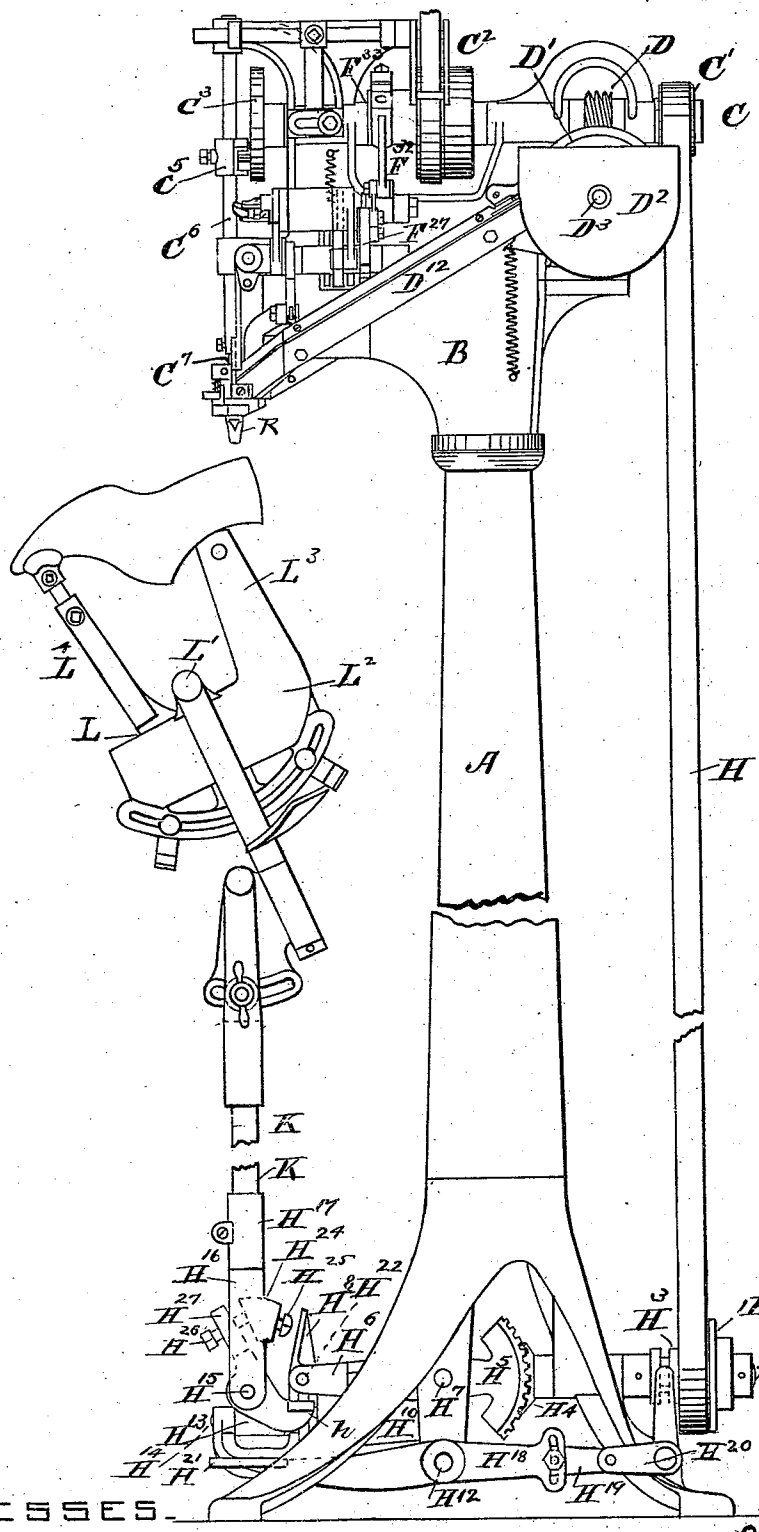
(No Model.) 9 Sheets—Sheet 1.

E. WOODWARD.

TACK DRIVING MACHINE.

No. 515,269. Patented Feb. 20, 1894.



WITNESSES.

Frank S. Parker

Edward S. Day

FIG 1.

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E. WOODWARD.

TACK DRIVING MACHINE.

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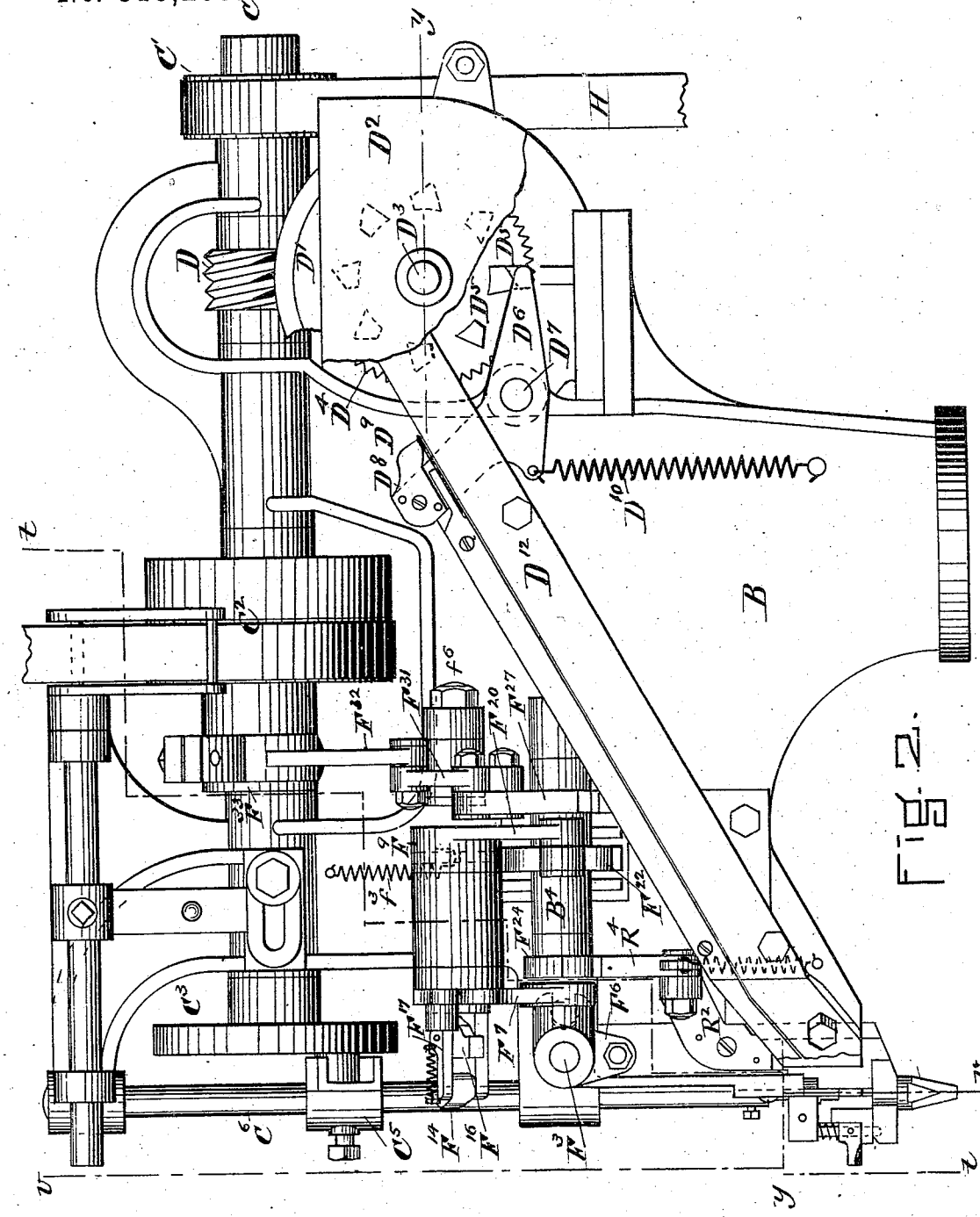

Fig. 2.

