Nov. 8, 1966 S. E. COBLITZ 3,283,978

TOOL FOR FRACTURING PIPE

Filed Aug. 26, 1964 3 Sheets-Sheet 1

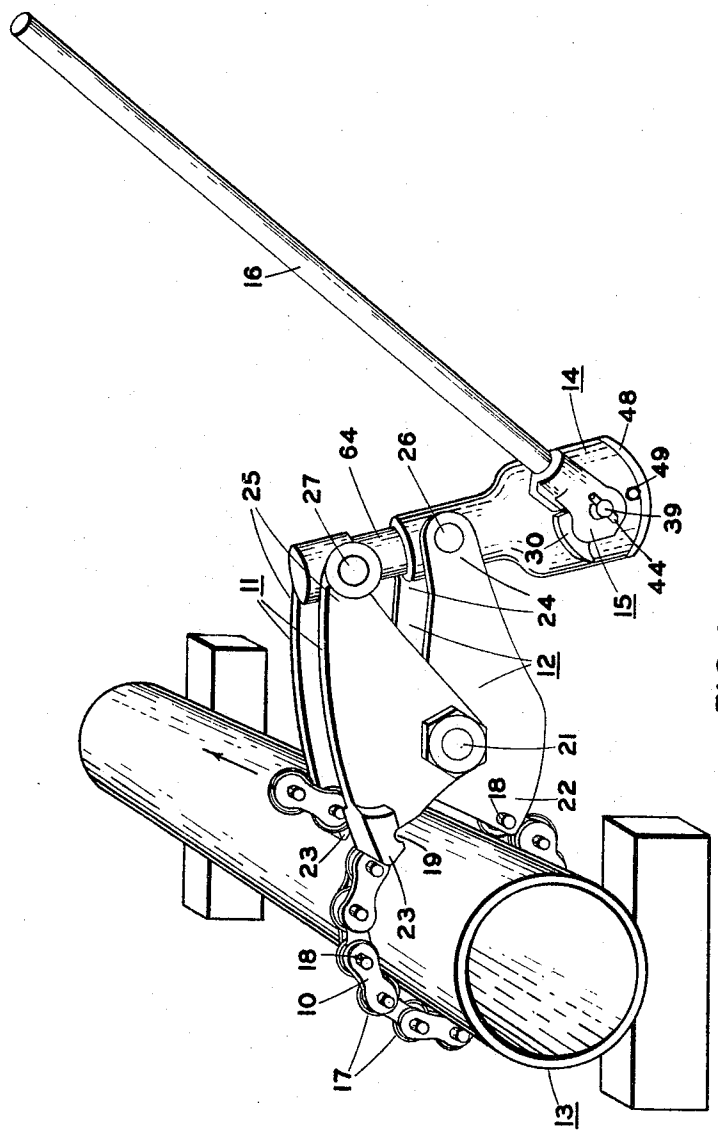


FIG. 1

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TOOL FOR FRACTURING PIPE

Filed Aug. 26, 1964 3 Sheets-Sheet 2

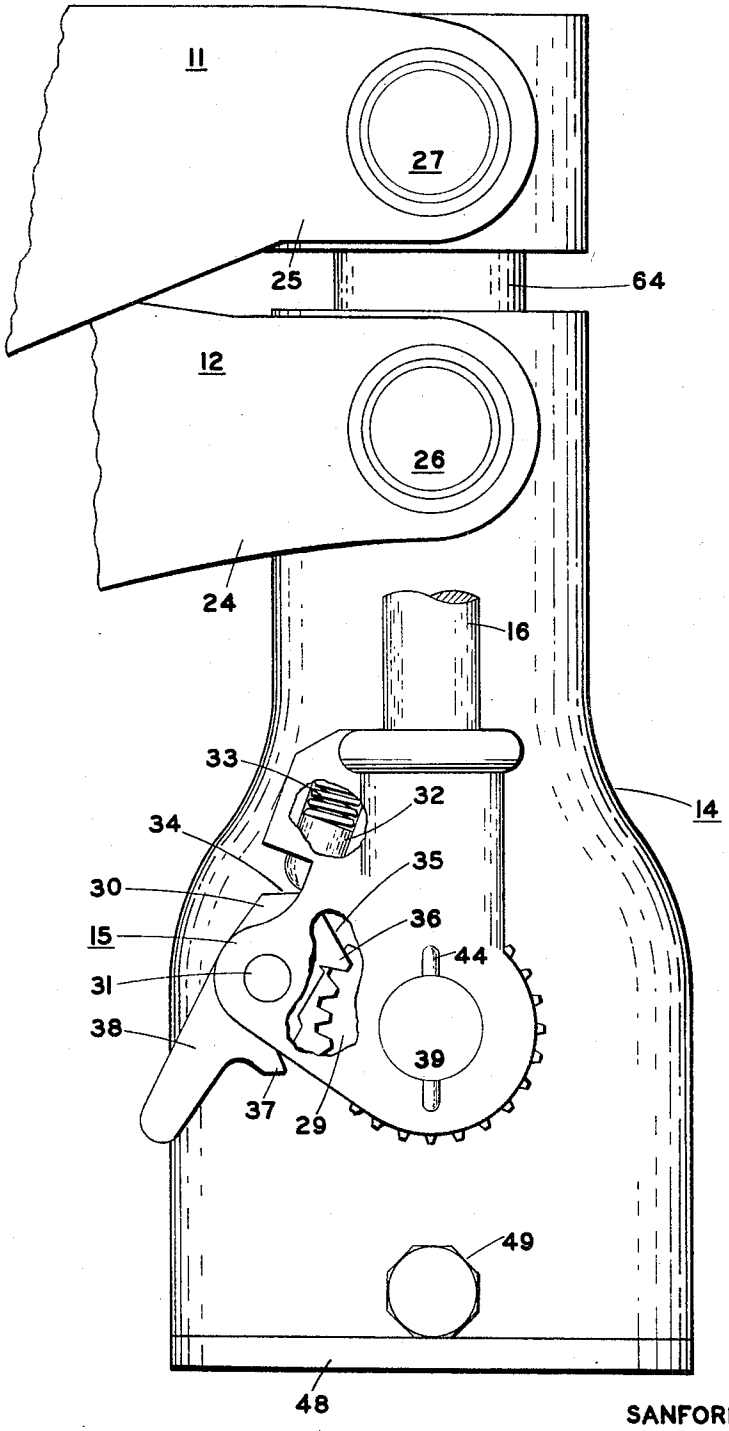


FIG. 2

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TOOL FOR FRACTURING PIPE

Filed Aug. 26, 1964 3 Sheets-Sheet 3

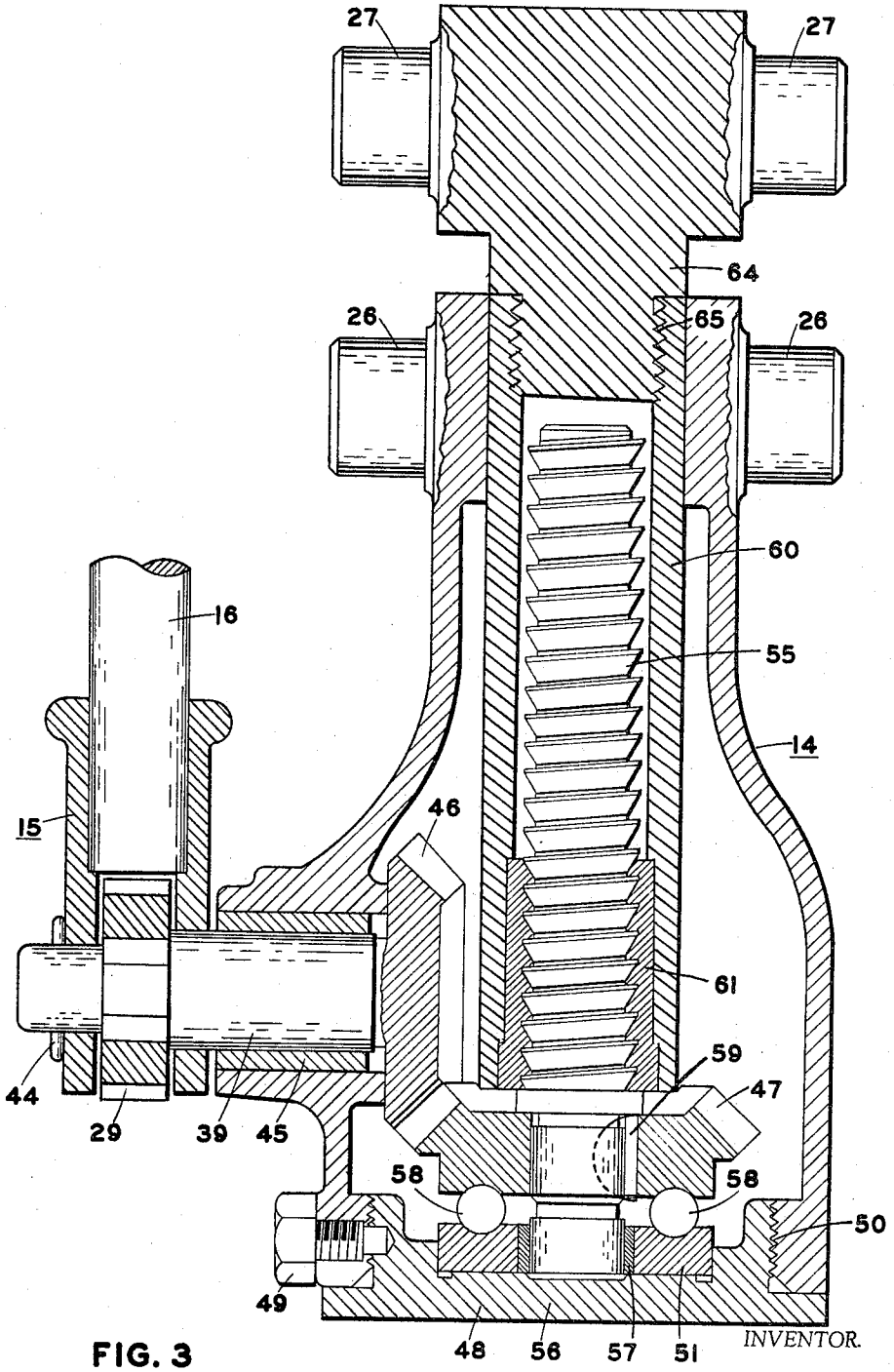


FIG. 3

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United States Patent Office 3,283,978 Patented Nov. 8, 1966

3,283,978

TOOL FOR FRACTURING PIPE

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Filed Aug. 26, 1964, Ser. No. 392,207
1 Claim. (Cl. 225—103)

The invention relates generally to a tool for fracturing and parting a fracturable member and more particularly to a tool having power screw means to operate a pair of jaws for tension-squeezing a cutter chain about the fracturable member for fracturing and parting same.

An object of my invention is the provision of drawn means including jaw means, power screw means, gear means and handle means for tension-squeezing a cutter chain about a fracturable member for fracturing and parting same, wherein said handle means extends in a direction transverse to the axis of the fracturable member.

Another object of my invention is the provision of screw and handle means for operating a pair of jaws for tension-squeezing a cutter chain about a fracturable member for fracturing and parting same.

Another object of my invention is the provision of handle operated mechanical advantage screw means for operating a pair of jaws for tension-squeezing a cutter chain about a fracturable member for fracturing and parting same.

