July 27, 1943. C. C. BROWN ET AL 2,325,104

OUTSIDE PIPE CUTTER

Filed June 30, 1941 3 Sheets-Sheet 1

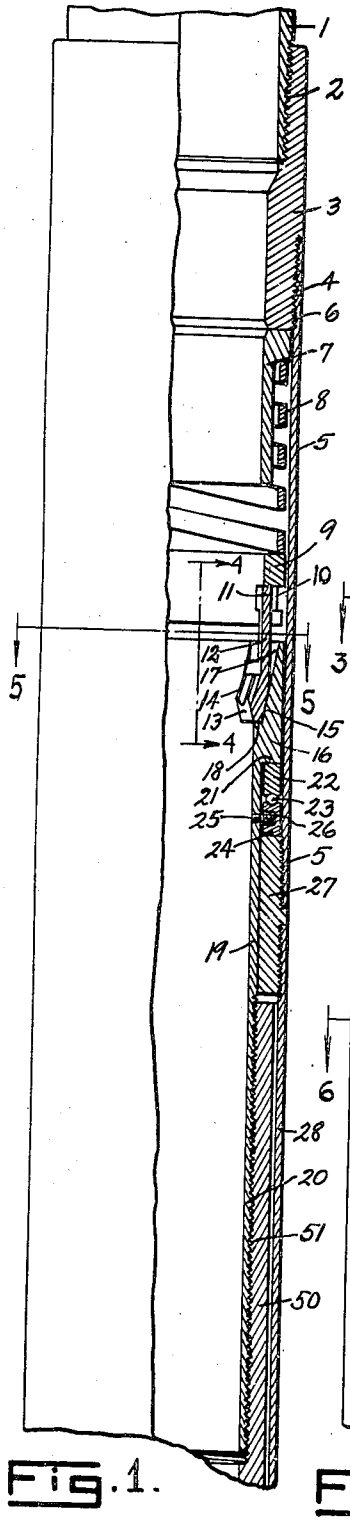


Fig. 1.

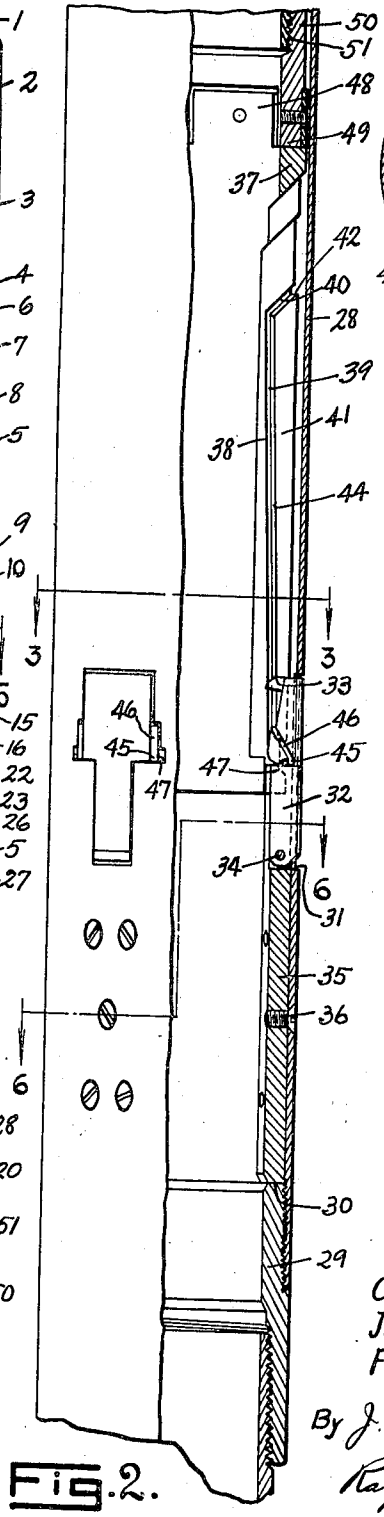


Fig. 2.

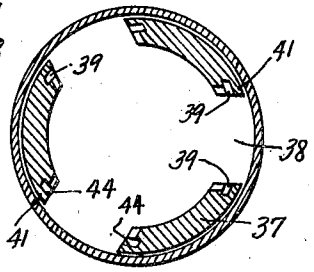


Fig. 3.

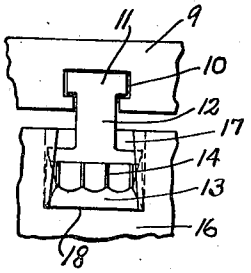


Fig. 4.

