

(No Model.)

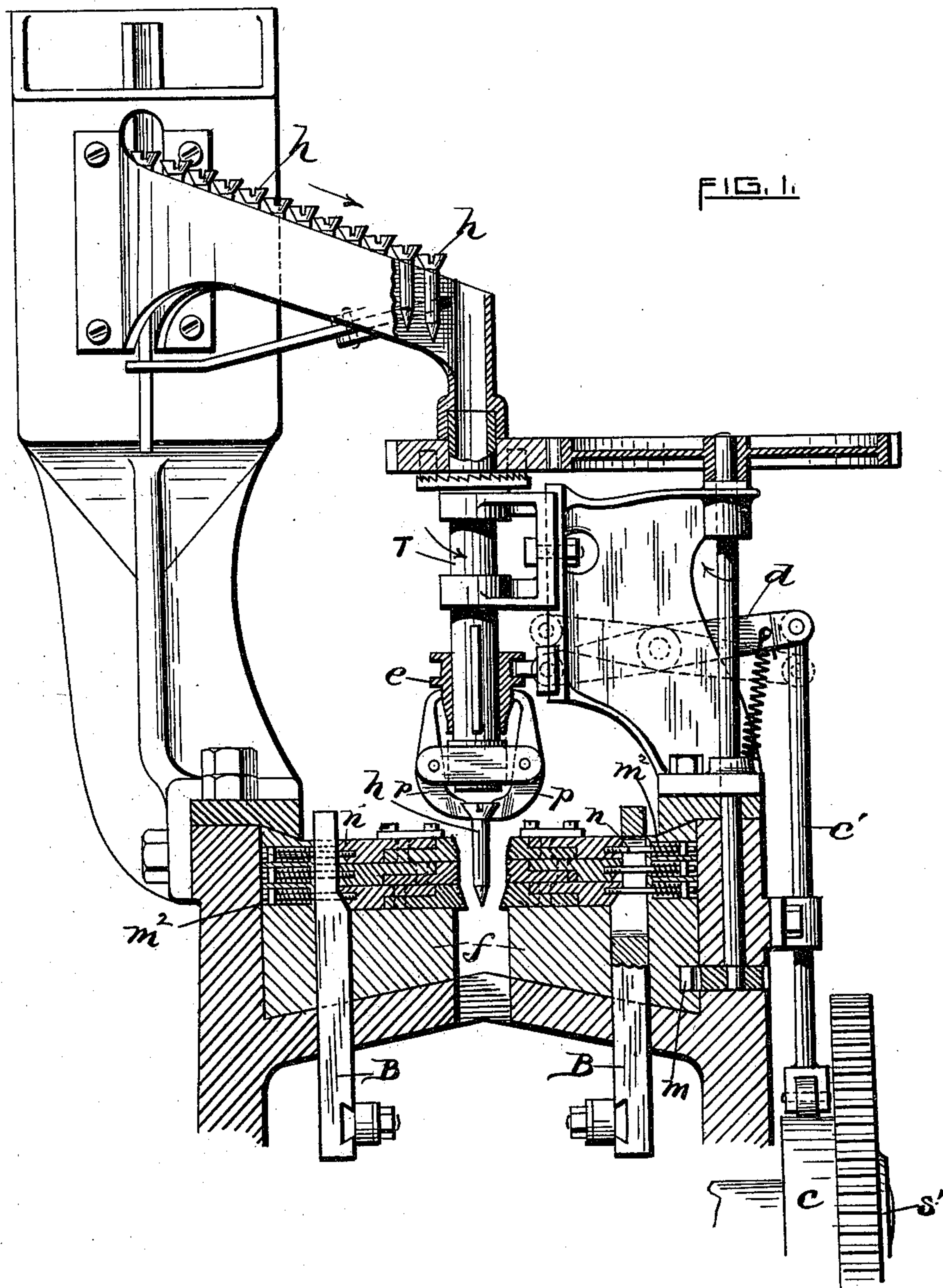
3 Sheets—Sheet 1.

C. D. ROGERS.

MODE OF FORMING SCREW THREADS UPON SCREWS.

No. 408,530.

Patented Aug. 6, 1889.



WITNESSES.

Charles Fannigan
Herbert F. Tourtellot

INVENTOR.

Charles D. Rogers.

by Remington & Henthorn
Attys.

