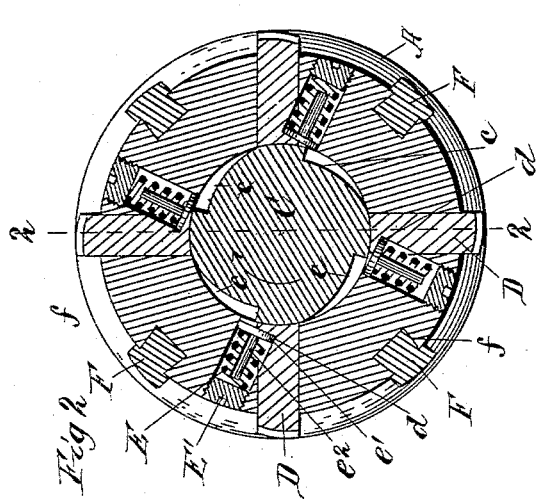
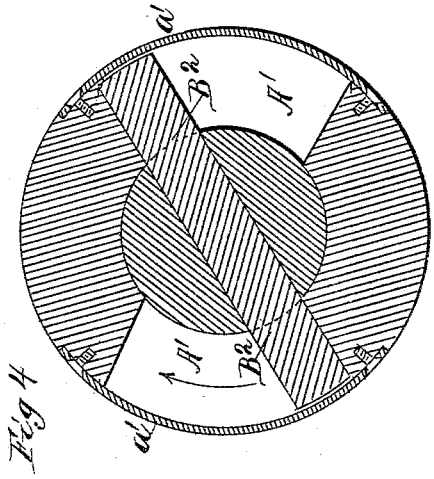
(No Model.)

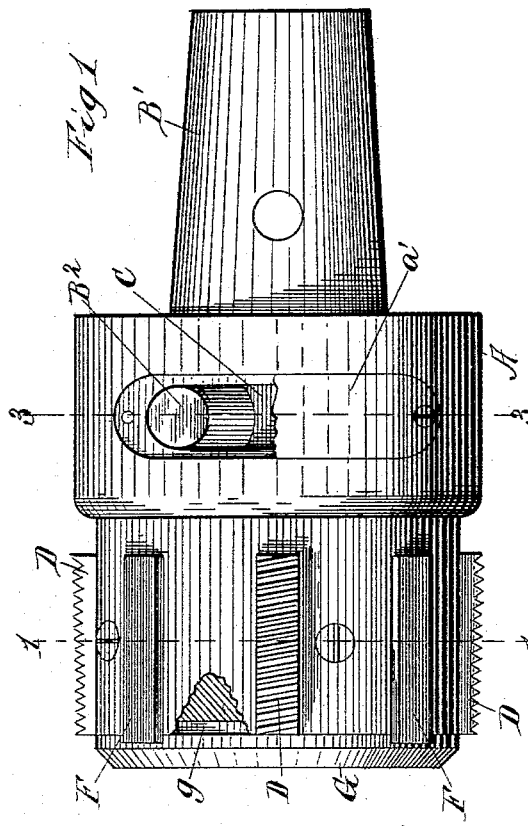
J. T. HAYDEN.

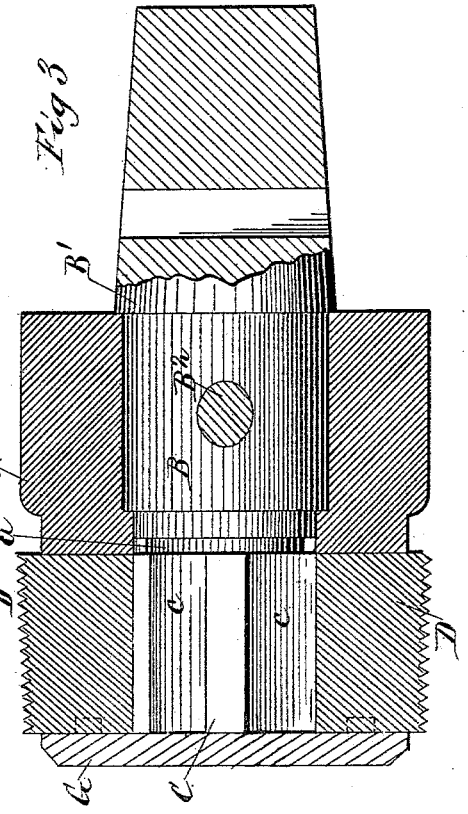
COLLAPSING TAP.