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OUTSIDE PIPE CUTTER

Filed June 30, 1941 3 Sheets-Sheet 2

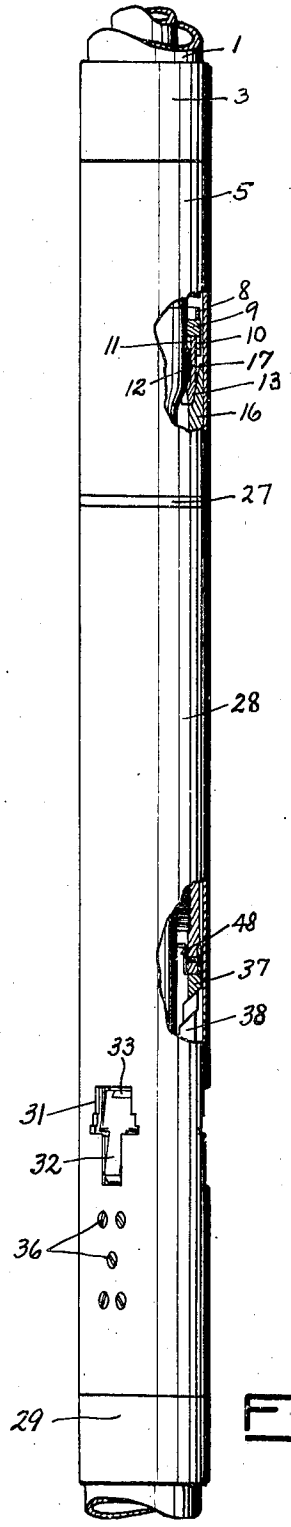


Fig. 11.

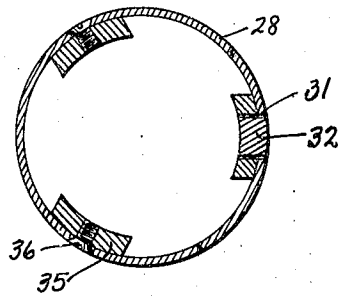


Fig. 6.

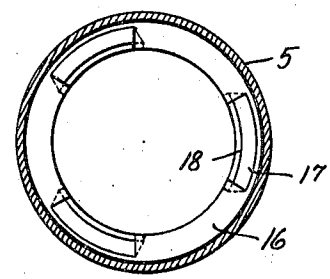


Fig. 5.

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OUTSIDE PIPE CUTTER

Filed June 30, 1941 3 Sheets-Sheet 3

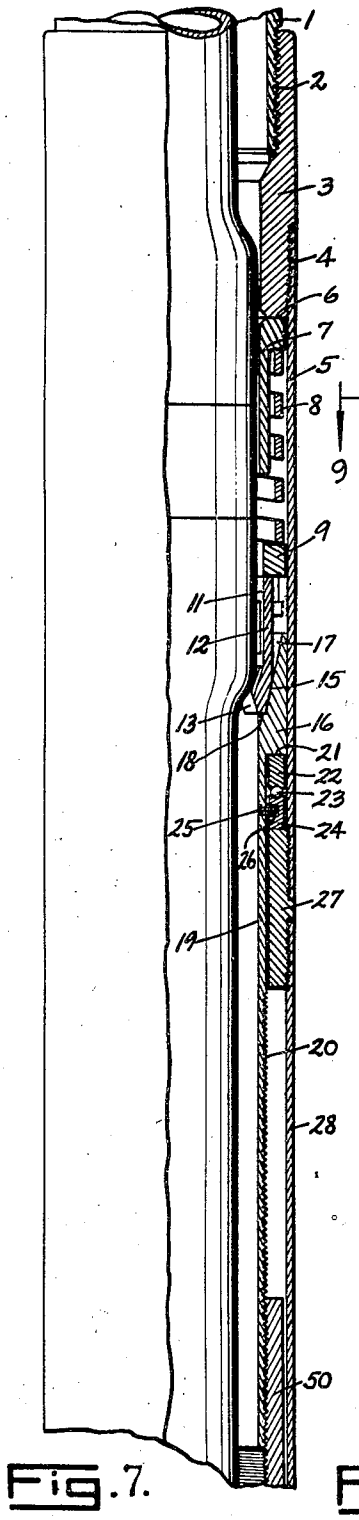


Fig. 7.