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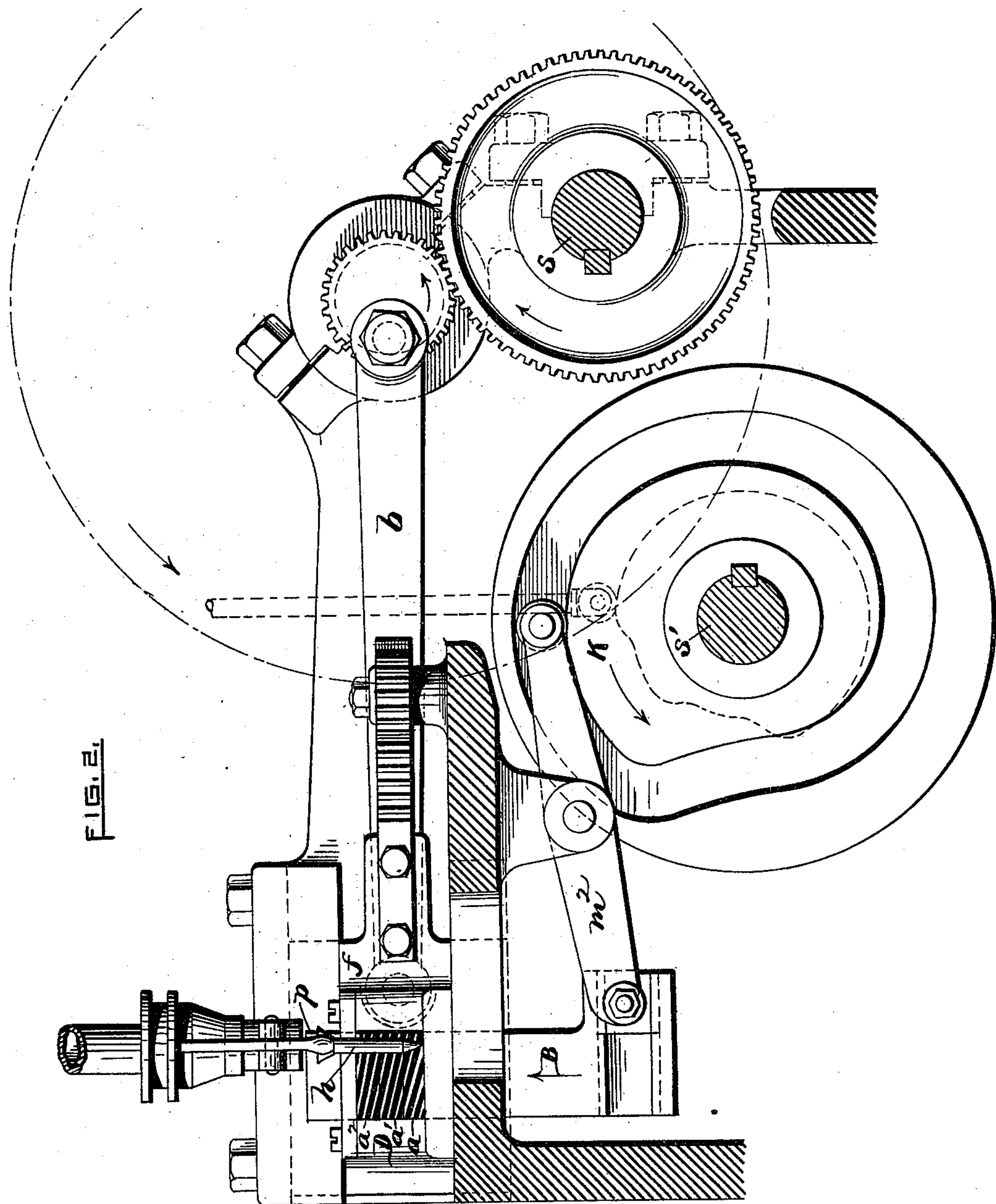
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