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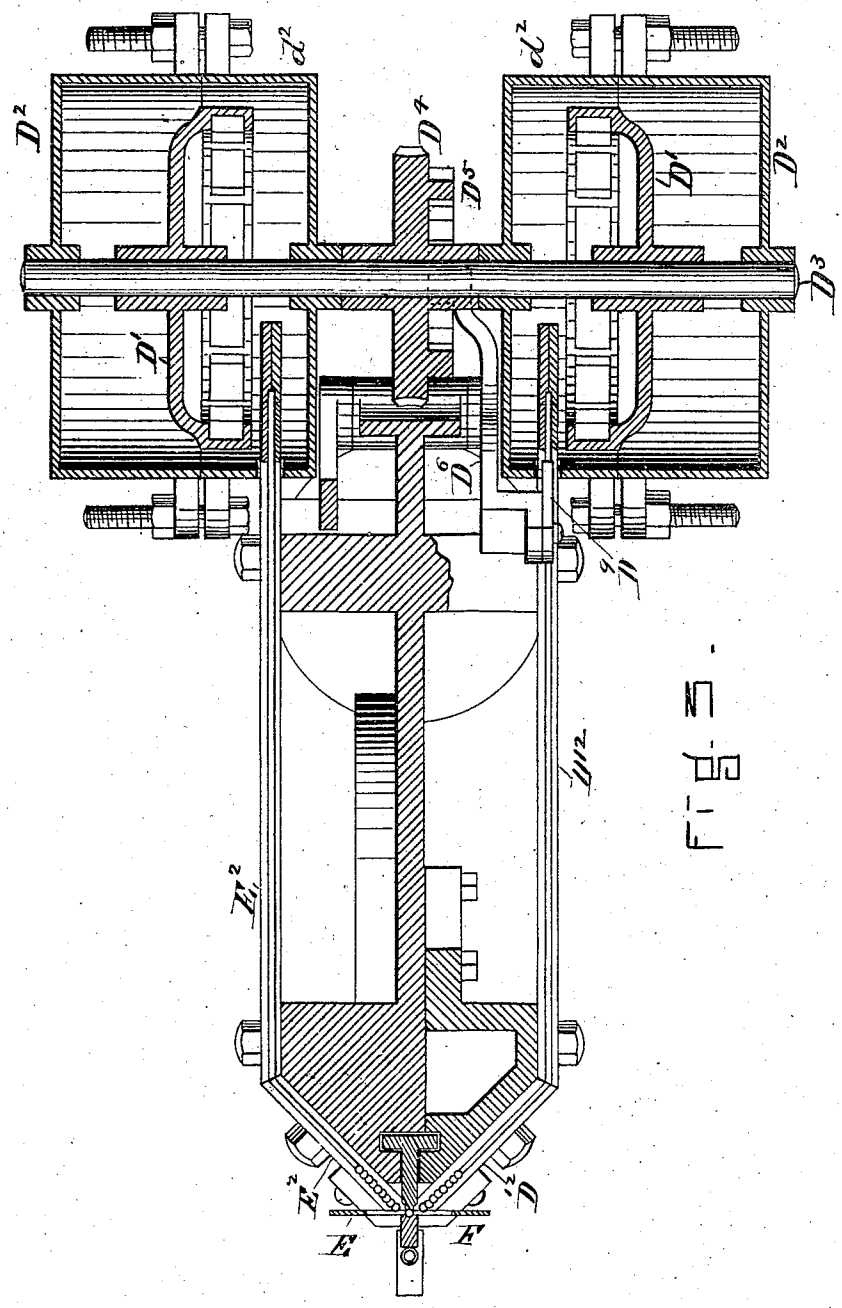

Fig. 5.

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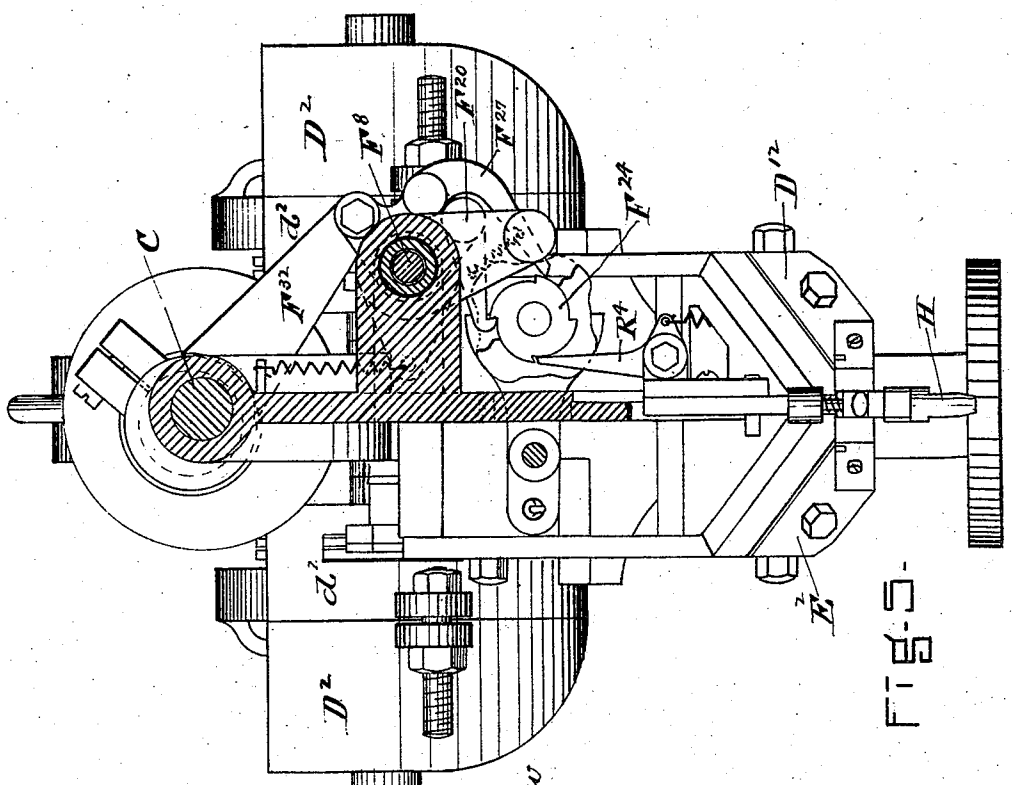

FIG. 5.

