

(No Model.)

4 Sheets—Sheet 1.

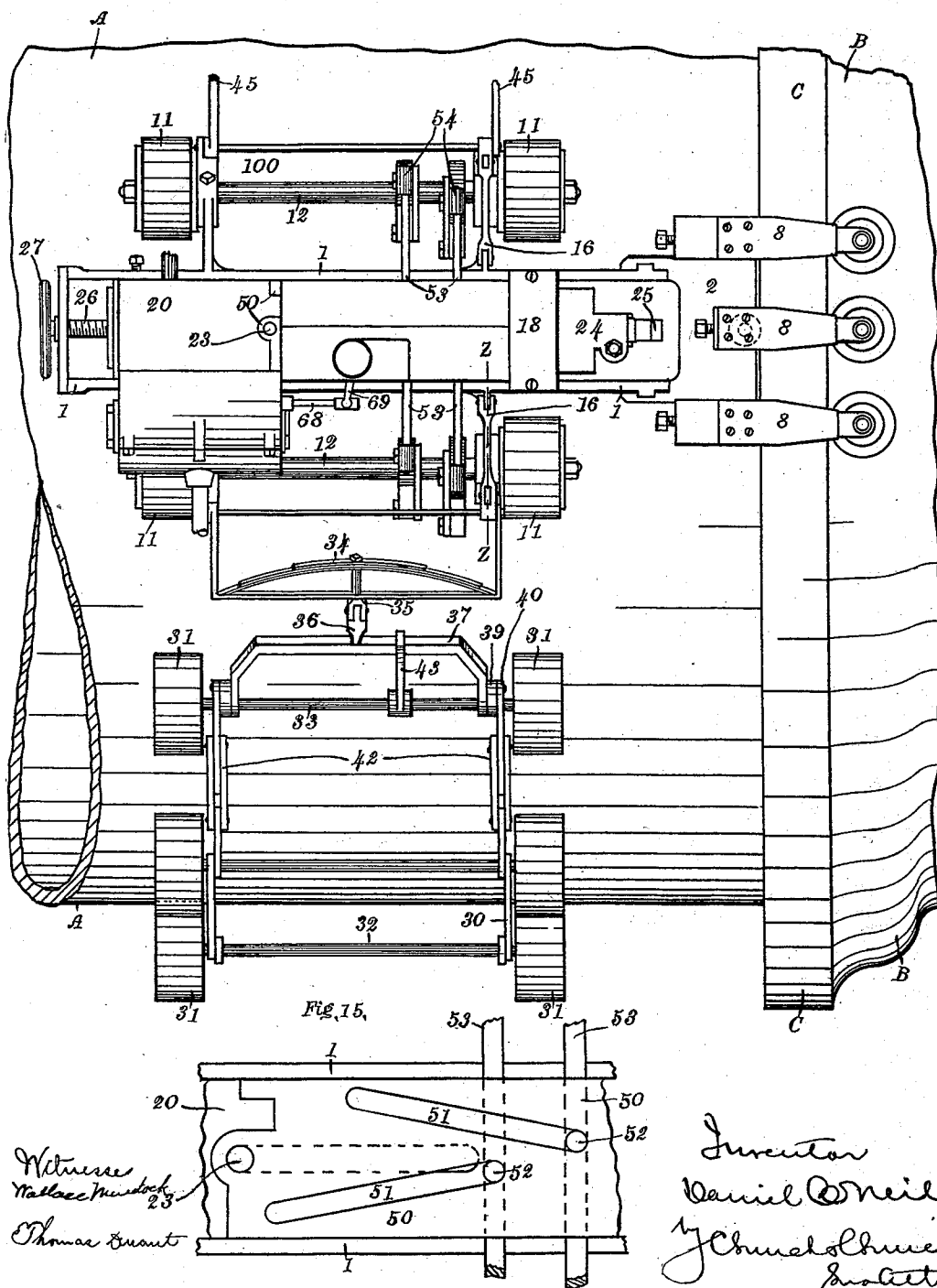
D. O'NEIL.

APPARATUS FOR CALKING JOINTS OF PIPES AND MAINS.

No. 534,572.

Patented Feb. 19, 1895.

Fig. 1.



(No Model.)

