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L. GODDU.

LASTING APPARATUS.

No. 559,130. Patented Apr. 28, 1896.

Fig. 1.

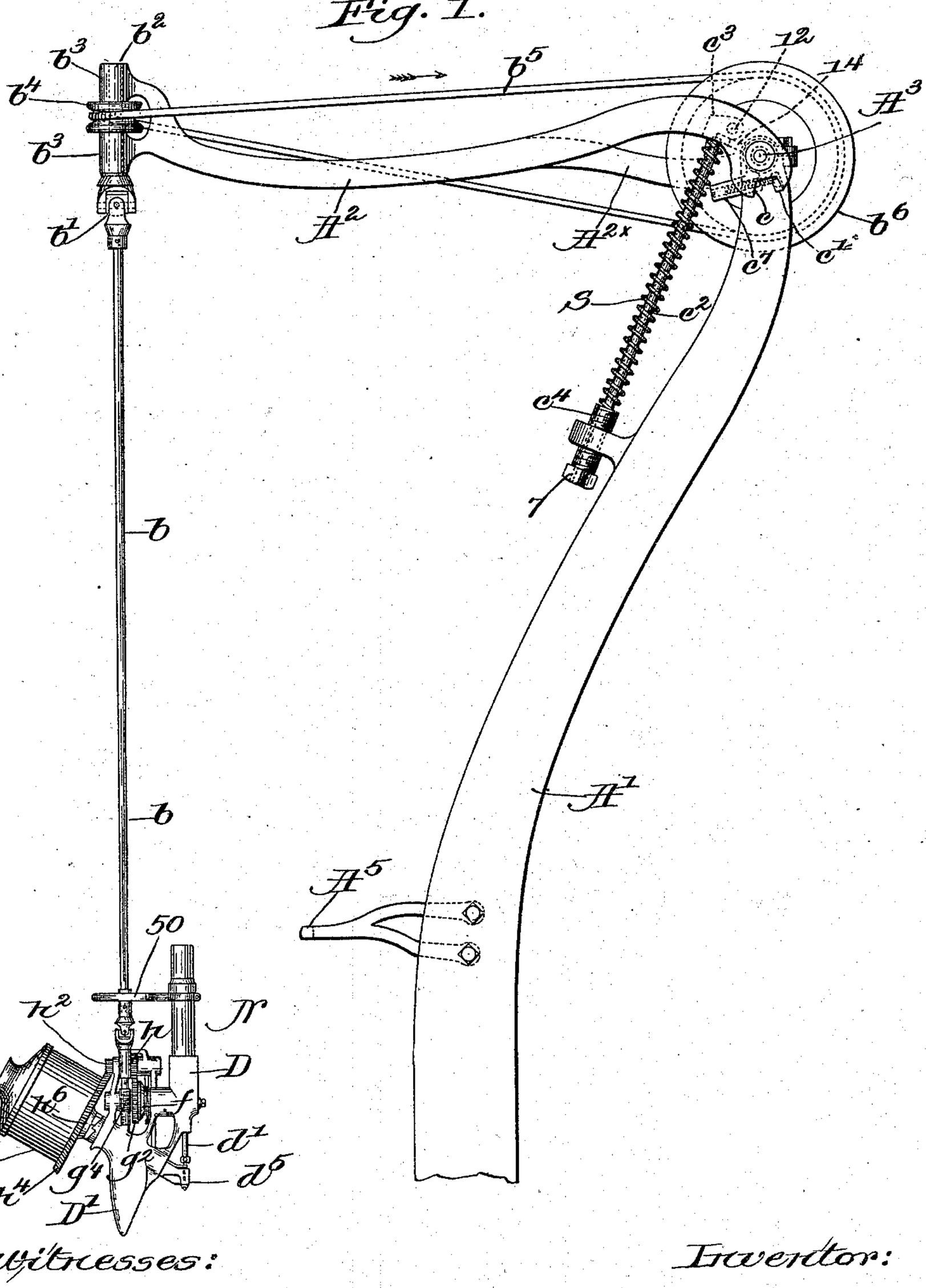

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Fig. 2.

