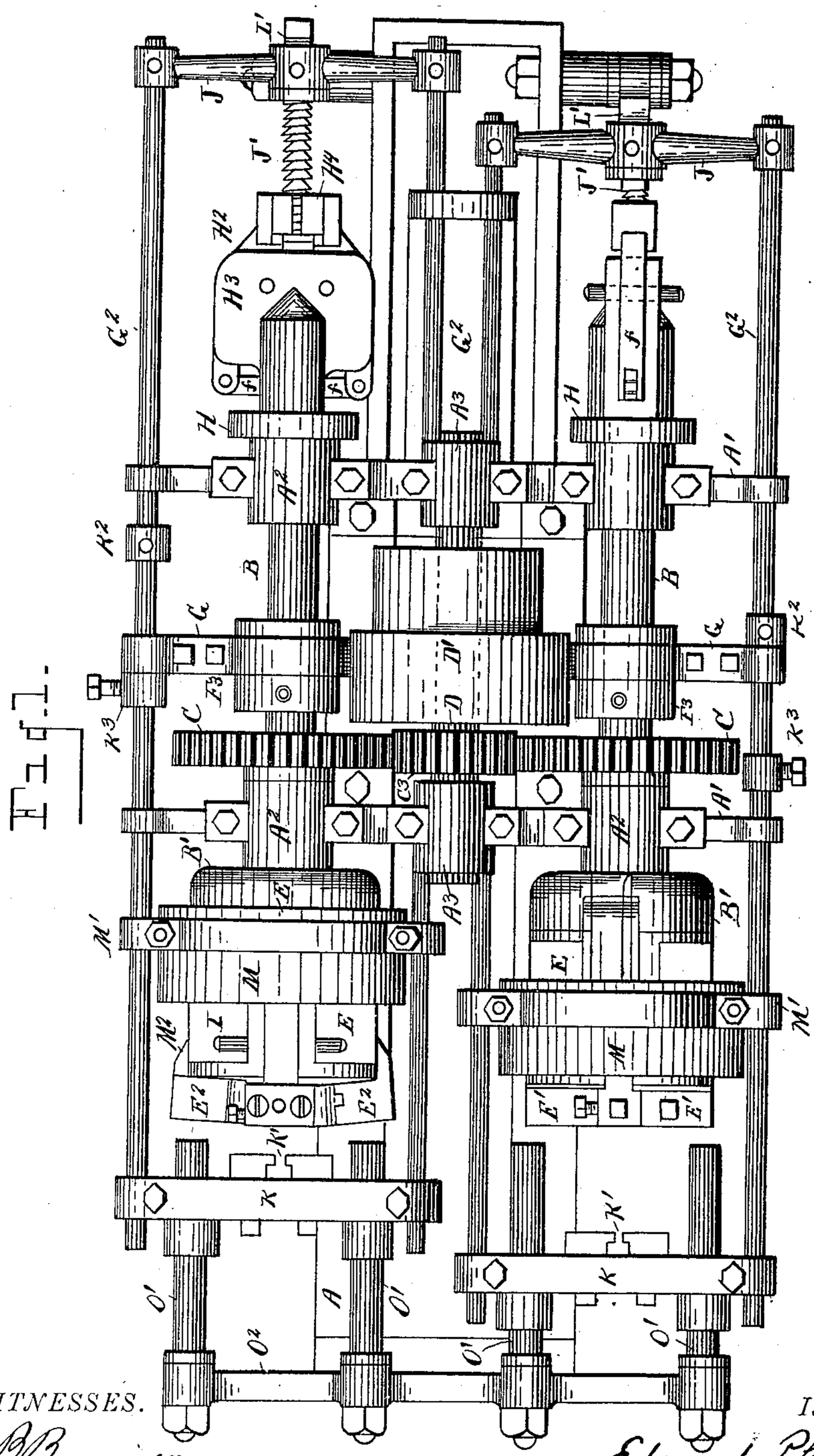
No. 658,396. Patented Sept. 25, 1900.

E. PHILLIPS.

SCREW CUTTING MACHINE.

(Application filed Jan. 31, 1900.)

(No Model.) 4 Sheets—Sheet 1.



