D. F. Millen.

Threading Wood Screws.

No. 54,188. Patented Apr. 24, 1866.

Fig: 1.

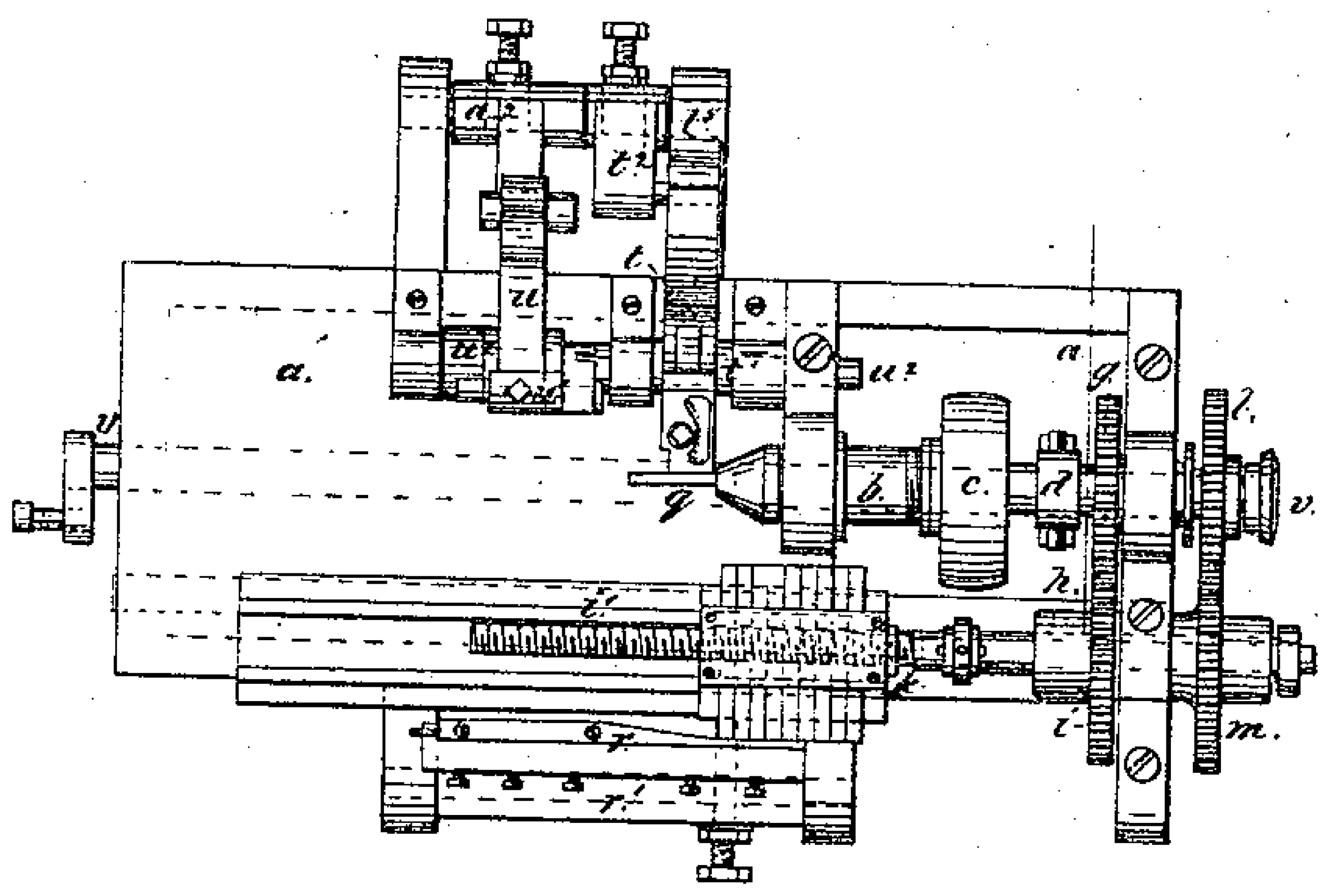


Fig: 2.

