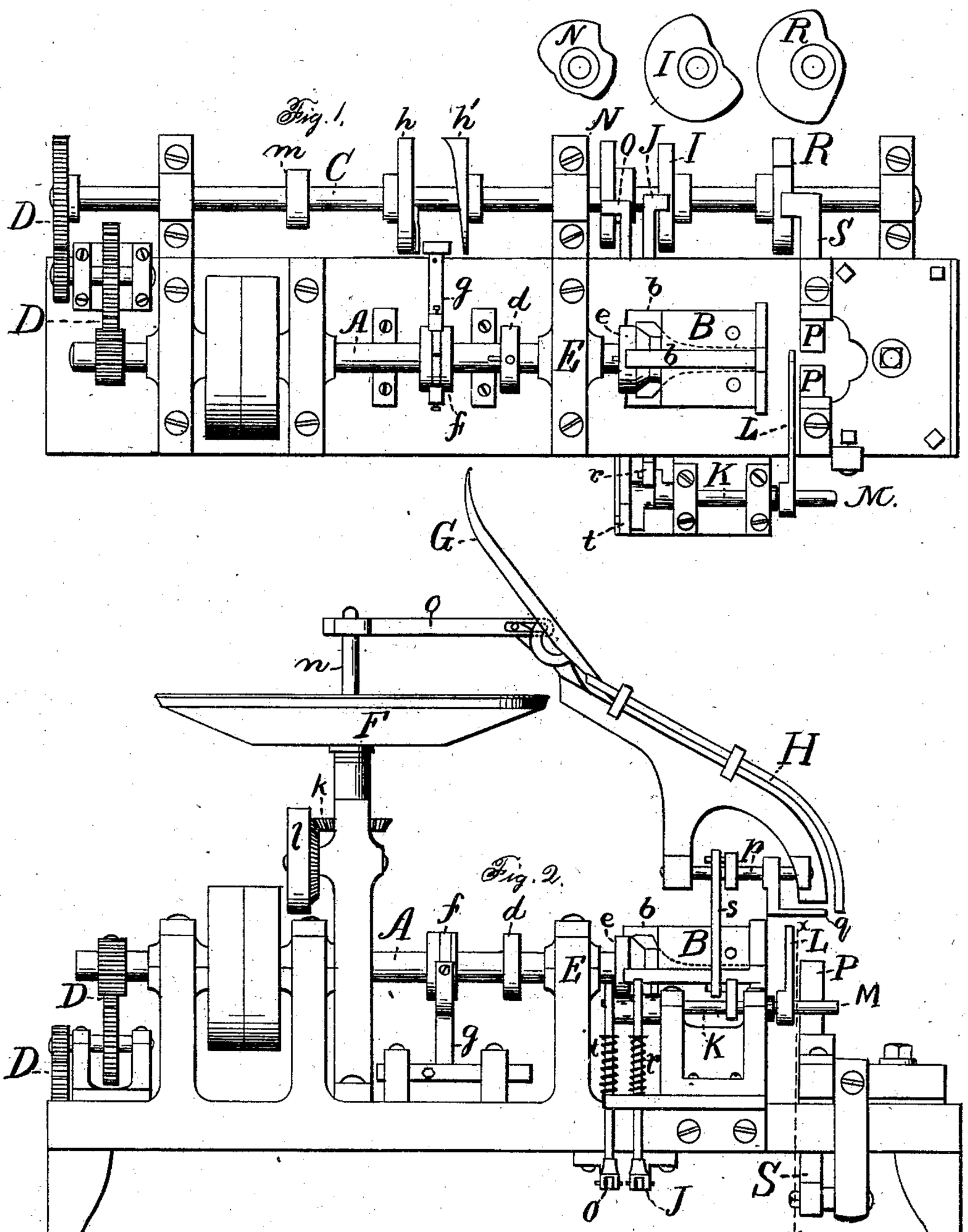
(No Model.) 3 Sheets—Sheet 1.

