No. 864,951. PATENTED SEPT. 3, 1907.

L. A. CASGRAIN.

MACHINE FOR INSERTING FASTENINGS.

APPLICATION FILED AUG. 4, 1898.

4 SHEETS—SHEET 1.

Fig. 1.

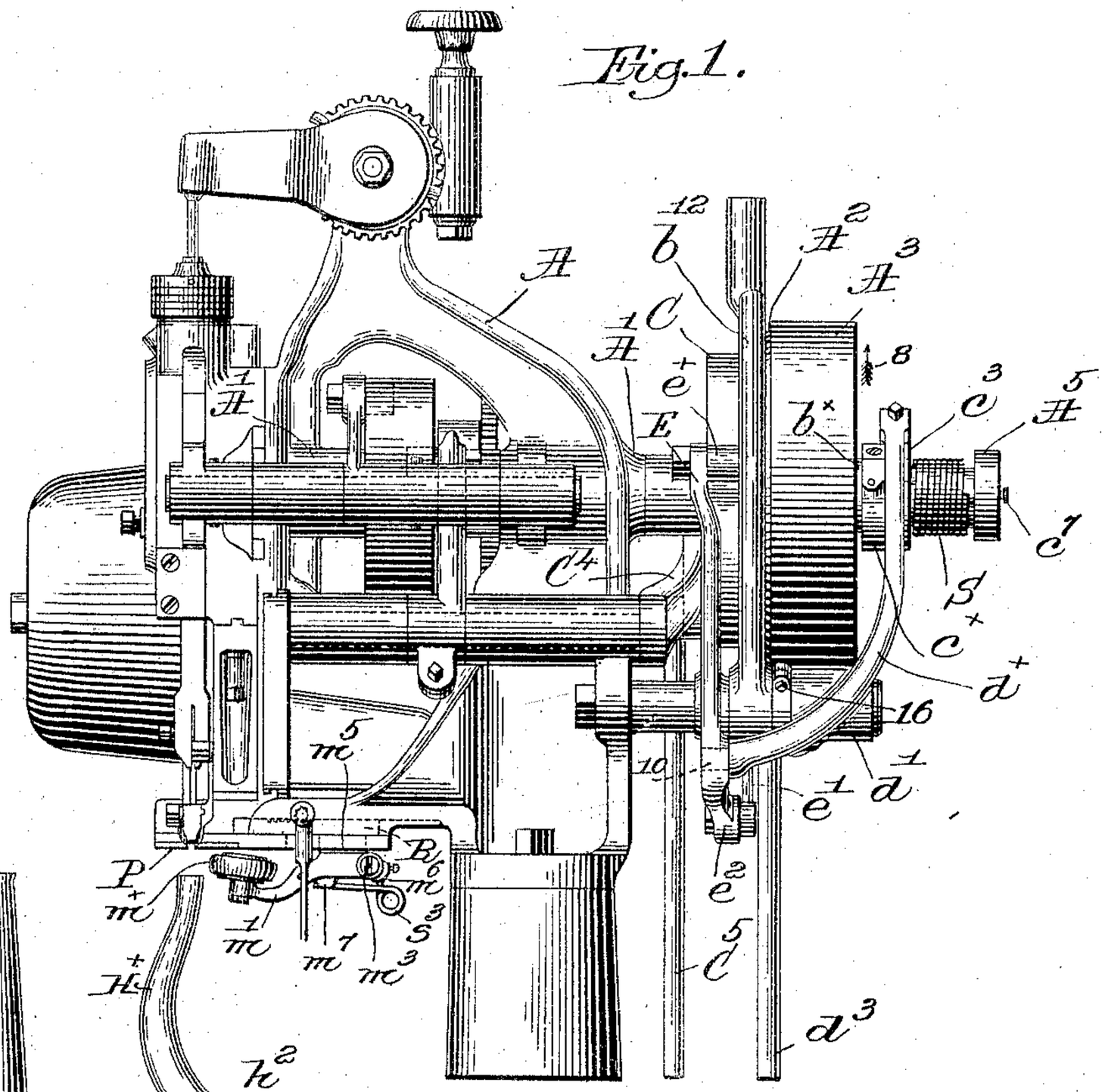

Fig. 1a.

Fig. 5.

Fig. 6.

Fig. 7.

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4 SHEETS—SHEET 2.

Fig. 3.

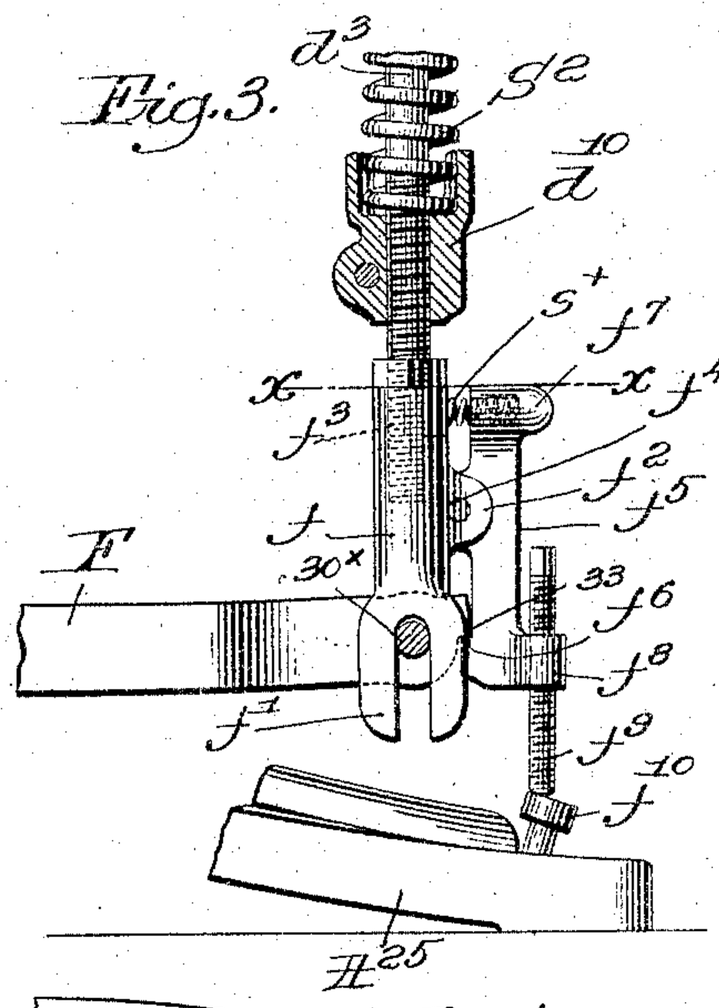


Fig. 4.

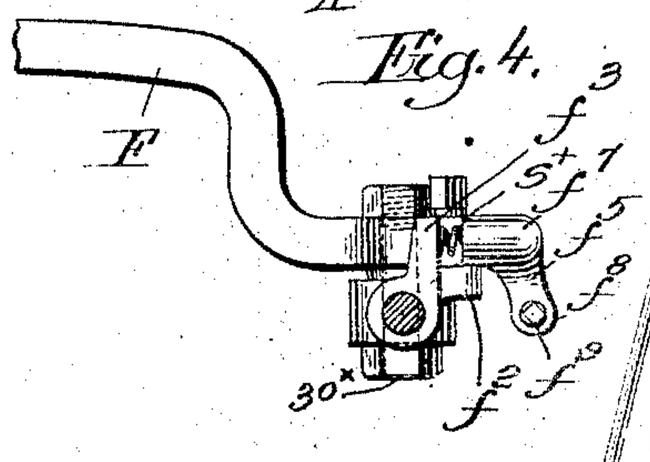
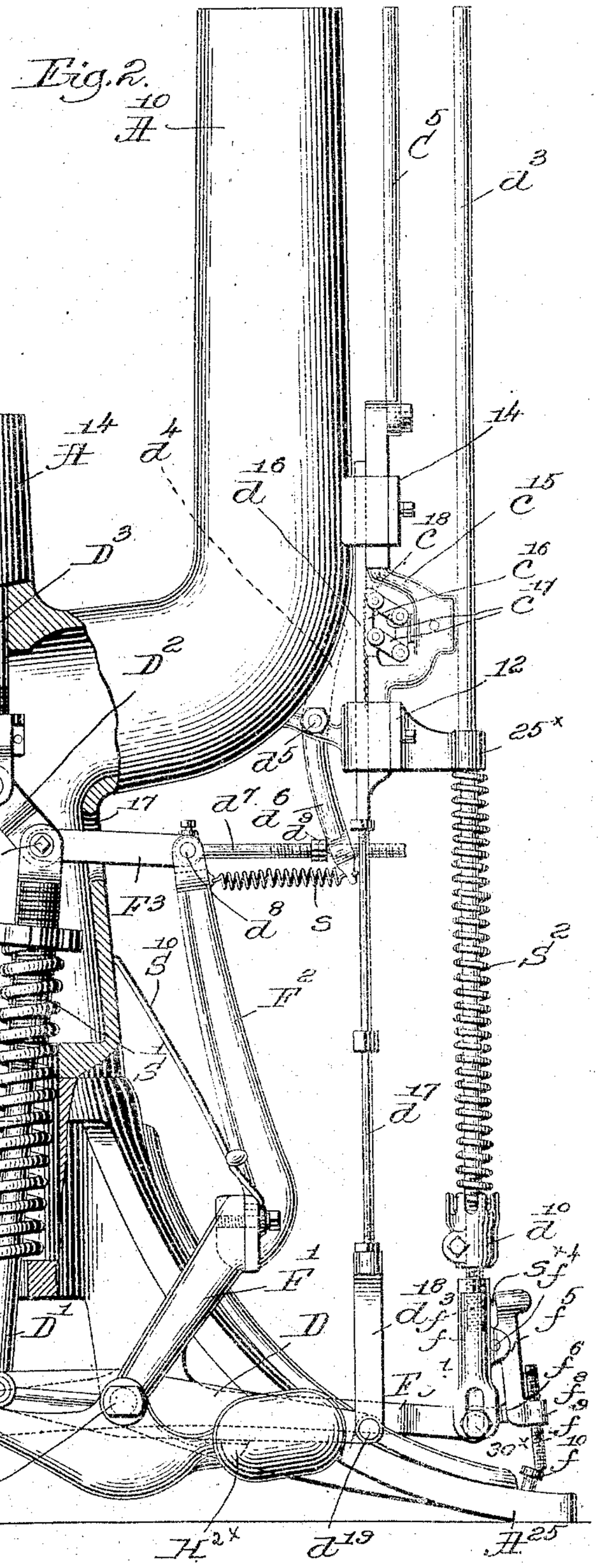


Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 8.

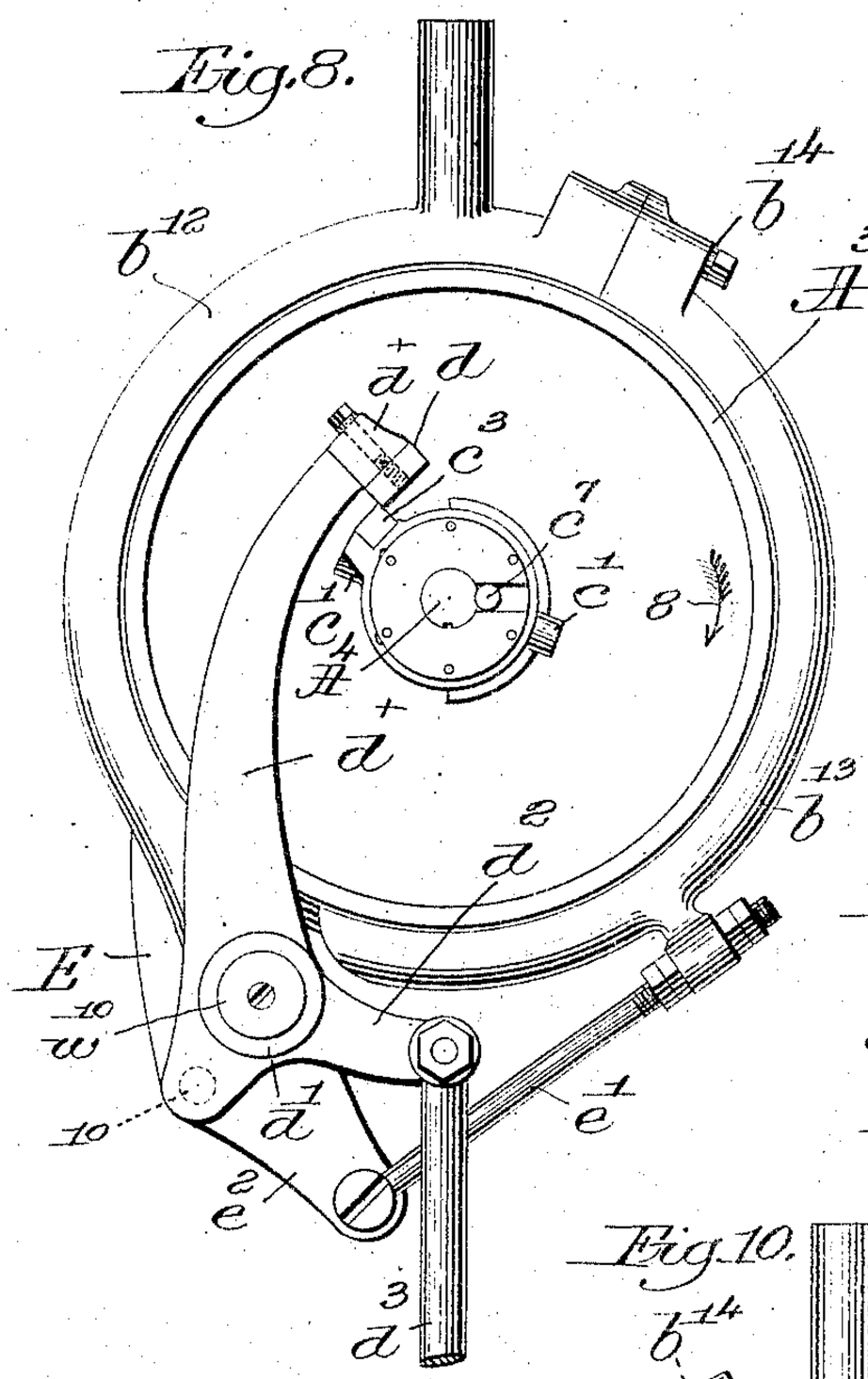


Fig. 9.

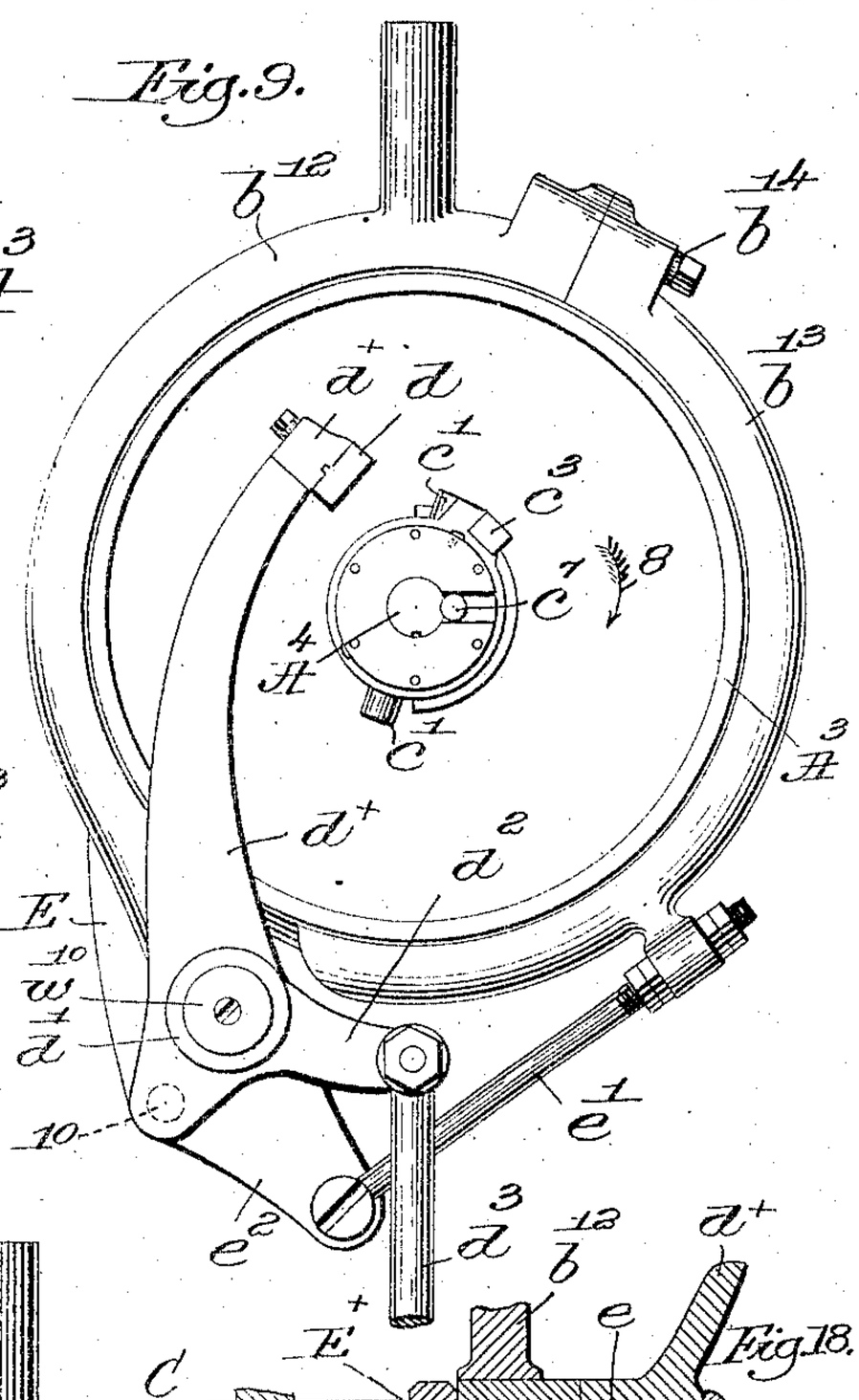


Fig. 10.