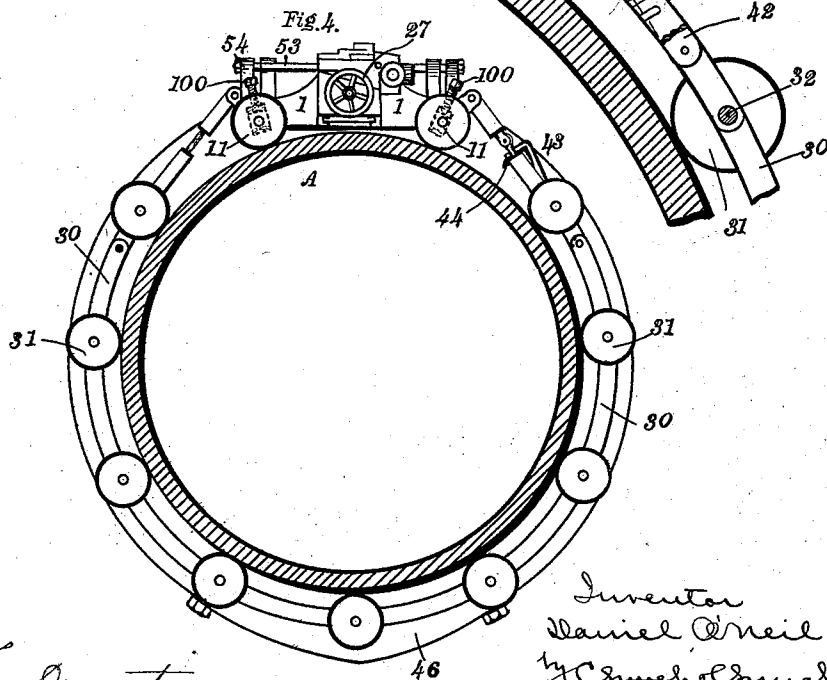
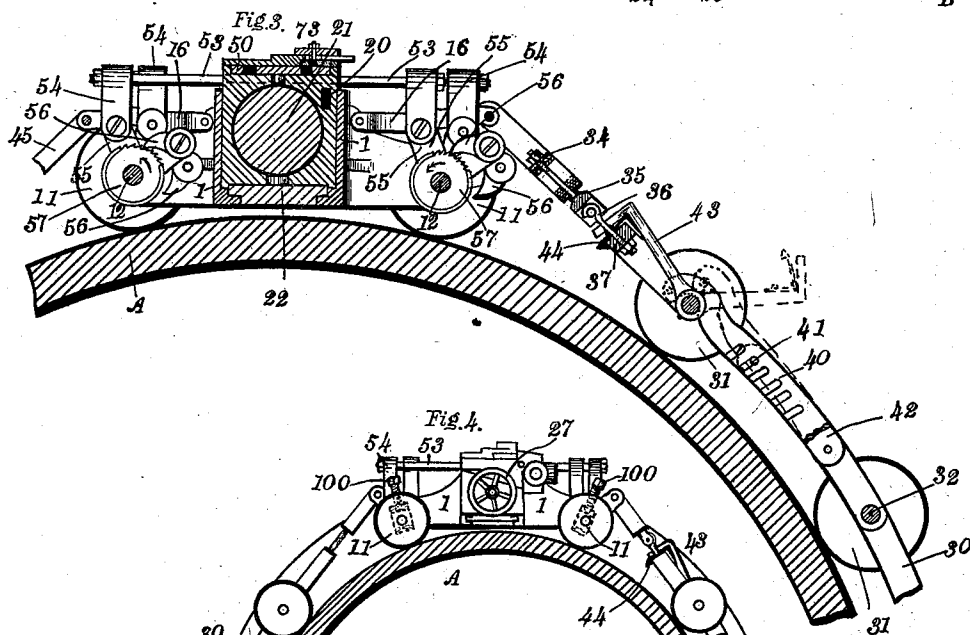
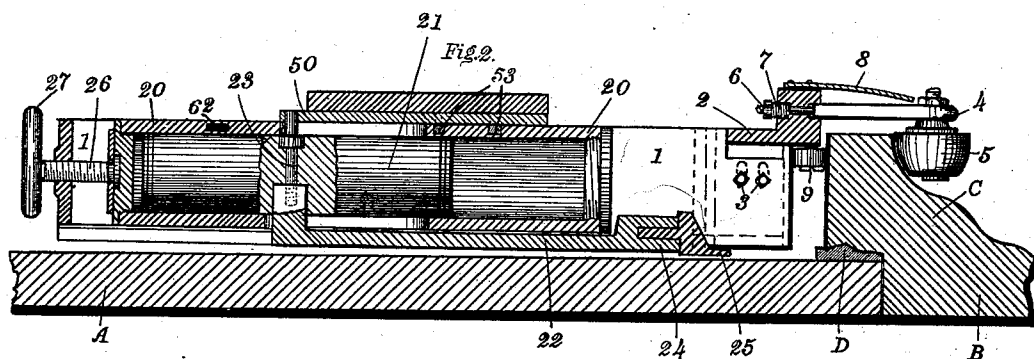
4 Sheets—Sheet 2.