C. H. GRAHAM.

MACHINE FOR THREADING BOLTS.

No. 256,675. Patented Apr. 18, 1882.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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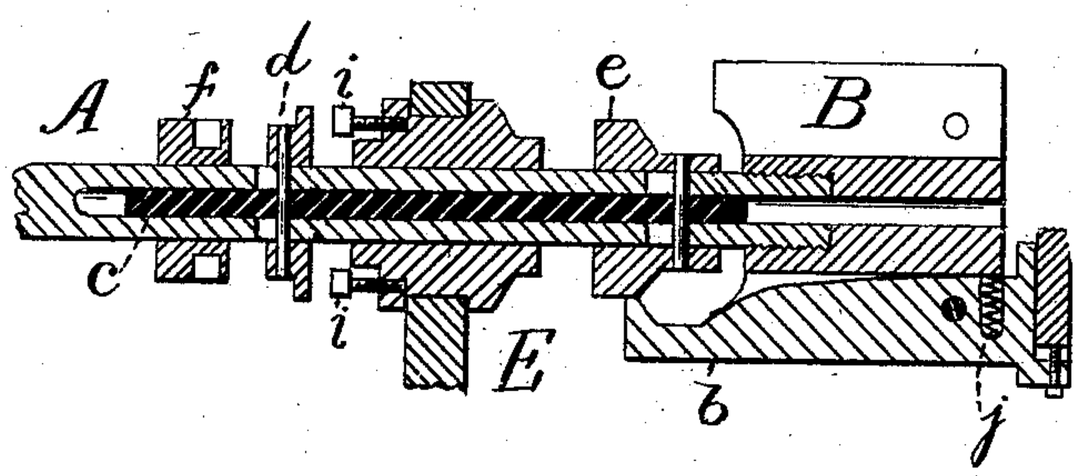

Fig. 3.

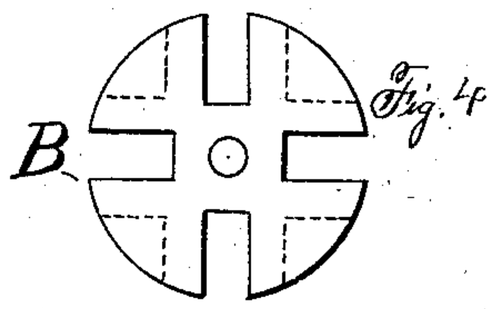

Fig. 4.

