(No Model.) 2 Sheets—Sheet 1.

S. W. CARD.

MACHINE FOR THREADING SCREW TAPS.

No. 300,041. Patented June 10, 1884.

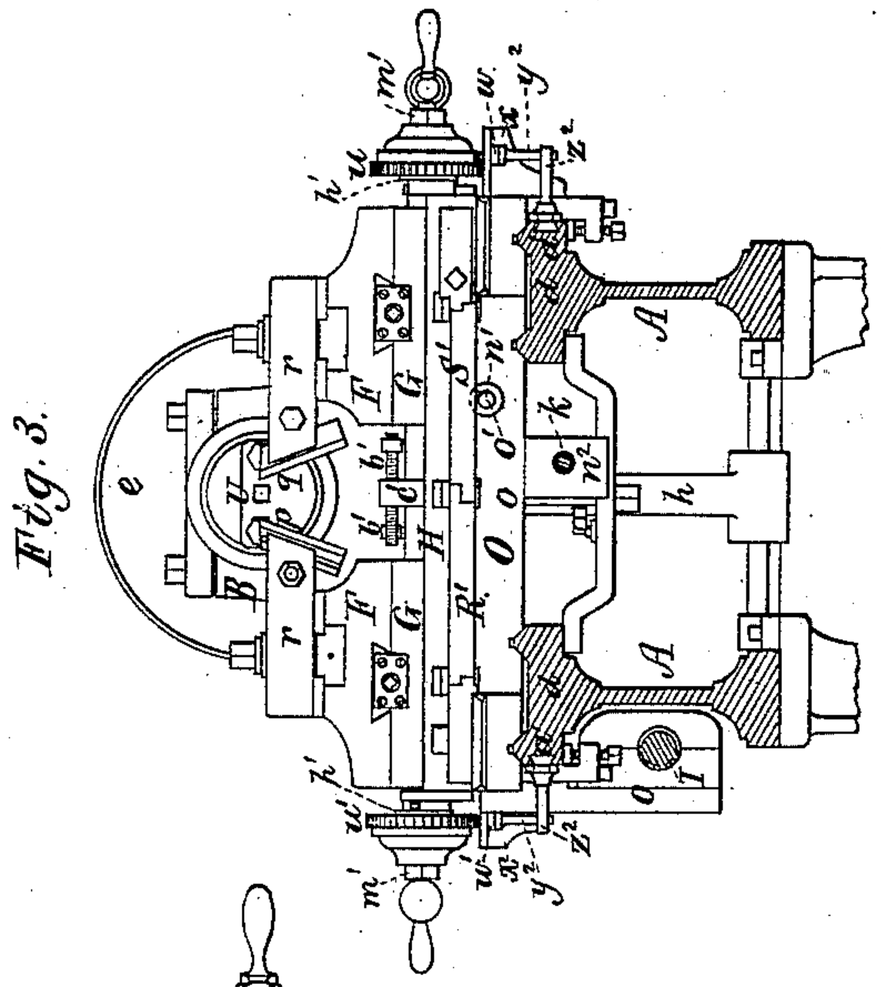

Fig. 3.