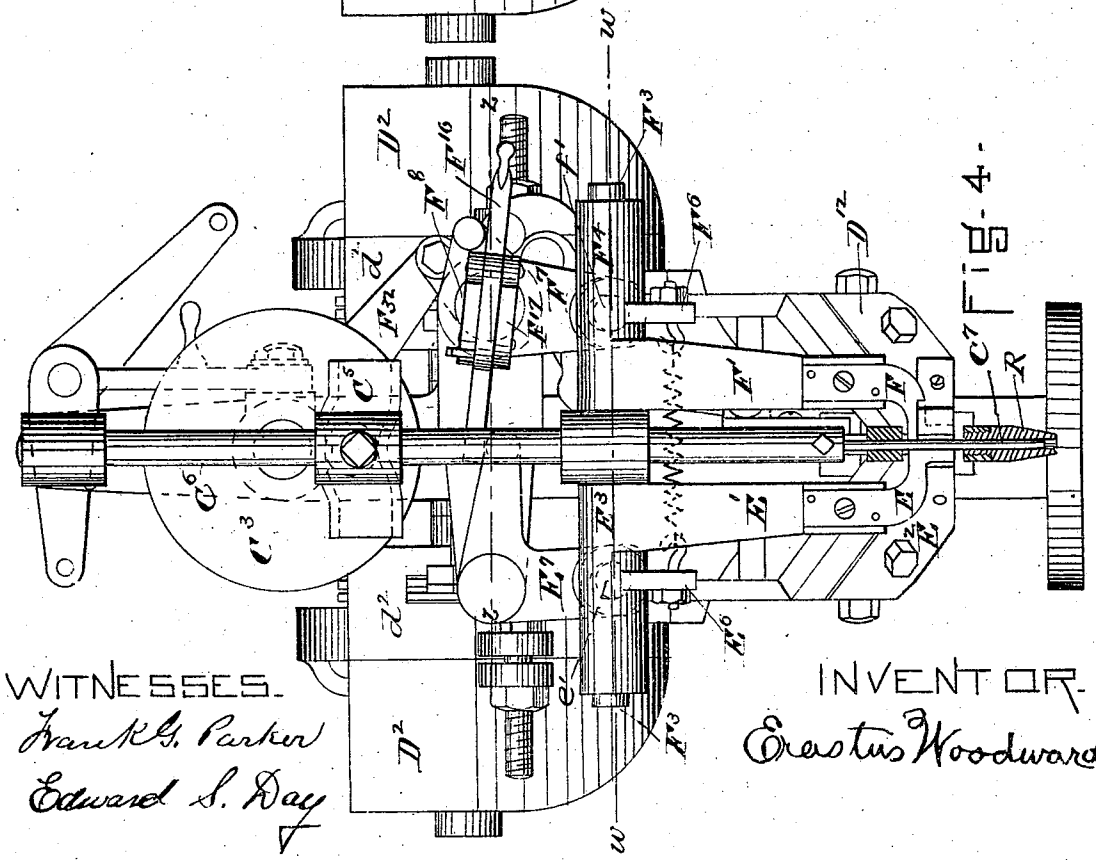

FIG. 4.

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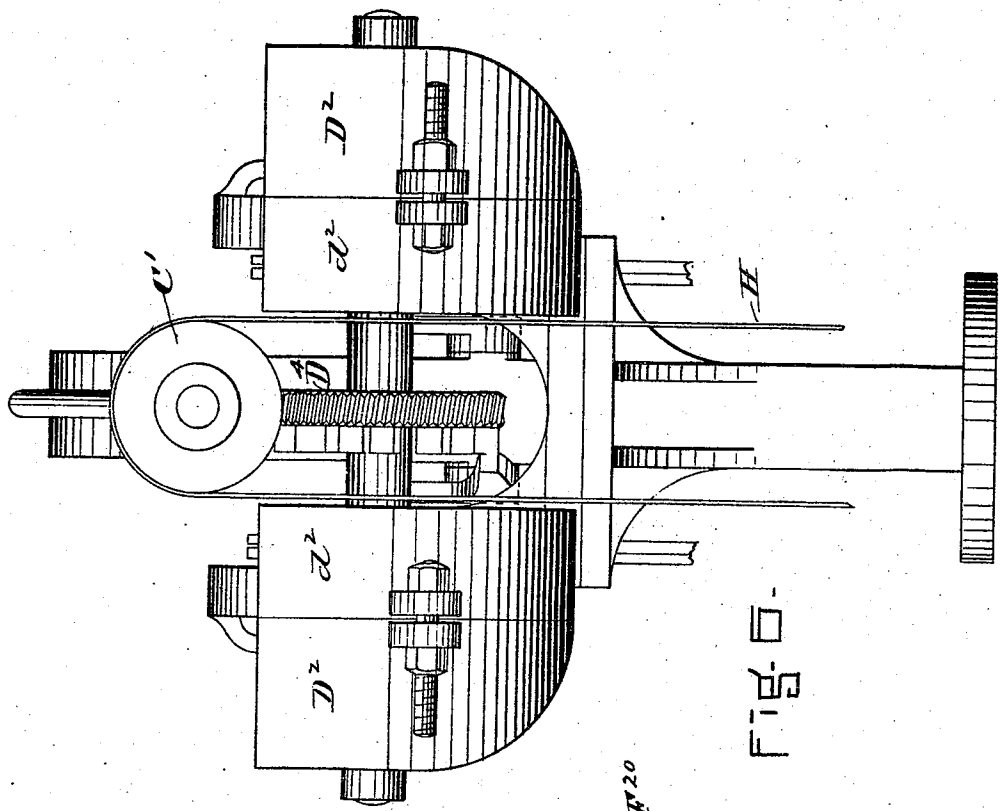

FIG. 6.

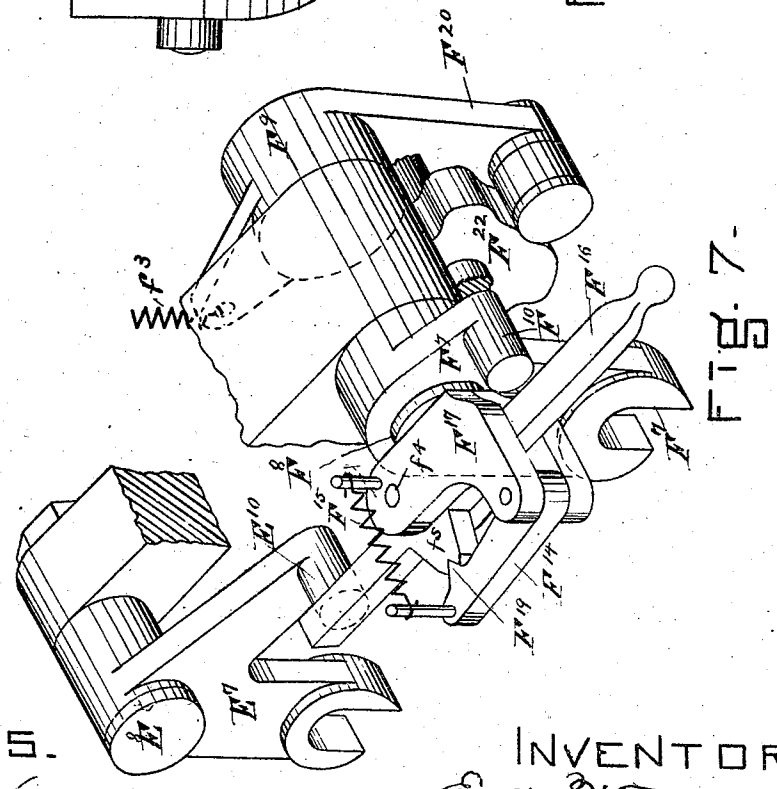

FIG. 7.

