

N. C. HUBBELL.

Machines for Making Metal Screws.

No. 143,412.

Patented Oct. 7, 1873.

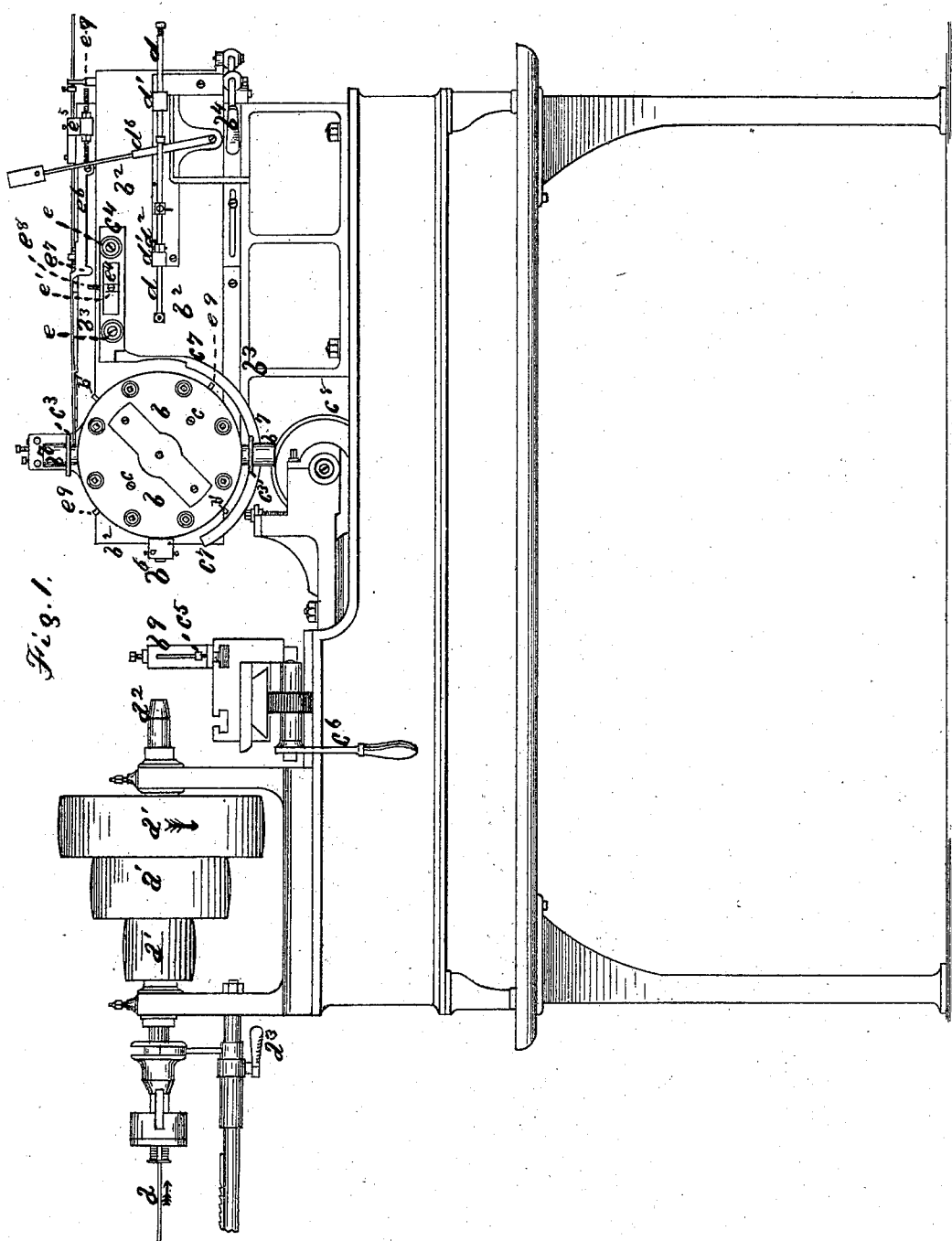


Fig. 1.

