

(No Model.)

2 Sheets—Sheet 1.

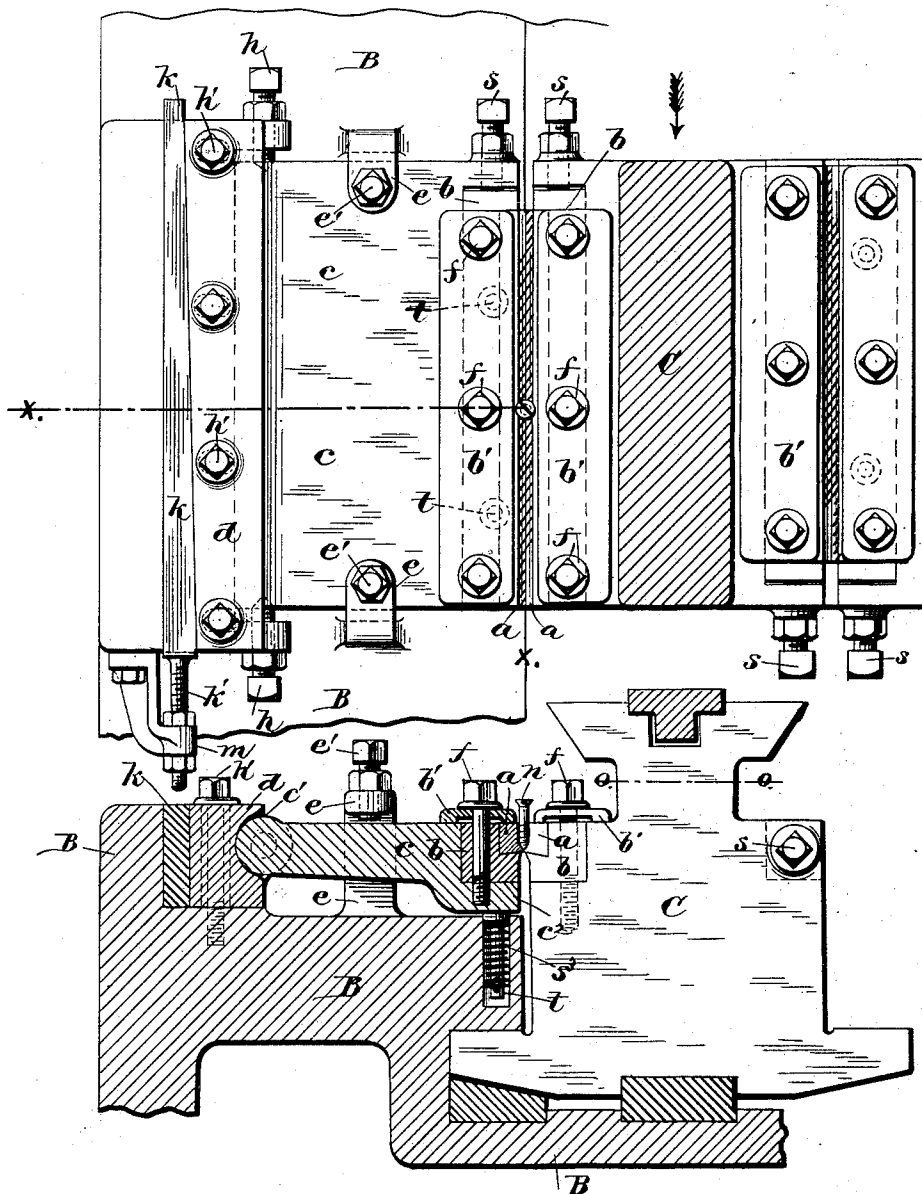
C. D. ROGERS.

SELF ADJUSTING DIE FOR SWAGING WOOD SCREWS.

No. 375,099.

Patented Dec. 20, 1887.

FIG. 1.



WITNESSES.

FIG. 2.

INVENTOR.

Herbert Wilford

Charles D. Rogers.

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Atty.

(No Model.)