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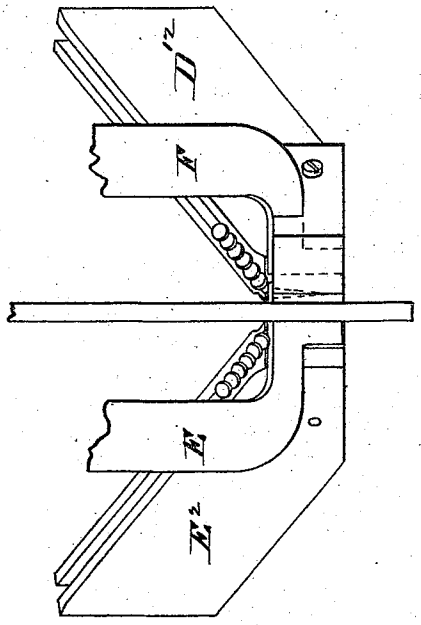

Fig. 9.

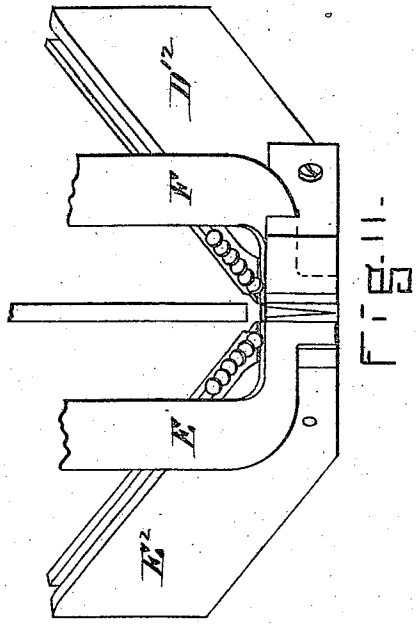

Fig. 11.

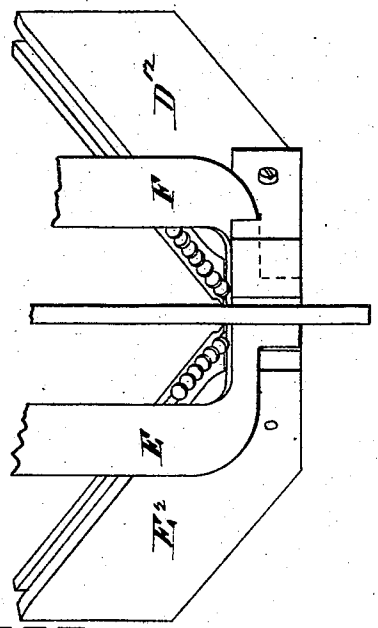

Fig. 8.

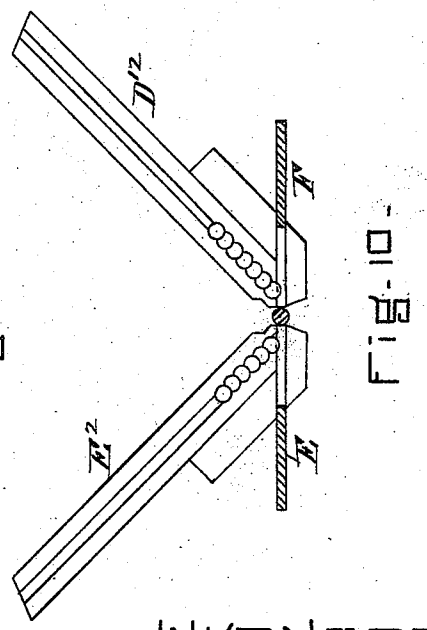

Fig. 10.

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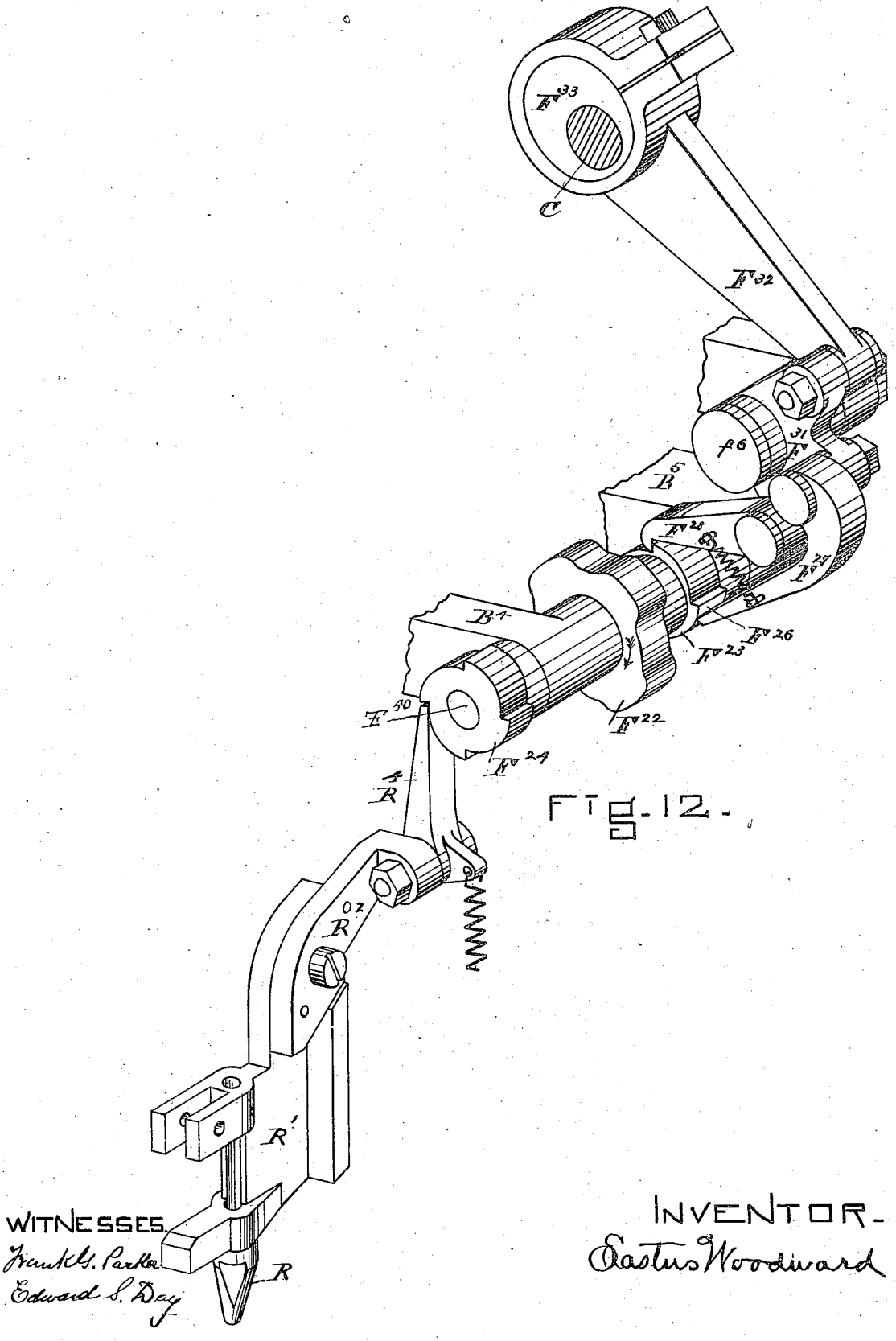

FIG. 12.