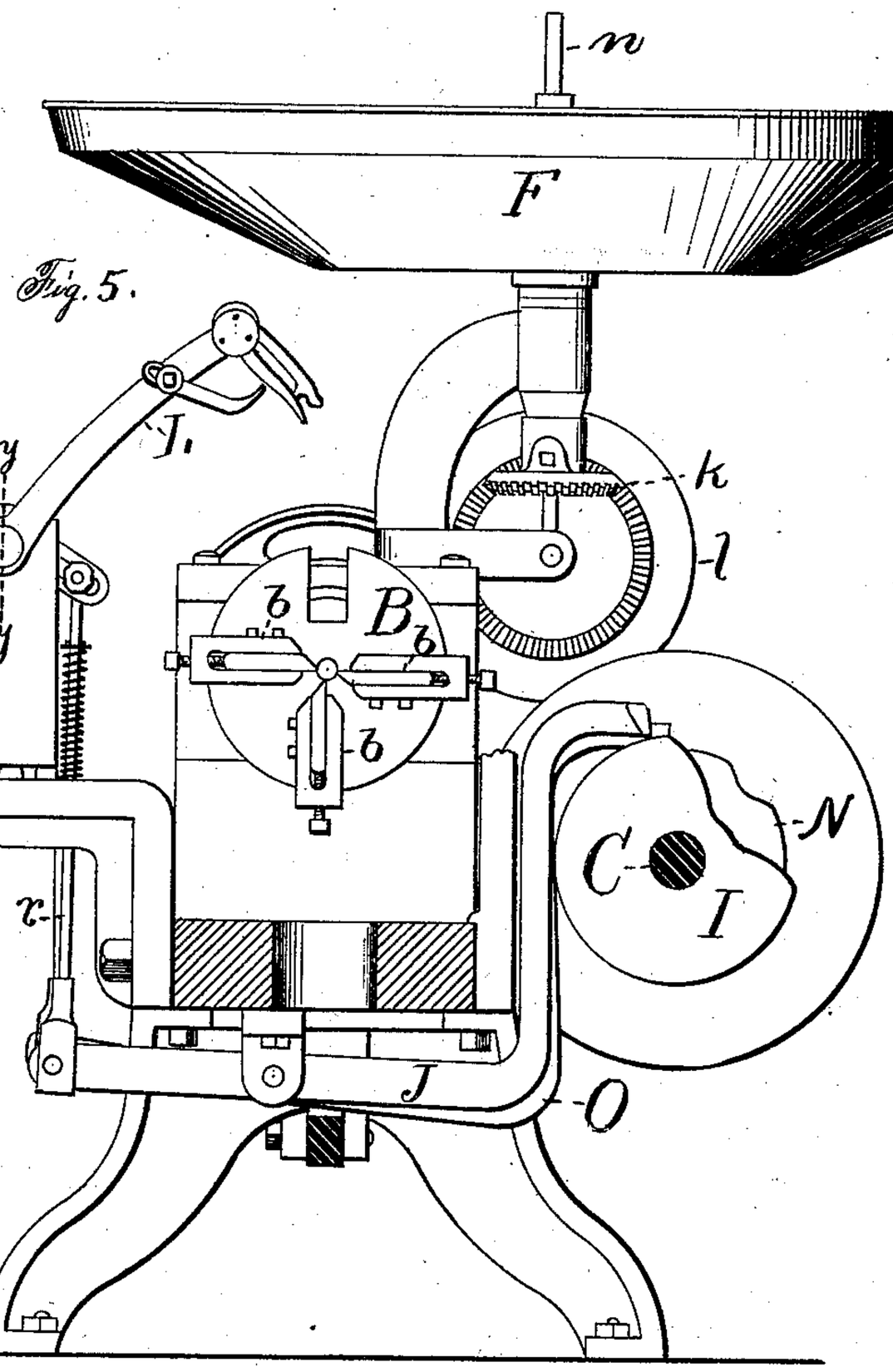

Fig. 5.