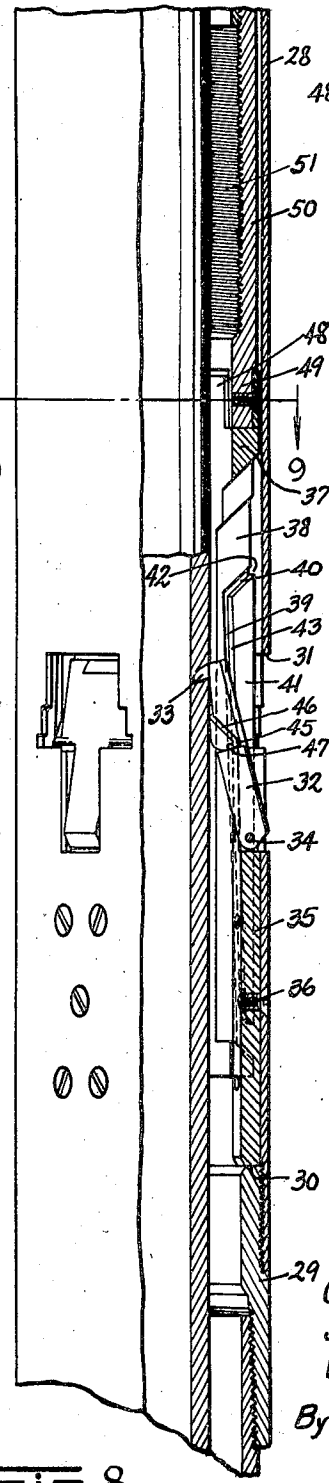


Fig. 8.

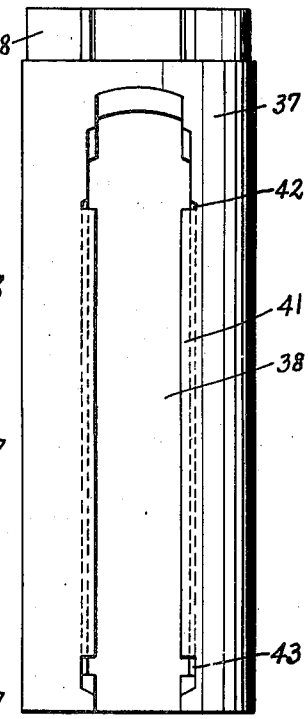


Fig. 10.

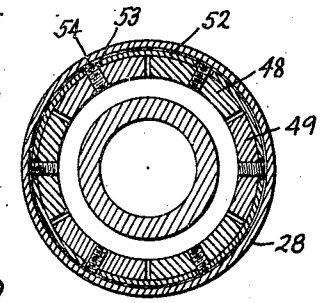


Fig. 9.

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UNITED STATES PATENT OFFICE

2,325,104

OUTSIDE PIPE CUTTER

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Application June 30, 1941, Serial No. 400,492

25 Claims. (Cl. 164—0.6)

This invention relates to outside pipe cutters and has for its general object the provision of a pipe cutter which will constitute an improvement over those heretofore employed.

In previously designed outside pipe cutters various means have been employed for feeding the cutting knives to the work as the cutting operation progresses. Among such means is a screw thread type of feed, such as illustrated in the D. H. Reed Patent No. 1,936,643.

It is an object of this invention to provide an outside pipe cutter with a screw type feed which will be more rugged and durable and more efficient in operation than those heretofore employed.

Another object of this invention is to provide such a device with a novel and advantageous means for gripping the pipe to be severed.

Another object of this invention is to provide such a device which may be more easily manufactured than those heretofore employed.

Another object of this invention is to provide a structure which may be more easily assembled than similar structures which have been heretofore designed.

Another object of this invention is to eliminate the use of frangible or easily destructible parts which upon destruction or partial destruction while the device is in use may interfere with its continued use or its removal.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings wherein is illustrated one embodiment of this invention.

In the drawings:

Fig. 1 is a view partly in longitudinal cross section and partly in side elevation illustrating the upper portion of a pipe cutter constructed in accordance with this invention;

Fig. 2 is a view similar to Fig. 1 but showing the lower portion of the same device, Fig. 2 being a continuation of the lower portion of Fig. 1;

Fig. 3 shows a transverse cross section taken along the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary elevation of one of the gripping dogs and the mounting therefor which forms a part of this invention;

Fig. 5 is a transverse cross section taken along the line 5—5 of Fig. 1;

Fig. 6 is a transverse cross section taken along the line 6—6 of Fig. 2;

Fig. 7 is a view similar to Fig. 1 but showing the device in position surrounding a pipe to be cut, the mechanism having been operated to move the cutters a portion of the way through the walls of the pipe to be cut;

Fig. 8 shows a continuation of the lower portion of Fig. 7;

Fig. 9 is a transverse cross section taken along the line 9—9 of Fig. 8;

Fig. 10 is a side elevation of that part of the body of the cutter which engages the knives to move them into cutting position;

Fig. 11 is a side elevation of the complete cutter assembly parts being broken away and shown in vertical cross section for purposes of illustration.