Another object is the provision of screw means, and handle and ratchet means for operating the jaw-end portions of a pair of jaws for tension-squeezing a cutter chain about a fracturable member for fracturing and parting same, wherein said handle and ratchet means is disposed to one side of the jaw-end portions of said pair of jaws rather than between the jaw-end portions.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a perspective view of the tool as it appears when in use for fracturing and parting a pipe;

FIGURE 2 is a vertical side view of the power unit of the tool which is operated by a ratchet and a handle; and

FIGURE 3 is a vertical sectional view of the power unit, showing the gear and power screw means.

The invention comprises a non-extensible chain **10**, a pair of jaw means **11** and **12** for squeezing the chain about a pipe **13** which is to be fractured and parted, and a power unit **14** actuated by a ratchet **15** and a handle **16** for operating the pair of jaw means **11** and **12**. The chain **10** preferably comprises a plurality of links and cross-connected pins **18**. On each one of the cross-connected pins there is mounted a cutter wheel **17** which has a V-shaped cutting edge for cutting or penetrating into the wall of the pipe for fracturing and parting same. The wheels are peripherally spaced apart from each other so that when the chain is tension-squeezed about the pipe, the wheels make a plurality of "squeeze-cuts" or indentures in the outer surface of the pipe. The squeeze-cuts or indentures are peripherally spaced apart from each other and there is left between the squeeze-cuts or indentures a full-wall section. The chain may be of the type shown in Wheeler Patents No. 2,940,035, No. 2,949,669 or No. 3,048,920.

The jaw means **11** and **12** are pivotally connected together by means of a cross-pin or bolt **21** and the entire jaw assembly has first and second jaw-end portions **22** and **23** which are adapted to be connected respectively to two spaced engageable portions of the chain **10**, and third and fourth jaw-end portions **24** and **25** which are adapted to be connected respectively to trunnions **26** and **27** of the power unit **14**. When the power unit **14** is operated, the jaw-end portions **24** and **25** are spread apart relative to

each other which, in turn, draws the jaw-end portions **22** and **23** relatively toward each other for tension-squeezing the chain about the pipe for fracturing and parting same. As shown in FIGURE 1 of the drawings, each of the jaw means **11** and **12** comprises two side-by-side jaw members secured together as a unit with a lateral space therebetween. The second jaw-end portion **22** may be connected to the end portion of the chain **10** by means of a cross-pin **18** extending through the side-by-side jaw members of the jaw-end portion. In other words, the end of the chain is preferably permanently connected to the jaw-end portion **22**, although it may be readily disconnected when repairing same. The free end of the chain **10** is wrapped around the pipe and is then drawn through the two spaced side-by-side jaw members which comprise the jaw means **11**. The jaw-end portion **23** of the jaw means **11** is provided with a transverse socket **19** in each of the two side-by-side jaw members. Therefore, when the chain is drawn substantially tight around the pipe, a selectable cross-pin **18** may be hooked under the transverse socket **19** for fastening the chain to the jaw-end portion **23**. The wrapped-around chain thus has a first spaced engageable portion connected to the jaw-end portion **22** and a second spaced engageable portion connected to the jaw-end portion **23**. The chain does not completely reach around the pipe and thus a circumferential gap is provided between the first and second spaced engageable portions of the chain.

The power unit **14** has a casing which is adapted to rest on the ground or other surface as illustrated in FIGURE 1 of the drawings. The upper part of the casing of the power unit is provided with two oppositely disposed trunions **26** which are connected to the third jaw-end portion **24**. Extending out of the casing is a power extension plunger **64** which is provided with two oppositely disposed trunnions **27** which are connected to the fourth jaw-end portion **25**. The construction of the power unit **14** is illustrated in FIGURES 2 and 3 of the drawings. Generally, the power unit comprises a ratchet **15**, a stub shaft **39** on which the ratchet is mounted, a bevel gear **46** which is anchored to the opposite end of the stub shaft from the ratchet, a mating bevel gear **47** which is mouned on the lower part of the casing, a vertically extending power screw shaft **55**, a vertically and reciprocally mounted power sleeve **60**, and a power sleeve bushing **61**, which is secured inside of the power sleeve **60** and which is threadably connected to the power screw shaft **55**, and a power extension plunger **64** which is threadably connected by means of screw threads **65** to the upper end of the power sleeve **60**.

