No. 730,486. PATENTED JUNE 9, 1903.

J. H. SMITH.

CLAMP FOR REMOVING TUBING.

APPLICATION FILED JAN. 8, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

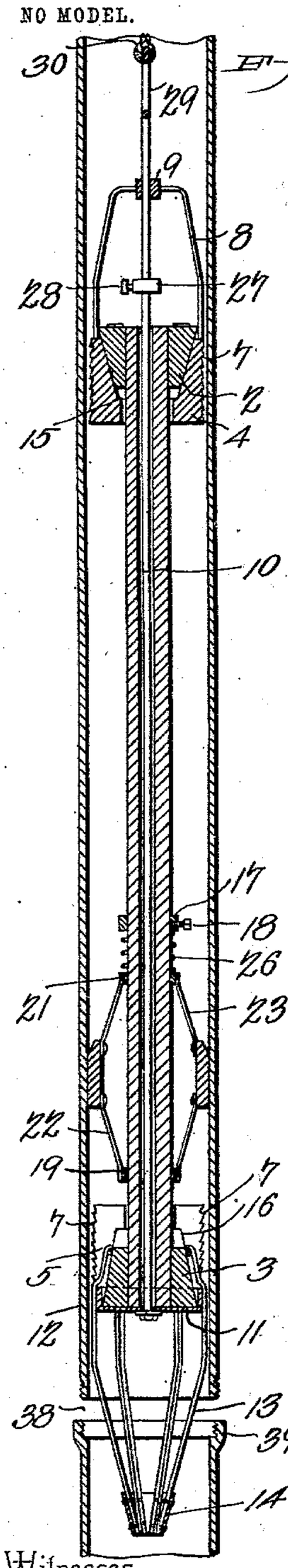


Fig. 4.

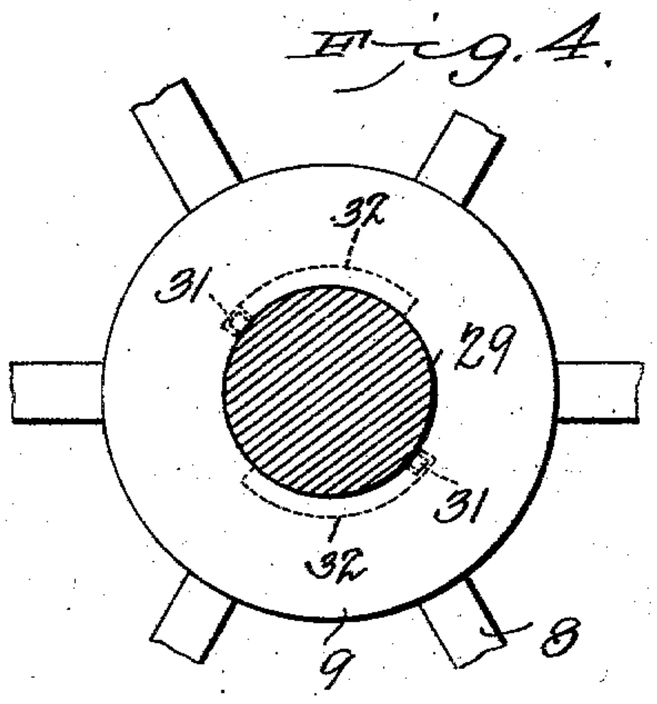


Fig. 3.