WITNESSES.

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4 Sheets—Sheet 2.

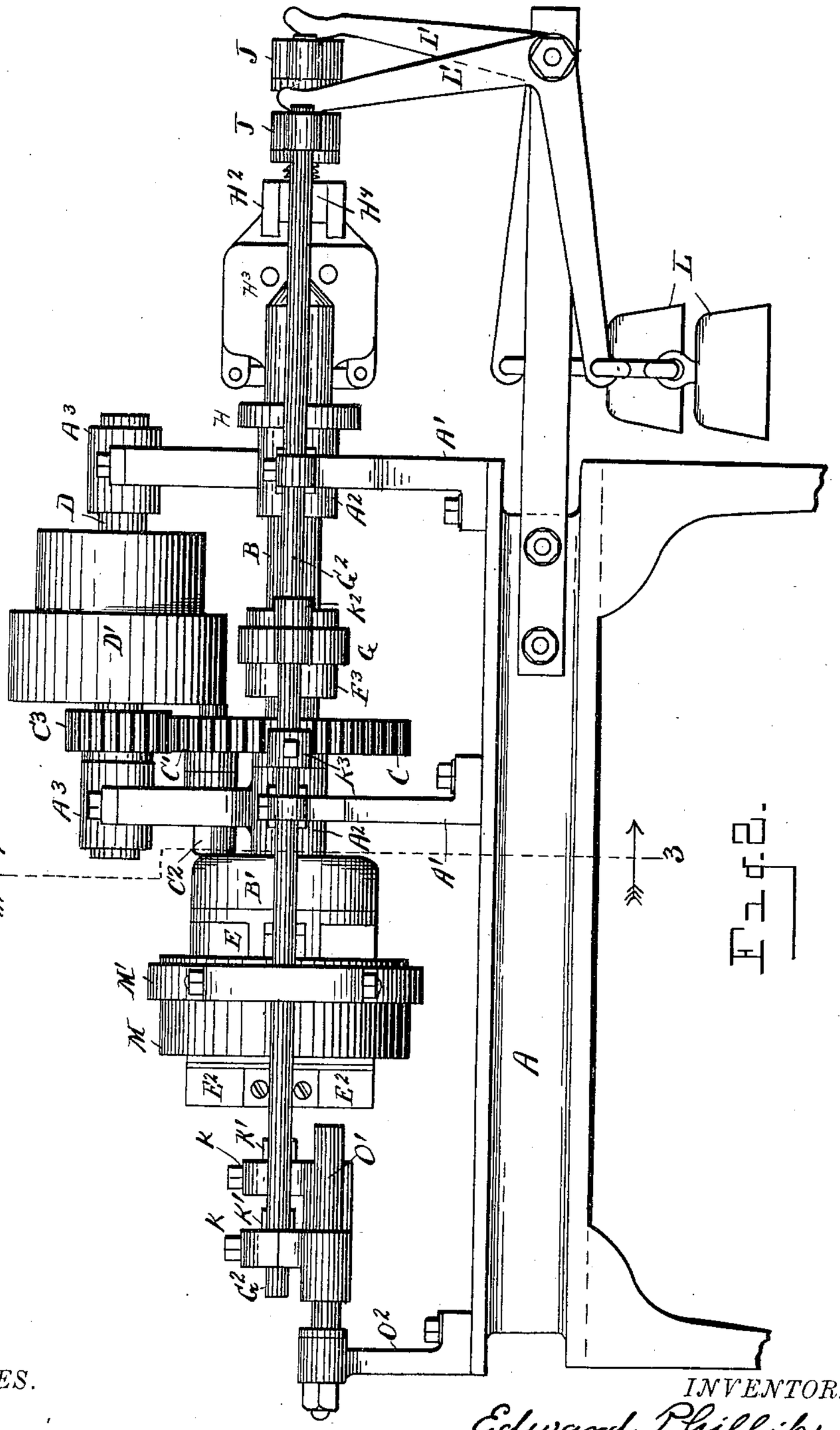

