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F. A. ERRINGTON.

AUTOMATICALLY OPENING OR CLOSING DIE FOR CUTTING SCREW THREADS, &c.

(Application filed July 24, 1897.)

(No Model.)

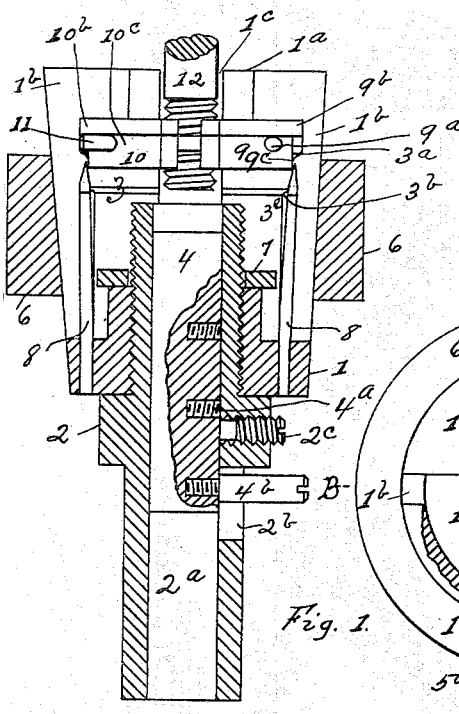

Fig. 1.

Fig. 3.

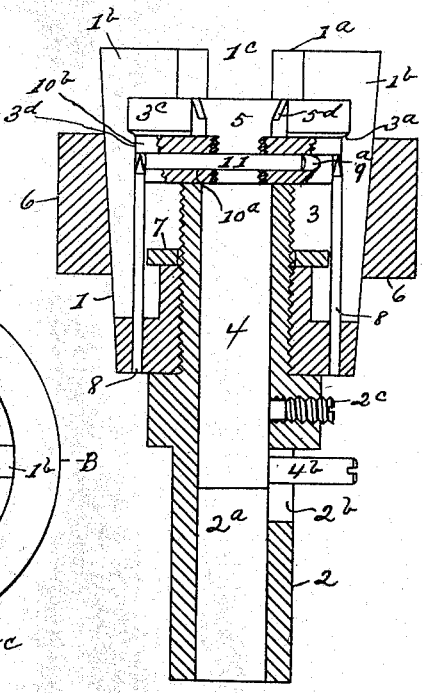

Fig. 4.

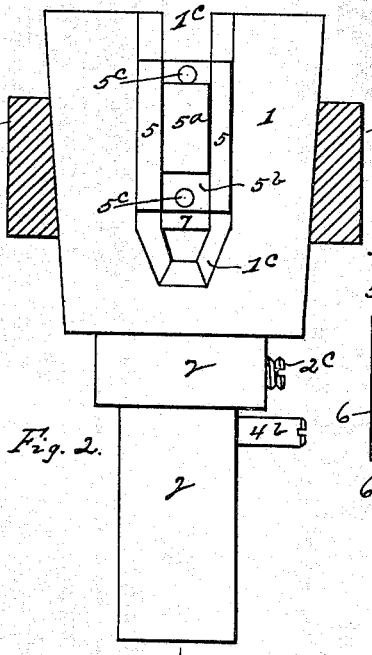

Fig. 2.

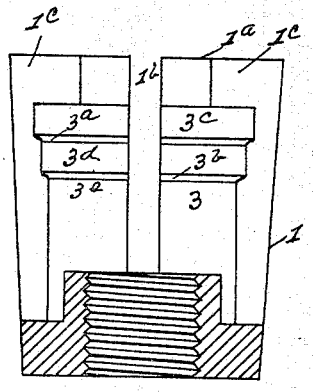

Fig. 5.

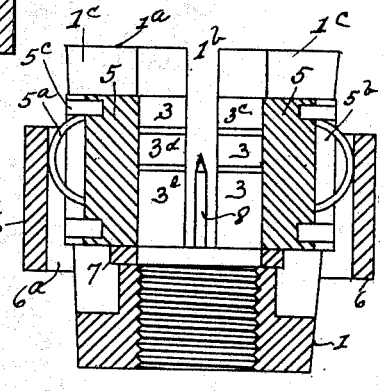

Fig. 6.

