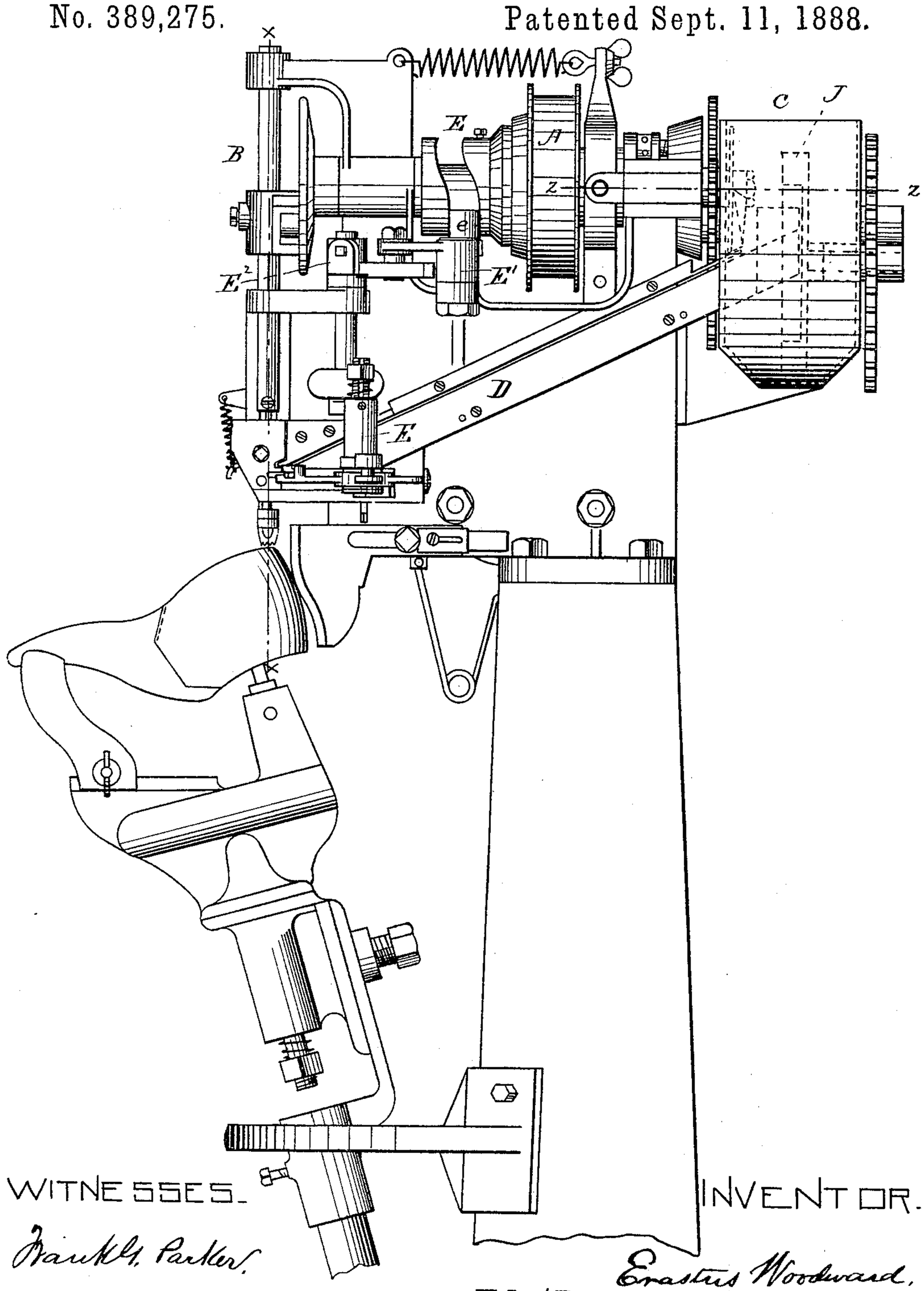
(No Model.) 5 Sheets—Sheet 1.

E. WOODWARD.

TACK DRIVING MACHINE.

No. 389,275. Patented Sept. 11, 1888.



WITNESSES.

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Matthew M. Blunt.

INVENTOR.

Erastus Woodward.

Fig. 1. by Geo. W. Copeland.

attorney.

(No Model.) 5 Sheets—Sheet 2.

