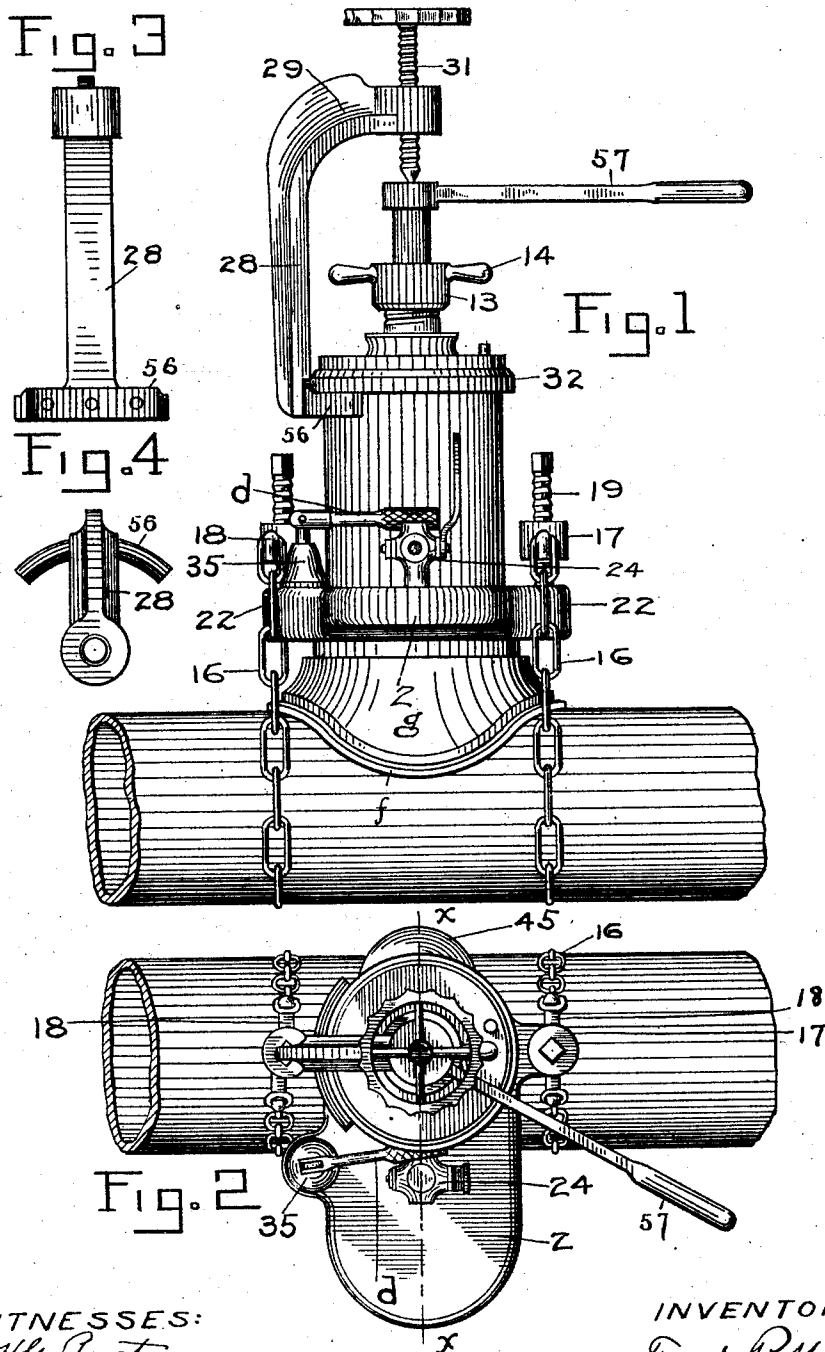


F. P. SHARP.
 APPLIANCE FOR TAPPING WATER MAINS.
 APPLICATION FILED NOV. 30, 1908.

1,039,827.

Patented Oct. 1, 1912.

2 SHEETS—SHEET 1.



WITNESSES:
H. G. Post.
L. C. Brady.