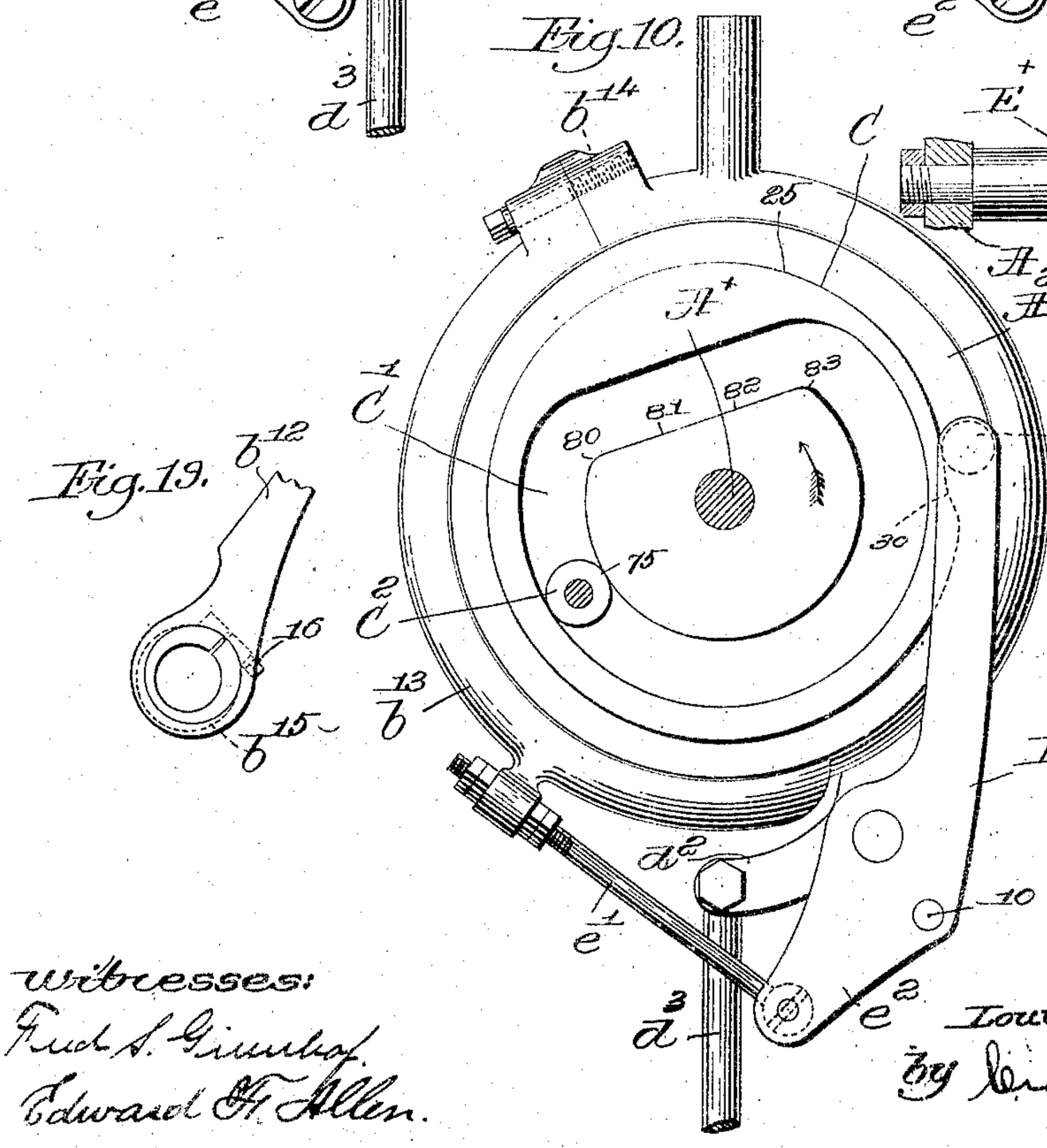


Fig. 18.

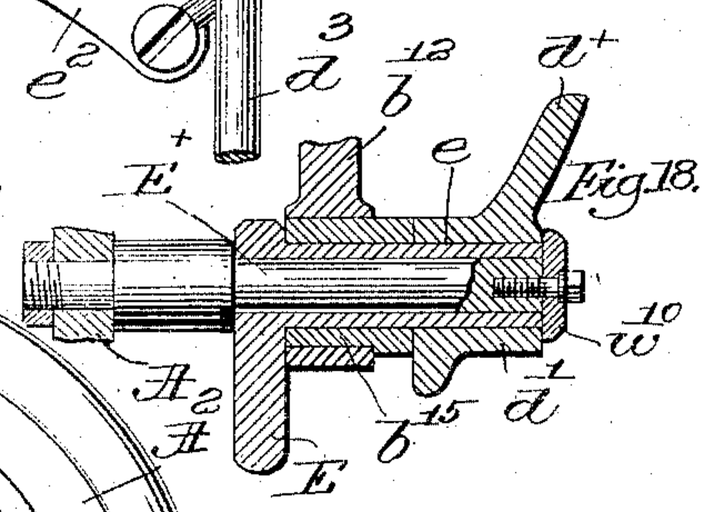
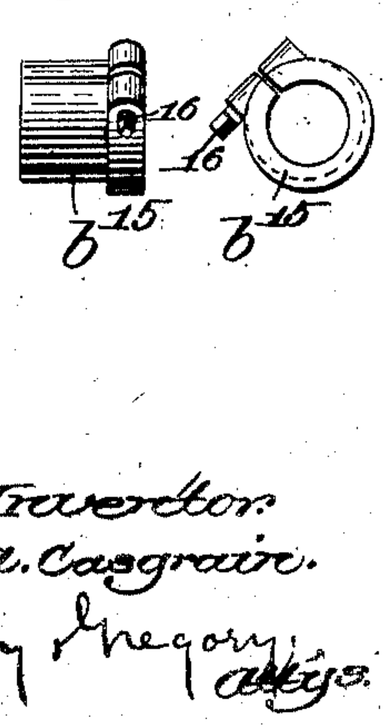


Fig. 19.

Fig. 20. Fig. 21.



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No. 864,951. PATENTED SEPT. 3, 1907.

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4 SHEETS—SHEET 4.

Fig. 11.

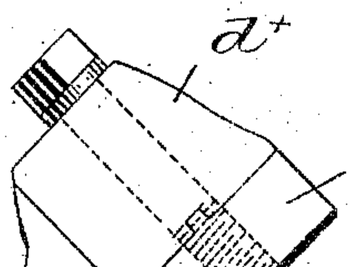


Fig. 12.

Fig. 13.