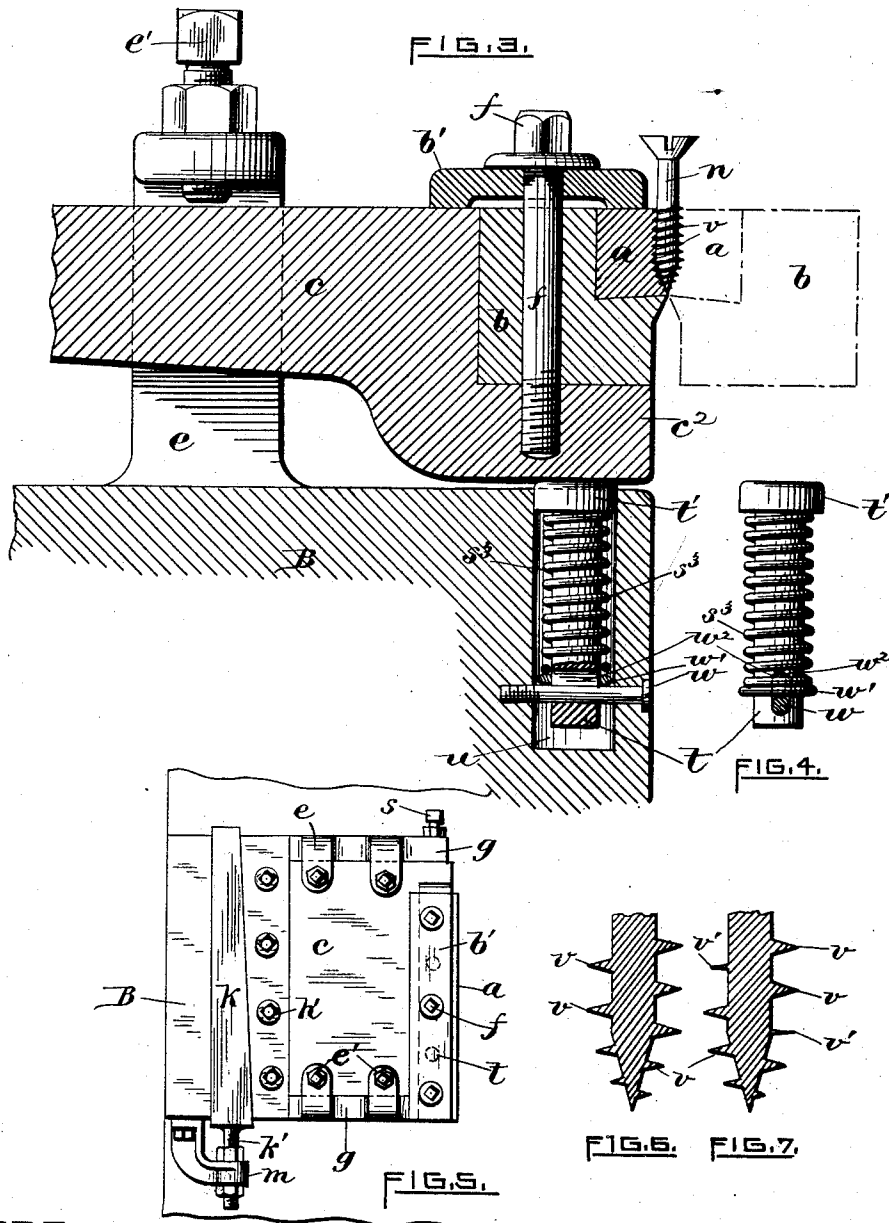
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WITNESSES.

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Herbert H. Rogers

INVENTOR.

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UNITED STATES PATENT OFFICE.

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

SELF-ADJUSTING DIE FOR SWAGING WOOD-SCREWS.

SPECIFICATION forming part of Letters Patent No. 375,099, dated December 20, 1887.

Application filed July 7, 1887. Serial No. 243,673. (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 Self-Adjusting Dies for Screw-Making Machines; 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.

My present improvement relates to machines for automatically forming the threads of wood-screws.

The invention consists in providing one of the thread-forming dies (the other being relatively stationary) with means whereby in working it is adapted to automatically accommodate itself (within its limits) to the fellow die.

Heretofore in machines of the class constructed to form screw-threads upon wood-screws by rolling the blanks between the grooved faces of reciprocating dies the position of the dies with relation to each other has been attained by fixed adjustment—that is to say, the stationary die and the traveling die are adapted each to be adjusted both longitudinally and laterally and then rigidly secured in position in their respective die seats or holders. By means of such arrangement and adjustment it is in practice often difficult to turn out screws having perfect threads, owing to the rigidity of the dies and some want of symmetry in them. In hardening the dies they frequently become slightly bent or warped, thereby throwing the thread-forming ribs somewhat out of true. In such case they do not act in harmony in forming the threads upon the blank while it is being carried along by and between the rigidly-adjusted dies, and thereby imperfect threads are produced.