E. WOODWARD.

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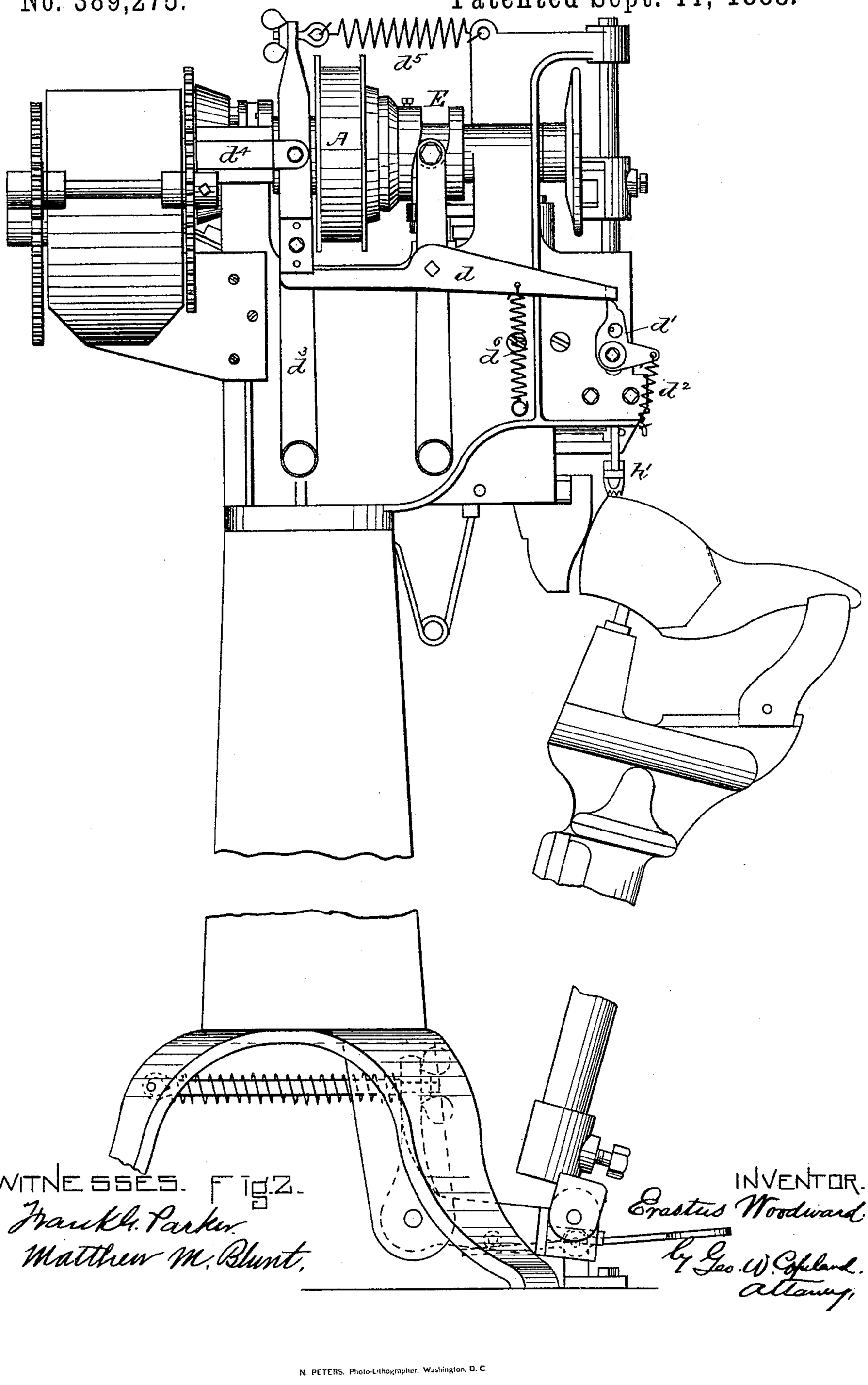

Fig. 2.

WITNESSES.
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(No Model.) 5 Sheets—Sheet 3.

E. WOODWARD.

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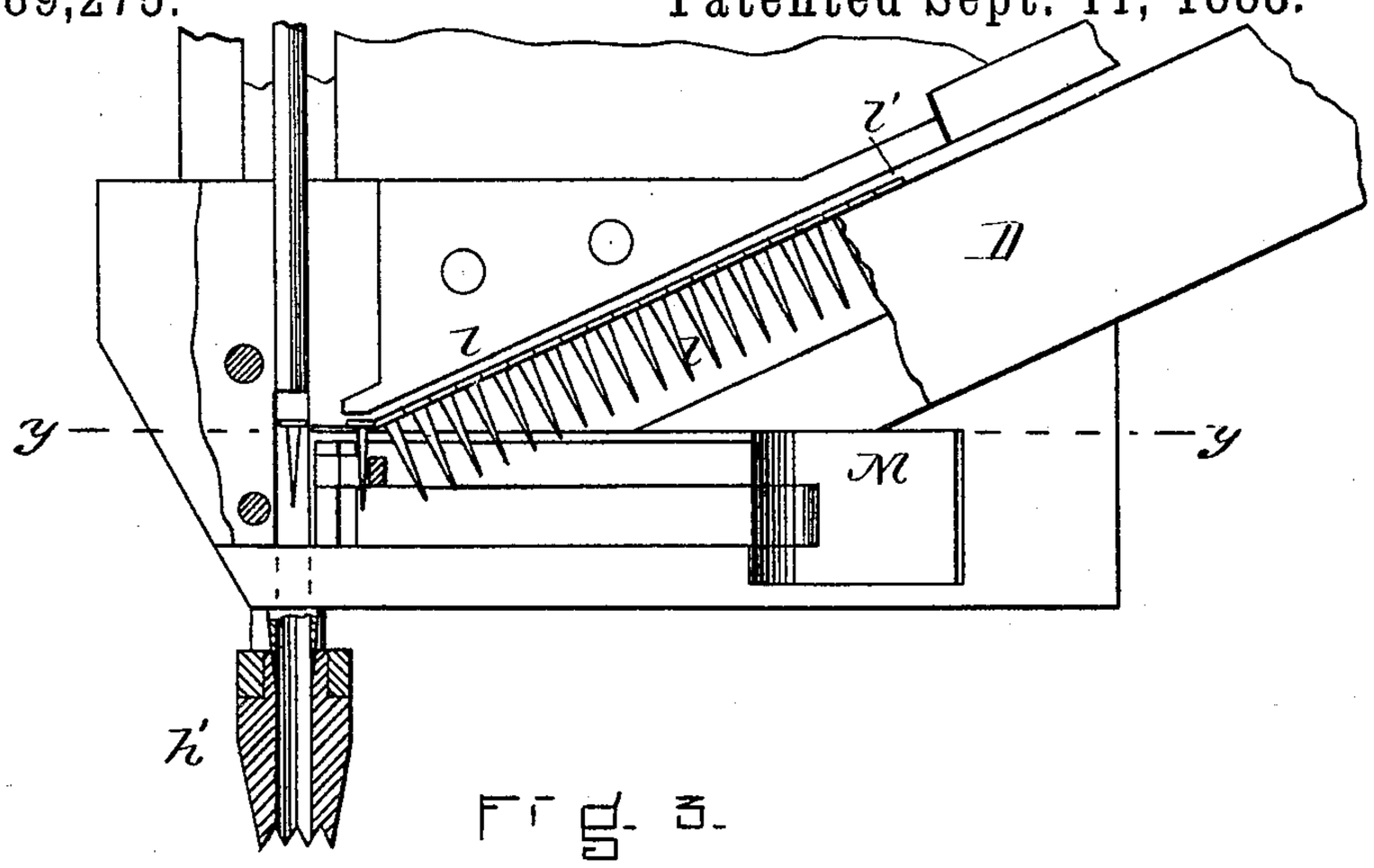

Fig. 3.

