element 24 as is clear in the drawing.

When the trigger element 72 is swung outwardly about its pivots 74, the coupling 66 is extended to release the tension on spring 62, making it possible to release the hook 76 from its eye element 24. Conversely, when the couplings 66 are in the position illustrated in the drawing, the trigger element 72 remains in place because of an off-center action between pivot 78 and the pivot 74 and clevis 70.

It is obvious from the foregoing that when the apparatus is attached to the pipe 58 in the manner just above described, the feet 22 are held in position against the pipe 58 and an opening may be formed in pipe 58 by rotating the shaft 36 and, therefore, the cutter 40 while holding the cutter blocks 52 in engagement with the pipe 58.

Sewer pipes generally are made from ceramic materials or the like and, therefore, the action of the leading edges of the cutter blocks 52 on the pipe 58 is to shave away the material forming the pipe 58 into a dust until the circular opening is completely formed. It is contemplated that slight pressure be exerted on the shaft 36 inwardly to thereby hold the blocks 52 tightly against the pipe 58 during rotation of cutter 40.

A set collar 80, adjustable on the shaft 36, limits the extent of inward movement of the cutter 40 into the pipe 58 after the hole has been formed therein.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. In an apparatus for cutting a circular hole in a side of a circular underground sewer pipe comprising:

- (A) a cutter support including an elongated plate having opposed faces and an opening therein,
- (B) a housing secured to said plate at one face thereof in surrounding relationship to said opening and extending outwardly therefrom,
- (C) a cutter shaft extending through said opening and housing,
- (D) bearing means within said housing mounting said cutter shaft for rotation about its longitudinal axis and for reciprocal movement toward and away from said pipe,
- (E) a cutter secured to said cutter shaft and disposed between said plate and said pipe,
- (F) at least two pairs of legs secured to said plate and extending generally perpendicularly outwardly from the opposite of said faces,
- (G) each of said legs having a pipe-engaging foot extending laterally therefrom generally tangentially to said side of said circular pipe,

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- (H) two link chains, each interconnecting the feet of corresponding pairs of legs for holding the feet against said side of said pipe,
- (I) a coil spring connecting one end of each chain to the foot on one leg of each pair; 5
- the improvement in means for tightening said chains against said pipe comprising a quick release coupling attached to the opposite end of each chain comprising:
- (a) hook means for insertion into a hole 10 in the foot on the other leg of each pair of legs, and
- (b) lever means connecting each hook means to one of said chains, said lever means being pivoted off-center for quickly moving said hook means toward and away from said hole. 15
2. In apparatus for cutting a circular hole in the side of a circular underground sewer pipe comprising:
- (A) a cutter support including elongated plate means 20 having opposed faces and an opening therein,
- (B) a housing secured to said plate means at one face thereof in surrounding relationship to said opening and extending outwardly therefrom,
- (C) a cutter shaft extending through said opening and housing, 25
- (D) bearing means within said housing mounting said cutter shaft for rotation about its longitudinal axis and for reciprocal movement toward and away from said pipe, 30
- (E) a cutter secured to said cutter shaft and disposed between said plate means and said pipe,
- (F) at least two pairs of legs secured to said plate means and extending outwardly from the opposite of said faces, 35

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- (G) each of said legs having a pipe-engaging foot extending laterally therefrom,
- (H) two separate pipe-engaging means, each encompassing said pipe and interconnecting the feet of corresponding pairs of legs for holding the feet against said side of said pipe,
- (I) spring means connecting one end of each pipe-engaging means to the foot on one leg of each pair; the improvement in means for tightening said pipe-engaging means against said pipe comprising a quick release coupling attached to each pipe-engaging means comprising:
- (a) hook means for insertion into a hole in the foot on the other leg of each pair of legs,
- (b) bifurcated lever means connecting each hook means to one of said pipe-engaging means, said lever means being pivoted off-center for quickly moving said hook means toward and away from said hole, and
- (c) separated portions of said bifurcated lever means receiving said hook means therebetween when in tightening position.

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