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TACK-DRIVING MACHINE.

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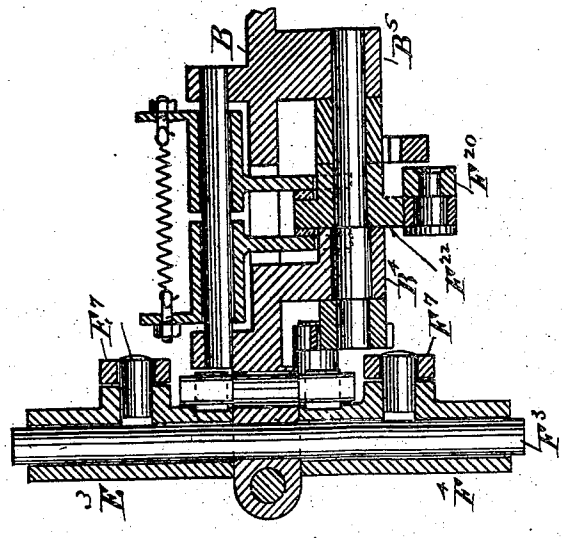

FIG. 15.

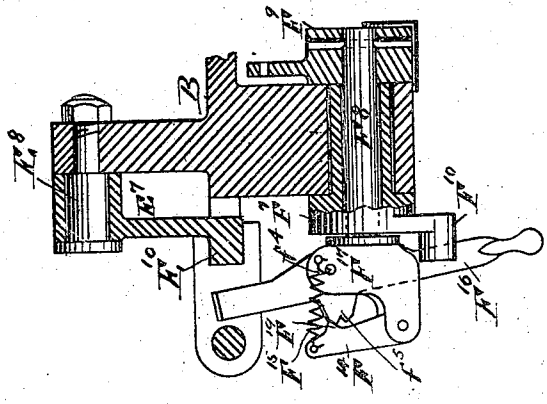

FIG. 14.

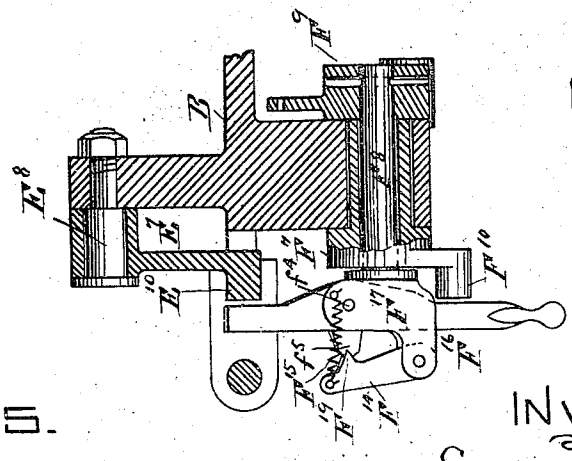

FIG. 13.

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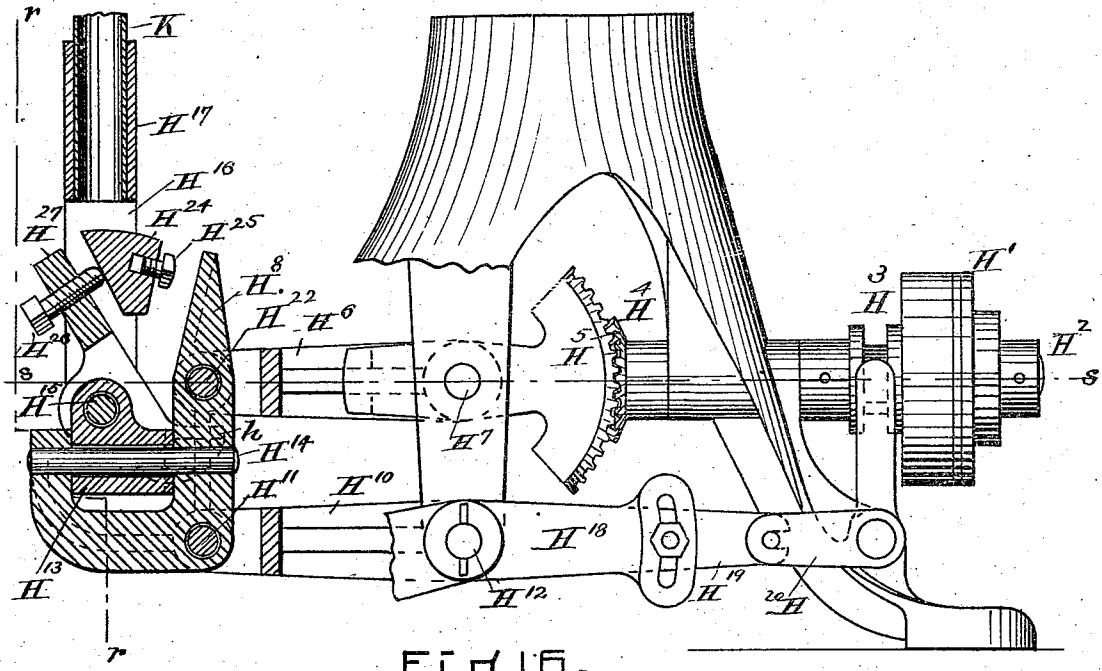

Fig. 16.

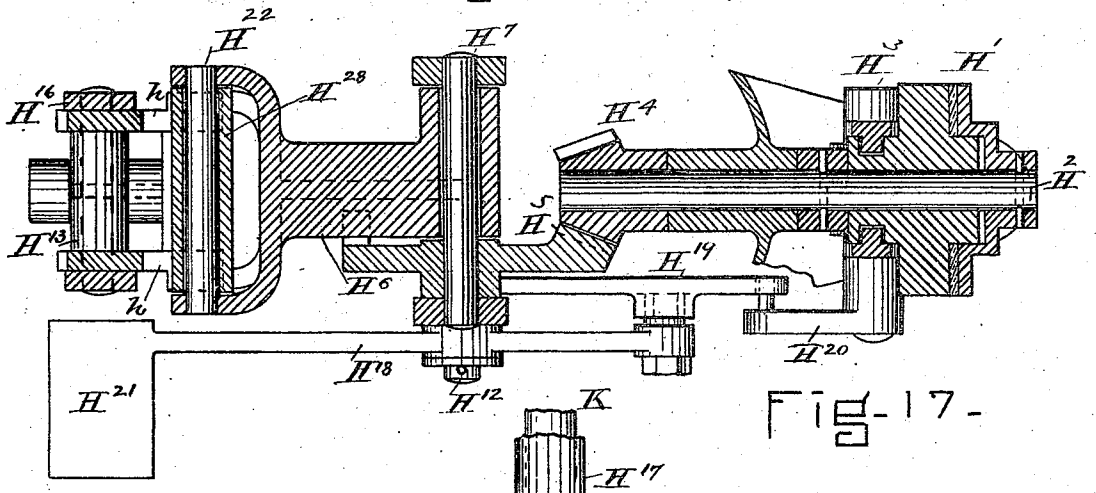

Fig. 17.