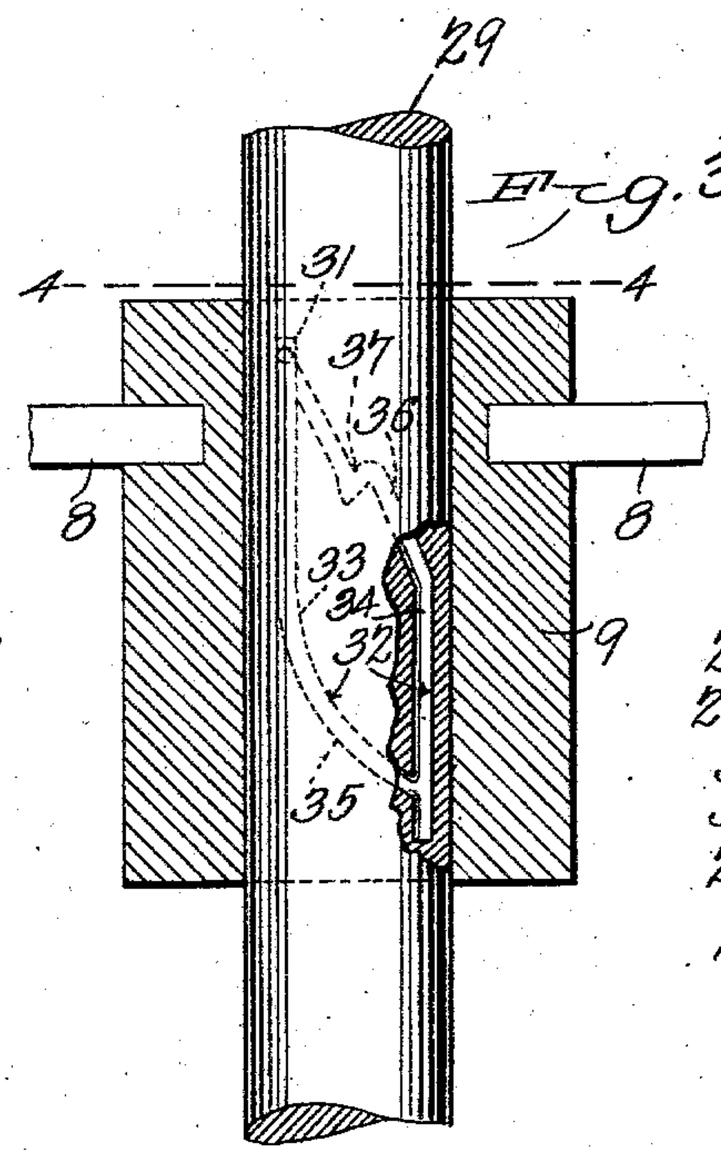
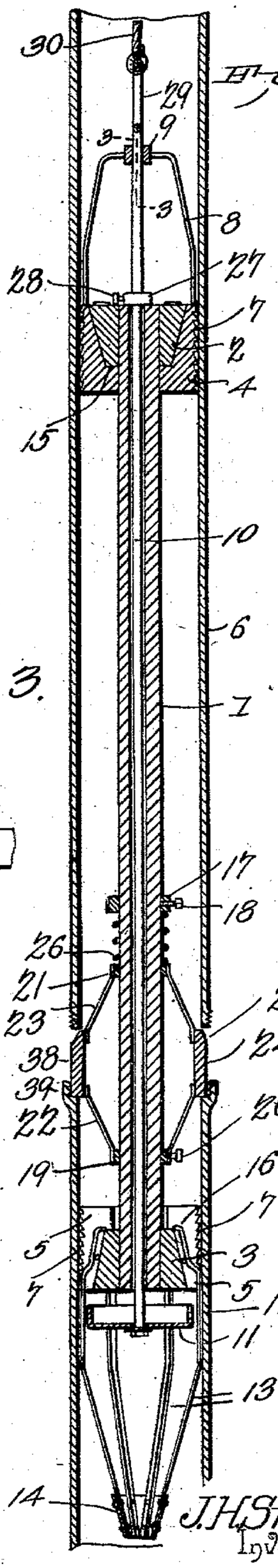


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.