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

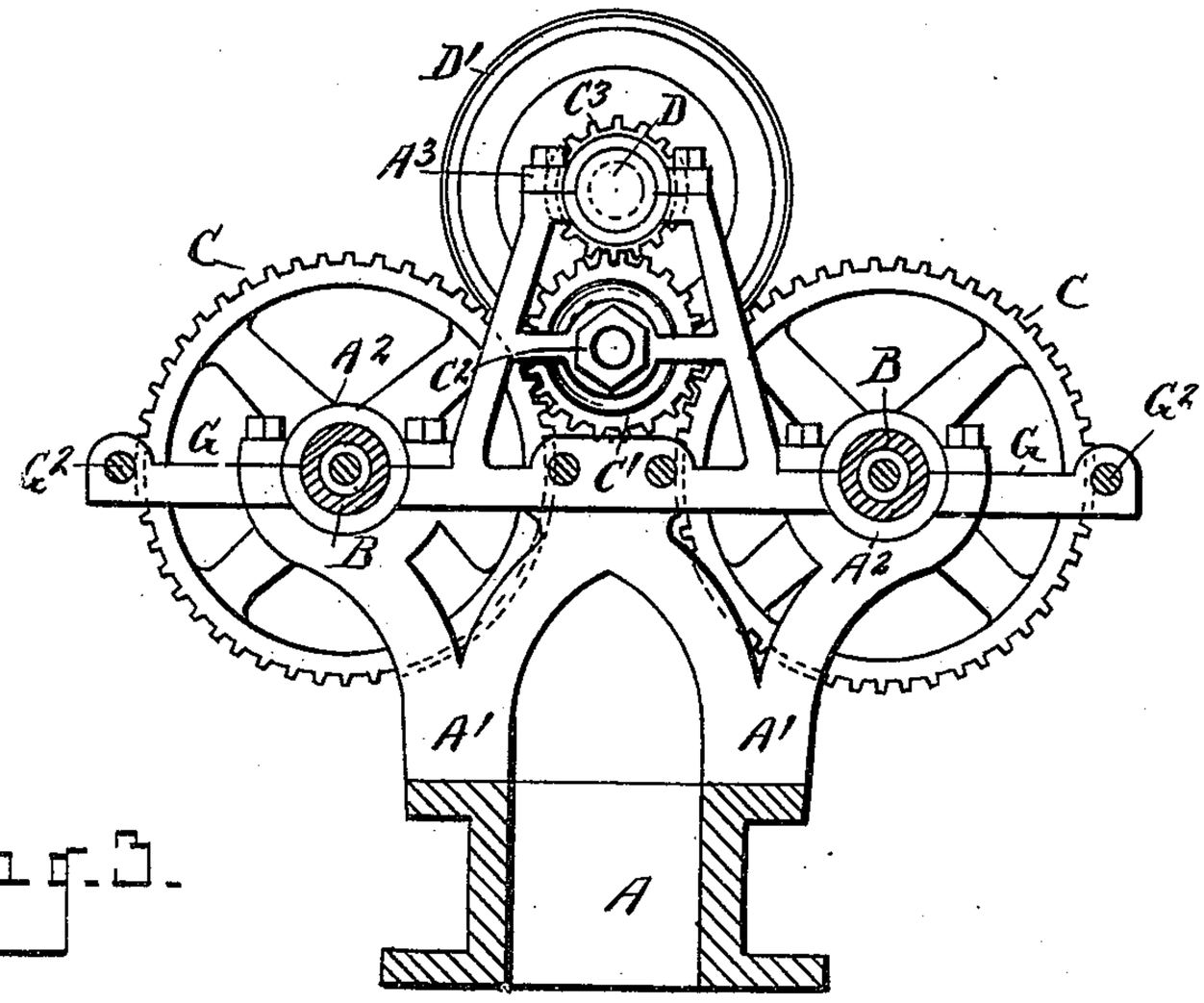

Fig. 9.