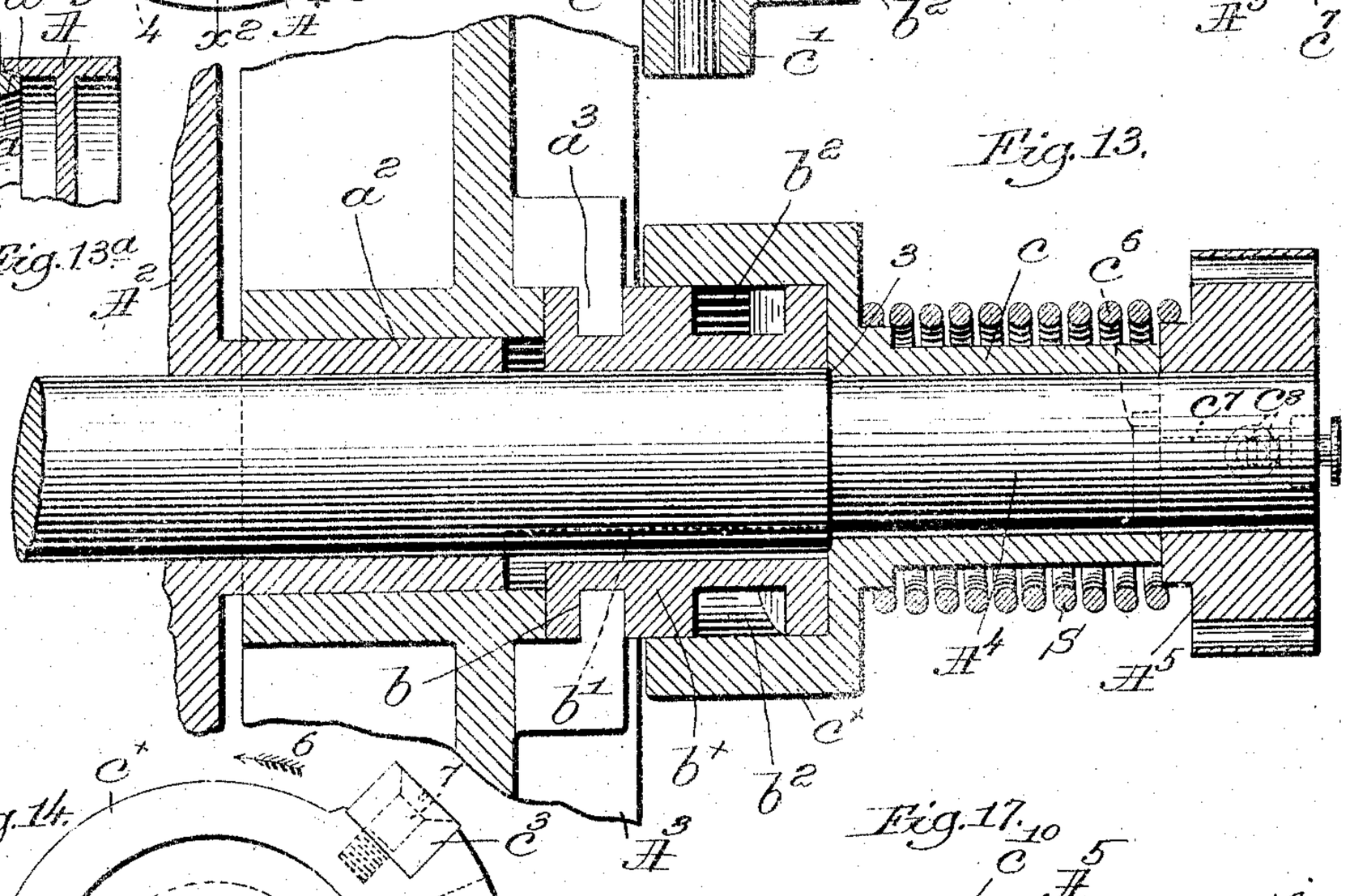


Fig. 13a.

Fig. 14.

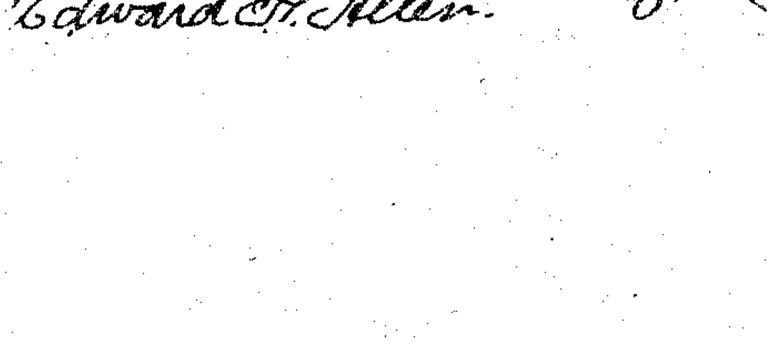


Fig. 15.

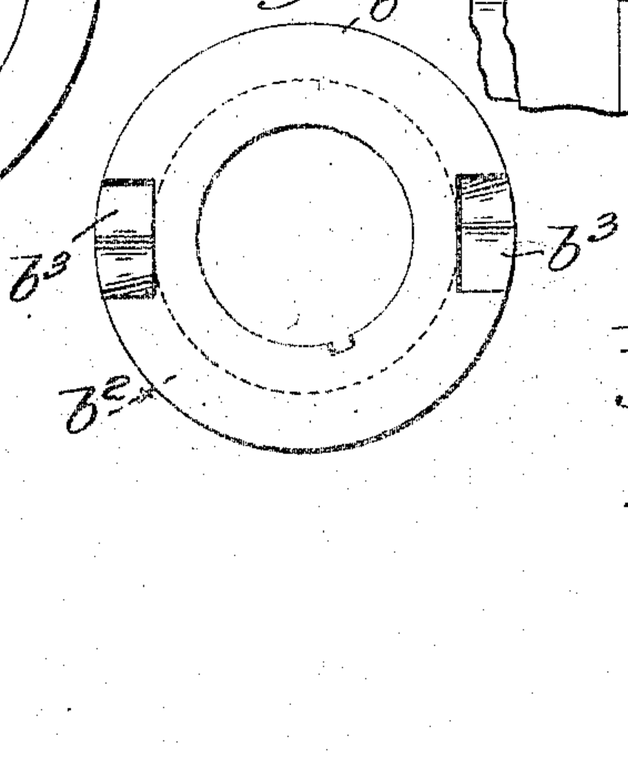


Fig. 17.

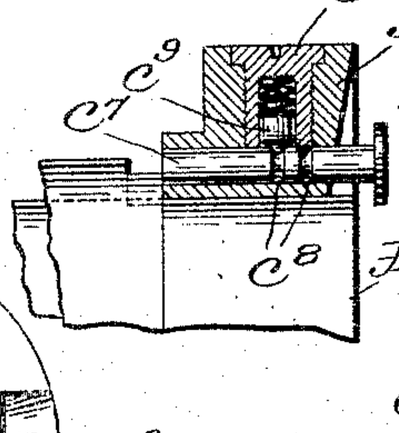
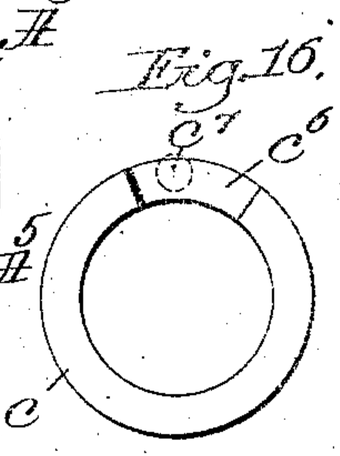


Fig. 16.



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UNITED STATES PATENT OFFICE.

LOUIS A. CASGRAIN, OF WINCHESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED SHOE MACHINERY COMPANY, A CORPORATION OF NEW JERSEY.

MACHINE FOR INSERTING FASTENINGS.

No. 864,951. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed August 4, 1898. Serial No. 687,682.

To all whom it may concern:

Be it known that I, LOUIS A. CASGRAIN, of Winchester, county of Middlesex, State of Massachusetts, have invented an Improvement in Machines for Inserting Fastenings, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to apparatus employed in the manufacture of boots and shoes for the purpose of inserting nails or other fastenings into the work, the latter being held upon a work-support or horn during the nailing operation.

More specifically the invention relates to mechanism for controlling the position of the horn and for effecting its movements.

While a fastening is being driven into the work the latter is firmly held or clamped between the horn and a coöperating presser, and I have provided herein simple and effective means for so controlling the horn that it will be automatically moved away or lowered from the presser when nailing ceases, and maintained in such lowered position until the apparatus is set in motion to resume nailing. Such separation of the horn and presser permits the instant removal of the work from, or application of the work to the horn with entire freedom, the work being fed over the horn after the insertion of each fastening in continuous nailing, the apparatus herein illustrated belonging to that type of nailing machine wherein the operator can cause a plurality of nails or other fastenings to be inserted in the work in rapid succession, or stop the apparatus after a single fastening has been inserted. Such control of the apparatus is preferably effected through the medium of a suitable treadle, and I have provided a device coöperating with the horn controlling means to prevent premature lowering of the horn should the operator accidentally lose control of the operating mechanism before the proper time for effecting the stoppage of the apparatus. The construction and arrangement of the horn has also been improved to include a connection between the horn and the horn spindle which permits the horn to be moved on the spindle and carry the work laterally away from the nailing devices to facilitate its removal from the horn and the application of a new piece of work in its place. I have provided stops to limit this movement of the horn and have so located the connection that the horn will remain at rest when in contact with either stop. I have also provided means for moving said horn into operative position when the machine is started. In the embodiment of my invention herein shown, means for tipping the horn into upright position is connected to the treadle by which the horn spindle is raised and the machine is started. The connection of the tipping means with the treadle is such that the horn is tipped into upright position at the same time that it is elevated, but it could be tipped into upright position before being raised if that were found desirable. The means which tips the horn also acts to lock it in upright position so long as the machine is running and to unlock the horn to permit it to be tipped away from the nailing devices as soon as the machine is stopped.

Various other novel features of my invention will be hereinafter described in the specification and pointed out in the claims.

