3 Sheets--Sheet 1.

JAMES M. CARPENTER.

Improvement in Machines for Threading Wood Screws.

No. 125,269. Patented April 2, 1872.

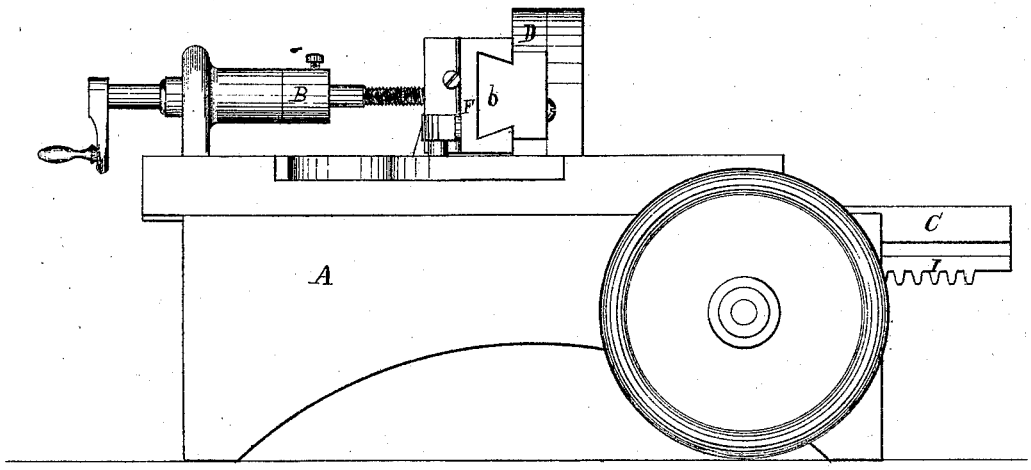

Fig. 2.

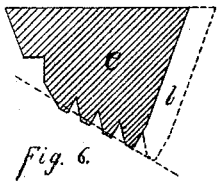

Fig. 6.

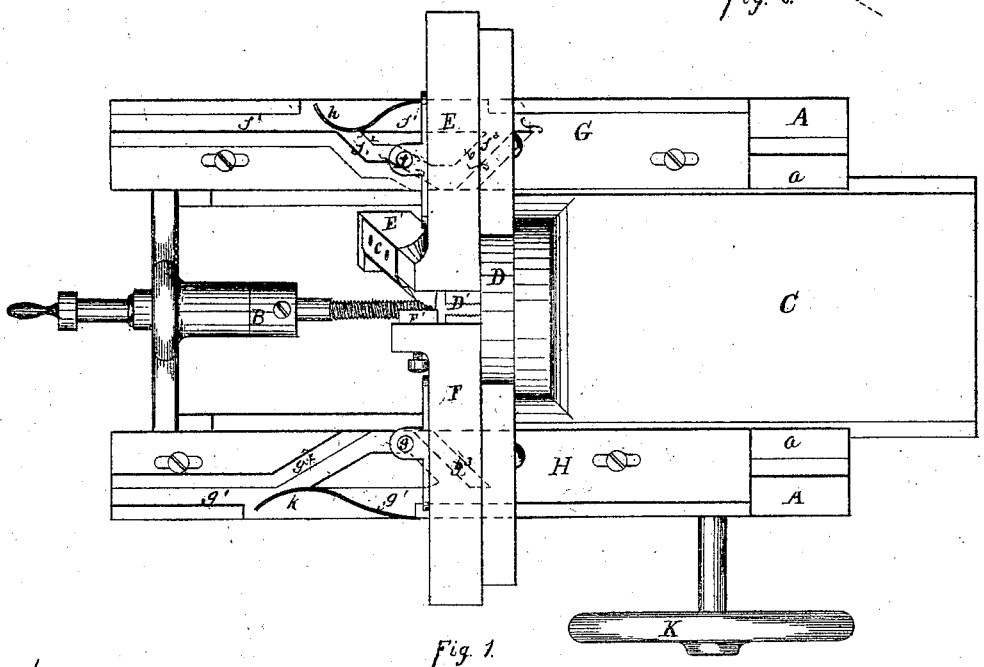

Fig. 1.

WITNESSES.

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3 Sheets--Sheet 2.

JAMES M. CARPENTER.