The outside pipe cutters to which this invention relates are customarily run on the lower end of a wash over pipe 1 having threads 2 thereon for the reception of the upper end portion of the cutter body 3. This upper part 3 of the cutter body is in accordance with this invention provided with external threads 4 on its lower end for the purpose of receiving the upper internally threaded end of a sleeve 5. The sleeve 5 is of larger internal diameter than the fitting 3 so that the lower end of the fitting 3 provides an internal downwardly facing shoulder 6. Against this shoulder is seated the upper end of a stop and guard sleeve 7. This sleeve has a flange at the upper end, the upper surface of which engages the shoulder 6 and the lower surface of which receives the upper end of the spring 8. This spring 8 surrounds the relatively thin smaller diameter lower portion of the member 7 and rests at its lower end upon the upper surface of a slip carrier ring 9. The spring 8 is a compression spring and normally urges the slip carrier ring 9 downwardly with respect to the body of the cutting tool. However, it permits upward movement of said ring until the upper surface of the ring comes into engagement with the lower end of the sleeve 7, whereupon the sleeve 7 serves as a stop to limit such upward movement.

The slip carrier ring 9 is formed with T-shaped slots or notches in its lower edge, as shown at 10, for the reception of correspondingly shaped ends 11 of the arms 12 on the lower ends of which are integrally formed pipe gripping dogs or slips 13. The dogs 13 have circumferentially spaced teeth 14 on their inner surface, these teeth extending upwardly and inclined outwardly with respect to the axis of the cutting tool. The outer surfaces of the dogs 13 are conical being inclined inwardly and downwardly toward an apex substantially below the lower ends of the dogs, and the opposite side edges of the dogs are tapered toward the inner surfaces of the dogs. The dogs are thus formed to fit into slots formed in the upper end

portion of the member 16 as shown at 17. These slots have their outer surfaces formed as segments of a cone corresponding to the conical outer surfaces of the dogs 13, all of the slots 17 having their outer surfaces formed as segments of the same cone, however. The cone has its apex a substantial distance below the slots and substantially on the axis of the tool, so that the outer surfaces of all of said slots taper downwardly and inwardly. The side edges of said slots taper inwardly toward the central axis of the tool so as to make the slots of dove-tail formation, the taper on these side edges of the slots preferably corresponding substantially to that on the side edges of the dogs. Each slot terminates at its lower end in an upwardly facing shoulder 18 against which the dogs are adapted to abut so as to limit their downward movement. The conical surfaces on the dogs 13 are formed so that they will coincide with the conical surfaces in the slots 17 when the dogs are at the lowermost points of their travel. For this reason, when the dogs grip a pipe the weight will be taken by the shoulder 18 and by the entire conical surface of each slip.

It will be seen from the foregoing that the slots 17 are of substantially dove-tail formation and that when the ring 9 is moved downwardly with respect to the member 16 the dogs will be forced inwardly toward the central axis of the tool by virtue of their contact with the conical outer surfaces of the slots 17. Thus, the slots 17 in the member 16 will act together to form an overshot bowl. On upward movement of the ring 9 the dogs will be moved outwardly by virtue of their contact with the overhanging side edges of the slots 17.

Below the upper portion of the member 16, which portion actually forms the slip or overshot bowl, the member 16 is formed with an elongated sleeve-like part 19 which is externally threaded over a large portion of its length as shown at 20. This sleeve-like portion 19 is of relatively smaller external diameter than the upper end portion that forms the overshot bowl, thus providing a downwardly facing shoulder 21 against which is received a ball race member 22. The balls 23 are adapted to run in the said race member 22 and also in the race member 24, which is disposed below the race member 22 and opposed thereto. For the purpose of preventing these two race members and the balls 23 from dropping off of the sleeve-like part 19 when the device is being assembled or disassembled, there is provided a set screw 25 which engages in a circumferential groove 26 in the race member 24. The race member 24 is thus permitted to turn on the sleeve member 19 but may not slide off of the sleeve member. Any other form of securing means may be employed for holding the race member 24 in place on the sleeve-like member 19 while permitting it to rotate.

