

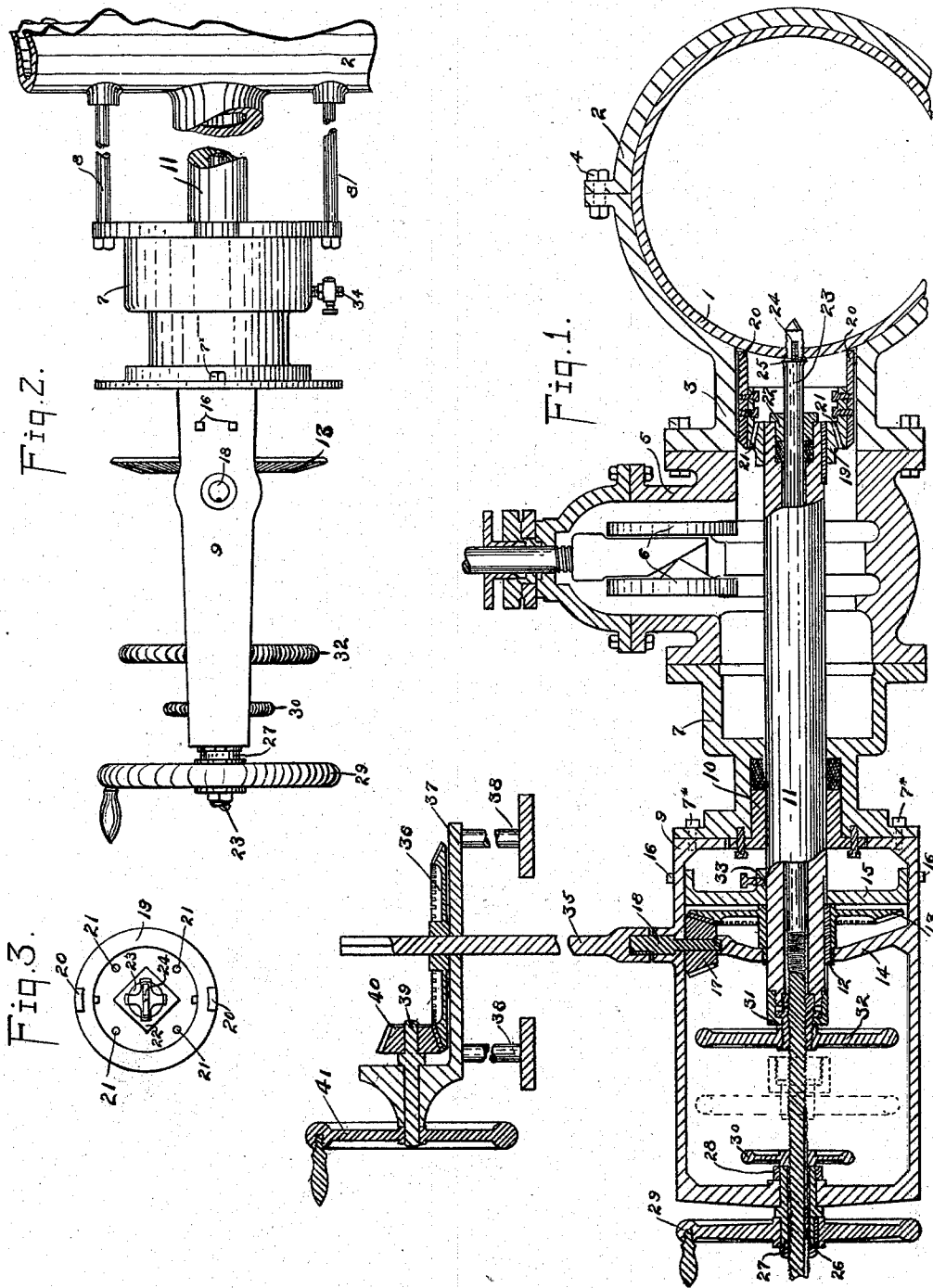
(No Model.)

