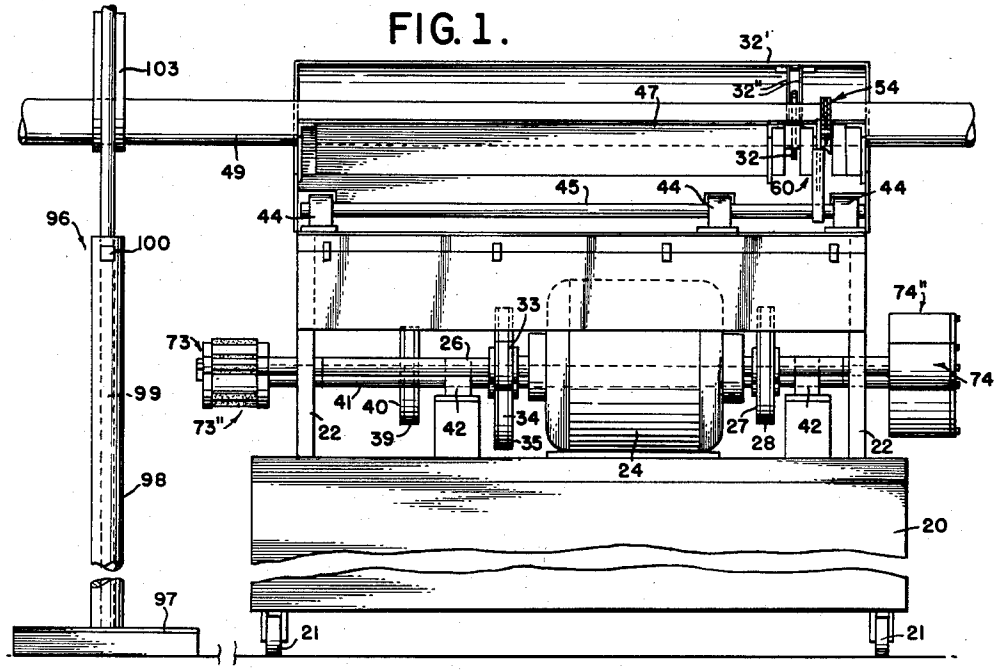
Dec. 1, 1964 J. L. BATEMAN 3,159,071

PIPEWORKING MACHINE

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FIG. 1.



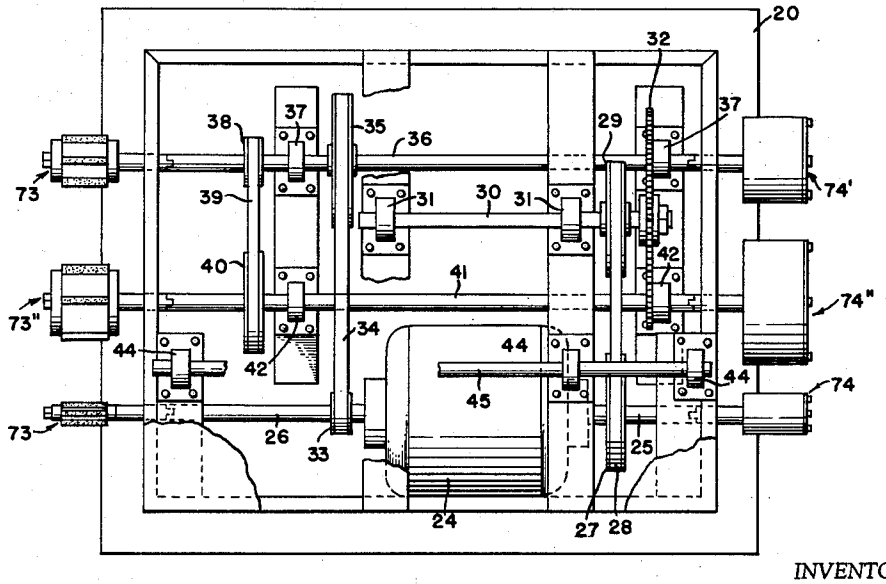


FIG. 2.

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Dec. 1, 1964 J. L. BATEMAN 3,159,071

PIPEWORKING MACHINE

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FIG. 3.