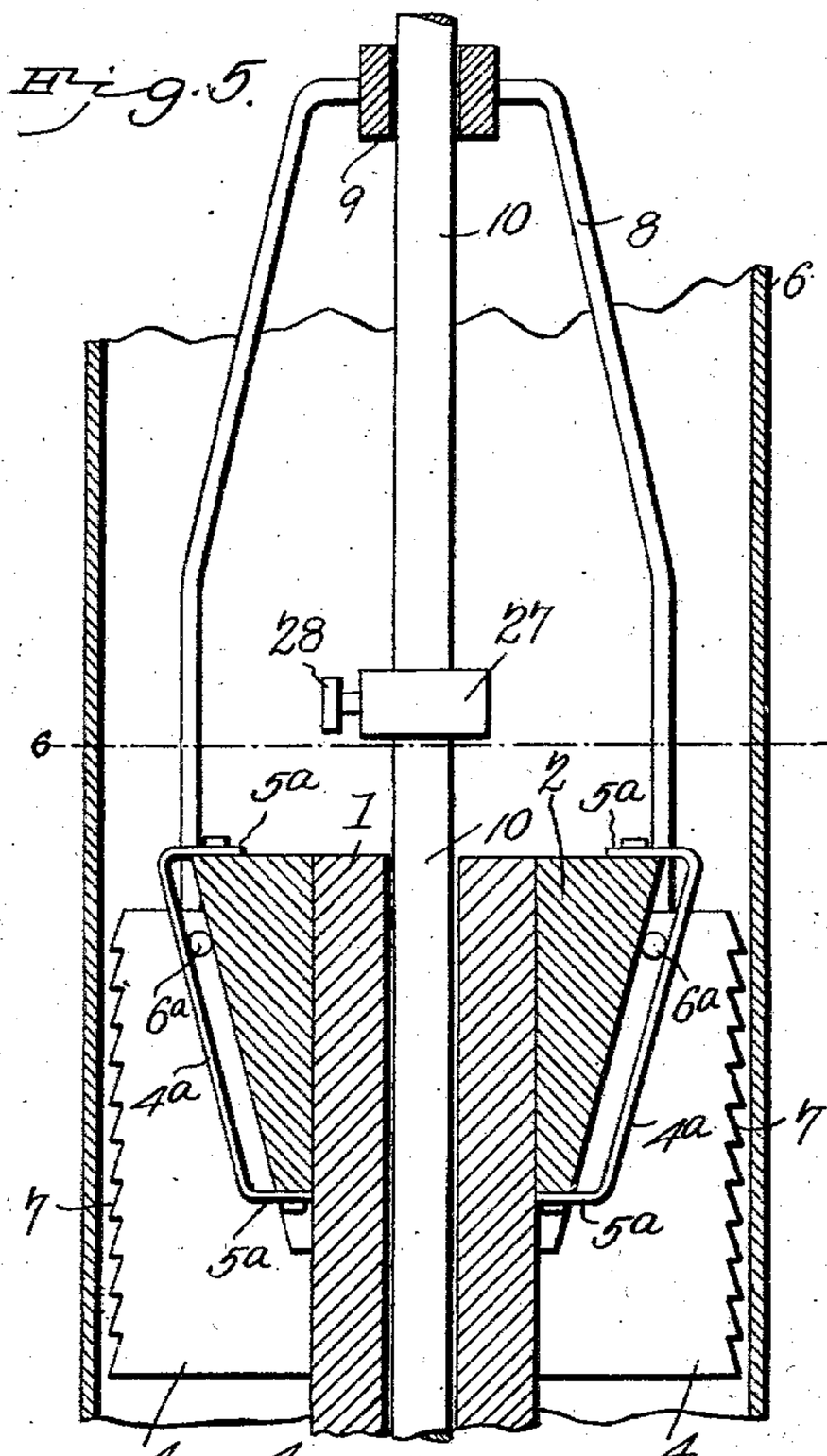


Fig. 6.

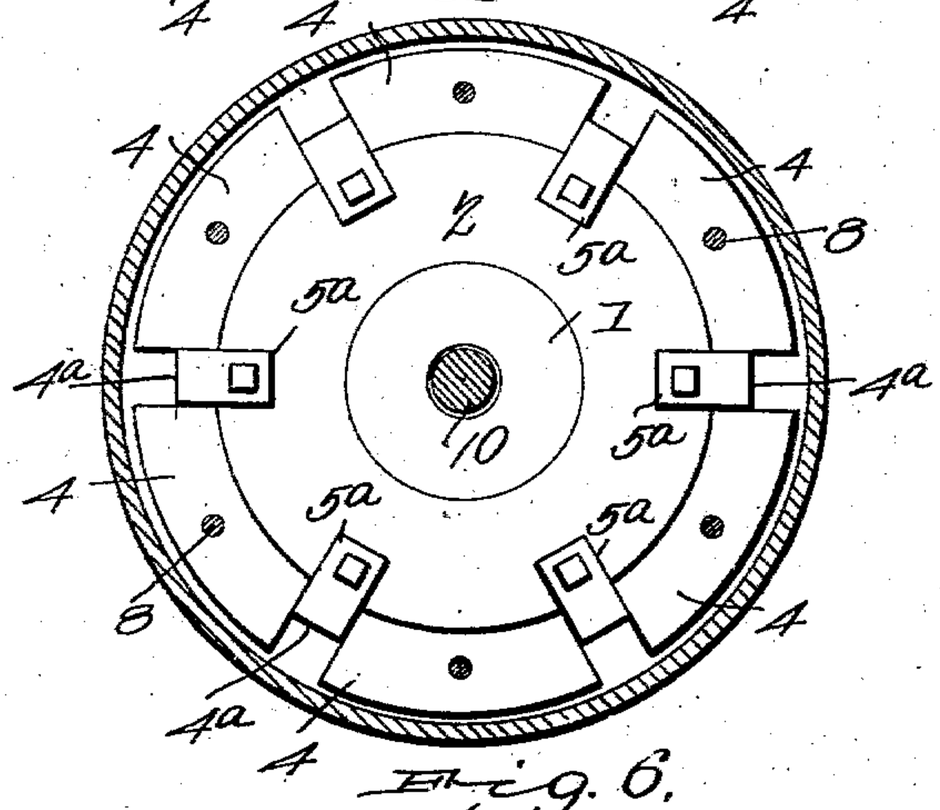


Fig. 7.