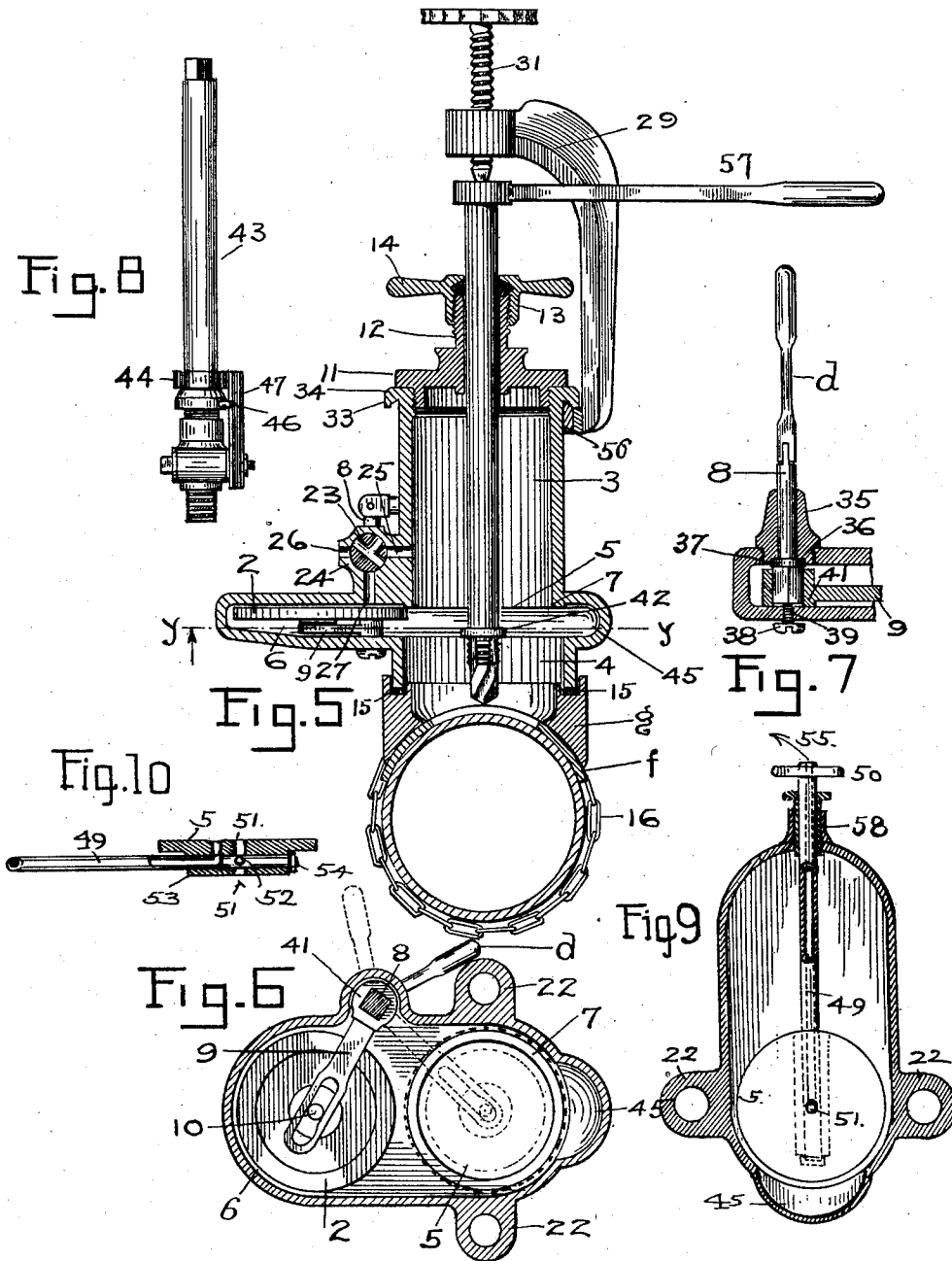
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WITNESSES:
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UNITED STATES PATENT OFFICE.