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AUTOMATICALLY OPENING OR CLOSING DIE FOR CUTTING SCREW-THREADS, &c.

SPECIFICATION forming part of Letters Patent No. 642,309, dated January 30, 1900.

Application filed July 24, 1897. Serial No. 645,787. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN ALFRED ERRINGTON, a citizen of the United States, residing in New York, (Stapleton,) Richmond county, New York, have invented certain new and useful Improvements in Automatically Opening or Closing Dies, of which the following is a specification.

My invention relates, broadly, to means for closing and opening screw-cutting dies, split nuts, or similar devices by the independent movement of said dies actually and laterally of their supporting-body or die-holder, the pressure of the unthreaded rod upon the outer face of the die or dies pushing said dies back into said body to the operative or closed position and the arrest of the relative axial movement of said work and said body during the continued rotation of the rotative member causing the dies to move axially outward along their supporting-body during operation and to expand laterally thereof automatically to permit the work to be withdrawn without reversing the direction of rotation of said rotative member.

Reference is to be had to the accompanying drawings, forming part hereof, in which—

Figure 1 is a partly-broken front end view of my device, illustrating the dies in the inoperative or open position. Fig. 2 is a side elevation of Fig. 1, with the adjusting-ring in section to show the method of constructing the laterally-movable adjusting-blocks and preventing their end movement. Fig. 3 is a cross-section on the line B B of Fig. 1, showing the parts in the open position and the work being withdrawn. Fig. 4 is a similar view showing the parts in the operative or closed position and exposing the expanding surfaces of the flanges 5^d of adjusting-blocks 5. Fig. 5 is a vertical cross-section of body 1 on the line A A of Fig. 1, showing the die-chamber in detail. Fig. 6 is a similar cross-section on line A A of Fig. 1, showing the adjusting-blocks 5 in section, &c.

A supporting-body 1 is adapted for connection with either the turret or live spindle of any usual design of lathe, screw-machine, or similar tool, and I have preferably shown a movable shank 2 for this purpose, the inner end of said shank being screw-threaded to mesh with a screw-threaded axial bore in the back plate of the body 1 and projecting beyond said back plate into a die-chamber 3, axially located in said body 1. The shank 2 is provided with an axial bore 2^a and with an elongated slot 2^b, opening into said axial bore 2^a. A stop-piece 4 is located in said axial bore 2^a and preferably provided with tapped holes 4^a to receive a stud 4^b, which projects through the slots 2^b to permit said stop-piece to be adjusted externally. A screw 2^c rigidly secures the stop-piece 4 to the die-supporting body 1 2 in any desired position therealong to render said stop-piece normally immovable relatively to said body when adjusted.

An axial bore in the face-plate 1^a of the body leads into the die-chamber 3, and two sets of segmental slots 1^b 1^c are cut through the periphery of the body 1 into said die-chamber, the sides of the slots 1^c being preferably sloped to receive correspondingly-tapered adjusting-blocks 5. An adjusting-ring 6 surrounds the body 1 and is provided with grooves 6^a to receive the backs of the adjusting-blocks 5. Springs 5^a are interposed between the rings 6 and adjusting-blocks 5 and are shown located in a groove 5^b cut in the back of each adjusting-block between pins 5^c. The periphery of the body 1 and the bore of the ring 6 being suitably tapered, as the ring 6 is moved along the body 1 the walls of the die-chamber 3 are compressed or expand again, according to the direction in which said ring 6 is moved, the adjusting-blocks 5 being squeezed out of the slots 1^c into the grooves 6^a as the body 1 is compressed and the springs 5^a pushing the adjusting-blocks 5 back into the slots 1^c again as the body 1 expands. The outer ends of the adjusting-blocks 5 are flanged at 5^d to abut against the inner surface of the face-plate 1^a, and their inner ends abut against a washer 7, which surrounds the inner end of the shank 2 and bears against a hub formed on the back plate of body 1.