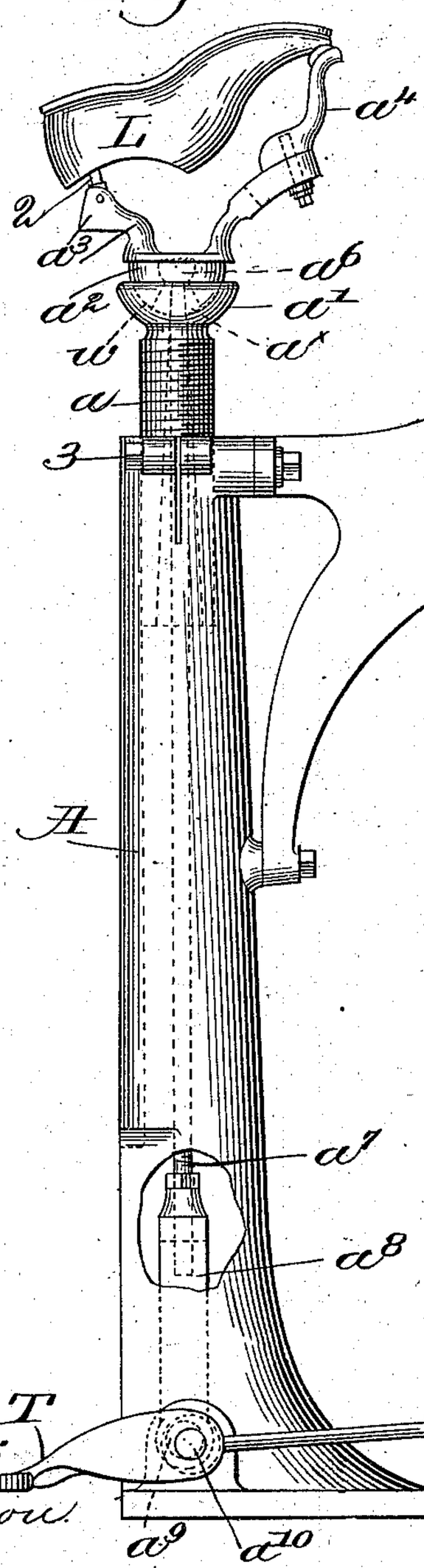

Fig. 3.

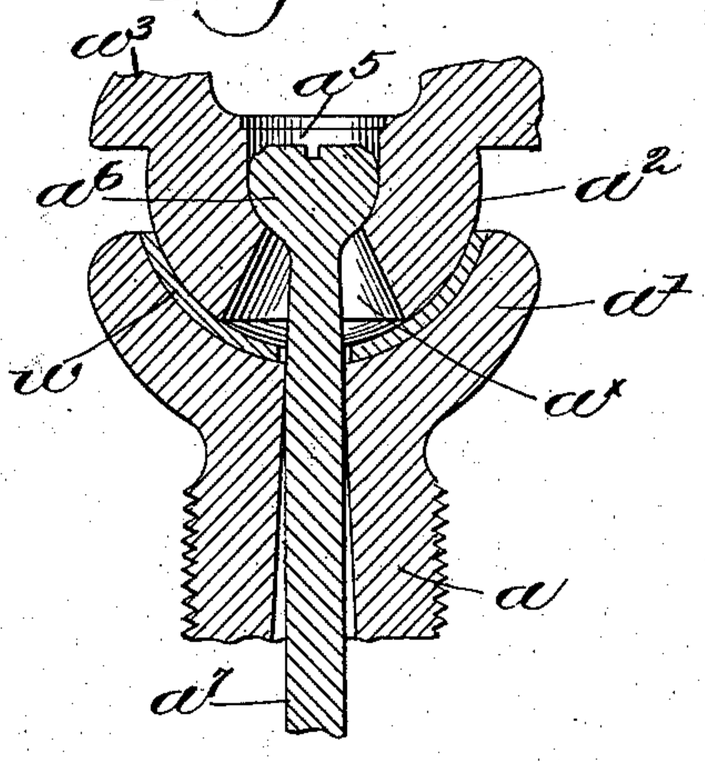

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Fig. 4.