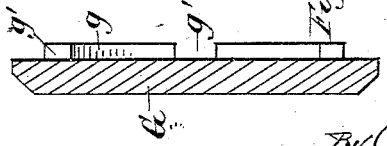
No. 378,310. Patented Feb. 21, 1888.











Witnesses
W. C. Coulés
A. M. Best.

Inventor
James T. Hayden.

By Coburn & Thacher
Atty's.

UNITED STATES PATENT OFFICE.

JAMES T. HAYDEN, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE CRANE BROS. MANUFACTURING COMPANY, OF SAME PLACE.

COLLAPSING TAP.

SPECIFICATION forming part of Letters Patent No. 378,310, dated February 21, 1888.

Application filed October 15, 1887. Serial No. 252,486. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. HAYDEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Collapsing Taps, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of an apparatus embodying my invention; Fig. 2, a transverse sectional view of the same, taken on the line 1 1 of Fig. 1; Fig. 3, a longitudinal sectional view taken on the line 2 2 of Fig. 2; Fig. 4, a transverse sectional view taken on the line 3 3 of Fig. 1, and Fig. 5 a detail sectional view of the end plate detached.

Like letters refer to like parts in all the figures of the drawings.

My invention relates to collapsing taps, or, in other words, to that class of taps employed in cutting female screw-threads, in which the cutters are drawn radially inward after the operation of cutting, in order to permit the ready disengagement of the tap from the article operated upon.

The object of my present invention is to provide a tap of this description which shall be automatic in its action and cheap and simple in construction; and to these ends my invention consists in certain novel features, which I will now proceed to describe, and will then particularly point out in the claims.

In the drawings, A represents the head or body of the tap, which is recessed longitudinally along its center, as shown at *a*, to receive the spindle B. This spindle is provided at its rear end with a shank, B′, by means of which it may be attached to the revolving spindle of a lathe or other suitable device for operating the same. At its forward end the spindle B is provided with a cam, C, having inclines *c*, corresponding in number to the number of the cutters employed, which in the present instance is four, although this number may obviously be varied, as desired. The threading-cutters D are mounted in radial slots in the head A, in which slots they are capable of moving in and out, and are held against the respective inclines *c* of the cam C by means of suitable springs, E. In the present instance I have shown these springs arranged as follows: At the side of each cutter I form through the head A a cylindrical aperture, *e*, inclined with relation to the cutter as shown, and closed at its outer end by a screw-plug, E′, which forms an abutment for the outer end of the spring E. At the inner end of the aperture *e*, I place a movable disk, *e′*, fitting within the aperture, and provided with a stem or shank, e^2, extending centrally outward within the coil of the spring E, as shown. The cutter D is provided with a seat, *d*, in its side near the inner end, against which the disk *e′* is held by the spring E. It will be seen that from this construction each cutter is held against the cam by its spring in an obvious manner, and that the spring may be readily inspected, removed, or replaced by the removal of the screw-plug E′, which latter part also serves to adjust the tension of the spring in an obvious manner.

The head A is capable of a movement of rotation around the spindle B, and in order to limit this movement I provide in the said head a transverse slot, A′, the ends of which are preferably closed by plates *a′*, in order to protect the interior working parts. The spindle B is provided at this point with suitable projections, which engage with the walls of the slot A′, and thereby limit the rotary motion of the spindle within the head. These projections are preferably formed by means of a transverse pin, B^2, extending diametrically through the spindle and projecting therefrom at each end, as shown more particularly in Fig. 4. I prefer this construction for the reason that it affords a ready means for assembling and separating the parts, since by removing the plates *a′* the pin B^2 may be placed in position from either end of the slot A′, and may as readily be removed when desired.

