(No Model.) 2 Sheets—Sheet 1.

S. D. LELAND.

SELF ACTING TAP HEAD.

No. 496,420. Patented May 2, 1893.

FIG. 1.

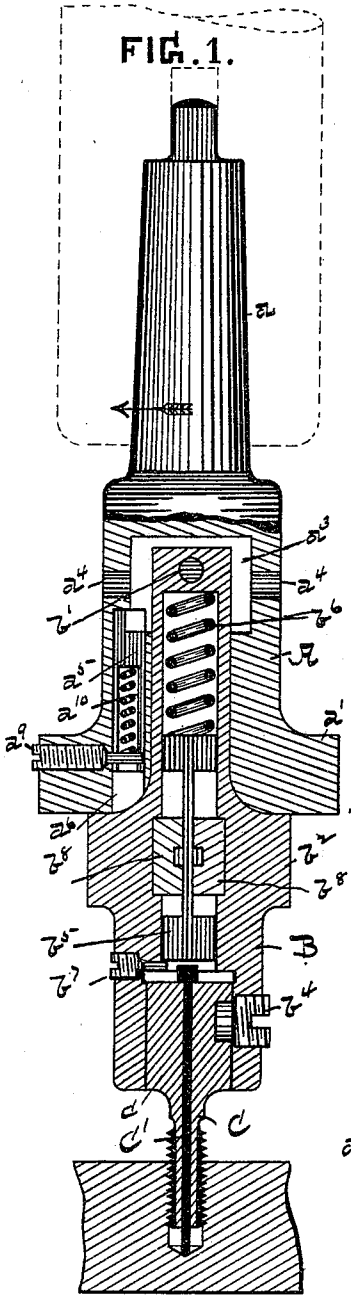


FIG. 2.

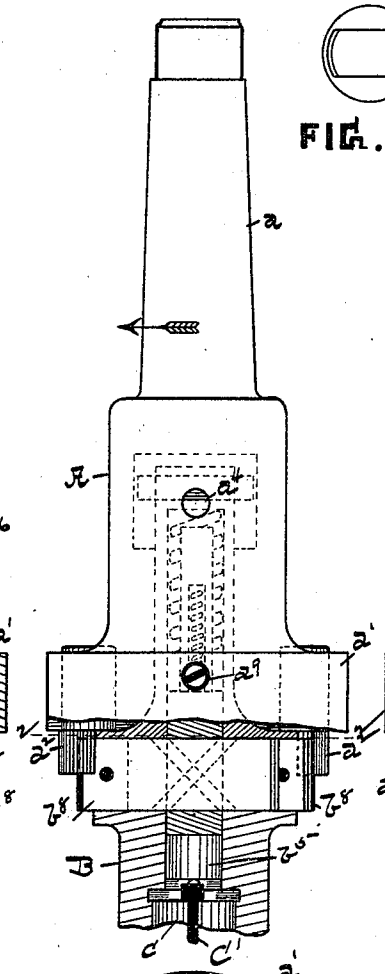
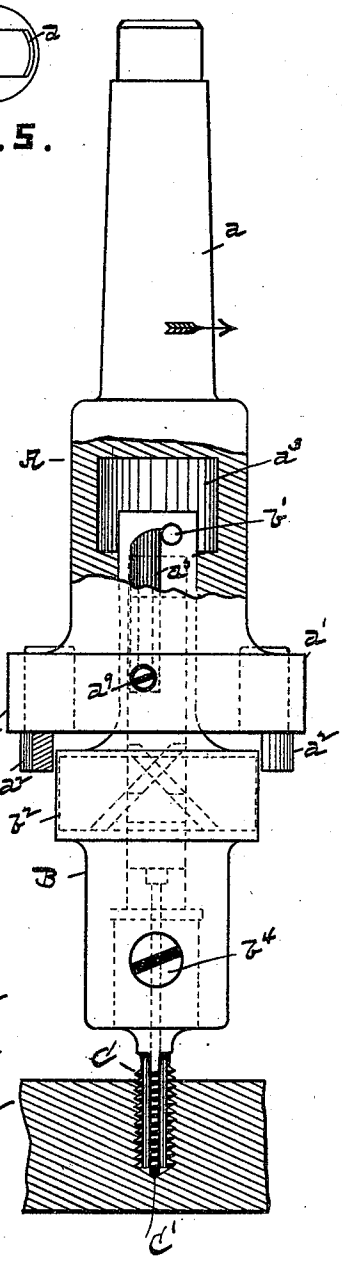


FIG. 5.

FIG. 3.