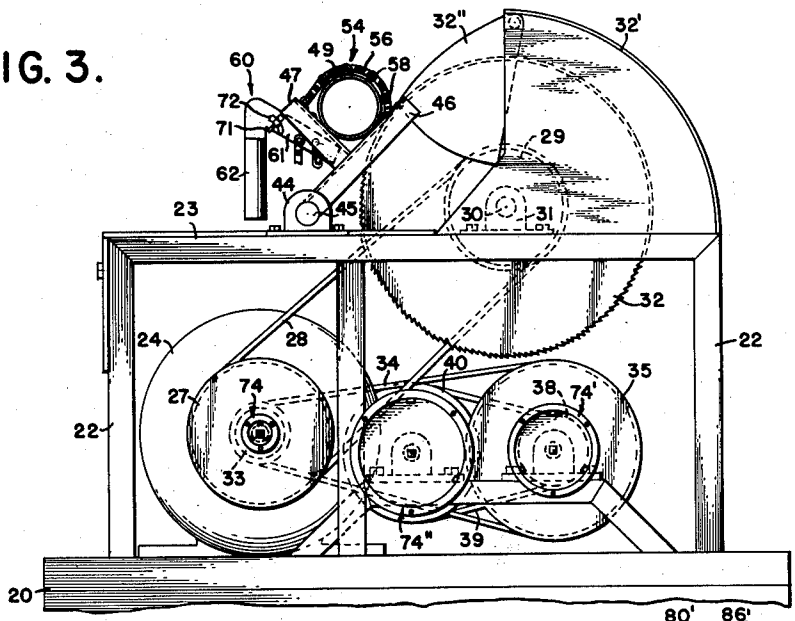
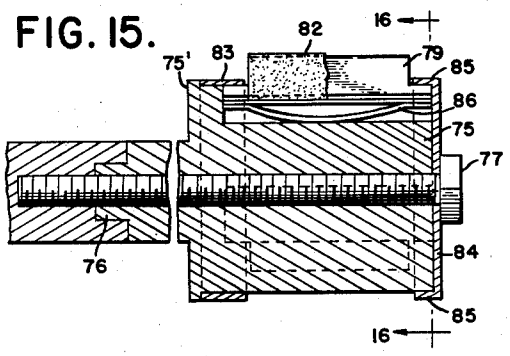


FIG. 15.



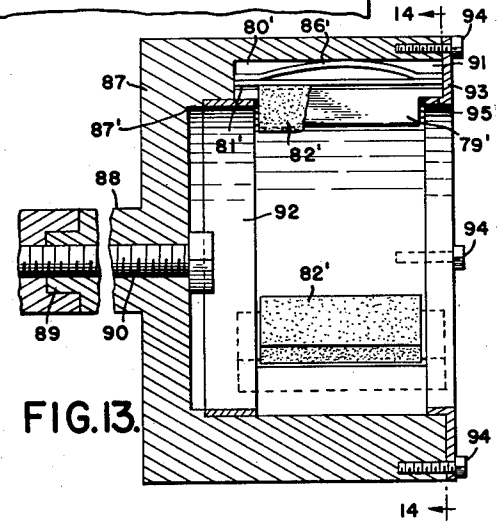


FIG. 13.

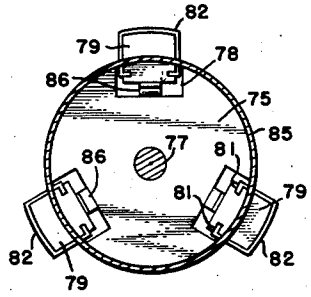


FIG. 16.

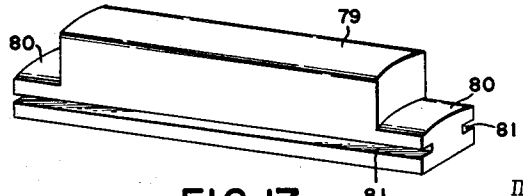


FIG. 17.

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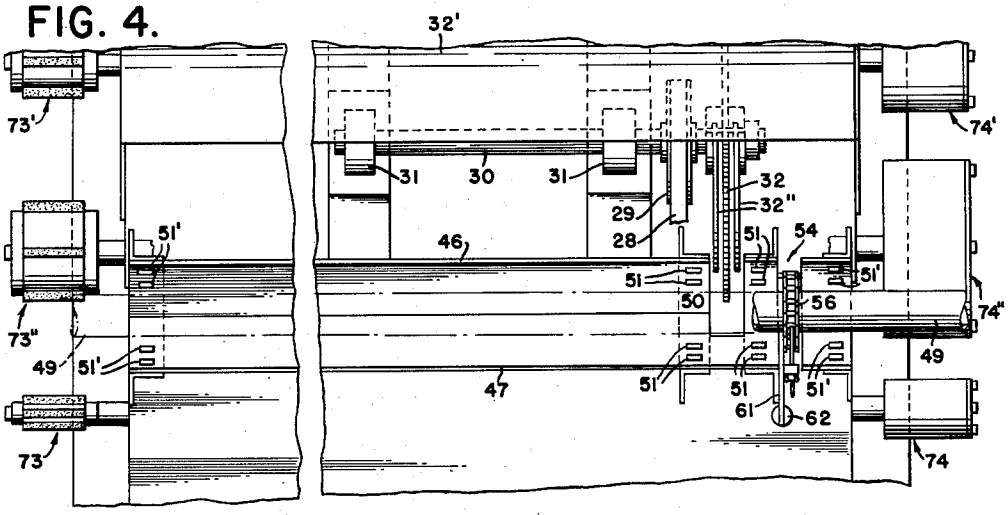
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Dec. 1, 1964 J. L. BATEMAN 3,159,071

PIPEWORKING MACHINE

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FIG. 4.



