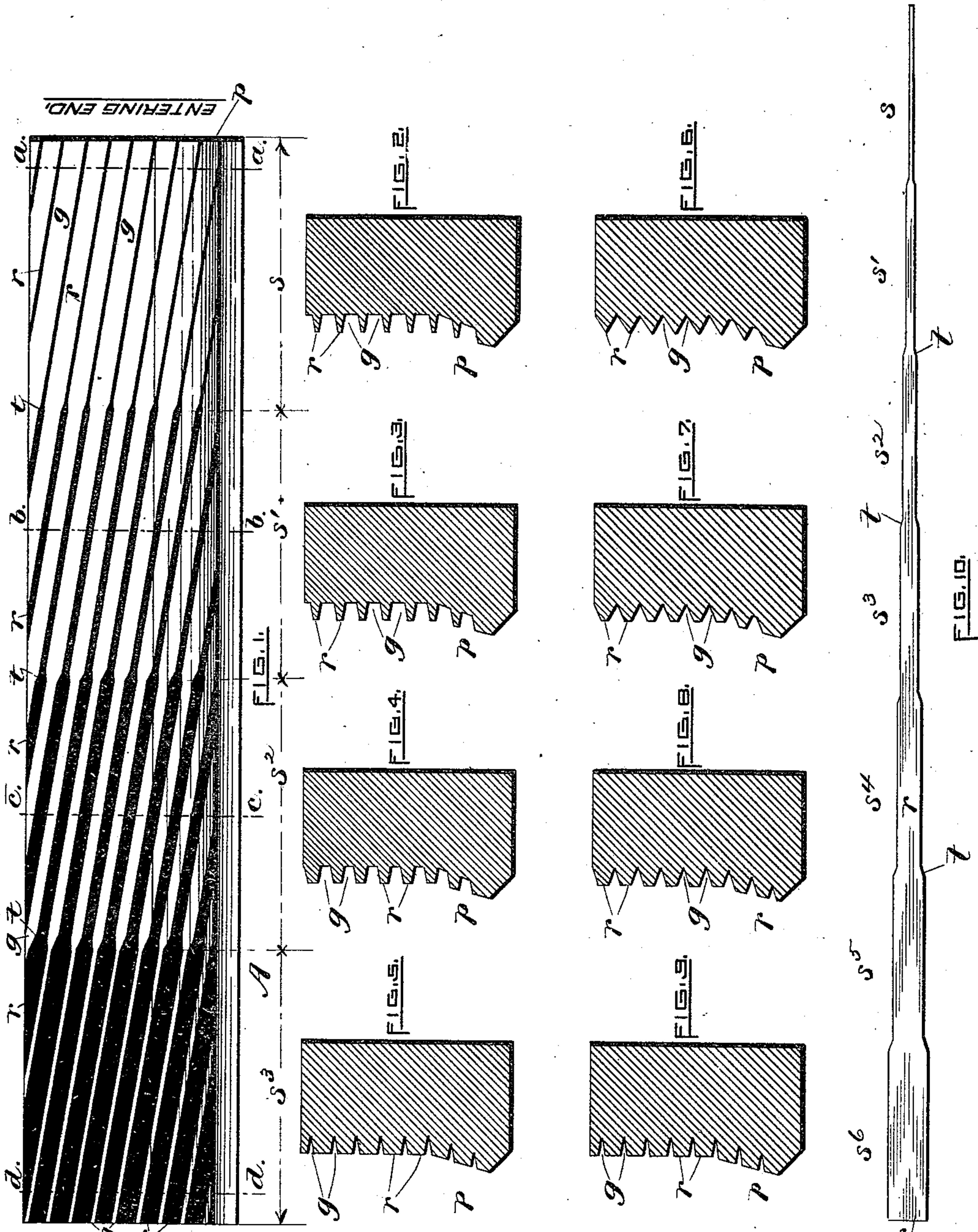


(No Model.)

C. D. ROGERS.  
DIE FOR ROLLING WOOD SCREWS.

No. 440,329.