At its lower end the tubular sleeve 5 is internally threaded to receive a ball race supporting nipple 27. The upper end of this nipple 27 provides a shoulder which engages the lower surface of the ball race 24, and the nipple 27 is externally threaded at its lower end to receive the upper end of the main tubular body portion 28 of the cutting tool.

At its lower end this tubular body portion 28 is internally threaded to receive a bottom adapter bushing 29 whose upper end provides an upwardly facing shoulder 30 within the body of the cutting tool.

The tubular body member 28 is formed at circumferentially spaced points somewhat above its lower end with openings 31 which are adapted to receive the cutter bodies 32 and knives 33, which are carried thereon. These cutter bodies are pivoted at 34 adjacent their lower ends to upper ends of brackets 35 which are in the form of elongated vertical bars that form segments of a cylinder. These bars are secured to the interior of the tubular body member 28 by means of screws 36, or any other suitable fastening means. The knives are advanced toward and retracted from their cutting position during the operation of the tool by means of a mandrel in the form of a sleeve 37, which is provided with slots 38 extending from its lower end upwardly and of a width to straddle the knives and knife holders as well as the bars or segmental brackets 35. The side faces of these slots are formed with grooves which are inclined upwardly and inwardly toward the axis of the tool from a point adjacent the lower end of each slot to a point adjacent its upper end as shown at 39, at which point the said grooves turn abruptly outwardly as shown at 40. The said slots 38 are made narrower along those portions 41 which lie outwardly from the said grooves than they are along the remaining portions and the grooves open to the outside surface of the sleeve 37 at each end of the slot as shown at 42 and 43 respectively. The inner surfaces of the narrowed portions form inwardly and downwardly facing wedge or cam parts 44 which serve to engage the lugs 45 on the knife holders and move the knife holders and knives inwardly about the pivot 34 as the sleeve 37 is moved downwardly with respect thereto. It should be explained that the initial movement of this sleeve downwardly causes the lower end of each of the narrowed portions 41 to engage the inclined surfaces 46 on the lugs 45 and thus to move the knife holders rapidly inwardly to a point where they are almost ready to begin cutting. Thereupon the long cam surface 44 engages the outermost portion 45 of such lugs on the knife holders to cause them to move inwardly more slowly as the cutting proceeds.

Projecting substantially circumferentially from each of the lugs 45 is a relatively small pin-like portion 47 which is adapted to engage the corresponding groove 39 on the side face of the corresponding slot 38. During the time the cut is being made these pins 47 by engagement with the grooves 39 prevent the knife holders from feeding inwardly too rapidly and thus "hogging" the cut, and upon completion of the inward travel of the knives if the pipe to be severed has not been completely severed, further downward movement will cause these pin-like portions 47 to engage the outwardly extending portions 40 of these grooves and in traveling therealong to retract the blades from the work. It will be noted that the knives cannot be so retracted from the work during continued downward movement of the member 37 until after they have moved inwardly the maximum distance. Furthermore, it will be noted that the retraction of these knives will not disengage the tool from the pipe upon which it has been operating because said pipe will still be held by the overshot dogs 13 heretofore described. The only purpose of retracting the knives from the work after the cutters have moved inwardly as far as possible is to prevent the knives from interfering with efforts to remove the tool from the hole.

At its upper end the sleeve or mandrel 37 is provided with circumferentially spaced projec-

tions 48. These projections, segmental in form, have spaces between them adapted to receive similar projections 49 carried on an upwardly extending internally threaded sleeve 50. The internal threads 51 on this sleeve are right hand threads and are engaged with the threads 20 on the sleeve-like part 19, so that when one is rotated with respect to the other the sleeve 50 will be elevated or lowered, as the case may be. The interengaging parts 48 and 49 just referred to are secured together in such a manner that they move loosely with respect to each other and yet may not separate when rotated substantially with respect to each other, by means of a band 52 which surrounds the same and which has openings 53 therein to receive loosely screws or any other form of dowel 54 slightly smaller than the opening and carried by the respective projections 48 and 49. This in effect provides a limited universal joint action between the members 37 and 50.

In operation, the device is lowered into a hole and over a pipe which is to be severed with the parts in the positions illustrated in Figs. 1 and 2. As the tool passes down over the pipe to be severed, any tool joints, couplings, or other projections on the outer surface of such pipe will engage the lower portions of the dogs 13 and cause them to move upwardly and outwardly with respect to the tool and the pipe to be cut so that they may pass over such projections. This upward and outward movement will be opposed by the spring 8 which tends constantly to urge the dogs downwardly and inwardly to the position illustrated. Immediately upon passing such a projection the dogs will again be moved to their downward and inward position, which may be termed their gripping position.

