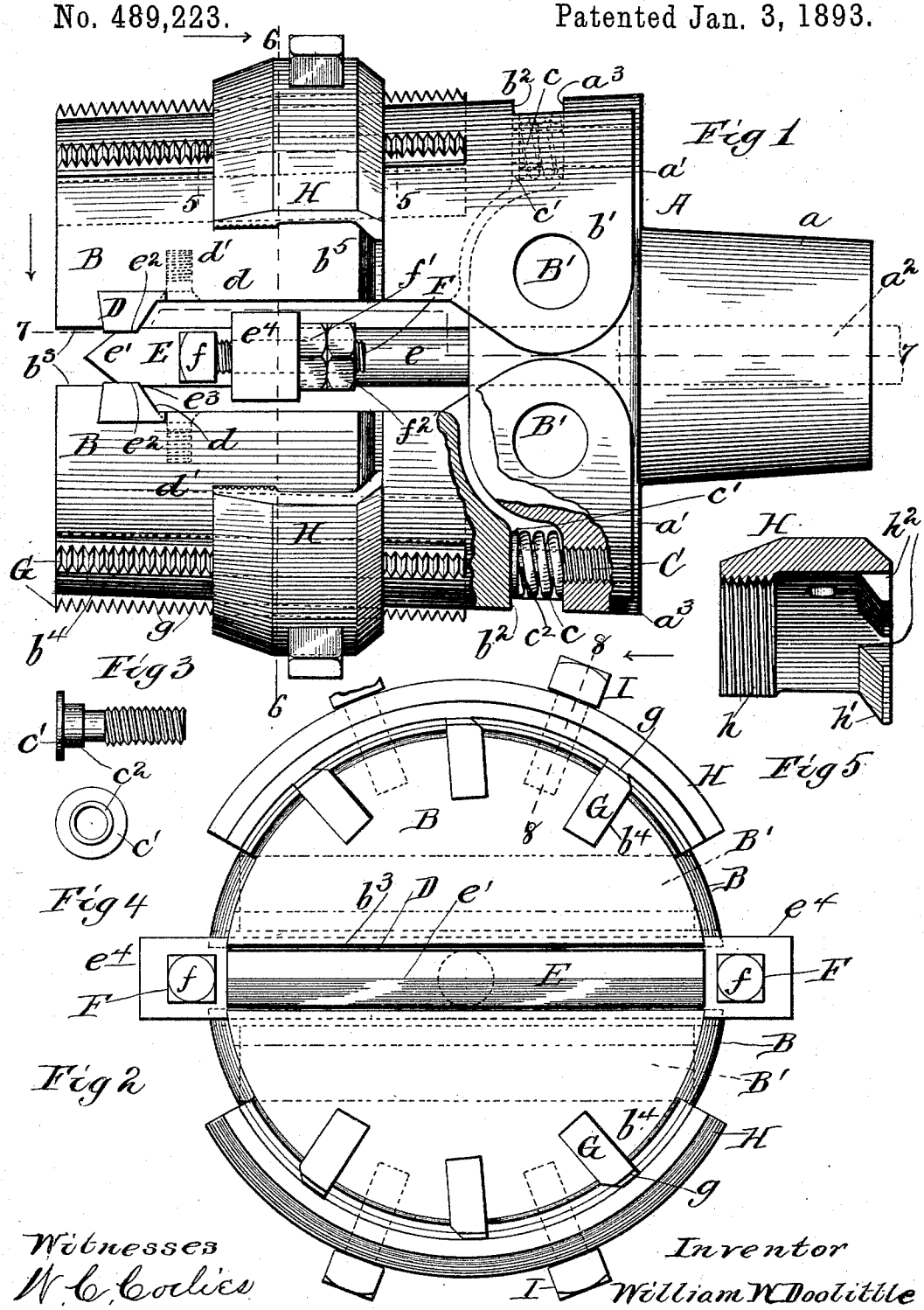
(No Model.) 2 Sheets—Sheet 1.

W. W. DOOLITTLE.

AUTOMATIC COLLAPSIBLE TAP.