In order that the invention may be clearly understood the same will be described in connection with the accompanying drawings which illustrate a preferred embodiment thereof and in which,—

Figure 1 is a right hand side elevation of the head and the upper part of the supporting column of a nailing machine, with my invention embodied therein, the horn and the upper portion of its support being also shown, with the horn lowered and the machine at rest. Fig. 1ª is an inner side view of the horn and its support, looking to the left, Fig. 1. Fig. 2 is a side elevation of the lower part of the supporting column or standard, the lower part of the said standard being broken out to show more clearly the mechanism within it, the column being continued from the upper part thereof shown in Fig. 1. Fig. 3 is an enlarged view in side elevation and partly in section of the device shown in the lower right hand part of Fig. 2, for preventing the full descent of the horn before the proper time. Fig. 4 is a transverse sectional detail of the mechanism shown in Fig. 3, on the line x—x of said figure. Figs. 5 and 6 are enlarged views, in side elevation and plan respectively, of the work gage to be hereinafter described. Fig. 7 is an enlarged detail view of the horn locking device shown in Figs. 1 and 1ª. Fig. 8 is a right hand elevation enlarged of the main controlling cam and coöperating brake mechanism, looking to the left, Fig. 1, the parts being shown in the position they occupy when the machine is at rest. Fig. 9 is a similar view but showing the brake mechanism as released and with the clutch in operation. Fig. 10 is an inner side view of the horn and brake controlling cams, the main driving shaft being shown in section. Fig. 11 is an enlarged outer end view of the clutch controlling means, shown in Fig. 8, in inoperative position. Fig. 12 is a side elevation thereof, and partially in section, the sectional portion being shown as taken on the line x'—x' Fig. 11. Fig. 13 is a longitudinal sectional view of the clutch controlling means, taken on the line x^2—x^2, Fig. 11, the main driving shaft, however, being shown in elevation. Fig. 13ª is a sectional detail on a small scale showing the coöperating friction surfaces of the loose pulley and the disk-like brake member. Fig. 14 is an inner face view

of one member of the clutch controlling means. Fig. 15 is an outer end view of the coöperating member of the said means. Fig. 16 is an outer end view of the hub of the member shown in Fig. 14. Fig. 17 is a detail, partly in section, of a throw-off device to be described, and Figs. 18 to 21 inclusive, are details to be hereinafter referred to, of a portion of the brake mechanism.

Referring to Fig. 1, the head A of the machine is of suitable shape to provide bearings for the operative parts of the mechanism, and said operative parts, including a presser P and means for inserting fastenings in the work, may be and are of substantially the construction shown and described in United States Patent #310816, dated January 13, 1885, the main driving shaft A× having suitable bearings at A′ Fig. 1.

The driving shaft A× has fast upon it a disk-like member A^2 provided with an annular, bevel faced flange *a* which operates as a friction surface to coöperate with a similarly beveled surface *a′* on the rim of a loose pulley A^3, see Figs. 13 and 13ª, the disk and pulley thus forming the fast and loose members of a friction clutch mechanism. The loose pulley A^3 is mounted to freely rotate upon and slide laterally on the extended hub a^2 of the fast member A^2, and it is driven continuously by a belt from any suitable source of power not shown, the pulley having a suitable yoke a^3 to engage an annular groove *b* in one member *b*× of the clutch controlling means, said member being shown as a sleeve mounted to slide longitudinally on the main driving shaft A× and connected therewith by a spline *b′*, Fig. 13. The said member *b*× is provided with a double cam-groove b^2, the two parts of which are adapted to receive two roller or other studs c^2, mounted in suitable bearings *c′* on the other member *c*× of the clutch controlling means, recessed to receive the sleeve *b*×, said member *c*× having an outwardly extended hub *c* rotatably mounted on a reduced portion as A^4 of the main shaft, see Fig. 13, the member *c*× being held from longitudinal movement by the shoulder 3 and a collar A^5 rigidly secured to the shaft, as by a pin 4, Fig. 12. A strong spiral spring S surrounds the hub *c* and is attached at one end to the collar A^5 and at its other end by a pin or stud 5 to the member *c*× of the clutch controller, the spring being wound in such a way as to normally tend to rotate the member *c*× on or relatively to the main shaft in the direction of the arrow 6, Figs. 11 and 14.

The double cam groove b^2 in the member *b*× of the clutch controller is provided with diametrically opposite entrances b^3, see Fig. 15, to permit the entrance of the studs c^2 in the assembling of the parts, and, as shown in Fig. 12, the inner wall of the cam groove is provided with a high portion or shoulder b^4, it being understood that there are two such high portions or shoulders diametrically opposite each other to coöperate each with one of the studs or rolls c^2.

One of the bearings *c′* is cut away to form a seat for a preferably hardened steel block c^3, suitably held in place as by a screw 7, Fig. 14, said block forming a stop to coöperate at times with a detent *d*, Figs. 8 and 9, preferably also made as a hardened steel block and attached to the upper end of one arm *d*× of a bell crank lever, the said detent, when in the position shown in Fig. 8, engaging the stop c^3 and preventing rotation of the member *c*× of the clutch controller.

Now, referring to Figs. 1 and 13, which show the clutch as inoperative, and supposing the direction of rotation of the loose pulley A^3 to be in the direction of the arrow 8, Figs. 1 and 9, when the detent *d* is withdrawn from engagement with the stop c^3, the spring S will instantly turn the member *c*×, of the clutch controller on the shaft A× from the position shown in Fig. 12, less than a quarter of a turn, to bring the studs c^2 into engagement with the cam-shoulders b^4, on the memqer *b*×, to thereby slide such coöperating member of the clutch controller and positively move with it the pulley A^3, to the left, Figs. 12 and 13, to thereby bring the friction surfaces *a*, *a′* of the clutch members A^2, A^3 into engagement and effect the operative rotation of the main shaft, such rotation continuing as long as the two members *b*×, *c*× of the controller, remain in such relative angular position. When, however, the detent is brought into operative position to, and does engage, the stop c^3 in its rotation, the relative positions of the members of the clutch controller will be changed instantly, and while the member *c*× is of course positively and suddenly stopped, the momentum of the parts connected with the main shaft A× will impart a further partial rotation to the shaft and member *b*×, bringing the latter into the position shown in Fig. 12, moving it and the pulley A^3 positively to the right, through the studs c^2 and cam groove b^2, to release the clutch members, and at the same time the spring S will be wound up sufficiently to give the quick rotative throw to the member *c*× hereinbefore described, when the machine is again started.

It is sometimes convenient or desirable to turn the machine over by hand, and in order to do this without slipping the belt from the loose pulley, I have provided a clutch-controller locking device, shown best in Figs. 16 and 17, the outer end of the hub *c* of the member *c*× having a peripheral notch c^6 therein, to be entered by a sliding stop pin c^7 mounted in the collar A^5, as best shown in Fig. 17, said pin having two annular grooves c^8 therein, one or other of which is entered by a spring controlled locking plunger c^9 mounted in a threaded stud c^{10} screwed into the collar A^5. The locking plunger holds the stop pin c^7 either in its normal or inoperative position, as shown in Fig. 17, or in its inmost position, to enter, in the latter case, the notch c^6. This notch and pin are so located relatively each to the other that when the stop pin is pressed in to enter the notch, the member *c*× cannot be turned by the spring S relatively to the shaft or to its coöperating member *b*× to throw the clutch members into operative engagement, even though the detent *d* is withdrawn from the stop c^3. In other words, the stop pin c^7 takes the place of the detent, and so long as rotative movement of the controlling member *c*× relative to the main shaft is prevented, the machine may be turned over by hand as desired without any danger whatever of the power being accidentally thrown on by the clutch.

It will be seen that the movable member A^3 of the clutch is positively moved out of engagement with the coöperating fast member A^2, by or through the clutch controlling means described, and I am thus enabled to dispense with a spring or springs to separate the clutch members.

The construction herein described is positive, sure

and rapid in its action, whereas when dependence must be placed upon a spring to separate the clutch members the action is slow and sometimes the clutch fails entirely to operate as desired.

The arm $d^{\times}$ has a hub d' through which is extended loosely the long sleeve-like hub e of a lever arm E, see Fig. 18, fulcrumed on a stud $E^{\times}$ rigidly held in the head A of the machine, said lever arm E having at its upper end a roller or other stud $e^{\times}$, see Fig. 10, to travel on an edge cam C, secured to or forming a part of the fast member A^2 of the clutch, a washer w^{10} retaining the hubs d' and e on the stud $E^{\times}$. The cam C has a low portion, gradually curving in from the point 25 to the point 30, whereat there is a quick rise to the circular part of the cam, which continues to the point 25, thus permitting the brake which is controlled by this cam, as will be described, to be applied gradually and without sudden shock to the machine. The lever arms $d^{\times}$ and E are connected to rock in unison by means of a suitable stud or pin 10, the cam C thus governing the movement of the detent d, and, by or through the latter and the clutch controller, the operation of the clutch is governed.

