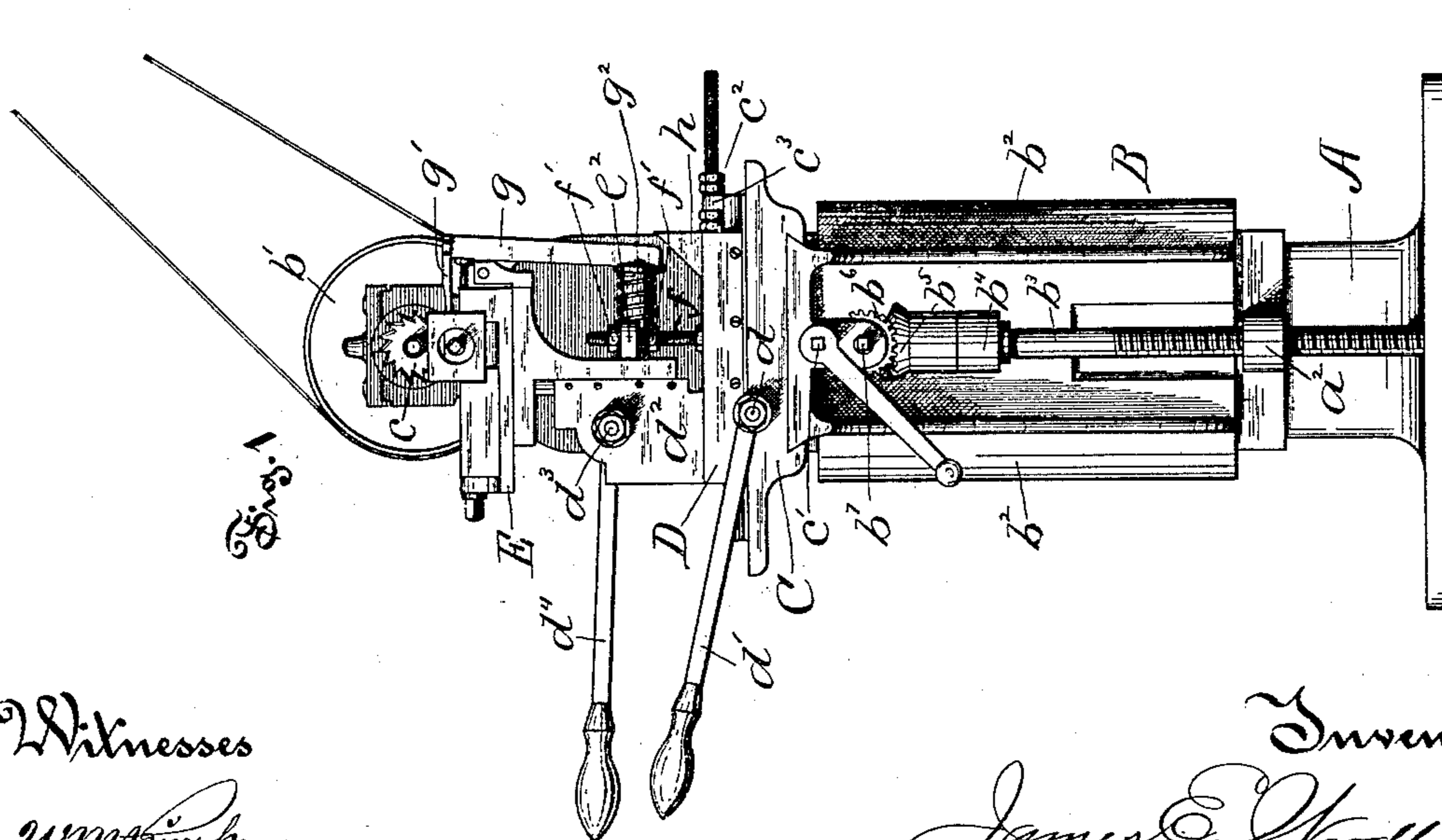