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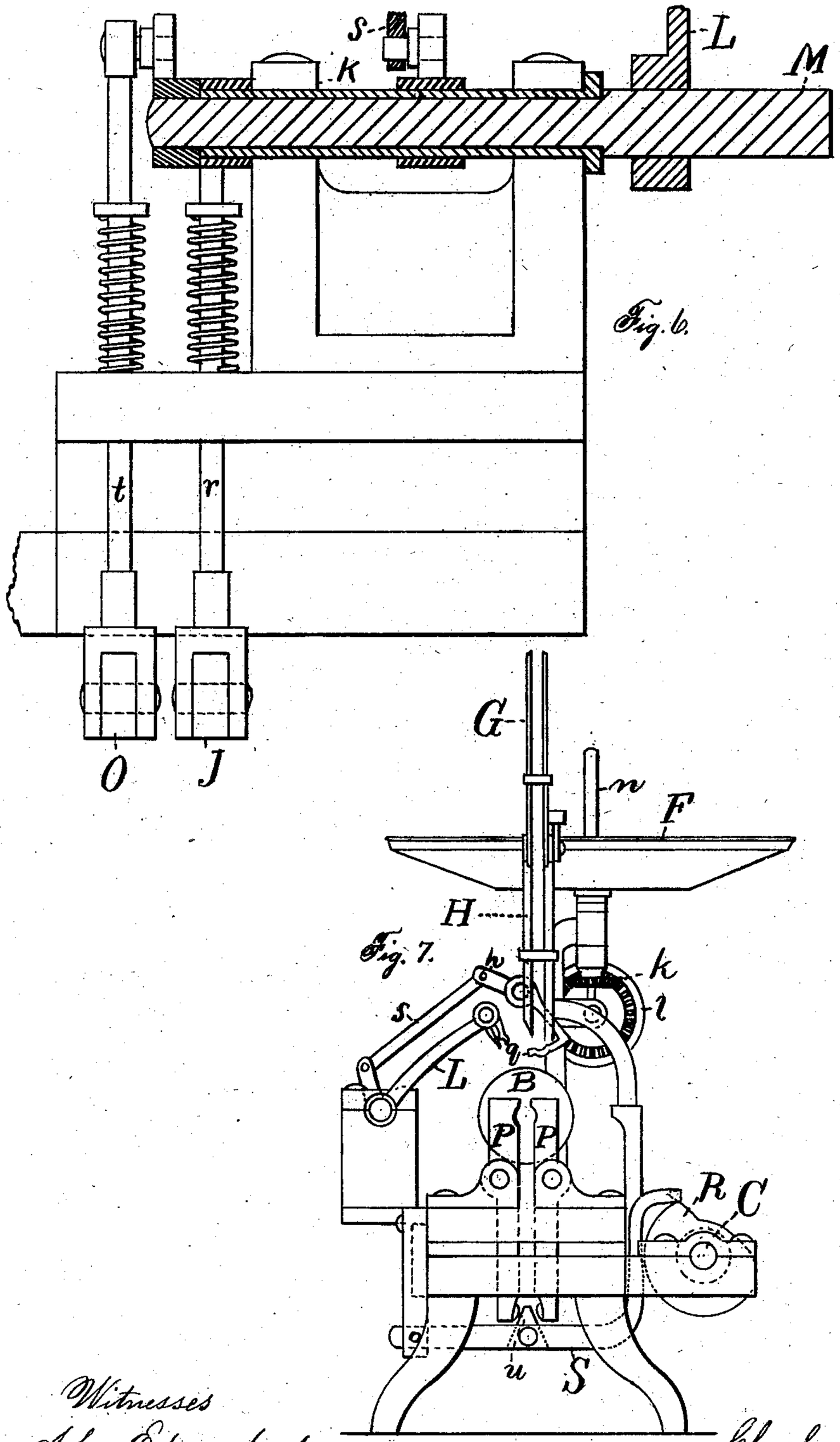

Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

CHARLES H. GRAHAM, OF UNIONVILLE, CONNECTICUT, ASSIGNOR TO THE UNION NUT COMPANY, OF SAME PLACE.

MACHINE FOR THREADING BOLTS.

SPECIFICATION forming part of Letters Patent No. 256,675, dated April 18, 1882.

Application filed May 2, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. GRAHAM, of Unionville, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Threading Bolts, of which the following is a specification.

My invention relates to improvements in bolt-threading machines in which the threading-dies are opened and closed by a reciprocating longitudinal motion of the spindle or main shaft and the bolts are fed from a hopper to the dies, all operating automatically, so that the bolts are not touched by hand, after placing them in the hopper, until after they are threaded and fall from the holding-jaws.

The objects of my improvements are to render the machine automatic and to so simplify its construction that it is very compact in form, sure in its operation, and economical to build. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view minus the feeding mechanism. Fig. 2 is a side elevation complete. Fig. 3 is a longitudinal section of a portion of the main shaft and the head which carries the dies. Fig. 4 is an end view of said head. Fig. 5 is a transverse section on line *x x* of Fig. 2. Fig. 6 is a longitudinal partial section on line *y y* of Fig. 5, and Fig. 7 is an end view.