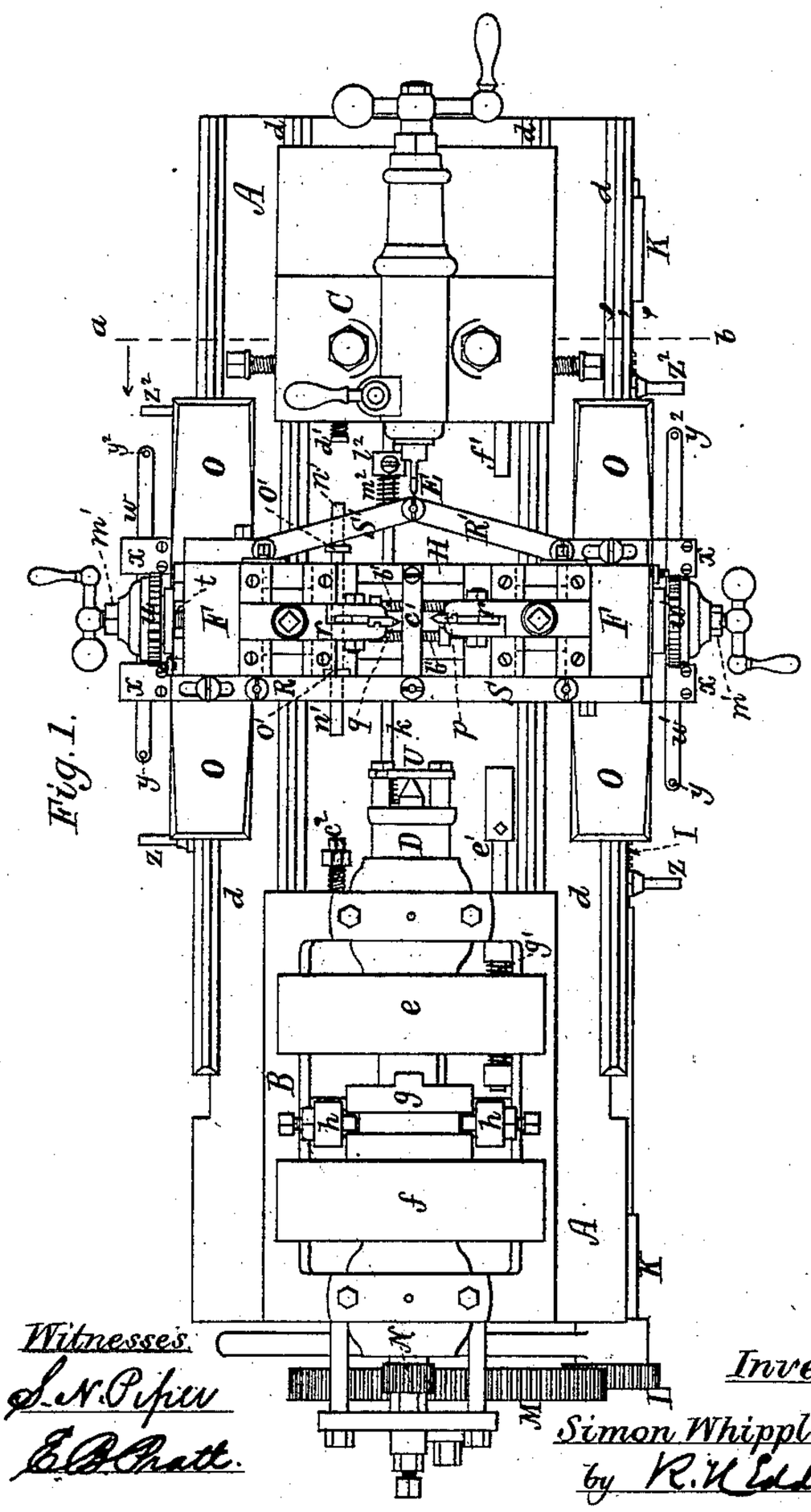

Fig. 1.