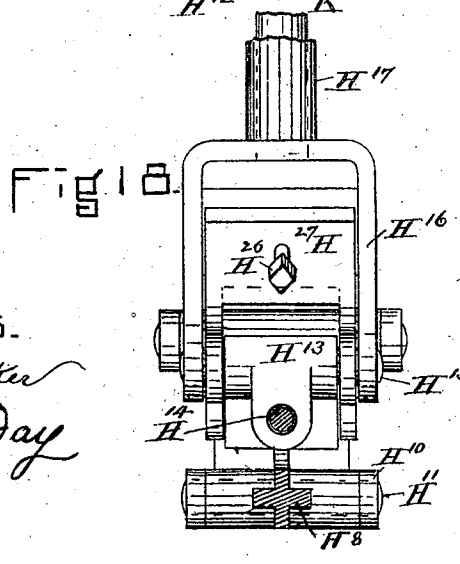

Fig. 18.

WITNESSES.

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Edward S. Day

INVENTOR.

Eastus Woodward

UNITED STATES PATENT OFFICE.

ERASTUS WOODWARD, OF SOMERVILLE, MASSACHUSETTS.

TACK-DRIVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 515,269, dated February 20, 1894.

Application filed January 10, 1891. Serial No. 377,373. (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, have invented certain new and useful Improvements in Tack-Driving Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to improvements in tack driving machines of the class in which the working parts are in constant motion, although not driving tacks, except at such times as the operator may desire, and then as soon as a single tack is driven the work ceases until resumed by the action of the operator.

The improvements are involved in several devices which may be best understood by reference to the description in connection with the accompanying drawings in which—

Figure 1 is a side elevation. Fig. 2 is a side elevation of the upper or tack feeding and driving part of the machine. Fig. 3 is a section taken on line *y—y* of Fig. 2. Fig. 4 is a section taken on line *v—v* of Fig. 2. Fig. 5 is a section taken on line *t—t* of Fig. 2. Fig. 6 is a rear elevation showing parts of the tack feeding mechanism, &c. Fig. 7 is a perspective view showing in detail the parts by which the kind of tack to be fed is determined. Figs. 8 and 9 show in front elevation parts of two tack feed raceways, one for long tacks and one for short tacks. Fig. 10 is a view partly in section and partly in plan of parts of the raceways and feed controllers. Fig. 11 shows in elevation parts of the feed raceways and the feed controllers, a single tack being shown in position to be driven. Fig. 12 is a perspective view showing connected operative parts from the main shaft to the feed nozzle. Figs. 13 and 14 are horizontal sections taken on line *z—z* of Fig. 4, and show in detail parts which serve to determine the position of the feed controllers. Fig. 15 is a horizontal section taken on line *w—w* of Fig. 4, and shows in detail parts connected with the feed. Fig. 16 is a view partly in elevation and partly in vertical section, showing the lower part of the machine including the jack-controlling mechanism. Fig. 17 is a horizontal section of the same, taken on line *s—s* of Fig. 16. Fig. 18 is a view partly in front elevation and partly in section taken on line *r—r* of Fig. 16.

In the drawings, A represents the standard of the machine and B the upper fixed part which serves as a base or frame work for holding the tack feeding and driving mechanism and their adjuncts.

The main shaft of the machine is indicated by C. This main shaft has connected to it fast and loose pulleys C^2 for receiving the driving belt as shown in Figs 1 and 2.

C′ is a pulley on the main shaft which acting through the belt H, pulley H′ and clutch device H^3 actuates the jack-lifting shaft H^2 (the action of lifting the jack taking place only at such times as may be determined by the operator, as will be hereinafter explained.)

The tacks or nails to be fed are placed in the receptacles D^2, D^2, one of which is shown in Figs. 1 and 2, but both are shown in Figs. 3, 4, 5 and 6. The tack feed wheels D′ and D′ are mounted on the transverse shaft D^3, which is driven by the worm gearing D and D^1, Fig. 2.

For keeping the raceways D^{12} clear from overlying or clogging tacks, I have a clearer D^9, Fig. 2. The clearer D^9 is attached to the bell crank lever D^6 by screw and pins as shown at D^8 and is moved back and forth in an arc of a circle the center of which is the pivotal pin D^7, the cams D^5—D^5 serving in connection with the spring D^{10} to give a tilting motion to the lever D^6 and through it a motion to the clearer D^9.

The tack raceways D^{12} and E^2, as well as the above described device for taking the tacks from the receptacles and putting them into the raceways are not new in themselves.

The driving mechanism consists of a driver C^7 and reciprocating bar C^6, cross-head C^5 and crank disk C^3 and crank pin, all operating in the usual manner.

It will be observed that my machine has but one feed nozzle and one driver, yet there are two feed raceways, one intended for one kind of a tack and the other for another kind of tack or nail. These tacks or nails may vary in length and in style or shape so long as they are adapted to pass through the nozzle and to be acted upon by the driver.

As one tack only can be driven at a time

the device for admitting the tack to the nozzle must determine from which raceway the tack shall be taken. The mechanism which determines this, I will call the tack feed controlling mechanism and will now describe it; referring more particularly to Figs. 10, 4 and 7.

F and E represent two slides or gates which are adapted to close respectively the raceways D^{12}, E^2. These slides F and E also serve (after having been withdrawn to admit of a tack passing out of the raceway into the slide way to the right or left of the drive way) to force the tack from the slideway into the driveway, that is, into a position in which it will be acted upon by the driver (see Figs. 9, 10 and 11), and forced through the nozzle or nose piece and driven into the article being operated upon. Their operating mechanism being so arranged that but one of the slides can be withdrawn at a time. The slide F (see Fig. 4) is attached to a hanger F', extending from the sliding quill F^4; and the slide E is attached to a hanger E' extending from the sliding quill E^3. These two sliding quills F^4 and E^3 are both mounted on the same fixed rod or pin F^5, Fig. 4, one adapted to slide to the right and the other to the left, as may be required to open the raceway D^{12} or the raceway E^2. The two slides are held normally in position, that is closed, by the spring which connects with the arms F^6, E^6, extending downward from the quills F^4 and E^3. The quills F^4 and E^3 that actuate the feed slides F and E have inwardly extending studs (indicated by dotted lines at f' and e' Fig. 4) which are respectively embraced by the forked ends of the oscillating arms F^7 E^7 (see Figs. 4 and 7). These oscillating arms F^7 E^7 (see Fig. 7) are pivoted respectively on the rocker shaft F^8 and the pin E^8, and are free to swing upon them, and are provided with shoulder starts F^{10}, E^{10}, by which they may be operated. The device for operating the arms F^7, E^7, consists of a lever F^{16}, which is hung in an oscillating housing F^{17}. The housing F^{17} being mounted on the rocker shaft F^8, said rocker shaft F^8 being actuated by the arm F^{20} (extending from the boss F^9, affixed to the rocker shaft F^8) and the cam F^{22}. The rocker shaft F^8, and through it the housing F^{17} and lever F^{16} is controlled as to its movement in one direction by the spring f^3, the swell parts of the rotating cam F^{22} giving the contrary motions. The lever F^{16}, besides having an oscillating motion in a vertical plane (caused by the movement of the rocker shaft F^8) is so pivoted on a vertical pin f^4 in the housing F^{17}, that it may be turned by hand to the right and left as desired. If the outer end of said lever is turned to the right, it will be under the pin F^{10} on the arm F^7 and when raised by the cam F^{22} will lift the shoulder pin F^{10}, and, acting through the arm F^7, will withdraw the tack feed slide F, from the raceway D^{12}, and thus admit of a tack being fed into the path of the driver. If, on the contrary, the lever F^{16} is turned to the left, then the inner end will act upon the shoulder pin E^{10} of the arm E^7 from above and through it and the connected parts already described, cause the slide E to be drawn from the mouth of the raceway E^2 and thus allow a tack to pass into the path of the driver. The swinging movements of the lever F^{16} in a vertical plane are made by the machine itself, but only at such times as the operator may have placed the article to be tacked in the proper position for being tacked as will be explained hereinafter. When the lever F^{16} is in its central horizontal position, as indicated in Fig. 7, its oscillation in its vertical plane will have no effect upon either of the feed slides F and E. To hold the lever F^{16} from moving from the position in which the operator leaves it, a detent pawl F^{14} is used. This pawl has a detent F^{19} which engages with the notched end of the fixed projection f^5 of the lever F^{16}. The detent pawl F^{14} is held in place by a spring F^{15}.