The die-chamber 3 is shown subdivided by shoulders 3^a 3^b into a plurality of sections or portions located in line, whose opposed walls 3^c 3^d 3^e provide internal thrust-faces, which are preferably parallel with each other, the planes of the thrust-faces at the inner portions of said chamber lying within the planes of the thrust-faces of the outer portions there-

of. As aforesaid, said internal thrust-faces are adjusted laterally of body 1 in unison by the coaction of the tapered surfaces of body 1 and adjusting-ring 6. The shoulders 3^a 3^b are preferably shown abrupt in form to avoid forward movement of the dies when opening laterally in passing from the inner to the outer portions of said chamber. When it is desired to move the dies back into the inner portions of the chamber, the abrupt shoulders might resist the inward axial movement of the dies, and I have therefore provided laterally-yielding elastic cams at the shoulders 3^b, preferably shown in the form of beveled spring-pins 8, and I have located said spring-pins in the clearance-slots 1^b, where they are free to yield outwardly laterally of the body and permit the abrupt opening of the dies.

Two independent screw-cutting dies 9 and 10 are located in the die-chamber 3 and are shown connected together by slip-pieces or slip-pins 11, located in transverse bores 9^a 10^a to enable said dies to move axially in unison along the die-chamber 3 and have independent movement toward and from each other when opening from and closing to the cutting position. The opposing surfaces of the dies 9 10 slope back from the screw-threaded portions on a bevel corresponding to the surfaces of the adjusting-blocks 5, along which said dies slide and by which they are connected to rotate with the body 1.

The opposed surfaces of the dies are shown provided with cutting-faces suitable for cutting external screw-threads upon a rod 12 or similar work, and the opposite end of each die is provided with a plurality of external thrust-faces 9^b 9^c 10^b 10^c, respectively, the plane of one of said external thrust-faces, as 9^c, lying within the plane of its associate outer die thrust-face 9^b, and the distance between said planes being proportioned to the depth of the shoulders 3^a 3^b to enable the external die thrust-faces 9^b 10^b and 9^c 10^c of the dies 9 10 to bear simultaneously upon the internal body thrust-faces 3^d 3^e, respectively, of the chamber 3 during operation, as shown in Fig. 4. This secures alinement of the dies while moving automatically axially of body 1 during operation from the operative position shown in Fig. 4 to the open or inoperative position illustrated in Fig. 3. The inner surfaces of said dies bear against the inner end of the shank 2 when in the cutting or operative position to limit the inward movement of said dies axially of the supporting-body 1 2.

The operation of the parts is as follows: The pressure of a rod or piece of work 12 to be threaded against the outer face of one or both of the dies 9 10 pushes said dies back along the die-chamber 3 and against the cam portions of spring-pins 8, which normally stand within the slots 1^b between the ends of the shoulders 3^b to engage the edges of the inner ends of the dies 9 10 to aid in forcing the dies together to pass over the abrupt shoulders 3^a 3^b and to generally facilitate the automatic closing of the dies to bring their thrust-faces 9^b 9^c 10^b 10^c into operative position within the portions 3^d 3^e of the die-chamber 3. When the inner surfaces of the dies abut against the inner end of the shank 2, the teeth of the dies commence to thread the rod 12 under the rotation of the work 12, (or the body 1, as the case may be,) the rod being pressed continually along until it encounters the normally-immovable stop-piece 4, whereupon the axial movement of the work 12 ceases and the threads cut in the rod 12 act upon the threads of the dies 9 10 and enable the dies 9 10 to cut their way outwardly along the rod 12 while moving axially of the die-chamber 3 during the continued rotation of the rotative member. Upon the inner edges of the external thrust-faces 9^b 10^b 9^c 10^c of the dies arriving at the shoulders 3^a 3^b the dies 9 10 will open automatically and the spring-pins 8 yield outwardly laterally of body 1, said parts being forced away from the work by the continued rotation of the rotative member. The frictional engagement of the dies and work during the withdrawal of the rod 12 from the device will pull the dies 9 10 up the sloping flanges 5^d, and the work can be freely withdrawn without injury to the threads or dies. The spring-pins 8 will then act to recenter the dies for the next piece of work, and so on, the dies automatically closing and opening by the axial movement of the work and cutting the threads to a uniform distance on each piece. For some classes of work I may slope the shoulders 3^a 3^b sufficiently to avoid using the spring-pins 8; but the combination of the spring-pins 8 with the abrupt shoulders 3^a 3^b avoids forward movement of the dies in opening, and the construction shown is particularly desirable in threading up to a shoulder on the work.