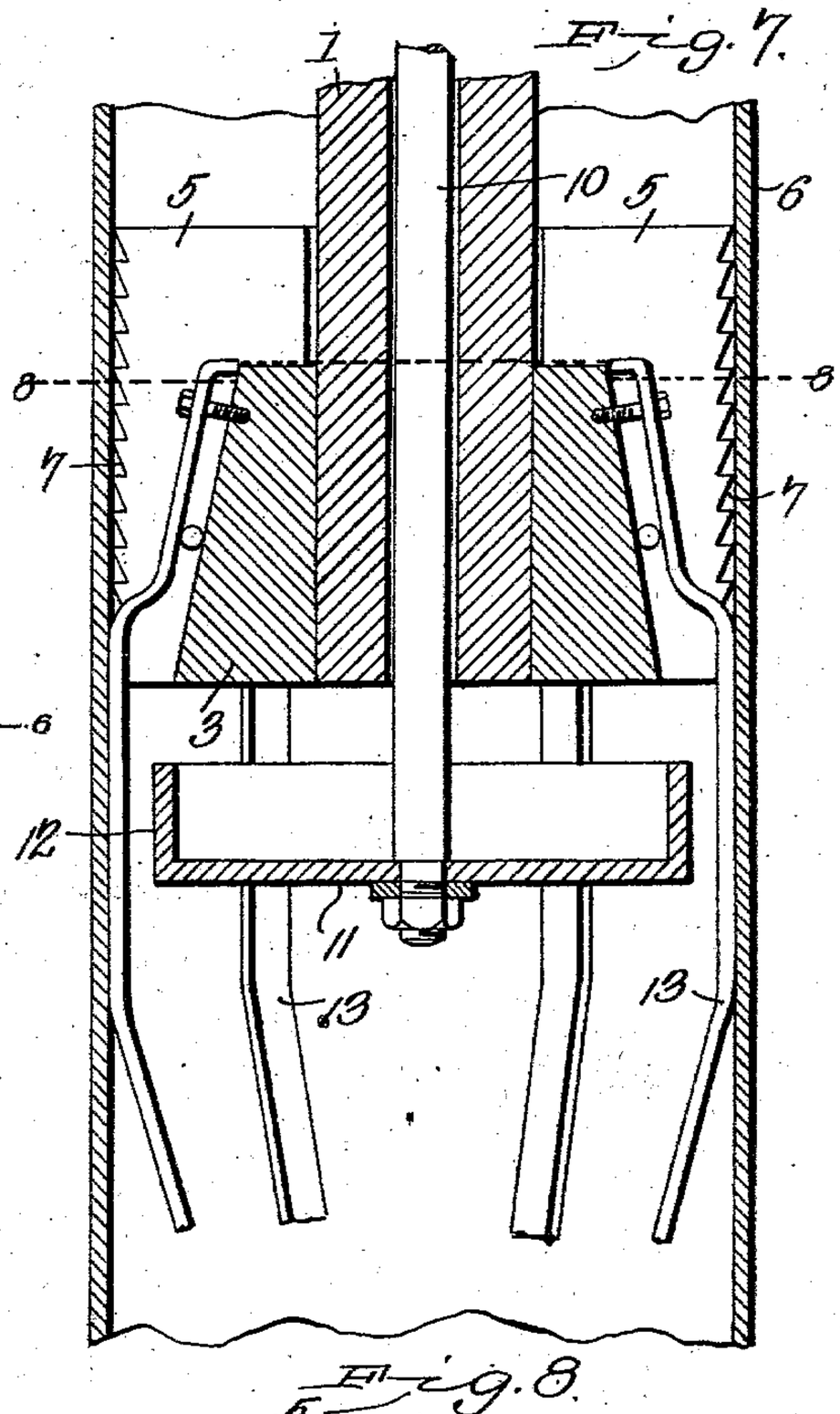
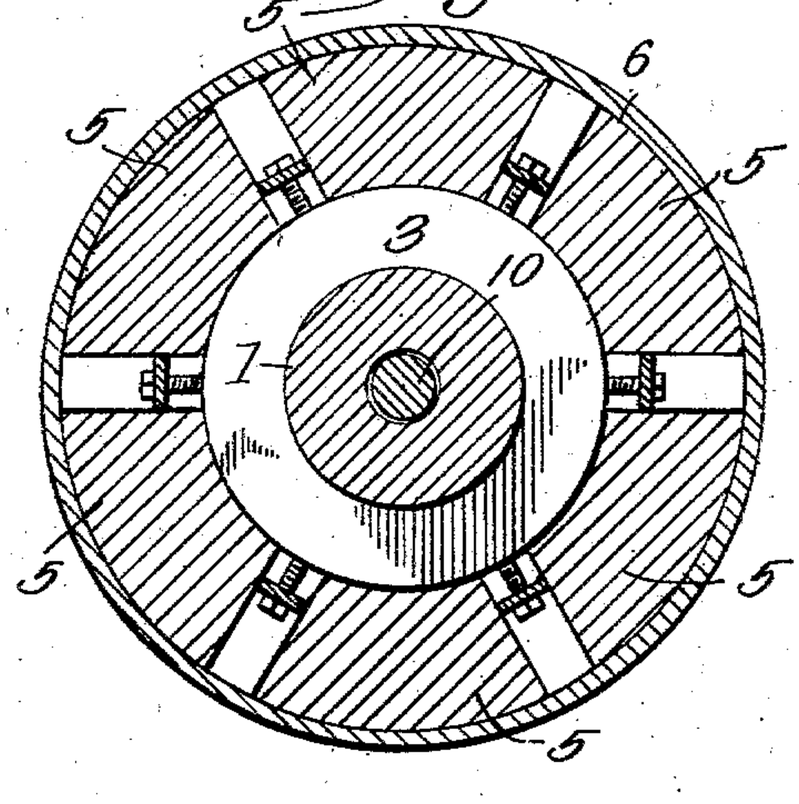