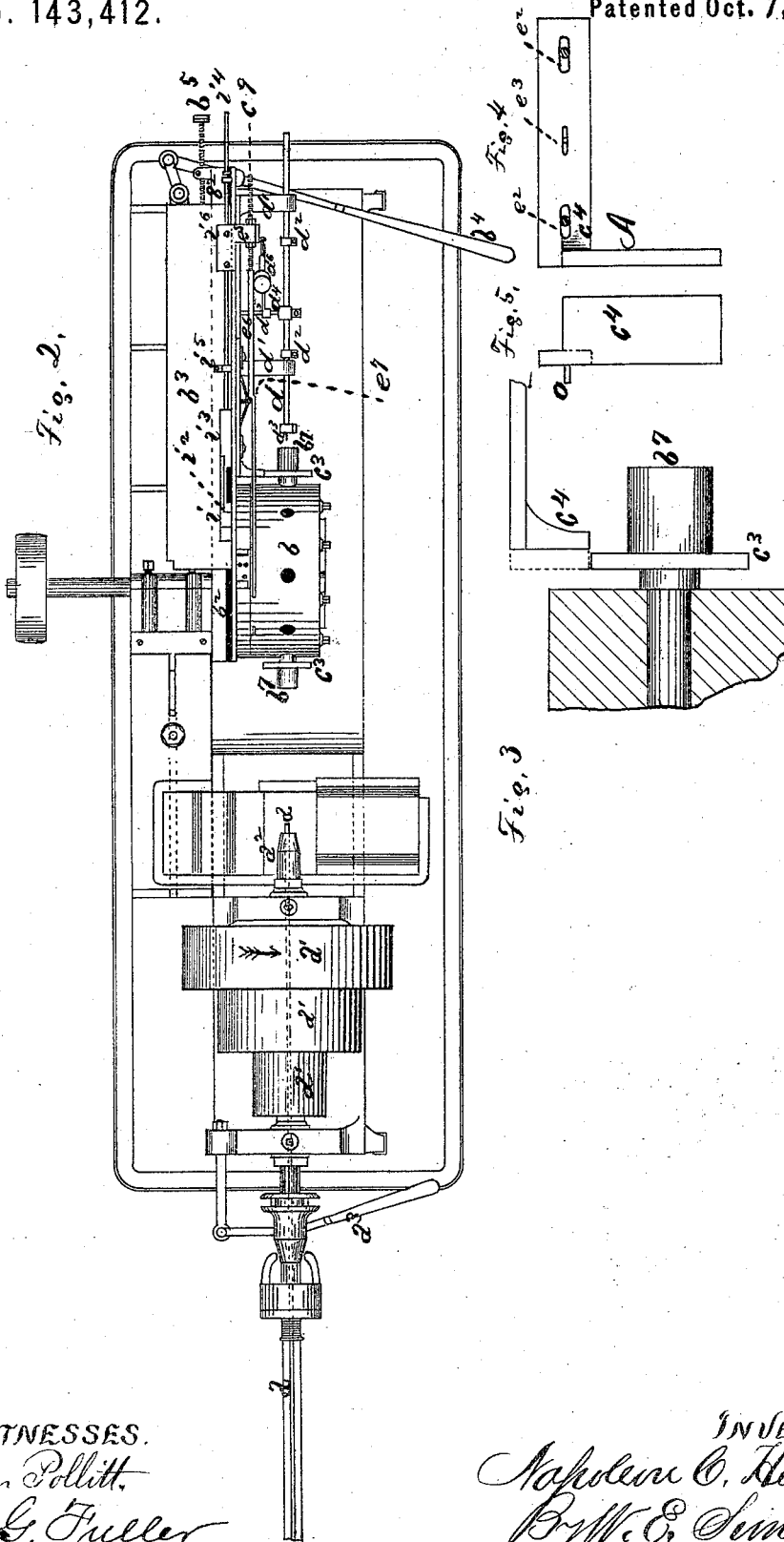
WITNESSES.

John Pellitt
C. S. Fuller

INVENTOR

Nathaniel C. Hubbell
By W. E. Hummels
Atty

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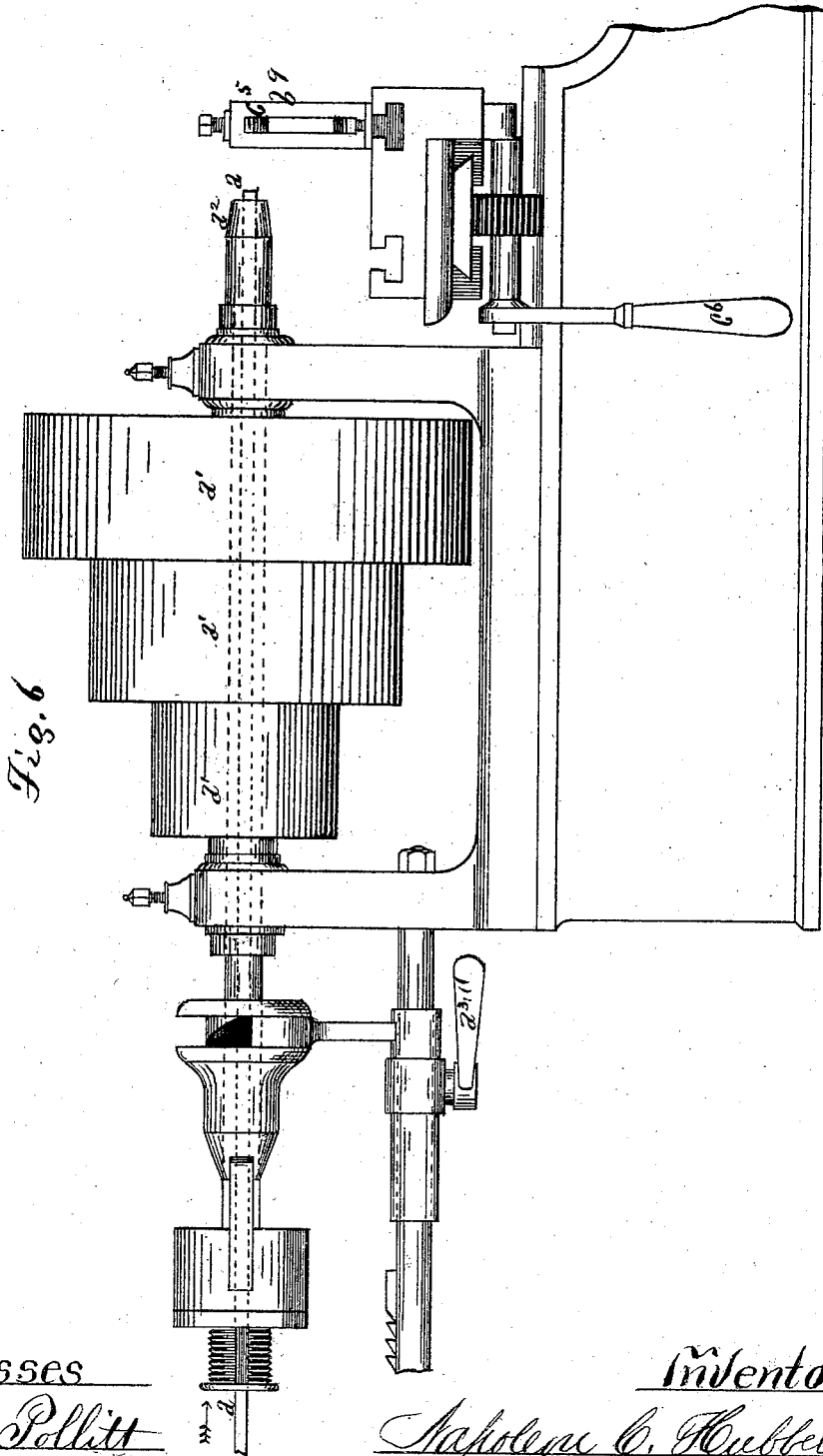
WITNESSES.
John Pollitt,
F. G. Fuller