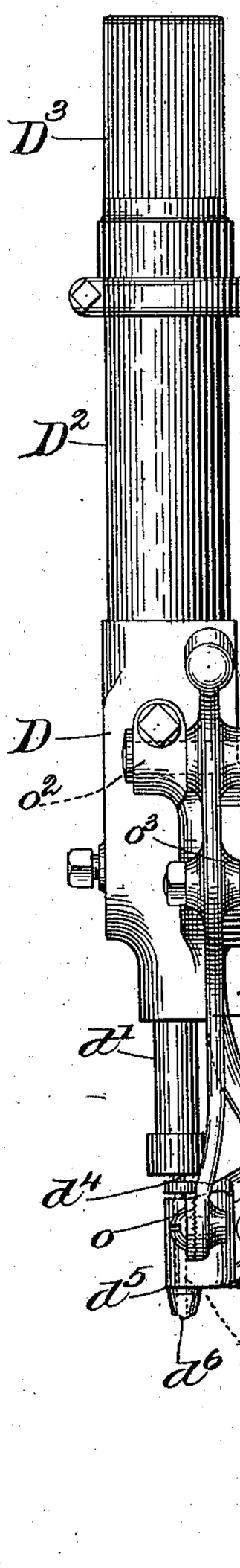

Fig. 13.