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Witnesses
Thomas Duant
Wallace Murdoch

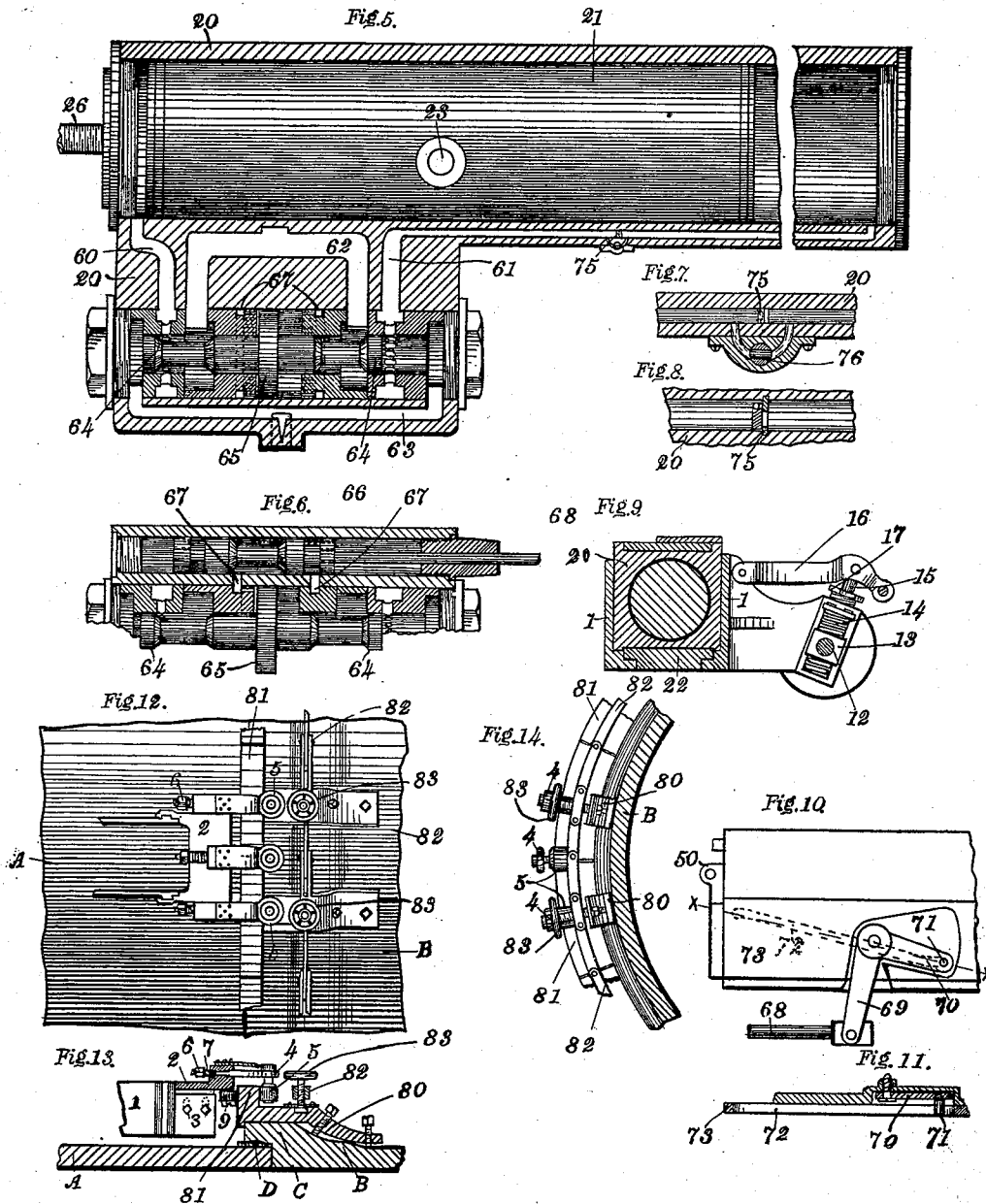
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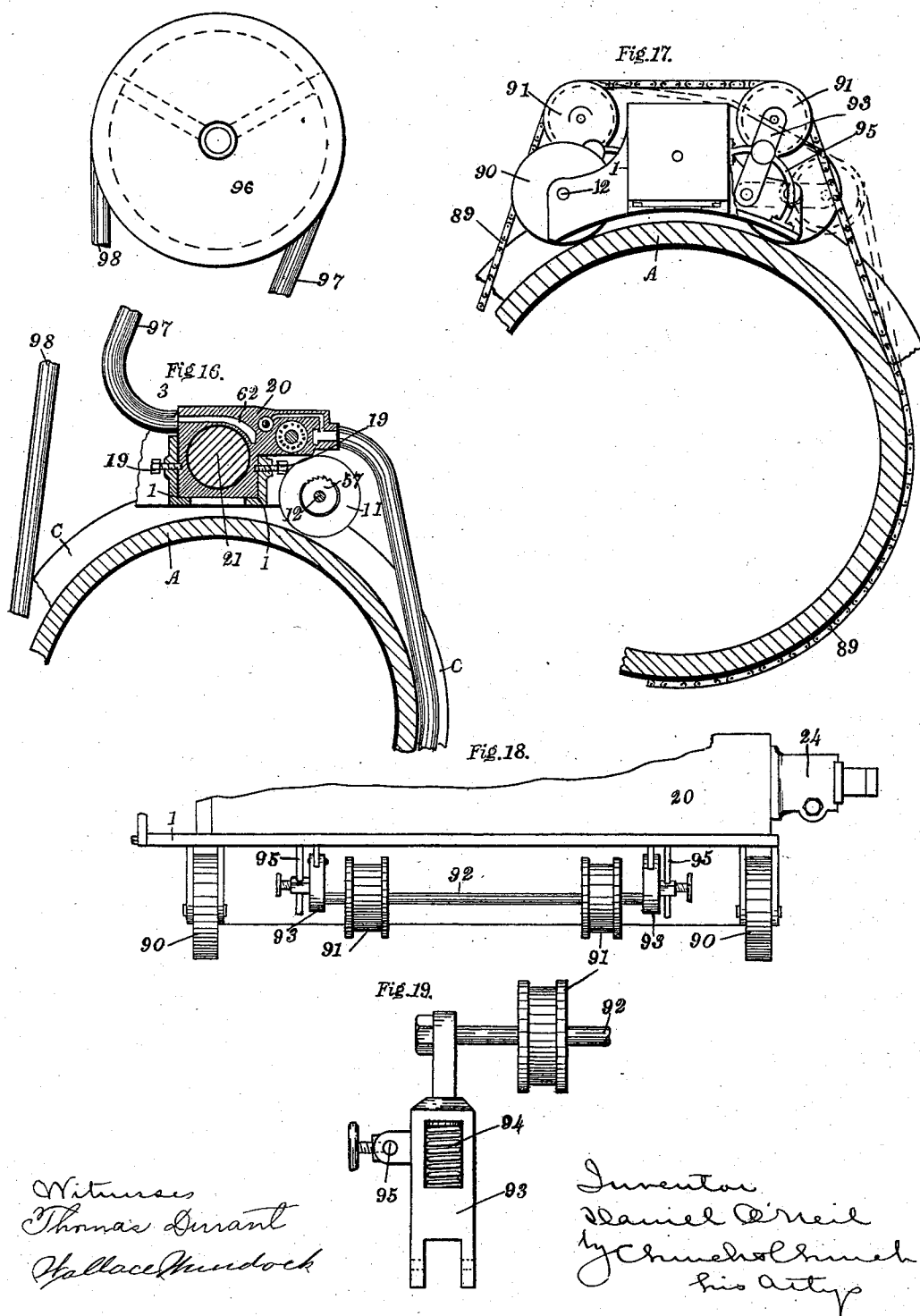
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Fig.17.