Fig. 8.



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No. 730,486. Patented June 9, 1903.

UNITED STATES PATENT OFFICE.

JOHN HARVEY SMITH, OF MEADVILLE, PENNSYLVANIA.

CLAMP FOR REMOVING TUBING.

SPECIFICATION forming part of Letters Patent No. 730,486, dated June 9, 1903.

Application filed January 8, 1903. Serial No. 138,308. (No model.)

To all whom it may concern:

Be it known that I, JOHN HARVEY SMITH, a citizen of the United States, residing at Meadville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Clamp for Removing Well-Tubing, of which the following is a specification.

This invention relates to a clamping device for engaging the tubing of bored wells to enable the said tubing or casing to be removed from the well, and it has special reference to that class of tools which are known as casing-spears and which operate interiorly upon the tubing or casing.

The object of my invention is to provide a tool of this class which shall be capable of being used for so connecting broken or parted sections of pipe that by exerting an upward pull upon the upper section the lower section shall be raised therewith, thus preventing the soil from caving above the lower section when the upper section is withdrawn.

With this and other ends in view the invention consists in the improved construction, arrangement, and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of a tool constructed in accordance with the principles of my invention, showing the same in the act of being lowered within the well-casing. Fig. 2 is a similar view, but showing the tool in operative position at the point where adjacent tubes of the casing have parted. Fig. 3 is a sectional detail view, on an enlarged scale, taken on the line 3 3 in Fig. 2. Fig. 4 is a sectional view taken on the line 4 4 in Fig. 3. Fig. 5 is a sectional detail view of the upper collar and slips of the device on an enlarged scale, taken at a different angle than Figs. 1 and 2. Fig. 6 is a section taken on line 6 6 in Fig. 5. Fig. 7 is an enlarged sectional view of the collar and slips at the lower end of the device. Fig. 8 is a section taken on line 8 8 in Fig. 7.

Corresponding parts in the several figures are indicated by similar numerals of reference.

The body of my improved tool consists of a tubular member 1, which is composed of a heavy tube constructed of iron or steel and of suitable dimensions to enable it to resist the strain to which it may be in practice subjected. Said tube is provided at its upper and lower ends with frustum-shaped collars 2 and 3, the small ends of which face each other. The collars 2 and 3 are engaged exteriorly by wedge-shaped slips 4 and 5, having toothed or corrugated outer edges 7, adapted to engage the interior of the well-casing 6, the exterior faces of said wedges 4 and 5 combining to form expanding cylinders, which by the engagement of the inner wedge-shaped faces of said slips with the collars 2 and 3 may be expanded so as to exert a gripping force interiorly upon the tubing or casing of the well. The slips 4, engaging the upper collar 2, are connected by upwardly-extending arms 8 with a collar 9, slidable upon a rod which extends longitudinally through the tubular body 1 and which carries at its lower end a disk 11, having an upturned annular flange 12, the upper edge of which is adapted to engage the lower ends of the slips 5. The collar 3 is connected by downwardly-extending converging arms 13 with a conical base 14, which constitutes the spear-point whereby the tool is guided through the well-casing and which in the event of a break or parting of the tubes having occurred will guide the tool into the lower section of the casing. The sliding movement of the slips 4 and 5 with relation to the frustum-shaped collars 2 and 3 is limited by shoulders 15 and 16, formed near the inner ends of said wedge-shaped slips and adapted to engage the inner ends of the said collars 2 and 3, as will be readily understood by reference to the drawings. The downward movement of the slips 4 upon the collar 2 is further restrained by means of yokes or straps 4^a, the arms 5^a at the upper and lower ends of which are suitably secured to the upper and lower sides of the collar 2, said straps being disposed intermediately between the slips. These straps which are thus spaced apart from the collar 2 afford guides for pins 6^a, which are suitably connected with the slips, and which will thus prevent the said slips from dropping down and out of contact with the collar. This specific means for retaining the slips with rela-

tion to the collar may be omitted; but I prefer to use them as enhancing the efficiency of the operation of the device.