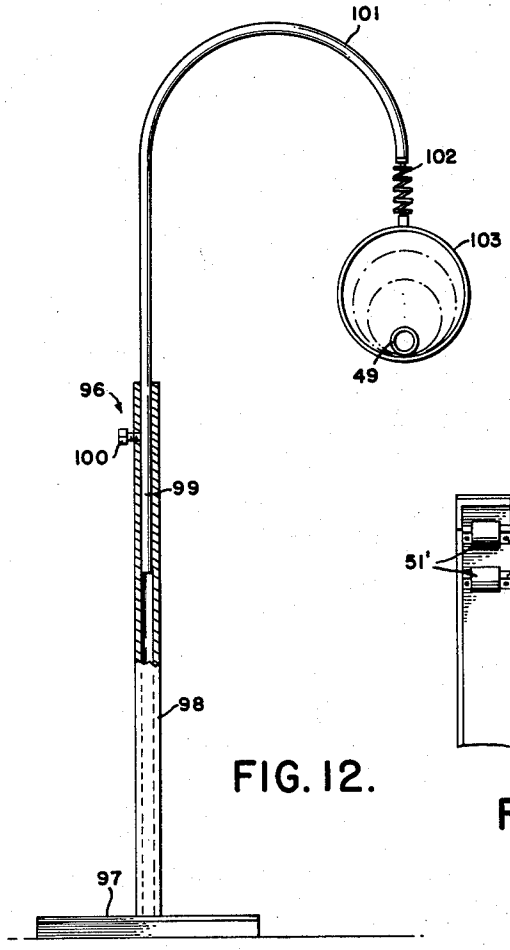


FIG. 12.

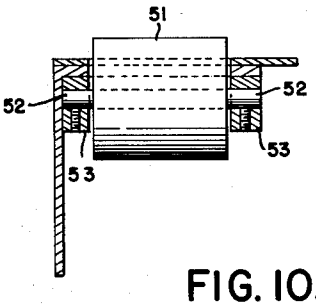


FIG. 10.

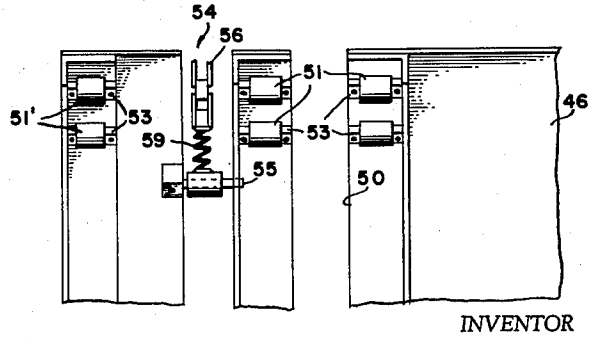


FIG. 9.

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PIPEWORKING MACHINE

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FIG. 5.

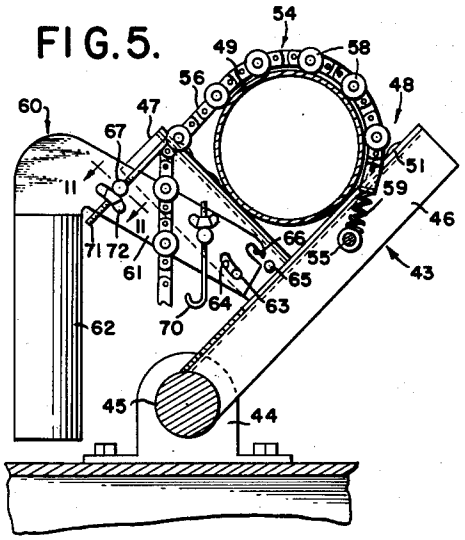
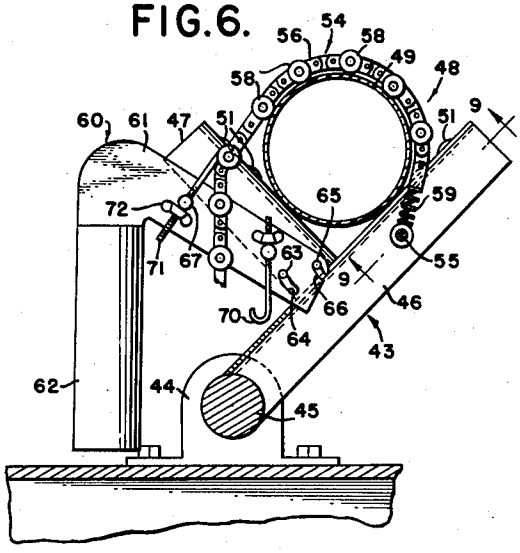


FIG. 6.