No. 489,223. Patented Jan. 3, 1893.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

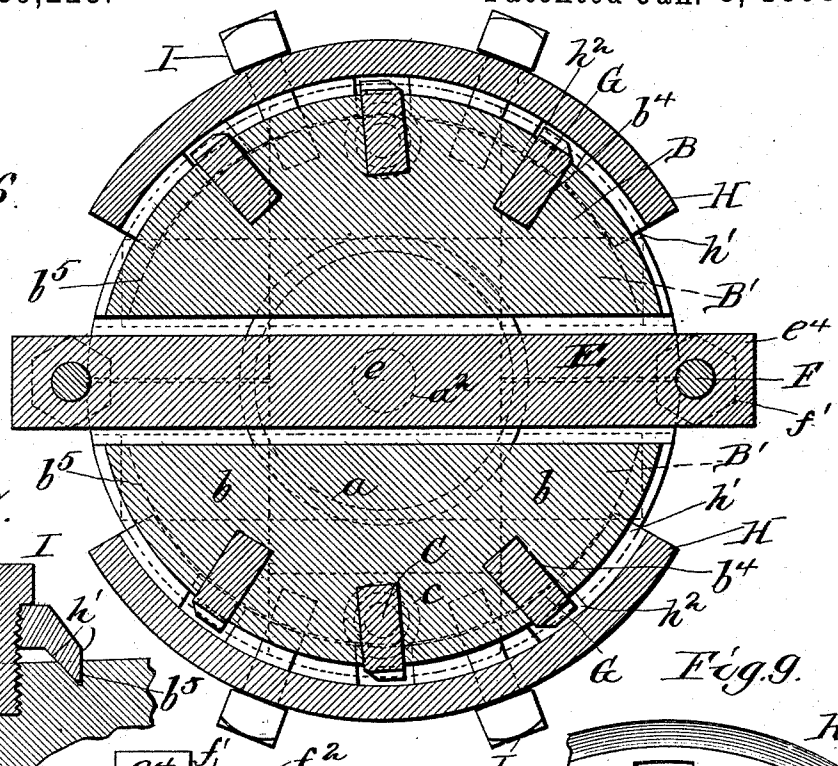


Fig. 8.

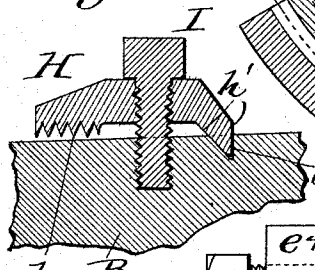


Fig. 9.

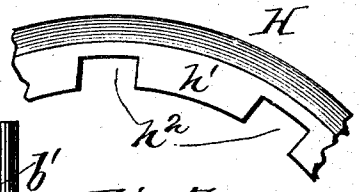
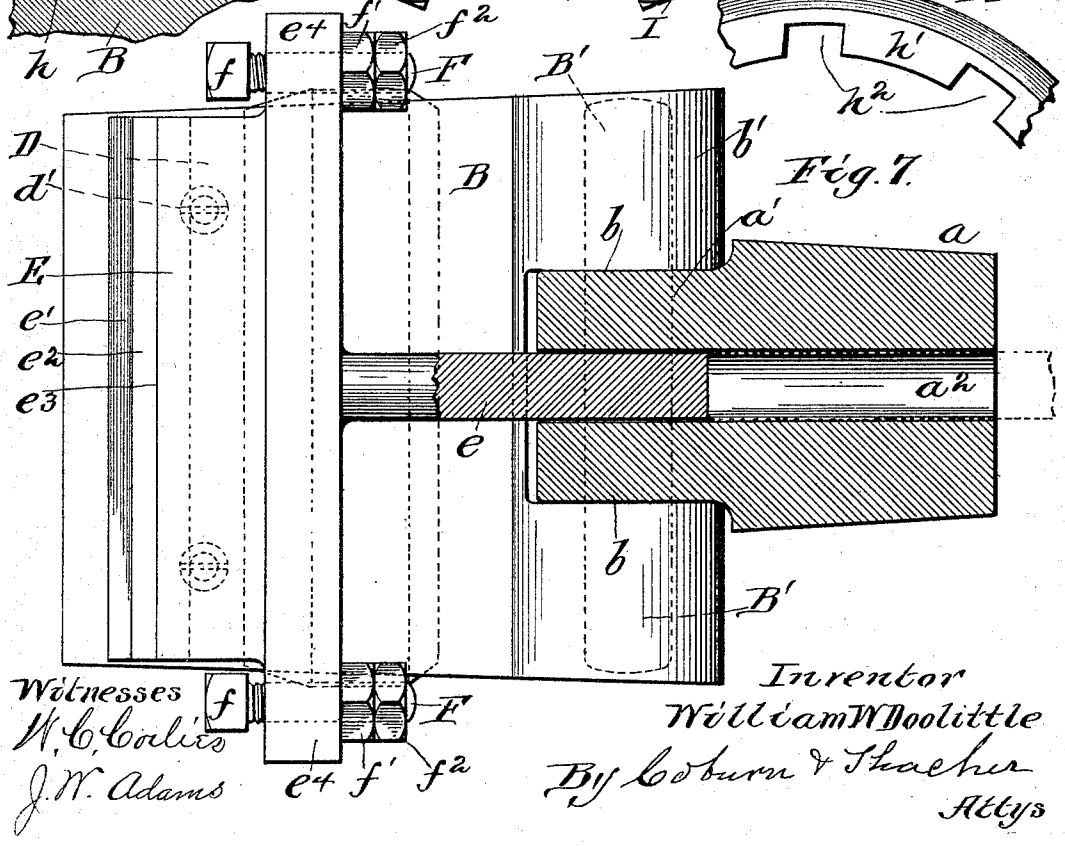