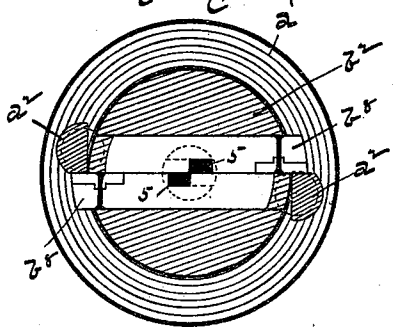


FIG. 4.

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(No Model.) 2 Sheets—Sheet 2.

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SELF ACTING TAP HEAD.

No. 496,420. Patented May 2, 1893.

FIG. 6.

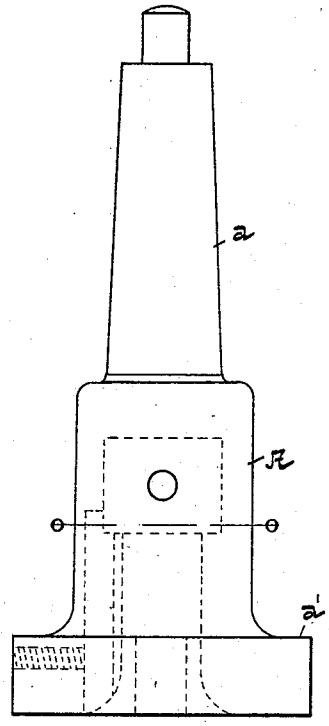


FIG. 8.

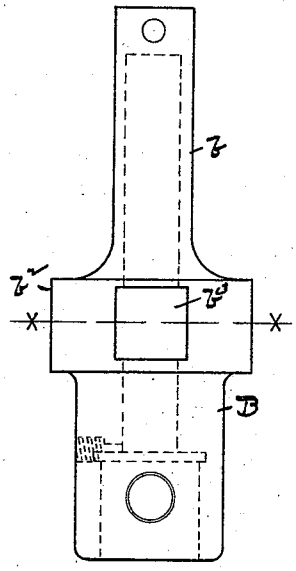


FIG. 10. FIG. 11.

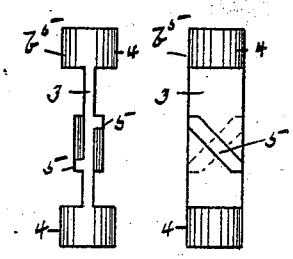
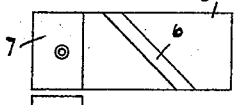


FIG. 12.

FIG. 13. b8



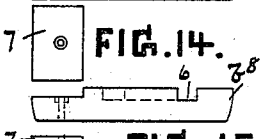


FIG. 14.

FIG. 15.

FIG. 16.

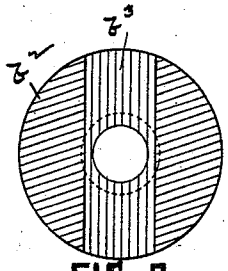


FIG. 9.

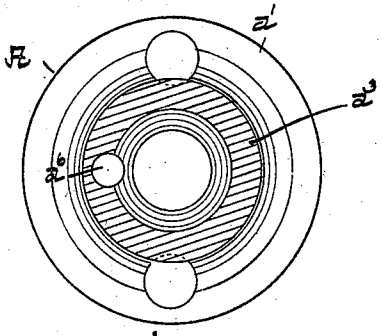


FIG. 7.

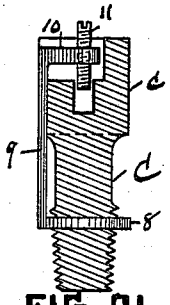


FIG. 21.

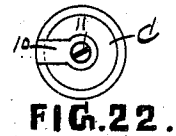


FIG. 22.

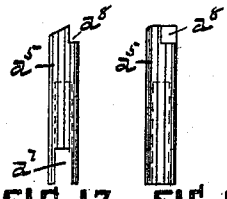


FIG. 17.

FIG. 18.

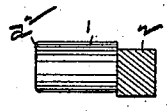


FIG. 19.

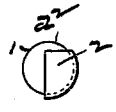


FIG. 20.

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UNITED STATES PATENT OFFICE.

SANFORD D. LELAND, OF HOLYOKE, MASSACHUSETTS.

SELF-ACTING TAP-HEAD.

SPECIFICATION forming part of Letters Patent No. 496,420, dated May 2, 1893.

Application filed April 2, 1892. Serial No. 427,481. (No model.)