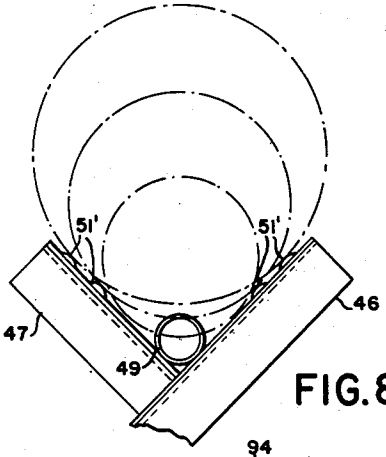


FIG. 8.

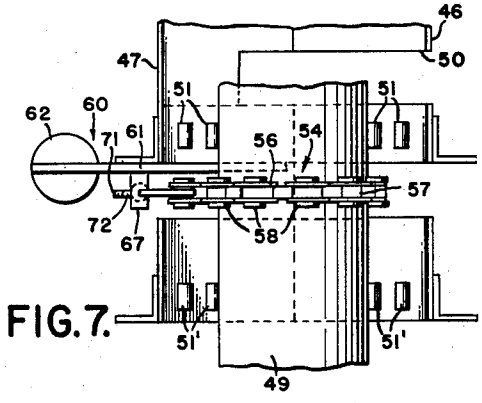
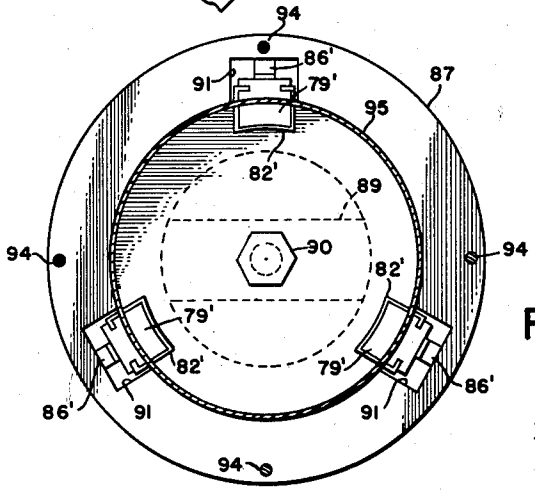


FIG. 7.



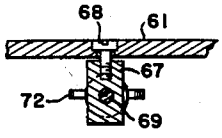


FIG. 11.

FIG. 14.

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United States Patent Office

3,159,071
Patented Dec. 1, 1964

3,159,071

PIPEWORKING MACHINE

Joseph L. Bateman, 3412 University Blvd. E., Hyattsville, Md.

Filed Nov. 25, 1960, Ser. No. 71,708
6 Claims. (Cl. 83—411)

This invention relates to a pipeworking machine and more particularly to a machine for cutting and cleaning pipe, preparatory to installation.

Pipe and copper tubing, in particular, is cut and finished by use of various similarly operated machines, illustrative of which are the Clean-O-Matic machine manufactured by Stockmeister & Prins of Wellston, Ohio, and the Oster machine of the Oster Manufacturing Company of Wickliffe, Ohio. With both of these machines, a length of copper tubing is first placed on roller supports and rotated, pursuant to which a cutting knife gradually cuts the peripheral wall of the rotating pipe until the latter is completely severed. As a result of this cutting operation, however, internal and external burrs are left on the pipe ends at the locus of the cut. This necessitates the provision of tools to remove both the internal and external burrs. The final step in finishing the tube, prior to installation, is the cleaning of the terminals thereof. This is done by means of rotary steel brushes, the component parts of which, it has been found, become bent and distorted after a time and are then ineffective.

It is an object of this invention, therefore, to provide a pipeworking machine including means for cutting pipe without leaving internal or external burrs at the locus of the cut.

Other objects are to provide a pipeworking machine which is portable and includes a pipe support movable into engagement with a cutting tool, the support being provided with means for securing the pipe in position during the cutting operation; to provide roller means on the support to permit rotation of large diameter pipe during cutting; to provide an assembly for holding the aft end of pipe remote from the machine during the cutting operation, the assembly permitting free movement of the pipe under urging of the support; to provide rotary cleaning elements selectively engageable with the interior and exterior surfaces of the pipe, the elements including abrasive members movable into cleaning engagement with the pipe walls; to provide cleaning elements comprising shoe members to which abrasive members are removably attached, the shoes being in spring-pressed engagement with the pipe periphery; and to provide a pipeworking machine which may be operated by one person.