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM W. DOOLITTLE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE CRANE COMPANY, OF SAME PLACE.

AUTOMATIC COLLAPSIBLE TAP.

SPECIFICATION forming part of Letters Patent No. 489,223, dated January 3, 1893.

Application filed March 26, 1892. Serial No. 426,518. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. DOOLITTLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Collapsible Taps, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation, partly broken away, of a tap embodying my invention; Fig. 2, a front end elevation of the same; Fig. 3, an elevation of the screw-pin and washer, detached; Fig. 4, a rear elevation of the washer, detached; Fig. 5, a detail cross-section of the cutter retaining segment, taken on the line 5—5, of Fig. 1; Fig. 6, a cross-section, taken on the line 6—6, of Fig. 1; Fig. 7, a plan section, taken on the broken line 7—7, of Fig. 1; Fig. 8, a detail section, taken on the line 8—8, of Fig. 2; and Fig. 9, a rear elevation of a section of the retaining segment.

My invention relates to taps of the collapsible type and the purpose of my present improvements is to provide means, whereby the tap is automatically collapsed when the work reaches a certain point, so that the operation will cease at the required point whether an attendant is present or not. I have shown in the drawings a tap of this description embodying my invention in one practical way; I will now describe in detail the construction and operation of the tap thus shown, and the particular improvements which I believe to be new and wish to secure by Letters Patent will then be definitely specified in claims.

In the drawings, A represents what may be called the head of the tap. This head consists of a circular shank, a, and a rectangular head, a', arranged at right angles to the axis of the shank, extending outward on each side beyond the latter and of a width about the same, or a little less than the diameter of the shank. The cross-head and shank thus form a kind of T-head; and a central perforation, a^2, extends through both. The main or body portion of the tap is composed of two twin parts or halves, each of which is hinged to the cross-piece of the head. These parts are of exactly the same construction and, therefore, a description of one only will be necessary, but the corresponding parts of each will be designated by the same letters in the drawings for the purpose of identification. Each of these twin members, B, is the section of a cylinder in general form, the section, however, being somewhat less than a semi-cylinder and also with its exterior or convex surface slightly tapering. Each section B is cut out at its larger end to form a recess, b, extending inward and of a width adapted to receive one of the projecting ends of the cross-head a'. This recess commences at the inner or flat face of the section, and extends out through to the circumference. The extremities of the piece B on each side of the head are prolonged slightly to form ears b' and the sections B are hinged to the head by pivot-pins or bolts, B′, passed through the ears and the T-head, as seen in Figs. 1 and 7. Obviously the two parts of the tap will swing or vibrate on these hinges to and from each other, for as they are less than semi-cylinders in size there will be an open space between their two plane faces, as seen in Figs. 1 and 6. The recess is constructed relatively to the end of the cross-head which it is to receive, so that when the hinged tap sections are thrown outward until they are stopped by a device for this purpose, they will form the regular or fully expanded tap—that is, their exterior will lie in the circumference of such a tap of slightly tapering form. The stop referred to must be constructed to prevent the two hinged sections from moving outward beyond this point and may be any device suitable for this purpose; as shown in the drawings it is as follows: The extremities of the cross head a' are cut away on the inside face to form seats a^3 outside of the pivots, as seen in Fig. 1. The end of the tap section B immediately opposite is cut away between the ears to make a flat face or seat, b^2, between which and the seat on the cross-head there is left a free space, as seen in Fig. 1. A screw-pin, C, is set into the seat a^3 and extends out into this free space, and is adjusted to form a stop against which the rear end of the hinged section will strike as it is thrown outward and, of course, the pin is set to stop this movement at the proper point sug-