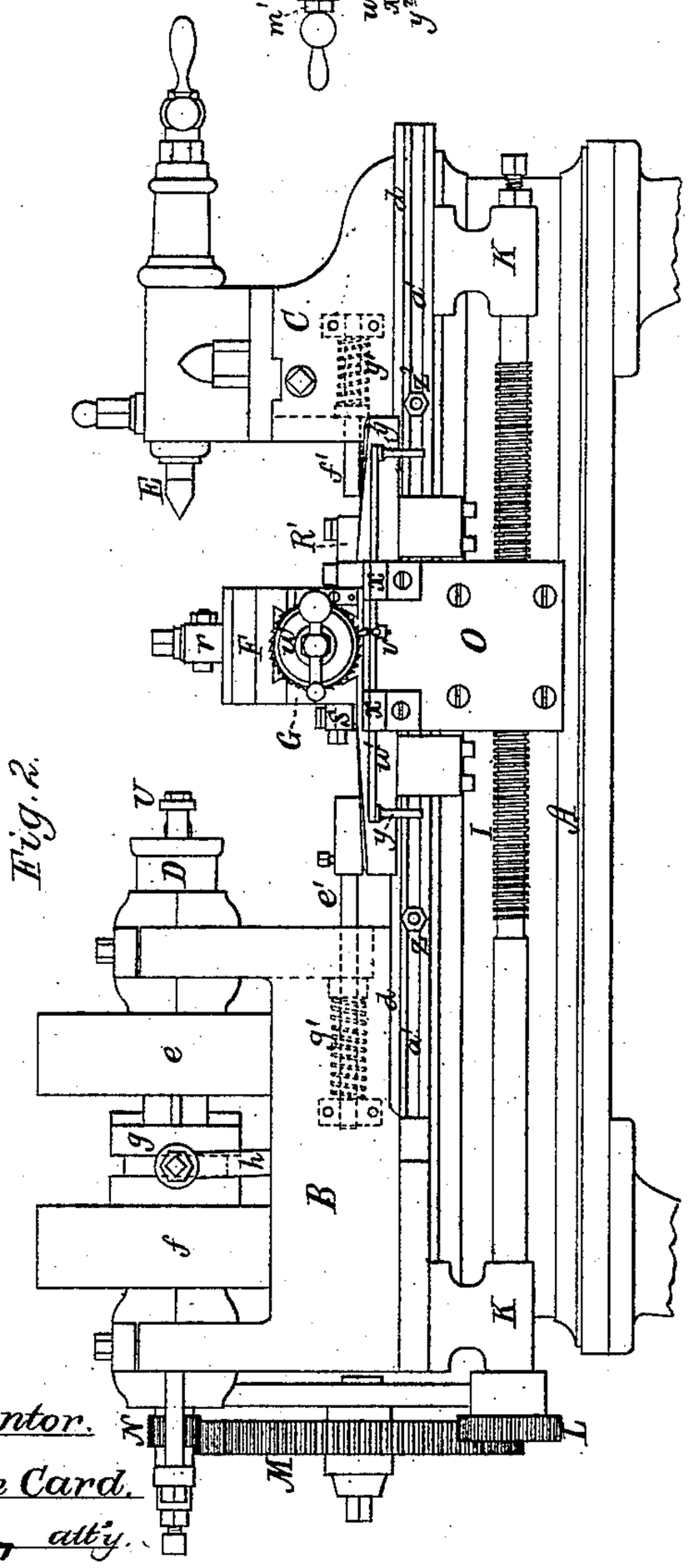

Fig. 2.

Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

S. W. CARD.

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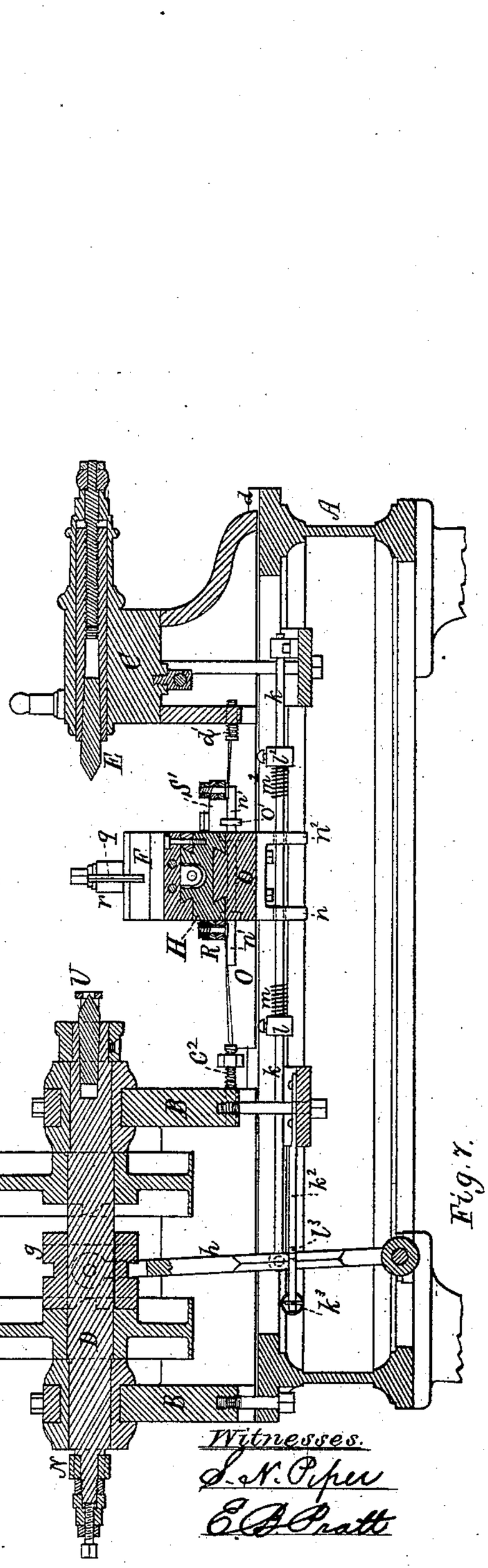

Fig. 4.

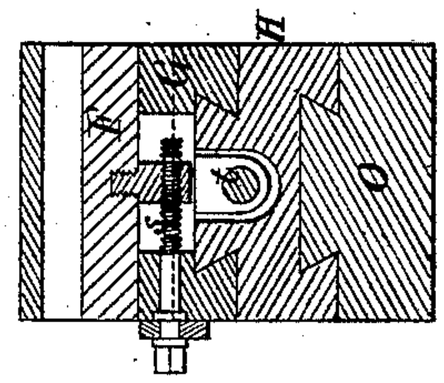

Fig. 6.

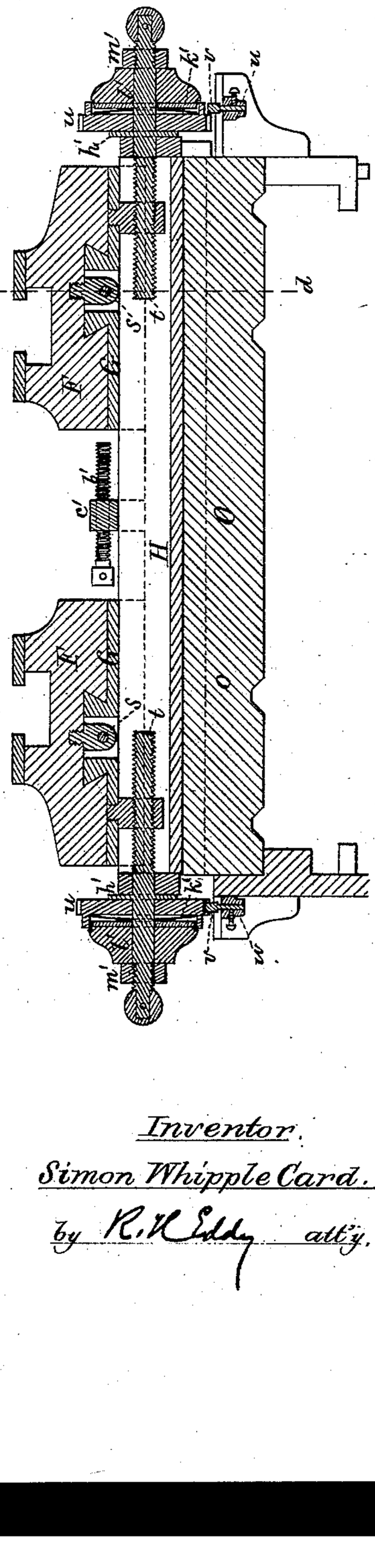

Fig. 5

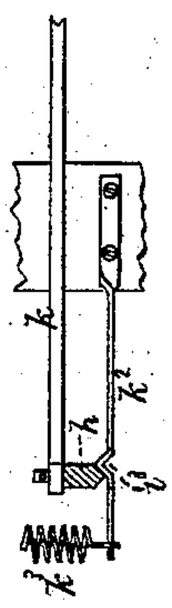

Fig. 7.