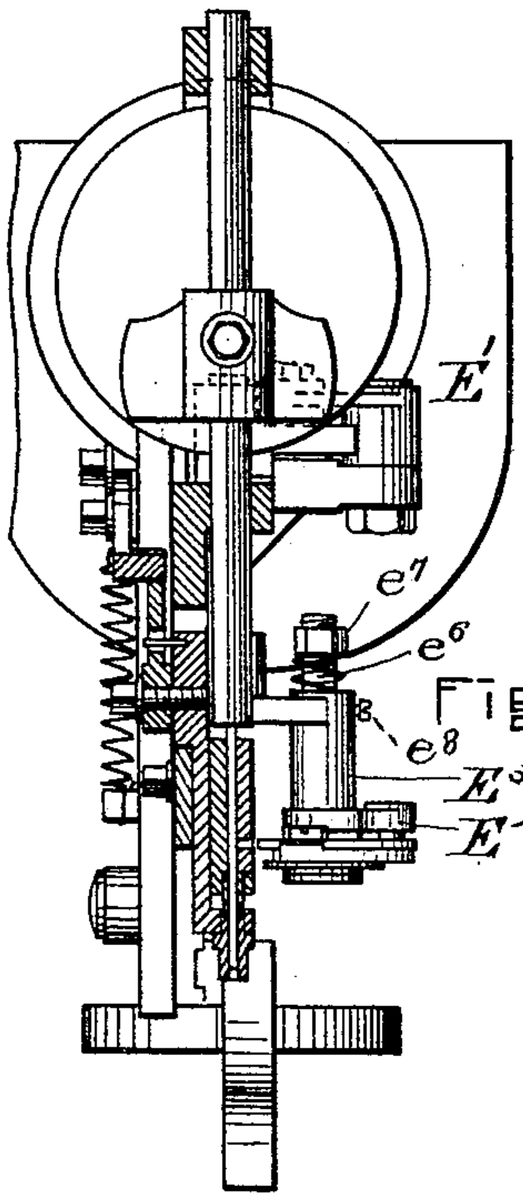

Fig. 4.

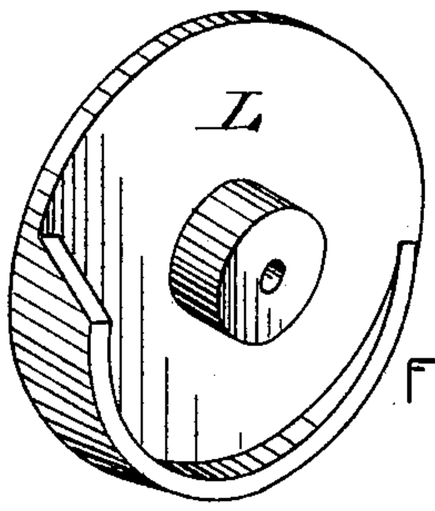

Fig. 7.

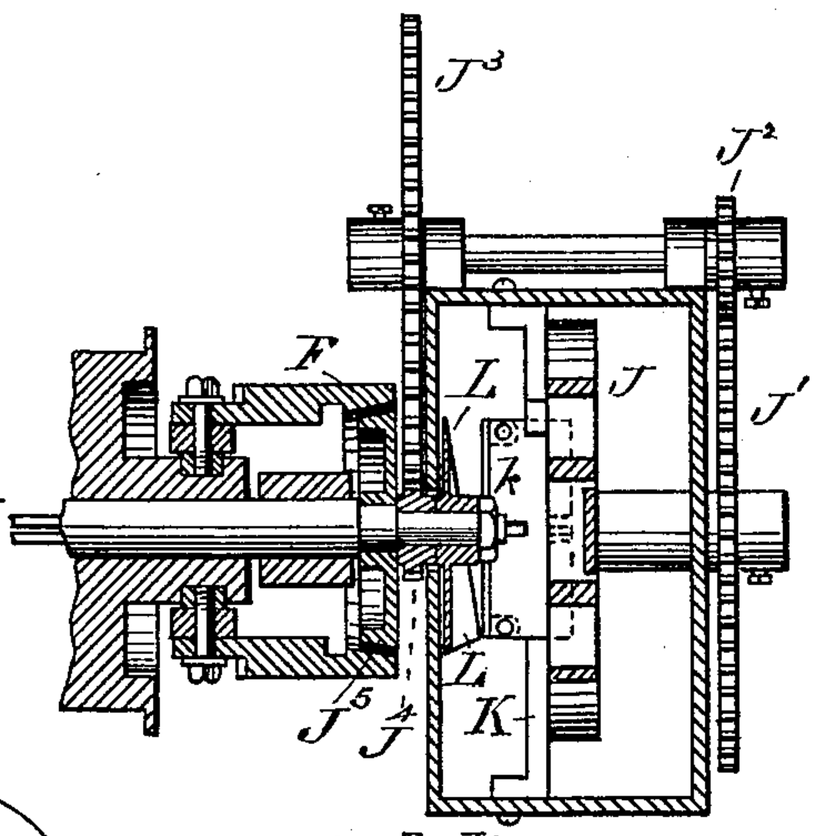

Fig. 6.

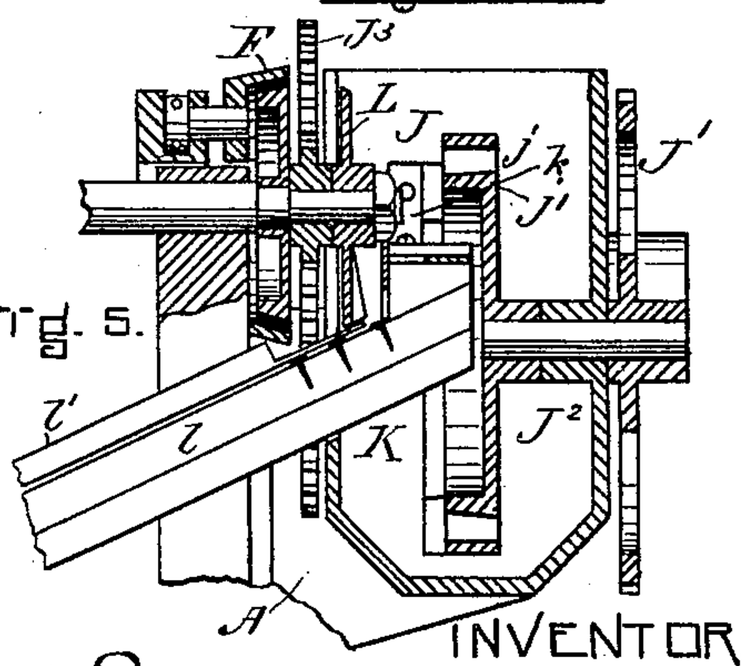

Fig. 5.

