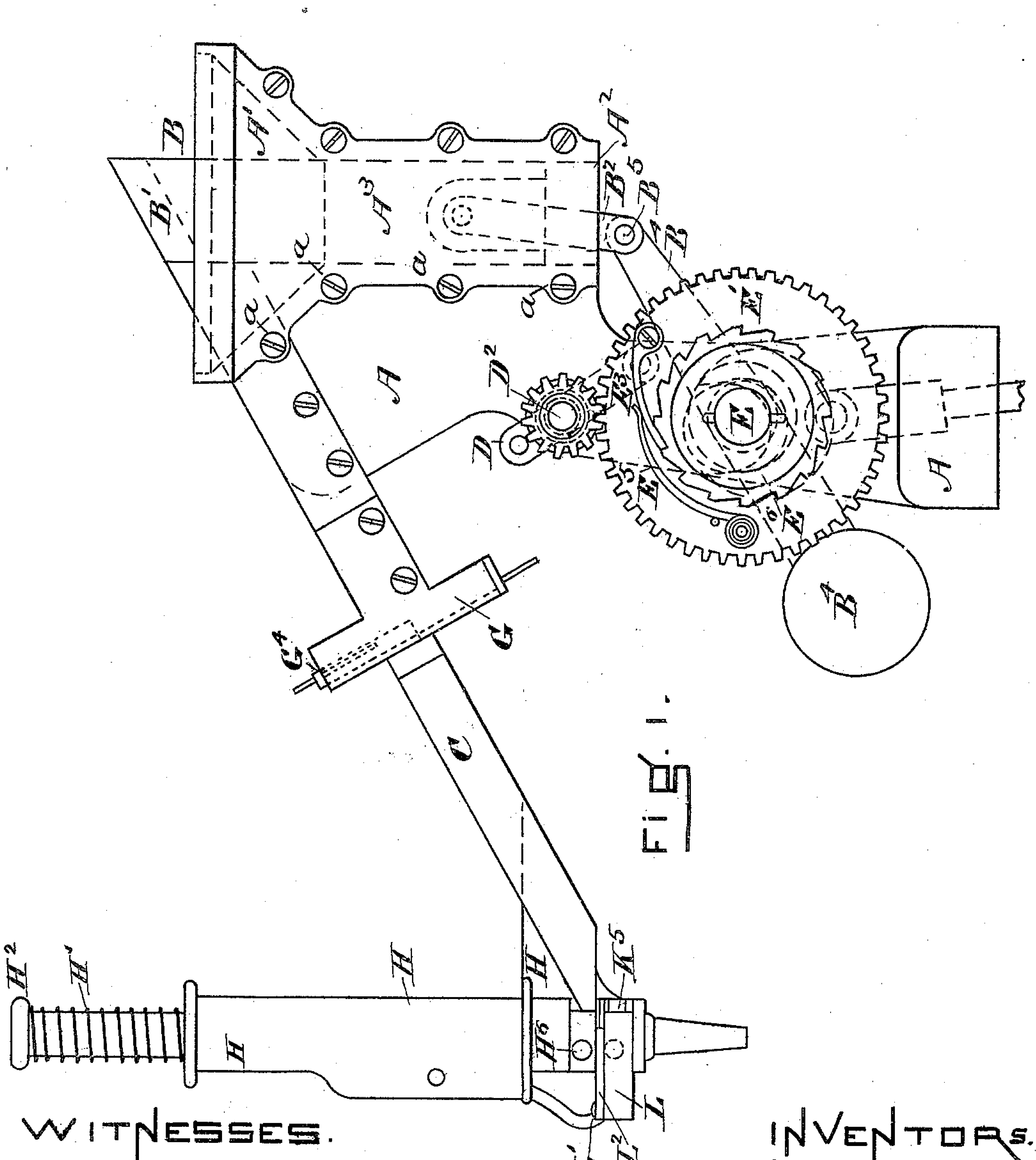
(No Model.) 4 Sheets—Sheet 1.

J. E. CRISP & G. W. COPELAND.

TACK DRIVING MACHINE.

No. 446,631. Patented Feb. 17, 1891.



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(No Model.) 4 Sheets—Sheet 2.

