R. P. STEWART.

APPARATUS FOR CUTTING IRON PIPES IN SITU.

APPLICATION FILED OCT. 18, 1918.

1,301,759.

Patented Apr. 22, 1919.

2 SHEETS—SHEET 1.

Fig: 1

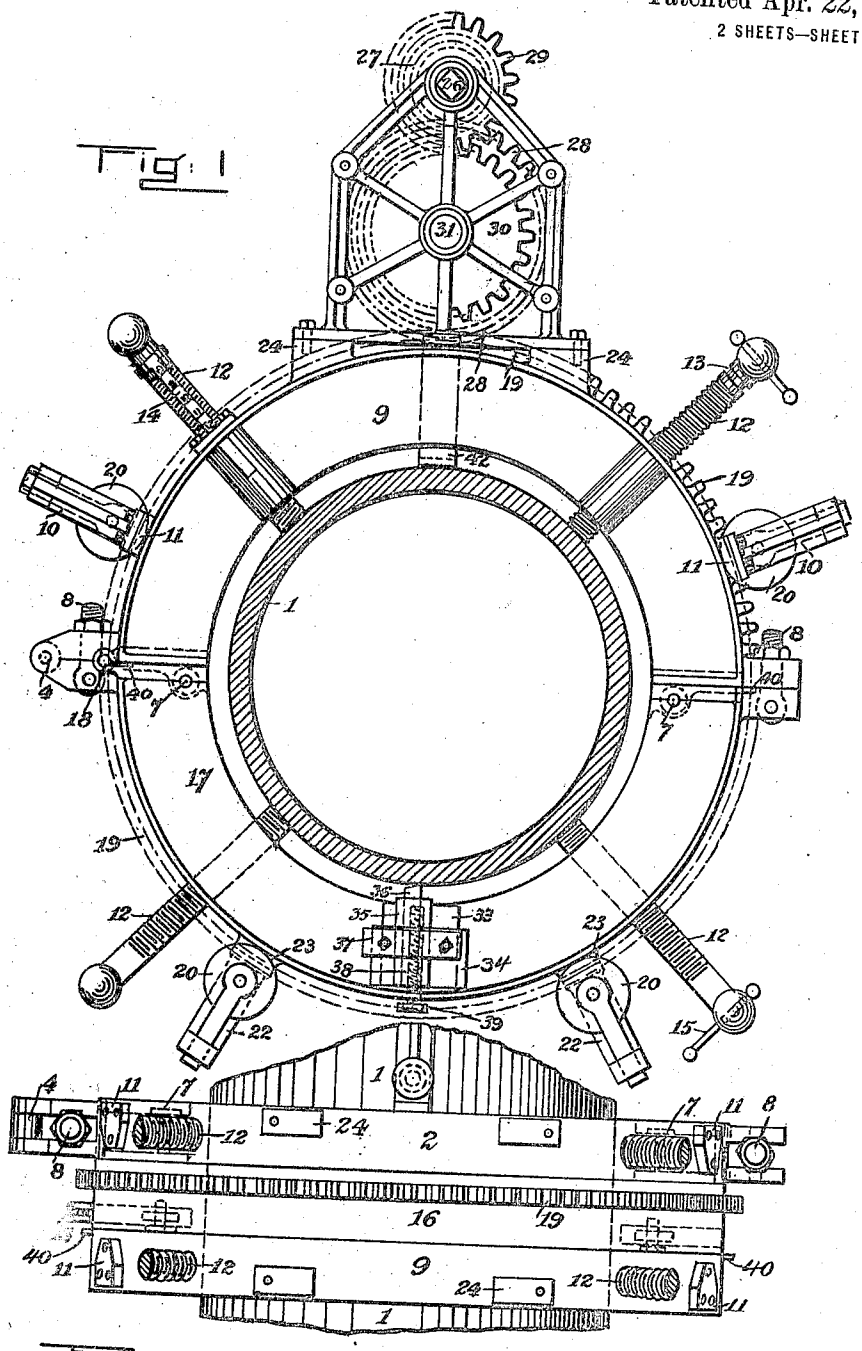


Fig: 2

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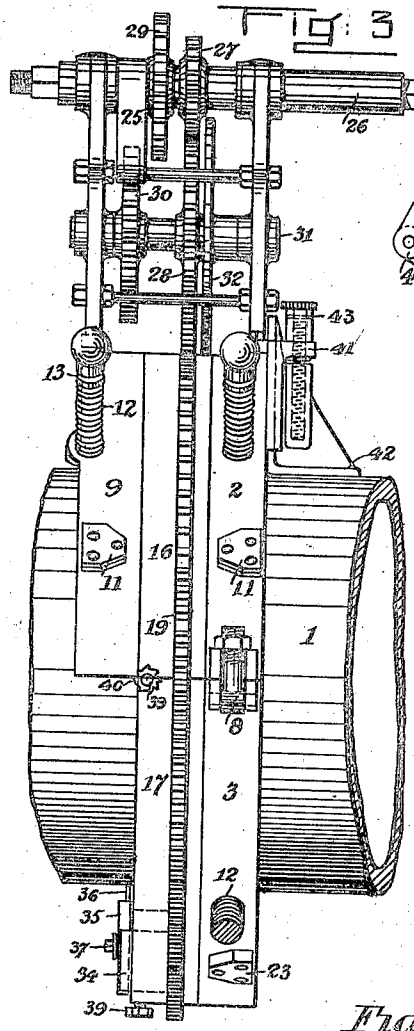
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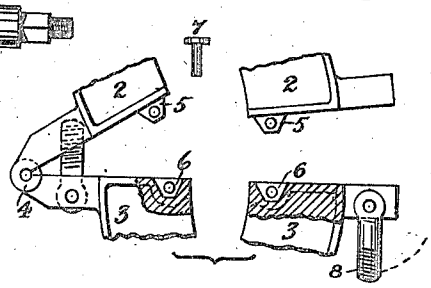
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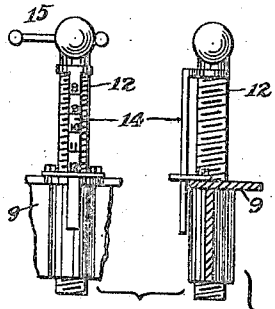
2 SHEETS—SHEET 2.

Fig: 3

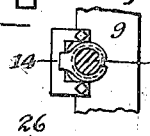


Figs: X





Figs: 6



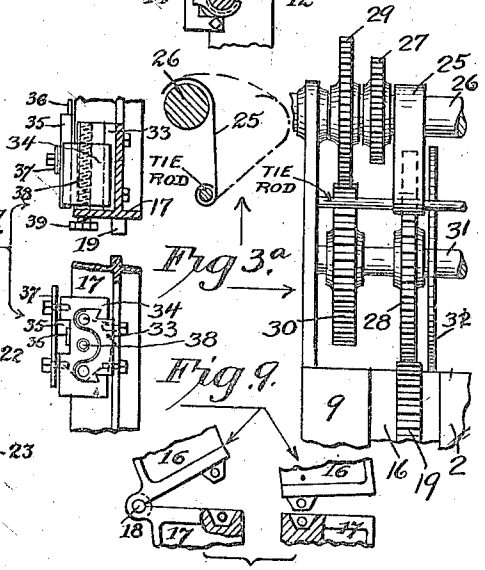
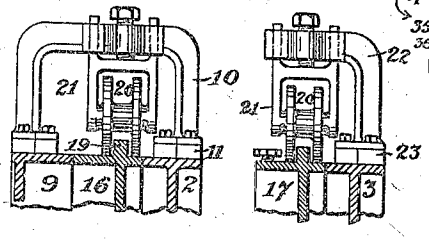


Fig. 7.

Fig 3.a

Fig. 9.

Figs: 4 & 5



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CUTTING IRON PIPES IN SITU.

1,301,759. Specification of Letters Patent. Patented Apr. 22, 1919.

Application filed October 18, 1918. Serial No. 258,740.

To all whom it may concern:

Be it known that I, ROBERT PERCY STEWART, a subject of the King of Great Britain and Ireland, residing at "Walton," Nicholson street, Burwood, Sydney, State of New South Wales, Commonwealth of Australia, have invented new and useful Improvements in Apparatus for Cutting Iron Pipes in Situ, of which the following is a specification.

This invention is intended to be applied to cut cast-iron pipes in trenches, thus obviating the necessity to remove the pipe from the trench before it can be shortened or replaced by another pipe of a more suitable length.

In giving effect to the invention, an annular frame is provided, the frame being adapted to encircle the pipe to be cut. To effect this object with facility, the frame is divided into two halves hinged together and furnished with suitable means for securing the two halves rigidly together. The upper half is duplicated, the two parallel parts being connected together by means of bows, which have a further function.

Between the parallel upper halves of the frame is a ring, divided into two halves hinged together. The external diameter of the ring will be the same as the external diameter of the annular frame. Projecting radially from the ring is a circular rack that gears with differential gear carried by the two upper parts of the frame, the gear being operated by means of one or two winch handles.

The frame is provided with centering screws whereby it may be adjusted concentrically upon the pipe to be cut. The bows between the two upper halves of the frame carry grooved antifriction rollers; the lower half of the frame is provided with half bows that carry grooved antifriction rollers similar to those carried by the full bows. The function of the grooved antifriction rollers is to maintain the rack-ring in a position concentric with the pipe to be cut. To the rack-ring are firmly secured the tool-holders that carry the cutting tools; the tool-holders and cutting tools may be two or more in number. The tool-holders are provided with means whereby the cutting tools may be automatically fed in toward the center, as the cut deepens.