Other objects of the invention will be manifest from the following description of the present preferred form of the invention, taken in connection with the accompanying drawings, wherein:

FIG. 1 is a front elevational view of a pipeworking machine constructed in accordance with the present invention and illustrating its application;

FIG. 2 is a top plan view of the same, portions thereof being broken away to disclose details of construction;

FIG. 3 is a side elevational view of the machine of the present invention;

FIG. 4 is an enlarged fragmentary top plan view of the present machine, showing to advantage the pipe support forming a part thereof;

FIG. 5 is an enlarged side elevational view of the pipe

support forming a part of the present invention, showing the operating handle thereof in inoperative position;

FIG. 6 is an enlarged side elevational view similar to FIG. 5, showing the operating handle in operative position;

FIG. 7 is an enlarged fragmentary top plan view of the pipe support shown in FIGS. 5 and 6;

FIG. 8 is an enlarged fragmentary end elevational view of the pipe supporting trough forming a part of the present invention, illustrating its use with pipe of varying diameters;

FIG. 9 is a fragmentary top plan view of the pipe support forming a part of the present invention, showing to advantage the pipe support rollers and pipe chain;

FIG. 10 is an enlarged fragmentary sectional view of a pipe support roller;

FIG. 11 is an enlarged fragmentary sectional view of the pipe chain mechanism forming a part of the pipe support of the present invention;

FIG. 12 is a plan view, partially in section, of the support for holding the aft end of pipe, forming a part of the present invention;

FIG. 13 is an enlarged vertical sectional view of an external cleaner for pipe terminals forming a part of the present invention;

FIG. 14 is a sectional view taken along the lines 14—14 of FIG. 13, looking in the direction of the arrows;

FIG. 15 is an enlarged sectional view of an internal cleaner for pipe;

FIG. 16 is a sectional view taken along the lines 16—16 of FIG. 15, looking in the direction of the arrows; and

FIG. 17 is a perspective view of a cleaner shoe forming a part of the present invention.

Referring now in greater detail to the drawings, and more particularly to FIGS. 1, 2, and 3 thereof, the pipeworking machine of the present invention comprising a base 20 preferably mounted on casters 21 or other suitable mobile means on which base is a rectangular frame including vertical members 22 and horizontal members 23. Mounted within the frame on base 20 near the front edge thereof is a motor 24 from which extends a pair of shafts designated 25 and 26. A pulley 27 is fixed to drive shaft 25, which pulley is adapted to receive a drive belt 28 which extends rearwardly of the machine into engagement with a second pulley 29 fixedly mounted on an idler shaft 30, suitably journaled in bearings 31. A circular saw 32 is fixed to and movable with one terminal of shaft 30, said saw being provided with a cover 32' and spring-urged guards 32''. Saw 32 may be of any suitable diameter and adapted for cutting metal, a 10 inch Simonds saw-toothed blade having been found to produce optimum results.

As shown to advantage in FIG. 2, a small pulley 33 is fixed to drive shaft 26 and is provided with a drive belt 34 extending rearwardly to a larger pulley 35 mounted on a driven shaft 36 which is suitably journaled between bearings 37. A second pulley 38 is also mounted on shaft 36 and is provided with a drive belt 39 extending forwardly to a large pulley 40 mounted on an intermediate driven shaft 41 rotatably mounted between suitable bearings 42. In addition to its function of operating circular saw 32, drive shaft 25, together with the drive shaft 26 and driven shafts 36 and 41, serve to actuate pipe cleaning elements in a manner which will be hereinafter more fully described.

The pipeworking machine of the present invention

further includes a pipe support or carriage generally designated 43, disposed in a plane at right angles to the plane of saw 32 and including spaced supporting bases 44 suitable secured to frame members 23 at intervals longitudinally of the machine. Bases 44 are provided with aligned cylindrical bores adapted to receive a cylindrical shaft 45 to which is fixed a pipe-supporting plate 46. A second supporting plate 47, coextensive with plate 46, is secured to the latter at right angles intermediate its width to form a pipe supporting trough 48 adapted to receive a pipe 49, which pipe may be of varying diameter as illustrated in FIG. 8. Plate 46 is provided with an inwardly extending slot or recess 50 at a point adjacent circular saw 32, which slot extends partially through plate 47, and, upon actuation of pipe support 43, receives the saw in order to effect cutting engagement of the saw with pipe 49 resting in pipe-supporting trough 48. Supporting plates 46 and 47 are provided with pairs of rollers 51 positioned on opposite sides of slot 50 and disposed longitudinally of the supporting plates. As shown in FIGS. 9 and 10, each roller 51 has axial pintles 52 which are rotatably mounted in journals 53. The terminal portions of plates 46 and 47 are also provided with pipe-engaging rollers designated 51' which are similar to rollers 51. Rollers 51 and 51' are adapted to engage the outer peripheral wall of pipe of large diameter which must be rotated in order to permit severance thereof by circular saw 32. Pipe of smaller diameter requires no rotation since saw 32 is large enough to cut the pipe in one movement.