A distinctive functional effect of employing independent (not integral with each other) dies that are movable both laterally and axially independently of the supporting-body is that when the device is stationary and the work rotates I may utilize gravity to assist in closing the dies, as it is apparent that when the device is turned quarter-way around from the position illustrated in Fig. 1 the upper die will drop sufficiently to engage the advancing work to be threaded, in which case the bottom die only will require the aid of a cam or cam-pin 8 to raise it over the abrupt shoulder or shoulders 3^a 3^b as the pressure of the advancing work against the upper die pushes the dies axially of the body 1 from the outer to the inner portion or portions of the die-chamber 3. However, when the device is rotated and the work is held from rotation it is preferable to provide a cam for each die to move it positively laterally of body 1.

Having now described my invention, what I claim is—

1. The combination with a supporting-body provided with internal thrust-faces, of a plurality of independent dies connected with said

body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and means to retain said dies in alinement relatively to each other and to the axis of said body, substantially as described.

2. The combination with a supporting-body provided with internal thrust-faces, of a plurality of independent dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, each of said dies being provided with an indenture that registers with that of the other thereof, and a slip-piece meshing with said indentures to connect said dies to move in unison axially of said body, one of said dies being movable along said slip-piece laterally of said body, substantially as described.

3. The combination with a body provided with internal thrust-faces, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof, said dies being provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, and a spring-cam adapted to yield outwardly laterally of said body and to move one of said dies laterally of said body, substantially as described.

4. The combination with a supporting-body provided with internal thrust-faces, a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation and said dies being movable axially of said body during operation independently of said internal thrust-faces, of a spring-cam adapted to yield outwardly laterally of said body and to move one of said dies laterally of said body during the inward movement of said dies axially thereof, substantially as described.

5. The combination with a supporting-body provided with internal thrust-faces, of a plurality of independent dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation and said dies being movable axially of said body during operation independently of said internal thrust-faces, one of said thrust-faces being provided with an associate cam-face to move one of said dies laterally of said body during the inward movement of said dies axially thereof, substantially as described.

6. The combination with a supporting-body provided with internal thrust-faces and having a die-chamber therebetween, the distance between the thrust-faces at the outer portion of said chamber being greater than at the inner portion thereof, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, substantially as described.

7. The combination with a supporting-body provided with internal thrust-faces and having a die-chamber therebetween, the distance between the thrust-faces at the outer portion of said chamber being greater than at the inner portion thereof, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and one of said thrust-faces being provided with an associate cam-face to move one of said dies laterally of said body during the inward movement of said dies axially thereof, substantially as described.

8. The combination with a supporting-body provided with internal thrust-faces and having a die-chamber therebetween, the distance between the thrust-faces at the outer portion of said chamber being greater than at the inner portion thereof, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof, each of said dies being provided at its end opposite its cutting-face with a plurality of external thrust-faces that respectively bear simultaneously upon the internal thrust-faces of the inner and outer portions of said chamber during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, substantially as described.

9. The combination with a body provided with inner and outer internal thrust-faces, the planes of said inner thrust-faces lying within the planes of said outer thrust-faces, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof, each of said dies being provided at its end opposite its cutting-face with inner and outer external thrust-faces, the plane of the inner of said die thrust-faces lying within the plane of its associate outer die thrust-face to enable said associate inner and outer die thrust-faces to respectively bear si-

multaneously upon the corresponding inner and outer body thrust-faces during operation, substantially as described.

10. The combination with a body provided with inner and outer external thrust-faces, the planes of said inner thrust-faces lying within the planes of said outer thrust-faces and said planes being parallel with each other, of a plurality of dies provided at their ends opposite their cutting-faces with inner and outer external thrust-faces that bear against said internal thrust-faces during operation, said dies being connected with said body to rotate in unison therewith, and movable laterally thereof, substantially as described.