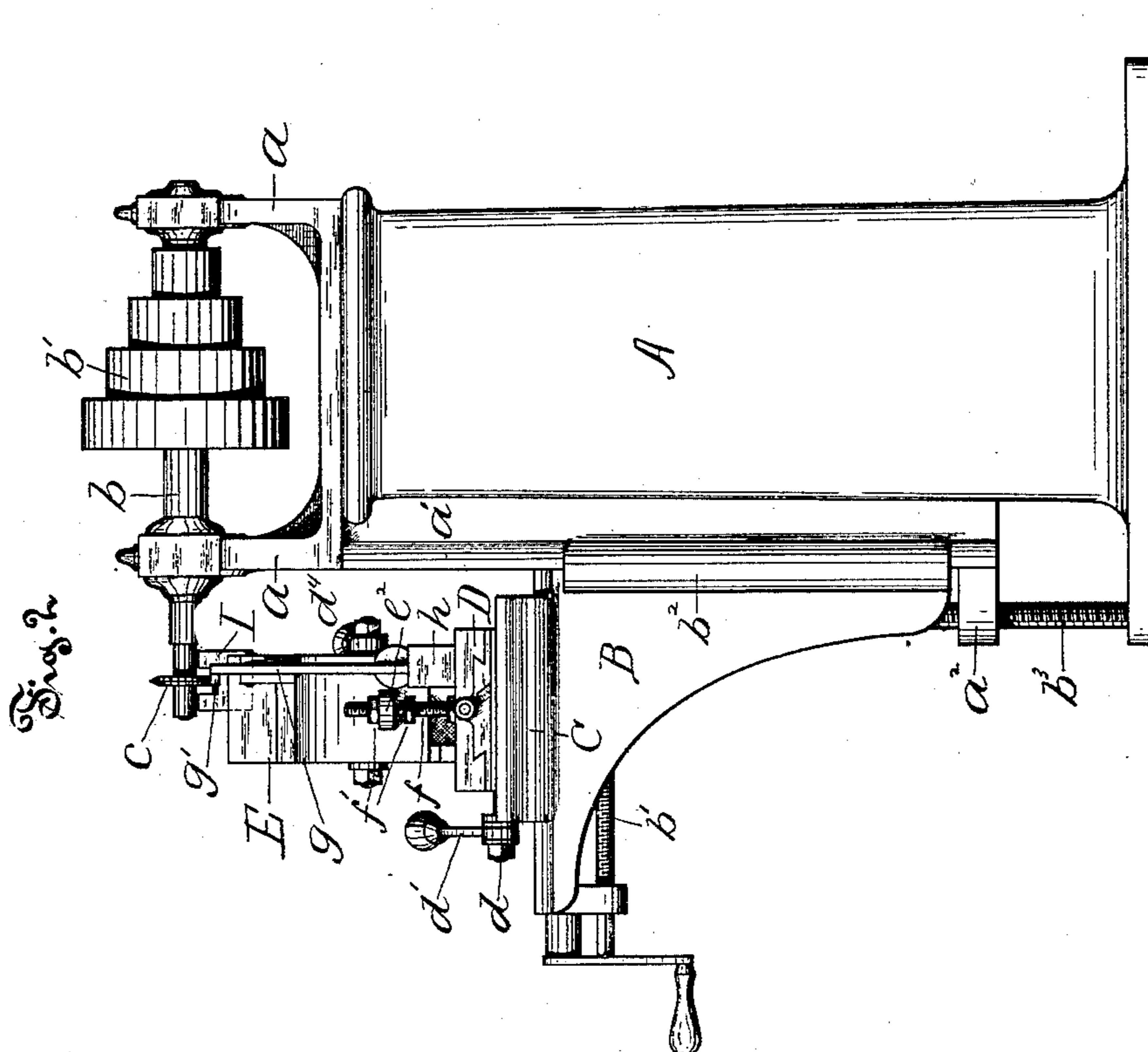