INVENTOR.
Napoleon C. Hubbell
By W. C. Simonds
Att'y

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John Pollitt
H. G. Fuller

Inventor.

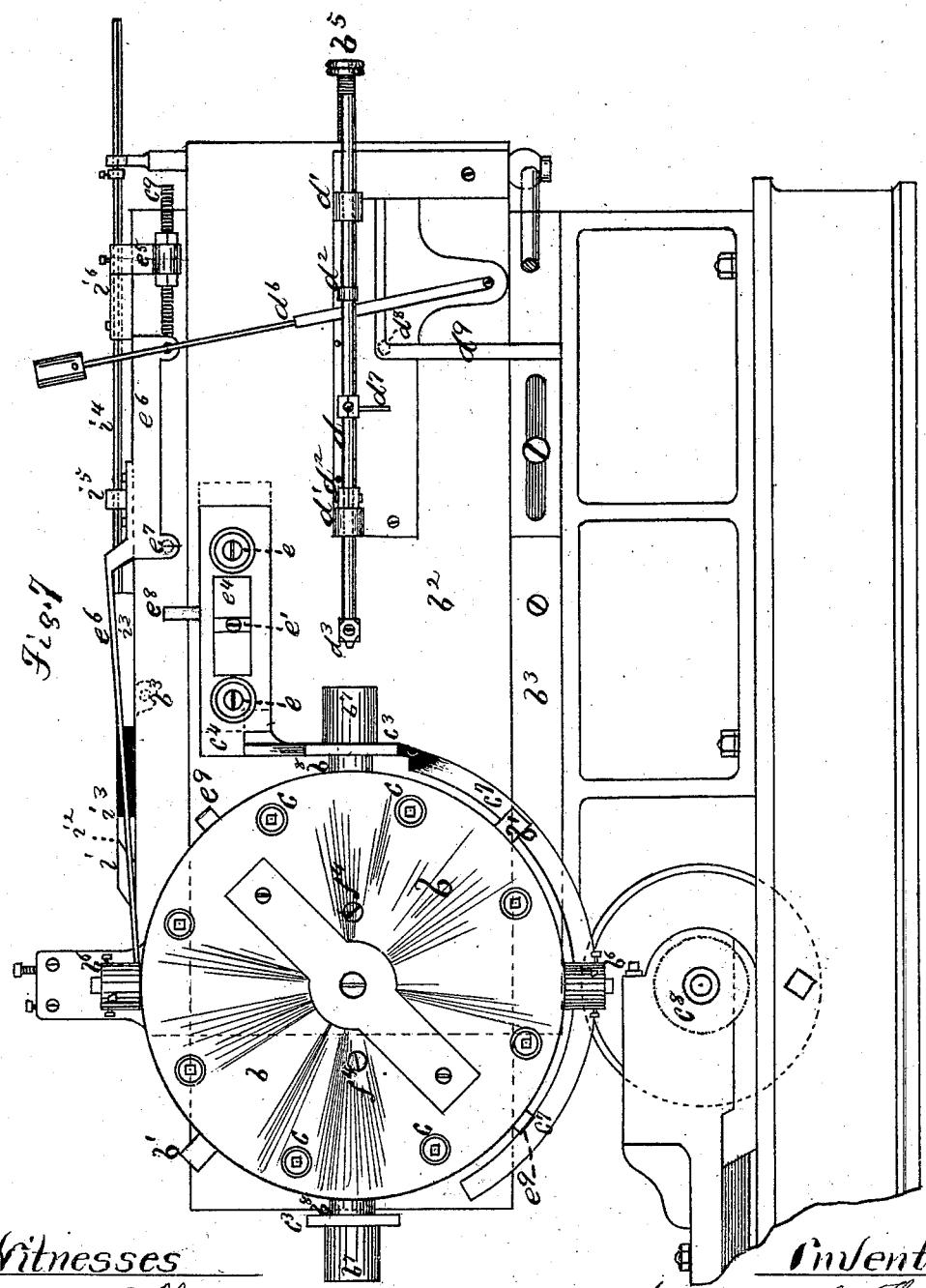
Napoleon C. Hubbell
By W. E. Simonds Atty

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Witnesses
John Pollitt
F. G. Fuller