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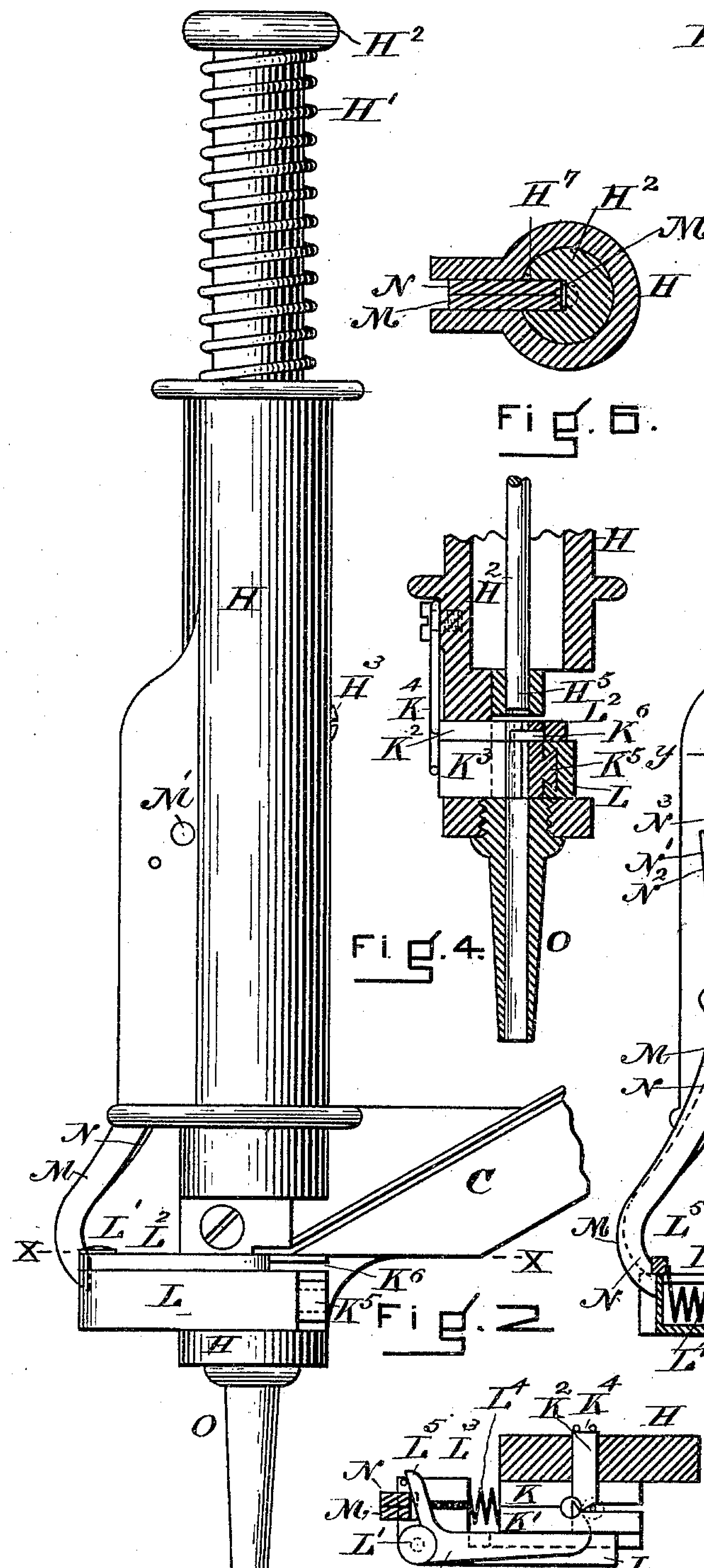

Fig. 2.

Fig. 6.

Fig. 4.