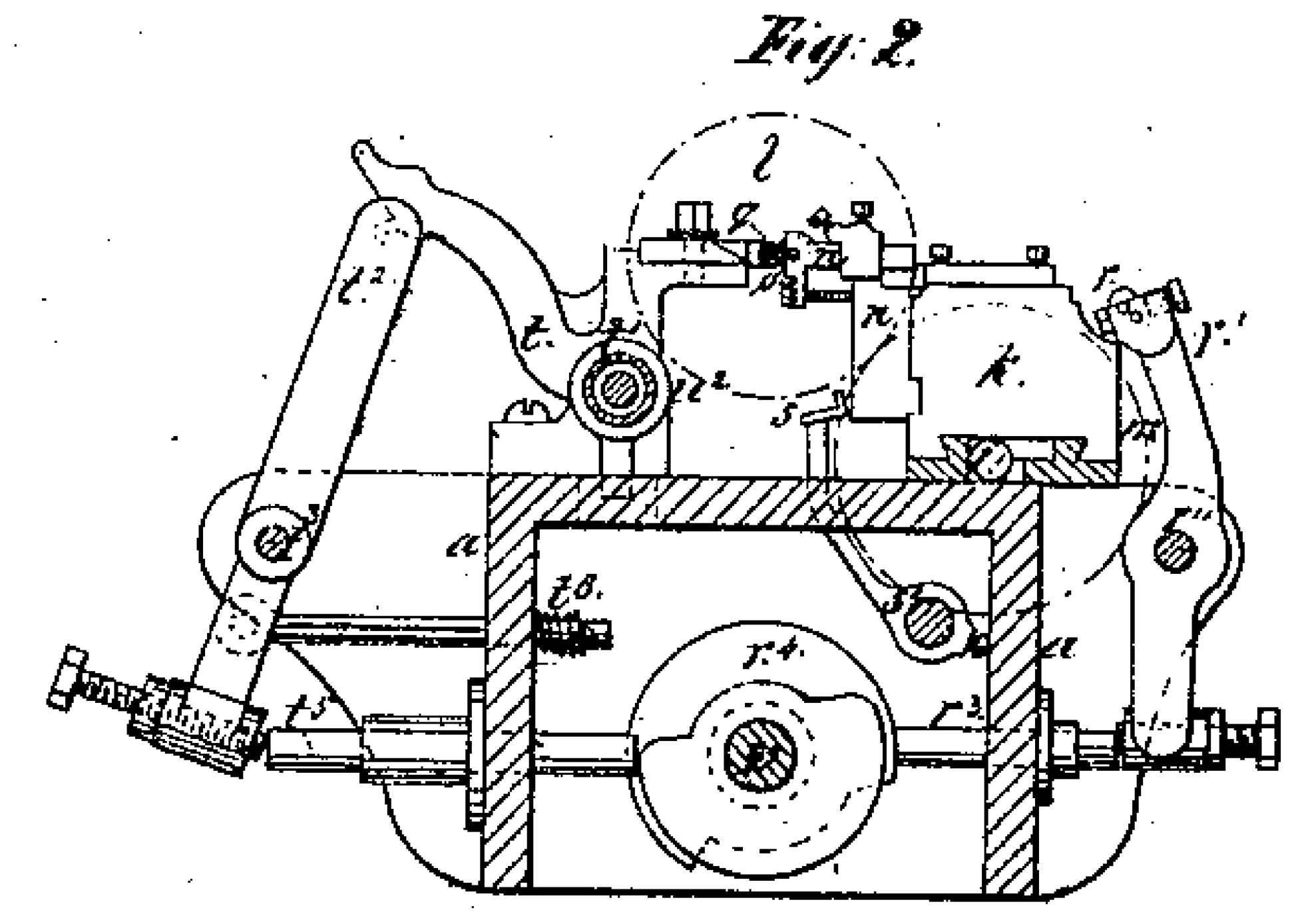


Fig: 3.