When the point is reached at which the cut is desired to be made, the tool will be moved upwardly until the dogs 13 engage beneath a tool joint or other projection on the pipe to be severed. A strain will then be taken against the pipe, the dogs gripping the lower edge of the tool joint or the like.

The tool is then rotated to the right. This rotation causes a simultaneous rotation of the fitting 3, the tubular member 5, the nipple 27, the tubular body 28, the brackets 35 and knife holders 32, together with the knives 33 and the sleeves 37 and 50. In the meantime the dogs engaging with the projection on the pipe to be cut will be held against rotation and will in turn serve to prevent rotation of the overshot bowl 16 together with the sleeve 19. Thus, there will be a rotation to the right of the sleeve 50 while the sleeve 19 is held stationary and this will result through the action of the threads 20 and 51 in the downward movement of the sleeves 50 and 37.

As this downward movement progresses it will cause an inward feeding movement of the knife holders and knives as heretofore described. When a cut has been completed the inward movement of the knives will cease because then the severed section of pipe which is engaged by the dogs 13 will begin to rotate with the tool and there will no longer be any relative rotation between the sleeve 19 and the sleeve 50. If the cut is not successfully completed, the device will not release from the pipe which was to be severed and the only way that the tool can be removed is by forcibly pulling loose the pipe on which the cut was being made or by destroying the dogs which engage the pipe or the tool joint or any other projection on the pipe.

It is further to be noted in connection with the present construction that the dogs 13 are carried in a continuous element 16 forming what is called the overshot bowl. This element holds these dogs substantially rigidly except for the permissible upward and downward and outward and inward movement above described. When the tool has locked, as at the completion of the inward feeding and outward retraction of the knives, so that the sleeve 19 will be compelled to rotate with the main body of the tool, this sleeve, as well as the sleeve 50 which forces it to rotate, are strong and heavy as compared with corresponding parts of previous constructions, so that they will not give way in the event of continued forced rotation of the tool. This makes it possible to carry out such manipulations as may be necessary to remove the tool from the hole in the various ways mentioned without materially damaging the tool other than the dogs 13.

Having described our invention, we claim:

1. In an outside pipe cutter, a hollow rotatable body, inwardly movable cutter knives carried thereby, an anchorable part adapted to remain stationary during operation of the cutter, an actuator locked to rotate with said body and otherwise movable relative to said body and anchorable means to move said knives, and a rotary feeding connection between said anchorable part and said actuator for translating relative rotation of said anchorable part and actuator into feeding movement of said actuator with respect to said body and anchorable means to cause said actuator to move said knives when said body is rotated with respect to said anchorable part and positively feed said knives into the pipe during the cutting operation.

2. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, and otherwise movable with respect to said body to move said knives into cutting position, and a rotary feeding connection between said anchor and actuator for translating relative rotation of said anchor and actuator into feeding movement of said actuator with respect to said body and anchor to cause said actuator to move and positively feed said knives into the pipe when said body is rotated with respect to said anchor.

3. In an outside pipe cutter, a hollow rotatable body, inwardly movable cutter knives carried thereby, an anchorable part adapted to remain stationary during operation of the cutter, an actuator carried by said body and movable with respect to said body to move said knives, a rotary feeding connection between said anchorable part and said actuator to cause said actuator to move said knives when said actuator is rotated with respect to said anchorable part, and means for rotating said actuator from said body to cause said actuator to drive said rotary feeding connection, whereby said actuator will be moved to feed said knives positively as said body is rotated first to a cutting position and then into the pipe.

4. An outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator car-

ried by said body and rotatable therewith while said anchor is stationary, and movable to move said knives into cutting position, and a threaded feeding connection between said anchor and said actuator to cause said actuator to move and feed said knives when said body and actuator are rotated with respect to said anchor.

5. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary and movable longitudinally with respect to said body to move said knives into cutting position, and a rotary feeding connection between said anchor and actuator to cause said actuator to move and feed said knives when said body is rotated with respect to said anchor.

6. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, and movable longitudinally with respect to said body to move said knives into cutting position, and a threaded connection between said anchor and said actuator to cause said actuator to move longitudinally with respect to said body and to feed said knives when said body and actuator are rotated with respect to said anchor.

7. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary and movable longitudinally with respect to said body to move said knives into cutting position, and interengaging threaded sleeves non-rotatably carried by said anchor and said actuator respectively, whereby when said body and said actuator are rotated and said anchor is held stationary, said actuator will be caused to move longitudinally and feed said knives into cutting position.

8. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, and movable longitudinally with respect to said body to move said knives into cutting position, means providing a rotatable feeding connection between said anchor and said actuator to cause said actuator to move and feed said knives when said body is rotated with respect to said anchor, and universal joint means between said rotary feeding connection and said actuator.

9. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly moving cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, and movable longitudinally with respect to said body to move said knives into cutting position, a threaded sleeve separate from and joined to said actuator by a universal joint, and a threaded sleeve carried by said anchor and engageable with the threaded sleeve on said actuator, whereby when said body and actuator are rotated with respect to said anchor there will be relative rotation between said threaded sleeves to produce a longitudinal movement of said actuator to feed said knives into cutting position.

10. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly moving cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, and movable longitudinally with respect to said body to move said knives into cutting position, a threaded sleeve, said actuator and sleeve having interengaging projections thereon, means joining said actuator and sleeve together loosely with said projections interengaged to provide a universal joint connection between said actuator and sleeve, and a threaded sleeve carried by said anchor in threaded engagement with said first mentioned sleeve, whereby upon rotation of said body and said actuator said first mentioned sleeve will be rotated to shift said first mentioned sleeve and said actuator longitudinally with respect to said anchor and said body and to cause said knives to move to cutting position.

11. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor comprising an overshot engageable with said pipe to hold said anchor against both rotary and vertical movement with respect to said pipe, said overshot having dogs and means for moving said dogs outwardly when they are forced to move upwardly with respect to said body, means connecting said anchor to said body to anchor said body against vertical movement in an upward direction with respect to said pipe, an actuator carried by said body and rotatable therewith while said anchor is stationary, and movable to move said knives into cutting position, and a rotary feeding connection between said anchor and said actuator to cause said actuator to move and feed said knives when said body is rotated with respect to said anchor.

12. In an outside pipe cutter, a hollow rotatable body, inwardly movable cutter knives carried thereby, an anchorable part adapted to remain stationary during operation of the cutter, an actuator rotatable with said body and movable longitudinally of said body to move said knives, and a rotary feeding connection between said body and said anchorable part for feeding said actuator to cause said cutter to move said knives when said body is rotated with respect to said anchorable part, the means for driving said rotary feeding connection comprising a plurality of continuous annular parts.

13. In an outside pipe cutter, a hollow rotatable body, inwardly movable cutter knives carried thereby, an anchorable part adapted to remain stationary during operation of the cutter, an actuator rotatable with said body and movable longitudinally of said body to move said knives, and a rotary feeding connection between said body and said anchorable part for feeding said actuator to cause said cutter to move said knives when said body is rotated with respect to said anchorable part, the means for driving said rotary feeding connection comprising a plurality of continuous annular parts, the means for joining said anchorable part to said rotary feeding

connection comprising a continuous annular member.

14. In a device of the character described, an overshot including a slip bowl comprising a cylindrical member having segmental conical slots formed in its inner surface, the outermost surfaces of said slots being conical and extending inwardly and downwardly with respect to the axis of said bowl, and a plurality of slips in said slots respectively, said slots having parts overlying portions of said slips respectively to prevent inward movement of said slips without corresponding downward movement thereof, and said overlying parts being inclined outwardly and upwardly whereby on upward movement of said slips they will be forced to move outwardly simultaneously.

15. In a device of the character described, an overshot including a slip bowl comprising a cylindrical member having segmental conical slots formed in its inner surface, the outermost surfaces of said slots being conical and extending inwardly and downwardly with respect to the axis of said bowl, and a plurality of slips in said slots respectively, said slots having parts overlying portions of said slips respectively to prevent inward movement of said slips without corresponding downward movement thereof, and said overlying parts being inclined outwardly and upwardly whereby on upward movement of said slips they will be forced to move outwardly simultaneously, said slips each having a portion of their outer surfaces conical to coincide with the conical surfaces of the corresponding slot when said slip is at the lowermost point of its travel.

16. In a device of the character described, an overshot including a slip bowl comprising a cylindrical member having segmental conical slots formed in its inner surface, the outermost surfaces of said slots being conical and extending inwardly and downwardly with respect to the axis of said bowl, and a plurality of slips in said slots respectively, said slots having parts overlying portions of said slips respectively to prevent inward movement of said slips without corresponding downward movement thereof, and said overlying parts being inclined outwardly and upwardly whereby on upward movement of said slips they will be forced to move outwardly simultaneously, said slots terminated at their lower ends in upwardly facing shoulders for limiting the downward movement of said slips.