Fig. 18.

Fig. 19.

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UNITED STATES PATENT OFFICE.

DANIEL O'NEIL, OF ROCHESTER, NEW YORK.

APPARATUS FOR CALKING JOINTS OF PIPES AND MAINS.

SPECIFICATION forming part of Letters Patent No. 534,572, dated February 19, 1895.

Application filed November 1, 1894. Serial No. 527,674. (No model.)

To all whom it may concern:

Be it known that I, DANIEL O'NEIL, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Apparatus for Calking the Joints of Pipes and Mains; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference letters and numerals marked thereon.

Heretofore in calking the joints of pipes and mains it has been customary to perform the work by hand, and considerable time is consumed in the operation, the difficulty of properly calking the under side of the joint when in the bottom of the trench, necessitating the workman lying on his back, and oftentimes when there is an accumulation of water in the trench it is practically impossible to perform the operation properly, and the object of my invention therefore is to provide a means for rapidly and thoroughly driving in the calking or packing material, and this whatever the position of the joint to be calked, and it further has for its object to provide a machine that is automatic in its operation and which will properly and thoroughly calk the joints in about one-tenth of the time now required for accomplishing the result, and to these and other ends the invention consists in certain improvements in construction and combinations of parts, all as will be hereinafter fully described and the novel features pointed out in the claims at the end of this specification.

In the drawings:—Figure 1 is a plan view of a portion of a large pipe or main showing the application of my invention thereto; Fig. 2, a longitudinal-sectional view thereof; Fig. 3, a cross-sectional view through the center of the apparatus; Fig. 4, a rear elevation showing its application to a pipe; Fig. 5, a horizontal-section through the main valve; Fig. 6, a sectional view through the pilot or auxiliary valve; Figs. 7 and 8, views of details; Fig. 9, a sectional view on the line $z-z$ of Fig. 1; Fig. 10, a plan view of the device for operating the auxiliary valve; Fig. 11, a sectional view of the same; Fig. 12, a plan view of a modified form of attaching device; Fig.