Inventor
Napoleon C. Hubbell
By W. E. Siggins
Atty

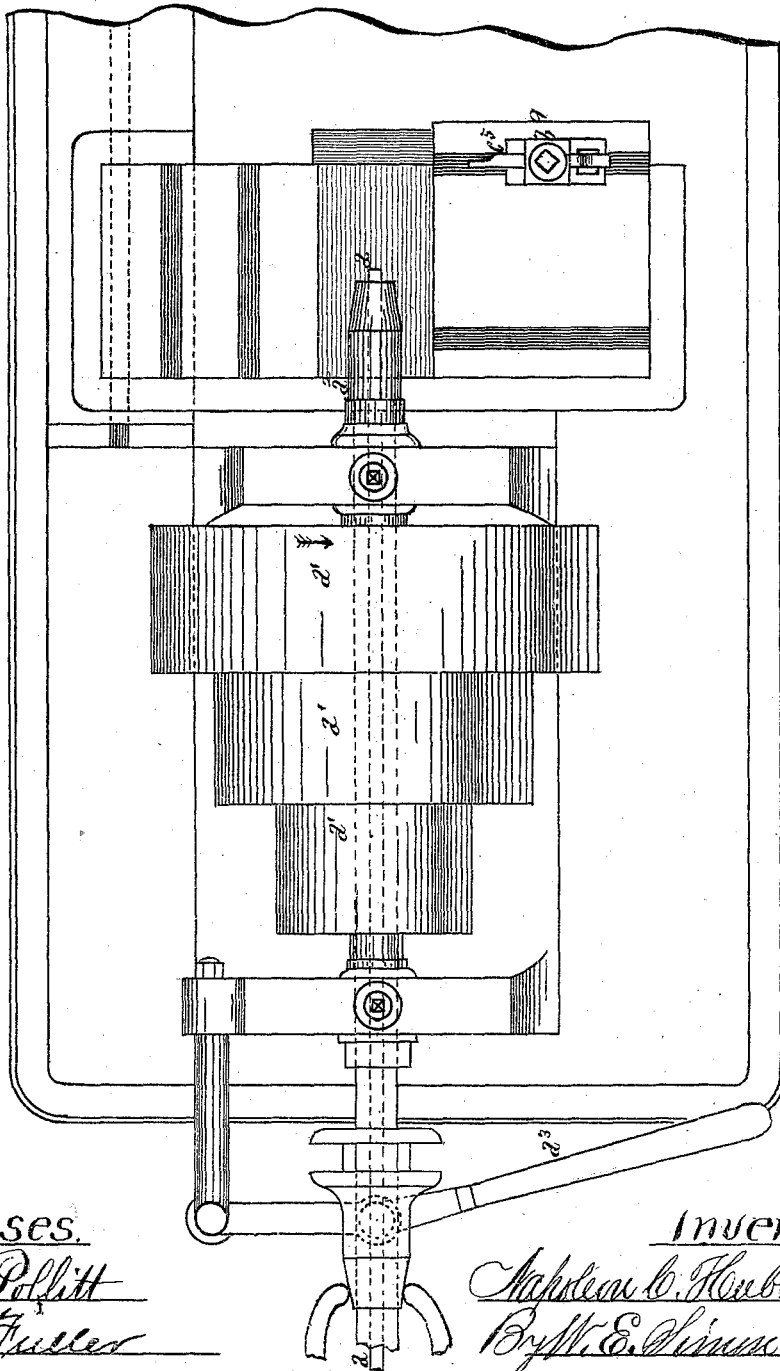
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Fig. 8.



Witnesses.

John Pollitt
J. G. Fuller

Inventor.

Nathaniel C. Hubbell
By W. E. Kimball Atty

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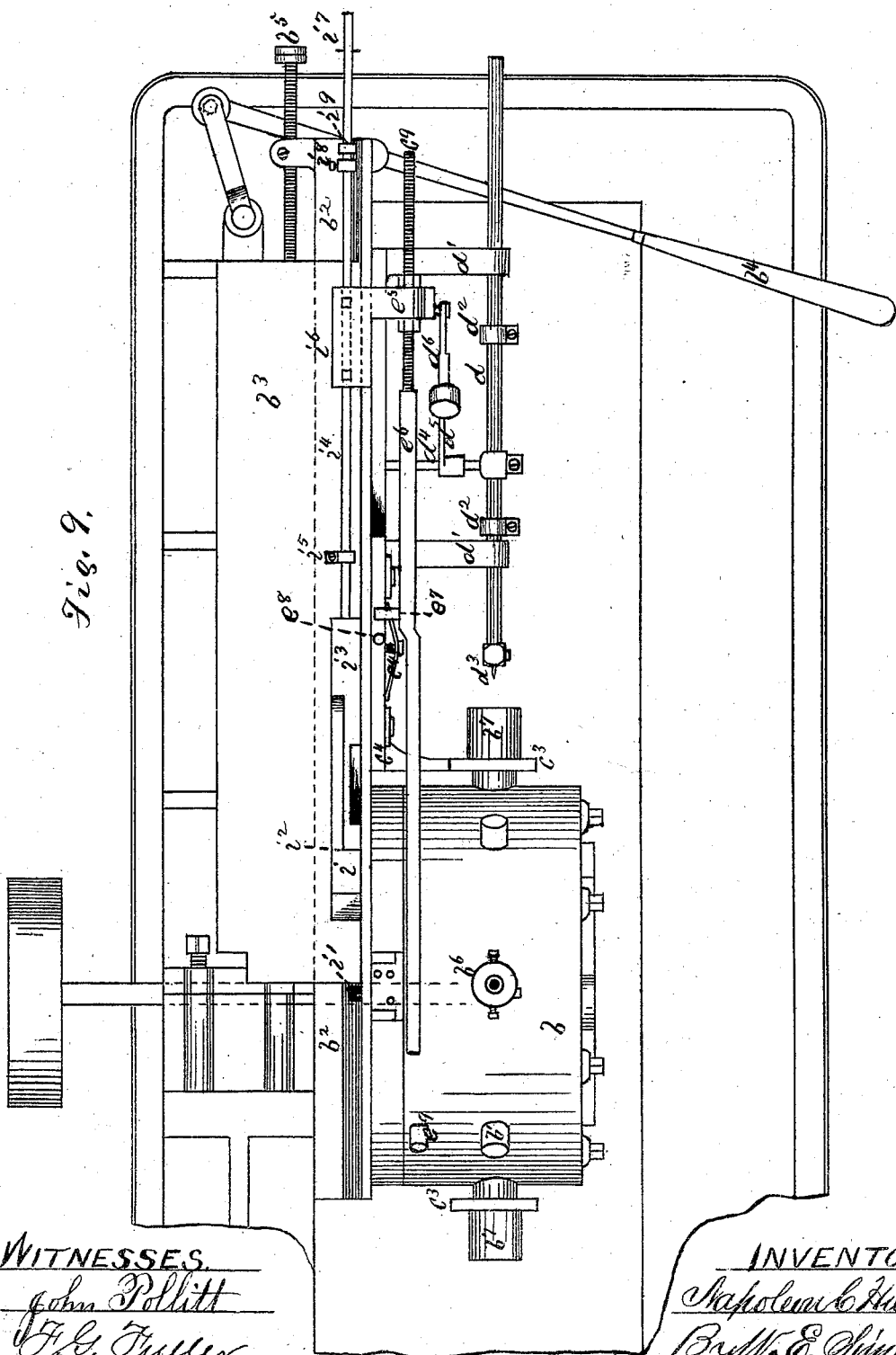