The object of my invention is to overcome the disadvantages just stated. To accomplish this result I secure the stationary die in a holder which is both laterally and longitudinally adjustable. I provide the holder with an elas-

tic support adapted to vertically maintain the die in its normal relation to the traveling die, yet permitting a slight downward movement of the holder against the resistance of the spring. Should this movement be exceeded, a fixed stop serves to prevent further action of the die in this direction. An adjustable stop is also provided which serves to limit the upward movement of the holder. The extreme vertical movement of the holder need not ordinarily exceed one thirty-second of an inch. This small up-and-down movement of the holder while rolling the threads is produced by the slight inequalities in the dies, as stated, which for the instant possibly do not exactly "register." By means of this property of the die and holder it is enabled to automatically adjust itself to the opposite die. The finished thread is thereby much more perfectly formed.

The shape of the thread-forming ribs of the dies, adapted to produce a solid screw-thread raised from the surface of a screw-blank, is shown and claimed in an application for United States Letters Patent filed by me May 11, 1887, Serial No. 237,824.

In the two sheets of drawings herewith, Figure 1 represents a plan view, in partial horizontal section, of a portion of a machine for making wood-screws, having a thread-forming die mounted in a holder embodying my improvement. Fig. 2 is a vertical transverse sectional view, in partial elevation, taken on the irregular line *xx* of Fig. 1, showing a blank in the act of being screw-threaded, and also showing means for adjusting and automatically retaining the normally-stationary die in position. Fig. 3, Sheet 2, is a similar sectional view, enlarged, showing the end portion of the holder and the elastic support therefor. Fig. 4 is a detached side view of the supporting device. Fig. 5 is a reduced plan view of a die-holder adjustably mounted to move up and down in guides, as distinguished from the pivotally-mounted holder shown in Fig. 1. Fig. 6 is an enlarged sectional view, showing symmetrical screw-threads produced by means of my improvement, and Fig. 7 is a similar view showing imperfectly-formed threads.

A more detailed description of the invention is as follows:

The machine as a whole, of which only the

part having my improvement is represented herewith, is of the class which produce screw-threads on the screw-blank by the "rolling process," so called, an example of which is shown and claimed in an application for Letters Patent filed by me in the United States Patent Office May 11, 1887, Serial No. 237,822.

C designates a cross-head adapted by suitable means to reciprocate back and forth in ways formed in the bed or framing B of the machine. The cross-head as drawn is adapted, by means of oppositely-arranged dies *a*, adjustably secured thereto, to roll two screws during a double stroke. These dies are each clamped in a holder, *b*, seated in the cross-head, by means of the bolts *f* and clamping-plate *b'*, as clearly shown in Figs. 1 and 2, the dies being susceptible of adjustment longitudinally by means of end screws, *s*, the holes in the holder through which the bolts *f* pass being elongated for the purpose. The clamping-plate *b* is constructed so as to get a bearing-surface upon the cross-head and the upper side of the die. (See Fig. 2.)

c indicates a normally stationary holder-frame, whose length is substantially equal to that of the cross-head. The inner edge of the frame is planed out longitudinally to receive a die-holder, *b*, which rests upon the lower portion, *c'*, of the frame *c*.

The manner of mounting and securing the holder and die in position in the holder-frame is effected by a clamping-plate, *b'*, bolts *f*, and screws *s*, substantially as just described with reference to the traveling die.

In Figs. 1 and 2 the holder-frame is represented as pivoted by screws *h* to the thrust-block *d*, the outer edge of the frame being semicircular in cross-section and fitting a channel, *c'*, cut in the thrust-block, having the counterpart of the adjacent face of the plate. This construction relieves the pivot-screws from lateral thrust and allows it to be borne by the concave surface *c'* of the thrust-block, the latter being secured to the bed of the machine by bolts *h'*, which are tapped into the bed, the holes therefor formed in the block *d* being elongated. The thrust-block is backed by a wedge, *k*, which in turn is backed by a heavy rib or extension projecting upward from the bed, as clearly shown. By means of this latter arrangement the stationary die is adapted to be nicely adjusted with reference to its fellow or traveling die, a screw-threaded stem, *k'*, attached to the wedge and passing through a bracket, *m*, in connection with the check-nuts, serving to facilitate the adjustment.