WITNESSES.

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(No Model.) 5 Sheets—Sheet 4.

E. WOODWARD.

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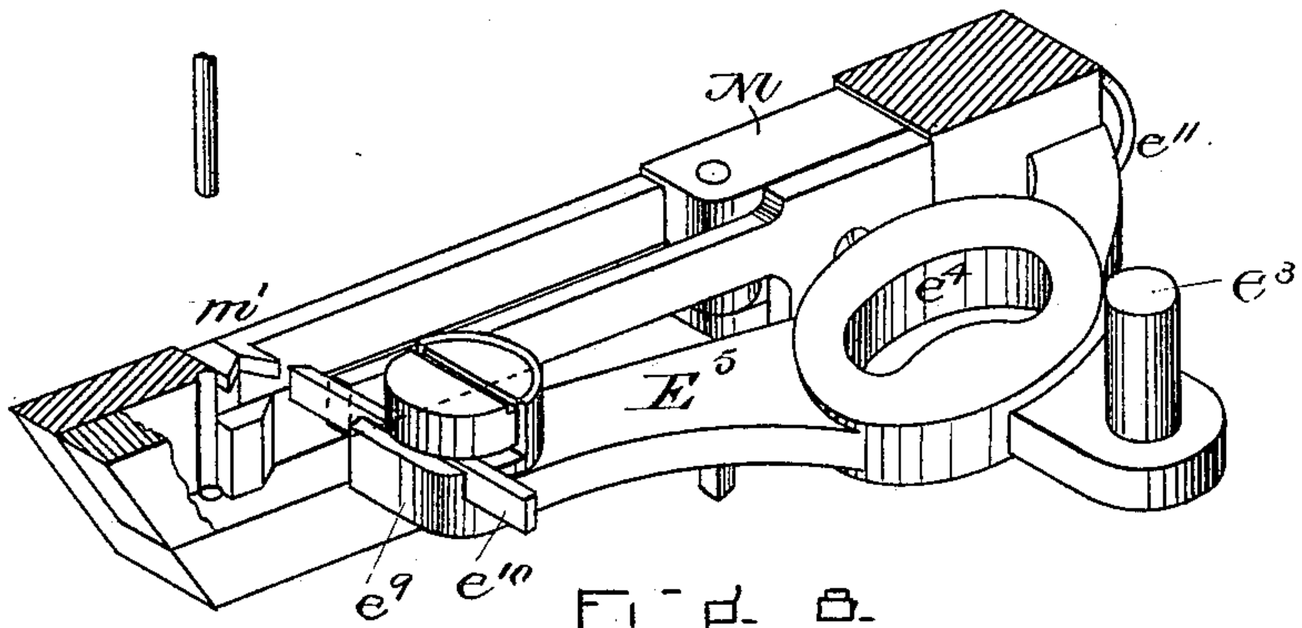

Fig. 8.

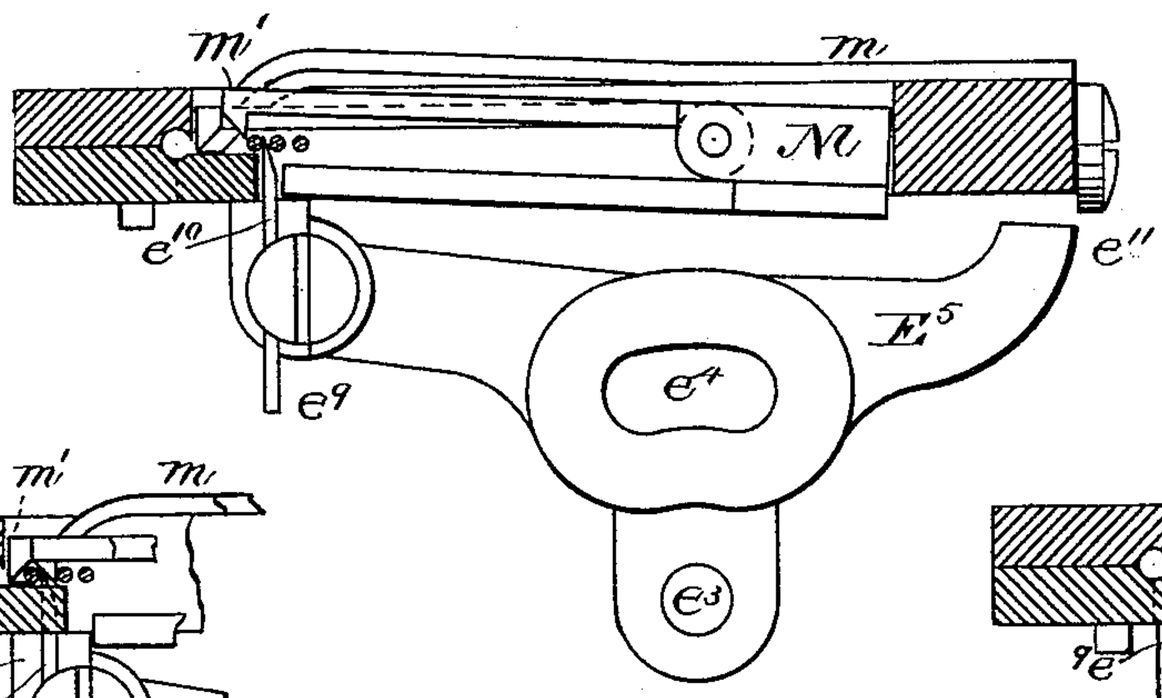

Fig. 9.