Having described the mechanism and arrangement by which motion is communicated from the rotating cam F^{22} to either of the tack feed slides F or E, I will now explain the mechanism by which the operator may cause the cam to be moved by the constantly running parts of the machine and to move sufficiently to allow one tack only to be fed and then to stop. Referring to Fig. 12, the rotating cam F^{22} is mounted on the shaft F^{50} in the bearings B^4 B^5, the cam being put on the shaft so as to revolve with it. Affixed to the shaft F^{50} are two ratchet wheels F^{24} F^{23}. It will be noticed that the ratchet wheels F^{24} and F^{23} have each four divisions corresponding with the four divisions of the rotating cam F^{22}. Two pawls F^{28} and F^{27}, working to and fro, are mounted on a rocker piece F^{31}, which receives a rocking motion on its axis f^6 from the pitman F^{32}; the pitman receiving its motion from an eccentric F^{33} on the main shaft C. The motion of the pawls F^{28} and F^{27} being such in relation to the teeth F^{26} of the ratchet, that when the said ratchet is in the position shown, the pawls may move to and fro on the interval surfaces without coming in working contact with either of the teeth F^{26}; but if the cam is made to turn a part revolution in the direction indicated by the arrow, then the pawl F^{27} will take effect on one of the teeth and cause a sufficient rotation of the cam F^{22} to take place to withdraw one of the tack feed slides F or E, and allow a tack to be fed, then the pawl F^{28} will take effect on the ratchet F^{23} and thus cause the cam F^{22} to make a further rotation, and thus allow the spring f^3 to draw back the arm F^{20}, this action will bring the lever F^{16} back to place, so as to leave both of the forked levers F^7 and E^7 free to assume their normal position in which position the feed slide F or E, as the case may be, will be brought back to its normal position, and thus force the tack in the slide way into the driveway. To effect this motion a second ratchet wheel F^{24} (in all respects like the ratchet wheel F^{23} and made

fast to the same shaft) is used. This ratchet wheel F^{24} is made to turn by the operator who places the article to be tacked onto the jack and under the nozzle R, then by causing the jack to rise up (as will be hereinafter explained), the nozzle or nose piece R will be forced upward taking with it the slides R′ and R^2 and pawl R^4, which pawl will act on the ratchet wheel F^{24} and give it the required amount of rotation to turn the ratchet-wheel F^{23} sufficiently to allow the pawl F^{27} to operate upon it and give it the motion required to cause (acting through the cam F^{22}) one of the feed slides F or E to withdraw and then open one of the tack raceways as above referred to. The motion thus given to the ratchet F^{23} and cam F^{22} leaves the ratchet F^{23} in such a position that the pawl F^{28} can act upon it and further turn it and the cam F^{22} so as to allow the arm F^{20} to be drawn back by the spring f^3, which action, as above explained, will allow the feed slide (that is in use) to feed the tack to the driver. The action of the pawl F^{28} on the ratchet F^{23} leaves the said ratchet in its normal position, that is in such a position that neither of the pawls F^{27}, F^{28} can act upon it again, until the operator has again caused the nozzle R to rise, that is, until he has again adjusted the article to be tacked to its proper position under the nozzle R, and has caused the moving parts of the machine to lift the jack and the article to be tacked up to the working position.

I will now describe my device by the aid of which the operator is enabled to connect the moving parts of the machine with the jack lifting device and thus cause the jack to be raised up, which action will force the work up against the nozzle and by causing the said nozzle to move upward to withdraw one of the tack feeding slides F or E, and thus allow one tack to be fed, and one only.

H^2, Figs. 1, 16, 17 and 18, is a shaft properly mounted in the base of the standard of the machine; this shaft has upon it a loose friction clutch pulley H′ and a clutch device H^3, said clutch device being operated by the foot lever H^{21}, H^{18}, pivoted at H^{12} and acting through the adjusting lever H^{19} and the bell crank lever H^{20}. The pulley H′ is driven by the belt H, (see Fig. 1) and communicates its motion to the shaft H^2 through the clutch device H^3. On the front end of the shaft H^2, I have a beveled gear H^4, which engages with a segment of the beveled gear H^5 connected to the lever H^6, said lever H^6 being pivoted to H^8, said lever H^6 serving to lift the jack foot piece H^8 to which it is attached by the pivotal pin H^{22}. To cause the jack foot-piece H^8, and the jack to be raised up, the operator places his foot on the lever H^{21}, H^{18}, and depressing it throws the clutch H^3 into frictional connection with the running pulley H′, this causes the shaft H^2 and the beveled gear H^4 to make a part rotation, which in turn forces the segment H^5 to be depressed and to throw the front end H^6 up, taking with it the jack. The jack foot-piece H^8, besides being held by the lever H^6 and pivotal pins H^7, H^{22}, is also held by a link H^{10} and the pivotal pins H^{12} H^{11} (see Figs. 16 and 18.) This method of connecting the jack foot-piece to the base of the machine allows the outer end of it to swing freely in a vertical plane.

The standard K of the jack is held firmly in a forked piece H^{17}, H^{16}, (see Figs. 16, 17, and 18.) This forked piece H^{17}, H^{16} is pivoted to a swiveling tumbler H^{13} by the pivot H^{15}, and the swiveling tumbler H^{13} is pivoted to the jack foot-piece H^8 by the pivot H^{14}, so that the forked piece H^{17}, H^{16} and the jack standard K may swing to the right and left and also back and forth. To limit the back and forth swinging motion of the jack, a supplemental forked piece H^{27} is used. This is pivoted on the swiveling tumbler H^{13} and terminates in forked ends *h*, *h*, (see Figs. 16 and 17) which, when the jack is tipped too far forward, will come in contact with the under side of a cross-bar H^{28}, which forms a portion of the jack foot-piece H^8 and this checks further motion in this direction. The swinging motion to the right and left is also checked by the action of one of the prongs *h h*, coming in contact with the same cross bar, as will be seen by an inspection of the drawings. In order to limit the back and forth motion of the jack I have a set screw H^{26} in the top part of the supplemental forked piece H^{27}, which abuts against the piece H^{24}, forming a part of the forked piece H^{17}, H^{16}. This limits the forward motion, and the set screw H^{25} in the piece H^{24} abutting against the upper part of the jack foot-piece H^8 limits the rearward motion.