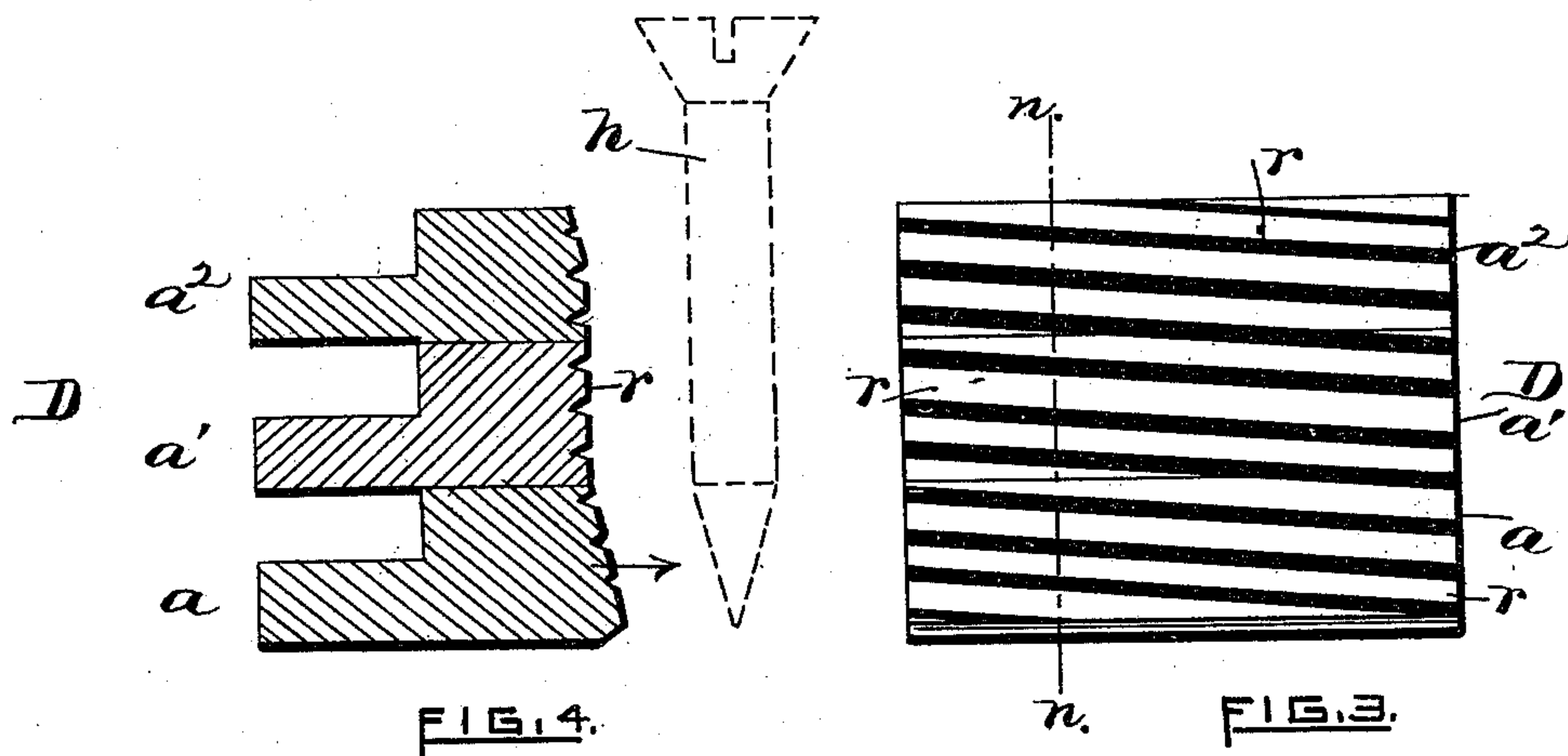
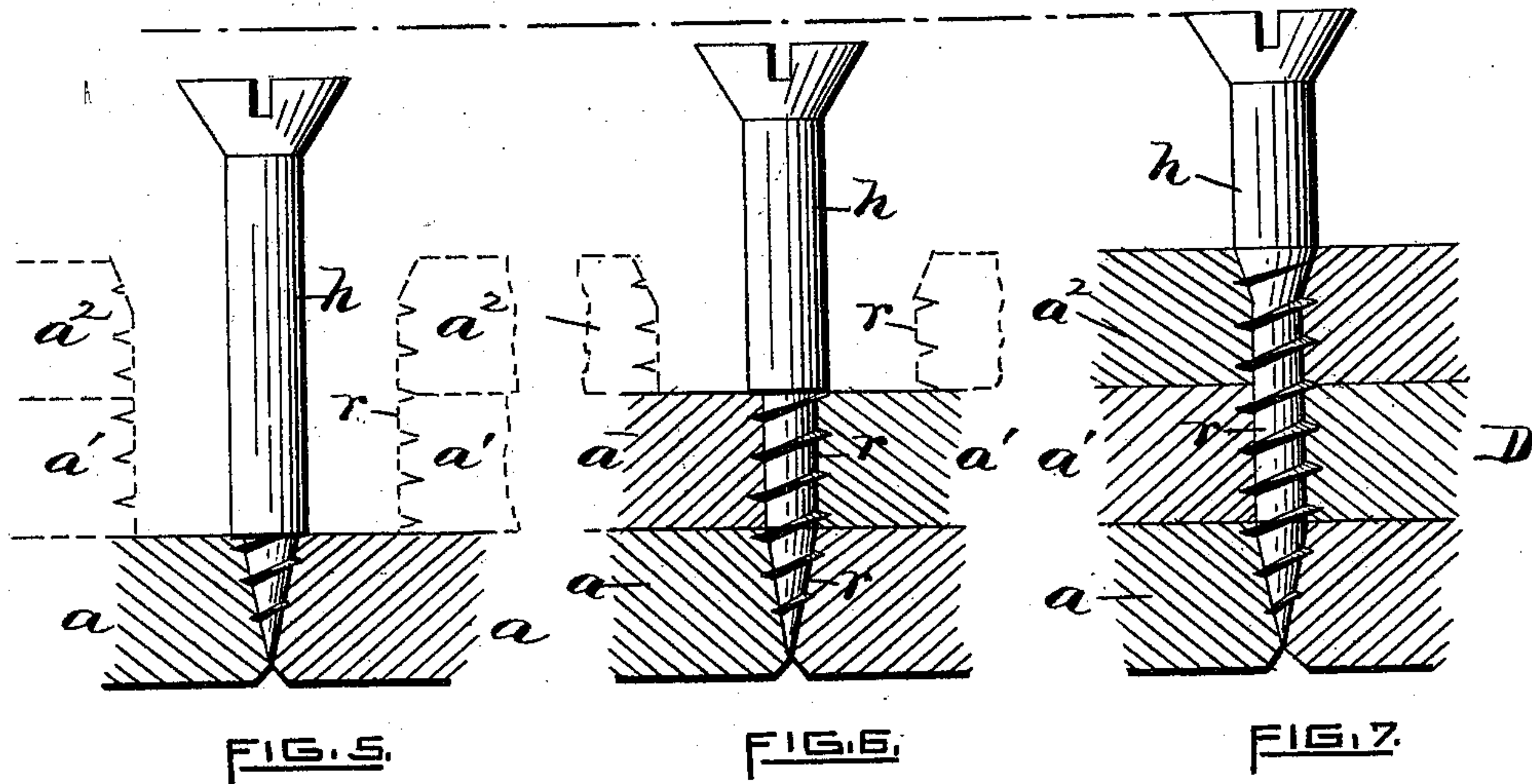
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UNITED STATES PATENT OFFICE.