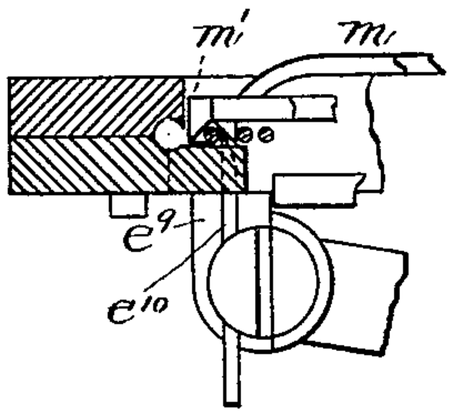

Fig. 10.

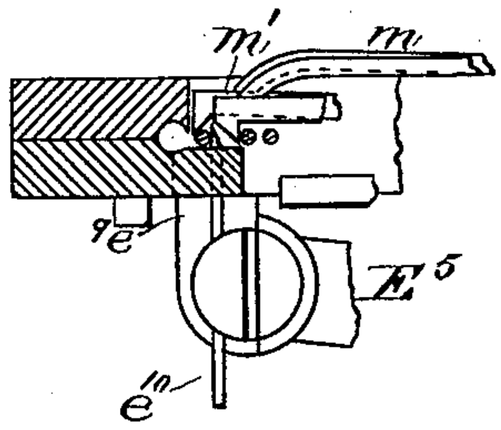

Fig. 11.

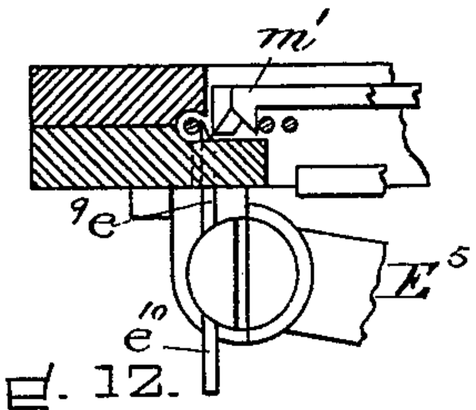

Fig. 12.

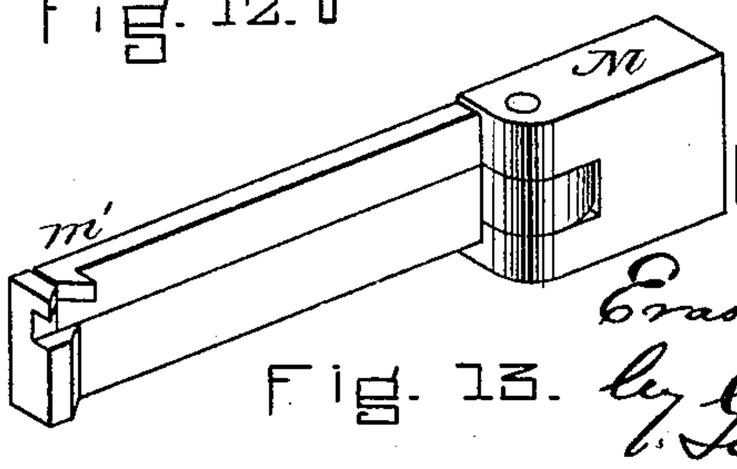

Fig. 13.

WITNESSES.

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(No Model.) 5 Sheets—Sheet 5.

E. WOODWARD.

TACK DRIVING MACHINE.

No. 389,275. Patented Sept. 11, 1888.