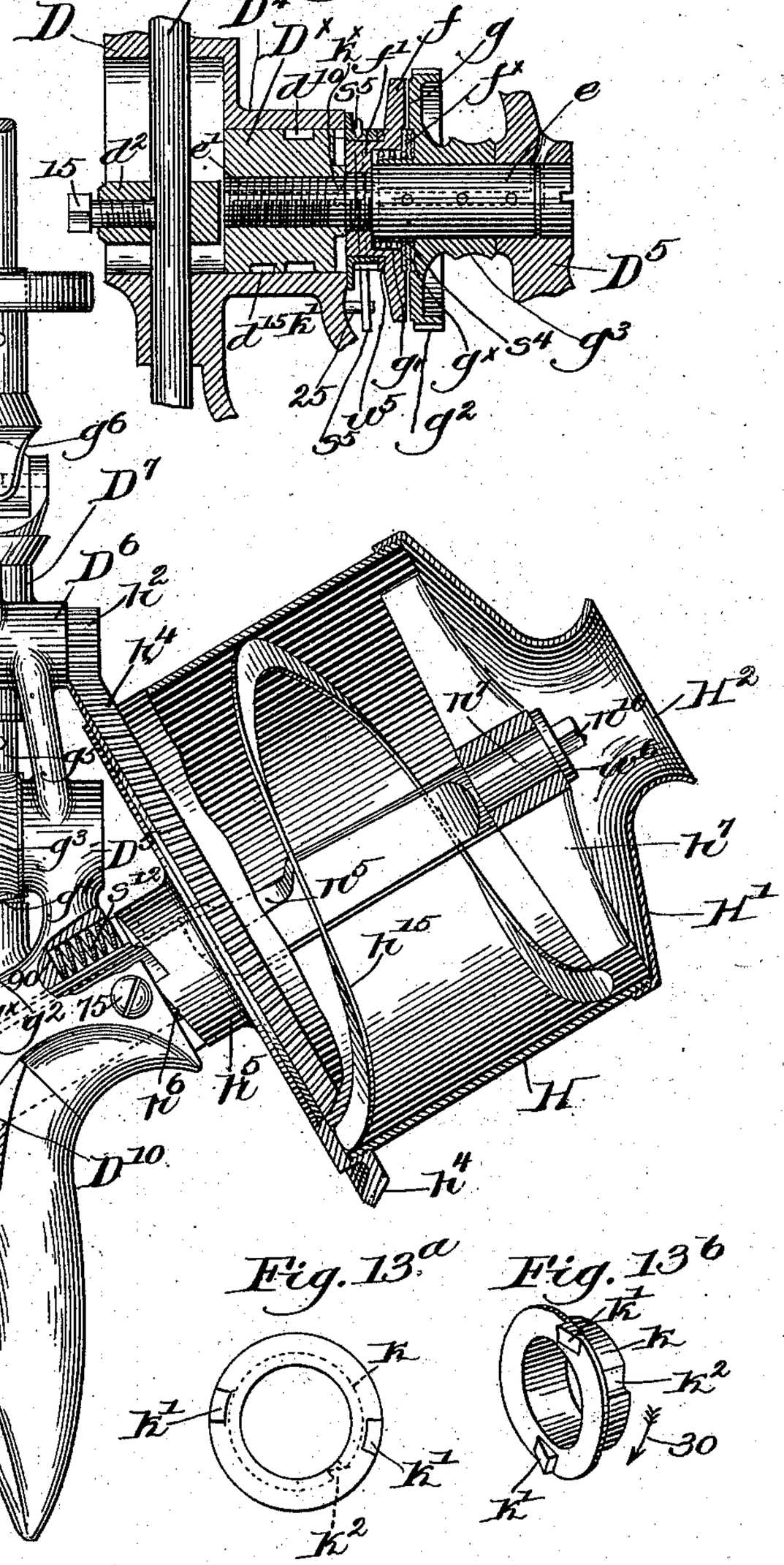

Fig. 13a

Fig. 13b

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LASTING APPARATUS.

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Fig. 6.

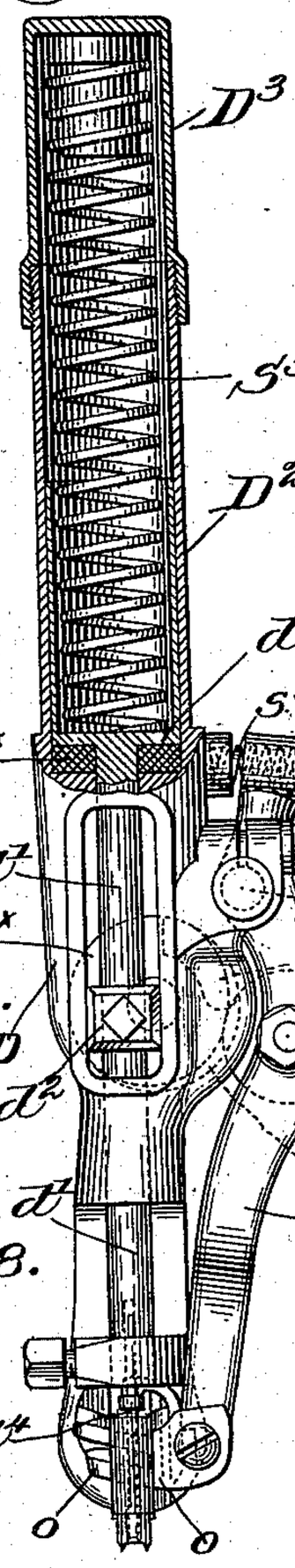


Fig. 5.