The periphery $a^{\times}$ of the clutch member A^2 is reduced in thickness and made substantially A-shaped, as shown in Fig. 13^a, to be engaged by an interiorly and correspondingly grooved brake shoe, herein shown as made in two parts b^{12}, b^{13}, connected at their adjacent ends by a suitable bolt as b^{14}, the part b^{13} of the shoe being adjustably connected by a link e' with the depending portion or arm e^2 of the lever E, the free end of the other part b^{12} of the brake shoe embracing an eccentric sleeve b^{15}, shown separately in Figs. 20 and 21, longitudinally split and adapted to be clamped by a suitable bolt 16 onto the sleeve-like hub e of the lever arm E, as best shown in Fig. 18, and supporting the shoe.

Referring now to Figs. 8 and 9, it will be seen that, while the clutch is inoperative, owing to the position, shown in Fig. 8, of the detent d, the two ends of the brake shoe will be drawn together to tightly clamp the periphery of the fast member A^2 of the clutch, the roll $e^{\times}$ then resting on the low portion of the cam C, as in Fig. 10, but when the lever arm $d^{\times}$ is moved by the operator into the position shown in Fig. 9 to release the stop c^3 and effect operative engagement of the fast and loose members of the clutch, as described, the lever E will also be rocked so that the link e' will move the part b^{13} of the brake shoe away from the clutch member A^2, and at the same time the rocking movement of the lever arm E will cause the eccentric b^{15} to act upon the surrounding end of the part b^{12} of the shoe to move it away from the end of its fellow member b^{13}, separating part b^{12} from the clutch member A^2, so that the brake mechanism will be released at the instant the clutch becomes operative, and vice versa, the main portion of cam C holding the brake off as the roll $e^{\times}$ travels thereon. A cam groove C', Fig. 10, in the inner face of the clutch member A^2, receives a roller or other stud C^2 carried by a rocker arm C^4 mounted on the head A, see Fig. 1, said arm C^4 having pivotally connected thereto a depending link C^5 which extends down to the lower part of the supporting standard A^{10} of the apparatus, as shown in Fig. 2, the lower end of the said link being pivotally connected with a pawl carrier c^{15} adapted to slide in bearings 12 and 14 secured to the standard, said pawl carrier having mounted thereon a toothed pawl c^{16} supported by parallel links c^{17} and acted upon by a spring, herein shown as operating through a plunger c^{18}, to press the toothed pawl normally into engagement with a correspondingly toothed rack d^{16}, also mounted to slide in the bearings 12 and 14, said rack being connected by a rod d^{17} with a yoke d^{18} pivoted at d^{19} to a lever D fulcrumed at $D^{\times}$ on the lower part of the standard. The inner end of the lever D has pivotally connected therewith a link D' extended up into the offset base portion A^{12} of the standard, said link being surrounded by a horn lifting spring S' held between the bottom of the standard and a nut 15 on the threaded upper end of the link, said link forming one member of a toggle, the other member D^2 being pivoted thereto at 16 and at its other end pivoted to the lower end of the horn support, shown as a spindle D^3 having a vertical bearing in the upright extension A^{14} of the standard. A foot treadle F, also fulcrumed at $D^{\times}$ on the base of the standard, has attached to or forming part of it a yoke F' to which is rigidly secured an upturned arm F^2 pivotally connected to the joint 16 of the toggle by a short link F^3 extended through a suitable opening 17 in the standard, so that depression of the end of the treadle F at the front of the standard will act through the upturned arm F^2 and the link F^3 to positively straighten or set the toggle and thereby elevate the horn, which latter is mounted on the upper end of the horn support or spindle D^3, as will be hereinafter described. The other or rear end of the controlling treadle F is connected in a peculiar manner, as will be described, to a rod d^3 pivoted at its upper end to the short arm d^2 of the arm $d^{\times}$.

When the operator has placed the work on the horn, he depresses the front end of the treadle F and thereby elevates the horn to bring the work up against the usual presser foot P, Fig. 1, and at the same time the elevation of the rod d^3 acts to swing the lever arm $d^{\times}$ from stopping position shown in Fig. 8 into the position shown in Fig. 9, to effect by the mechanism hereinbefore described the engagement of the clutch members and the consequent operation of the machine. The machine will continue to operate as long as the operator by keeping his foot upon the treadle F maintains the clutch operative, and at every revolution of the main shaft the lever C^4 will be rocked, to raise and lower the pawl carrier c^{15} with a constant throw, and on its descent the pawl c^{16} will engage the rack bar d^{16} at the proper point, to depress the horn as said pawl-carrier thereafter rises, such depression of the horn permitting the feed of the work, the general operation of this device being substantially as shown in U. S. Patent #265227.

I have herein provided a pawl releasing device to engage the pawl at times on the descent of the carrier, and thereby throw the pawl c^{16} out of engagement with the rack-bar. Referring to Fig. 2, the releasing device is shown in dotted lines as a trip d^4, fulcrumed on the column at d^5, and having a depending leg d^6, through an opening in which is loosely extended a threaded rod d^7 pivoted at d^8 to the arm F^2, said rod having a check nut d^9 thereon to adjust the movement of the trip d^4, the leg d^6 and arm F^2 being connected by a spring s to hold the leg against the check nut. When the front end of the treadle F is depressed to start the machine the movement of the upper end of the arm F^2 to the

left, against a spring S^{10}, viewing Fig. 2, permits the spring s to throw the trip d^4 to the right into the path of the pawl c^{16} or one of its supporting links c^{17}, and so long as the treadle is maintained depressed the trip will remain in such position and will release the pawl from the rack at each descent of the pawl carrier. This does not interfere, however, with the engagement of the pawl and rack at each ascent of the pawl, at a point corresponding to the thickness of the work, to thereby lower the horn sufficiently to permit the work to be fed. In the machine herein illustrated in which the work is fed by the awl, the horn is in its raised position while the roll C^2, Fig. 10 travels in the cam groove C′ from the point 75 to point 80, and the awl enters the work. From 80 to about 81 the horn is lowered, and the feeding movement of the awl occurs while the horn is down, from about the point 81 to point 82, and as the horn is rising as the roll travels in the cam groove to point 83 the awl is withdrawn from the work, the spring S′ raising the horn while the toggle remains set. When the treadle F is released and the toggle is thereupon broken by the action of the spring S^{10}, the adjustable projection or nut d^9 on the threaded rod d^7 acts to positively move the upper end of trip d^4 to the left, or into the position shown in Fig. 2, so that the pawl at the lower end of its stroke will not be disengaged from the rack as the machine is brought to a stop. Such withdrawal of the trip d^4 is necessary when the machine is stopped, for the pawl and rack must then the locked together to resist, through the lever D and rod D′, the action of the horn lifting spring, so that when the toggle is broken the horn will descend. Were not the rod D′ so held against the lifting action of the spring the latter would operate to elevate the horn upon stoppage of the machine.

Obviously the horn must be maintained elevated with certainty during the nailing operation, and to prevent premature breaking of the toggle, such as would be caused by a release of the treadle F before the proper time, I have provided a locking device, which is shown as forming a part of the connection of the rear end of the treadle with the rod d^3, such connection permitting at times movement of the treadle relatively to the rod. This rod d^3 passes through a fixed guide 25× secured to or forming part of the bearing 12 for the pawl carrier, and is threaded at its lower end to receive an adjustable socketed collar d^{10} between which and the guide 25× a spiral spring S^2 surrounds the rod to normally depress the latter and maintain the detent d in operative position, the lower end of the spring entering the socket.

The lower threaded end of the rod d^3 has screwed upon it a foot f having a longitudinally slotted or bifurcated end f' to embrace a lateral stud 30× mounted in the treadle F near its rear end, to permit setting of the toggle before the machine is actually started. Said foot has two laterally extended lugs f^2 and f^3 thereon, Figs. 3 and 4, substantially at right angles to each other, the former supporting the fulcrum pin f^4 of a locking dog f^5, shouldered at f^6 to engage an opposite shoulder 33 on the extremity of the treadle F, a spring s× held in the chambered head f^7 of the dog and bearing against the lug f^3 tending to maintain the dog in operative position. An internally threaded ear f^8 on the dog receives therein a threaded depending stud f^9 which at its lower end bears on a headed pin or projection f^{10} mounted on one of the legs as A of the standard.

Referring to Fig. 3, it will be seen that the stud 30× is near the upper end of the slotted end of the foot f and that the shouldered dog f^5 is in engagement with the shoulder 33 of the treadle F, and, it being remembered that the cam C indirectly controls the descent of the rod d^3, it will be obvious that so long as said rod is held from descending, it will, through the dog f^5, prevent the return of the treadle F to normal position even should the foot of the operator be removed therefrom. If, therefore, with the parts in the position shown in Fig. 3, the operator removes his foot from the treadle too soon, the toggle will not be broken, but will be maintained set or straightened until the descent of the rod d^3 causes the lower end of the adjustable stop f^9 then in engagement with the cam or inclined face of the stud f^{10}, to slide over such face and swing the dog f^5 on its fulcrum and withdraw the shoulder f^6 from engagement with the shoulder 33 on the treadle, and the latter is then free to return to normal position.