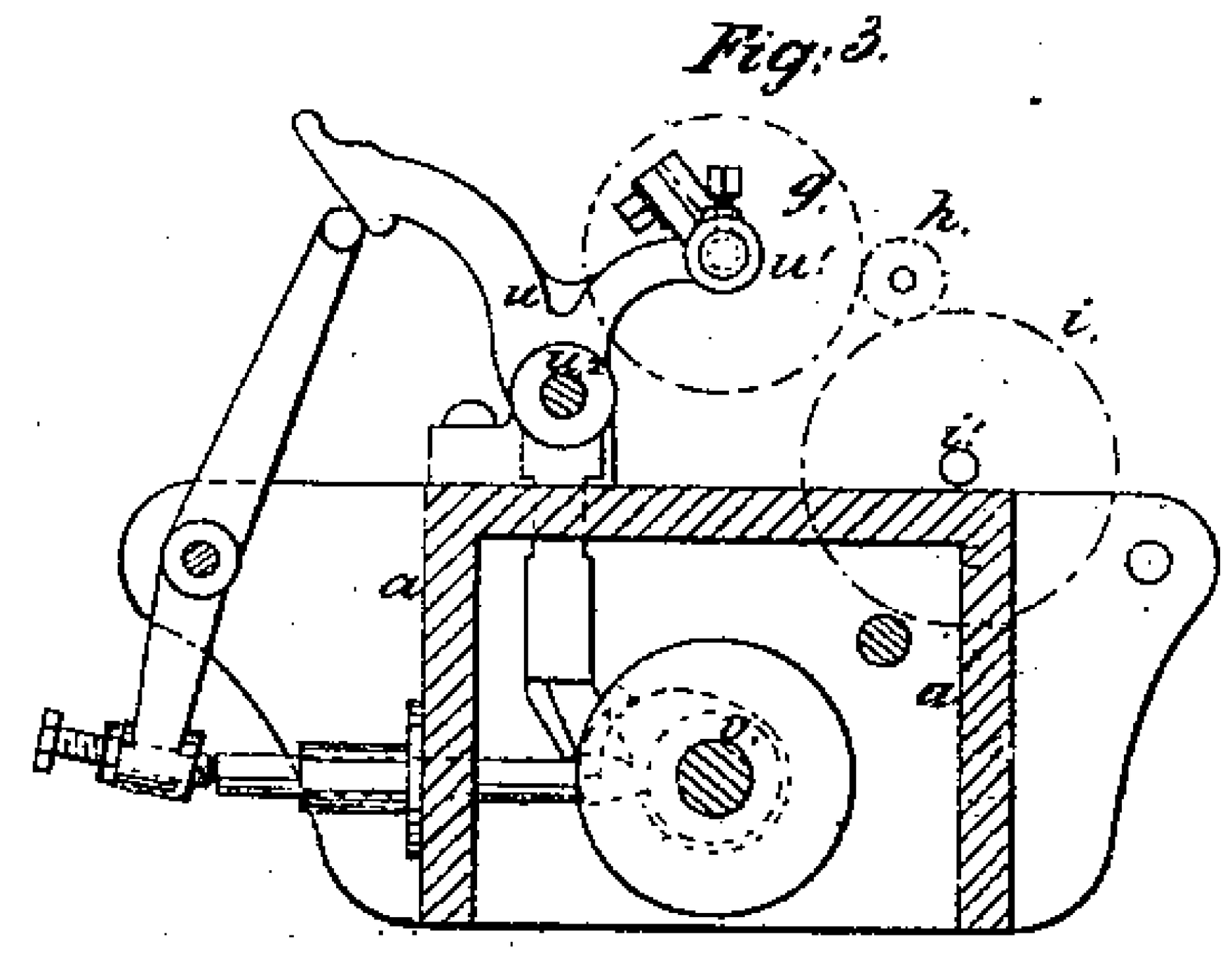


Fig: 4.

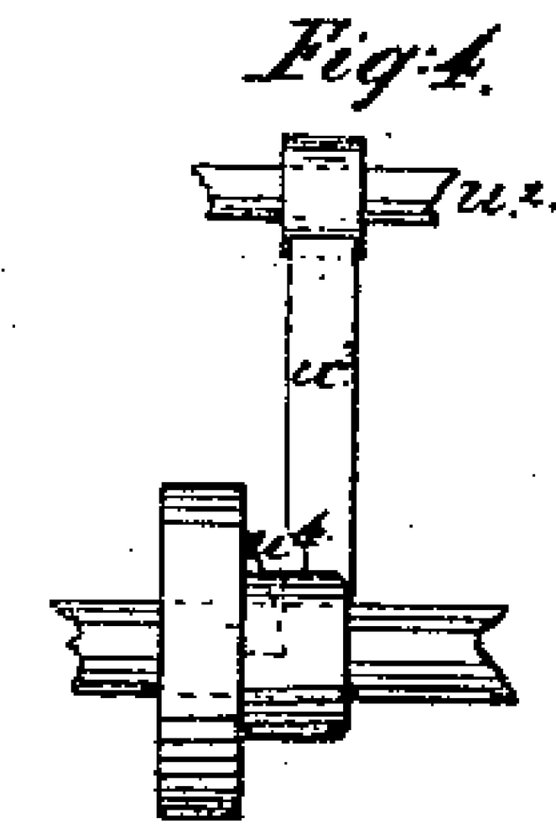


Fig: 5.