But in order that the construction of the machine may be intelligently grasped, reference will hereinafter be made to the accompanying sheets of drawings, in which:—

Figure 1 is a front elevation of the apparatus, viewed from the side of the duplicated upper half of the frame.

Fig. 2 is a plan of the frame and the rack-ring, the differential gear and the bows being removed.

Fig. 3 is a side elevation of Fig. 1, the bows and the half bows being removed in order to exhibit the stud platforms which are their bases.

Figs. 3ª are views showing the hook 25 in side and front elevation.

Figs. 4 and 5 are elevations of a full bow and a half bow, respectively, showing the grooved antifriction rollers, illustrating their position and function relative to the rack-ring.

Figs. 6 are front and side elevations of an upper centering screw with the necessary index gage for adjusting the upper part of the frame to pipes of different diameters, and a plan of the same, the knob of the screw being removed. The centering screws in the lower half of the frame need not, necessarily, be provided with index gages.

Figs. 7 are a side elevation and a plan of a tool holder, showing its position relative to the rack-ring. The front elevation of a tool holder may be seen in the lower part of Fig. 1. There may be two or more of such tool-holders.

Figs. 8 illustrate details of the hinge and jamb of the frame.

Figs. 9 illustrate details of the hinge and jamb of the rack-ring.

The pipe to be cut is shown at 1; it is encircled by an annular frame, constructed in two halves, the upper half 2 being hinged to the lower half 3 by the hinge 4, shown in detail at Figs. 8. The upper half of the frame is provided with taper dowels 5, near the hinge and at the jamb, corresponding taper recesses 6 being made in the lower half of the frame. The two halves of the frame are rigidly secured together by push-pins 7 passing through holes in the dowels and the walls of the recesses, and by swing bolts and nuts 8. The two halves of the frame thus secured will be perfectly rigid and free from play in any direction.

Parallel with the upper part 2 of the

frame, is a duplicate half 9 connected to the part 2 by means of full bows, or bridges 10, secured by set screws to stud platforms 11. The bows 10 are not shown in Figs. 2 and 3, in order that the parts below them may not be obscured, but an elevation may be seen at Fig. 4, so that the construction may be readily grasped.

The frame is centered upon the pipe by means of centering screws 12, two of which pass through female screws in part 2, two in part 3, and two in part 9. The centering screws 12, in the upper parts 2 and 9 of the frame, have an annular groove 13 near their knobs, to receive a clip from which depends a marked scale or index gage 14, so that the centering screws may be set to pipes of different diameters. In the drawing the index gage is shown set to 12 signifying that the pipe embraced by the frame has a 12″ bore. The centering screws are provided with means, such as the lever rods 15, whereby they may be turned.

Between the upper halves 2 and 9 of the frame is a ring divided into two halves, an upper half 16 and a lower half 17 hinged together at 18; the details of the hinge and jamb being shown at Figs. 9. There are taper dowels and recesses secured together by push-pins, as in the case of the hinge 4 and the jamb of the frame, illustrated at Figs. 8. Projecting radially from the surface of the ring 16—17, are spur teeth forming a circular rack 19, which is part of the means whereby the ring is rotated. The ring is maintained in a position concentric with the pipe 1 through the instrumentality of peripherally grooved antifriction rollers 20, of which there may be four, or more, as shown in Fig. 1. The rollers that bear against the upper half 16 of the rack-ring, are carried in adjustable bearings 21 by the full bows 10 secured by set screws to the stud platforms, 11, projecting from the upper halves of the frame 2 and 9, but as there is no lower half to the duplicate part 9, the lower half 3 must alone be provided with means for carrying the grooved antifriction rollers 20. To this end there are half bows 22 in which the antifriction rollers 20 are mounted similarly to those carried by the full bows 10, each half bow being secured by set screws to only one stud platform 23, as shown at Fig. 5. This figure should, more correctly, have been drawn upside down, because these particular antifriction rollers, react against the lower half 17 of the rack-ring, but it was deemed preferable to draw the half bows as shown, because it might more readily be compared with the full bow shown at Fig. 4. It will be observed that the grooved antifriction rollers 20 bear upon the periphery of the rack-ring 16—17 on each side of the rack 19, the grooved roller straddling the rack, the teeth passing through the annular peripheral groove in each roller, when the ring is rotated.