It is sometimes desirable to depress the horn independently of the operation of the machine, and for this purpose an auxiliary treadle H is provided, fulcrumed at D× and having a toe H^2×, see dotted lines Fig. 2, extended beneath the part of the lever arm D back of the fulcrum, so that when the treadle H is depressed, the lever D will be tipped to depress the horn against the action of the spring S′.

The upper end of the horn support or spindle D^3 passes through the bearing A^{14}, and has clamped thereupon a split sleeve h, see Figs. 1 and 1^a, said sleeve having fulcrumed thereon at b' a yoke h×, also shown as split at its upper end and adapted to receive the shank of the horn H× and to be clamped upon said shank by a suitable clamp screw or bolt h^2. The yoke and attached horn may thus be swung about the fulcrum h' into or out of operative position, the former being shown in Fig. 1, and I prefer to provide protecting lips 40 and 41 at the front and rear of the yoke to prevent the entrance of chips or dirt to the part of the mechanism therebelow. The inner wall of the lip 41 contacts with the adjacent face of the sleeve h, acting as a stop to arrest the movement of the horn when it reaches operative position. One of the yoke arms is downwardly extended as at h^3, below its fulcrum, and the face h^4 thereof is adapted to be engaged by the rocker arm h^5 mounted on the bearing A^{11}, and connected by link h^6 with the treadle F. The rocker arm h^5 forms a stop to be engaged by the face h^4, and limit the outward tipping movement of the horn. The fulcrum h' is so located with relation to said stops and to the center of gravity of the tipping horn that said horn will remain at rest in either its upright, operative position shown in Fig. 1, or in the inclined position to which it may be tipped. When the treadle F is depressed, the rocker arm h^5 is turned by the link h^6 to bring its free end or eccentric portion into engagement with the face h^4 of the yoke and tip the horn into upright position, and thereafter said arm holds or locks the horn positively against any rocking or swinging movement until the treadle is released, whereupon the locking device h^5 is turned into the position shown in Fig. 1, and the horn is free to be moved. The face h^4 is of sufficient

length so that the rocker arm h^5 may slide thereon as the horn is raised and lowered to clamp and unclamp the work for feeding while the horn is locked against tipping movement. From this description it will be understood that when the nailing of a piece of work is completed and the machine is stopped by the release of the treadle F, the rocker arm h^5 occupies the position shown in Fig. 1, and the operator in removing the work from the horn may tip the horn outward to carry the work away from under the driver and the presser P, where it can be easily pulled off the horn. This capacity of the horn for movement laterally away from the nailing mechanism is of particular advantage when relatively thin work, such as heel seats, is being nailed, because it is desirable that the depression of the horn to permit the removal of such work be very slight, varying from one-eighth to one-fourth of an inch, and if the horn were not laterally movable it would often be difficult to remove and apply the work quickly. When the horn is tipped away from the nailing devices in the removal of the work, it remains in such position because of the location of the fulcrum h'. When a new piece of work has been put in place on the horn, the depression of the treadle F acts through the toggle to elevate the horn spindle and horn, and simultaneously through the link h^6 to turn the locking device h^5 and tip the horn into upright position. During these movements of the horn, or during the first portion of these movements, the stud 30× on the right hand end of the treadle F moves in the slotted end of the connecting rod f, through which the starting mechanism is actuated. When the stud 30× reaches the upper end of said slot the connecting rod f is raised to actuate the starting mechanism. The horn is therefore always moved into operative position in advance of the starting of the machine so that there is no danger of a fastening being driven before the work is in position to receive it.

I have also devised a simple and effective work gage adapted to engage the upper of the boot or shoe near the sole, the upper being preferred because of the irregularities which are apt to occur in the edge of the sole.

Figs. 5 and 6 are enlarged views of the work gage shown in position in Fig. 1, said work gage comprising a work-engaging member in the form of a truck or roll m preferably having a periphery m× of some soft or yielding material as felt, rubber, etc., the roll being rotatably mounted on an arm m' provided with a hub m^2 through which is extended a shouldered bolt m^3, see Fig. 6, the reduced portion of the bolt passing through a lateral bearing m^4 in a plate or bracket m^5, adapted to be bolted to the usual gage carrier R, see Fig. 1. The gage carrier is adjustable to vary the distance between the gage and the driver of the machine, to determine the distance from the edge at which the nail or other fastening will be inserted. One end of a spring s^3 is held in a housing m^6 on the bracket m^5, the other end of the spring extending beneath a lug m^7 on the arm m', to normally elevate the roll or gage m. Referring to Fig. 5, the bracket m^5 has a depending portion m^8 with its upright edge notched at m^9 to receive one of a series of stops 50, 51, 52. I have herein shown these stops as ears of different width mounted on a combined clamping and supporting bolt m^{10}. As shown in Fig. 5, the narrowest one of the ears 50 projects into the notch m^9, so that the greatest vibratory movement of the arm m' is permitted, it being obvious that the ears are carried by the arm m'. The ear 51 is a little wider than the ear 50, and permits less movement of the arm m', while the widest ear 52 is so wide that the very slightest vibration of the work gage is permitted.

The adaptability of the work gage to move up and down is of advantage in that it permits the gage to move with the work as the latter follows the up and down movement of the horn, and the spring s^3 is very light, merely strong enough to retain the work gage in operative position.

I have herein described one practical embodiment of my invention, but do not restrict the invention to such construction and arrangement of parts, for the construction may be varied or the parts rearranged or any of the combinations defined in the claims may be used separately without departing from the spirit and scope of my invention.

While I have herein shown and described a work-gage to engage the upper of the boot or shoe near the sole thereof, such work-gage is not made the subject of a claim herein, except in combination with other mechanisms of the machine, as the gage itself forms the subject matter of and is duly claimed in a divisional application, Serial No. 120044, filed by me on the 18th day of August, 1902.

The term "manually operated" used in some of the following claims is intended to mean operated or controlled by the workman or operator.

Having fully described my invention, what I claim and desire to secure by Letters Patent, is:—

1. In an apparatus of the class described, a vertically movable horn or work-support, a driving shaft, a cam thereon, connections between said cam and horn and operated by the former, to positively effect downward movement of the horn, manually controlled means to raise the horn and start the apparatus, and a locking device to retain said means in operative condition and thereby prevent premature descent of the horn during the insertion of a fastening into the work.

2. In an apparatus of the class described, a rising and falling horn or work-support, means including a cam, to effect downward movement of the horn, manually controlled means to raise the horn and start the apparatus, and a locking device to retain said means in operative condition and thereby prevent premature descent of the horn during the insertion of a fastening into the work.

3. In an apparatus of the class described, a rising and falling horn or work-support, manually controlled means to start the apparatus, horn lowering mechanism, a toggle connection between the horn and said mechanism, a positive connection between the toggle and said means, to straighten the toggle manually and thereby raise the horn when starting the apparatus, a lock to prevent descent of the horn during the insertion of a fastening into the work, and means to automatically release the lock and permit lowering of the horn thereafter.

4. In a machine for inserting fastenings, a horn or work-support, a main driving shaft, mechanism controlled thereby to depress the horn periodically, a clutch for the said shaft, controlling means to throw said clutch into or out of operation, a treadle, operating connections between it and said means, to start the machine, and positive connections between the treadle and the horn, to raise the latter manually when the machine is started.

5. In a machine for inserting fastenings, a horn or work-support; means to automatically lower the horn; a toggle connection between the horn and said lowering means; means, including a manually operated treadle, to start the machine, and controlling connections between

the toggle and treadle, including an arm rigidly connected with the treadle, and a link positively jointed to said arm and the toggle, to set the toggle and thereby raise the horn by movement of the treadle to start the machine.

6. In a machine for inserting fastenings, a horn or work-support; means to automatically lower the horn; a toggle connection between the horn and said lowering means; means, including a manually operated treadle, to start the machine; positive connections between the toggle and treadle, to set the former and raise the horn when the machine is started, a lock to hold the treadle in position to maintain the toggle set, and means to automatically release said lock as the machine is stopped.

7. In a machine for inserting fastenings, a vertically movable horn, a manually operated means for raising said horn, a starting and stopping mechanism including a rod connected to said manually operated means for actuation thereby to start the machine, said connection permitting a limited independent movement of said means to raise the horn before the starting mechanism is actuated, a lock to secure said horn raising means against movement and maintain the horn raised during a cycle of operations of the machine, and means to release said lock when the cycle of operations is completed.

