No. 896,711. PATENTED AUG. 25, 1908.

A. E. CHURCH.

SCREW CUTTING DIE HEAD.

APPLICATION FILED JULY 16, 1907.

Fig. 2.

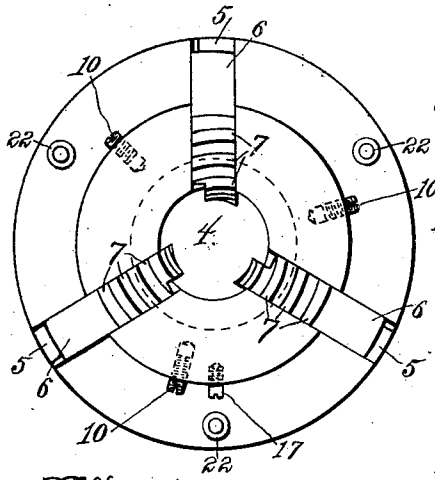


Fig. 1.

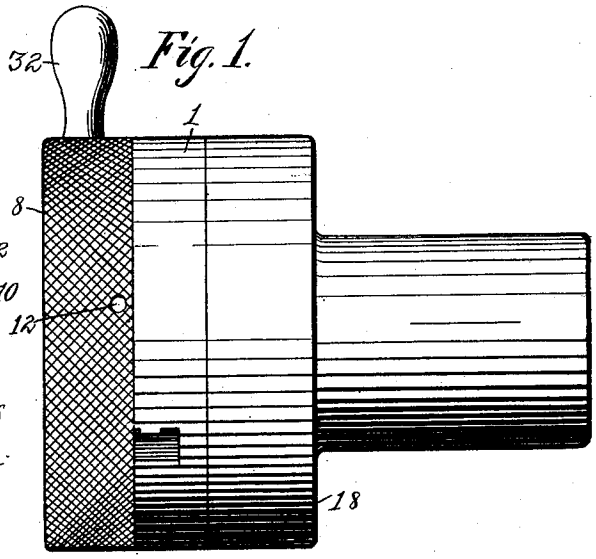


Fig. 4

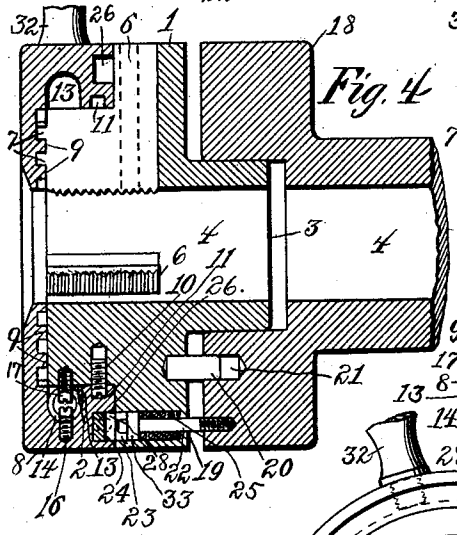


Fig. 3.

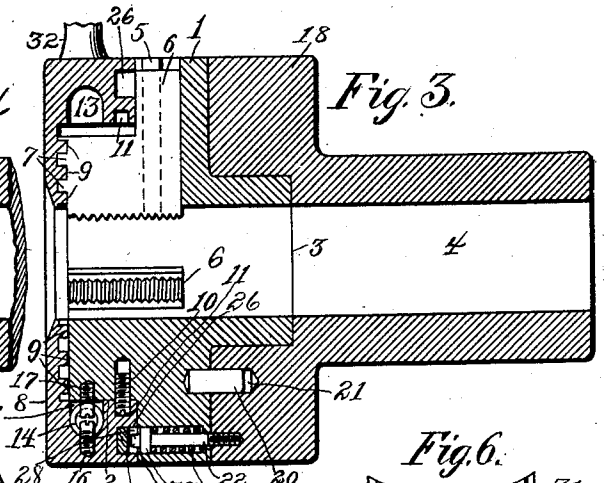


Fig. 5.

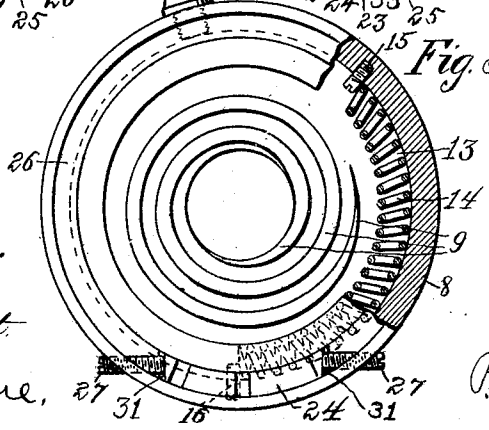
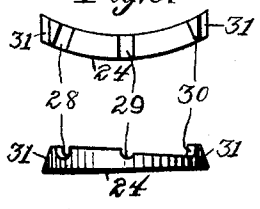


Fig. 6.