13, a longitudinal sectional view of the same; Fig. 14, a rear view thereof; Fig. 15, a plan view of the movable plate for actuating the feeding devices; Fig. 16, a cross-sectional view through the main and pilot valves showing the arrangement of the steam and exhaust pipes when the apparatus is in use; Fig. 17, a rear view of the apparatus showing a modified form of holding device; Fig. 18, a plan view; Fig. 19, a detail view.

Similar reference letters and numerals in the several figures indicate similar parts.

Ordinarily the large pipes or mains upon which my invention is designed to operate are provided at one end with a flange or hub between the under side of which and the surface of the other section the lead or other packing material has to be driven in the operation of calking, and when the shape and size of such flange are sufficient, I prefer to guide my apparatus upon it and to employ said flange as an abutment for receiving the reaction from the stroke of the plunger carrying the calking tool.

The letter A indicates one section of a main of large diameter, and B the adjoining section provided with the large flange or hub C, as shown; D indicating the lead or other material placed in the joint between said sections, and adapted to be driven in by the use of my apparatus.

1 indicates a rectangular frame supporting the tool and its motor-mechanism, having at the front a cross-piece 2 relatively vertically adjustable and secured by means of bolts 3, as shown in Fig. 2, said cross-piece having attached to it three or more arms 4 carrying at their outer ends rollers 5 adapted to engage the rear side of the flange C on the pipe, the arms 4 being provided with nuts 6 on their rear ends, and springs 7 being interposed between said nuts and the cross piece 2 of the frame. This connection will permit a slight vertical movement of the rollers 5, limited, however, by the springs 8 attached to the cross-piece bearing on the arms 4 and holding the rollers down against the outer side of the flange. In the construction in which this pipe flange forms a guide, the rollers 5 have the rounded lower sides to more readily conform to its shape, and the springs 7 and 8 will

allow them to conform to any slight irregularities in the surface. The inner side of the flange is adapted to be engaged by the small roller 9 mounted on the under side of the cross-piece 2, this connection preventing the longitudinal movement of the frame relative to said flange. These rollers 5 and 9 constitute projections extending laterally of the plane of movement of the tool as will be understood. At the sides of the frame 1 are provided supporting rollers 11, which also in the present embodiment of my invention constitute feed-rollers for causing the progressive movement of the apparatus, and said rollers are secured upon shafts 12 journaled in bearings secured to the frame 1. The bearing-block 13 for the ends of the shafts toward the front of the machine are arranged between springs 14 engaging the frame and are connected by bolts 15 with arms 16 pivoted to the sides of the frame, as shown particularly in Fig. 9, to allow for the slight independent movement of the front portion of the frame if the surface of the pipe over which it moves is somewhat irregular, nuts 17 screwing in the frame adjusting the tension of said springs.

Arranged within the frame 1 and adapted to be adjusted back and forth upon suitable guide-flanges on the lower sides thereof is a motor-frame 20 carrying a movable and preferably a reciprocating-calking tool, and a motor, for automatically reciprocating it, the frame 20 being held from vertical movement by a plate 18 and screws 19 entering grooves in its sides. In the present embodiment of my invention I prefer to employ a motor device operated by steam or compressed air and therefore the frame 20 contains a cylinder, within which operates a piston 21. The cylinder is provided with a slot in its under side through which projects a vertical extension of a slide or plate 22 operating in guides formed in the bottom of the cylinder and frame, and connected by a bolt 23 with the said piston. The forward end of this slide is provided with a tool socket 24 in which the shank of the calking-tool 25 is removably secured so that by the reciprocation of the piston, said tool will strike and drive the calking material or packing in the joint. The attachment of the calking-tool to the piston between its ends is particularly advantageous in this and other machines adapted to deliver repeated blows, for the reason that the piston itself forms the guide both forward and in rear of the point of attachment of the tool and there is less strain on the operating parts, and further in this class of machines, I am enabled to bring the tool close to the surface of the main and therefore to deliver a more direct blow on the packing.

The frame 20 carrying the tool-operating device is adjustable longitudinally on the guides in the frame 1 by means of a screw 26 having a hand-wheel 27, as shown in Figs. 1 and 2, so that the force with which the blow of the calking tool is delivered may be changed,

as desired, and said motor-frame may be adjusted vertically by the bolts 100.