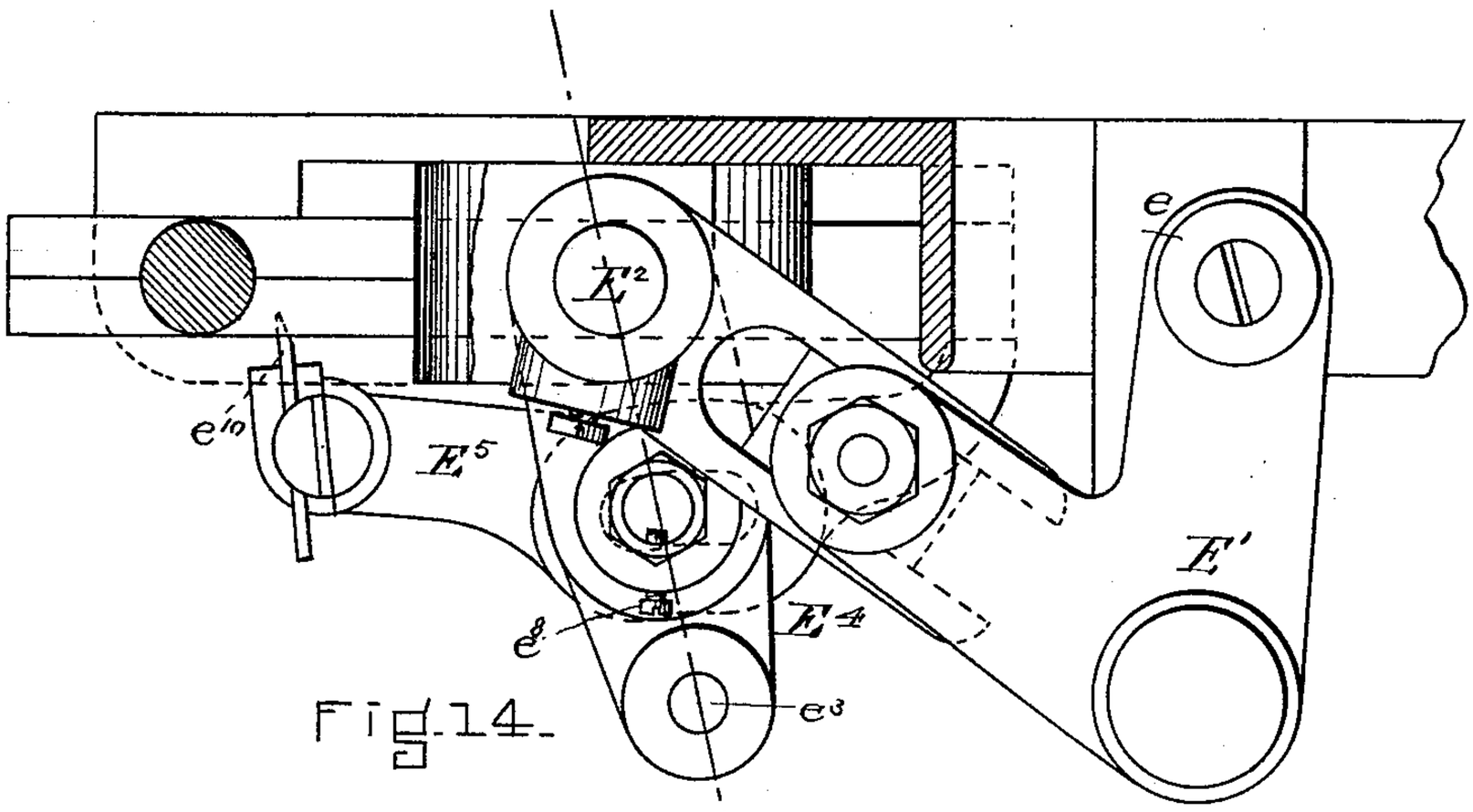

Fig. 14.

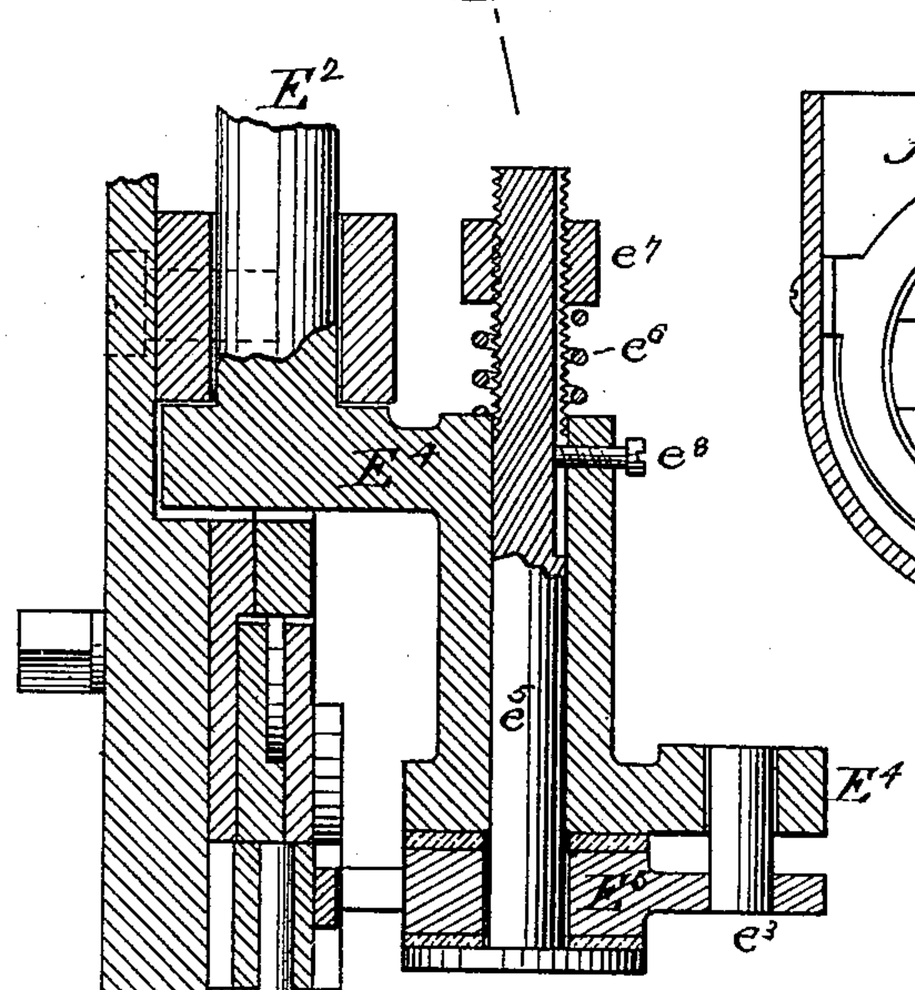

Fig. 15.

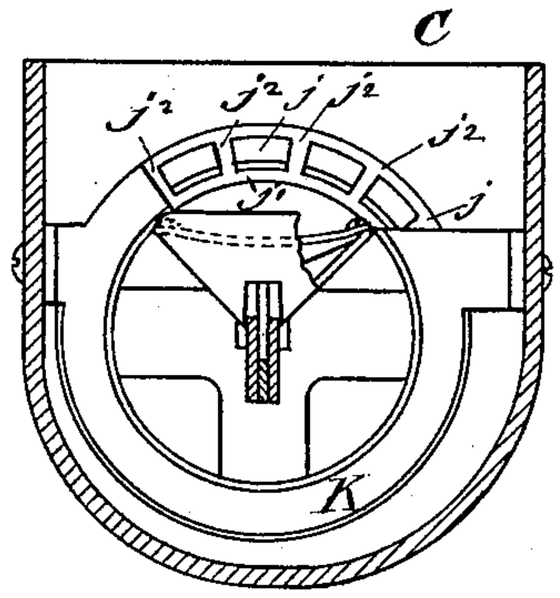

Fig. 16.

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Lev. W. Copeland.

Attorney.

UNITED STATES PATENT OFFICE.

ERASTUS WOODWARD, OF SOMERVILLE, MASSACHUSETTS.

TACK-DRIVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 389,275, dated September 11, 1888.

Application filed July 16, 1888. Serial No. 280,029. (No model.)

To all whom it may concern:

Be it known that I, ERASTUS WOODWARD, of Somerville, in the county of Middlesex and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Tack-Driving Machines, of which the following, reference being had to the accompanying drawings, is a sufficient specification to enable others skilled in the art to make and use my invention.