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APPLIANCE FOR TAPPING WATER-MAINS.

1,039,827.

Specification of Letters Patent.

Patented Oct. 1, 1912.

Application filed November 30, 1908. Serial No. 465,163.

To all whom it may concern:

Be it known that I, FRANK P. SHARP, a citizen of the United States, and a resident of Oakland, in the county of Alameda and State of California, have invented a new and useful Improvement in Appliances for Tapping Water-Mains, of which the following is a specification.

This invention relates to improvements in appliances for drilling and tapping a water-main and fixing in place a cock or a coupling by which to connect a service-pipe to the main while carrying water under pressure, without shutting off or reducing the pressure while the work is being carried on.

The present invention comprises a casing of novel and peculiar construction having a recess or chamber in one side containing a valve which is movable out of the recess in a plane perpendicular to the axis of the casing; the valve in one position being arranged to divide the casing into an upper lock or compartment and a lower lock or compartment, and in the other position to be contained wholly within its chamber; together with means for setting and locking the valve from the outside of the casing. Also novel means for controlling the pressure of the water on the valve after the hole is drilled and especially for equalizing the water pressure in the compartments above and beneath the valve and thereby allowing the valve to open readily.

The improvements comprise further, novel means for feeding and controlling the drills and other tools used in the casing, in which provision is made for centering and fixing the cock or the coupling in the drilled hole from the outside of the casing.

The invention embraces further, a pipe-tapping machine or appliance embodying the before-mentioned features, all as herein-after described and set forth.

The accompanying drawings illustrate the complete machine or appliance of my invention for drilling and tapping a water-main.

Figure 1 is an elevation of the appliance, representing the same fixed in place on a water-main, in the top of which a cock or coupling for connecting a service-pipe to the main is to be fixed. Fig. 2 is a top-view of Fig. 1. Fig. 3 is an elevation of the yoke without the feed-screw by which the drill is centered and fed. Fig. 4 is a top-view of Fig. 3. Fig. 5 is a sectional-view; the section

being taken on the line $x-x$ Fig. 2, diametrically through the casing, the valve-chamber and through the water-main, but showing the drill-stock and its yoke in full. Fig. 6 is a horizontal section through Fig. 5 on the line $y-y$. Fig. 7 is a sectional-view of portions of the valve and the wall of the valve-chamber, and showing in detail the construction of the bearing for the pivot of the valve-operating lever. Fig. 8 is a detail of the staff for centering and fixing in place the cock or coupling after the hole has been drilled, and for use also in unscrewing and removing a cock already fixed in the pipe when it becomes necessary to substitute one cock or coupling for another. Figs. 9 and 10 illustrate a modification in which the communication of the upper compartment with the lower compartment is made through the valve, and is made with the atmosphere through the valve-actuating rod; Fig. 9 being a horizontal sectional view through the valve-chamber showing the valve closed; and Fig. 10 a sectional view of the valve.

In this improved appliance the valve divides the interior of the casing into two "locks" or compartments 3-4, in the lower one of which the head or pressure of the water which is admitted after the hole is drilled is exerted directly against the valve from below, with the effect to hold it to a close seat in the recess 5 provided in the walls of the casing. This recess 5 is an extension of the valve-chamber 6 on one side of the casing body; and the valve 2 being somewhat larger in diameter than the corresponding dimension of the casing, is fitted to seat tightly on the ledge or shoulder 7 formed by the recess before mentioned. The valve-chamber 6 opening from the side of the casing is of sufficient size to take in the valve and allow it to set clear of the space within the casing when the valve is opened.

The means for closing and opening the valve 2 consists of a swinging arm d movable in a limited arc from a pivot 8 or center of movement, and having a forked or slotted member 9 in which a pin or stud 10 in the back of the valve 2 is fitted to play loosely, so that while the arm swinging on its pivot will readily throw the valve, it also allows the valve to adjust itself to the recess and seat tightly in the recess, thus insuring an efficient water-tight joint without requiring the use of packing.