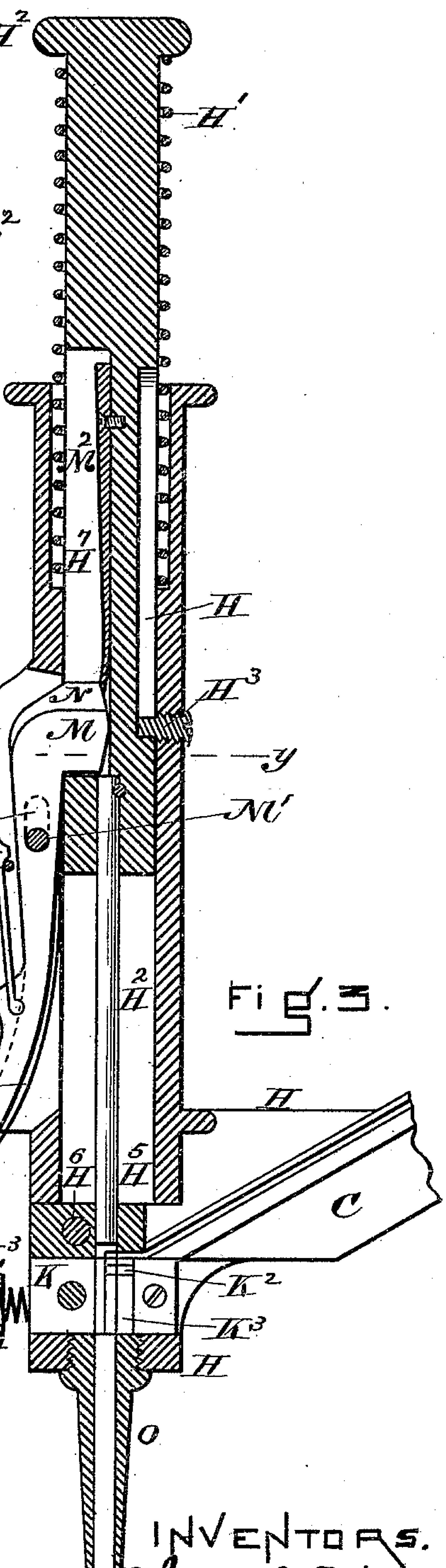

Fig. 3.

Fig. 5.

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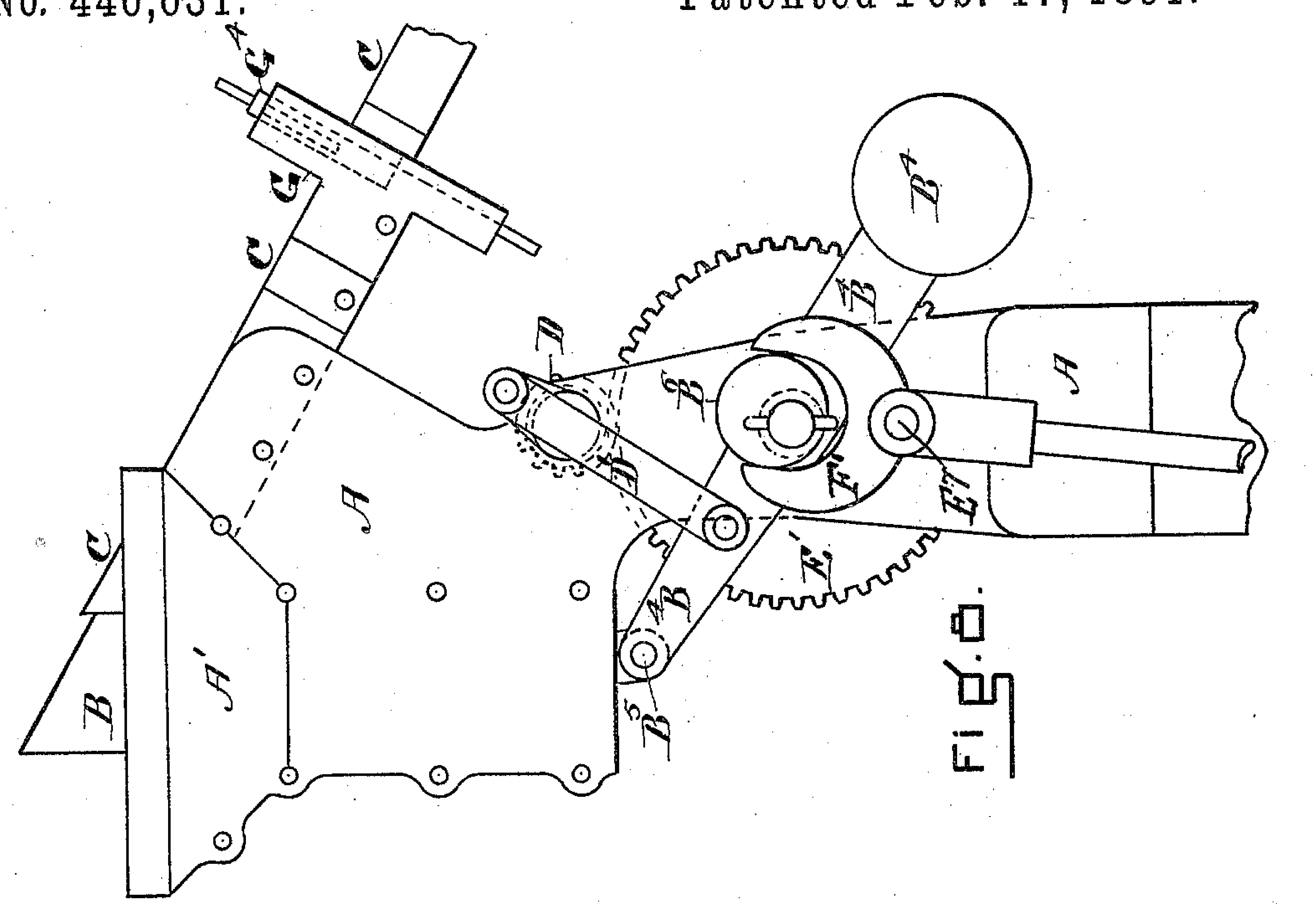