The downwardly-extending converging arms 13, which connect the collar 3 with the conical base 14, serve to space the wedge-shaped slips 5 apart from each other, thus guiding them vertically. The weight of said slips will tend to retain them securely in position; but I desire it to be understood that means of any suitable nature may be employed to prevent their displacement in an upward direction.

17 designates a collar which is secured adjustably by means of a set-screw 18 upon the tubular body 1 at a suitable intermediate point between the collars 2 and 3. Another collar 19 is likewise secured by means of a set-screw 20 at a suitable distance below the collar 17. 21 is a collar mounted slidably between the collars 17 and 19. The collars 19 and 21 are connected by flexible arms 22 and 23 with expansible supporting members 24, having beveled upper ends, as shown at 25. A coiled spring 26, interposed between the collars 17 and 21, serves to force the latter in a downward direction, thereby tending to expand the flexible members 24 in an outward direction with a degree of force which is governed by the tension of the spring 26, which is regulated by the adjustable collar 17. The rod 10 is provided with a collar 27, adjustable by means of a set-screw 28 to limit the movement of said rod within the tubular body 1. The rod 10, which may be termed the "operating-rod," is provided at its upper end with an eye 29, connected with the operating-rope 30. The said rod is also provided with radially-extending pins 31, engaging cam-grooves 32 in opposite sides of the inner surface of the collar 9, which supports the slips 4 at the upper end of the device by means of the arms 8, which coöperate to constitute a cage in like manner as a cage is formed at the lower end of the device by the arms 13, which connect the collar 3 with the point 14. The cam-groove 32, upon each inner side of the collar 9, includes an upper vertical groove 33, a lower vertical groove 34, parallel with and at a distance therefrom, an inclined groove 35, connecting the lower end of the groove 33 with the groove 34 at a point near the lower end of the latter, and an inclined groove 36, connecting the upper end of groove 34 with the groove 33 at a point near the upper end of the latter. The groove 36, moreover, has a recessed portion forming a socket 37.

The break or parted portion of the well-casing is indicated at 38, 39 designating the collar at the upper end of the section of tubing below the parted place.

When the tool is let into the well-casing, the rod 10, to which the rope 30 is attached, supports the entire weight of the tool, the flanged disk at the lower end of said rod engaging the lower ends of the slips 5, so as to hold the latter raised and free from contact with the well-casing, so as to prevent them from exercising a gripping force upon the latter. The supporting members 24 will, it is true, be expanded against the well-casing by the tension of the spring 36; but the friction thus created is not sufficient to interfere with the lowering of the tool. The weight of the slips 4 at the upper end of the tool keeps them out of engagement with the interior of the casing. The pins 31 of the rod 10 will be in engagement with the upper vertical grooves of the cam-grooves 32, which are designated 33. One of the said pins has been indicated in this position in Fig. 4 of the drawings. When the broken or parted place in the casing is reached, the point 14 will guide the lower end of the tool into the lower end of the casing, where it will continue until the supporting members 24 by the expansive force of the spring 26 are expanded into the space caused by the break or parting in the casing, when said supporting members by engaging the upper edge of the collar 39 will prevent the farther descent of the apparatus. The rod 10, continuing the descent, will disengage the flanged disk 4 from the lower ends of the slips 5, which will thus by their own weight, aided by the weight of the arms 13 and point 14, drop into active engagement with the lower section of the well-casing, being guided into such engagement by the frustum-shaped collar 3 engaging the wedge-shaped inner faces of the slips. At the same time the pins 31 as the rod 10 descends will follow the grooves 33 and 35, causing the said rod to make a quarter-turn. The operator now pulls on rope 30, forcing the rod 10 in an upward direction, with the pins 31 engaging the slots 34 and 36, until the notch or socket 37 of the latter is encountered. The rod 10 will thus exercise a strain in an upward direction upon the colar 9, thus forcing the slips upwardly, when by the action of the frustum-shaped collar 2 against the wedge-shaped inner faces of said slips the latter will be forced into engagement with the well-casing, as will be readily understood. It will be seen that when the tool is in this position the parts of the well-casing above and below the break are firmly connected, so that when a pull in an upward direction is exercised upon the upper portion of the well-casing the slips 4 will engage the latter with increased tenacity, said slips supporting by the collar 2 the body 1 of the tool, the collar 3 at the end of which forces the slips 5 into engagement with the lower section of the well-casing, which may thus be lifted and drawn together with the upper section or portion above the break. If it shall be desired to remove the tool from the well-casing, this may be easily accomplished by first slightly lowering the rod 10 until the pins 31 are out of engagement with the sockets 37 of the cam-grooves, and then