To all whom it may concern:

Be it known that I, SANFORD D. LELAND, of Holyoke, in the county of Hampden and State of Massachusetts, have invented a new and useful Improvement in Self-Acting Tap-Heads, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

In Letters Patent of the United States No. 393,511, issued to me on the 27th day of November, A. D. 1888, I have shown, described and claimed a self-acting tap-head comprising a friction clutch by means of which a revolving movement is transmitted from a revolving spindle to the tap, and automatic releasing devices for rendering said clutch inoperative to turn the tap, as the latter approaches the bottom of the hole within which it is working.

The object of my present invention is to improve the construction of said tap-head by reducing the number of parts, thereby lessening its cost, and by providing it with a positive clutch mechanism in lieu of the friction clutch therein utilized.

To these ends my invention consists in the tap-head constructed and operating as hereinafter fully described and particularly pointed out in the claims.

Referring to the drawings, in which like parts are designated by like letters and numerals in the several figures, Figure 1 is a central vertical section of the tap-head. Fig. 2 is a side elevation of the upper member and a vertical section of the lower member, the same being shown revolved one-fourth of a revolution from the position shown in Fig. 1. Fig. 3 is a side elevation, partly in section, illustrating the manner of withdrawing the tap by reversing the movement thereof. Fig. 4 is a cross-section taken upon line 2—2 of Fig. 2. Fig. 5 is a plan of the upper end of the upper member of the device. Fig. 6 is a side elevation of said upper member. Fig. 7 is a cross-section thereof, taken upon line *o—o* of Fig. 6. Fig. 8 is a side elevation of the lower member of the head. Fig. 9 is a cross-section thereof taken upon line *x—x* of Fig. 8. Figs. 10, 11 and 12 are an edge, side and plan view, respectively, of the cam-block which actuates the sliding dogs. Fig. 13 is a side view of one of the sliding dogs. Fig. 14 is a similar view of one of the detachable face-plates with which said dogs are preferably provided. Figs. 15 and 16 are edge views of said dog and plate respectively. Figs. 17 to 20, inclusive are detail views of the spring-actuated pawl by which the reversal of the movement of the tap is effected, and of the engaging lugs of the upper member. Figs. 21 and 22 are detail views illustrating the application of my invention to a pipe tap.

The letter A designates the upper member of the tap-head, B the lower member thereof, and C the tap proper. The member A terminates at its upper end in the tapering stem *a* adapted to be inserted in the spindle-socket of a drill-press, whereby the tap-head is operated in the usual manner. At its lower end the member A terminates in the outwardly projecting, annular flange *a'*, and is provided with the downwardly projecting lugs a^2, located at diametrically opposite points in said flange. I prefer to make said lugs a^2 as shown in Figs. 19 and 20, that is to say, with a round stem 1 adapted to be driven into similarly shaped holes in the member A and a head 2 having two of its sides flattened to form bearing surfaces to engage the contact devices on the lower member, as hereinafter described. The member A is bored centrally to form a socket to receive the stem of the lower member, and said bore at its upper end is increased in diameter to form the chamber a^3, communicating with which chamber are two oppositely located holes a^4. The lower member B is provided with the stem *b* adapted to snugly fit within the bore of the upper member and to revolve freely therein, said stem having a hole extending transverely therethrough, at its upper end, to receive a pin *b'* of slightly less length than the diameter of chamber a^3 in member A, as shown, whereby said pin, while permitting a revolving and a limited vertical movement of the upper member upon the lower, will prevent the complete withdrawal of the latter from the former. By bringing the hole in the stem *b* in alignment with the holes a^4 the pin *b'* can be readily inserted in and removed from the former. At the base of stem *b* the lower member is enlarged to form hub b^2 which has the rectangular opening b^3 extending transversely therethrough, as shown in Fig. 8. Said lower