Fig. 6.

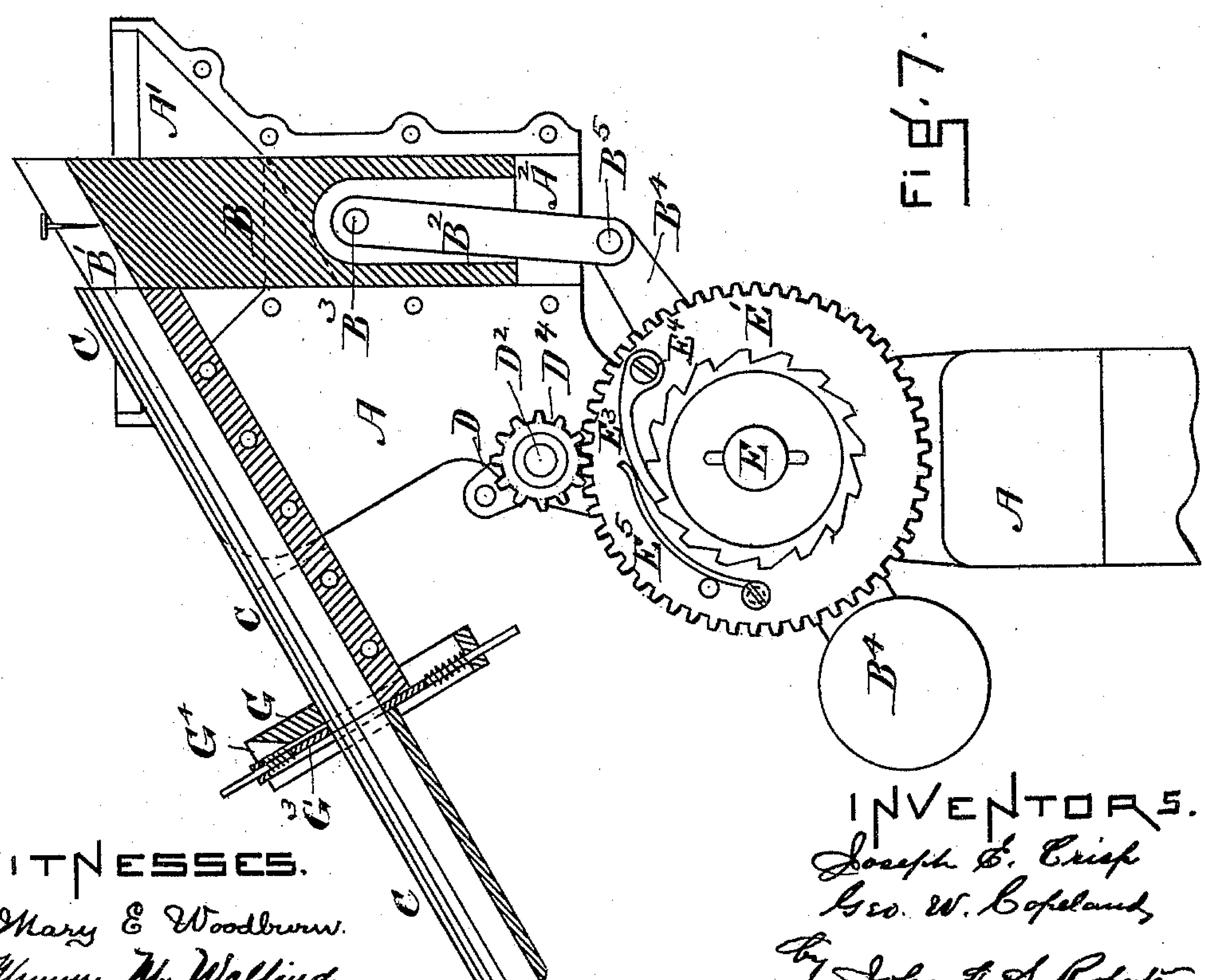

Fig. 7.