The main frame 1 of the apparatus is held down upon the surface of the pipe by an encircling band or cincture passing around the pipe, and in the construction shown in Figs. 1 to 13, I prefer to make this band of a number of connected links 30 pivoted to each other and having rollers 31 on the ends of the connecting rods 32; said rollers bearing on the surface of the pipe and permitting the device to be moved around either automatically or by hand to calk the whole joint, and as the preferred means of connecting the ends of said band, and to enable it to be held tightly and also to accommodate itself to any inequalities in the surface of the pipe, I connect to one side of the frame 1 a plate 33 having its ends bent back toward the main frame, the rear end being pivoted directly thereto, while the forward end is pivoted to the link 16 attached to the main frame, as shown in Fig. 9, and on the inner side of said plate is arranged a spring 34 through which passes a bolt 35 connected by a hook bolt 36 with the cross-bar 37 connected loosely to the spindle 38, the latter having mounted loosely upon it the first pair of wheels 31 of the chain. Connected to this spindle 38 are crank-arms 39 pivoted to the curved ends of links 40 forming in effect a double toggle, the latter being notched on its under side to engage with the cross-pins 41 connecting the two sides of the double link 42. Also secured to the spindle 38 is an arm 43 having a spring-latch 44 thereon adapted when the band is locked around the pipe to engage the under side of the cross bar 37, as shown in Fig. 3, and it will be seen that the arm 43 being thrown back to the position in dotted lines, the links 40 and 42 can be engaged and the chain tightened by turning the arm 43 downward again straightening the toggle and engaging the latch with the cross-bar. The link 45 of the chain on the other side of the main frame 1 and toward the front thereof, is connected with the end of the link 16 on that side in order that the front of the machine may be permitted to move slightly, the movement being governed by the springs 14, as shown in Fig. 9 and before described.

When the machine is entirely automatic and is to be moved around a pipe by the mechanism operating the reciprocating tool and also when operated by hand, it is advisable to employ a counterweight 46 on the under side of the chain opposite the machine, as shown in Fig. 4, to balance it and permit its easy movement, and the feeding devices for operating the feed-rollers 11 may be of any desired description, but I prefer to employ those shown in Figs. 1 and 3. In this construction I attach to the upper side of the piston 21 and preferably by means of the bolt 23 a sliding-plate 50 having inclined slots 51 therein with which co-operate pins 52 attached to feed-bars 53, as clearly shown in Fig. 15. To the outer ends of these bars 53

are connected arms 54 pivoted to levers 55 journaled loosely on the shafts 12 carrying the feed-wheels 11, and also connected to said arms 55 are pawls 56 engaging the teeth of ratchet wheels 57 splined upon the shafts 12 and permitted a longitudinal movement thereon so that when the motor-frame 20 is adjusted it will carry the feed-wheels back and forth on said shaft. The pawls connected to the feed-bars 52 are arranged to be thrown into and out of engagement with the ratchet-wheels so that the movement of one of the bars in one direction will cause both the pawls connected there to engage the ratchets on the shafts of both the feed-wheels and move them in one direction and the movement of the other bar in the opposite direction will rotate all of the feed-wheels and cause the machine to be moved in the opposite direction around the pipe. It will be understood that only one pair of these feed-bars is operative at a time and this only while the piston is moving back after having caused the tool to strike the lead in the joint, the pawls of the other bar being turned out of engagement, so that the calking tool operates while the piston is moved in one direction and the feed of the machine around the main is accomplished while said tool is moving in the opposite direction, and, as will be described, at less speed.

While any preferred form of valve mechanism may be employed to actuate the piston, such for instance as is ordinarily employed in reciprocating-tools of this class, I prefer that shown herein, and particularly in Figs. 5 and 6.

The steam passages to the ends of the cylinder are indicated by 60 and 61,—62 indicating the exhaust passage, and 63 the live steam passage. The main steam valve is provided with the heads 64 and the central steam-actuated piston-head 65, the passage of steam to this piston being controlled by the auxiliary or pilot valve 66, which admits steam to and exhausts it from the ports 67, as shown in Fig. 6. The pilot valve 66 is connected to the stem 68 actuated by the arm 69 of a double crank pivoted on the top of the cylinder, the other crank arm 70 having a pin 71 operating in a slot 72 in a plate 73 secured to the sliding-plate 50 that actuates the feed-rollers. Arranged in the passage 61 is a small inwardly opening check valve 75, and around this is a by-pass 76 containing an adjustable cock or plug 76*, the object of this construction being, that while the steam in the forward end of the cylinder is exhausted freely through the passage 61 by the opening of the check-valve 75, the passage of steam to this end of the cylinder for causing the backward movement of the tool will be restricted by passing through the by-pass (the check-valve 75 being automatically closed by pressure). This arrangement enables me to deliver a hard quick blow with the tool, while the return stroke will be slightly slower and will

insure the turning or feeding of the machine before the next blow of the calking tool is delivered.

It is sometimes the case that pipes or mains the joints of which it is desirable to calk, are not provided with flanges sufficiently large or of the right shape to hold the apparatus in position, and in such cases I prefer to employ such an arrangement as is shown in Figs. 12, 13 and 14, embodying brackets 80 having segmental flanges 81 with which latter the guide-rollers 5 and 9 on the tool-frame are adapted to engage; said brackets being connected to links 82 of a band or chain by screws 83, so that after the brackets are placed in position, the band composed of the links may be tightened up by said screws, and held in position forming a continuous way or track around the pipe upon which the apparatus may travel, being moved around either by hand or the automatic feeding-device described.