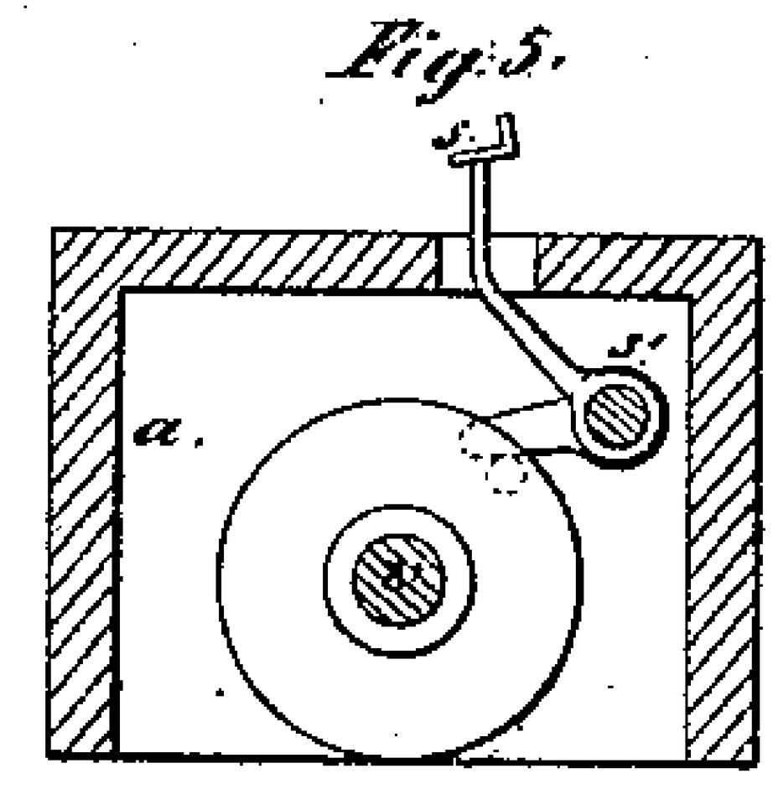


Fig: 6.