2 Sheets—Sheet 1.

D. O'NEIL.
APPARATUS FOR TAPPING MAINS.

No. 527,877.

Patented Oct. 23, 1894.



WITNESSES.

G. M. Rich.

Thomas Durant.

INVENTOR.

Samuel O'Neil
by Churchill & Church
his Attys

(No Model.)

2 Sheets—Sheet 2.

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Fig. 5.

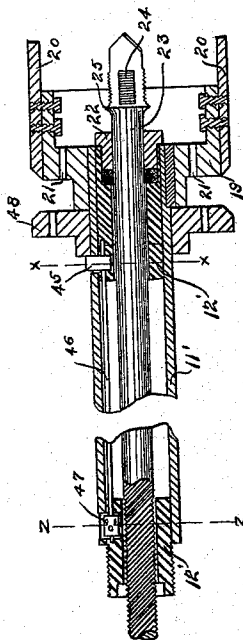


Fig. 6.

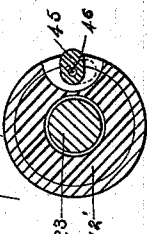


Fig. 7.

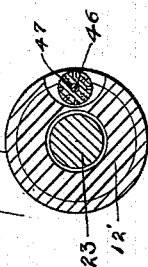
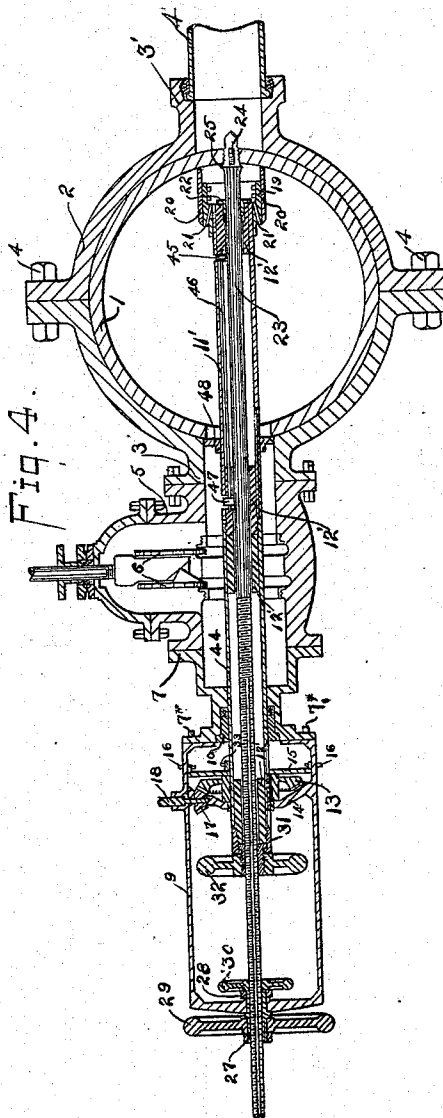


Fig. 4.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TAPPING MAINS.

SPECIFICATION forming part of Letters Patent No. 527,877, dated October 23, 1894.

Application filed April 18, 1894. Serial No. 507,992. (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 Tapping 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-numerals marked thereon.

My present invention has for its object to provide an improved apparatus for tapping water, gas or other mains, containing liquid or fluid under pressure and connecting lateral mains or pipes therewith, all as will be hereinafter fully described and the novel features pointed out in the claims at the end of this specification.

In the accompanying drawings: Figure 1 is a longitudinal sectional view showing the application and use of my invention in tapping a main and connecting a lateral therewith; Fig. 2, a plan view of one end of the device; Fig. 3, an end view of the cutting tool; Fig. 4, a longitudinal sectional view showing a modification of the apparatus adapted for connecting two laterals with the main; Fig. 5, a longitudinal sectional view of the cutting stock; Fig. 6, a section on the line $x-x$ of Fig. 5; Fig. 7, a section on the line $z-z$ of Fig. 5.