With reference to FIGURE 2, the ratchet **15** comprises generally a sprocket wheel **29** and a pawl **30** which is pivotally mounted on a pivot pin **31**. The ratchet **15** is of the reversible type in that it may be set to operate either on a downward stroke of the handle **16** or on an upward stroke of the handle **16**. The upper end of the pawl **30** is provided with two inclined surfaces **34** and **35** which taper towards each other. A plunger **32** having a semi-spherical end is arranged to work against either the inclined surface **34** or against the inclined surface **35**, depending upon which direction the ratchet is set to operate. The upper end of the pawl **30** is provided with a tooth **36** for engaging the sprocket wheel **29** when the ratchet is set to operate in one direction, and the lower end of the pawl **30** is provided with a tooth **37** which is adapted to engage the sprocket wheel **29** when the ratchet is set to operate in the reverse direction. The pawl **30** may be operated from the first direction to the second direction and vice versa by actuating a small lever **38** provided on the end of the pawl **30**. The plunger **32** is spring-biased so that when the semi-spherical end works against the

inclined surface **34**, the tooth **36** is adapted to engage the sprocket wheel **29**. When the lever **38** is operated to turn the pawl **30** in a counter-clockwise direction about the pivot pin **31**, the semi-spherical end of the plunger **32** is adapted to work against the inclined surface **35** and to bias or constrain the tooth **37** to engage the sprocket wheel **29**, whereupon the ratchet then is set to operate in the reverse direction to that shown in FIGURE 2 of the drawings. The plunger **32** may be spring-biased selectively against either one of the inclined surfaces **34** and **35** by means of a spring **33**. Therefore actuation of the handle up and down causes the stub shaft **39** to be turned for operating the power unit **14** through the ratchet **15** which may be secured to the stub shaft **39** by means of a pin **44**.

FIGURE 3 of the drawings shows the internal construction of the power unit **14**. The stub shaft **39** is mounted to rotate in a bearing **45**. The right-hand end of the stub shaft **39** is provided with the bevel gear **46** which mates with a bevel gear **47** for turning the power screw shaft **55**. The bevel gear **47** may be connected to the lower end of the power screw shaft **55** by means of a locking key **59**. The bottom end of the casing of the power unit is provided with a bottom cover plate **48** which may be secured thereto by means of screw threads **50**. The bottom cover plate **48** may be securely locked in the bottom of the casing by means of a lock screw **49**. The bottom cover plate **48** is provided with a bearing plate **51** which has a bushing **57** into which the lowermost end of the power screw shaft is adapted to rotate. The upper surface of the bearing plate **51** and the bottom surface of the bevel gear **47** are provided with circular raceways into which ball bearings **58** may be mounted for vertically supporting the bevel gear **47**, which in turn supports the power screw shaft **55**. Reciprocally mounted within the casing of the power unit **14** is a power sleeve **60** which has mounted in the inside lower portion thereof a sleeve bushing **61** which is threadably engaged by the power screw shaft **55**. As illustrated, the power screw shaft **55** preferably has buttress threads which threadably engage matching buttress threads provided on the inside surface of the sleeve bushing **61**. The upper end of the power sleeve **60** is provided with threads **65** into which the power extension plunger **64** is threadably connected. The power sleeve **60**, being hollow and of reduced cross-section, is preferably constructed of high tensile strength steel to carry the heavy vertical load and in the drawing it is so indicated by the double section lines, being the standard drafting symbol for steel.