17. In a device of the character described, an overshot including a slip bowl comprising a cylindrical member having segmental conical slots formed in its inner surface, the outermost surfaces of said slots being conical and extending inwardly and downwardly with respect to the axis of said bowl, and a plurality of slips in said slots respectively, said slots having parts overlying portions of said slips respectively to prevent inward movement of said slips without corresponding downward movement thereof, and said overlying parts being inclined outwardly and upwardly whereby on upward movement of said slips they will be forced to move outwardly simultaneously, said slots terminating at their lower ends in an upwardly facing shoulder and said slips each having a portion of its outer surface conical and shaped to fit the conical surface of the corresponding slot when the slip is in engagement with the upwardly facing shoulder.

18. In a device of the character described, an overshot including a slip bowl comprising a cylindrical member having segmental conical slots formed in its inner surface, the outermost surfaces of said slots being conical and extending inwardly and downwardly with respect to the axis of said bowl, and a plurality of slips in said slots respectively, said slots having parts overlying portions of said slips respectively to prevent inward movement of said slips without corresponding downward movement thereof, and said overlying parts being inclined outwardly and upwardly whereby on upward movement of said slips they will be forced to move outwardly simultaneously, means for limiting the downward movement of said slips and thereby limiting the inward movement thereof, and means for resiliently urging said slips downwardly at all times.

19. In a device of the character described, a body, a slip bowl within said body and rotatable with respect thereto, means for holding said slip bowl against downward longitudinal movement with respect to said body, said slip bowl comprising a substantially cylindrical member having slots therein, the outermost surfaces of which constitute segments of a cone and taper inwardly and downwardly between the axis of said bowl, slips in said slots, said slips having teeth thereon disposed in a vertical plane, whereby when said teeth are engaged with an object within said bowl they will hold said bowl against rotation with said body, said bowl having parts overlying portions of the edges of said slips to prevent inward movement of said slips toward the axis of said bowl without corresponding downward movement thereof, and said parts being inclined upwardly and outwardly with respect to the axis of said bowl so that when said slips are forced upwardly they will also be forced to move outwardly with respect to said bowl.

20. In a device of the character described, a body, an anchor for holding a part stationary while said body is rotated, said anchor comprising a substantially cylindrical bowl having slots with their outermost surfaces inclined downwardly and inwardly, slips in said slots, and means for limiting the downward and inward movement of said slips with respect to said bowl.

21. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, a rotary feeding connection between said anchor and actuator to move said actuator axially of the body upon rotation of the body, and cooperating means on the knives and actuator for positively feeding the knives into a cutting position and for positively feeding the knives into the pipe during the cutting action upon displacement of the actuator.

22. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, a rotary feeding connection between said anchor and actuator to move said actuator axially of the body upon rotation of the body, and cooperating means on the knives and actuator for positively feeding the knives into a cutting position at one speed and for positively feeding the knives into the pipe

at a lower speed during the cutting action upon displacement of the actuator.

23. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, a rotary feeding connection between said anchor and actuator to move said actuator axially of the body upon rotation of the body, cooperating means on the knives and actuator for positively feeding the knives into a cutting position and for positively feeding the knives into the pipe during the cutting action upon displacement of the actuator, and means operable upon further movement of the actuator for retracting the knives from the pipe.

24. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, a rotary feeding connection between said anchor and actuator to move said actuator axially of the body upon rotation of the body, cam means on the knives engageable with the actuator upon initial movement of the actuator for displacing the knives into cutting position, and cam means on the actuator engageable with coperating means on the knives for feeding the knives into the pipe during further movement of the actuator and during cutting action.

25. In an outside pipe cutter, a hollow body adapted to receive a pipe to be cut, inwardly movable cutter knives on said body, an anchor engageable with said pipe to hold said anchor against both rotary and vertical movement, an actuator carried by said body and rotatable therewith while said anchor is stationary, a rotary feeding connection between said anchor and actuator to move said actuator axially of the body upon rotation of the body, cam means on the knives engageable with the actuator upon initial movement of the actuator for displacing the knives into cutting position, cam means on the actuator engageable with cooperating means on the knives for feeding the knives into the pipe during further movement of the actuator and during cutting action, other cam means on the actuator, and means on the knives cooperating with said other cam means for limiting movement of the knives into the pipe and for retracting the knives from the pipe after limited penetration thereof.

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