A designates the main shaft bearing the head B, which carries the threading cutters or dies, mounted on hinged jaws *b*. This shaft is reciprocated longitudinally by means hereinafter described, for the purpose of opening and closing the jaws and to allow it to run forward in cutting the thread and return. It is hollow and carries within it a rod, *c*, Fig. 3, to which rod is pinned the collar *d* and cone *e*, the shaft being longitudinally slotted for a short distance at the points through which the collar-pins pass, so that the rod, together with the collar and cone, has a slight longitudinal movement relatively to the shaft. These parts, however, are not new with me, except in combination with the other parts.

In order that the shaft A may be properly started forward and backward, I secure rigidly to said shaft a grooved collar, *f*, and connect thereto a sliding frame, *g*, one arm of which frame extends upward and bears a fork and divided ring, which rests in the groove of the collar *f*, and the other arm of which extends toward the rear of the machine.

At the rear side of the machine, and extending nearly the whole length of the bed, there is a shaft which is parallel to the main shaft, and which I designate as the "parallel cam-shaft," C. This shaft C is connected with the main shaft A by means of a system of geared wheels, D D, so as to rotate positively at a given relative speed, but much slower—for example, one revolution to every twenty of the main shaft.

A pair of side-acting cams, *h h'*, are set face to face on the parallel cam-shaft C, and the end of the rearwardly-extending arm of the sliding frame *g* lies between said cams, as shown in Fig. 1. Suppose an unthreaded bolt to be firmly held in proper position before the cutting-dies of the head B at a time when the cam *h'* has forced the sliding frame *g* and shaft A backward so far as the highest point of said cam will carry them. In doing so the back of the cone *e* strikes the frame E and arrests the backward movement of the cone *e* and the rod *c*, while the movement of the shaft still continues until the tails of the jaws are drawn over the cone and the jaws closed ready for cutting. The cam *h* next strikes the arm of the sliding frame *g* and throws the shaft forward. This forward movement of the shaft is sufficient to force the dies against the end of the bolt and enter it therein, after which the thread in the dies will draw the shaft forward.

I prefer to make the side of the cam *h* to yield under the influence of a spring; but it may be made rigid, if desired.

The thread in the dies continues to draw the shaft forward until the collar *d* strikes the adjusting-screws *i i*, Fig. 3, or other suitable stops on the frame E of the machine. This will arrest the forward movement of the collar, rod, and cone while the shaft continues onward, thereby carrying the tails of the jaws off the base of the cone and allowing the springs *j*,

Fig. 3, to throw open the jaws. The cam *h'* then takes the shaft backward to its former position, and the operation before described is repeated. Only one of the jaws is shown in Fig. 3, and only three in Fig. 5; but in use of the particular form of head shown in Fig. 4 there will always be four jaws in the head. If desired, the head might be made for three jaws set at equidistant points.

I mount a hopper or pan, F, upon the frame of the machine and give it a continuous but slow rotary motion by means of beveled gears *k* and a belt or pulley, *l* and *m*, the latter being on the shaft C, and the whole deriving their motion from that shaft.

A swinging trough or take-up, G, having a claw-shaped end, is mounted upon an inclined trough, H, so as to swing from the position in which it is represented in Figs. 2 and 7 to one in which its claw-shaped end is in the inside and near the bottom of the pan. This motion is caused by the rising and falling of the spindle *n* and arm *o*, Fig. 2, under the influence of a cam, (not shown,) which cam is operated by the pulley *l*. The motion of the take-up G, together with the rotary motion of the pan F, will supply the trough H with bolts from said pan.