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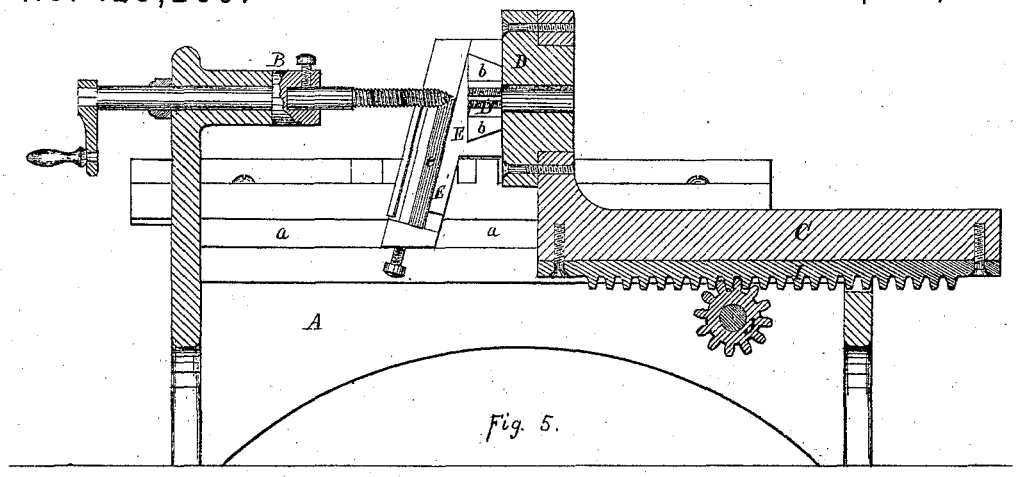

Fig. 5.

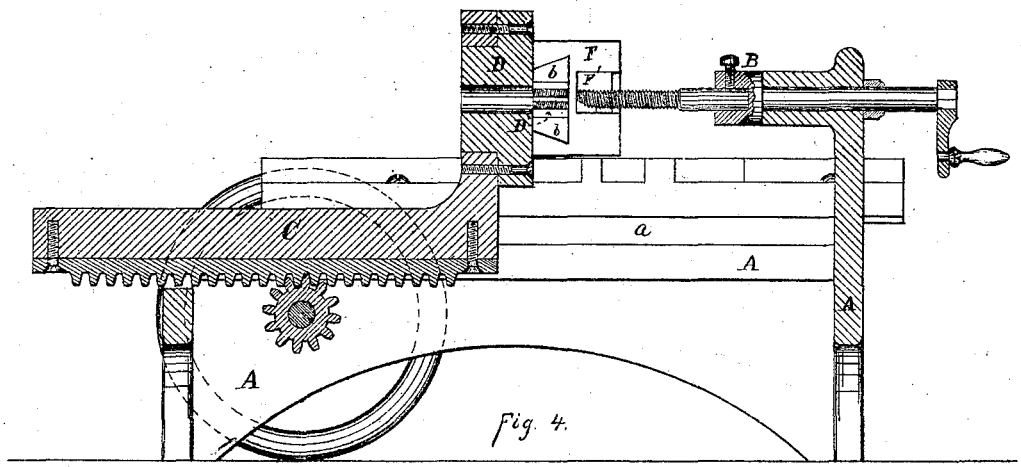

Fig. 4.

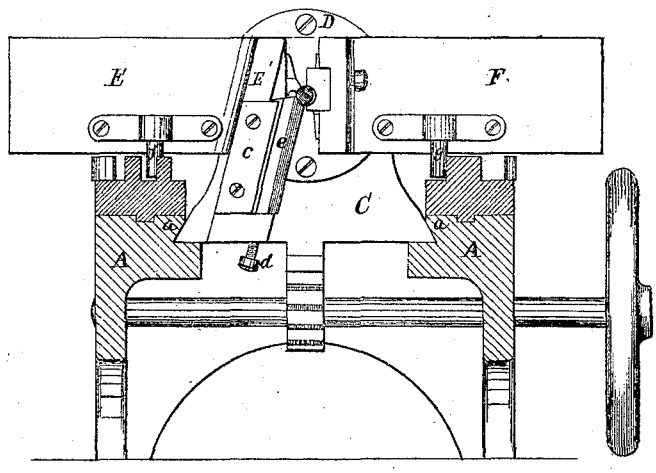

Fig. 3.

WITNESSES.

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3 Sheets--Sheet 3.