The jack proper, is not new in construction, and need not be particularly described, L^3 being the heel support and L^4 the toe support. These are mounted on a suitable base L^2, the whole being pivoted at L′ to an upper member L of the jack standard K. The connection between these parts should be such as to allow the jack to swing freely into such positions as are necessary to properly present the last to the nose piece. Such connections are well known in the art and will not require further description.

It is believed that the operation of my machine will be fully understood from what has been said heretofore, but it will be noted that the eccentric F^{33} with the parts connected to it, form a normally inoperative motor which permits the feed slide or gate to remain in position to prevent the feeding of the tack, and is started or made operative to cause the feed slide to feed a tack by the partial rotation of the shaft F^{30} caused on the lifting of the nose piece, and that the motor becomes inoperative again after feeding one tack.

The jack lifting mechanism referred to allows the jack to be raised and lowered and, moved freely in all directions when not under control of the clutch. When the pulley and the clutch are caused to engage, the

clutch and the parts connected with it to lift the jack, form a yielding lifting mechanism. Such a yielding lifting mechanism is desirable to compensate for the inequalities in the surface of the last so that as the jack is being lifted, if the bottom of the last strikes the nose piece before the jack support has reached the end of its normal stroke, the parts will yield and so prevent any damage to the machine.

With the addition of a properly located movable part like the nose piece above described, so constructed and connected that by lifting it a single tack is driven, this jack becomes one of the elements of a tacking machine to transmit power from the constantly running pulley to lift such a movable part and cause a tack to be driven.

I claim—

1. In a tack driving machine, the combination of a tack-driving mechanism, including a driving shaft and a driver reciprocated thereby; a tack feed race-way, a slide or gate normally in position to prevent the passage of tacks to the driver, a movable nose piece, a normally inoperative motor for said slide or gate, connections between said motor and nose piece whereby the motor is made operative by the displacement of the nose piece, a work-supporting jack movable toward and from the nose piece, jack-lifting mechanism comprising first a continuously running pulley, secondly a shaft having a clutch member normally disconnected from the driving pulley and adapted to be engaged therewith to cause the rotation of the shaft, and thirdly connections between the shaft and jack whereby the jack is elevated by the rotation of the shaft, a connection such as a belt H, between the driving shaft and the continuously running pulley, and a clutch-operating device under control of the operator whereby the clutch may be engaged with the pulley, the said jack-lifting mechanism, nose piece, slide or gate and slide or gate operating motor constituting a normally inoperative tack-feeding mechanism which is made operative by the clutch-operating device and is caused to supply a single tack to the driving mechanism by each action of the clutch-operating device, as set forth.

2. In a tack-driving machine, the combination with a driving mechanism, a tack feed race-way and a tack feed slide or gate normally in position to prevent the passage of tacks to the driver, of a motor comprising a shaft having a cam such as F^{22} and a ratchet wheel F^{23}, two pawls F^{27} F^{28} continuously oscillated by the power of the machine, the pawl F^{28} being arranged to move or set the ratchet wheel so that the pawl F^{27} cannot actuate it, means controlled by the operator whereby the shaft and ratchet wheel may be moved to make the pawl F^{27} operative to partly rotate the shaft through the ratchet wheel and give the cam an operative movement, and connections between the cam and slide through which the operative movement of the cam is communicated to the slide, as set forth.

3. The combination with a tack feed race-way and a tack feed slide or gate normally in position to prevent the feeding of tacks, of the shaft F^{50} having the cam F^{22}, the rocker shaft F^{8} having an arm yieldingly held against the perimeter of said cam, the arm F^{7} adapted to oscillate loosely, connections between said arm and the slide or gate, a lever engaged with the rocker shaft F^{8}, and means for alternately moving and stopping said shaft and its arm, whereby the cam is caused to first actuate the feed slide and then leave said slide in its normal position, as set forth.

4. The combination with two tack feed race-ways and two tack feeding slides or gates normally in position to prevent the feeding of tacks, of the shaft F^{50} having the cam F^{22}, the rocker shaft F^{18} having an arm yieldingly held against the perimeter of the cam, the arms F^{7} E^{7} adapted to oscillate loosely, the lever F^{16} pivoted to the rocker shaft and adapted to be adjusted to engage either of the arms F^{7} E^{7} as well as to occupy a position out of engagement with both arms, and connections between said arms and the feed slides, the lever F^{16} enabling either slide to be operated, the other remaining idle, or both to remain idle, as set forth.

5. The combination of two tack feed race-ways, two tack feeding slides or gates normally in position to obstruct said race-ways, two slides or quills supporting said gates, two loosely oscillating arms F^{7} E^{7} engaged with said quills, the shaft F^{50} having the cam F^{22}, the rocker shaft F^{8} having an arm yieldingly held against the perimeter of the cam, the lever F^{16} pivoted to the rocker shaft and adapted to engage either of the arms F^{7} E^{7}, and means for alternately moving and stopping the shaft F^{50} and its cam, as set forth.

6. In a tack driving machine, the combination with two tack feeding race-ways and a driving mechanism common to both, of two tack feeding slides or gates, a pivoted lever F^{16} adapted to be moved by the operator to either of two operative positions and to an inoperative or intermediate position, mechanism for oscillating said lever, and two devices such as the levers E^{7} F^{7} through which motion may be communicated from the lever to the feed slides, one of said devices being arranged to be moved when the lever is in one of its operative positions, and the other when the lever is in its other operative position, both devices remaining at rest when the lever is in its intermediate position, as set forth.

7. In a continuously-running tacking-machine, the combination of a driving shaft, a driver reciprocated by said shaft; a tack feed device normally inoperative, a movable nose piece, adapted to be moved upwardly by the motion of the jack pressing the article to be tacked against it, mechanism connecting said nose piece with said tack feed device, said up-

ward movement of the nose piece and its connected mechanism causing the tack feed device to feed one tack and then to become inoperative, and a multiple tack feed device as described, with a jack-lifting mechanism adapted to be set in motion and caused to lift the jack by the movement of a foot lever or starting device by the operator, and a connection such as the belt II between the jack lifting mechanism and the driving shaft substantially as and for the purpose set forth.

8. In a continuously-running tack machine, the combination of the shaft II having a beveled gear H^4, the bar II^6 having a beveled gear II^5 engaged with the gear II^4 the lever II^8 pivotally connected with the lever II^6, the jack and devices substantially as described, for connecting the lever II^8 with the jack to permit the jack to oscillate in different directions on said lever, as set forth.

9. A machine for tacking shoes containing the following parts in combination, a nose piece, a jack normally free to be lifted thereto, a constantly running pulley, a yielding lifting mechanism comprising a clutch adapted to be connected to said pulley and mechanism connecting said clutch and said jack, and means adapted to cause the engagement of said clutch and said pulley and hold them as described, all arranged for the purposes set forth.

10. A machine for driving a single tack having in combination a constantly running tack driving mechanism a tack feed, a tack feed motor normally disconnected from said tack feed, mechanism including a movable nose piece adapted to connect said tack feed motor with said tack feed, a jack normally free to be lifted to and lift said nose piece, a constantly running pulley, a yielding lifting mechanism comprising a clutch adapted to be connected to said pulley and mechanism connecting said clutch and said jack, all as and for the purposes set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 1st day of January, A. D. 1891.

ERASTUS WOODWARD.

Witnesses:

FRANK G. PARKER,

EDWARD S. DAY.