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SCREW-CUTTING DIE-HEAD.

No. 896,711. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed July 16, 1907. Serial No. 384,029.

To all whom it may concern:

Be it known that I, ALBERT E. CHURCH, of the city of New Britain, the county of Hartford, and the State of Connecticut, have invented certain new and useful Improvements in Screw-Cutting Die-Heads, which improvements are described in the following specification and are illustrated by the accompanying drawings.

My invention relates to self-opening dies, or die-heads, which are used for cutting screws.

It is the object of the invention to produce in dies of this kind a wide range of adjustability, so that a single die-head, having a single set of dies, or chasers, will cut screws of different sizes, ranging from the largest to the smallest which the die-head will contain; also to simplify the construction of such die-heads, and reduce the number of parts, and the cost of manufacture; also to secure accuracy in the cutting of screws by holding the chasers up to their work in a special manner; and at the same time to obtain other operative advantages. To accomplish these objects, I use in such a die-head a set of chasers which are provided with scroll thread along their anterior faces, and a rotarily movable cap, provided with a rack, which is adapted to engage said scroll threads in all positions of said chasers within the die-head, in combination with mechanism for operating said movable cap.

In said drawings, Figure 1 is a side elevation of a screw-cutting die-head which is constructed in accordance with the principles of my invention. Fig. 2 is an anterior end elevation of the same tool, without the rack-bearing cap. Fig. 3 is an axial section on Fig. 1, showing the die closed. Fig. 4 is a similar sectional view of the same tool, with the dies, or chasers, open. Fig. 5 is a posterior view of the rack-bearing cap, excepting parts which are removed to show construction. Fig. 6 is a detail.

The body of the die-head consists of a main cylindrical portion 1 and the smaller anterior and posterior cylindrical portions 2 and 3, all in one piece and on a single axial line. This body has an axial bore 4, whose size determines the capacity of the die-head. From this bore a number of slots, or chambers, 5, extend radially through the walls of the die-head for the accommodation of an equal number of cutters, or chasers, 6. Like the jaws of a scroll chuck, these chasers are severally provided with scroll threads 7, which are shown in Figs. 2, 3 and 4. The annular cap 8, having a handle 32, and having on its inner face a spiral rack, or scroll, 9, engaging said scroll threads 7, is adapted to move the chasers 6 in unison in chambers 5, toward and from the axis of the die-head. This cap is held rotatably in the position shown, by retaining screws 10, which are seated in radial positions in the body of the die-head, with their heads normally occupying an annular groove 11 in the flanged rim of the cap. When it is desired to remove the cap, these screws may be turned down out of groove 11 by means of a screw-driver inserted through a small hole 12, which perforates the rim of the cap, and is shown in Fig. 1. In the flanged rim of this cap is formed an internal annular groove 13, wherein is seated a coiled spring 14, confined between the stop screw 15 at one end and the stop screws 16 and 17 at the other end. Whenever the scroll cap 8 is turned in a direction to close the die, this spring is placed under tension by compression between said stop screws 15 and 17.

The tool shank 18, having an axial bore 4, continuous with the body bore 4, and fitting as a sleeve over the rear portion 3 of the die-head body, normally abuts on the backwardly facing shoulder 19 of that body, and is held against independent rotation by a dowel pin 20, which is rigidly seated in that shoulder, and fits loosely into a hole 21 in that shank. In the same shank 18 is seated a stop pin 22, which extends through a hole 23 in the main cylinder 1, and normally protrudes into engagement with a stop lug 24 in the rim of cap 8, as shown in Fig. 3. This stop pin is provided with a surrounding coil spring 25, which is compressed under the head 33 of that pin, as shown in Fig. 4, whenever separation occurs between shoulder 19 and the abutting face of shank 18. This spring tends at all times to hold said shank and shoulder together. Two other stop pins 22, of the same description and of the same function, are similarly located in the die-head at equal intervals, as shown in Fig. 2. Said stop lug 24 is seated in a groove 26 in the rim of cap 8, and is held adjustably in position in the bottom of that groove by two adjusting screws 27, which abut on the beveled ends 31 of that lug, as shown in Figs. 3,

4 and 5. A face view and a profile view of lug 24 are presented separately in Fig. 6. The face of this lug has two transverse slots, or notches, 28 and 29, and a stop shoulder 30, for engagement with the stop pins 22.