Fig. 9.

WITNESSES.

John Pollitt
F. G. Fuller

INVENTOR.

Napoleon C. Hubbell
By W. E. Shumelle
Att'y

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Fig. 10.

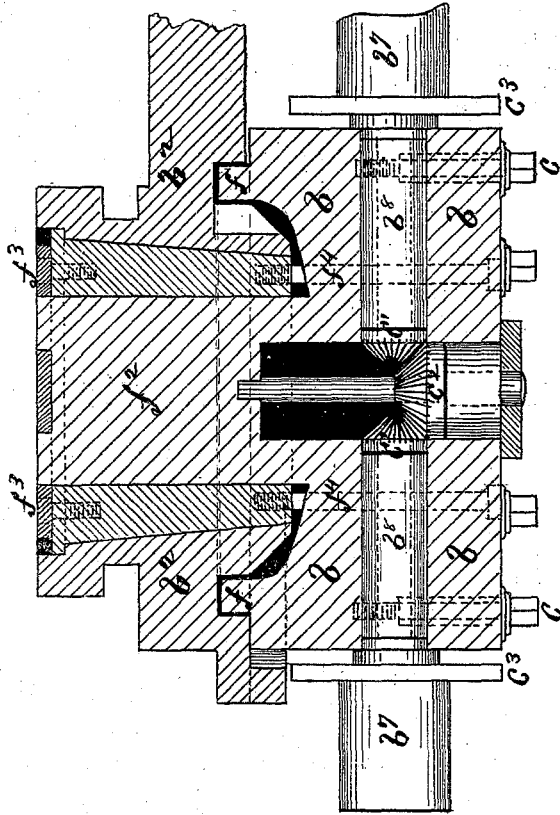
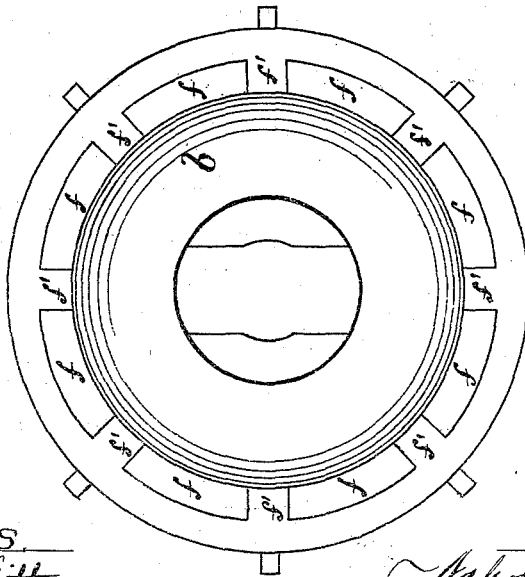