The casing is closed at the top end by a removable head 11 having an aperture in its center surrounded by a standing neck 12 through which the stock of the tool extends from within the casing to the outside. A water-tight joint is secured by a gland or stuffing-box 13 threaded to fit the threaded portion on the neck 12. As this part 13 requires to be taken off or loosened quite frequently to insert the tools and to remove them, it is provided with handles 14 for turning it, instead of using a wrench.

A tight-joint between the casing and the pipe to be tapped is made by means of a packing-ring *f* and a saddle-piece *g*, having a groove 15 to take the bottom end of the casing. This end when set in the groove is drawn to a close seat therein and the saddle-piece also held down against the pipe in the usual manner by chains 16 attached to the nuts or threaded collars 17 which are provided with hooks 18 for that purpose, the nuts 17 being carried by screws 19 mounted in lugs 22 on the sides of the casing, one diametrically opposite to the other, and provided with heads properly shaped to take a wrench.

In practice saddle-plates *g* and gaskets *f* are provided in several different sizes and degrees of curvature to fit the various sizes of water-mains or conductors to be tapped, but otherwise of proper diameter on the top to fit the same casing.

Another novel feature in this machine consists in connecting the upper lock 3 with the lower lock 4 around the valve 2 through a passage in which is placed a cock or plug-valve 23 provided with means for setting it from the outside of the casing. A chamber for this valve is formed in a valve seat in the side wall of the casing where such wall is made of greater thickness directly upon or over the valve-chamber 6 containing the slidable valve, and the passages 25—26—27 connecting the space 3 above the valve with the space 4 below it, and also with the atmosphere, are intersected by the seat bored for the valve; the passages or ways 25—26—27 being so arranged that in one position of the plug all the passages will be closed, and there will be no communication between the upper and the lower compartments and the outlet to the atmosphere will be cut off. Or, by turning the plug-valve in the proper direction and to the required extent whenever the valve 2 may be closed to cut off communication between the lower and the higher compartment, the passage 25—27 will connect the two locks or compartments together, and the head or pressure of the water confined within the casing will be equal upon both sides of the valve 2. Under such conditions the pressure of the water admitted to the casing through the drilled hole will not be confined to the space beneath the slide-

valve 2, but it will be the same in the lock above the valve; and being thus equal at such time, it allows the valve 2 to be set or shifted without difficulty. In another position the plug-valve will not only cut off one lock from the other, but it will establish communication of the upper lock with the atmosphere through the outlet 25—26 which, when the slidable valve is closed, will have the effect to confine the existing pressure of the water to the lower side of the valve, and to maintain that pressure against the valve as long as the compartment over the valve remains open to the atmosphere. In the third position the plug-valve will close the outlet to the atmosphere and also cut off communication between the two compartments. This is the position of the valve while the work of drilling and tapping the hole is carried on.

Another feature in this machine consists in a removable and adjustable centering and feeding yoke, whereby the drill or other tool is readily and accurately centered and is held in a true perpendicular position from the outside of the casing. As shown in Figs. 1, 3 and 4 this yoke is preferably composed of a single leg 28 ending in a goose neck 29 with a screw-threaded socket for the feed-screw 31 and having at the opposite end a foot 36 standing across and at right angles to the leg. This foot or lateral extension of the leg being fitted to enter and slide easily in a groove or circular recess around the underside of the casing-head 32 is by that means loosely attached to the casing, while yet freely movable around the rim. Being composed of a single leg, it is not in the way of the ratchet lever or handle 57 of the drill, and that part has a sweep or movement in a large arc for nearly the entire circle, without requiring the yoke to be loosened and shifted during the operation of drilling. A yoke of this construction will hold the drill perpendicularly on the center, and need not be disturbed until the hole is drilled and the tool is to be removed. It can then be removed and taken out of the way of the workman in the remaining operation.