Instead of employing the automatic feeding-device and the movable chain or band connecting the device to the pipe, I may employ such an arrangement as is shown in Figs. 17 and 19, the main frame having supporting rollers 90 and the holding band or cincture being composed of two chains 89, preferably sprocket chains, passing around the pipe and over rollers 91 journaled on a cross-bar 92 supported on the outer movable portion of telescoping arms 93, springs 94 being interposed between the two sections of said arms, and the section of the arm pivoted to the main frame is provided with an eye through which passes a curved guide 95. In using this form of device, the tool is placed upon the top of the pipe or main, the sprocket chains are placed around the pipe and over the rollers 91, which are in the position shown in dotted lines in Fig. 17, and then said rollers 91 are turned up to the position in full lines, the chains holding the machine firmly on the main, and it may be moved around the pipe by the operator, the chains being prevented from movement by the friction on the main, while the machine will move under them.

It will be understood that when my device is being used in a trench, either the exhaustor the steam pipe should extend entirely around the main when the operation is started and that when the machine has moved half-way around and is beneath the main, both the live steam and the exhaust pipes must extend to the top of the trench, and in order that this may be accomplished, I provide over the trench a reel 96, such as is shown in Fig. 16, to which the exhaust and steam pipes 97 and 98 are connected, so that they are wound in opposite directions as the tool moves around a main. One of said flexible pipes will be unwound from the reel and be wound around the main, and the other vice versa.

It will be understood that a motor of any description may be employed to operate the

calking tool, as for instance, an electric motor, and the current conductors to and from it could be connected to the motor and the reel in the same manner that the steam and exhaust pipes are connected. The band or cincture for holding the device on the main may also be of any description, and as shown may be attached to the frame and travel with it or may be stationary and permit the frame to travel beneath it, and the feeding movement may be accomplished either automatically or by hand.

I do not desire to limit myself to the precise construction shown herein, as the parts could be greatly modified without departing from the spirit of my invention.

It will be understood that the term "frame" in the claims refers to any frame carrying a motor and tool, whether a separate motor-frame adjustable on the main frame is employed or one to which the band is directly connected, and that the term "motor" refers to a tool-actuating device which may be of any desired construction.

I claim as my invention—

1. The combination with a motor, and a band or cincture for holding it upon a main or pipe and permitting its movement around it, of a reciprocating tool operated by the motor in a plane approximately parallel with the said main, substantially as described.

2. The combination with a movable tool, and a motor for operating it, of a band or cincture for holding the motor on a main or pipe and permitting its movement around the latter, and projections for engaging a flange or projection on the main or pipe and preventing the longitudinal movement of the motor, substantially as described.

3. The combination with a movable plunger carrying a tool, and a motor for operating it, of a band or cincture for holding the motor on a main or pipe, and a guide between the frame and pipe for guiding the frame around the latter and preventing longitudinal movement thereon, substantially as described.

4. The combination with a frame and a band or cincture connected to the frame and adapted to encircle and move around a main or pipe, of a reciprocating tool on the frame movable in a plane at an angle to that of the band, substantially as described.

5. The combination with a frame having guiding projections for engaging a flange or projection on a main or pipe, and a band or cincture for holding it upon said main, of a motor adjustable on said frame, a reciprocating tool actuated by the motor, and movable in a plane approximately parallel with the pipe, substantially as described.

6. The combination with a frame and a reciprocating plunger thereon having a tool, of the guiding projections on the frame extending at an angle to the plane of movement of the tool and adapted to engage a flange or

shoulder on a main or pipe, substantially as described.

7. The combination with the frame having the adjustable forward portion, and the two projections thereon adapted to engage opposite sides of the guide, of a motor, and a reciprocating tool actuated thereby mounted on said frame, substantially as described.

8. The combination with the frame having the adjustable forward portion, and the guide rollers thereon adapted to engage a guide-flange, of a motor, a reciprocating tool actuated thereby arranged on the frame, and an attaching band or cincture for holding the frame on a main or pipe, substantially as described.

9. The combination with the frame having the roller 9, the forwardly extending arms loosely connected to the frame provided with rollers, and the springs pressing on said arms, of the motor carried by the frame, the reciprocating tool operated thereby and a band or cincture for holding the frame upon a pipe or main, substantially as described.

10. The combination with the frame, a motor thereon, and a reciprocating tool actuated thereby, of a band or cincture for holding the frame on a main or pipe and feeding mechanism actuated by the motor for moving the frame around the pipe, substantially as described.

11. The combination with the frame, a motor thereon, a reciprocating tool actuated thereby and guiding projections extending at an angle to the plane of operation of the tool, of a band or cincture for holding the frame on a main or pipe, and feeding mechanism actuated by the motor for moving the frame around the pipe, substantially as described.