The bolts are prevented from falling through the trough H by means of a swinging arm, *q*, on the rock-shaft *p*. Upon the parallel cam-shaft C is a cam, I, which acts upon the end of the lever J, and through pitman *r* imparts motion to the hollow rock-shaft K, a sectional view of which is shown in Fig. 6. A pitman, *s*, connected to suitable arms on the hollow rock-shaft K and the rock-shaft *p*, imparts motion from the former shaft to the latter one, whereby the arm *q* will swing out from under the trough and carry the bottom bolt with it. When it is thus carried forward the spring-jaws mounted on the swinging arm L of the rock-shaft M are caused to descend and seize the bolt. This rock-shaft M is mounted upon the inside of the hollow rock-shaft K, as clearly shown in Fig. 6, and it has motion imparted to it by means of the cam N on parallel cam-shaft C, lever O, and pitman *t*. Springs upon the pitmen *r* and *t* force the rocking arms in one direction, while the cams I N force them in the opposite direction. The cam N should be so shaped as to cause the swinging arm L to descend and take hold of the bolt lying on the arm *q*, retreat out of the way, and then further descend to carry the bolt to the holding-jaws P P, when the jaws close upon the bolt and the arm L and its spring-jaws rise again to their former position, leaving the bolt firmly held in the jaws P P. These jaws are forced together by means of the cam R on cam-shaft C, lever S, and wedge *u*. The several cams are so located upon the parallel cam-shaft that the several operations will take place in the respective times hereinbefore described.

If the bolts are lifted into the trough faster than they are taken out at the bottom, they will fall upon the trough and roll off without doing any damage, and if the trough is not supplied as fast as they can be taken out by the rocking arm *q* the only effect will be that every time a bolt is missed the parts will make their usual movement without accomplishing anything.

The rotary pan F, swinging take-up G, trough H, swinging arm *q*, and swinging arm L, carrying spring-jaws, are old in prior combinations, and are claimed by me only in combination with the other parts of the machine.

By the employment of the parallel cam-shaft the machine is of a very compact form, and only one cam-shaft is necessary for the whole machine. The shaft is also driven by simple gearing, so that the relative motions of the cam-shaft and main shaft are positive, and the complete organization is such that the machine is automatic by merely supplying the pan with bolts promiscuously placed therein, and one person can keep the pans of several machines supplied.

I claim as my invention—

1. The combination of the main shaft bearing threading-dies and mechanism for opening and closing said dies by a longitudinal reciprocation of said shaft, the parallel cam-shaft, intermediate connecting-gearing, and cams *h h'*, operating upon an extension from the main shaft to reciprocate it, substantially as described, and for the purpose specified.

2. In combination with the main shaft A, provided with the central rod, *c*, and hinged jaws *b*, carrying the dies, the cone *e*, collar *d*, adjusting-screws *i i*, collar *f*, sliding frame *g*, and pair of side cams, *h h'*, substantially as described, and for the purpose specified.

3. In a bolt-threading machine, the combination of the main shaft and threading-dies, the holding-jaws P P, wedge *u*, lever S, and cam R, substantially as described, and for the purpose specified.

4. In a bolt-threading machine, the combination of the main shaft and threading-dies, the holding-jaws P P, wedge *u*, lever S, cam R, and the automatic feed mechanism for feeding the bolts from the pan or hopper through a trough to the holding-jaws, substantially as described, and for the purpose specified.

5. The combination of the main shaft bearing threading-dies and mechanism for opening and closing said dies by a longitudinal reciprocation of said shaft, the parallel cam-shaft, intermediate connecting-gearing, cams *h*, *h'*, and R, lever S, wedge *u*, and jaws P P, substantially as described, and for the purpose specified.

6. In a bolt-threading machine, the combination of the main shaft and threading-dies, the holding-jaws P P, wedge *u*, lever S, cam R, rock-shafts *p* and M, and cams N and I, for operating said rock-shafts, substantially as described, and for the purpose specified.

7. The combination of the main shaft bear-

ing threading-dies and mechanism for opening and closing said dies by a longitudinal reciprocation of said shaft, intermediate connecting-gearing, cams *h*, *h'*, and R, lever S, wedge *u*, jaws P P, and the automatic feed mechanism, substantially as described, and for the purpose specified.

8. The combination of the cam R, lever S, wedge *u*, jaws P P, and the automatic feed mechanism, substantially as described, and for the purpose specified.

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Witnesses:
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