CHARLES D. ROGERS, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE
AMERICAN SCREW COMPANY, OF SAME PLACE.

MODE OF FORMING SCREW-THREADS UPON SCREWS.

SPECIFICATION forming part of Letters Patent No. 408,530, dated August 6, 1889.

Application filed February 21, 1889. Serial No. 300,709. (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 the Method of Forming Screw-Threads upon 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 or figures of reference marked thereon, which form a part of this specification.

In the methods employed in the manufacture of rolled-thread screws, as described in patents heretofore granted to me, the practice has been to use threading-dies which act to completely form the screw-thread upon the screw-blanks during a single movement or reciprocation of such dies, the threads thus produced being simultaneously formed upon the point and shank portions of the blank and the metal being expanded radially; but it may be desirable to apply the method of producing screw-threads by rolling instead of cutting where the diameter of the screw across the threads is the same as that of the blank or unthreaded portion: This involves the elongation of the blank by the displaced metal, instead of its radial enlargement, and very important changes in the means by which the threads are formed.

In order to accomplish the objects just stated, I have devised an improved method or process, which consists, substantially, in the use of the following-named steps, viz: first, placing the headed and pointed blanks singly into the revolving jaws of a suitable gripping device, which acts to firmly hold the blank in position while being acted upon by the threading-dies and to release it immediately thereafter; next, forming the screw-thread on the blank by oppositely-mounted reciprocating dies, each divided into two or more parallel sections, which are gradually and successively forced into engagement with the blank, the first or lower die-section acting to form the thread on the point portion of the

blank, the other die-sections in turn continuing and completing the thread on the cylindrical or shank portion of the blank, and, finally, withdrawing the dies from the now screw-threaded blank in a lateral direction to permit the screw-head to pass freely down between them after the gripping-jaws have released it.

In an application for United States Letters Patent, Serial No. 300,708, filed by me upon even date with this, I have shown and claimed a machine embodying the process claimed herewith.

In the accompanying three sheets of drawings, which illustrate a machine combining the several steps before stated, Figure 1, Sheet 1, represents a transverse sectional view thereof, showing a blank held in position in revolving jaws preparatory to being acted upon by the several sections of the threading-dies. Fig. 2, Sheet 2, is a longitudinal sectional view, the position of the blank, &c., corresponding to that shown in Fig. 1. Fig. 3, Sheet 3, is a front elevation of one of the threading-dies, the same, as drawn, consisting of three horizontal parallel sections and showing the working-face. Fig. 4 is a cross-sectional view taken on line *nn* of Fig. 3, the dotted lines showing a blank in position to be acted upon by the die-sections. Fig. 5 shows the thread-forming portion of the lower or point threading section in engagement with the cone-shaped point of the blank. Fig. 6 shows the next die-section advanced and having produced a continuation of the screw-thread upon the cylindrical portion of the blank's shank, the blank thereby being slightly elongated; and Fig. 7 represents the last or upper section, which continues and completes the thread-forming operation upon the shank.