Similar reference numerals in the several figures indicate similar parts.

In Fig. 1 of the drawings, 1 indicates the main or pipe containing the fluid under pressure. 2 indicates the usual split sleeve having the branch or pipe section 3, and connected to the main by bolts 4, or other suitable securing means; 5, a gate or valve casing of the usual or any preferred construction having the movable abutment or valve 6 therein. These parts may be of any preferred construction and therefore need no specific description.

One of the sides of the valve or gate casing 5 is connected to the pipe section 3 by means of bolts or otherwise and to the flange on the other side of said gate the frame of my machine is adapted to be attached. This frame the construction of which is shown in Figs. 1 and 2, is composed of a recessed casting 7, to which is connected a frame 9 carrying the

operating parts, by means of bolts 7*. Said frame 7 is connected with the split sleeve 2 by means of bolts 8 passing through lugs on said frame and screwing into tapped bosses formed on the sides of the split sleeve 2, as shown in Fig. 2.

The casting 7 is provided with a stuffing-box 10 and provides a long bearing for the stock or hollow spindle 11 carrying at its outer end a cutting head, as will be described, and said stock is provided with a longitudinal key-way in which operates a key 12 fastened to a beveled gear 13 mounted in the frame 9 and held from longitudinal movement by means of cross bars 14 and 15, as shown in Fig. 1, the latter being removably secured in position by bolts 16, as shown.

17 indicates a bevel pinion meshing with the gear 13 on a short shaft 18 extending out at the side of the frame 9.

The cutter-head 19 is secured to the outer end of the cutter stock 11 and is provided with two or more cutting bits 20, as shown in Figs. 1 and 3, said head and the cutters being slightly smaller than the aperture in the branch 3, and it is also provided with a series of apertures 21 for permitting the passage of fluid to opposite sides to balance the pressure. The end of the stock 11 is also provided with a stuffing-box 22 through which passes a drill stock or spindle 23 carrying at its outer end and inside the cutter head a combined drill and tap 24, the extreme end of the drill being of such length as to pass through the side of the main to be tapped, and the threaded tap being sufficiently long to cut the thread in the aperture formed by the drill and become fastened thereto, a shoulder 25 limiting its movement.

The outer portion of the drill-stock 23 is threaded, as shown, and is also provided with a longitudinal groove or key seat with which co-operates a key 26 in a sleeve 27 journaled in the end of the frame 9 and held from longitudinal movement by a collar 28.

A suitable operating wheel 29 provided with a handle is connected to said sleeve, as shown, for rotating it.

30 indicates a hand wheel or nut screwing upon the threaded end of the drill stock and adapted to engage the inner side of the sleeve 27 or, if desired, the end of the frame, for the

purpose of feeding the drill stock, as will be described.

Mounted upon the inner end of the cutter-stock 11 is a threaded sleeve 31 serving to connect to the end of said stock by a swivel connection, a suitable nut, to which is attached a hand wheel 32; said nut engaging the thread on the drill stock and serving when the wheel 32 is rotated to move the cutter stock with relation to the drill stock.

The operation of the device will now be understood.