Patented Nov. 11, 1890.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

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## DIE FOR ROLLING WOOD-SCREWS.

SPECIFICATION forming part of Letters Patent No. 440,329, dated November 11, 1890.

Application filed July 25, 1890. Serial No. 359,851. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES D. ROGERS, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Dies for Rolling Wood-Screws; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and to letters of reference marked thereon, which form a part of this specification.

In the manufacture of rolled wood-screws—that is, screws having the thread raised from the body of the blank by compression and by rolling between dies provided with a series of oblique grooves into which the metal is forced by the ribs between the grooves—it has been the usual practice to employ dies whose working-faces are provided with parallel inclined grooves and ribs which have a gradually-varying area cross-sectionally. In other words, the ribs at the entering or front end of the die are made V shape or narrow, so as to enter the blank more easily. From this point the ribs extend toward the rear or finishing end in a gradually-changing form and size, the area of the ribs gradually increasing correspondingly.

I am aware that some of the first dies employed in rolling threads on the body of the screw-blank had a uniform size and shape throughout their length. In such case there could be no gradual development of the thread. In fact, such dies were used to produce the threads of “machine-screws”—that is, screws having comparatively shallow V shape threads of fine pitch, the metal thus transformed being in a longitudinal direction rather than radial.

An objection to the use of dies provided with gradually-varying ribs and grooves employed to raise the metal radially from the blank's surface, particularly when used to produce the threads of gimlet-pointed wood-screws, is that the blank in its passage between a suitably mounted and operating pair of such dies is liable to become more or less changed from its proper position or true re-

lation to the dies, the product then being imperfect. It is well known that it is extremely difficult to so accurately adjust a pair of dies that the blank will “track” properly with the grooves and ribs at all points of the die. Consequently any material variation in the dies, or even in introducing the blanks to them at the proper instant, will cause the blanks to issue at the end of the operation as imperfect, if not wholly worthless, screws. As before stated, if gimlet-pointed screws are to be produced a slight variation of the blank from its true relation vertically either up or down will from this cause alone be sufficient to discard the product—that is, if the blank rises and is not immediately corrected the screw thus produced will not have a full thread on its point portion. On the other hand, if the blank moves in the opposite direction or downwardly there will be an excess of metal to be provided for, which results in clogging the dies, &c.

The object I seek to accomplish by my present improvement is to provide thread-forming dies with grooves and ribs so constructed and arranged that the objections before referred to are practically overcome. To that end my invention consists, essentially, of a die having its working-face provided with a series of inclined parallel grooves and ribs which are arranged in the form of two or more steps or terraces—that is, suppose the face of the die is formed longitudinally, say, in four rectangular sections, in the first section or entering portion the several ribs are alike and uniform in cross-section throughout. In the next section the ribs are also alike but wider than the first-named section. The ribs of the third section are also uniform but wider than those of the second, and the ribs of the last or finishing section being still wider but uniform throughout this portion of the die, the said rectangular sections being connected by quite short sections having beveled or curved edges.

By reason of my improvement I find that in case the axis of the blank is not exactly at right angles with the plane of movement of the die the tendency of the ribs at the junction or intersection of any of the stepped sections is to slightly retard the blank at the



adjacent junction until the corresponding portion of the opposite die corrects such variation in the blank's position, when the continued action of the dies completes the screw and drops it from them.

In the appended sheet of drawings, Figure 1 represents a side elevation of a thread-rolling die having its working-face provided with a series of stepped ribs and grooves embodying my invention, the shaded portions indicating the ribs. Figs. 2, 3, 4, and 5 are cross-sectional views of the die, taken on lines  $a a$ ,  $b b$ ,  $c c$ ,  $d d$ , respectively, of Fig. 1, the angle of the sides of the ribs transversely being the same throughout. Figs. 6, 7, 8, and 9 are similarly-taken sectional views, the angle of the sides of the ribs being variable; and Fig. 10 shows in detail, although somewhat enlarged or exaggerated, a face or front view of one of the ribs of my improved die, the die in this case having seven sections or steps.