Tack-driving machines which drive loose tacks have hitherto encountered much difficulty in organization; but a successful tacker which employed what is known as a "tack-strip"—viz., an arrangement of tacks in a ribbon of paper, which properly spaced them one from another, so that they were properly presented to the tack-driving mechanism—has been patented and somewhat extensively used in the arts.

The present invention employs to a considerable extent the devices and combinations of the said patent. It also employs, in combination with these parts of the tack-driving machine, certain parts of the machine for making tack-strips patented September 13, 1881, No. 247,143, with some modifications thereof, and also, in addition thereto, a specially new device at the end of the chute for the purpose of transferring the tacks from the chute to the driver.

In the drawings, Figure 1 is a side elevation of the machine. Fig. 2 is an elevation of the machine upon the opposite side from that shown in Fig. 1. Fig. 3 is a view, partly in section and partly in elevation, of the tack-driving apparatus and its relation to the tack-chute. Fig. 4 is a vertical section on the line *x x* of Fig. 1. Fig. 6 is a horizontal section on the line *z z* of Fig. 1. Fig. 5 is a section of the tack-feeding apparatus and its relation to the chute vertical to the section-line *z z* and transverse to the section shown in Fig. 6. Fig. 7 is a portion of the tack-feeding apparatus. Fig. 8 is a perspective section on the line *y y* of Fig. 3, showing the apparatus employed for transferring tacks from the chute to beneath the driver. Fig. 9 is a horizontal section of the line *y y* of Fig. 3. Figs. 10, 11, and 12 are sections showing the apparatus illustrated in Fig. 9 in different positions. Fig. 13 is a portion of the transferring apparatus shown in Fig. 8. Figs. 14, 15, and 16 are parts of the mechanism upon an enlarged scale.

The parts of the machine from the driving-pulley (lettered A in Fig. 1) to the spring d^2 and tack-driver B of Fig. 1 are substantially as shown in the tack-driving machine patented to me, No. 246,437, dated August 30, 1881, and No. 248,544, dated October 18, 1881, and need not be further described.

The tack hopper and chute for tacks shown in the drawings in Fig. 1 are very similar to the tack hopper and chute shown in the machine for making tack-strips No. 230,386, dated July 20, 1880, and in the patent, No. 247,143, dated September 13, 1881. These parts are marked on the drawings, Fig. 1, C and D.

A reference to the tack-driving patents, Nos. 246,437, 248,544, and 251,755, shows that the driving-wheel A of Figs. 1 and 2 is automatically clutched with and unclutched from the driving-shaft by means of a system of levers and catches, d' d d^3 d^4, and springs d^2 d^5 d^6. The catch d' is tripped by the lifting of the shoe, which, by moving the nozzle h' or a trip adjacent to the nozzle, trips the lever d, which lever d is reset to unclutch the wheel A by a cam-pin in the cam-groove E; but while the friction-brake serving as part of the stop-motion was a pair of disks in the old devices, in the present device it is a hollow frustum of a cone, F, on the stationary side, as shown in Figs. 5 and 6, and a frustum, J^5, on the shaft side, whereby the braking-friction has better leverage than before.

The hopper C of Fig. 1 contains the bucket-wheel J of Fig. 6. This bucket-wheel is, as shown in Figs. 5 and 16, made with two concentric rims, j j', which are united to spokes j^2, which extend from the outer rim, j, to the hub of the said wheel J. These spokes therefore divide the annulus between the rim j and the rim j' into cells, for the spokes extend all the way across the annular space. These cells, therefore, or buckets are sections of the annulus, and in the revolution of the wheel J the tacks lying in the bottom of the hopper C enter these cells and are carried up in the cells, like the water in the buckets of a Persian wheel, to or nearly to the top of the hopper C. In order to render it certain that these tacks shall not spill out in the wrong direction in ascending in this wheel, a shield, K, is ar-

ranged on the front of the wheel and covers the apparatus from the bottom of the hopper up to the place where it is desirable for the tacks to be delivered from the wheel. On arriving at or near the top of the hopper the tacks fall out of the buckets of the wheel J into a small hopper, *k*, (shown in Fig. 6,) which small hopper is really only a pair of inclined deflectors, and lies over the chute *i*, (shown in Fig. 5,) and the tacks, falling into the hopper *k*, points downward, are guided into the slot in the top of the chute and slide down the chute beneath the cover *l'* toward the point of delivery. The wheel J is mounted on an axle, which passes through a hub in the side of the hopper C, and carries on its exterior a gear-wheel, J', which is driven by a pinion, J^2, on the end of a shaft, which carries on its other end a gear-wheel, J^3, which is driven by a pinion, J^4, on the braking-clutch J^5.

The brushing-disk L (shown in Fig. 7 separate and in Figs. 5 and 6 in position) serves to push back any tack which may have had its head caught on the cover of the chute. It is described in former patents. The inner rim, *j'*, of the wheel J is beveled toward the front, so as to spill the tacks readily at the proper time and pocket them at other times against the guard K. Thus it will be seen that tacks are only deposited in the hopper *k* when the machine is employed to feed and drive a tack, the wheel J^3 receiving then a fraction of a revolution, just sufficient to supply a few tacks to the hopper *k*. The difference between this mechanism for feeding tacks to the chute and the mechanism formerly employed consists, mainly, in the employment of the shield K, in combination with the wheel J, and in the inclination of the rim *j'*.

In order to deliver the tacks from the end of the chute *l* to beneath the driver, a mechanism is employed which is shown in various details in the drawings, Figs. 2, 9, 10, 11, 12, and 13. The chute ends at or near the point where the tack-heads appear in the drawings, Figs. 9, 10, and 11. A hinge-block, M, is provided, pivoted to the frame of the machine and thrown into the proper position by the spring *m*. This block M terminates toward the driveway of the machine in a hook, *m'*, as shown in the drawings, Figs. 8 to 13, and this hook *m'*, when the block M is in line with the frame of the machine, serves to check the forward passage of the tacks by engaging with them. In order, therefore, to feed a tack forward from the position where the chute ends, it is necessary to displace this hook.