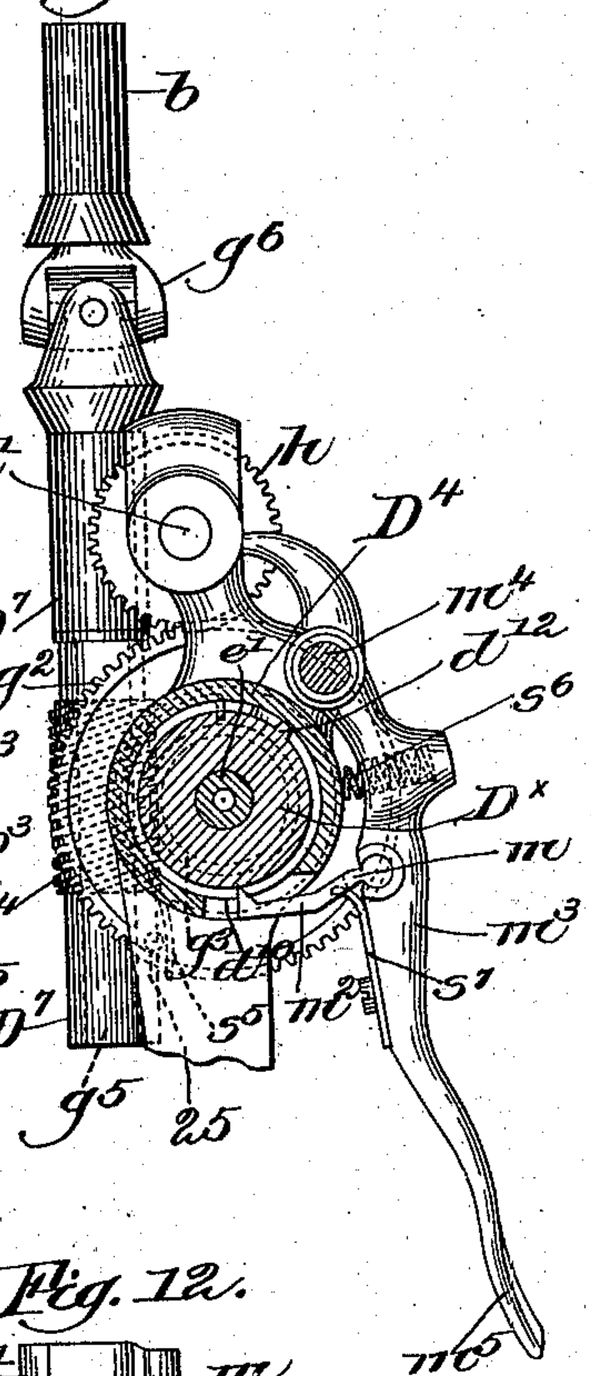


Fig. 9.

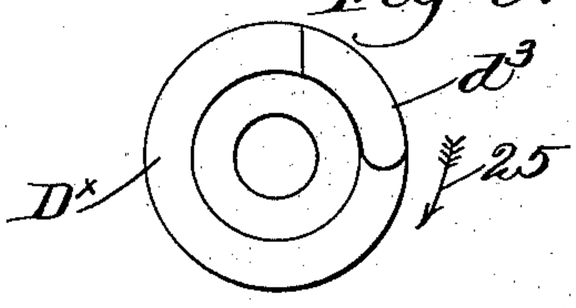


Fig. 10.

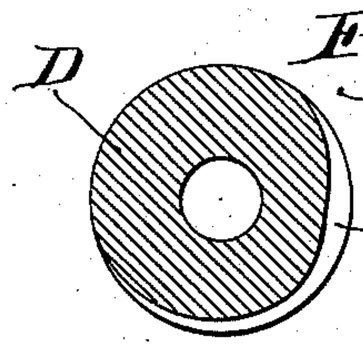


Fig. 11.

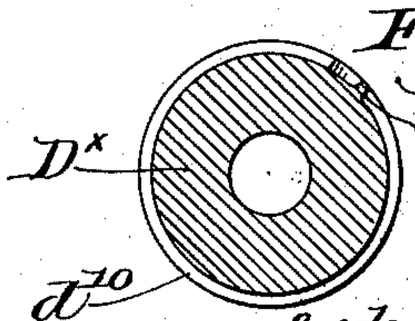


Fig. 8.

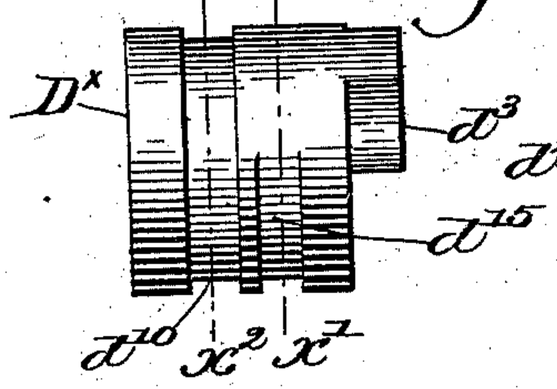


Fig. 12.