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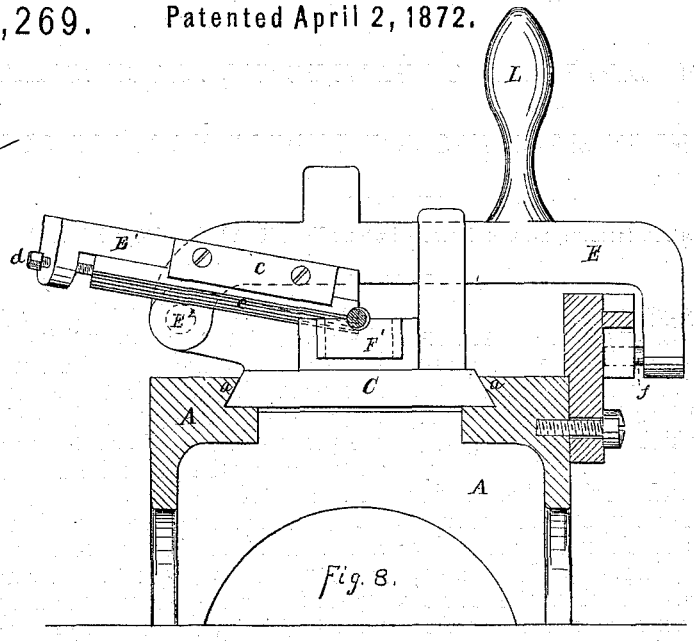

Fig. 8.

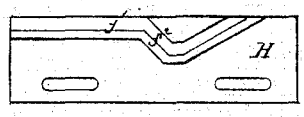

Fig. 9.

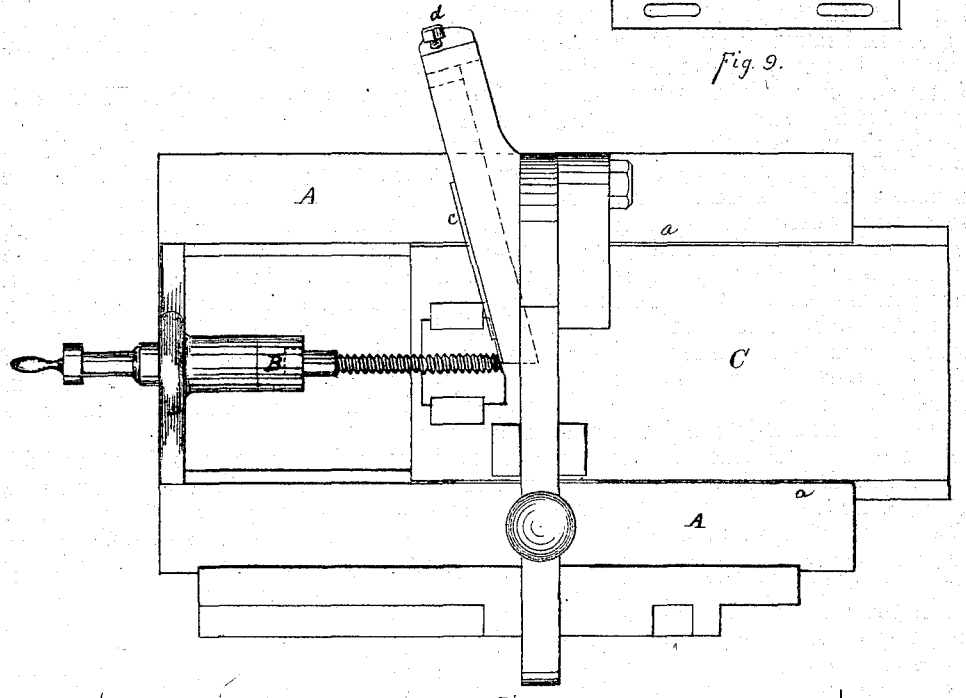

Fig. 7.

WITNESSES.

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UNITED STATES PATENT OFFICE.

JAMES M. CARPENTER, OF PAWTUCKET, RHODE ISLAND.

IMPROVEMENT IN MACHINES FOR THREADING WOOD SCREWS.

Specification forming part of Letters Patent No. 125,269, dated April 2, 1872.

To all whom it may concern:

Be it known that I, JAMES M. CARPENTER, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain Improvements in Machines for Cutting Gimlet-Pointed Screws, of which the following is a specification:

The modifications and devices herein described are improvements upon the mode of making gimlet-pointed coach or lag screws, by means of dies for cutting the body of the screw, and tools moving toward and from the axis of the same, under the control of a pattern or former to cut the thread upon the point, for which Letters Patent have already been granted to me. In cutting this kind of screw, where the entire thread is formed by running the dies over the blank only once, the strain upon the blank is so great in removing so large a portion of the metal, that only screws of considerable diameter can be cut in that way; and if, in addition to this, tools for cutting the thread upon the point are added, the strain upon the blank is thereby increased, and the danger of twisting off the blank is increased. The purpose of the present improvements is to cut the gimlet-point upon the screw by an operation subsequent to that by which the thread is cut upon the body, so that the strain of the two operations shall not come upon the screw-blank at the same time, while the screw-threads upon each part of the screw shall be made accurately to coincide.