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(No Model.) 4 Sheets—Sheet 4.

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TACK DRIVING MACHINE.

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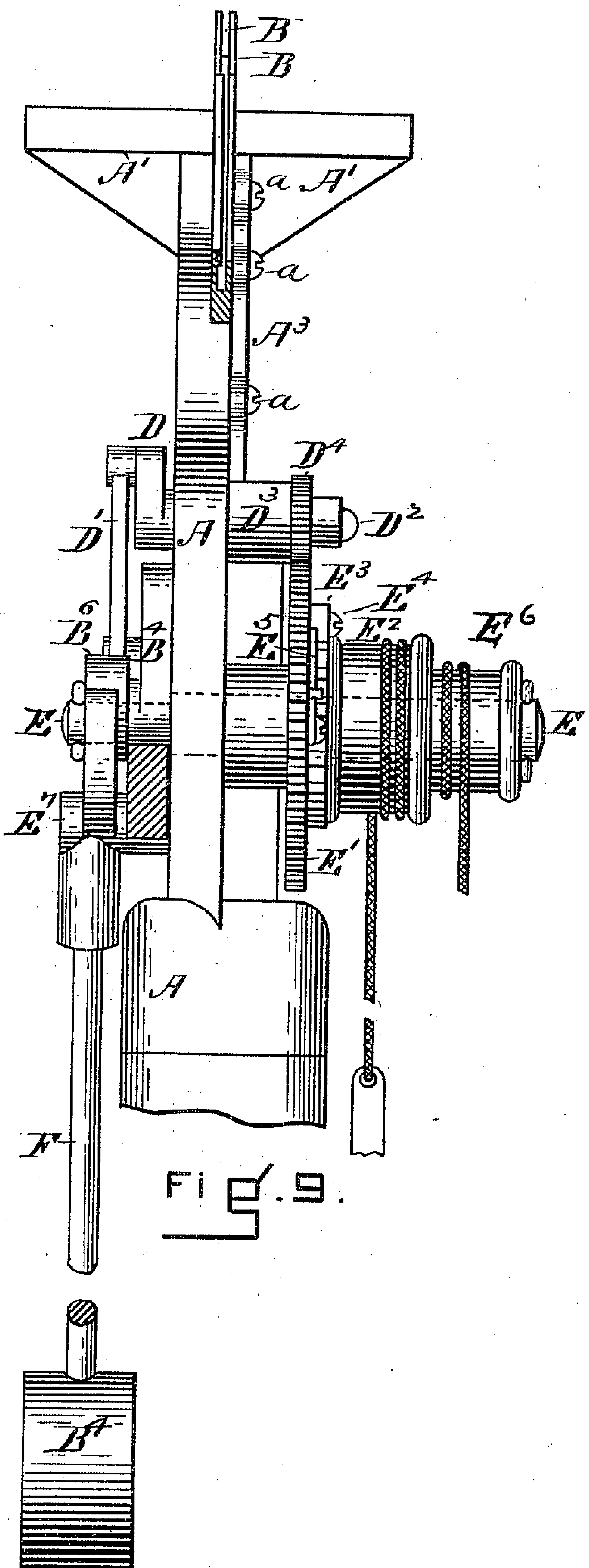

FIG. 9.

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UNITED STATES PATENT OFFICE.

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TACK-DRIVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 446,631, dated February 17, 1891.

Application filed November 4, 1890. Serial No. 370,291. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH E. CRISP, of Somerville, and GEORGE W. COPELAND, of Malden, both in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Tack-Driving Machines; and we do declare the following, with the accompanying drawings, 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.

This invention relates to hand tack-driving machines designed to drive tacks placed loosely in a hopper from which the tacks are automatically arranged in an inclined chute leading to feeding devices which successively present the tacks for the action of the driving mechanism. It is so constructed that the work may be presented to the nozzle of the driver.

It consists in providing the tack separating and arranging mechanism with a weight or spring operated motor for localities where it is not advisable or possible to use the ordinary power facilities.