Witnesses.
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UNITED STATES PATENT OFFICE.

SIMON WHIPPLE CARD, OF MANSFIELD, MASSACHUSETTS.

MACHINE FOR THREADING SCREW-TAPS.

SPECIFICATION forming part of Letters Patent No. 300,041, dated June 10, 1884.

Application filed December 18, 1883. (No model.)

To all whom it may concern:

Be it known that I, SIMON WHIPPLE CARD, of Mansfield, in the county of Bristol, of the Commonwealth of Massachusetts, have invented a new and useful Improvement in Machinery for Threading Screw-Taps; and I do hereby declare the same to be described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a top view, and Fig. 2 a front elevation, of a machine embodying my invention, the nature of which is defined in the claims hereinafter presented. Fig. 3 is a vertical and transverse section taken on the line *a b* of Fig. 1, the tail-stock being supposed to be removed from the ways, in order for the said figure to exhibit a side view of the parts between the head and tail stocks. Fig. 4 is a longitudinal and vertical section of the machine. Fig. 5 is a vertical section of the two tool-carriages and their supporting mechanism. Fig. 6 is a transverse section of one of the tool-carriages and the parts below it, such section being taken on the line *c d* of Fig. 5. Fig. 7 is an illustration of the mechanism for operating the clutch.

This machine is automatic, and is to support and operate two screw-thread cutters in a manner to cause them alternately to be brought into action on the screw-tap blank.

In the drawings, A is the bed-frame of the machine. On its parallel ways *d* are a "head-stock," B, and a "tail-stock," C, the head-stock having an arbor, D, and the tail-stock an adjustable "center," E, all being substantially as in ordinary turning-lathes. The arbor D has on it two driving-pulleys, *e* and *f*, and between them a clutch, *g*, for alternately engaging them with the shaft. A furcated lever, *h*, suitably adapted to the clutch, and at its lower end pivoted to the bed-frame, is employed to slide such clutch from one to the other of the said pulleys. The pulleys *e* and *f* are to be supposed to revolve in opposite directions, and to be put in motion by endless belts from a suitable driving-drum or motor.

A rod, *k*, (see Fig. 4,) jointed to the lever *h*, slides longitudinally of the lathe in projections $n\ n^2$, extending down from the lower part, *o*, of the tool-carriage mechanism, and has two adjustable collars, $l\ l^2$, and two spiral springs, $m\ m^2$, arranged on it as shown.

In Figs. 1 and 3 the two screw-thread cutters are represented at *p* and *q* as sustained in two clamps, *r r*, supported by two tool-carriages, F. Each of such carriages rests upon and is adjustable rectilinearly and in a direction longitudinally of the lathe on one of two other carriages, G, arranged as shown, screws *s* being suitably applied to the carriages F and G (see Fig. 6) for effecting such adjustment. The carriages G slide transversely and rectilinearly on a carriage, H, resting on the bed-carriage O, supported and to slide longitudinally on the ways *d*. Each carriage G is movable transversely of the machine and rectilinearly on the carriage H, and is provided with a screw, *t*, for effecting such movement, in order to feed in the cutter *p* or *q*, that is clamped to the carriage F, as may be required. On the shank of each screw *t* a ratchet-wheel, *u* or *u'*, is arranged. Immediately below each ratchet-wheel is a suitable pawl, *v*, applied to a slide-rod, *w* or *w'*, sustained in bearings *x x*, extending from the carriage O. The slide-rod *w* or *w'* has two studs, $y\ y^2$, one at each end, extending downward from it between two other studs, $z\ z^2$, projecting from the frame A, and adjustable in a dovetail groove, *a'*, formed lengthwise therein.