member is also bored centrally from its lower end to a point near the upper end of stem b, and is counter-bored at its lower end to form the socket to receive the shank c of the tap C. I intend to employ a series of taps, of various sizes, the shanks of which will be made of a proper size to fit the socket in the member B, and thereby avoid the use of the bushings described in my said previous patent. A screw b^4 entering a tapped hole in the lower end of member B, and having its inner end adapted to enter a hole or recess in the shank of the tap, as shown, may be employed to secure the tap in its socket, or any suitable means for the purpose can be used. Within the bore of the lower member is located the cam-block b^5 which, at its ends, is of such diameter as to cause it to snugly fit said bore, while being free to have longitudinal movement therein. A coil spring b^6 located in the upper end of the bore, normally retains said block in its lowest position, while a screw b^7 having its inner end adapted to project within the bore, as shown in Fig. 1, serves to permit the insertion of said block within the bore and to prevent its descent below said screw after being so inserted. The central portion of the block b^5 is removed upon opposite sides thereof, thus leaving a central, flattened stem 3 uniting the heads 4, and upon opposite sides of said stem are located oppositely inclined ribs 5, whose planes bisect each other, see Figs. 10, 11 and 12. Within the rectangular opening b^3 in hub b^2 are located two sliding dogs b^8 the length of which corresponds substantially with the diameter of said hub, which dogs are provided within their adjacent faces with the oppositely inclined grooves 6, whose planes intersect each other, as shown by broken lines in Figs. 2 and 3. The dogs b^8 are placed within the hub with their grooves embracing the ribs 5 on the block b^5, and by the action of said ribs within said grooves, a longitudinal movement of said block within the bore of the lower member will cause a positive movement of said dogs, in opposite directions within the opening in hub b^2, and will cause the outer ends of the dogs to project beyond the surface of the hub, as shown in Fig. 2, or to be withdrawn within said hub, as shown in Fig. 3, as the block is moved in an upward or a downward direction. The parts just described are so arranged that spring b^6 will normally retain the block b^5 in its lowest position, where its lower end rests upon screw b^7, and will retain the dogs b^8 in their outermost position, wherein their outer ends lie in the plane of revolution of the lugs a^2 on member A, as shown in Figs. 1 and 2. In such normal position, therefore, a revolving movement imparted to the upper member of the head will be transmitted to the lower member thereof and in the same direction.

The means for automatically releasing the clutch preferably consists, as in my previous patent, of a rod C′ centrally located within the tap C, in such manner as to be capable of lengthwise movement therein, said rod having its lower end projecting beyond the end of the tap, and having at its upper end a head to prevent it from escaping downwardly through the tap. The operation of said releasing device will be fully apparent by reference to Figs. 1 and 2, in which it will be seen that, as the tap approaches the bottom of the hole in which it is operating, the rod C′ gradually rises within the tap, carrying with it cam-block b^5 and through the latter retracting dogs b^8, until the ends of the latter are entirely withdrawn within hub b^2, when the revolving movement of the lower member and of the tap will cease. The operator then reverses the direction of movement of the spindle of the drill-press and of the upper member of the head, and raises said parts until pin b' at the upper end of stem b is brought into contact with the bottom of chamber a^3 of member A. In my previous patent, referred to, a fixed lug is located at the bottom of said chamber a^3, which, by its contact with said pin b', transmits the reverse movement of the upper member to the lower member, and withdraws the tap from the hole. I have found, however, that a careless operator is liable to raise the upper member of the head before reversing the movement thereof, and, the pin being thereby brought into contact with said lug while it is still operating in the forward direction, and the tap being at the bottom of the hole, breakage of the tap or of some portion of the head is caused. In order to render it impossible for the carelessness of an operator to thus cause injury to the tap or head, I employ in lieu of said fixed lug the pawl a^5, shown detached in Figs. 17 and 18, which is preferably made round in cross-section, whereby it is adapted to occupy a hole a^6 bored in the member A, said hole extending from the bottom of said member to, and communicating with the chamber a^3. I prefer to locate the hole a^6 in such position that a portion only of its area in cross-section will lie within the plane of the bottom of chamber a^3, as shown in Fig. 1, thus leaving only a portion of the upper end of the pawl a^5 exposed to the action of pin b'. Pawl a^5 is bored centrally from its lower end for a portion of its length, and at said lower end is provided with the transverse slot a^7. At its upper end said pawl is cut away to form the recess a^8 having horizontal and vertical walls, and has said upper end beveled at one side of said recess, as shown. The pawl is inserted within the hole a^6 with its beveled surface, at its upper end, facing in the direction of the forward revolving movement of member A, in which position it is retained by a screw a^9, which enters a tapped hole in the flange a' of member A, and has its inner end reduced in diameter sufficiently to enable it to loosely enter slot a^7 in the pawl, and a coil spring a^{10}, which is located within the bore of the pawl and bears at its ends against the upper end

of said bore and said screw. The pawl is thus held in its highest position by a yielding pressure, and, consequently, should the operator raise the upper member of the head before reversing its motion, the beveled surface of the pawl will be brought into contact with pin b' and the pawl will be depressed and will pass under the pin without exerting strain upon the tap or any portion of the head. When the motion of the upper member is reversed, however, the vertical wall of recess a^8 will engage said pin b', and will revolve the lower member to withdraw the tap from the hole, in the same manner as the lug shown in my said previous patent. As the outer ends of the dogs b^8 are exposed to considerable wear upon their inner faces, or the faces which engage the lugs a^2, I prefer to provide said dogs with bearing plates 7, see Figs. 13 to 16 inclusive, which plates will preferably have a small hub projecting from their rear sides to enter a recess in the face of the dog, and can be detachably secured to the dogs by bolts, or in any convenient manner. Said bearing plates can thus be renewed as often as may be necessary, and at slight expense.