raising or lifting said rod, the pins 31 following the upper ends of the grooves 36 to the points where the latter merge with the upper ends of the grooves 33. The flanged disk 11 will thus be brought into engagement with the lower ends of the slips 5, which will thus be lifted and disengaged from the lower section of the casing. The lifting action being continued, the frustum-shaped collar 2 will be raised to an extent which will permit the slips 4 to contract and to become loosened from the casing. The beveled upper ends or ridges of the supporting members 24 will permit them to enter the lower end of the upper section of the casing, thus permitting the tool to be withdrawn by means of the hoisting-rope 30. The shoulders 15 and 16 at the inner ends of the slips 4 and 5 will prevent displacement of the said slips in the event of bulging or breakage of the pipe. The sliding collar 27 may be adjusted by the set-screws 28 so as to regulate the drop of the operating-rod 10.

While I have in the foregoing described a simple and preferred construction of my invention, I desire it to be understood that I do not limit myself with regard to the structural details of the same, but reserve to myself the right to any changes, alterations, and modifications which may be resorted to without departing from the spirit and scope of my invention or sacrificing the utility of the same.

Having thus described my invention, I claim—

1. In a device of the class described, a body member and separate means, independent of each other, for connecting the same with the upper and lower sections of a parted well-casing.

2. In a device of the class described, a body member, and means for connecting the upper and lower ends of the same with the upper and lower sections of a parted well-casing.

3. A device of the class described comprising a body member, means for connecting the lower end of the same interiorily with the upper end of the lower section of a broken or parted well-casing, and means for connecting the upper end of said body member interiorly with the lower end of the upper section of the broken or parted well-casing.

4. In a device of the class described, a body member, expansible gripping devices at the upper and lower ends of said body member, and means for causing said gripping devices to engage sections of broken or parted well-casing.

5. A device of the class described comprising a body member, expansible gripping devices disposed at opposite ends of said body member, and an intermediately-disposed expansible supporting device.

6. In a device of the class described, a body member, expansible gripping devices at the ends of the same, an intermediately-disposed expansible supporting device, and means for regulating the expansion of the latter.

7. In a device of the class described, a tubular body member, gripping devices at the upper and lower ends of said body member, and an operating-rod extending longitudinally through the latter.

8. In a device of the class described, a tubular body member, gripping devices at the upper and lower ends of said body member, an operating-rod extending longitudinally through the latter, and means carried by said operating-rod whereby the said gripping devices may be retained in inactive position.

9. In a device of the class described, a tubular body member, gripping devices at the upper and lower ends of said body member, an operating-rod extending longitudinally through the latter, means carried by said operating-rod whereby the said gripping devices may be retained in inactive position, and an expansible supporting device carried by the body member.

10. In a device of the class described, a tubular body member, expansible gripping devices at the upper and lower ends of said body member, an operating-rod extending longitudinally through the latter, an expansible supporting device carried by the body member, and means carried by the operating-rod whereby the gripping devices may be retained in inactive position and whereby the continued downward movement of said operating-rod shall be effective to release said gripping devices.

11. In a device of the class described, a tubular body member, expansible gripping devices at the upper and lower ends of said body member, a longitudinally-movable operating-rod extending through the latter, an expansible supporting device carried by the body member, means carried by the operating-rod whereby the gripping devices may be retained in inactive position and whereby the continued downward movement of said operating-rod shall be effective to release said gripping devices, adjustable means for limiting the downward movement of the rod, and means for regulating the tension of the expansible supporting device.

12. In a device of the class described, a tubular body member, frustum-shaped collars at the upper and lower ends of the same, and toothed slips having wedge-shaped inner faces slidably engaging said collars.

13. In a device of the class described, a tubular body member, frustum-shaped collars at the upper and lower ends of the same with their small ends facing each other, and wedge-shaped slips engaging said collars and provided at their inner ends with shoulders to limit their outward movement.

14. In a device of the class described, a tubular body member, frustum-shaped collars at the upper and lower ends of the same, with their small ends facing each other, wedge-

shaped slips engaging said collars, and means for connecting the slips with the collar at the upper end of the device to limit the movement of said slips.

15. In a device of the class described, a tubular body member having a frustum-shaped collar, bars connected with the upper and lower ends of said collar and spaced apart from the wall of the latter, and wedge-shaped slips engaging the frustum-shaped collar spaced apart by the bars and having guide-pins engaging the latter.

16. In a device of the class described, a body member provided at its lower end with an expansible gripping device comprising a frustum-shaped collar, wedge-shaped slips engaging the same, and arms connecting said collars with a base and coöperating with the latter to form a pointed, conical cage.