The operation of the several steps constituting my improved method of threading screws is substantially as follows:

The blanks *h*, being first suitably headed and pointed, are automatically conducted from a reservoir to and into the revolving hollow spindle *T*, having attached jointed gripping-jaws *p* at its lower end, the jaws at the time being partly closed to prevent the blank from

dropping clear through them. The jaws arrest the blank under its head, and are immediately closed firmly upon it by means of the cam *c*, connection *c'*, lever *d*, and the spiral cone-shaped sleeve *e*, actuated by said lever, the relation and adjustment of the several parts being such that the lower end of the blank is in the position to properly be acted upon by the threading-dies. The spindle *T* is revolved in unison with the reciprocating dies by means of suitable gearing actuated by a toothed rack *m*, attached to one of the cross-heads, the proportion being such that the surface velocity of the revolving blank is substantially the same as the speed of the threading-dies *D*, the dies at the same time traveling back and forth in opposite directions through the medium of the cross-heads or die-holders *f*, jointed to a suitably-driven short-stroke connecting-rod *b*, &c.

The next step in the operation consists in actuating the several die-sections to successively impress the ribs *r* thereof into the blank's surface. A means for accomplishing this is represented in Fig. 2, wherein cams *K* and pivoted levers *m*² are introduced to vertically actuate thrust-blocks *B*, (one on each side of the machine,) which in traveling slowly upward successively engage the several reciprocating die-sections and force the ribs thereof into the surface of the revolving blank. The first die-sections to be acted upon are the two lower ones *a*, which in moving laterally toward each other by means of the thrust-blocks engage the point portion of the blank and form the threads thereon, as in Fig. 5. The intermediate die-sections *a'* next form a corresponding length of thread upon the cylindrical portion of the shank, as in Fig. 6, followed by the completion of the screw-thread by the upper die-sections *a*², as shown in Fig. 7, the blank meanwhile being continuously revolved. The direction of rotation is, however, reversed at each reciprocation of the dies, so that the relation of the developing threads to the corresponding ribs of the dies remain the same until the screw is completed. The finished screws are somewhat longer than the blanks, in case the diameter of the threads and unthreaded shank are substantially the same. Under this method of rolling screws the stroke of the dies is preferably less than their length. Therefore the screws cannot be readily removed, except the dies be separated laterally a sufficient distance to allow the

head of the screw to pass down between them. This is accomplished by means of springs *m*², in connection with bolts *n*, secured to the several die-sections, which automatically act to withdraw the dies from the screw as soon as the cam-shaped portions of the thrust-blocks in descending are successively disengaged from the die-sections.

The final operation consists in opening the gripping-jaws *p* to allow the now threaded blank or screw to drop therefrom past the dies and into a suitable receptacle beneath.

The number of reciprocations of the dies in forming the screw-threads may be varied, if desired, by changing the ratio of the speed of the two shafts *s* and *s'*.

I claim as my invention—

1. The hereinbefore-described process of swaging screw-threads upon screw-blanks, which consists, first, in forming the thread on the point portion by forcing reciprocating swaging-dies into engagement therewith; next, continuing the forming of the thread upon the shank portion by one or more sections of swaging-dies moving to and fro, and, finally, finishing the thread by the joint action of all the said dies.

2. The hereinbefore-described process of swaging screw-threads upon screw-blanks, which consists in forming the thread in connected sections, first producing the thread upon the point portion; next, continuing the thread therefrom upon the shank in one or more successive sections by swaging, and, finally, subjecting the entire threaded portion to the simultaneous action of the swaging mechanism to reduce and finish the threads.

3. The hereinbefore-described process of swaging screw-threads upon screw-blanks, the same consisting in, first, swaging a thread upon the point portion of the mechanically-revolving blank; next, continuing the said thread therefrom upon the cylindrical portion of the shank of the revolving blank by swaging the thread thereon in one or more connected sections, and, finally, subjecting the entire threaded portion to a simultaneous action of the swaging mechanism to finish the threads.

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

CHARLES D. ROGERS.

Witnesses:

CHARLES HANNIGAN,
GEO. H. REMINGTON.