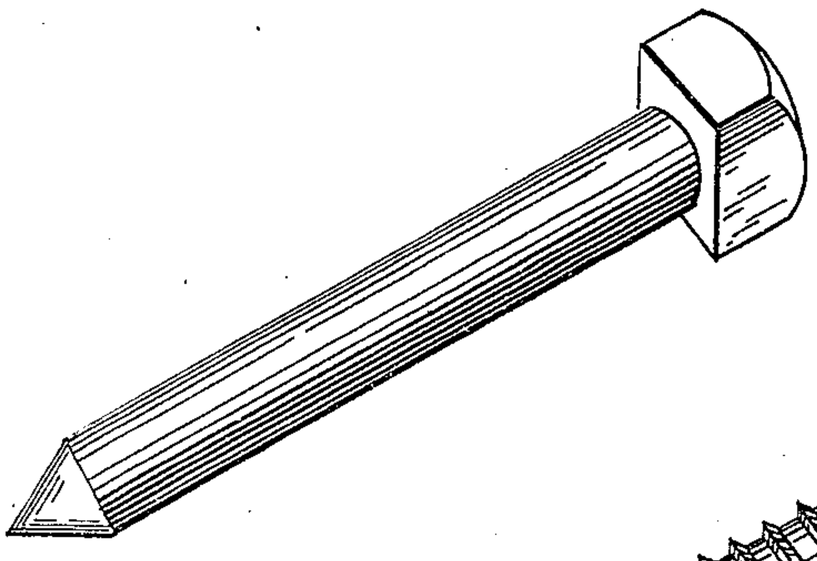

Fig. 10.

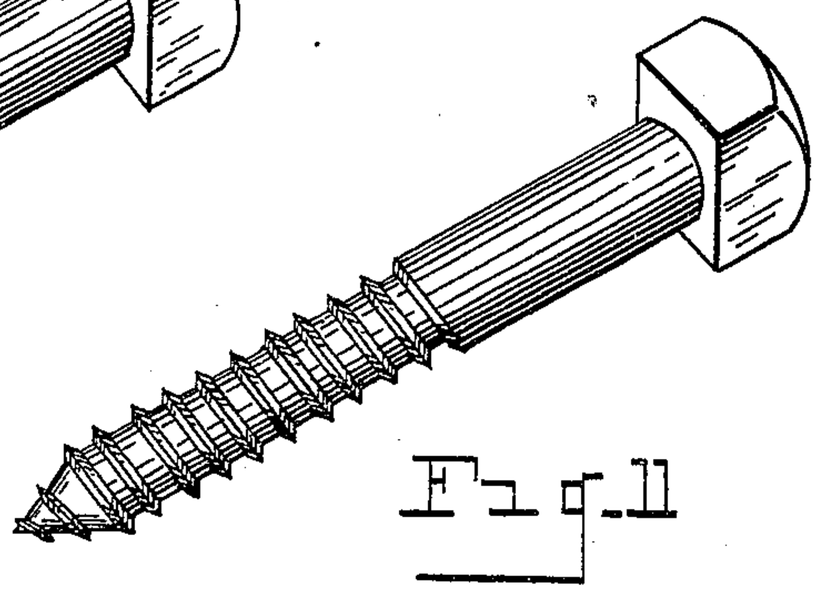

Fig. 11

WITNESSES.

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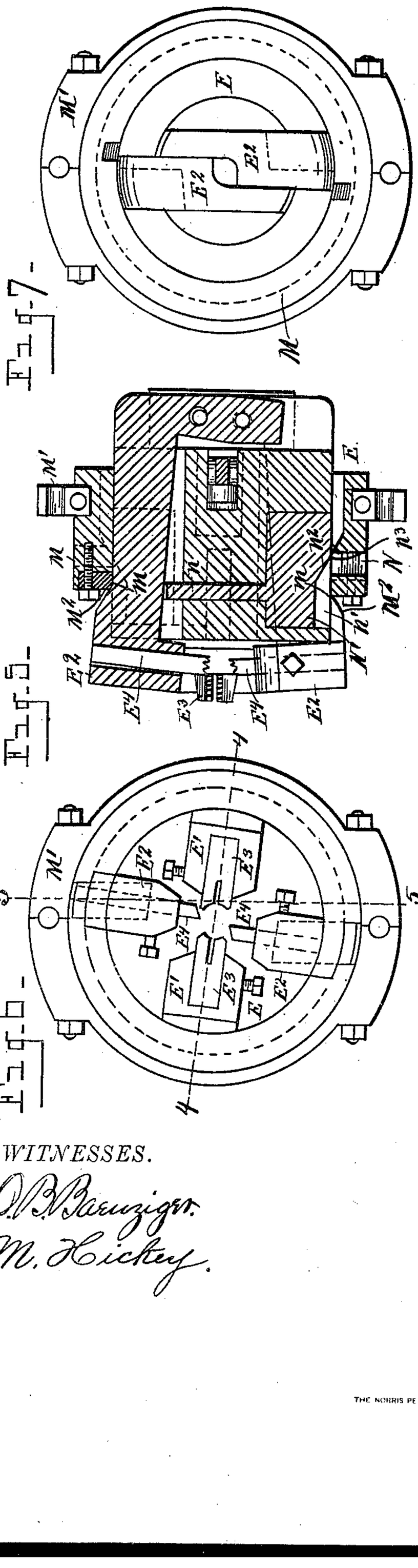