In setting the tool for work of a given size, the chasers 6 are first placed by hand in approximately the requisite positions, equally but not quite sufficiently advanced in channels 5 toward the axis of the die-head. Cap 8 is then put on, and fastened rotarily in position by the retaining screws 10, while the scroll 9 engages the scroll threads 7 as shown in Figs. 3 and 4. At the same time one of the stop pins 22 presses against the face of stop lug 24; and the tool shank 18 is held immovably to the body cylinder 1 by the dowel pin 20 and the spring-seated stop pins 22. Then the scroll cap 8 is turned rotarily by handle 32 until one of the stop pins 22 engages the stop lug 24 at notch 28, and until the chasers 6, impelled in unison toward the axis of the die-head, are brought either exactly or almost exactly to the situation requisite for the particular size of work in hand. This turning of the cap places spring 14 under tension by compression between stop screws 15 and 17; and this tension is maintained so long as the stop pin 22 continues so to engage the stop lug 24. A final slight adjustment of the chasers, if necessary, is then effected by longitudinally adjusting said stop lug 24 in its groove 26, as may be required, by means of the adjusting screws 27. The work is then fed rotarily into the die-head, either automatically or by hand-controlled mechanism, until the completion of a cut, when by familiar means not shown in the drawings the carriage that holds the shank of the die-head is stopped. Then by the effort of the screw to feed rotarily into the die-head the body and the shank of the tool are drawn apart into the separated positions shown in Fig. 4. By this separation the stop pin 22 is withdrawn from slot 28 in stop lug 24; and thereupon cap 8, being thereby released, is turned rotarily backward by the compressed energy of spring 14. In this way the die is opened automatically and the work is released. The described backward movement of cap 8 brings the stop pin 22 into engagement with notch 30 of the stop lug 24, and is thereby arrested. Then the tool is ready to be closed for a new cut in the same manner as before.

When it is desired to give the work a roughing cut, socalled, followed by a finishing cut, socalled, the die-head is set for the finishing cut in the manner already described, with the stop pin 22 engaging the stop lug 24 at notch 28; but for the roughing cut is set with that pin engaging that lug at notch 29.

In the operation of this invention, it is convenient to cut all sizes of screws up to one inch in diameter in a single die-head and with a single set of chasers; all sizes between one and two inches in diameter with a single set of chasers in a die-head of larger capacity; and an equal variety of larger sizes in the same way in any die-head which is large enough to receive the work.

From the circumstance that in the operation of this invention the function of holding the chasers up to their work is performed by mechanism which engages the foremost parts of the chasers, namely, by a scroll cap which engages the chasers by means of scroll threads which are located along the anterior faces of those chasers, as described, it follows that those cutters do their work without variation, from the beginning to the end of each cut, and turn out, even when worn by use, a screw that is threaded uniformly from one end to the other.

I claim:—

1. A die-head body, having a number of radially disposed chambers, which are formed in said body, a set of chasers, provided with scroll threads, and working in said chambers, an annular cap, provided with a scroll, which engages said threads, a spiral spring, acting between said cap and said body, and adapted to rotate said cap, and an adjustable stop lug, which is provided with engagement notches, and is seated in the rim of said cap, in combination with a sleeve shank of said body, and a spring-actuated stop pin, which is seated in said shank, works through a hole in said body and is adapted to engage said lug notches, one at a time, for the purpose of locking said cap in different positions at different times.

2. A die-head body, which has a number of radially disposed internal chambers and a longitudinally movable sleeve shank, an equal number of chasers, adjustable in said chambers, and provided with scroll threads, a rotatable annular cap, provided with a scroll, which engages said threads, a spring, acting between said die-head body and said rotatable cap, and adapted to rotate said cap, and an adjustable stop lug, which is seated in the rim of said cap, and is provided with engagement notches, in combination with a spring-actuated stop pin, which is seated in said shank, works through a hole in said body and is adapted to engage said lug by said notches, one at a time, for the purpose of locking such scroll-carrying cap in different positions at different times, and mechanism for adjusting said stop lug in the rim of said cap.

3. A die-head body, having a number of radially disposed chambers, which are formed therein, a longitudinally movable sleeve shank of said body, a set of chasers, working in said chambers, and provided with scroll threads, a rotatable cap, provided with a scroll, which engages said threads, a spring, which is adapted to rotate said cap on said

body, an adjustable stop lug, which is carried in the rim of said cap, and is provided with stop notches, mechanism for adjusting said stop lug, and a stop pin, which is seated in said shank, and is adapted to engage said lug by said notches, one at a time, in combination with a spring, acting between said stop pin and said die-head body, to draw said body and its shank together, and to push said pin into said notches, one at a time, when brought to register therewith.

In testimony whereof I hereunto set my name in the presence of two witnesses.

ALBERT E. CHURCH.

Witnesses:
WILLARD EDDY,
SYLVESTER BARBOUR.