17. In a device of the class described, a body member provided at its lower end with an expansible gripping device comprising a frustum-shaped collar, wedge-shaped slips engaging the same and provided with shoulders to limit their movement in a downward direction, and a conical-pointed cage comprising a base and arms connecting the latter with the collar and serving to guide the strips.

18. In a device of the class described, a body member, an expansible gripping device at the lower end of the same comprising a frustum-shaped collar, wedge-shaped slips engaging said collar and having shoulders to limit their downward movement, and a coniform downward-extending guiding-cage having arms secured to the collar.

19. In a device of the class described, a tubular body member, an expansible gripping device at the lower end of the same comprising a frustum-shaped collar, wedge-shaped slips engaging said collar and having shoulders to limit their downward movement, and longitudinally-movable means for supporting said wedges in inactive position.

20. In a device of the class described, a tubular body member, an expansible gripping device at the lower end of the same comprising a frustum-shaped collar, wedge-shaped slips and guiding means for said wedges, an operating-rod extending longitudinally through the tubular body member, and a supporting-disk at the lower end of said rod provided with a flange to engage the lower ends of the wedges.

21. In a device of the class described, a tubular body member, an expansible gripping device at the lower end of the same comprising a frustum-shaped collar, wedge-shaped slips and guiding means for the latter, an operating-rod extending longitudinally through the tubular body and having a supporting-disk at its lower end, and means connected with said rod for supporting the wedges in a raised, inactive position.

22. In a device of the class described, a tubular body member, an expansible gripping device at the lower end of the same comprising a frustum-shaped collar and wedge-shaped slips, guiding means for said slips comprising arms secured to the collar and converging downwardly, and connecting means for the lower ends of said arms.

23. In a device of the class described, a tubular body member having expansible gripping devices and expansible supporting means, the latter comprising members which are beveled at their upper ends, and flexible supporting means for said members.

24. In a device of the class described, a body member having expansible gripping devices and expansible supporting means, the latter comprising a fixed and a slidable collar, supporting members beveled at their upper edges, and flexible arms connecting said supporting means with said collars.

25. In a device of the class described, a body member having expansible gripping devices and expansible supporting means, the latter comprising a fixed and a slidable collar, supporting members beveled at their upper edges, flexible arms connecting said supporting members with said collars, and a spring disposed to move the slidable collar, in the direction of the fixed collar.

26. In a device of the class described, a tubular body member, an expansible gripping device at the upper end of the same comprising a frustum-shaped collar and wedge-shaped slips engaging said collar, a longitudinally-movable operating-rod, a collar slidable upon the latter, and arms connecting said collar with the wedge-shaped slips.

27. In a device of the class described, a body member, an expansible gripping device at the upper end of said body member comprising a frustum-shaped collar, wedge-shaped slips engaging said collar and provided at their inner ends with shoulders to limit their upward movement, a longitudinally-movable operating-rod, a collar slidable upon said rod, and arms connecting said collar with the wedge-shaped slips.

28. In a device of the class described, a tubular body member, an expansible gripping device at the upper end of the same, comprising a frustum-shaped collar and wedge-shaped slips engaging said collar, a longitudinally-movable operating-rod having radially-extending pins, a collar mounted loosely upon said rod and provided with interior cam-grooves engaging said pins, and arms connecting said collar with the wedge-shaped slips.

29. In a device of the class described, a tubular body member, an expansible gripping device at the upper end of the same, comprising a frustum-shaped collar with its apex pointing downwardly, and wedge-shaped slips engaging said collar, a longitudinally-movable operating-rod, and movable means upon the latter for supporting the wedge-shaped slips.

30. In a device of the class described, a tubular body member, an expansible gripping device at the upper end of the same, compris-

ing a frustum-shaped collar and wedge-shaped slips engaging the same, a longitudinally-movable operating-rod having radially-extending pins, a collar upon said rod having interior cam-grooves comprising vertical grooves spaced apart and connected by inclined grooves, one of which has a recess or socket, said cam-grooves being engaged by the radially-extending pins of the operating-rod, and arms connecting said cam-grooved collar with the wedge-shaped slips of the gripping device.

31. A device of the class described comprising a tubular body member, expansible gripping devices at the upper and lower ends of said body member comprising frustum-shaped collars and wedge-shaped slips engaging said collars, a downward-extending conical cage having arms connecting the wedge-shaped slips of the lower gripping device, an operating-rod extending longitudinally through the body member, a supporting-disk at the lower end of said rod, having a flange adapted to engage the lower edges of the lower wedge-shaped slips, a collar connected slidably with the operating-rod near its upper end, arms connecting said collar with the upper wedge-slips, an expansible supporting means located upon the tubular body member between the gripping devices and the ends thereof.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN HARVEY SMITH.

Witnesses:

WIN S. ROSE,

OTTO A. STOLZ.