FIG. 7.

FIG. 8.

FIG. 5.

FIG. 6.

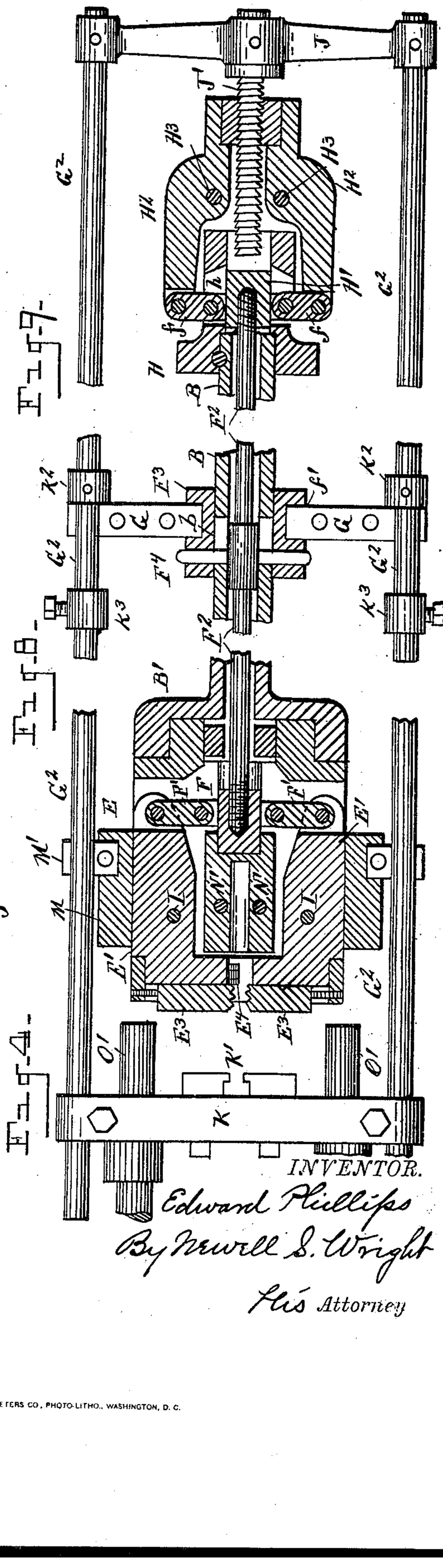

FIG. 4.

WITNESSES.

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UNITED STATES PATENT OFFICE.

EDWARD PHILLIPS, OF DETROIT, MICHIGAN, ASSIGNOR TO EDWARD T. GILBERT, OF SAME PLACE.

SCREW-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 658,396, dated September 25, 1900.

Application filed January 31, 1900. Serial No. 3,459. (No model.)

To all whom it may concern:

Be it known that I, EDWARD PHILLIPS, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented certain new and useful Improvements in Cutter-Heads for Forming Threads on Screws and Mechanism for Operating the Same; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object a novel cutter-head for forming threads on screws and mechanism for operating the same; and it consists of the structure, combination, and arrangement of devices hereinafter described and claimed and illustrated in the accompanying drawings, in which—

Figure 1 is a plan view embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical section on the line 3 3, Fig. 2, showing the parts in end elevation. Fig. 4 is a view in section of the threading-head on the line 4 4, Fig. 6, showing also the bolt-head chuck and cross-head. Fig. 5 is a view of the same in section on the line 5 5, Fig. 6. Fig. 6 is a front elevation of a threading-head with the parallel threading-dies and the inclined threading-cutters for threading the points shown in open position. Fig. 7 is a rear elevation of a threading-head. Fig. 8 is a view in section through the sliding collar and adjacent parts. Fig. 9 is a view in section of the feed-head and feed-nut and the feed-screw. Fig. 10 is a view of a pointed lag-screw blank. Fig. 11 is a view of such a screw threaded.