Referring now to the drawings, Fig. 1, it will be seen that there is at E a cam-wheel fastened upon the main shaft of the machine, in the groove of which wheel a cam-pin runs, which is oscillated from side to side in following the contour of the cam. This cam-pin *e* oscillates a rock-shaft, E', by which motion is conveyed to another rock-shaft, E^2, an arm, E^4, from which rock-shaft E^2 carries half-way out toward its outer end a barrel, E^3, bored through from end to end, as shown in Fig. 15. To this arm E^4 is pivoted at e^3, Fig. 15, the slide E^5. (Best shown in Figs. 8 and 9.) A segmental slot, e^4, in this slide E^5 allows the stem e^5 to pass through it. This stem is terminated at its lower edge by a disk, and has a screw cut upon its upper end, and around the upper end of the stem e^5 is arranged a spring, e^6, which is set to the proper tension by driving the nut e^7 down upon it and thereby compressing the spring e^6. The set-screw e^8, passing through the barrel E^3, engages its point in a groove in the stem e^5, and serves to keep it from turning. Between the disk of the lower end of the stem e^5 and the slide E^5, and between the slide E^5 and the bottom of the barrel E^3, friction-disks are arranged, as shown in Fig. 15, and the tension of the spring e^6 gives to these friction-disks any desired compression upon the slide E^5. If, now, the machine be revolved, it is obvious that the barrel E^3 will move in an arc of a circle, and that the pin e^3 will also move on the arc of a circle. This will carry the end e^9 of the slide E^5 into contact with the side of the rocking piece M, and will by its pressure move it somewhat away from its original position, thereby carrying out of the way of the tack the hook *m'*. At the same time a chisel-ended pin e^{10} will enter behind the leading tack at the end of the chute, and at last the point of the slide E^5 will come in contact with the fixed part of the machine, as shown in Fig. 9, where the pivoted block has been displaced, the chisel-pointed pin has entered behind a tack, and the toe of the slide has brought up against the frame of the machine. In the further movement of the cam this rocking motion will serve to carry forward the slide E^5, the pin e^{10} moving in a slot on the side of the frame of the machine, and the tack being carried forward until it is deposited in the driveway. By this time the stem e^5 will have changed its position in the slot e^4 of the slide E^5 from its leading end to its following end, and the cam will be in a position where the reverse motion will begin to take place. The first effect of the reverse motion will be of course to cause the slide to oscillate on the pivot e^3 until its heel end e^{11} comes in contact with the frame of the machine. By this time the chisel-ended pin e^{10} will be withdrawn from behind the tack, the latch *m'* will have been restored to its place soon after the tack is started forward by the pressure of the spring *m*, and the slide will begin to be moved back horizontally, the slot e^4 and the slide E^5 moving around the stem e^5 until the first position of the slide E^5 is reached, when the slide will again rock on the pivot e^3, and the chisel-pointed pin e^{10} will enter behind another tack. Thus the tacks will be taken one by one from the end of the chute and carried forward and left in the driveway of the machine.

The arrangement of cam, cam-pin, and rock-shafts in this contrivance may of course be much varied. The object to be accomplished

is to get a combination of a sliding rocking motion to the chisel-pointed pin e^{10}, resembling in some degree the four-motion feed of the sewing-machine—forward, out, back, in, and forward again.

I claim as my invention and desire to secure by Letters Patent—

1. In a machine for feeding loose tacks from a hopper to a driving apparatus, the combination of a wheel having an annulus of cells adjacent to its periphery, which cells are open through both faces of the wheel, and the walls of which cells on the periphery nearest the center of the wheel are inclined toward the axis of the wheel, substantially as shown, with a face-guard extending from the bottom of the wheel to some point near its top, and with a pair of fixed deflectors, and a chute, substantially as described.

2. In a machine for feeding loose tacks to a driving mechanism, the combination, with the reciprocating rocking slide E^5, provided with the transferring-pin e^{10}, of the rocking latch m', substantially as described.

3. In a machine for feeding and driving loose tacks, the combination of the reciprocating rocking slide E^5 with the barrel and arm E^3 E^4 and with the stem e^5, substantially as and for the purposes described.

4. In a machine for feeding and driving loose tacks, the combination of the stem e^5, provided with a disk at its lower end and with an adjustable tension-spring, e^6, at its upper end, with the barrel E^3 and rocking slide E^5, substantially as described.

5. In a machine for feeding and driving loose tacks, the combination of the pulley A and the friction-brake j^5, having its frictional engagement upon the edge instead of upon the surface, a hopper, a bucket-wheel, and suitable connecting-gearing, substantially as described.

6. In a machine for feeding loose tacks to a driving apparatus, the combination, with a chute, of a pair of deflectors, k, a bucket-wheel, J, open from side to side, and a face-guard, K, substantially as described.

7. The combination of a tack-driver, B, an actuating-wheel, A, an automatic clutching and braking apparatus tripped at the time and by the act of placing the work in position, a tack-hopper and intermittently-acting tack-lifting wheel, a tack-chute, and four-motion pin-feed, which conveys individual tacks from the end of the chute to the driveway, all combined with one shaft, substantially as described.

8. In a machine for feeding and driving loose tacks, a tack-chute, a feedway in line therewith, and a transferring device, substantially as described, for taking the tacks individually from the chute, carrying them through the feedway in line therewith, and delivering them to the driveway, substantially as set forth.

9. The combination, in a tack feeding and driving machine, of a movable nose or equivalent tripping device, a train of mechanism, substantially as described, for connecting it with the driving-shaft, a friction-clutch thereon, a hopper with a rotating bucket-wheel therein, and intermediate connecting mechanism, whereby upon the application of a shoe to the nose of the machine said wheel is intermittingly rotated, and a suitable tack-chute, driveway, and driving mechanism, substantially as described.

10. In a machine for feeding and driving loose tacks, the combination, with a suitable raceway, of mechanism for arrangings tacks and nails in a string therein, and a four-motion feed mechanism, substantially as described, for positively engaging the front tack and removing it from the raceway and depositing it directly under the driver, as set forth.

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Witnesses:

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