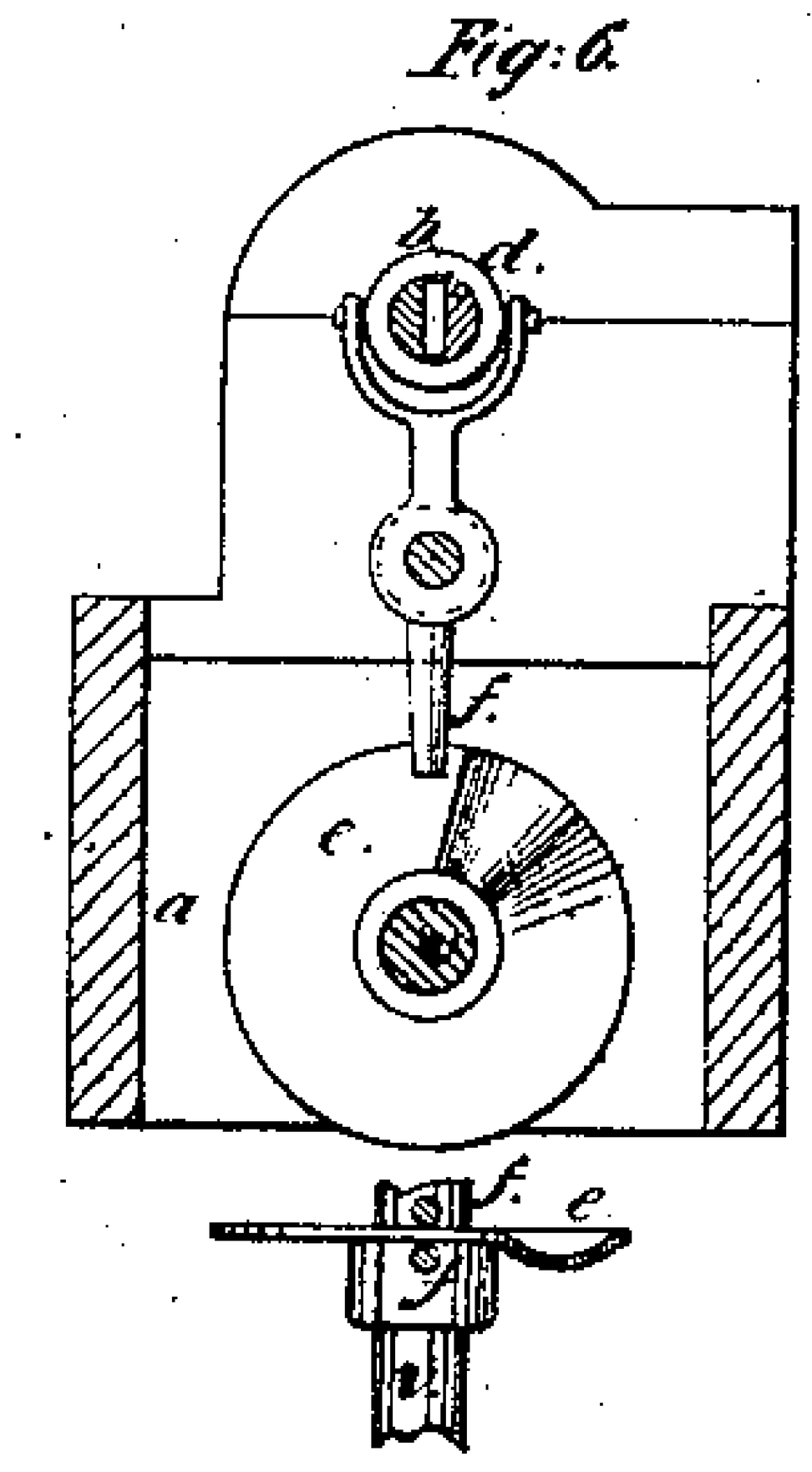


Fig: 7.