My invention is designed to produce a machine for the purpose specified of superior efficiency and utility, whereby more perfect work will be turned out rapidly in a simple and effective manner.

The purpose of the present invention is to provide means whereby a tapering pointed screw may be threaded both upon the body and upon the point of the screw in one and the same operation, the threads being cut on the body and point of the screw at a single operation of the dies and cutters along the bolt. In the accompanying drawings I have illustrated certain portions of the mechanism duplicated, so as to increase the capacity of the machine, whereby screws may thus be threaded in a more economical manner.

As shown in the accompanying drawings, I carry out my invention as follows:

A represents any suitable frame preferably provided with shaft-supporting standards or brackets A′, provided with journals A^2.

B represents hollow spindles rotatable in said journals, said spindles being each provided with gears C, which are intermediate the ends of said spindles.

D is a driving-shaft provided with a driving-pulley D′ and mounted in journals A^3, supported upon the standards or brackets A′,

C′ is a pinion journaled upon a stub C^2. meshing with gears C C and driven by a pinion C^3.

Carried upon one extremity of the hollow spindles B, respectively, is a threading-head E, said head provided with two parallel threading-jaws E′ E′, fulcrumed on pivot-pins I and provided with threading-dies E^3 E^3 at their outer ends. Said heads are also provided with two inclined threading cutter-jaws E^2 E^2, provided with cutters E^4 E^4 for threading the point. The parallel threading-jaws E′ are operated by means of a nut F, engaged with a rod F^2, sleeved through the hollow spindle B, said nut connected with said threading-jaws by means of links F′ F′. The rod F^2 passes through the hollow spindle B and is engaged at its opposite end with a toggle-nut H′ in a feed-screw head H. The feed-screw head is provided with jaws H^2, fulcrumed intermediate their ends upon pivot-pins H^3, and are connected at one extremity thereof with the toggle-nut H′ by means of links *f f*.

H^4 is a feed-nut upon a feed-screw J′, said screw projecting within the feed-screw head and at the opposite end is engaged with a cross-arm J, the parallel threading-jaws E′ and the jaws H^2 of the feed-screw head being fulcrumed, as described.

It will be seen that when the connecting-rod F^2 is moved forward the toggle-nuts F and H′, through the instrumentality of their

respective connecting-links, will close the adjacent ends of the jaws E′ H², thereby simultaneously opening the threading-dies E³ and the feed-nut H⁴, said feed-nut being made of separable sections engaged with the corresponding jaws H².

The feed-screw head H is engaged upon the corresponding hollow spindle B and is formed with an elongated orifice (indicated at *h*) to permit the operation of the toggle-links *f* in the reciprocation of the toggle-nut H′, with which the connecting-rod F² is engaged. Intermediate the ends of the hollow spindle B is located a sliding collar F³, keyed to the connecting-rod F², the spindle B being constructed with an elongated slot (indicated at *b*) to allow for the reciprocation of a key F⁴, engaging the sliding collar with the connecting-rod, as shown in Fig. 8.

G is a cross-arm loosely engaging at its extremities slide-rods G², said rods being connected at one extremity with the cross-arm J, carrying the feed-screw J′. At their opposite extremities the slide-rods G² are engaged with a cross-head K, provided with a chuck K′ to engage a bolt-head. The cross-arms G and K may be made of two parts bolted together, as indicated in the drawings. The sliding collar F³ is recessed on its periphery, as shown at *f*′, to receive the cross-arm G, said collar revolving within said cross-arm. It will be perceived that the feed-screw J′ moves the slide-rods G² forward, said rods carrying with them the cross-head K.