For moving the carriage O on the ways *d d*, in order to feed the cutting-tools along either toward or away from the head-stock arbor D or the tail-stock center C, there is a screw, I, whose shaft has fixed on it a gear, L, and is supported in bearings K K, projecting from the frame A. This gear L, by means of an intermediate gear, M, engages with a gear, N, fixed on the arbor D, so that when the said arbor is in revolution the screw I will revolve and cause the carriage O to be moved either in one or in the opposite direction on the ways *d d*. There are jointed to the carriage O two toggles, R and R', each of which is jointed to one of two fellow toggles, S S', which are respectively jointed to the carriage H, such carriage being between the two pairs of toggles, as shown in Fig. 1. Furthermore, between the two carriages G G are screws *b'*, that screw through an ear, *c'*, projecting upward from the

carriage H. The screws are to limit the extent of transverse movements of the carriages G G, and consequently of the cutting-tools, in order that such tools may cut a screw-thread of the depth required. The arbor has fixed to it a suitable chuck, U, for holding one end of a tap-blank, the opposite end of the blank being countersunk and supported by the center E.

Projecting in a longitudinal direction from the head-stock and the tail-stock are adjustable studs or screws c^2 and d', (see Fig. 1,) and there extend also into and from the head-stock and tail-stock two slide-rods, e' and f', they being arranged and supported against spiral springs g', as represented in Fig. 2 by dotted lines. On forcing each rod backward longitudinally into its socket, its spring will be compressed lengthwise of it. Extending transversely through the carriage O, but longitudinally of the lathe, is a slide-rod, n', provided with two collars, o', arranged on it, as shown in Fig. 1—that is, between the two sets of toggles—such slide-rod being directly between and in line with the two studs c^2 and d'. Furthermore, each ratchet-wheel u or u' is loose on the shaft of its screw t, bearing against a collar or circular plate, h', fixed on the said shaft concentrically. The ratchet-wheel is chambered on its outer side to receive a spring, k', and a disk, l', forced against the spring by a nut, m', screwed on the shaft. The plate h', spring k', disk l', and nut m' constitute a friction mechanism to cause the ratchet-wheel to revolve the shaft in order to feed the adjacent carriage G. On the carriage being carried up to the step b', should the bed-carriage O be in movement on the ways d d, so as to carry the ratchet-wheel u or u' into engagement with the pawl v, when the latter is stopped from moving in the same direction, the ratchet-wheel u or u' can revolve on the shaft without being injured or broken by the pawl, as it would be liable to be were it not for the friction mechanism above mentioned, which serves to hold the ratchet-wheel sufficiently to prevent it from turning independently of the shaft when necessary for the wheel to revolve the shaft, but allows it to turn when a liability of accident may occur, as represented.

Fig. 7 represents the mechanism that operates to hold the clutch in connection with either of its pulleys. The front portion of the lever h is made V-shaped in transverse section, to co-operate with a spring, k^2, which is provided with a V-shaped projection, l^3, as represented, a spring, k^3, connected at one end to the spring k^2 and at its other end to the frame A, holding the spring k^2 against the lever h with sufficient force to keep the clutch in engagement with either of its pulleys.

The operation of the above-described mechanism may be thus described: A tap-blank having been duly chucked and centered in the machine will revolve with the arbor. One of the cutters at the same time will be borne up against the tap-blank, and by the operation of the feed-screw I will be moved in one direction along such blank, whereby a spiral groove will be cut therein. The carriage of such cutter will have been drawn in the proper distance to cause the cutter to act on the blank by the action of one set of toggles connecting the carriage H with the carriage O, in consequence of such toggles being moved into an obtuse angle with each other, the toggles of the other set being at such time in line with each other. The carriage O being fed along will carry one of the toggles of the two at an obtuse angle to each other against the slide-rod e' or f', toward which the carriage may be in movement. The slide-rod will be forced inward against its spring, and will contract the latter, and continue so to do until and for a short time after the slide-rod n' is carried against one of the studs c^2 d'.