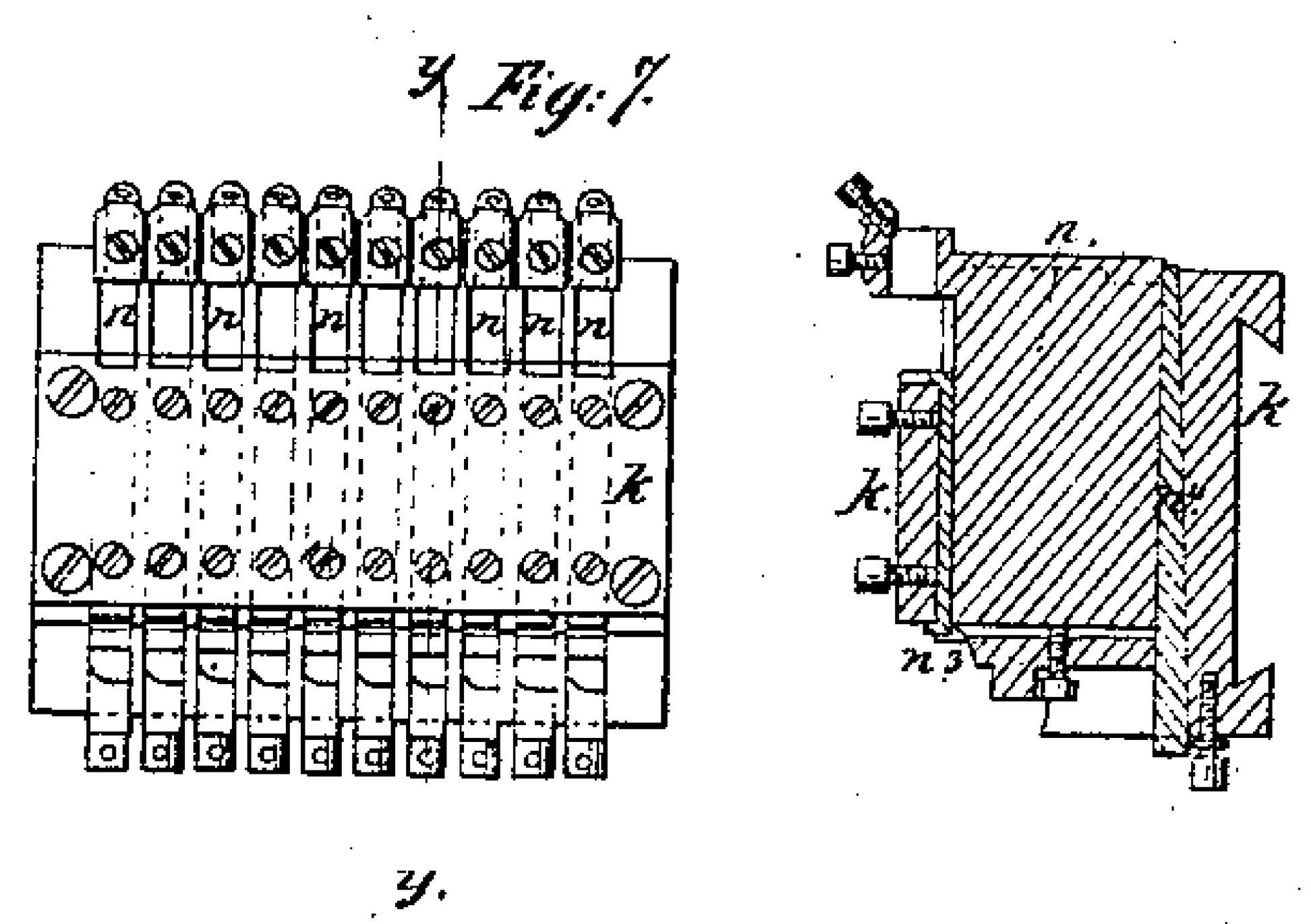
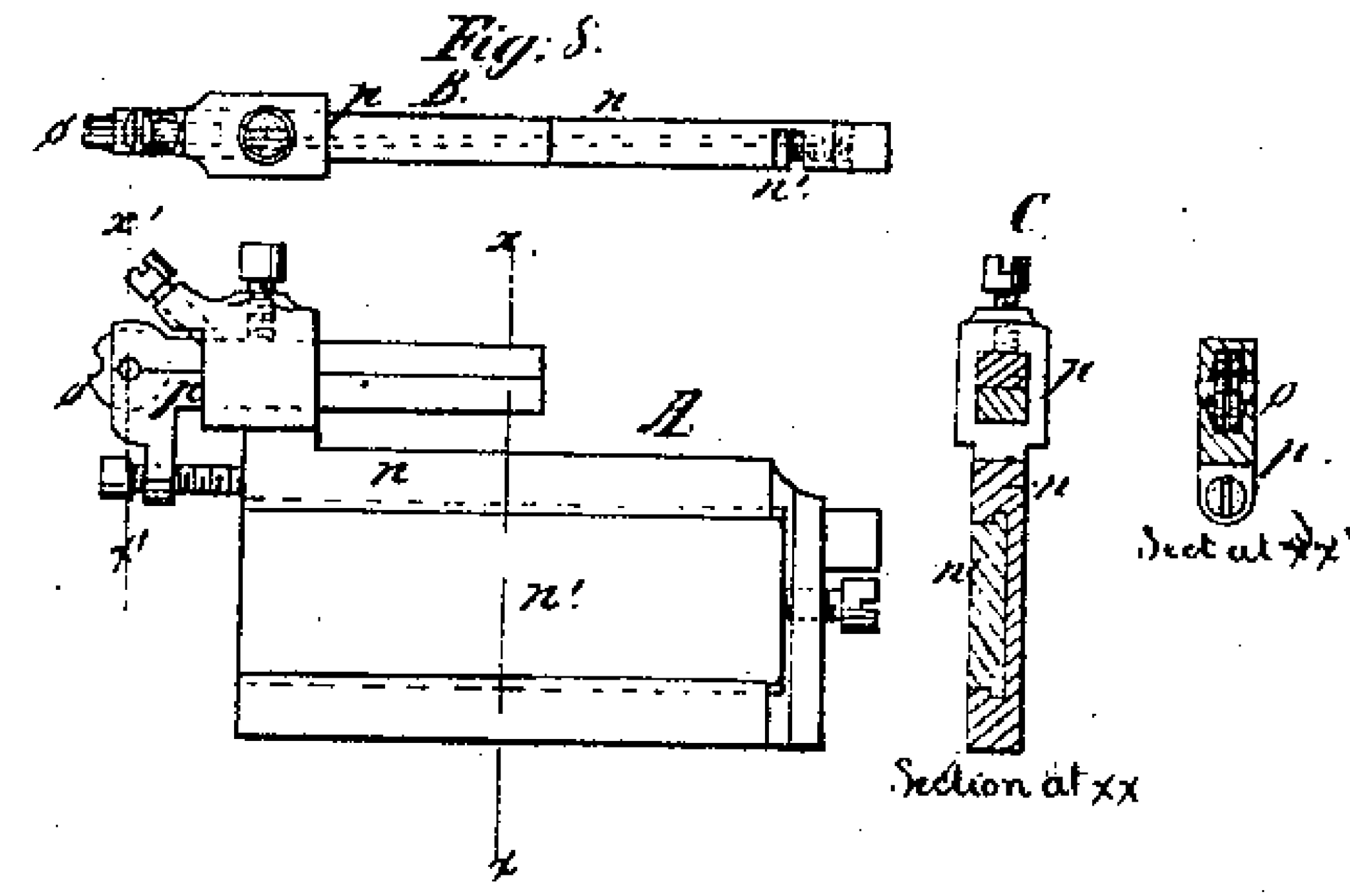


Fig: 8.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN MACHINERY FOR THREADING SCREW-BLANKS.