12. The combination with the frame having projections at one end for cooperating with a guide, a motor and a reciprocating tool operated thereby, of the feed-rollers mounted on the frame having the ratchet-wheels connected thereto, the laterally extending bar actuated by the motor, the pawls connected to said bar and cooperating with the ratchet-wheels, and the band or cincture for holding the frame on a pipe, substantially as described.

13. The combination with the frame, a motor thereon, a movable tool actuated by the latter, and the guiding projections extending at an angle to the plane in which the tool operates, of the band or cincture connected to the frame, and the counterweight thereon opposite the frame, substantially as described.

14. The combination with the frame, a motor thereon, a movable tool actuated by the latter, and the guide-rollers extending at an angle to the plane in which the tool operates, of the feeding rollers on the frame actuated by the motor and the band or cincture engaging the frame, and also having rollers thereon, substantially as described.

15. The combination with the frame, a motor thereon, and a movable tool actuated by

the latter, of the band or cincture connected to the frame, and adapted to extend around a pipe or main, and the spring connection interposed between the band and frame, substantially as described.

16. The combination with the frame, a motor thereon, and a movable tool actuated by the latter, of the double band or cincture connected to the frame and adapted to extend around a pipe or main, and a spring or springs arranged between one of the sides of said band and the frame, substantially as described.

17. The combination with the frame, the motor having the movable plunger and the tool connected thereto, of the supporting feed-wheels, the slotted plate connected to the plunger, the bars actuated thereby, and ratchet connections between said bars and the feed-wheels, substantially as described.

18. The combination with the frame, the motor having the reciprocating plunger, and the tool connected thereto, of the feeding-devices for moving the frame, and ratchet connections between the plunger and feeding devices for causing the operation of the latter when the tool is being retracted, substantially as described.

19. The combination with the frame, the cylinder, the reciprocating piston, of the tool connected to the piston intermediate its ends, whereby the cylinder serves as a guide for said tool, substantially as described.

20. The combination with the frame, the cylinder, the reciprocating piston operating therein, the slide extending parallel with the piston and connected to it intermediate the ends thereof, and a tool carried by said slide, substantially as described.

21. The combination with the frame having the projections for engaging a guide, of the cylinder, the piston operating therein, the calking tool operating below the cylinder and connected to the piston between the ends of the latter, substantially as described.

22. In a calking machine, the combination with a frame, a reciprocating plunger thereon carrying a calking tool, a band or cincture for holding the frame on a main or pipe, and permitting its movement around it, and a projection on the frame adapted to engage a flange or projection on the main for preventing longitudinal movement of the former, substantially as described.

23. The combination in a reciprocating tool, of a frame, a cylinder, having passages leading to opposite ends, a piston operating therein, a tool connected to the piston, a check-valve and by-pass in the passage leading to the front of the cylinder, valve mechanism for controlling the passage of fluid to the passages in the cylinder, feed-wheels for moving or feeding the frame actuated by the backward movement of the piston, whereby

the movement of the frame will be caused during the backward movement of the piston and when moving at reduced speed, substantially as described.

24. The combination with the frame, the cylinder, the piston, and the tool operated thereby, of the main fluid-actuated valve, the pilot valve controlling it, the slotted plate connected to the piston, the double crank, one arm of which is connected to the pilot valve and the other having the pin operating in the slotted plate, substantially as described.

25. The combination with the frame, the feed-wheels thereon, the cylinder, the piston, and the tool operated thereby, of the main fluid-actuated valve, the pilot valve controlling it, the feeding-plate connected to the piston having the slots therein, the valve operating plate connected thereto having the slot, the double crank, one arm of which is connected to the pilot valve and the other having the pin entering the slot in the last-mentioned plate, the transverse bars having the pins in the slots in the feeding-plate, the pawls carried by said bars, and the ratchet-wheels on the feed-wheels with which said pawls cooperate, substantially as described.

26. The combination with the frame, the guide-rollers thereon, the reciprocating tool, a motor for operating it, and a band or cincture for holding the frame on a pipe, of the segmental way or guide on which the guide-rollers operate, and means for connecting it to a pipe, substantially as described.

27. The combination with the frame having the guide rollers thereon, the reciprocating tool, a motor for operating it, and a band or cincture for holding the frame on a pipe, of the brackets having the segmental ways or guides thereon, the band or chain, and the adjusting screws connecting the brackets with the chain, substantially as described.

28. The combination with the frame, a motor thereon embodying a reciprocating plunger, and a tool carried thereby, guiding and securing devices for attaching said frame to a pipe or main, and permitting its movement around the same, of two flexible fluid conductors leading to opposite sides of the motor, and a reel to which said conductors are attached and upon which they are wound in opposite directions, substantially as described.

29. The combination with the motor and a tool operated thereby, of a band or cincture adapted to extend around a pipe or main and hold the motor thereon, and a spring or springs interposed in said band, substantially as described.

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