In practice, when the handle **16** is operated, the ratchet **15** turns the stub shaft **39**, which sets into operation the bevel gears **46** and **47**, the power screw shaft **55**, the sleeve bushing **61**, the power sleeve **60**, and the power extension plunger **64** for raising the trunions **27**. This power train in raising the trunions **27** with respect to the trunions **26** separates the third and fourth jaw-end portions **24** and **25** which, in turn, draw the first and second jaw-end portions **22** and **23** towards each other for tension-squeezing the chain about the pipe for fracturing and parting same. The operation of the handle **16** is such that upon each power stroke thereof, an additional force is applied to the chain to fracture and part the pipe. The additional forces are progressively increased with a pause (return stroke) between each additional force (power stroke). By being constantly repeated, this force-then-pause action produces a series of pulsation forces which are progressively superimposed upon the constantly held tension-squeeze which was effected by the previous power stroke of the handle. In other words, at the end of the power stroke, the pipe is put under a constant tension and this tension still prevails while the handle is returned to make the next stroke. The next increase of force caused by the power actuation of the handle is superimposed on the previous constant straining force, which action when repeated tends to fracture and part the pipe. This action may be looked upon as a constant strangling of the pipe with progressive impulses superimposed thereon until the pipe is fractured and parted. The fracturing and parting action is substantially the same as the method shown and described in Wheeler Patent No. 2,950,035.

As pointed out before, the indentures or squeeze-cuts are peripherally spaced about the pipe with a full-wall section therebetween. When a fracture occurs, at one or more of these indentures or squeeze-cuts, it extends peripherally across the full-wall sections making a complete fracture in a path around the entire fracturable member substantially perpendicular to the longitudinal axis of the fracturable member. In operation, the depth of the indentures or squeeze-cuts are gradually increased until the induced stresses reach such a high value as to exceed the physical breaking strength of the wall section therebetween, at which point the fracture then occurs.

The present disclosure includes that contained in the appended claims, as well as that of the foregoing description.

Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

Apparatus for parting a fracturable member comprising in combination, a flexible non-extensible cutter chain adapted to be wrapped substantially around said fracturable member and then tension-squeezed thereagainst for fracturing and parting same without substantial relative rotation or oscillation thereabout, said wrapped-around cutter chain having first and second spaced engageable portions with a circumferential gap therebetween, draw means to draw said first and second spaced portions relatively toward each other and thereby tension-squeeze said chain about said fracturable member, said draw means comprising a pair of pivotally connected jaw means having first and second jaw-end portions and third and fourth jaw-end portions, said third and fourth jaw-end portions having respectively first and second trunion receiving means, first fastening means for fastening said first spaced portion of said wrapped-around chain to said first jaw-end portion, second fastening means for fastening said second spaced portion of said wrapped-around chain to said second jaw-end portion, first and second screw means turnable relative to each other, first connection means for connecting said first screw means to said third jaw-end portion, said first connection means including a housing connected to said first screw means and having laterally extending first trunnion means fitting into said first trunion receiving means, second connection means for connecting said second screw means to said fourth jaw-end portion, said second connection means including a hollow sleeve connected to said second screw means and having laterally extending second trunion means fitting into said second trunion receiving means, said hollow sleeve having an internal longitudinal opening into which said first screw means extends and having an external surface slidably mounted into said housing, said pair of jaw means extending away from said first and second spaced portions of said wrapped-around chain and disposed substantially perpendicular to the axis of said fracturable member with said screw means extending in a direction transverse to that of the axis of said fracturable member, a shaft mounted in said housing substantially perpendicular to said screw means, gear means interconnecting said first screw means and said shaft for rotating said first screw means relative to said second screw means, said second screw means being constrained against rotation by said second trunion means fitting into said second trunion receiving means, and mechanical advantage torque actuating means including a ratchet connected to

said shaft and a hand-operated lever connected to said ratchet and extending in a direction transverse to said axis of said fracturable member to operate said shaft and said screw means and thereby tension-squeeze said chain about said fracturable member to fracture and part said member.

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