In the drawings, A indicates my improved die as a whole. As represented it is adapted to be used as a reciprocating die, although the improvement may be equally applicable to a curved or cylindrical shape die. The lower portion  $p$  extends above or in front of the general surface of the die for the purpose of forming threads on the point portion of the screw-blanks, as in making gimlet-pointed wood-screws. Obviously this raised portion  $p$  may be omitted without departing from the invention.

$r$  indicates my improved form of ribs, and  $g$  the grooves between the ribs. These ribs are made as thin and sharp as possible (consistent with the strength and quality of the metal employed) at the front portion of the entering end, so as to be more easily impressed into the screw-blank at the commencement of the thread-forming operation. Figs. 2 and 6 represent, cross-sectionally, two forms of ribs, taken on line  $a a$  of Fig. 1, well adapted for dies of this character. The said ribs and grooves are arranged parallel with each other and extend obliquely across the face of the die. As represented in Fig. 1, the face of the die is formed longitudinally into four substantially equal rectangular sections (see  $s s' s^2 s^3$ ) at the bottom of the die. In these sections or divisions the form of the ribs and grooves transversely throughout any individual section is alike or uniform; but the ribs change or vary in width or thickness at each section; or, in other words, each individual rib  $r$  is also formed of a series of rectangular-shaped sections, as indicated by  $s s' s^2$ , &c. At the junction or intersection  $t$  of the several rectangular sections of the rib the face of the rib at its opposite edges has the form of a truncated cone, or it may be curved at such points in lieu of such truncated or beveled edges. In the last or finishing division, as  $s^3$ , Fig. 1, or  $s^6$ , Fig. 10, the ribs are quite wide, while

the grooves are correspondingly narrow. In fact, the form of the grooves of this section are the counterpart of the threads to be produced upon the blank. (See Figs. 5 and 9.)

In Fig. 10 I have indicated a single rib  $r$  somewhat exaggerated, having seven divisions—viz.,  $s s' s^2 s^3 s^4 s^5 s^6$ . The number of divisions used may be increased or diminished without departing from my invention, the essential feature of which is a die provided with a series of ribs each consisting of two or more rectangular divisions  $s s'$ , &c., having different widths, the sides of which throughout the length of the die, except at the points of intersections  $t$ , are parallel with a line drawn through the center or axis of the rib.

In rolling screws I prefer to use a pair of straight dies, (alike,) the same being reversely arranged and mounted to reciprocate past each other. The screw-blank is stationary, except the axial motion imparted to it by the action of the dies.

A manner of producing a die having stepped ribs or divisions is as follows: The die-blank is first properly mounted and secured to a table of a suitable milling or other machine, over which an arbor carrying a number of milling-cutters is mounted to revolve. These cutters are so shaped and arranged that upon bringing them in contact with the die-blank, commencing at the rear end and feeding it ahead, the narrowest portion  $s^3$ , as in Fig. 1, of the grooves will be cut into the die throughout its length. Next by substituting other cutters adapted to the section  $s^2$  and again feeding the blank ahead the cutters act to trim away the sides of the grooves, commencing at the back end of the section  $s^2$ . In a similar manner the sections  $s'$  and  $s$  are milled out, respectively, by changing the cutters to correspond with the grooves of these sections.

I would state that the term "rectangular," as used in connection with the die, has reference to so much of the rib as is included between parallel sides, as in sections  $s^6 s^5$ , &c., which represents rectangular sections having varying widths, the contiguous sections being connected by the short beveled sides  $t$ .

I claim—

Dies for rolling screws, provided with ribs for forming the grooves of the screws, the upper or working faces of which are formed of a series of rectangular sections increasing in width from the initial end of the die to the finishing end.

In testimony whereof I have affixed my signature in presence of two witnesses.

CHARLES D. ROGERS.

Witnesses:

CHARLES HANNIGAN,  
GEO. H. REMINGTON.