K³ denotes movable collars engaged upon the slide-rods, which may be set for any desired length of thread to be cut upon the bolt.

K² denotes stationary collars also engaged upon the slide-rods G².

The cross-arm G, carrying the collar F³, connected with the rod F², upon being moved forward moves forward also the toggle-nuts F and H′, thereby throwing open the threading-dies and the feed-nut jaw, thus releasing the finished screw and the feed-screw, whereupon the feed-screw is immediately thrown back into normal position by means of a weight L, operating a bell-crank lever L′, as shown in Fig. 2. This movement, it will be seen, carries back the cross-arm G against the stationary collars K², thereby throwing back the toggle-nuts F and H′ and closing the threading-jaws and the feeding-screw jaws.

The inclined threading-jaws E² for threading the point are operated by means of a sliding collar M on the threading-head E, said collar being in turn operated by a strap M′ and secured to the slide-rods G², as shown. The sectional view embodied in Fig. 5 shows the inclined threading-jaws E² in open position. The jaws E² are formed with inclined surfaces, (indicated at M².) When the feed-screw J′ is released, as above described, the collar M is thrown back by the corresponding movement of the rods G² to the position shown. The jaws E² will be closed by the collar M engaging the inclined surfaces M² on the jaws E². The adjacent edges of the collar M are also slightly beveled, as indicated at *m*. The collar M is so adjusted relative to the inclined threading-jaws E² that when the point of the screw being threaded protrudes through the threading-dies E³ it will be engaged by the cutters E⁴. At the same time the collar M will have reached the edge of the inclined surfaces M² on the jaws E².

In the collar M is engaged a screw N, beveled at its inner end, as shown at *n*³. Within the head E is located a jaw-opening device to open the inclined threading cutter-jaws E², (indicated at N′,) provided with a stem *n*, passing through the head, to engage the opposite jaw E², as shown in Fig. 5. This jaw-opening device is formed also with a recess (indicated at *n*′) beveled at its inner edge, as indicated at *n*². When the point of the screw N engages the inclined surfaces *n*² of the jaw-opening device N′, the jaws E² are forced open as the collar M travels back, as indicated in Fig. 5. The angle of the point of the screw being threaded is regulated by the angle of these inclined surfaces M², *n*², and *n*³. When the jaws E² have thus been opened, they will remain in open position until the screw has been threaded the proper length by means of the parallel threading-dies E³, after which they will be closed by the weight L operating the bell-crank L′, this operation of the bell-crank occurring at the same time the parallel threading-dies E³ close.

The cross-head K, carrying the bolt-head chuck K′, slides on guide-rods O′, secured upon a bracket O², said cross-head being adjustable upon the slide-head E² to suit the different lengths of screws to be threaded.

The spindles B, adjacent to the threading-heads E, are formed with a housing engaging portions of the head, as indicated at B′.

It will be obvious that the mechanism for operating the feed-screw enables the cutter-head to be reversed or restored into normal position after having cut the threads upon a given screw without having to reverse the action of the feed-screw, the machine reversing instantly, and thereby increasing very materially the capacity of the machine.

The tapering surfaces M² correspond with the taper of the point of the screw, so that the pointing-jaws are kept in line with the surface of the point of the screw. The mechanism for opening and closing the jaws E² at the proper time by means of the sliding collar and the opening device are important features of the invention. The jaws E² after operating upon the point of the screw are then released, so that the parallel jaws can finish cutting the threads upon the body of the screw or bolt. It will also be observed that the cutter-head is moved forward by the feed-screw instead of being drawn forward as the threads upon the screw are being cut.

What I claim as my invention is—

1. A rotatable and reciprocatory cutter-

head for forming threads on screws provided with parallel threading-jaws pivotally connected therewith, means to open and close said jaws, expansible inclined threading-jaws connected with said head, means to close said inclined threading-jaws, a jaw-opening device within the head to open the inclined threading-jaws, and means to hold the work.

2. A rotatable and reciprocatory cutter-head for forming threads on screws provided with parallel threading-jaws pivoted thereto intermediate their extremities, threaded dies engaged with said jaws, expansible inclined threading-jaws carried by said head having cutters engaged therewith, means to open and close said parallel threading-jaws, and means to close said inclined threading-jaws, a jaw-opening device within the head to open the inclined threading-jaws, said head having in combination therewith a rotatable spindle engaging said head, and means to reciprocate said spindle and head.