gested above. A spring, *c*, is arranged around the pin and is of such length that it is compressed when the hinged section is turned into its outer adjustment, as seen in Fig. 1; obviously these springs will operate to swing the said sections inward toward each other and hold them in such position when released from their outward adjustment and left free to swing inward. This results from the recoil force of the spring upon the seat b^2 of the section. In the drawings, a washer, *c'*, is shown mounted on the end of the pin, being provided with a sleeve, c^2, to permit a certain sliding movement. As here shown the spring acts directly against the washer which rests upon the end face b^2 of the hinged section. This washer is to protect from dirt and may be dispensed with, if desired; the spring will operate without it.

At the front end of each section B there is a narrow rib or flange, b^3, running entirely across the flat face of the section and just back of this rib is set a cross-bar, D, of hard metal to stand wear. The bar is set in the flat face of the section B by a kind of dovetail joint, as seen in Fig. 1, and has an inclined inner face, *d*. The bar is secured by means of screws, *d'*, which are set into the hinged piece B against the inner edge of the bar, as seen in Fig. 1. The faces of these bars are just a little higher than the faces of the cross-ribs on the tap sections.

In the space between the tap sections in rear of the bars D is a wedge-plate, E, extending across from side to side and mounted in position by means of a stem, *e*, fitted into the aperture a^2 in the T-head, as seen in Fig. 4, and being free to slide in said aperture, while the plate itself does not fill the entire length of the opening between the hinged sections and so may have a sliding movement back and forth therein. This plate at its front end is provided with a tapering or wedge-shaped edge, *e'*, and just back of the inclined faces of this wedge, the two faces of the plate are cut down slightly, so as to provide two narrow, flat seats, e^2, leaving slight shoulders, e^3, just back of them. When this wedge plate is thrust forward the wedging front edge enters between the cross-bars D and forces them apart, and the thickness of the plate is such that when forced out far enough to seat the said cross-bars respectively on the narrow seats e^2, the tap sections will be thrown outward to their fullest extent against the stop-pins C; the shoulders e^3 will strike against the bars and prevent the wedge-plate from being thrust out farther than is necessary for this movement. This adjustment in which the tap is brought into working condition is shown in Fig. 1 of the drawings; obviously if now the wedge-plate is withdrawn the hinged sections are free to vibrate inward toward each other and the springs heretofore described will give them this movement and tend to hold them there in a condition of collapse. Now I provide for withdrawing this wedge-plate automatically and the means for accomplishing this, shown in the drawings, are as follows: At the rear edge of the plate there are extensions outward which form narrow arms, e^4, projecting out from the opening between the hinged sections on each side of the tap. In these arms are set respectively screws or screw-pins, F, the heads, *f*, being arranged to the front or toward the outer end of the tap. These screw-pins extend through the arms in which they are mounted and are provided back of the wedge-plate with fastening nuts, *f'*, (and if desired jam nuts, f^2,) so that they can be set at any point desired. The screw-pins are adjusted in their seats and set at such points that their heads will stand in the plane where the work of the tap is to end;—that is to say, they are set back just that distance from the front end of the tap which the latter is intended to operate; obviously then the article upon which the tap is working will abut against the heads of these pins when the point of finish is reached and the continued movement of the tap will force the pins inward and thereby drive the wedge-plate inward, thus releasing the hinged sections of the tap and permitting them to collapse, as already described.