Fig. 11



Witnesses

John Pollitt
J. G. Fuller

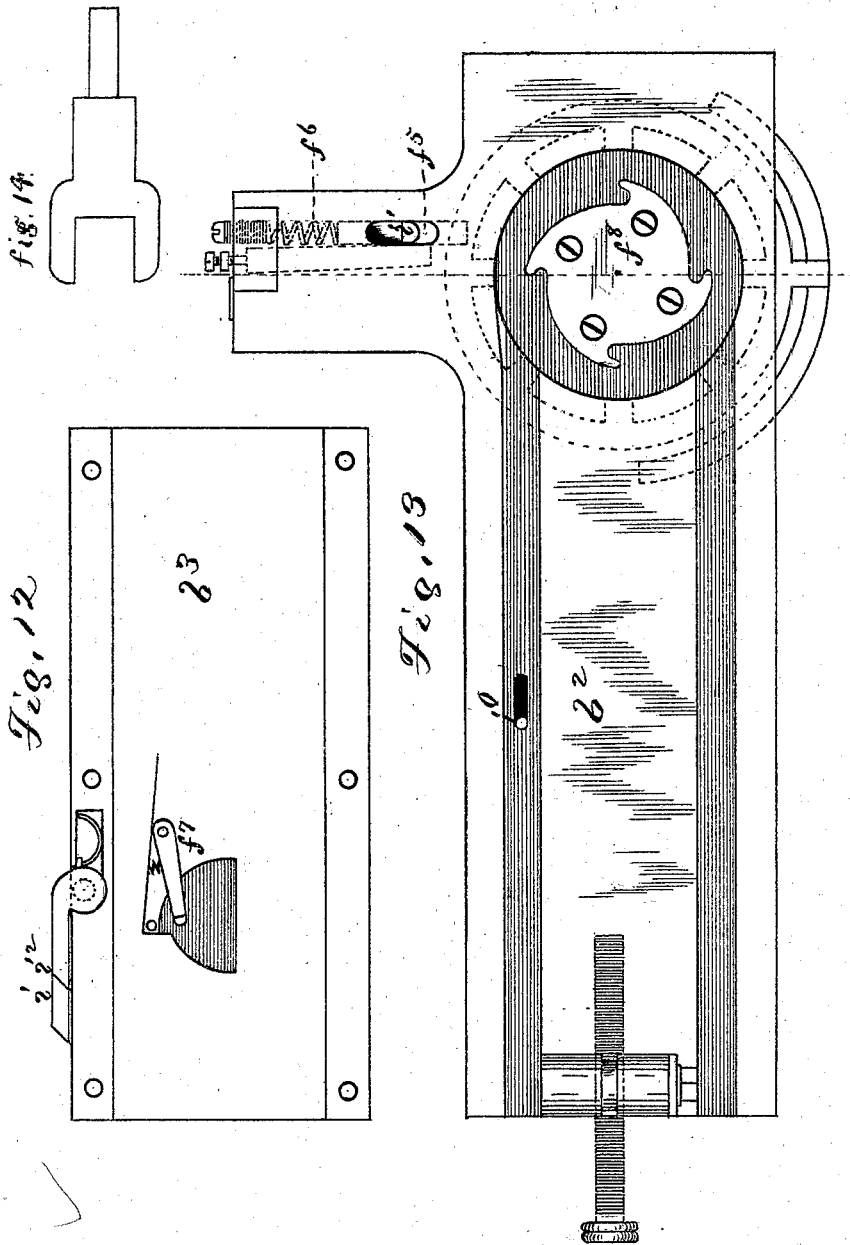
Inventor:

Nathan C. Hubbell
By W. E. Simmons
Att'y

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Witnesses.
John Pollitt
C. G. Fuller

Inventor.
Nathan C. Hubbell
By W. E. Simmons
 Atty

UNITED STATES PATENT OFFICE.

NAPOLEON C. HUBBELL, OF HARTFORD, CONNECTICUT, ASSIGNOR TO JOHN JOHNSON AND AMOS WHITNEY, OF SAME PLACE, AND ANDRUS CORBAN, OF PLAINVILLE, CONNECTICUT.

IMPROVEMENT IN MACHINES FOR MAKING METAL SCREWS.

Specification forming part of Letters Patent No. 143,412, dated October 7, 1873; application filed August 2, 1873.

To all whom it may concern:

Be it known that I, NAPOLEON C. HUBBELL, of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Making Screws, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of the machine embodying said improvements. Fig. 2 is a top view of the same. Fig. 3 is a detached view, showing the rotating arrangement of the revolving head and pull-off. Fig. 4 is a detached front view of the pull-off, which controls and prevents the rotation of the die-holders up to a certain point, and then releases them and allows them to rotate. Fig. 5 is an end view of the end A of the said pull-off. Fig. 6 is an enlarged side elevation of about one-half of the machine—the half at the left. Fig. 7 is an enlarged side elevation of the other and right half of the machine. Fig. 8 is an enlarged top view of the parts shown in Fig. 6. Fig. 9 is an enlarged top view of the parts shown in Fig. 7. Fig. 10 is a view of the revolving head in central cross-section. Fig. 11 is a detached view of the back side of the revolving head. Fig. 12 is a front view of the standard b^3 , hereinafter referred to, with the parts in front of it removed. Fig. 13 is a detached view of the back side of the sliding plate b^2 , hereinafter referred to.

This machine is designed more especially for making machine, milled, and set screws off the end of a piece of wire or round rod of the diameter of the head of the screw, the body of the screw being first cut down to the right diameter; the thread then cut; the screw then severed from the rod, leaving a head thereon of the diameter of the rod; the slot in the head of the screw, when one is needed, then cut, and, finally, the screw delivered from the machine. The parts and combination of parts in which the invention consists will be particularly specified in the claims forming a part of this specification, and nothing herein described which

is not so specified is claimed as the present invention.

The letter a indicates the metallic wire or rod to be worked up into screws, running through the hollow shaft of the pulley a^1 , on the end of which shaft is the chuck a^2 , which is opened and closed by means of the lever a^3 ; and by the movement of the same lever the rod a is fed inward in the direction indicated by the overlying arrow.

This mechanism forms the subject-matter of Letters Patent of the United States No. 118,481, dated August 29, 1871, and granted to E. G. Parkhurst; and to it I make no claim.

The letter b indicates a revolving head, having a rotary step-by-step motion, as will be hereinafter explained; from it project, among other things, the two measuring-stops b^1 b^1 . The first step in making a screw is to rotate the head b so that a stop, b^1 , points straight toward the chuck a^2 . The rod a is then moved up so as to strike the end of the stop, which leaves enough of the rod projecting from the mouth of the chuck to form a screw. The head b is hung upon the reciprocating plate b^2 , which moves in ways on the standard b^3 . The plate b^2 is moved back and forth by the lever b^4 . The inward movement of the plate b^2 is stopped at any desired point by the adjusting-screw b^5 , which is carried on the plate and strikes against the end of the standard b^3 . When the plate is drawn back the head b rotates, by means hereinafter described, one step. This brings one of the box-tools, so called, b^6 , into position to operate on the end of the rod a . This box-tool is simply a lathe or stationary milling-tool for cutting down the body of the rod to the proper diameter of the screw to be made. All this while the rod a is revolving, with the cone-pulley a^1 toward the operator, and when the plate b^2 and head b are again moved inward the box-tool cuts away the body of the rod to the desired diameter and length. The plate b^2 and head b are now drawn back again, thereby rotating the head another step, and bringing one of the die-hold-

ers b^7 , holding screw-cutting dies, into position for operating on the screw to be made. On moving the slide b^2 inward again this screw-cutting tool cuts a thread on the body of the screw.