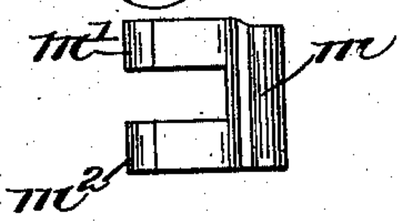
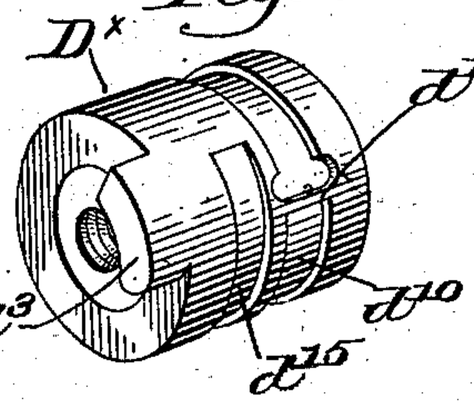


Fig. 7.



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LASTING APPARATUS.

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Fig. 14.

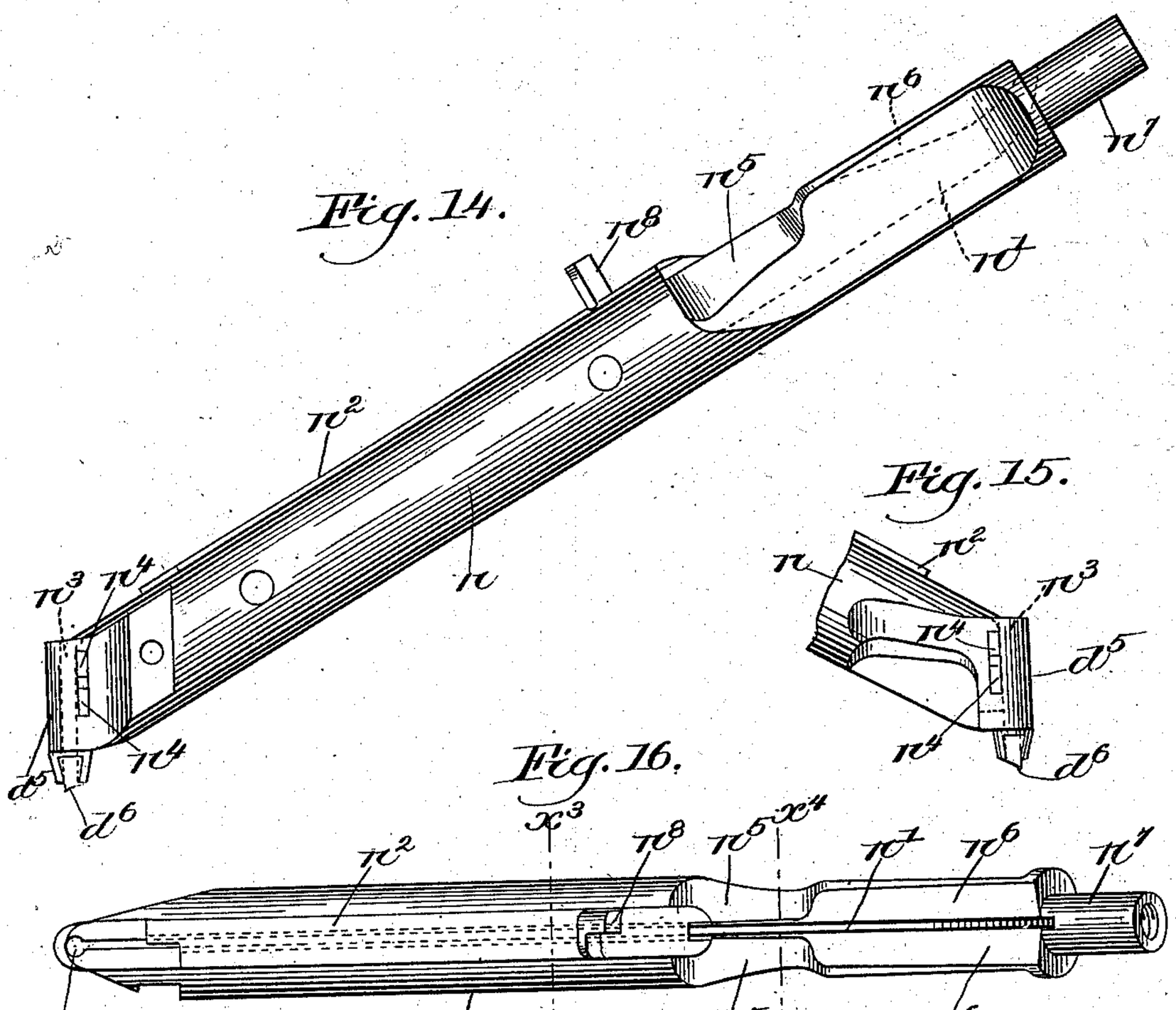


Fig. 15.

Fig. 16.

Fig. 17.

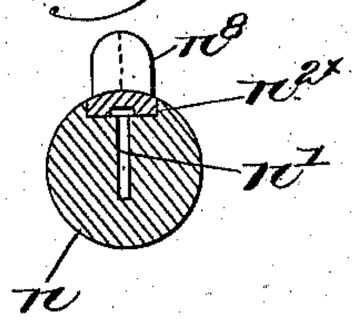