Specification forming part of Letters Patent No. **54,188**, dated April 24, 1866; antedated April 13, 1866.

To all whom it may concern:

Be it known that I, D. F. MELLEN, of the city, county, and State of New York, have invented certain new and useful Improvements in Machinery for Threading Screws, a part of which is applicable to other machinery for making metal screws; and I do hereby declare and ascertain my said improvements as follows, referring to the accompanying drawings, which illustrate my description, in which—

Figure 1 is a plan of the machine. Figs. 2, 3, 4, 5, and 6 are cross-sections thereof, showing the cams and their connection with the moving parts; Fig. 7, the tool-block and a section thereof; Fig. 8, the tool-holder and its details.

My improvement consists in the construction and adaptation of certain machinery for cutting the threads of wood-screws, &c.; and the several parts thereof are constructed as follows:

Those parts of my machine which are old, or which are the subject by me of other applications for patent, are not described in detail. For instance, the feed apparatus is entirely omitted, and my newly-improved apparatus or any other efficient feed may be used. The parts that I herein describe as new are combined in a permanent frame, *a*, in which there is a spindle, *b*, for holding the screw-blank while threading. Any sufficient spindle may be used for this purpose; but I prefer the one invented by me and described in another application for patent. This spindle is driven by a band from the driving power acting on pulley *c*.

d is a sliding ring which actuates the forceps of the spindle, and is made to slide thereon to open and close them by means of the cam *e*, (see Fig. 6,) which is embraced by a fork, *f*, that causes the ring *d* to slide when vibrated by cam *e*. A spur-wheel, *g*, on the spindle *b* is connected by an intermediate stud-wheel, *h*, with a spur-wheel, *i*, on the screw *i'*, by which a progressive motion is given to the tool-block *k*. The spur-wheel *l* on the spindle *b* gears directly into a similar wheel, *m*, on the screw *i'*. The two gear-wheels *i m* are loose on the shank of the screw *i'*, and are alternately connected therewith by a clutch of proper construction, well known or otherwise. (Not shown in the drawings.) The screw *i'* turns in a nut affixed to the tool-block *k*, by which the latter is made to slide in opposite directions as the screw is turned by the gear-wheel *i* or *m*.

The tool-block is an important feature of my invention, and is constructed as hereinafter described. I will premise that the screws are threaded by a series of cutters following in rotation, each cutting a light shaving until the screw-thread is completed by a single forward movement of the tool-block. To effect this it is necessary to construct the parts in a solid and careful manner, and to prepare for each tool-holder such adjustments as will compensate for the wearing of the parts and insure the greatest accuracy in the working of the threading-tools. For this purpose I form a series of horizontal mortises in the tool-block, a top view of which is seen in Fig. 7, together with a section through one of the mortises and a tool-holder on the line *y y*. Each tool-holder *n* is made as seen in the several views and sections, Fig. 8, A being a side elevation; B, a plan; C, a cross-section. The shank of the tool-holder *n* is made to conform to the shape of the mortise in the tool-block in one side of this shank, in which is dovetailed a wedge-piece, *n'*. The surface between this wedge-piece and the shank is inclined, as seen by the dotted lines at B, and behind it there is a set-screw to set up the wedge as the sides wear. The lower edge of the tool-holder rests upon a wedge-piece, *n''*, which can also be set up by a set-screw in the tool-block. (See Fig. 7, section.) An adjustable wear-plate, n^3, is also put in above the upper edge of the tool-holder, with proper set-screws for adjustment. It will thus be seen that the shank of each of the tool-holders, which slides forward and back in the tool-block at right angles to its line of progression, can be adjusted with the greatest accuracy, so as to cause each of the tools to cut properly. On the upper front corner of the shank there is a projecting piece, with a horizontal mortise in it, to hold the tool, having set-screw to fix the tool in place.

If, instead of an ordinary tool, which may be used, I employ a circular one, as shown in the drawings at *o*, it is composed of a hardened-steel roller, *o*, the periphery of which is turned to the exact figure of the cut to be made, (see

A; B, and D, Fig. 8,) and this roller is turned conical on its faces, so as to wedge into the recess made for it in a clamp, *p*, made to hold it and form the shank by which it is connected with the tool-holder. A notch is cut in the periphery of the roller *o*, forming the cutting-edge of the tool, as shown at A, Fig. 8.