I will describe the construction and operation of the two revolving die-holders here. These die-holders (see Fig. 3) are on the ends of the shafts b^8 , which are set into and revolve in the head b , being held in place by shoes fitting on the screws c . There are small bevel-gears c^1 upon the inner ends of the shafts b^8 , meshing into a bevel-gear, c^2 , so that if either die-holder rotates the other one must rotate in the opposite direction. When a die-holder is moved up to cut a screw-thread on the end of the rod a , the die-holder is held from rotating by that square collar c^3 , which is on the opposite or rear die-holder, bearing against the flat surface of the pull-off c^4 . Just at the point when the desired length of screw-thread has been cut, the square collar c^3 in the rear slips past or by the pull-off c^4 , and then the die-holders commence to rotate with the rod a , such rotation being caused by the friction of the rod and the operating-dies, the rear die-holder rotating in an opposite direction from the operating die-holder. The thread being cut, the cutting-off tool c^5 , set in the tool-stock b^9 and operated by the lever c^6 , is brought forward so as to cut off the screw from the rod a , leaving a head on the screw of the same size as the rod a . The head of the screw is now to have the customary slot milled or cut into it. The head b is now rotated another step, bringing the other stop b^1 into position, when the rod a is again moved inward preparatory to cutting another screw. As the head b rotates this last step, the square collar c^3 on the die-holder, which has just operated, and which now holds a screw in its grasp, strikes on the locking-guard c^7 , and holds this die-holder from rotating again until the pull-off is reached. The head b is now rotated another step, and the other of the box-tools b^6 is brought into position for operation. At the same time the head of the screw which is in the die-holder is carried across the rotating nicking-tool c^8 and a slot cut in the head of the screw. The head b is now rotated another step, a full quarter-turn, and the head of the screw is brought up into position to be removed from the die-holder, (while the opposite die-holder has come into position to cut another thread.)

The screw is removed from the die-holder by the aid of the screw-removing device, which I will now explain.

The letter d indicates a rod hung and having longitudinal, but not rotary, motion in the bearings d^1 d^1 , which project from the plate b^2 . The longitudinal motion of this rod is defined and limited at pleasure by means of the clamp-stops d^2 d^2 on the rod between the bearings d^1 d^1 . In the end of the rod d is a screw-driver blade, d^3 , always vertical in position, so that,

as the die-holder carrying a screw comes around to this side, the screw-driver blade will strike into the slot in the head of the screw, and when the die-holder, released from the pull-off, commences to rotate, the screw in the grasp of the dies, being held from rotating by means of the screw-driver blade, is thereby run out from the dies and drops into a receptacle beneath. The rod d is jointed, by means of the arm d^4 and connecting-rod d^5 , to the weighted lever d^6 . As the screw runs out from the die-holder it pushes back the weighted lever d^6 . When this lever gets back past a vertical position, it falls by its own weight to the other side, and thus suddenly pulls back the screw-driver blade, leaving the screw free to fall. The rod d is moved inward again by the pin d^7 projecting downward from the arm d^4 , which, as the plate b moves inward, strikes upon the pin d^8 on the arm d^9 screwed to the standard b^3 .

I will now more particularly explain how the pull-off c^4 is operated. This pull-off is set upon, and in the main moves with, the plate b^2 . It has, however, a short longitudinal and independent motion of its own. It is attached by the screws e e and e^1 to the plate b^2 , the pillars or bodies of these screws running through slots e^2 e^2 e^3 . The screw e^1 has a spring, e^4 , under its head bearing on the pull-off, so as to prevent accidental motion of the pull-off. The end wing of the pull-off just comes to and coincides with the end of the locking-guard c^7 when the pull-off is "set," so to speak, so that a square collar, c^3 , passes directly from the locking-guard to the end wing of the pull-off, still holding the die-holder from turning. Just above the plate b^2 there is pivoted to the end of the adjusting-screw c^9 running through the arm e^5 projecting from the standard b^3 an arm, e^6 , its inner and free end resting by its weight on the periphery of the head b . This arm e^6 has a stop, e^7 , against which, at the proper time, a pin, e^8 , projecting from the pull-off, strikes as the plate b^2 moves inward, and thus stops the inward movement of the pull-off, so as to release the square collar on the die-holder, and thus permit the two die-holders to rotate.

In order that the pull-off may not be thus stopped every time that the plate b^2 moves inward, the head b is furnished with pins e s set upon the periphery of the head b as to strike against and so raise the end of the lever-arm e^6 that the pin e^8 cannot hit the stop e^7 . The pins e^9 are omitted at those places on the head b when the lever-arm e^6 should be left down. The pull-off is again pushed into set, when the plate b^2 moves outward, by a pin, o , on the back side of the pull-off, striking against a pin (not seen in drawings) on the inside of the standard b^3 .