8. In a machine for inserting fastenings, a driving shaft, a cam thereon to positively effect downward movement of the horn, a vertically movable horn or work-support, a lever, a toggle connection between it and the horn, intermediate mechanism connecting said cam and lever, starting and stopping mechanism for the machine, including a manually actuated member, and a rod or link connected therewith to permit a limited movement of said rod or link relative to the said member, a lock to prevent such relative movement and thereby maintain the toggle set and the horn raised, means operated by said manually actuated member to set the toggle and raise the horn, and means to release said lock at a certain point in the movement of the rod or link to stop the machine.

9. In a machine for inserting fastenings, a vertically movable horn or work-support, a rotatable shaft, a cam on said shaft to effect downward movement of the horn, intermediate mechanism including a toggle, connecting said horn with the cam, brake mechanism to stop the rotation of the shaft and adjusted to stop such rotation when the toggle is broken, and manually operated means to positively set the toggle.

10. In a machine for inserting fastenings, a horn or work-support, a main driving shaft, mechanism controlled by rotation thereof to depress the horn, a toggle between said mechanism and the horn, stopping mechanism for the shaft, adjusted to operate when the horn is lowered, starting means for the machine, and connections between the toggle, the starting means and the stopping mechanism including an arm rigidly connected with the starting means, and a link positively jointed to the arm and toggle, to set the toggle and raise the horn before the machine is started, the connection between the starting means and the stopping mechanism acting at the same time to render the stopping mechanism inoperative.

11. In a machine for inserting fastenings, a horn or work-support, depressing mechanism therefor, to periodically depress the horn to permit feed of the work, a horn lifting spring, a toggle between the horn and said depressing mechanism, one member of the toggle being connected with the spring, and means to cause the depressing mechanism to prevent the spring from lifting the horn when the machine is stopped.

12. In a machine for inserting fastenings, a vertically movable horn spindle, a lever having a fixed fulcrum; a toggle connecting one end of said lever and the spindle, a horn lifting spring connected with one toggle member, means, including a coöperating pawl and rack, to lower the horn when said pawl and rack are engaged, a trip to release them, a starting treadle for the machine positively connected with the toggle to set or break it, and means operated by said treadle when it is moved into position to break the toggle to withdraw the trip and permit the horn lowering means to hold the spring-controlled toggle member against the lifting action of the spring.

13. In a machine for inserting fastenings, a vertically movable horn, means to automatically and periodically lower the horn, a horn lifting spring, and manually controlled means to effect final lowering of the horn when the machine stops, the automatically operating horn lowering means at such time holding the spring under tension and inoperative.

14. In an apparatus of the class described, a horn spindle, a horn movably mounted thereon, starting means for the apparatus, and means rendered operative by actuation of said starting means to prevent movement of the horn with relation to its spindle during the operation of the apparatus.

15. In an apparatus of the class described, a horn spindle, a horn movably mounted thereon, and means to automatically prevent movement of the horn with relation to its spindle during the operation of the apparatus and to permit such movement of the horn when the apparatus is stopped.

16. In an apparatus of the class described, a horn spindle, a horn mounted thereon and movable into and out of operative position, and means to automatically prevent movement of the horn from operative position during the operation of the apparatus.

17. In an apparatus of the class described, a vertically movable horn spindle, a horn mounted to rock thereon in a vertical plane, starting means for the apparatus, and a movable stop operatively connected with the starting means, to prevent rocking of the horn during the operation of the apparatus.

18. In an apparatus of the class described, a vertically movable horn spindle, a bearing therefor; a horn mounted on the spindle to rock in a vertical plane and having a depending arm below its fulcrum, a rocker-arm on the bearing adapted to be moved into engagement with the depending arm, to hold the horn rigid with relation to its spindle, and controlling means for the apparatus, operatively connected with and to actuate the rocker-arm.

19. In a machine of the class described, a horn or work-support, depressing mechanism therefor, a horn-lifting spring, a fixed support for one end of the spring, a toggle between the horn and the depressing mechanism, one member of the toggle being connected to the free end of the spring, and means to set the toggle to elevate the horn.

20. In a machine of the class described, a horn or work-support, a toggle one member of which is directly connected with said horn, a horn lifting spring fixed at one end, its other end being operatively connected with the other member of the toggle, means connected with said latter member to compress the spring and lower the horn, and means to set the toggle to elevate the horn.

21. In a machine of the class described, a horn or work-support, depressing mechanism therefor, a horn-lifting spring, a toggle between the horn and the depressing mechanism, one member of the toggle being directly connected with the spring, and means to set the toggle to elevate the horn.

22. In a machine of the class described, a horn or work-support, depressing mechanism therefor, a horn-lifting spring, a fixed support for one end of the spring, a toggle between the horn and the depressing mechanism, and an adjustable connection between one member of the toggle and the spring, whereby the tension of the latter may be varied.

23. In a machine of the class described, a horn, a support therefor, a connection between said horn and said support whereby the horn may be tipped toward and from operative position, stops to limit said movement, said connection being so located that the horn will remain at rest against either stop, and means for tipping said horn into its operative position and then starting the operation of the machine.

24. In a machine of the class described, a presser, a horn and a support therefor, a connection between said horn and said support whereby the horn may be tipped toward and from operative position, stops to limit said movement, said connection being so located that the horn will remain at rest against either stop, means for tipping said horn and for elevating said horn simultaneously to clamp the work against the presser.

25. In a machine of the class described, a support for

a horn, a horn mounted thereon and movable with relation thereto into and out of operative position, and mechanism to effect the operation of the machine and also to move the horn into operative position preliminary to the operation of the machine.

26. In a machine of the class described, starting means for the machine, a support for the horn, a horn mounted thereon and movable with relation thereto into and out of operative position, and means operative by or through the actuation of the starting means for moving the horn into operative position preliminary to the operation of the machine and locking said horn in such position so long as the machine continues in operation.

27. In a machine of the class described, a support for a horn, a horn mounted thereon and movable with relation thereto into and out of operative position, and means to tip the horn into operative position and to lock it in such position while the machine is operating, and to unlock it automatically when the machine ceases to operate.

28. In a machine of the class described, a support for a horn, a horn mounted thereon and movable with relation thereto into and out of operative position, a starting mechanism and means to actuate it, and means connecting said horn and said actuating means whereby the horn is first moved into operative position and thereafter the starting mechanism is actuated.

29. In a machine of the class described, devices for operating on the work, a support for a horn, a horn mounted thereon and adapted to be tipped toward and from said devices, and means for tipping the horn toward said devices and maintaining it in such position during the operation of said devices.

30. In a nailing machine, devices for operating on the work, a work support comprising a horn spindle movable vertically toward and from said devices, a horn mounted on said spindle and movable laterally toward and from said devices, and means for moving said spindle and simultaneously said horn with relation to the spindle, to present the work to the said devices.

31. In a machine of the class described, a pivotally supported horn, means for elevating said horn, and a locking device carried by a fixed part and engaging said horn to hold it against pivotal movement but permitting vertical movement of the horn with relation to the locking device.

32. In an apparatus of the class described, a support for a horn, a horn mounted thereon and movable with relation thereto into and out of operative position, a treadle and connections for moving the horn into operative position preliminary to the operation of the apparatus, and mechanism for intermittently depressing the horn to allow the work to be fed.

33. In a machine of the class described, a pivotally supported horn, means for elevating said horn, a locking device carried by a fixed part and engaging said horn to hold it against pivotal movement but permitting vertical movement of the horn with relation to the locking device, and mechanism for intermittently depressing the horn to allow the work to be fed.

34. In a machine of the class described, a horn or work-support, a horn lifting-spring, means for depressing the horn to permit the work to be fed, a device movable into and out of a position for rendering said means inoperative, and means under the control of the operator for moving said device while the machine is in operation.

35. In a machine of the class described, a horn or work-support, a horn lifting-spring, means including a movable connecting member for depressing the horn to permit the work to be fed, a device movable into and out of a position for throwing said connecting member out of operation and thus rendering said means inoperative, and a treadle or lever and connections for moving said device.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

LOUIS A. CASGRAIN.

Witnesses:
GEO. W. GREGORY,
MABEL E. WADE.

DISCLAIMER.

864,951.—*Louis A. Casgrain*, Winchester, Mass. MACHINE FOR INSERTING FASTENINGS. Patent dated September 3, 1907. Disclaimer filed December 31, 1919, by the assignee, by mesne assignments, *United Shoe Machinery Corporation.*

Enters this disclaimer—

"To said claim 4 of said Letters Patent, which is in the following words, to wit:

"In a machine for inserting fastenings, a horn or work-support, a main driving shaft, mechanism controlled thereby to depress the horn periodically, a clutch for the said shaft, controlling means to throw said clutch into or out of operation, a treadle, operating connections between it and said means, to start the machine, and positive connections between the treadle and the horn, to raise the latter manually when the machine is started."

[*Official Gazette January 6, 1920.*]