2 Sheets—Sheet 1.

METHOD OF RELIEVING SCREW TAPS.

Patented May 19, 1885.



W. M. Sporkman.

E. F. Nimock,

Inventor

James E. Woodbridge,
By Simonds & Burdett

Attys

(No Model.)

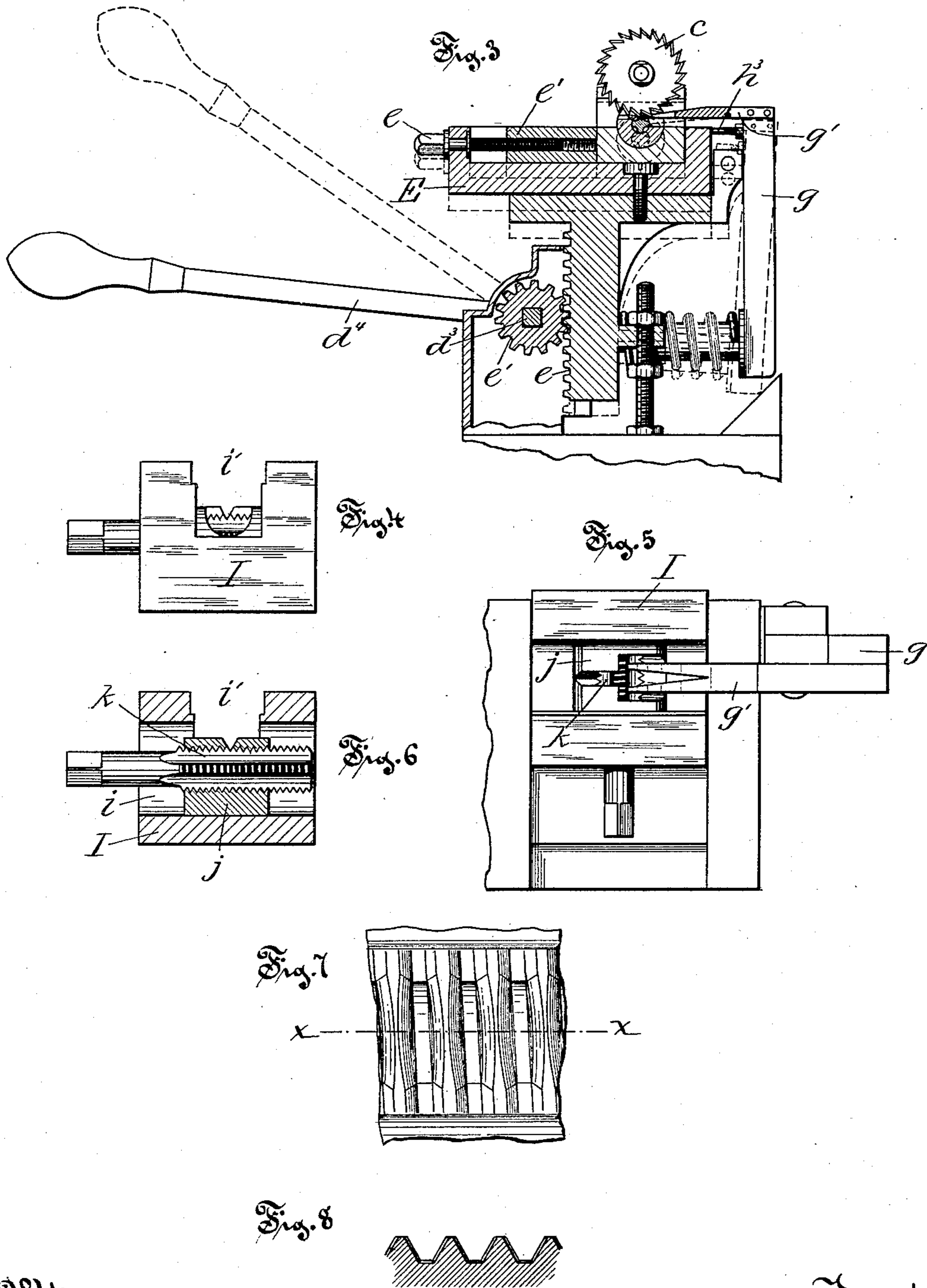
2 Sheets—Sheet 2.

J. E. WOODBRIDGE.

METHOD OF RELIEVING SCREW TAPS.

No. 318,153.

Patented May 19, 1885.



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES E. WOODBRIDGE, OF HARTFORD, CONNECTICUT.

METHOD OF RELIEVING SCREW-TAPS.

SPECIFICATION forming part of Letters Patent No. 318,153, dated May 19, 1885.

Application filed August 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. WOODBRIDGE, of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Method of Relieving Taps; and I do hereby declare that the following is a full, clear, and exact description of the same, whereby a person skilled in the art can make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Like letters in the figures indicate the same parts.

Figure 1 is a front view in elevation of a milling-machine with my improvements attached. Fig. 2 is a view of the same in elevation, looking from the right of the machine, as shown in Fig. 1. Fig. 3 is a view, on enlarged scale, of part of the machine, showing the parts in section on a vertical plane parallel to the plane of the cutter. Fig. 4 is a detail view of the tap-holder, on enlarged scale, looking at the side on which the stop device operates. Fig. 5 is a detail top view, on enlarged scale, of a part of the holder-bed, the holder, and the stop-lever. Fig. 6 is a view in central section of the holder on a plane parallel to the axis of the tap. Fig. 7 is a detail plan view, on a greatly-enlarged scale, of a part of the land of a tap, showing a number of teeth as relieved by my improved devices and method. Fig. 8 is a view in vertical section through the teeth shown in Fig. 7, on plane denoted by line *xx* of that figure.

My invention has for its object the production of a screw-tap the teeth of which shall be relieved in a manner that leaves each tooth with ample strength to do its work, and at the same time enables the tap as a whole to work better and freer than is possible with a tap relieved by any of the methods common in the prior art.

It consists in the improved method of relieving a tap by advancing it step by step through the plane of motion of a cutter, and using the tap as its own lead-screw. A screw-tap thus relieved, as a new article of manufacture, forms the subject-matter of my application filed March 6, 1883, which is still pending.