In connection with support or carriage 43, there is provided a pipe retainer chain 54 adapted to be secured to plate 46 at 55 and wrapped around pipe 49 to prevent relative longitudinal movement of the latter with respect to carriage 43. Chain 54 includes a plurality of links 56 joined together in pairs in spaced parallel relation by connectors 57. As shown to advantage in FIGS. 5, 6, and 7, it is within the contemplation of the present invention to provide rollers 58 rotatably mounted on the outer face of links 56 at predetermined spaced intervals, which rollers engage the outer periphery of pipe 49. In conjunction with rollers 51 of supporting plates 46 and 47, rollers 58 facilitate rotation of pipe of large diameter to effect ready cutting thereof. A coil spring 59 is interposed between the last link 56 and anchor point 55 of chain 54 in order to allow a limited amount of play in the chain for reasons which will be hereinafter more clearly set out.

Referfring now to FIGS. 5 and 6, the machine of the present invention further includes an operating handle 60 for pipe support 43, which handle includes an angularly disposed lever arm 61, one terminal of which is bent downwardly to form a pistol grip 62 which is grasped by the operator of the machine. Handle 60 is pivotally mounted on one end terminal of supporting plate 47 by means of a plate-carried pin 63 which is engageable in a slightly arcuate slot 64 of lever arm 61. Laterally adjacent pin 63 is a locking pin 65 adapted for insertion in a terminal slot 66 of lever arm 61, which slot is of similar configuration to slot 64. Downward movement of operating handle 60 effects entry of pin 65 into slot 66 to lock handle 60 into engagement with pipe support 43 (see FIG. 6).

As shown to advantage in FIGS. 5, 6, 7 and 11, spaced supporting blocks 67 are secured to lever arm 61 by screw means 68 through each of which blocks extends a chain retainer 69. One end of retainer 69 is hook-shaped as indicated at 70 for selective engagement with connectors 57 of chain 54. The opposite end of retainer 69 is threaded, as indicated at 71 to receive a wing nut 72 which, in conjunction with spring 59, serves to adjust the retainer for proper engagement with the chain 54 and to compensate for use thereof with different sized pipe. The provision of two chain retainers insures optimum retention of both small and large pipe.

It is within the contemplation of the present invention to provide a series of celaning members for the pipe. For this purpose, male cleaners of different sizes, generally designated 73, 73' and 73'' are fixed to and rotated by shafts 26, 36 and 41 respectively, the cleaners extending beyond one side of the machine for ready use preparatory to pipe installation. In addition to male celaners 73, 73' and 73'', there are also provided, a plurality of female cleaners of different sizes, generally designated 74, 74' and 74'' which extend beyond the opposite side of the machine, the female cleaners being rotatably mounted by shafts 25, 36 and 41.

Male cleaners 73, 73' and 73'' are of like construction, and, as shown in FIGS. 15, 16 and 17, generally include a cylindrical body portion 75, the innermost end of which is reduced to form a key 76 adapted for insertion in a complemental keyway of shafts 26, 36 or 41. Cylindrical body portion 75 is further provided with a threaded axial bore which extends into shaft 26, 36 or 41. A bolt 77 threadedly engages the bore to fix body portion 75 to the shaft. Referring now to FIG. 15, it will be seen that body portion 75 is provided with a plurality of peripheral cut-out sections 78 which extend from the front terminal of the body to a point adjacent the aft end thereof. Each cut-out portion 78 is adapted to receive a shoe 79, the upper margin of each of which extends considerably beyond the outer periphery of body portion 75. As shown in FIG. 17, each shoe is provided with lateral extensions 80 which are approximately half the height of the shoe. The lower portion of the side walls of each shoe 79 are further provided with longitudinal slits 81 into which the terminals of an abrasive element 82 are fitted. Element 82 may be of any suitable material, such as, for example, metal embedded with carbide chips, with a backing of spring metal, and is readily removed for replacement. Shoes 79 are held in perpiheral cut-out portions 78 by means of a retainer ring 83 which is in abutting engagement with an annular peripheral shoulder 75' of body 75, a portion of the ring being superjacent cut-out portions 78 and in contiguous relation with one of the extensions 80 of shoe 79 to prevent casual displacement of the aft end of the shoe. There is additionally provided, a retainer washer 84 of circular conformation adapted to be interposed between the head of bolt 77 and body portion 75, the washer including a peripheral flange 85 bent inwardly for contiguous relationship with the periphery of body portion 75. Flange 85 is superjacent cut-out portions 78 and engages the other extension 80 of each shoe 79 in the same manner as retainer ring 83. A leaf spring 86 in the bottom of each cut-out portion 78 engages the underface of each shoe 79 and urges the latter to its outermost position.