11. The combination with a supporting-body provided with inner and outer internal thrust-faces, the planes of said inner thrust-faces lying within the planes of said outer thrust-faces, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof, each of said dies being provided at its end opposite its cutting-face with inner and outer external thrust-faces, the plane of the inner of said die thrust-faces lying within the plane of its associate outer die thrust-face to enable said associate inner and outer die thrust-faces to respectively bear simultaneously upon the corresponding inner and outer body thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, one of said thrust-faces being provided with an associate cam-face to move one of said dies laterally of said body during the inward movement of said dies axially thereof, substantially as described.

12. The combination with a supporting-body provided with inner and outer internal thrust-faces, the planes of said inner thrust-faces lying within the planes of said outer thrust-faces and said planes being parallel with each other, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with inner and outer external thrust-faces that respectively bear simultaneously upon the corresponding inner and outer body thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and one of said thrust-faces being provided with an associate cam-face to move one of said dies laterally of said body during the inward movement of said dies axially thereof, substantially as described.

13. The combination with a supporting-body provided with internal thrust-faces, of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and a stop rigidly carried by said body and normally immovable relatively thereto to arrest the axial movement of work into said body during the automatic outward movement of said dies axially of said body, substantially as described.

14. The combination with a supporting-body provided with internal thrust-faces, of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and an adjustable stop rigidly secured to said body and normally immovable relatively thereto when adjusted substantially as described.

15. The combination with a supporting-body provided with internal thrust-faces, of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, a stop rigidly carried by said body and normally immovable relatively thereto, and one of said thrust-faces being provided with an associate cam-face to move one of said dies laterally of said body during the inward movement of said dies axially thereof, substantially as described.

16. The combination with a body of dies connected with said body to rotate in unison therewith and movable laterally thereof, said body having an elongated slot, and an adjustable stop having a projection rigidly secured thereto and extending through and movable axially of said body in said slot to permit said stop to be externally adjusted axially of said body, and means to retain said stop in position when adjusted, substantially as described.

17. The combination with a supporting-body provided with internal thrust-faces, of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, said body having an elongated slot, an adjustable stop having a projection rigidly secured thereto and extending through and moving axially of said body in said slot to permit said stop to be externally adjusted axially of said body, and means to secure said stop rigidly to said body when adjusted, substantially as described.

18. The combination with a supporting-body provided with internal thrust-faces and means to adjust the distance between said internal thrust-faces, of a plurality of dies connected with said body to rotate in unison there-

with and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and means to move one of said dies laterally of said body during the inward movement of said dies axially thereof, substantially as described.

19. The combination with a supporting-body provided with internal thrust-faces and means to adjust said thrust-faces relatively to each other laterally of said body in unison, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, substantially as described.

20. The combination with a supporting-body provided with internal thrust-faces, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, a plurality of adjusting-blocks, and an adjusting-ring movable along said body, substantially as described.

21. The combination with a supporting-body provided with internal thrust-faces and having a die-chamber therebetween, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, said body being also provided with slots opening into said chamber, adjusting-blocks situated in said slots, and an adjusting-ring, substantially as described.

22. The combination with a supporting-body provided with internal thrust-faces and having a die-chamber therebetween, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, said body being also provided with slots having sloping walls and opening into said chamber, adjusting-blocks situated in said slots and having sides that correspond with the walls thereof, an adjusting-ring, and a spring interposed between said adjusting-ring and each of said adjusting-blocks to move said adjusting-blocks inwardly laterally of said body, substantially as described.

23. The combination with a supporting-body provided with internal thrust-faces and having a die-chamber therebetween, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and a flange or flanges located at the outer end of said chamber and adapted to hold said dies apart when in the open position, substantially as described.

24. The combination with a supporting-body provided with internal thrust-faces and having a die-chamber therebetween, of a plurality of dies connected with said body to rotate in unison therewith and movable laterally thereof, and provided at their ends opposite their cutting-faces with external thrust-faces that bear against said internal thrust-faces during operation, said dies being movable axially of said body during operation independently of said internal thrust-faces, and an abutment rigidly carried by said body and projecting into said die-chamber beyond the back plate thereof to limit the inward movement of said dies axially of said body, substantially as described.

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