The split sleeve, gate valve and cutting machine being connected as shown in Fig. 1, and the gate valve being opened, the cutter and drill stocks are moved close up to the side of the main and the nut and connected hand-wheel 32 are moved out to the position shown in dotted lines, disconnecting the cutter stock from the drill stock, and at this time a small set screw 33 passing through the lug on the cross bar 15 is screwed in, to engage the cutter stock and prevent its movement. The operator now rotates the wheel 29 and causes the drill to cut a hole in the main 1, the feed of the drill being caused by the rotation of the hand-wheel 30. When the aperture has been drilled in the pipe, the continued rotation of the drill by the wheel 29 will cause it to be threaded by the tap, which will follow in, until the shoulder 25 engages the outer side of the main, thereby securing the drill-stock rigidly to the side of the main, when it may be fastened and secured from accidental rotation by moving the hand-wheel 30 outward against the sleeve 28. The hand-wheel 32 and its connected nut are now moved down and the collar 31 screwed upon the end of the cutter-stock, the set screw 33 disengaged from said stock and then the short shaft 18 is rotated by a suitable operating handle or wheel, causing the rotation of the beveled gear 13 and through it the rotation of the cutter stock and the cutter-head, for the purpose of removing the section of the main inside of said cutter head. The feed of the cutter stock is accomplished by rotating the hand wheel 32 operating on the thread of the drill stock. By this means, it will be seen that no strain is put upon the frame or split sleeve, but the feed of the cutter is resisted by the portion of the main to which the drill stock is connected. When the main 1 has been cut through, the piece cut out is retained upon the tap and the water or other fluid is permitted to pass through the apertures in the head into the valve casing and the chamber in the casting 7 so that the pressure is partially balanced on opposite sides of the cutter-heads. The bolts connecting the parts of the frame 7 and 9 are now loosened and the frame 9 and connected parts are moved back until the cutter head is within the chamber formed in the recess in the casting 7 of the frame, bringing the cutter-head, drill and the section cut out of the main, outward beyond the gate or valve 6. This gate is then closed,

shutting off the pressure from the main, and the water that may be in the chamber 7 and in the valve casing beyond the valve is allowed to escape through the pet cock 34, as shown in Fig. 2. Then the bolts 8 are loosened and the whole cutting device and the piece cut out of the main are removed, permitting the attachment to the valve casing of a suitable lateral or branch pipe or main.

Owing to the comparatively contracted space in the bottom of the trench, it is desirable oftentimes that the cutting device be operated from the surface of the ground, and for this purpose, I attach a shaft 35 preferably angular in cross section (or provided with a spline) to the short shaft 18 and extend it to the surface of the ground where it passes through a suitable beveled gear 36 supported in a frame 37 on suitable standards or supports 38. This frame 37 is preferably provided with a short shaft 39 having a beveled pinion 40 and an operating wheel 41. The sliding connection between the shaft 35 and the pinion 36 will, of course, permit great latitude in the vertical position of the latter relative to the operating device below.

It is oftentimes desirable to attach to the main, two lateral branches or pipes without shutting off the pressure, and when it is difficult, if not impossible, to have access to both sides of the main, and I have therefore shown in Figs. 4 to 7 a form of apparatus for accomplishing this purpose, the construction of the parts varying in but few particulars from that previously described.

It will be understood that in attaching two laterals to the main, a split sleeve must be employed having two branch pipes connected therewith, as shown in said figure and indicated by 3', one of these, however, being provided with a plug or a section of pipe 4', as shown, and the split sleeve is clamped to the main the same as before or in any other desired manner.

Inasmuch as the main may be of considerable diameter it is desirable that the stock carrying the cutter-head be made as light as possible, and in this construction as well as in the one previously described, if desired, the stock 11' may be formed of tubular material having plugs 12' welded or otherwise secured in the ends.

As it is necessary to have the cutter stock project clear across the main, it being intended to cut from only one side, a bearing should be provided near the side of the main from which the cut is made, and in order to accomplish this, I provide upon the end of the stock near the cutter head, means for holding a sleeve or collar which is moved up to the side of the main first cut, and left there, while the cutter stock is moved through it, until the cutter head reaches the opposite side of the main. The means employed for accomplishing this result is shown in Figs. 4, 5, 6 and 7, and consists in a small eccentric or finger 45 located in a suitable slot in the

cutting stock near the cutter head and secured to a small rod or shaft 46 inside of the cutter stock and having at its outer end a disk 47 provided with apertures whereby said rod may be rotated, by means of a pin inserted in the aperture from the side of the stock, as shown in Fig. 5. Arranged upon the cutter-stock is a collar 48 preferably having a series of apertures therein to balance the pressure and slightly larger in diameter than the cutter head, although small enough to project through the valve casing and the tubular portion of the split sleeve. When the collar is against the cutter head, as shown in full lines in Fig. 5, it is retained by moving outward the eccentric or finger 45 to the position shown, and when desired may be released by turning the finger down to the position shown in dotted lines in Fig. 6.