The head of the casing is formed with a downwardly turned flange 33 around the rim 34 to take the foot of the yoke.

By the construction illustrated in Figs. 5 and 7 a water-tight joint is secured at the pivot on which the valve throwing arm works, without the use of packing. Any loose play resulting from the wear of the pivot in its bearings is also taken up from time to time so as to maintain a water-tight joint, without taking the machine apart or removing parts to make repairs.

The post 8 is fitted to turn in the plug 35 which is removable from the top of the valve-chamber and is provided with a counter-sunk recess 36 in the bottom to take a

collar 37 on the post. Being formed to seat closely in the recess the collar 37 is held in position and to a tight-seat by means of a pointed screw 38 working through a threaded hole 39 in the bottom of the valve-chamber from the outside, and its end taking in a cavity in the bottom end of the pivot, thus forming a step or support on which the post will easily turn. The head of this set screw being accessible from the outside is readily turned to regulate the upward thrust or pressure of the collar 37 against the wall or upper face of the recess in which it is seated, and the screw also forms the center for the end of the post. The inner portion of the post is squared or formed with flat faces to take the hub 41 on the end of the arm 9, and thus dispense with screws, pins or other special fastenings to fix the arm in place. This construction has the additional advantage also of permitting the parts to be assembled and placed, or detached and removed without difficulty, it being evident that the disk-valve is readily inserted and set in its chamber, although the latter is cast or formed integral with and as a part of the casing; also that the arm and the post for turning it are united and easily adjusted in place by inserting the lower end of the post through the aperture in the top of the valve-chamber in which the plug or long bearing for the post is screwed.

The jointed member *d* on the outer end of the post provides a handle for turning the post in its socket. When turned down at an angle of ninety degrees, or about horizontally, as represented in Figs. 1 and 2, it will engage and set between the casing and the casing-body, thereby serving to lock the valve in position.

The attachment or staff illustrated in Fig. 8 is employed when a cock or coupling already fixed in a water-main is to be removed and a new one fixed in place. In that operation the staff is screwed into the cock from which the pipe has been removed before fixing the casing on the main-pipe, and the collar 44 of the bayonet-shaped piece is slipped on the end of the staff and its arm 47 set against the stem of the cock. On turning the staff in the proper direction the arm 47 engaging the cock will cause it to turn with the staff and be unscrewed from the main-pipe. In this operation the stop-pin 46 provided on the staff for that purpose causes the bayonet-shaped piece to turn with the staff. When the staff is used for setting a cock in place, the bayonet-shaped piece may be removed.

In the operation of tapping a water-main with this machine to connect a service-pipe the drill is first inserted and centered in the casing, which is clamped in position on the uncovered water-main by passing the chains around the pipe and drawing up the nuts

by turning the screws until the bottom rim of the casing is brought to a close seat on the saddle-plate and the latter is properly seated on the pipe. While the drill is being operated it is fed down by turning the feed-screw in the yoke, and the work is continued until the drill having penetrated the wall of the pipe it is arrested by the stop-collar 42 on the drill-stock. The drill is provided with the usual screw-threaded cutters or chasers, so as to perform the two operations of cutting the hole and tapping or threading it for the cock or nipple with the same tool, thereby avoiding the necessity of opening the casing to substitute one tool for another. As soon as the hole in the pipe is finished the yoke is detached and removed from the casing and the drill is drawn up above the level of the valve-seat to allow the valve to be closed, thereby cutting off the space below it from the space above. At such time the casing being filled by the water entering through the drilled hole, the pressure of the water is practically the same against both sides of the valve. On turning the plug-valve, however, the space above the disk-valve is opened to the atmosphere, allowing the bulk of the confined water above the valve to escape and exposing the top of the valve to the ordinary pressure of the atmosphere. The full head or pressure of the water carried by the main, therefore, is brought against the valve from beneath, with the effect to force it tightly to its seat in the recess, and no water will escape when the head of the casing is unscrewed and removed to take out the drill and place the cock in position to be fixed in the pipe. That part is now quickly and accurately placed and screwed into the tapped hole by means of the staff 43 illustrated in Fig. 8. On placing the staff and the attached cock in the casing for this final operation the top end of the staff is inserted through the stuffing-box in the head, and the latter is screwed down on the casing before the two compartments of the casing are thrown into one by opening the valve. At such time the excess of pressure against the back of the casing is removed by turning the plug-valve to the proper position to connect the lower compartment with the upper one around the closed valve, and thereby equalizing the pressure in both compartments.