The upper halves 2 and 9 of the frame are provided with stud platforms 24 on which is mounted a frame carrying differential spur gear, see Figs. 1 and 3. The drawing shows the slow gear in operation, but if it be desired to change the gear from slow to fast, it will only be necessary to throw back the flat hook 25, to push the driving shaft 26 toward the left, when the spur wheel 27 will cease to gear with the spur wheel 28, the spur wheel 29 will engage with the spur wheel 30 which is keyed on the same shaft 31 with the spur wheel 28, that continuously gears with the rack 19, and the rack-ring 16—17 will be rotated at a faster rate. When the driving shaft 26 is shifted to the left so that the spur wheels 29—30 gear together, the flat hook 25 may be slid along the tie-rod on which it is mounted and dropped over the shaft 26 behind the spur-wheel 27. In order to prevent the rack-ring 16—17 from rising, as it rotates, a disk wheel 32 turning freely on the shaft 31, reacts against any such tendency and assists in maintaining the rack-ring concentric with the pipe around which it revolves.

The rack-ring 16—17 carries two or more tool holders, each of which comprises a slide base 33 secured to the web of the rack-ring, as shown in Figs. 7; upon this base will be mounted the slide 34, in the outer side of which is a recess to receive the block 35 in which the cutting tool 36 is set and secured by the plate and set screws 37. The slide 34, carrying the tool holder, is caused to advance toward the center by means of a small screw shaft 38 having a ratchet head 39. Projecting from the undersides of the duplicate upper half 9 of the frame are fixed dogs or stationary pawls 40 which, as the rack-ring revolves, will engage with the ratchet heads 39, thus giving them a partial turn and feeding the tool inward toward the center of the pipe, as the cut deepens. Near the center of Fig. 3 a ratchet head is shown engaging with the fixed pawl. The ratchet head is represented in the position shown merely for the purpose of illustrating its action. When the tool 36 has cut through the wall of the pipe, the severed part of the pipe will drop away from the part encircled by the frame and may be removed from the trench.

Secured to the rear side of the upper half 2 of the frame is a bracket 41 in which a presser-foot 42 is adapted to slide vertically, so that it may be caused to press firmly down upon the upper side of the pipe 1. The vertical movement of the presser-foot 42 is controlled by an adjustment screw 43 with a milled head, for convenience of manipulation. The presser foot 42 acts as a "steadier"

to the frame, preventing it departing from a position perpendicular to the pipe.

What I claim is:—

1. In apparatus for cutting pipes *in situ*, an annular frame divided into two halves hinged together, a duplicate upper half to the frame, full bows secured to the two upper halves of the frame connecting them together, and radial centering screws working in female screw bearings in the three parts of the frame, for centering the frame concentrically with the pipe as and for the purposes specified.

2. In apparatus for cutting pipes *in situ*, an annular frame divided into two halves hinged together, a duplicate upper half to the frame, full bows secured to the two upper halves of the frame connecting them together, radial centering screws working in radial screw bearings carried by the three parts of the frame, for centering the frame concentrically with the pipe, and a presser-foot adapted to slide vertically in a bracket attached to the rear of the upper part of the frame, so as to bear down upon the upper side of the pipe, as and for the purposes herein set forth.

3. In apparatus for cutting pipes *in situ*, an annular frame divided into two halves hinged together, means for rendering the hinged parts perfectly rigid, a duplicate upper half to the frame, full bows connecting the hinged upper half to the duplicate upper half, a rack-ring divided into two halves hinged together and adapted to revolve between the two upper halves of the frame and means for centering the rack-ring concentrically with the pipe to be cut, all as and for the several purposes specified.

4. In apparatus for cutting pipes *in situ*, an annular frame divided into two halves hinged together, a duplicate upper half to the annular hinged frame, means for connecting the hinged upper half to the duplicate upper half of the frame, means for centering the frame concentrically upon the pipe, a rack-ring divided into two halves hinged together and adapted to revolve between the two upper halves of the frame, means for centering the rack-ring concentrically with the pipe to be cut, tool holders and cutting tools carried by the rack-ring and means for automatically feeding the tool radially toward the center of the pipe, as the cut in the pipe deepens, substantially as and for the several purposes specified.

5. In apparatus for cutting pipes *in situ*, an annular frame in two halves hinged together, a duplicate upper half to the frame, full bows connecting together the two upper halves of the frame, half bows carried by the lower half of the hinged frame, a rack-ring divided into two halves hinged together and adapted to revolve between the two upper halves of the frame, antifriction rollers carried by the full bows and by the half bows, such rollers bearing against the periphery of the rack-ring, and differential gear supported on standards carried by the upper halves of the frame, such differential gear meshing with the teeth of the annular rack projecting from the ring, and means for driving the differential gear in order to cause the rack-ring and the tools it carries to revolve around the pipe to be cut, all as and for the several purposes herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT PERCY STEWART.

Witnesses:
WILLIAM WALKER,
R. MASSEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."