3. A rotatable and reciprocatory cutter-head for forming threads on screws provided with parallel threading-jaws pivoted thereto intermediate their extremities, threading-dies engaged with said jaws, expansible inclined threading-jaws carried by said head having cutters engaged therewith, means to open and close said parallel threading-jaws, means to close said inclined threading-jaws, a jaw-opening device within the head to open the inclined threading-jaws, said head having in combination therewith a hollow rotatable spindle, and a reciprocatory rod within said spindle to actuate the parallel threading-jaws.

4. A rotatable and reciprocatory cutter-head for forming threads on screws provided with parallel threading-jaws pivoted thereto, inclined threading-jaws engaged with said head, means to close the inclined threading-jaws, a jaw-opening device within the head to open the inclined threading-jaws, a hollow spindle engaging said head, means to reciprocate said spindle, a rod reciprocatory within said spindle to actuate the parallel threading-jaws, a feed-screw to actuate said rod, and means to rotate said spindle.

5. A cutter-head for forming threads on screws provided with parallel threading-jaws, means to open and close said jaws, inclined threading-jaws engaged with said head, means to open and close the inclined threading-jaws, a feed-screw, a sectional feed-nut to engage said screw, and means to open and close said nut upon the feed-screw synchronously with the actuation of said jaws.

6. In combination, a cutter-head provided with parallel threading-jaws and with inclined threading-jaws, a hollow rotatable spindle, a feed-screw, a sectional nut to engage the feed-screw, a feed-screw head engaged upon said spindle, a rod sleeved through said spindle, a toggle-nut engaged with one end of said rod and with the parallel threading-jaws, an additional toggle-nut in the feed-screw head engaged with the opposite end of said rod, jaws connected with said sectional nut and with the nut in the feed-screw head to open and close the sectional nut, and means to open and close the inclined threading-jaws in the cutter-head.

7. In combination, a hollow rotatable spindle, a cutter-head carried by said spindle provided with parallel threading-jaws and with inclined threading-jaws, means to actuate the parallel threading-jaws, an opening device, and a sliding collar to actuate the opening device and the inclined threading-jaws, said inclined threading-jaws constructed with angular faces engageable by the sliding collar.

8. In combination, a rotatable hollow spindle, a cutter-head carried thereby, parallel threading-jaws and inclined threading-jaws carried by said head, a rod reciprocatory in said spindle to actuate the parallel threading-jaws, a feed-screw head upon said spindle, a feed-screw, slide-rods carrying the feed-screw, a sectional feed-nut engageable with the feed-screw, means connected with the rod in the spindle to actuate the sectional feed-nut, a sliding collar carried by the slide-rods to actuate the inclined threading-jaws, and means to limit the reciprocation of the cutter-head.

9. In combination, a rotatable hollow spindle, a cutter-head carried thereby, parallel threading-jaws and inclined threading-jaws carried by said head, a rod reciprocatory in said spindle to actuate the parallel threading-jaws, a feed-screw head upon said spindle, a feed-screw, slide-rods carrying the feed-screw, a sectional feed-nut engageable with the feed-screw, means connected with the rod in the spindle to actuate the sectional feed-nut, a sliding collar carried by the slide-rods to actuate the inclined threading-jaws, and means to limit the reciprocation of the cutter-head, said slide-rods moved forward by the feed-screw, and means to restore the slide-rods and cutter-head to normal position without reversing the action of the feed-screw.

10. In combination, a cutter-head, inclined threading-jaws carried thereby, a jaw-opening device within the head to open the said jaws, and a sliding collar to close said jaws.

11. In combination, a cutter-head provided with inclined threading-jaws, a jaw-opening device within the head to open said jaws, slide-rods, a collar engaged upon said head and upon the slide-rods to close said jaws, and means to feed the slide-rods and cutter-head.

In testimony whereof I sign this specification in the presence of two witnesses.

EDWARD PHILLIPS.

Witnesses:
N. S. WRIGHT,
M. HICKEY.