When it is desired to connect two opposite branch pipes to a main, the apparatus shown in Figs. 1 and 2 may be used in the manner previously described, for cutting the pipe on one side and the cutter stock may or may not be provided with the collar holding and releasing devices just described. After this cut is made the frame 9 is removed, the cutter stock drawn back, the valve closed and the piece cut out of the main is taken out by removing the casting 7. Then the cutter stock extension indicated by 44 is secured on the end of the cutter stock (which is now constructed as shown in Fig. 5) with the collar 48 in place, as shown in Fig. 6. The casting 7 is again secured to the split sleeve and the cutter stock is moved in until the collar 48 engages the sides of the main, as shown in full lines in Fig. 4, and then the rod or shaft 46 is turned, causing the eccentric 45 to release the collar 48 and the stock is moved inward again until the end of the drill and the cutter are brought in contact with the opposite side of the main. Then the frame 9 and the drill and cutter-operating parts previously described, are attached and operated to cut out the section of the main inclosed within the cutter head, the piece being drilled, tapped and then cut out as previously described. Then the frame 9 is removed as before and the cutter stock and drill withdrawn, outside of the valve, which is closed and the operation is completed, and only requires the removal of the casting 7 to enable the lateral main or branch pipe to be attached in the usual manner.

It will be noted that it is only necessary to push the collar 48 up to its place against the main when the cutter-stock is moved inward, and that the apertures through it will permit the water pressure to be balanced on opposite sides and prevent its displacement.

It is obvious that other means than that described can be employed for carrying the collar 48 to its proper position, and I therefore do not desire to be confined to precisely this construction.

The advantages of the method of procedure

just described and the particular apparatus for carrying it out will be obvious to those skilled in the art, as I am enabled to tap mains under pressure and apply one or two branch pipes as may be desired, and this even when ready access cannot be had to one side of the pipe for the application of the cutting apparatus. I am also, as before described, enabled to tap the main without liability of loosening or straining the split sleeve, which cannot be done by other devices of this nature with which I am familiar.

The drill stock is shown with the outer end broken away in Figs. 1 and 4, and it may be of suitable length in both instances, if desired, to project clear across an ordinary main, and it will be noted that it will not be necessary to fill up the key way on it, because the stuffing-box and packing at the end of the cutter stock will prevent the outward passage of water.

I claim as my invention—

1. In a device for tapping mains, the combination of a closed chamber and its cut off valve, a drill and tap whose stock serves as an abutment for receiving the thrust of a rotary cutter and a circular rotary cutters surrounding the drill and means for feeding said cutter forward, whereby the valve chamber is relieved of all strain during the cutting operation after the tap enters the main, substantially as described.

2. The combination with the split sleeve having the branch pipe, and the valve connected thereto, of the frame, and the bolts connecting it directly with the split sleeve and holding it against the valve box, a stock carrying a cutter, a stock carrying a drill and tap, feeding devices for moving the drill-stock, feeding devices for moving the cutter-stock operating on the drill-stock, and operating devices carried by the frame for rotating the cutter-stock and the drill-stock, substantially as described.

3. In a main-tapping machine, the combination with a drill-stock and a drill and tap thereon, of a cutter-stock, and a cutter thereon movable around the drill and tap, and feeding devices between the drill-stock and cutter-stock for feeding the latter on the former, substantially as described.