In Figs. 21 and 22 I have illustrated the application of my invention to a pipe-tap, in which there is substituted for the rod C' a releasing device composed of a ring 8 surrounding the tap and adapted to be brought against the end of the pipe as the tap approaches the bottom of the surface in the pipe which it is desired to operate upon, a stem 9 extending upwardly to and lying within a vertical groove in the shank of the tap, an inwardly extending arm 10 at the upper end of said stem, occupying a horizontal recess in the top of said shank, and an adjusting screw 11, entering a tapped hole in said arm, in the plane of the axis of the tap, whereby the distance between ring 8 and the lower end of the tap can be accurately adjusted. As the device thus constructed is moved upwardly, when ring 8 is brought into contact with the end of the pipe, the upper end of screw 11 engages the lower end of cam-block b^5 and raises the latter, thus releasing the clutch and stopping the movement of the tap, as previously described. By using said device in connection with a pipe-tap, an accurate gage to indicate upon the tap itself the depth to which it is desired to operate within the tap, is provided, as well as means for automatically stopping the tap at the proper point, as just described.

It will be observed that the tap-head herein described is simple in construction, composed of few parts, and positive in all of its movements.

I do not wish to limit myself to the exact details of construction herein shown and described, as it is obvious that modifications therein can be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The self-acting tap-head herein described consisting of an upper member having at its lower end downwardly projecting lugs, and a lower member having at its upper end radially movable dogs adapted to be engaged by said lugs on the upper member and to be withdrawn from said engagement, a vertically movable cam-block located within said lower member and having positive engagement with said dogs, whereby movement of the former will be transmitted to the latter, a tap carried by said lower member, and a gravity device carried by said tap in position to engage the material in which the tap is operating as the latter approaches the bottom of the surface to be tapped, said gravity device at its upper end abutting against said cam-block, combined and operating substantially as and for the purpose described.

2. In a tap-head, an upper member having at its lower end a central socket and two downwardly projecting lugs located at diametrically opposite points thereon, a lower member having at its upper end a stem adapted to project within the socket in the upper member, and having mounted within a transverse opening therein two sliding dogs adapted to be engaged by said lugs on the upper member when said dogs are in their outermost positions, each of said dogs being provided with a cam-groove substantially as described, a cam-block located within a central bore in said lower member and having ribs entering the grooves in said dogs, a spring normally retaining said block in its lowest position, a tap adapted to be seated in a socket in said lower member, and a releasing device carried by said tap and projecting beyond the ends thereof, combined and operating substantially as described, whereby said releasing device is adapted to actuate said cam-block automatically, to disconnect said upper and lower members.

3. In a tap-head, member A having its lower end bored centrally, and having the lugs a^2 projecting downwardly from said lower end, member B having stem b and having dogs b^8 mounted to move transversely therein, cam-block b^5 mounted in a central bore in said member B and engaging said dogs substantially in the manner described, spring b^6 bearing against the upper end of said block, a stop to support said block at its lower end, tap C and rod C', combined and operating substantially as set forth.

4. In a tap-head, member A having at its lower end a central bore and having at the upper end of said bore chamber a^3, and a spring-actuated pawl projecting above the bottom of said chamber, member B having stem b projecting within said chamber and having pin b' passed transversely through the upper end of said stem, a positive clutch mechanism by which the revolving movement

of said member A is transmitted to member B, and mechanism for automatically releasing said clutch, combined and operating substantially as and for the purpose set forth.

5. In the self-acting tap-head herein described, the combination with member A having chamber a^3, of pawl a^5 located within hole a^6 in said member and having its upper end projecting within said chamber, said pawl having its upper end beveled substantially as shown, and having the slot a^7 at its lower end, spring a^{10} located within a central bore in said pawl, and screw a^9 having its inner end inserted within the slot in said pawl, substantially as and for the purpose described.

6. In the self-acting tap-head herein described, member B having the transverse opening b^3 therein and having dogs b^8 located within said opening and adapted to have free movement therein, said dogs having the slots or grooves 6 therein, in combination with block b^5 located within a central bore in said member, said block being composed of the ends 4 united by stem 3, and having the inclined ribs 5 projecting from opposite sides of said stem within the grooves in said dogs, spring b^6, and stop-screw b^7, arranged and operating substantially as described.

7. In a tap-head, member A having lugs a^2 in combination with member B having dogs b^8 and cam-block b^5, said dogs being provided with the detachable bearing-plates 7, substantially as described.

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Witnesses:
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J. E. CHAPMAN.