My first improvement consists in the combination, with the dies which cut the body of the screw, of a threaded back rest, which is formed like the segment of a nut, and accurately fits the threads formed upon the body of the screw, and holds the screw after the dies which cut the body have left it; and the pointing tool or tools by which the thread is cut upon the point while the screw is supported by the threaded rest, by which means the rest becomes the support of the screw and, in connection with the threads already formed upon the screw, the leader, which controls the progressive motion of the tool or tools which cut the threads upon the point.

My second improvement consists in the use of what I call the serial cutter or tool, which is made with a series of cutting-edges—say four or more—the edges of which are set in a line nearly coinciding with the inclination of the point of the screw, and its relation to the pattern or former which controls its radial movement is such that the several cutting-edges will remove successive shavings from the point of the blank, so that when they have all passed by the point the thread thereon will be completed.

My third improvement consists in the combination of a threaded back-rest, which is made to serve as a support to the screw, and as a leader in the operation of forming the threads upon the point, and the series of cutting points or teeth which are moved radially under the control of a pattern or former, as will be described, by which means screws may have gimlet-points formed upon them, the bodies of which have been cut by a separate operation, as will be hereafter described, as a modification of my invention.

In the accompanying drawing, Figure 1 is a plan of my machine in the preferred form. Fig. 2 is a side elevation of the same. Fig. 3 is a transverse sectional elevation, showing the threaded rest and the pointing-tool in elevation. Fig. 4 is a sectional elevation looking toward the side of the machine that carries the pointing-tool. Fig. 5 is a sectional elevation looking in the opposite direction. Fig. 6 is an enlarged section of the serial pointing-tool. Figs. 7, 8, and 9 represent a modified form of my improvements for forming gimlet-points on screws, the bodies of which have been previously cut.

A represents the frame or bed upon which the other parts of the apparatus are arranged, as shown, which rests upon and is secured to the ways of a common lathe bed, or any other suitable frame. B represents the position of the mandrel for turning the screw to be cut, which is made in the usual way. The bed A is provided with ways *a a*, in which the carriage C slides back and forth, to which the die stock D is attached. The die-stock D carries the dies D^1 for cutting the body of the screw, and also has attached to it two horizontal dovetailed slides, *b b*, on opposite sides of the center, upon which the two stocks E F slide toward and from the center. To one of the stocks E the tool-holder E^1 is attached, which carries the serial tool *e* which cuts the thread upon the point of the screw. To the other slide F is at-

tached the threaded rest F′, which holds the screw while the thread is being cut upon its point. To these stocks E F, respectively, are attached studs *f* and *g*, which work in the guide or pattern grooves of the pieces G and H, and which move the stocks E F toward and from the center, as will be described. The form of the serial tool *e* is shown in section, enlarged, in Fig. 6, and is sharpened by grinding off the end. It is held and adjusted in the tool-holder E′ by the clamp *c* and set-screw *d*, as shown. The rest F′ is formed like half of a nut, and has a screw-thread made in it of a shape to fit the thread upon the body of the screw. While the dies D^1 are running onto the blank to cut the screw upon the body, the studs *f* and *g* of the slides run in the outer grooves f^1 and g^1 of the pieces G and H; but when the motion of the screw is reversed, to back the dies off from the screw, the studs are made to enter the inclined parts f^2 and g^2, by the action of the springs *h* and *k*, which move both of the stocks E and F inward by the act of moving the carriage C and its connections backward. The positions of the inclined parts of the groove f^2 and g^2 are such as to move the stocks E and F, respectively, so that the threaded rest F′ will come up against the body of the screw, and at the same time the tool *e* will come up to the screw, so that its most prominent point or tooth will be nearly in contact with the bottom of the thread just before the dies D^1 leave the screw. After the dies D^1 leave the screw the backward motion of the carriage C is continued by the action of the rest F′, and at the same time the stud *f* enters the incline part f^2 of its groove, which is of the proper inclination to carry the serial tool *e* over the point of the screw to cut the thread thereon by a succession of shavings, and also to hold the screw firmly in the back-rest. The further backward movement of the carriage C is produced by the hand-wheel K and rack I and pinion J in an obvious manner, and by this motion the studs *f* and *g* pass outward through the inclined grooves f^3 and g^3 to the outer grooves f^1 and g^1, which draw back the stocks E and F, respectively, and permit the finished screw to be removed and a fresh blank to be supplied. The carriage C, with the dies, are then brought up to and entered upon the screw, and the operation is repeated. While the carriage is moving forward the studs *f* and *g* are retained in the outer grooves, and as they move forward, push aside the springs *h* and *k*, which, on the return of the studs, direct them into the inclined parts of their respective grooves, as has been stated. The velocity of revolution of the screw in running the dies back is very much greater than when cutting the screw upon the body, both for the purpose of saving time, and also that the thread upon the point is better formed when it is running with considerable velocity than when running at a velocity proper for cutting the body of the screw with the dies.