Female cleaners 74, 74' and 74'' each include a cylindrical cup 87, the base of which is provided with a shaft extension 88 which issues into a key 89 adapted for engagement with a complemental keyway formed in the end of the shaft to which the cleaner is attached. The base of cup 87 and shaft extension 88 are provided with a threaded bore which extends into the shaft for the reception of a retaining bolt 90. It is within the contemplation of the present invention to provide a plurality of rectangular cut-out sections 91 in spaced relation along the inner periphery of the cup which are adapted to receive shoes 79' which are of the same construction as those employed in the male cleaners, the shoes having lateral extensions 80' and longitudinal slits 81' adapted to receive abrasive element 82'. There is also provided a leaf spring 86' for urging shoes 79' inwardly into engagement with the outer periphery of the pipe to be cleaned. The aft ends of shoes 79' are retained in position by a retainer ring 92, the innermost terminal of which engages an annular shoulder 87' of cup 87. The forward end of shoes 79' are maintained in proper position by an O-shaped retainer washer 93 secured to the outer end of cup 87 by bolts 94. Washer 93 includes an inwardly extending

circular flange 95 which engages shoe extension 80' to retain the latter within cut-out sections 91.

Referring now to FIGS. 1 and 12, it is within the contemplation of the present invention to provide an assembly generally designated 96 which may be positioned at any predetermined point remote from the machine for holding the aft end of a pipe projecting from the pipe support. Assembly 96 includes a base 97 to which is centrally secured, a vertical tubular pipe 98. A shaft 99 is telescopically housed within vertical tubular pipe 98, the shaft being held in any predetermined fixed position by a setscrew 100. As shown to advantage in FIG. 12, the upper portion of shaft 99 is bent to form a goose neck 101 from the terminal of which pends a spiral spring 102. A loop 103 is secured to the lower terminal of spring 102, which loop is adapted to receive pipe 49 which, as indicated, may be of varying diameter. Spring 102 permits yieldable movement of loop 103 together with pipe 49 in response to movement of pipe support 43.

In use of the present invention, the pipe to be cut is placed in trough 48 of pipe support 43, and the aft end thereof is placed within loop 103 of assembly 96. As shown in FIG. 8, if the pipe is of ½" to 1" diameter, the outer periphery thereof will not contact rollers 51 of supporting plates 46 and 47, but if the pipe diameter is 2" or larger, the outer periphery will contact a set of rollers 51 and 51' on each of plates 46 or 47. After the pipe is in the desired position on the support, pipe chain 54 is wrapped around the pipe and engaged with one of the chain retainers 69, depending on the size of the pipe. To adjust the retainer for optimum engagement with connector 57 of the pipe chain, wing nut 72 is operated to move the retainer longitudinally of the chain. Adjustment of the retainer, together with the provision of spring 59 enables the rollers of the pipe chain to firmly grip the outer periphery of the pipe to prevent longitudinal movement thereof. Where pipe of large diameter is to be cut, rollers 58, in cooperation with rollers 51 and 51' of pipe support 43 permit rotation of the pipe during the cutting operation.

After the pipe chain and retainer have been interengaged, handle 60, which up to this point has been pivoted to an end terminal of support plate 47, is pushed downwardly and inwardly until pin 65 of plate 47 has entered slot 66 to lock handle 60 into engagement with pipe support 43. Motor 24 is next actuated to rotate saw 32. Grip 62 of operating handle 60 is then moved forward to effect a corresponding movement of pipe 49 until saw 32 enters slot 50 to effect severing of the pipe. Where a circular saw of 10" diameter is employed, cutting of pipe of small diameter is readily effected, without adjustment of the pipe. However, in the case of pipe of larger diameter, saw 32 can only cut a portion of the pipe wall in situ. After this operation has been completed, the operator simply exerts a rotary force on the pipe and, by virtue of rollers 51, 51' and 58, the pipe is readily rotated so that the remaining portion of the pipe wall may be cut.