The cutters may be mounted in the tap sections in any suitable way. I have shown in the drawings an improved mode of mounting. Here long cutting dies, G, are employed, being almost as long as the hinged sections in which they are mounted. Each section of the tap is provided with a series of long, deep grooves, b^4, cut into the surface of the sections and running lengthwise thereof, nearly to the rear ends, as seen in Figs. 1 and 6. These grooves are rectangular and the cutting dies G are of similar shape, so as to be seated therein, the dies being provided on their outer edges with the usual cutting teeth, *g*, which project beyond the surface of the tap sections.

The cutters are secured in place by means of ring segments, H, which are adapted to fit over the exterior of the tap sections. On the inside of each segment, there is at the front edge, a threaded section, *h*, while at the rear edge there is an internal rib or flange, *h'*, through which notches, h^2, are cut adapted to receive the projecting portion of the cutters, while the threaded section at the front engages the teeth of the said cutters and so holds the cutting dies in any position of adjustment by securing the ring segments to the hinged sections, which is accomplished by screws, I, passing through the segments and entering threaded openings in the hinged sections, as seen in Figs. 6 and 8.

As a means for accurately fixing the ring segments always in the same place, a circumferential groove, b^5, may be cut in the tap sections into which the internal rib or flange *h'* of the segments fits, as seen in Fig. 8. This provides for the adjustment of the long cutters until they are used up and also for securing them firmly in proper position, while

the fastening device is readily detachable for the adjustment or removal of the said dies. As already explained the tap thus constructed is automatically collapsible. The wedge plate may also be restored to working position automatically by any suitable device, if desired, or it may be forced into such position by an attendant, according to choice. The stop pins in the wedge-plate being adjustable, as described, it is evident that the working distance of the tap may be regulated by changing the position of the screw-pins.

In many details of construction there may be changes and other devices for adjusting and holding the hinged sections to their working position and for fastening the cutting dies in their seats may be substituted for those here shown and described and yet the feature of the hinged tap sections be retained; I contemplate such changes, the main feature of my invention being the construction of the tap with the two hinged twin sections.

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

1. In a collapsible tap, a head, in combination with a two-part body, the twin sections of which are hinged to the head by a joint which permits them to swing inward toward each other, and an adjustable device for setting and holding the hinged sections in their outward or working adjustment, substantially as described.

2. In a collapsible tap, a head, in combination with twin body sections hinged thereto and with a free space between their inner faces, a stop to limit the outward vibration of said sections, an adjustable device for setting the same in said outward or working adjustment, and an automatic device for withdrawing the latter at a certain point, whereby the tap is automatically collapsible, substantially as described.

3. In a collapsible tap, the head A, in combination with the twin sections B hinged to said head, and the spring *c* arranged behind each hinged section outside of its pivot and immediately between the head and the inner end of the section, whereby the said sections are swung inward toward each other when released, substantially as described.

4. In a collapsible tap, the head A, provided with a cross-head *a'*, in combination with the twin body sections B, provided with a recess *b* at their rear ends, adapted to receive the ends of the cross-head to which they are pivoted, stop pins C and springs *c* set in each recess between the ends of the cross-head and the rear ends of the hinged sections, and an adjustable device for setting and retaining the hinged sections in their extreme outward adjustment, substantially as described.

5. In a collapsible tap, the twin sections B hinged to a rotary support and each a segment of a cylinder, whereby a free space is left between them, in combination with a sliding wedge plate E arranged in the space between said sections and adapted to slide back and forth therein to adjust and set the said sections, substantially as described.

6. In a collapsible tap, the head A, in combination with the twin tap sections B hinged thereto, a stop to limit their outward vibration, the cross-bars D set in the inner faces of the sections, the sliding wedge-plate E adapted to enter between said bars to set the sections in working position, and projections extending out from said plate on each side of the tap in the path of the work, whereby the wedge will be withdrawn automatically at a certain point, substantially as described.

7. The hinged tap sections B arranged with a free space between their inner faces, in combination with the cross-bars D, the sliding wedge plate E, provided with stem *e* mounted in the head and with projections e^4 extending out beyond the tap on opposite sides thereof, and the adjustable screw-pins F set in said projections and standing in the path of the work, substantially as described.

8. In a tap, the sections B provided with longitudinal grooves b^4 and circumferential groove b^5, in combination with the cutting dies G mounted in said grooves b^4 and ring segments H provided with threaded section *h* and rib *h'* secured upon the outside of the said sections, substantially as described.

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