The drawings represent the carriage O as it would appear if moving toward the tail-stock of the lathe, the cutter q being supposed to be in action on the tap-blank. On the toggle R′ bringing up against the slide-rod f', said rod will be forced into the tail-stock against its spring, which will be compressed more and more as the carriage continues to move, until the slide-rod n' will have been moved sufficiently within the carriage O, by bringing up against the stud d', to throw the toggles R S enough out of line to allow the force of the spring of the slide-rod f' to move the toggles R′ S′ into line and the toggles R S into an obtuse angle with each other. Such action of the toggles will have moved the carriage supporting the cutter q in a direction away from the tap-blank, and will have advanced the carriage carrying the cutter p up to the blank sufficiently to bring the said cutter p into action therewith.

While the above-described operation has been going on, and before the cutter p has been brought into action on the tap-blank, the stud y^2 of the slide w' will have been brought in contact with the stud z^2, and the said slide w' will have been moved sufficiently to cause its pawl v to turn the ratchet-wheel u' the proper distance to advance the cutter p enough to make a cut the necessary amount deeper than was made by the cutter q. Also, while the carriage O has been moving in the direction above described, the projection n^2 of the said carriage will have compressed the spring m^2 against its collar l^2, and carrying them with it has thereby slid the rod k sufficiently to move the clutch out of contact with the pulley f. The carriage will then have reached the limit of its movement in that direction. At the moment the carriage stops the point of the angular portion of the lever h (see Fig. 7) is brought against the point of the angular portion of the spring k^2, and the spring m^2 is then free to expand itself and carry the points above referred to past each other, and move the rod k sufficiently to bring the clutch g into

contact with the pulley *e*. Thus it will be seen that the tap-blank will now be revolved in the proper direction to be acted upon by the cutter *p*.

It will also be observed that while the tool *p* was being advanced to act on the tap the ratchet-wheel *u'* was carried away from or out of the path of movement of the pawl of the slide *w'*, and the ratchet-wheel *u* was moved into the position to be acted on at the proper time by the pawl of the slide *w*.

I claim—

1. The combination, substantially as described, composed of the following elements, adapted and arranged essentially as set forth, viz: first, the lathe-bed A and the head and tail stocks B and C, with the arbor D and center E; second, the two cutter-carriages F, provided with cutter-holding devices or clamps *r;* third, the carriages G G, H, and O; fourth, the mechanism for reciprocating the carriage O, it consisting of the screw I, gears L, M, and N, pulleys *e* and *f*, clutch *g*, lever *h*, rod *k*, collars *l* and l^2, springs *m* and m^2, and the ears *n* and n^2; fifth, the mechanism for advancing the cutter-carriages alternately to the blank, such consisting of two pairs of toggles, R and S, R′ and S′, the slide-rod *n'*, (having two collars, *o*,) the studs c^2 and *d'*, the slide-rods *e'* and *f'*, and the two springs, *g';* sixth, the mechanism for feeding forward the two cutter-carriages F in the required order, each of such mechanisms consisting of the carriage G, the screw *t*, ratchet-wheel *u* or *u'*, pawl *v*, slide *w* or *w'*, studs *y* y^2, stops *z* z^2, friction-disk *l'*, and spring *k'*, all as set forth.

2. The combination, substantially as described, for advancing each cutter-carriage to the blank, such combination consisting of the two pairs of toggles R and S, R′ and S′, slide-rod *n'*, shoulders *o'*, studs c^2 and *d'*, slide-rods *e'* and *f'*, and the two springs *g'*, arranged and adapted essentially as set forth.

SIMON WHIPPLE CARD.

Witnesses:
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