It consists, further, in various improvements in tack arranging and feeding mechanism, hereinafter described in detail, which simplify the construction and increase the efficiency of the machine.

In the drawings, Figure 1 is a side elevation of the tack elevating and arranging mechanism, also showing the driving mechanism in its rest. Fig. 2 is an enlarged side elevation of the driving-machine, including the lower portion of the movable chute. Fig. 3 is a vertical cross-section of Fig. 2, showing the operating mechanism. Fig. 4 is a vertical cross-section at right angles to that of Fig. 3, further illustrating the feeding mechanism. Fig. 5 is a horizontal cross-section of Fig. 2 on line *x x*. Fig. 6 is a horizontal cross-section of Fig. 3 on line *y y*. Fig. 7 is a side elevation of the tack-arranging mechanism with the removable part of the hopper off, and showing in section the tack-elevator and tack-chute. Fig. 8 is an elevation of the side opposite to that shown in Fig. 7, showing the means for driving and governing the motions of the tack-elevator. Fig. 9 is a front elevation of the tack-hopper, showing the chute in section and also the driving and governing mechanism.

The casting A supports the various parts of the tack receiving and arranging mechanism. This casting may be fixed at any desired height upon a proper support and wherever desired.

The tack-hopper A', Figs. 1, 7, 8, and 9, is formed at the top of the casting A or secured thereto, and this hopper may be of any suitable shape, and it is provided in the bottom with a slot and depending guideway, and reciprocating vertically in this guideway, which is a narrow slot in the center of the hopper, is the tack-elevator slide B, which elevates the tacks and discharges them into that part of the tack-chute attached to the hopper. The elevator-slide is made a little thicker than the diameter of the tack-heads it is designed to operate upon and as wide as desired. The top of this slide is inclined about thirty-five degrees, and is provided with a groove B' in the center a little wider than the shanks of the tacks used and a little deeper than the length of the shanks of the longest tacks to be used. As this elevator-slide is reciprocated it descends through the tacks in the hopper and a short distance below the bottom of the hopper, thus forming a narrow trough, into which a number of the tacks will fall parallel to the groove in the top of the elevator-slide, and the shanks will swing into the groove and hang there by their heads until the slide B reaches its highest point, when the tacks will run into the chute C and the slide B descend for the other tacks.

The tack-elevator slide is preferably guided in a slideway A^2, formed in the casting A or secured thereto below the bottom of the hopper, and a portion of the hopper is preferably made integral with the cap A^3 and secured to the casting A by the screws *a*.

The fixed part of the chute C is attached to the casting A at the proper inclination for the tacks to run down, and its upper end is fitted to the edge of the elevator-slide. It is made long enough to fill the removable part of the chute attached to the tack-driver. After the elevator has filled the fixed part of the chute the tacks overflow at the top end and fall back into the hopper until the movable part of the chute is placed in the rest or coupling of the fixed part, when sufficient tacks to fill the movable part run into it, and the elevator operates as before.

The elevator-slide B is reciprocated by the connection B^2, attached to it by a pivot at B^3 and to the end of the oscillating counterbalance-lever B^4 by a pivot at B^5, Fig. 7, the lever B^4 being operated by the crank D and connection D′, Figs. 8 and 9. The counterbalance of the lever B^4 balances the weight of the elevator-slide carried by the opposite end, and the only strain brought upon the crank D is the friction of the slide passing through the tacks in the hopper.

The crank-shaft D^2 is fitted to a bearing D^3, formed on or secured to the casting A and driven by a belt-pulley from a prime motor.

In order to operate the elevator-slide and keep the fixed part of the chute supplied with tacks when the machine is used where the only power advantageous or available is manual, there is connected to the crank-shaft D^2 simple clock mechanism, which reciprocates the elevator-slide a sufficient number of times to fill the fixed part of the chute at each running down of the going weight or spring. The preferred form of mechanism is constructed and operated in the following manner: Upon the outer end of the crank-shaft D^2 there is fixed the pinion D^4, and properly located upon the stud E on the frame A runs the gear E′, whose teeth intermesh with those of the pinion D^4, Figs. 1, 7, and 9. Outside of the gear E′, and also upon the stud E, is placed the drum E^2, around which the cord of the going or driving weight is wound when a weight is used. The inside flange of this drum is provided with ratchet-teeth, as shown by Fig. 7, and the strain of the going-weight is transmitted to the gear E′ by the pawl E^3, hung on the gear at E^4 and pressed into the ratchet-teeth by the spring E^5. Beyond the outer flange of the drum E^2, and preferably formed integral therewith, is a smaller drum E^6, around which a cord is wound in the opposite direction to the going one, so that as either is unwound the other is wound up. The drum E^2 is made the correct size to give the desired number of reciprocations to the elevator-slide, and the cord wound around the drum E^6 is used to raise the going-weight by hand, or it may be connected by a foot-treadle, if desired.