The advantages of this form of tool are that the configuration of the cutting-edge will be preserved, and the relative position of its cutting-edge will always remain the same as it is worn away by sharpening.

The series of tool-holders *n*, more or less in number, sufficient to cut the required thread of the screw at one operation, are placed in the tool-block, as seen in Fig. 7, and when properly set are ready for use. The block, when in place, as seen in the plan, Fig. 1, moves in a line parallel to the axis of the screw-blank *q* which is to be threaded. When the block commences its advance movement to make the cut its tool-holders are all back far enough to clear the frame holding the spindle. To carry them forward and cause them to cut the screw-thread properly, I employ the well-known former *r*, which must be of the form of a section of the screw at the base of thread when cut. This former *r* is affixed and adjusted by set-screws accurately to the upper limb of a vibrating frame, *r'*. (Seen in Figs. 1 and 2.) The pivots *r''* of this frame are supported by brackets on the stationary main frame *a*, and at its lower end it is connected by an adjustable slide-bar, r^3, with a cam, r^4, on the cam-shaft. This adjustable slide-bar is a very important connection between the driving and working parts. The cam acts on it in a radial line, giving great accuracy to the motion, and the parts can be readily and carefully adjusted as they wear by the set-screw seen in the drawings. This connection I use in other machines. When the threading-tools have made the cut, and before the block returns back, a bar, *s*, (see Figs. 2 and 5,) is brought into contact with the face of the tool-shanks *n* and forces them back out of the way of the frame. This bar is supported on vibrating arms pivoted at *s'*, and is operated by a pin on one of the cams. (See Fig. 5.) To support the screw-blank *q* while being threaded, there is a counter-rest introduced at *t*, consisting of a stout lever, formed as shown in Fig. 2. Its fulcrum is at *t'*. That part which bears against the screw-blank *q* is made adjustable. The opposite end of the lever is an inclined plane, against which the upper end of a second lever, t^2, bears to force the rest forward against the screw-blank. This second lever, t^2, has its fulcrum at t^3, and is connected with its moving cam by a bar, t^5, similar to r^3, heretofore described.

In making pointed screws, an additional tool may be used to chamfer off a portion of the end of the screw-blank before the threader passes over it to form the point of the screw.

On the end of one arm of a lever, *u*, I form a socket, *u'*, which has a proper cutter inserted therein to chamfer the end of the screw-blank. (See Figs. 1 and 3.) The fulcrum of lever *u* is at u^2, and the lever moves forward like lever *t*, and by similar means. (Shown at Fig. 3.) The forward motion brings the axis of the socket into line with the axis of the screw-blank *q*, and when at that point an arm, u^3, (see Fig. 4,) on the axis u^2 of the socket-lever is struck by a side cam, u^4, on the cam-shaft, which forces the socket forward in the line of its axis over the end of the revolving screw-blank and chamfers it. The arm u^3 is then released from the cam, and a spring upon axis u^2 (not shown in the drawings) throws the lever sidewise, releasing the socket-cutter from the blank, free to fall back to its first position.

The cam-shaft *v* in the several figures, and in Fig. 1 principally by dotted lines, is geared to the spindle in any convenient way, and makes one revolution for every screw threaded.

The feeding of the screw-blanks to this machine may be done in any convenient way; but I prefer the apparatus which I have devised for that purpose, for which I have applied for Letters Patent. As this is not included in the present claims to invention, it is not shown or described, as other well-known devices may be used therefor.

When the screw-blank is inserted and held by the spindle it revolves with it. It is then chamfered and threaded, as above described, the pressure of the threading-cutters upon the blank being counteracted by the vibrating counter-rest. The jaws of the spindle then open and relieve the screw, which is thrown out by centrifugal force. The tool-block then returns to its first position, and a new blank is inserted and the operation repeated.

Having thus fully described my improvements in machinery for threading screws, what I claim therein as new, and for which I desire to obtain Letters Patent, is—

1. The tool-block and tool-holders constructed, arranged, and combined, substantially as and for the several purposes herein set forth.

2. The construction, arrangement, and application of the socket-cutter for chamfering the end of the screw-blank before threading, in combination with the threading apparatus, as set forth.

3. The bar *s* for throwing back the threading-tools into place, as described.

4. The cutting-tool *o* and its clamp *p*, combined as herein described.

DUSTIN F. MELLEN.

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