I will now describe the arrangement for giving the rotary step-by-step motion to the head b . When this head rotates so as to bring one of the die-holders b^7 into position for opera-

tion, the head makes a full quarter-turn; but when the head rotates so as to bring either a measuring-stop, b^1 , or a box-tool, b^6 , into line with the chuck a^2 , the head makes but an eighth-turn, so that in making one complete revolution the head makes two quarter-turns and four eighth-turns, the quarter-turns separated from each other by two intervening one-eighth turns. On the back side of the head b is a raised annular collar, f , having eight equidistant stop-notches, f^1 . This annular collar fits into and turns in a corresponding annular groove in the slide b^2 . The head b has a shaft, f^2 , running through the slide b^2 , and on the rear end of this shaft is a round disk, f^3 , fitting into and turning in a corresponding socket in the back side of the slide b^2 . The head b is fastened to the disk f^3 by the screws f^4 . A dog, f^5 , lies in a vertical slot in the standard b^3 , pressed down by a spring, f^6 , its lower end resting on the collar f , so that as opportunity offers this dog shuts down into the notches f^1 , and thus stops and holds the head b at desired points. The head is rotated by means of the pawl f^7 , pressed down by a spring, striking into the toothed ratchet-wheel f^8 when the slide b^2 moves outward. The dog is raised out of a notch preparatory to the action of the pawl and ratchet by the cam i , pivoted at its outer end to the standard b^3 , and pressed down by a spring. The pin i^1 , projecting from the rear side of the dog, rides and rises on this cam as the slide b^2 moves outward, thus raising the dog out of a notch. When the head b has made an eighth-turn the pin i^1 drops off the shoulder i^2 of the cam i , and the dog shuts down into a notch. The pin i^1 moves inward with the slide b^2 , passing under the cam i , the under side of which is hollowed out, this cam i lifting up to allow the pin to pass under the point of the cam. But there are two points in the revolution of the head b where a quarter-turn, instead of an eighth-turn, is required, and this is accomplished by means of the sliding cam i^3 , which is on the end of the rod i^4 , which slides in bearings i^5 i^6 , and has the pin-stop i^7 and the clamp-stop i^8 . On the cam-rod i^4 , and between the two stops i^7 and i^8 , is an actuating-slide, i^9 , moving back and forth with the lever b^4 . Every time that the slide b^2 is moved inward till stopped by the screw b^5 , the slide i^9 strikes the clamp i^8 , and the sliding cam i^3 moves inward so as to abut against the shoulder of the cam i , and so protracts the outward ride of the pin i^1 that the dog passes over one of the eighth-turn notches, and thus permits the head b to make a full quarter-turn. After the pin i^1 has ridden outwardly so far that the dog has passed one of the eighth-turn notches, and has passed upon the sliding cam i^3 , the slide i^9 strikes the pin i^7 and moves the sliding cam outward so as to leave an opening between the two cams. When the dog arrives at the second of the eighth-turn notches, and so that

the head b has made a full quarter-turn, the dog strikes into the notch, and the pin i^1 returns to the end of its inward play, under the two cams. The next two movements of the head b are eighth-turns, and the sliding cam i^3 is prevented from moving in to abut against the stationary cam as follows: There is a stop, e^7 , already referred to, on the lever-arm e^6 , acting in conjunction with the pin e^8 , to operate the pull-off. These parts have another office in connection with the sliding cam. When the head b is to make a quarter-turn the pins e^9 on the head b lift the lever-arm e^6 , so that the pin e^8 will not strike the stop e^7 , and so that the slide b^2 moves inward till stopped by the screw b^5 ; but when the head b is to make but an eighth-turn the arm e^6 lies upon the head b , so that the pin e^8 strikes the stop e^7 , and the slide b^2 is thus prevented from moving farther in, and the gap between the two cams is not closed.

When square-headed set-screws are made by this machine the screws are made off the end of a square rod. The slotting-tool e^8 is dispensed with if the heads are to have no slot; and in the place of the screw-driver blade d^3 I use the forked tool shown in Fig. 14 to embrace the square head.

I claim as my invention—

1. The combination of the revolving head b and the two rotating die-holders b^7 b^7 , so geared together that when they rotate such rotation is in opposite directions, all substantially as described, and for the purposes set forth.

2. The combination of the revolving head b , the two contrarily-rotating die-holders b^7 b^7 , equipped with the square collars c^3 c^3 , and the locking-guard c^7 , all constructed, arranged, and designed for operation and use, substantially as described.

3. The combination of the revolving head b , the two contrarily-rotating die-holders b^7 b^7 , equipped with the square collars c^3 c^3 , and the pull-off e^4 , the whole constructed, arranged, and designed for operation and use, substantially as described.

4. The combination of the revolving head b , the two contrarily-rotating die-holders b^7 b^7 , the longitudinally-reciprocating screw-driver rod d , the weighted lever d^6 , and the screw-driver blade d^3 , the whole arranged, constructed, and designed for operation and use, substantially as described.

5. The combination of the longitudinally-reciprocating slide b^2 , the head b provided with the notched collar f , the dog f^5 , and the cam i , the whole constructed, arranged, and designed for operation and use, substantially as described.

6. The combination of the sliding plate b^2 , the head b provided with the notched collar f , the ratchet and pawl f^7 f^8 , the dog f^5 , the stationary cam i , and the sliding cam i^3 , the whole constructed, arranged, and designed

for operation and use, substantially as described.

7. The combination of the sliding plate b^2 , the adjusting-screw b^5 , the standard b^3 , the stationary cam i , the sliding cam i^2 , with its cam-rod and actuating-lever, the lever-arm e^6 , and the head b , provided with the pins e^9 , the whole constructed, arranged, and designed for operation and use substantially as described.

8. The combination of the sliding plate b^2 , the pull-off e^4 , the pin e^8 , lever-arm e^6 , provided with the stop e^7 , and the head b , equipped with the pins e^9 , the whole constructed, arranged, and designed for operation and use substantially as described.

NAPOLEON C. HUBBELL.

Witnesses:

WM. E. SIMONDS,

C. M. SPENCER.