After the cutting operation, the pipe is removed from the pipe support and, since saw 32 leaves no exterior or interior burrs on the pipe, the conventional burr removal step is obviated. The final step in preparing the pipe for use is the cleaning of the inner and outer periphery of the pipe by means of male cleaners 73, 73' and 73" and female cleaners 74, 74' and 74", the particular cleaners used depending upon the diameter of the pipe. To clean the inner periphery of the pipe, the latter is sleeved over the appropriate cleaning member so that abrasive 82, carried by shoe 79, is urged by spring 86 into frictional engagement with the pipe wall. Rotation of the cleaner member is effected by motor 24. After the inner periphery of the pipe is cleaned, the pipe is inserted in the appropriate female cleaner 74, 74' or 74" and a similar action takes place on the outer periphery of the pipe wall. It will be noted that, by virtue of the arrangement of pulleys between drive shafts 25 and 26 and shafts 36 and 41, the cleaning members rotate at different speeds to facilitate cleaning of pipe and pipe fittings.

The machine of the present invention is adapted to be readily rolled from place to place as needed. By virtue of assembly 96, which holds the aft end of the pipe, the cutting operation may be performed by one person rather than the two persons heretofore required, one to hold the pipe and one to perform the cutting operation. With this machine also, the pipe is rapidly cut clean and square without forming burrs at the locus of the cut, thereby eliminating a step in the pipe preparation process.

While I have herein described a preferred form of my invention, it is nevertheless to be understood that various changes may be made therein, without departing from the spirit and scope of the claims hereto appended.

What is claimed is:

1. A pipeworking machine including a frame, a cutting tool rotatably mounted on the frame, power means for rotating said cutting tool, a pipe support pivotally mounted on said frame proximate said cutting tool, means for effecting cutting engagement of the cutting tool and the pipe on the pipe support, and a flexible locking member carried by the pipe support and engageable with the pipe periphery for preventing longitudinal movement of the pipe relative to the pipe support, said flexible member including rollers engageable with the pipe periphery to facilitate rotation of the pipe on the pipe support.

2. A pipeworking machine including a frame, a circular saw rotatably mounted on the frame, a pipe support pivotally connected to the frame, said pipe support being movable in the direction of said circular saw to effect cutting engagement of the latter with the pipe, a pipe retaining chain carried by said pipe support and engageable with the pipe periphery for preventing relative longitudinal movement of the pipe with respect to the pipe support, and rollers carried by said pipe support and by said pipe retaining chain engagable with the pipe periphery for facilitating rotation of the pipe during the cutting operation.

3. A pipeworking machine including a frame, a cutting tool rotatably mounted on the frame, power means for rotating said cutting tool; a pipe support pivotally mounted on said frame, said pipe support being movable in the direction of said cutting tool to effect cutting engagement of the latter with the pipe, a flexible locking member carried by the pipe support and engageable with the pipe periphery for preventing longitudinal movement of the pipe relative to the pipe support, said flexible member including rollers engagable with the pipe periphery to facilitate rotation of the pipe on the pipe support and an assembly remote from the frame, the assembly including a loop for holding the aft end of the pipe, projecting from the pipe support, uniplanar with the entire length of the pipe, said assembly loop being yieldable.

4. A pipeworking machine, as set out in claim 3, wherein the assembly loop is vertically adjustable.

5. A pipeworking machine, as set out in claim 4, wherein the assembly is portable.

6. A pipeworking machine including a frame, a circular saw rotatably mounted on the frame, power means for rotating said circular saw, a pipe support pivotally mounted on said frame and movable toward and away from said circular saw to effect cutting of pipe on the pipe support, a flexible locking member carried by the pipe support and engageable with the pipe periphery for preventing longitudinal movement of the pipe relative to the pipe support, spaced pins mounted on said pipe support, and an operating handle connected to said pipe support for moving the latter toward and away from said circular saw, said operating handle including a lever arm having a closed slot intermediate its length adapted to receive one of said pins, retaining means on said lever arm with which said flexible locking member is detachably engaged, said lever arm having an open terminal slot selectively engagable with the other of said pins mounted on

the pipe support upon downward movement of said lever arm, to lock said operating handle to said pipe support.

References Cited in the file of this patent

UNITED STATES PATENTS

981,417	Halsey et al.	Jan. 10, 1911
1,842,009	Brasch	Jan. 19, 1932
1,881,441	Fisher	Oct. 11, 1932
2,080,941	Hutchinson	May 18, 1937
2,147,387	Schwarz	Feb. 14, 1939
2,353,125	Carpmail	July 11, 1944
2,367,521	Pero	Jan. 16, 1945
2,401,659	Pealer	June 4, 1946
2,635,393	Barth	Apr. 21, 1953
2,775,077	Whittenberg	Dec. 25, 1956
2,793,473	Hickman	May 28, 1957
2,814,913	De Witt	Dec. 3, 1957
2,818,688	Swedmark	Jan. 7, 1958
2,855,728	Lindh	Oct. 14, 1958

FOREIGN PATENTS

531,455	Germany	Aug. 10, 1931
1,030,968	France	June 18, 1953
842,332	Great Britain	July 27, 1960