4. In a main-tapping machine, the combination with the longitudinally movable hollow cutter-stock carrying the cutter and means for rotating it, of the longitudinally movable drill-stock extending through the cutter-stock, the drill and tap thereon, and means for rotating it, feeding devices for the cutter-stock, and independent feeding devices for the drill-stock, substantially as described.

5. In a main-tapping machine, the combination with the longitudinally movable hollow cutter-stock having the stuffing-box, and the cutter, and the wheel for rotating said stock, of the drill stock extending through the cutter-stock and rotatable independently

thereof, and the drill and tap thereon, and the screw connections between the cutter-stock and drill-stock for feeding the former, substantially as described.

5 6. The combination with the longitudinally movable hollow cutter-stock having the stuffing-box and the cutter, and the wheel splined to said stock, of the drill-stock extending through the cutter-stock and the drill and
10 tap thereon and the nut swiveled to the cutter stock and connected to the drill by a threaded connection, substantially as described.

7. The combination with the frame, the
15 wheel therein, the cutting stock splined to the wheel, and the cutter on the stock, of the rotary drill-stock having the drill and tap and extending through the cutter-stock, feeding devices between the drill stock and frame and
20 detachable threaded connections between the drill-stock and cutter-stock for causing the feed of the latter from the former, substantially as described.

8. The combination with the frame, the
25 wheel therein, the cutting stock splined to the wheel, and the cutter on the stock, of the threaded drill stock, the drill and tap thereon, the wheel on the frame splined to the drill-stock, the feed nut engaging the frame and
30 drill-stock, and the feed nut threaded on the drill-stock and swiveled to the cutter-stock, substantially as described.

9. In a main-tapping machine, the combination with the frame, having the gear-wheel
35 therein, and means for connecting said frame to a main, the pinion meshing with said gear-wheel, and a cutter-stock operated from said pinion, said parts being adapted to be located in a trench, of a frame provided with sup-
40 ports and having beveled gears thereon and means for rotating one of them and a shaft sliding through one of said gears and connected with the pinion on the first-mentioned frame, substantially as described.

45 10. In a main-tapping machine, the combination with a longitudinally-movable and rotary cutter-stock, of a disk or collar loose on the stock, and a detachable fastening device for holding it in position, substantially as described.
50

11. In a main-tapping machine, the combination with a frame adapted to be connected

to a branch of a main, a longitudinally-movable and rotary cutter-stock projecting through said frame, a collar loosely arranged
55 on the stock near one end, a fastening for holding it in position, and connections on the other side of the frame from the collar, for releasing it and permitting movement of the stock independently of it, substantially as
60 described.

12. The combination with the sleeve having two branches adapted to be connected to a main, and a valve or gate and cutter-frame
65 connected to one of said branches, of a cutter-stock adapted to project through the frame, valve and branch, a bearing collar on the stock, and a holding device therefor adapted to be released from the outside of the frame,
70 substantially as described.

13. The combination with the cutter-stock, of the collar thereon, the finger, and the shaft or rod in the stock connected to the finger
75 and the collar for actuating the rod, substantially as described.

14. In a device for tapping mains through a gate or valve, the combination with the frame made in two parts, one of said parts having a stuffing-box therein and adapted to be arranged next the gate, of a cutter-stock
80 and cutter, a drill-stock and a drill and tap connected thereto, and operating devices for the drill and cutter-stocks, said parts being mounted in the other portion of the frame, and detachable fastenings for securing the
85 two parts of the frame together, substantially as described.

15. The combination with the frame constructed in two parts detachably connected, one of said parts having a recess, and a stuffing-box, of a cutter-stock made in two sections connected detachably, and a cutter, a collar loose on the stock and detachable holding devices therefor, a drill-stock, a drill and
90 a tap thereon, operating devices for the cutter and drill-stocks, and feeding devices between the drill and cutter-stocks, said last-mentioned parts being mounted on the other part of the frame, substantially as described.

DANIEL O'NEIL.

Witnesses:

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GILES WILLARD RICH.