In using the serial-tool, I propose, in some cases, to make the longest point or bit separate, as shown in dotted lines at *l* in Fig. 6, and to use this only for the purpose of holding the screw into the threaded rest F′, and is not intended to cut, and is therefore made separate from the tool, which has to be ground upon the end to form the cutting-edges. But this part may also be formed upon the tool and ground with the rest, and then slightly blunted to prevent it from cutting, which will operate in the same way.

In Figs. 7, 8, and 9 are represented a part of my improvements adapted to forming gimlet-points upon screws already cut, in which A is the frame; B, the mandrel for turning the screw; C, the carriage, sliding in guides in the frame A, as before. E^1 is the threaded rest which is fixed to the carriage C; and E is a lever which has its fulcrum at E^2 upon the carriage, and carries the tool-holder E^1 attached to it, as shown. The serial-tool *e* is held in it by the clamp *c* and set-screw *d*, as before described. The lever E has a handle, L, by which it is worked, as well as the carriage C, by the attendant. The outer end of the lever is turned down and carries a pin, *f*, which works in the guide-groove f^1 of the former H, which is attached to the bed by screws, as is shown more clearly in Figs. 8 and 9. The form of the inclined part of the groove at f^2, Fig. 9, is such as to bring down the lever with the proper motion to carry the tool down the inclination of the point of the screw, and cause the several points of the tool to cut away the metal in successive shavings to form the thread, while the tool and carriage are carried longitudinally by the action of the threaded-rest F′ in connection with the screw-threads upon the body of the screw, as in the other form of my improvements.

In cutting screws by my improvements, the operation with the mechanism first described is as follows: The screw-blank previously pointed is secured in the socket B, and the dies are brought up to and started onto the same, and the screw is cut upon the body of the blank by the usual mode of operation to as great length as is desired. The motion of the mandrel is then reversed and run back with a motion—say three times as fast as the motion in cutting the screw. When the dies have nearly reached the end the threaded-rest F′ is brought up to the screw, so as to engage accurately with the screw-threads already formed, and the pointing-tool with its series of points is brought up to the opposite side of the screw, which holds it in to the rest and causes it to push the carriage back after the dies have left the point of the screw. By this last part of the motion the tool, by its pattern-groove f^2, is directed so as to cut the threads upon the point, as has been already described. After the tool has passed off from the point of the screw the studs *f* and *g* pass through the inclines g^3 and f^4, which draw back the stocks E and F, with the tool and rest F′, when the finished screw is removed and a fresh blank is supplied to repeat the operation.

In pointing screws by the modification last

described the operation is as follows: The carriage C is drawn toward the mandrel B, so that when the screw is inserted in the socket of the mandrel its body will lay in the threaded rest F'; the lever E with the tool *e* is then brought down upon it until the stud *f* rests upon the bottom of the groove f^1; the mandrel is then put in revolution in a backward direction, which, by the threaded-rest, pushes the carriage outward, and with it the tool. As the stud *f* passes down the incline f^2 of the piece H, Fig. 9, it guides the tool over the point and forms the thread upon it, as has already been described. By pushing the carriage further in the outward direction, the stud *f* passes up the incline f^4, and raises the lever so that the screw can be readily removed.

What I claim as my invention is—

1. The threaded-rest, as a device to support the screw already formed, while being operated upon by the pointing or other tools, and, in connection with the screw, to act as a leader to give motion to the tool-carrier, substantially as described.

2. The serial-tool *e*, in combination with a former or guide so related thereto that as the tool is carried past the point of the blank the several teeth will cut successive shavings therefrom and complete the thread, substantially as described.

3. The combination of the threaded rest and pointing-tool, substantially as described.

4. The combination of the threaded rest and the pointing tool or tools with the dies for cutting the body of the screw, substantially as described.

Executed October 14, 1871.

JAMES M. CARPENTER.

Witnesses:

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WM. C. HIBBARD.