In order to govern the speed of the reciprocations of the elevator-slide when operated by the clock mechanism, either a pendulum or balance may be used. In the drawings, Figs. 8 and 9, a pendulum F is shown hung on the stud E^7 below the counterbalanced lever B^4, and this pendulum is provided with the forked extension F′, which engages with the eccentric B^6, fixed on the counterbalanced lever, and causes the pendulum and lever to move in unison. By varying the length of this pendulum and the weight of its bob the reciprocations of the elevator-slide can be timed as desired.

The movable part of the tack-chute C is fitted at the proper angle to the body H of the tack-driver, as shown by Figs. 2 and 3. Sliding inside of this body and upheld by the spring H′, which surrounds the top end of the driving-bar, is the round driving-bar H^2, which is formed in two parts, as shown by Fig. 3. This bar is prevented from turning and has its range of motion limited by the screw-stud H^3, fitted to its slot H^4, and the smaller part is correctly led into the throat of the machine by the guide-block H^5, secured to the body H by the screw H^6. Below the guide-block is secured the throat composed of the parts K and K′ and the inclined gates K^2 and K^3, which serve to close the passage from the chute. These gates are pressed across the passage from the chute by the spring K^4, Figs. 4 and 5. They yield backward as the tack-shanks are drawn against their inclined sides by the hooked feed-pawl L^2, and as soon as the tack-shank is completely within the throat they spring forward and complete the circle of the throat, as shown by Fig. 5. The inclined parts of these gates bear upon the tack-shank above and below the point where the feed-pawl engages with said shanks, and the spring K^4 is so adjusted that the tack is caused to move squarely into the throat when the feed-pawl draws it against the inclines of the gates.

The tack-chute C leads the tacks to the inclined sides of the gates K^2 and K^3, from which place they are drawn and held in the throat by the feeding devices constructed and operating as follows: A slide L is fitted to move freely upon a dovetail guide K^5, formed upon the part K′ of the throat, and upon this slide is hung at L′ the hooked feed-pawl L^2, which operates through a slot made for its point to pass through in the part K′ of the throat. This slide is provided with a pocket L^3, which carries the spring L^4. This spring bears against the throat, as shown by Figs. 3 and 5, and is made strong enough to cause the feed-pawl L^2 to draw the tack it is engaged with past the gates K^2 and K^3 and hold it in the throat until the driving-bar H^2 descends. The feed-pawl L^2 is provided with the arm L^5, and the rear end of the spring L^4 is extended up through a slot formed in the top of the pocket L^3 and engages with the arm L^5 to serve as a spring to swing the hook of the feed-pawl behind the tack it is desired to move into the throat. The slide L is moved in to carry the point of the feed-pawl to the tack next in succession to the one being driven by the lever M, pivoted on the pin M′, fixed to the body H, Fig. 3. This lever is operated as the driver descends by the incline M^2, preferably formed of a separate piece and removably secured in a groove H^7, formed in the larger part of the driving-bar H^2. The incline M^2 is so shaped that as the driving-bar descends the feed-pawl will move just enough to clear its lower end and deliver the tack and then move gradually into the limit of its motion by the time the driving-bar is about a quarter of an inch from its lowest point. The lower end of the lever M presses against the end of the slide L, as shown by Figs. 3 and 5, and as the driving-bar is raised by the spring H′ the spring L^4 swings the lever M back to its starting-point. The hooked feed-pawl is operated substantially at right angles to the line of motion of the slide L to produce the square or four-time feed by the slotted lever N, which is also operated by the incline M^2. This lever N is slotted, so that it may move endwise on the pivot-pin M′, and is provided with the double-acting spring-dog N′, which acts alternately against the sides of the fixed pin N^2 and holds the lever N at either end of the slot it may be moved to, Fig. 3. The wide upper end of the lever N, by contacting with the ends of the groove H^7 as the driving-bar is reciprocated, operates the dog N′ at the ends of the stroke, and the combined swinging and sliding of the lower end of this lever causes the dog to operate in this the desired manner. With the driving-bar up and the lever N held at the lower end of its slot as the driving-bar commences to descend the lower curved end of the lever N presses against the back of the arm L^5. As the driver continues its downward motion the feed-pawl is swung clear of the tack it is to pass behind, and is so held until the slide L has reached its innermost limit of motion, which is by the time the driving-bar is about a quarter of an inch from its lowest point. At this point the end of the groove H^7 and top of the lever N contact, and the continued downward motion of the driving-bar compels the lever to move in unison therewith. As the lever N moves down its curved lower end passes clear of the arm L^5 and allows the spring to snap the point of the feed-pawl between the first two tacks in the chute. When the driving-bar is being raised by the spring H′, the levers M and N are pressed back by the slide L, and at last the lever N is raised to the lower end of its slot ready for another movement. By reason of the different relations of the two ends of the lever N when at the upper and lower ends of the slot N^3 the upward motion of the driving-bar will not affect the feed-pawl as the lever moves to the lower end of the slot at the termination of the ascent of the driver. This construction and operation of the lever N makes it impossible for the feed-pawl to draw a tack into the throat unless the preceding one has been driven from the end of the nozzle O, for unless the lever N is moved down the feed-pawl will not snap in behind a tack, but will return back as it moved in—that is, resting upon the arm L^5.