In screwing the cock into place the long bearing on the head of the casing operates to advantage in quickly and accurately centering the staff and bringing the cock in true alinement with the hole in the pipe. As soon as the cock is screwed down to its seat the casing may be unfastened and removed, leaving the staff still attached to the cock to be afterward unscrewed. Or the staff can be first started by giving it a quick turn in a reverse direction and then de-

tached from the cock by taking off the head of the casing before throwing off the chains and removing the casing from the pipe.

- 5 This appliance is adapted for use in tapping a pipe from the side, or on the top, as the casing has the advantage of working equally well in any position because of its relative shortness and compact form, arising from the arrangement of the valve in its own chamber clear of the casing so as to slide in and out in a plane at right angles to the axis of the casing. When it is placed upright on the pipe or main to be tapped, 10 it will be seen that the chips or borings will drop away from the valve, and will not be liable to lodge in the valve seat or its chamber; on the other hand, when the appliance is set to work in a horizontal position, or 15 in an inclined one, the chips having no escape, would be liable to obstruct the movement of the valve and prevent it from seating tightly. Provision is made therefore for catching and holding the chips when 20 the appliance is secured to one side of a pipe in position to work the drill more or less nearly horizontally, by forming a pocket or deep recess 45 in one side of the casing, in which the chips will collect and be retained while the work is being carried on. This receptacle is seen in Figs. 2, 5, 6 and 9. In the modification illustrated in Figs. 9 and 10 the three way valve is removed from the outside of the casing and is arranged 25 directly on the slide-valve. The passage 51 connecting the upper and lower compartments is intersected by the rotatable stem or rod 49 in which the apertures or ways 52 are so arranged that by giving the rod a 30 quarter-turn the upper compartment will be put in communication with the atmosphere through the valve actuating rod 49, the rod being tubular from the valve to the end 55 of the rod outside the casing. Or by turning the rod another quarter the upper and 45 lower compartments will be put in communication through the passage 51. The two compartments are thus connected directly

through the slide-valve and not around it. The valve-actuating rod 49 is provided with 50 a hand-wheel 50 on the outer end for turning it. The rod 49 is fitted also to slide through a packing 58 on the end of the slide-valve case. The inner end of the rod or stem 49 is confined by a head 54 that prevents it from drawing out of the valve. 55

I claim:—

1. In an appliance for tapping pipes carrying fluids under pressure, the combination of a casing having a laterally extending 60 valve chamber on one side, a slidable valve adapted when opened to be seated in said chamber and when closed to separate the casing into an upper compartment and a lower compartment, the said lower compartment communicating at all times with 65 the said valve chamber, a valve seat for conducting fluid arranged between the said valve chamber and the upper compartment of the casing and comprising a thickened 70 portion of the wall of the casing located in the exterior angle between the upper portion of the casing and the laterally extending valve chamber, and a valve mounted 75 in the said valve seat, operatable from the outside of the casing and arranged, according to its adjustment, to establish communication between the said upper and lower compartments, or to cut off communication.
2. In an appliance for tapping mains, the 80 combination of a casing inclosing a cylindrical chamber in which the tapping tool operates, a valve for closing the said chamber and separating it into two compartments, a valve chamber into which the said 85 valve may be moved when opened, and a pocket opposite the edge of the valve when closed arranged to catch the chips formed by the tool when the appliance is adjusted with the axis of the tool horizontal or approximately so. 90

FRANK P. SHARP.

Witnesses:

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E. E. OSBORN.

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