In the accompanying drawings, the letter A denotes the standard of a milling-machine

of ordinary material and construction, with the journal-bearings *a* supporting a rotary cutter-spindle, *b*, which bears the pulley *b'* and a removable cutter, *c*.

The letter B denotes a sliding bracket; *b*², dovetailed flanges on the bracket, which grasp the dovetailed tenon *a'*, fast to the standard, the latter serving as a guide to the bracket in its vertical play; *b*³, a vertical threaded shaft, supported in a bearing, *b*⁴, fast to the bracket, and moving in a threaded socket, *a*², which forms a part of the standard, and having at its upper end a beveled gear, *b*⁵, in mesh with a like gear, *b*⁶, fast to a horizontal shaft, *b*⁷, operated by means of a crank applied to the squared end of the shaft. The horizontal arm of the bracket has its opposite edges undercut to fit the dovetailed socket in the lower part of the movable carriage C, the latter being moved by means of a threaded shaft, *c'*, that is fixed against longitudinal motion in the bracket, and passes through a nut formed in a downward projection from the lower part of the carriage. This latter shaft *c'* and its connections are not shown any more fully in the drawings because they are common to this class of machines. The carriage C is movable in line with the axis of the cutter-spindle, and it bears a bed, D, which has a sliding movement in a plane at right angles to the axis of the cutter-spindle. This bed D is connected to the carriage C by the ordinary dovetailed tenon, and bears a rack, the teeth of which are in mesh with a cog-wheel fast to the shaft *d*, that is secured to the carriage, and is operated by means of the lever-handle *d'*, to move the bed D back and forth on the carriage. The carriage C bears a stop device, *e*², consisting of a screw-rod moving in a socket in a lug, *e*³, fast to the carriage, the rod bearing lock-nuts on both sides of the lug. An upright arm, *d*², fast to the bed D, bears a vertically-moving holder-bed, E, connected to the former by the ordinary slide mechanism, and bearing a rack, *e*, in mesh with the cog-wheel *e'* on the shaft *d*³, that is operated by the lever *d*⁴ to raise and lower the bed E. The bolt *f* is fast to the bed D, and bears the nuts *f'*, which, by limiting the movement of the lug *e*², fast to bed E, and through which the bolt projects, limits the vertical play of the bed E.

On the side of the bed E is pivoted the stop-

lever g , that bears on its upper end a fork, g' , in such manner as to project inward and directly under cutter c , and the lower end of the lever bears a spring, g^2 , tending to force the lower end of the lever outward. The cam-block h , fast to the bed D , serves to press the lower end of the stop-lever inward when the latter in its downward play strikes the face of the cam-block. The lever bears above the pivot an adjustable stop, h^3 , that limits the forward movement of the lever by striking against the side of the holder-bed, as seen in Fig. 3.

The tap-holder I consists of a metallic block, having an opening, i , from end to end, and a lateral opening, i' , through which access is gained to the central opening, and this holder has an interior thread of any required dimension, or is provided with a bushing, j , firmly secured within the holder, and the bushing bears a threaded socket of the required size. When the bushing is used, it is of course cut away to give access to a tap, k , that fits the threaded socket within the bushing and holder.

The operation of my device is as follows: The holder I is firmly clamped in the holder-bed E , as by means of the threaded shaft e and movable jaw e' , the axis of the tap-socket being arranged so that its movements shall be in a plane passing through the axis of the cutter-spindle. A tap is then introduced into the socket in the holder, with the stop g' so set as to hold the tap by contact with the back of one of the lands with the latter directly below the cutter, when the tap is raised so that the cutter may operate.

The dotted lines in Fig. 3 show the position of the holder-bed and its immediate parts when the tap is ready to be operated upon, and the full lines in Fig. 3 show the relative position of the same parts when the holder-bed is raised and the cutter is in operation in relieving the tap.

The operation of the cam to throw back the stop-lever is clearly illustrated in this Fig. 3. As soon as the cutter has operated to relieve the adjacent sides of any two teeth the lever d^4 is raised, the holder-bed depressed, the stop thrown out of contact with the side of the tap, and the latter turned upon its axis in its socket until the next land is brought to the proper position to be operated upon by the cutter. The lever d^4 is then depressed and the bed and the tap raised to have the newly-presented surfaces between the teeth operated upon by the cutter, as before described. These operations are repeated until all the teeth on the tap have been relieved.

I claim as my invention—

The within-described method of relieving a tap, which consists in advancing it in successive steps through the plane of motion of a cutter which cuts between successive teeth in alternation with the step-by-step progression of the tap, which is advanced by using its own thread as a lead-screw, all substantially as described.

JAMES E. WOODBRIDGE.

Witnesses:

CHAS. L. BURDETT,
E. F. DIMOCK.