From the foregoing it is evident that the die *a*, with its holder-frame *c*, is adapted to be adjusted both laterally and longitudinally, as desired, and at the same time being adapted to resist the thrust or pressure imposed upon the dies while rolling the blank between them.

The immediately-following description relates to the more important features of the present invention.

Intermediate of the front and rear edges or

faces of the die-holder frame are stops *e'*, adjustably mounted in ears or extensions *e*, secured to or forming a part of the bed B, said stops serving to limit the upward movement of the frame *c*. Practically such movement of the die from its normal position does not exceed one thirty-second of an inch, as before stated, the distance varying, of course, according to the size of the screws produced and the curvature or inequalities of the die itself. The lower portion or extension, *c'*, of the frame *c* is adapted to be separated from the underlying adjacent face of the bed-frame B by a like distance. (See Fig. 3.)

In order to maintain the die in its normally stationary position, I introduce a series of automatically-yielding supports constructed substantially as follows: The bed is first drilled from the top near its inner vertical face, thereby forming a (one or more) hole, *u*. A pintle, *t*, having a slotted opening, *w'*, at its lower end and the enlargement or head *t'* at its upper end, is mounted in said hole, the head portion *t'* being fitted to move freely therein. A pin, *w*, passing through the opening *w'* and secured to the bed, serves to retain the pintle in position in the hole *u*, a washer, *w'*, resting upon the pin *w*, and a strong spiral spring inclosing the pintle intermediate of the head and washer, serving to normally keep the pin in engagement with the lower side of the slotted opening *w'*, thereby permitting the upper face of the pintle to extend only a fixed short distance above the bed. It is obvious, however, that the extension of the pintle may be readily altered, if desired. The resistance of the spring *s'* is such that it considerably exceeds the unsupported weight of the holder *c* and its attached parts.

Now, assuming a machine to be provided with the device hereinbefore described, its operation in rolling a screw would be substantially as follows: The screw-blank is inserted between the reversely-arranged dies *a* at their entering end. The movement of the cross-head C in the arrow direction, Fig. 1, carries the blank along with it at a rate of speed just one-half that of the traveling die. While the blank is thus being carried forward, due to the action of the ribs of the thread-forming dies, the holder *c*, &c., remains in the normal position represented in Fig. 3—that is, if the dies exactly agree with each other in their vertical relation at all portions of the stroke. Practically, however, such perfection and uniformity of action are not often attained. Among the causes which produce imperfect screw-threads may be mentioned the following: slight inequalities in the density of the wire itself, the wear of the cross-head or other analogous reciprocating parts of the machine, in connection with the rigidity of the fixed dies. The chief difficulty, however, lies in the fact that the dies may become so curved or warped in hardening that it is impossible to secure them in such relative positions as to produce perfect threads upon the screw, the action of the rig-

idly-secured dies being in such case to "thin" the threads, as represented in Fig. 7 at *v*'.

With one of the dies mounted to vibrate or move up and down a short distance from its normal position, the foregoing defects are overcome as it automatically adjusts or accommodates itself to the fixed die in working, the result being to produce screws having their body, threads *v* alike in section throughout, as shown in Fig. 6. This improvement in the mounting of dies I consider very useful, as by its adoption the percentage of imperfect screws made by the machine is reduced to a minimum.

As before stated, it is not necessary that the holder *c* be pivotally mounted. It may be constructed to move vertically between guides *g*, as shown in Fig. 5.

I prefer to adapt the (normally) stationary die to adjust itself to the traveling die, although the latter may be mounted to automatically adjust itself to the stationary die.

I claim as my invention—

1. In a screw-threading machine, the combination, with a mounted die for rolling screw-threads, of a fellow die mounted, substantially

as described, to automatically adjust itself in a direction parallel to the axis of the screw or blank while being acted upon.

2. In a screw-threading machine, the combination, with a reciprocating thread-forming die, of a normally stationary fellow die mounted to vibrate parallel to the axis of the screw or blank while being acted upon, and an elastic or yielding support for the latter-named die, substantially as hereinbefore described.

3. The combination, with a thread-forming die mounted to reciprocate, of a fellow die, an adjustably-mounted holder having the latter die secured thereto, a yielding support for said holder, and stops for limiting the movement of the holder and die in a direction parallel to the axis of the screw or blank, substantially as hereinbefore described, and for the purpose set forth.

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

CHARLES D. ROGERS.

Witnesses:

CHARLES HANNIGAN,
GEO. H. REMINGTON.