Upon the exterior of the head A, I provide a series of reaming-cutters, F, arranged one between each pair of threading-cutters and extending slightly forward of the said cutters, as shown in Fig. 1. These reaming-cutters may be placed in position and secured in any desired manner, the method which I prefer being that shown, in which each cutter is pro-

vided with a dovetailed base, *f*, which fits in a corresponding dovetailed groove in the periphery of the head.

G represents an end plate or cap which covers the front end of the apparatus, it being provided with a circular flange, *g*, which fits in a corresponding groove in the head to hold the same in place. The flange *g* is provided with slots *g'*, through which the threading-cutters D pass, so as to permit the free radial movement of the cutters.

The operation of the device is as follows: The article to be threaded is mounted in a suitable stationary chuck, and the shank B' of the spindle B is secured, in the manner hereinbefore described, to a rotating lathe-spindle or other suitable part capable of being fed forward as it rotates, in the manner usual in taps of this description. The entire apparatus is then rotated in a direction the reverse of that shown by the arrows in Figs. 2 and 4, and is at the same time advanced into the article to be threaded. The reaming-cutters F, by reason of their projecting forward beyond the threading-cutters D, will first ream out the aperture to be threaded, and thus provide a smooth surface for the threading-cutters to operate upon. The threading-cutters will be projected outward by means of the cam C, which is rotated within the head A by reason of its connection with the spindle B, until the pin B^2 assumes the position shown in Fig. 4. The pin, by reason of its contact with the walls of the slot A', will limit this movement of rotation, so as to render it just sufficient to project the cutters to their full extent, in which case the relative position of the cam C and cutters D is that shown in Fig. 2. The engagement of the pin with the walls of the slot will then rotate the head along with the spindle, and thus carry the cutters around. When the operation of threading is completed, the spindle B is rotated in the opposite direction, as shown by the arrows in Figs. 2 and 4, and will turn within the head A until the pin B^2 strikes the other walls of the slot A'. This movement of the spindle will of course rotate the cam C to a like extent, and the cutters D will be moved inward by means of the spring E and disengaged from the work. As soon as this disengagement occurs, the entire tap may be removed directly from the article, thus saving the time which would be employed in a non-collapsing tap in the withdrawal of the tap by retracing the steps taken in cutting the thread.

It will be seen that I provide a tap which is automatic in its action and simple and cheap in construction, and which dispenses with the necessity of employing a separate reaming-tool to ream out the interior of the article to be threaded prior to the operation of cutting.

It is obvious that various modifications may be made in the details of construction and arrangement of parts without departing from the principle of my invention, and I therefore do not wish to be understood as limiting myself strictly to the precise details hereinbefore described, and shown in the drawings.

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

1. The combination, with the head and the radially-movable cutters, of the spindle provided with a cam for actuating the cutters, said spindle being capable of a limited movement of rotation within the head, substantially as and for the purposes specified.

2. The combination, with the head provided with the radially-movable cutters and with a transverse slot, of the spindle provided with a cam to operate the cutters and with a transverse pin to engage with the walls of the slot, and thereby limit the rotation of the spindle within the head, substantially as and for the purposes specified.

3. The combination, with the head provided with the radially-movable cutters and with a transverse slot, of the spindle capable of a limited movement of rotation within the head and provided with a cam to actuate the cutters and springs to hold the cutters in contact with said cam, substantially as and for the purposes specified.

4. The combination, with the head and the spring-controlled radially-movable cutters, said head being provided with a transverse slot, of the spindle provided with a cam to actuate the cutters and with a transverse pin to engage with the walls of the slot, substantially as and for the purposes specified.

5. The combination, with the head provided with the threading-cutters, of reaming-cutters arranged between each pair of threading-cutters and extending forward of the same, substantially as and for the purposes specified.

6. The combination, with the cam C, of the head A, provided with the radially-movable cutters D, each having a seat, *d*, the springs E, arranged in the inclined apertures *e*, the screw-plugs E', for closing the outer ends of said apertures, and the disks *d'*, held against the seat *d* by said springs, substantially as and for the purposes specified.

JAMES T. HAYDEN.

Witnesses:
CARRIE FEIGET,
IRVINE MILLER.