Should the operator rest the driving-maul upon the head of the driving-bar and prevent its full upward rise, the incline M^2 is so shaped that whenever the lower end of the driving-bar during its upward motion clears the throat the spring L^4 can press the slide L fully out, and the tack will be fair in the throat.

By the above-described operation of the feeding devices it will be seen that the tacks cannot be wedged solid in the nozzle, nor can they be half-fed into the throat and on the descent of the driver have a part of the head turned around the head of the driver, and thus wedge it fast in the nozzle. It will also be seen that when the chute is joined tacks may be driven from the nozzle so long as the supply in the hopper lasts.

Either of the levers M or N may be used to operate the feeding-slide L and a fair result be obtained; but their combined use, as described, gives the best results.

We do not in this application make any claim to the two-part tack-chute with male and female couplings provided with automatic gates, as we have made these features the subject of another application.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a tack-driving machine of the class described, tack-arranging mechanism consisting of a hopper with a slotted bottom and a tack-chute, in combination with a narrow elevator-slide having an inclined groove deeper than the length of the tack used in its upper end and suitable operating mechanism by which said slide is reciprocated from the point of delivery into the chute to a point wholly below the bottom of the hopper, substantially as described, and for the purposes set forth.

2. In a tack-driving machine of the class described, the combination of the elevator-slide B, the connection B^2, the counterbalanced lever B^4, and operating mechanism, substantially as described.

3. In a tack-driving machine of the class described, tack-driving and tack-elevating mechanism, substantially as set forth, and means for operating the elevating mechanism, consisting of suitable clock mechanism, in combination with devices and suitable connecting mechanism by which said clock mechanism may be set in motion, all operating substantially as shown and described.

4. In a tack-driving machine, the driving-bar provided with the groove H^7, and the lever N, having the widened end, in combination with the slide L, carrying the tack-feed, all operating substantially as shown and described.

5. In a tack-driving machine, the combination of the sliding and swinging lever N and operating mechanism with the arm L^5 of the feed-pawl L^2, whereby the operating-point of said pawl is swung clear of the shank of the

first tack in the feedway, substantially as shown and described.

6. In combination with a tack-driving machine, a throat composed of the parts K and K′ and the spring-operated inclined gates K^2 and K^3, which bear upon the shank of the tacks above and below the place engaged by the feed-pawl and cause the tacks to be fed squarely into the throat when said gates close and complete the circle of the throat, substantially as shown and described.

7. In combination with a tack-driving machine, the spring-operated slide L, mounted on the outer part of the throat K′ and carrying the spring-operated feed-pawl L^2, all operating as shown and described.

8. In combination with a tack-driving machine, a removable incline, as M^2, for operating the feeding-levers M and N and the tack-feeding devices, substantially as shown and described.

9. In combination with a tack-driving machine, the incline M^2, the lever M, and the spring-operated slide L, provided with the feed-pawl L^2, all operating substantially as described.

10. In combination with a tack-driving machine, the slotted lever N, provided with the double-acting spring-dog N′ for acting, in combination with the pin N^2, to retain said lever at the ends of the slot, substantially as shown and described.

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