Fig. 18.

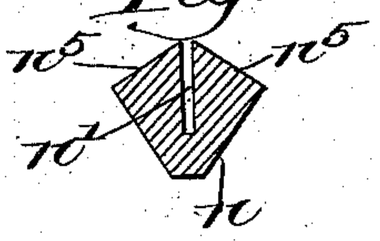
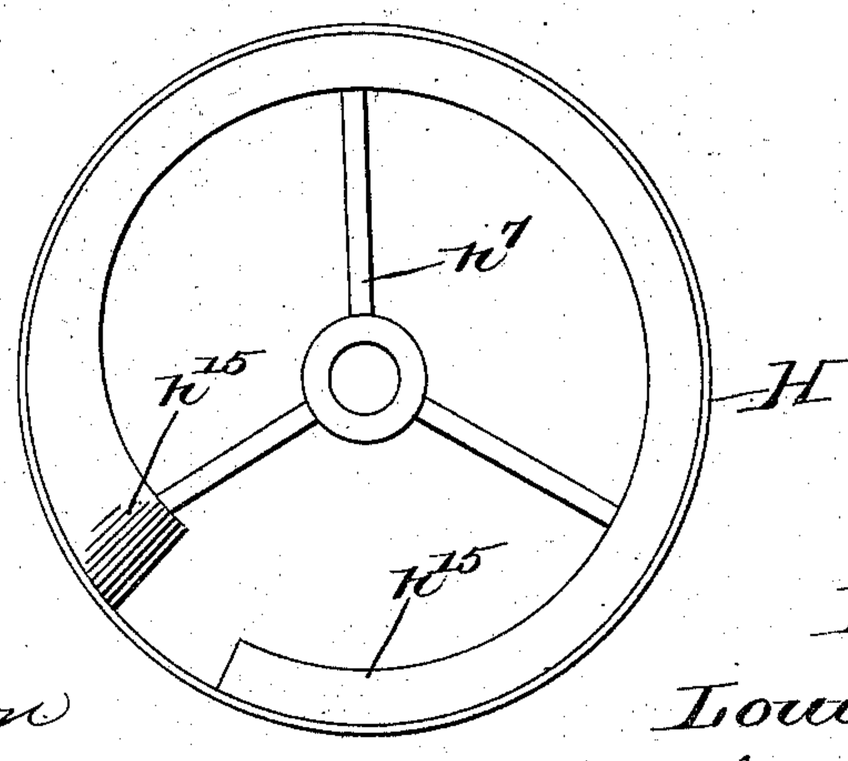


Fig. 19.



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(No Model.) 6 Sheets—Sheet 6.

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LASTING APPARATUS.

No. 559,130. Patented Apr. 28, 1896.

Fig. 20.

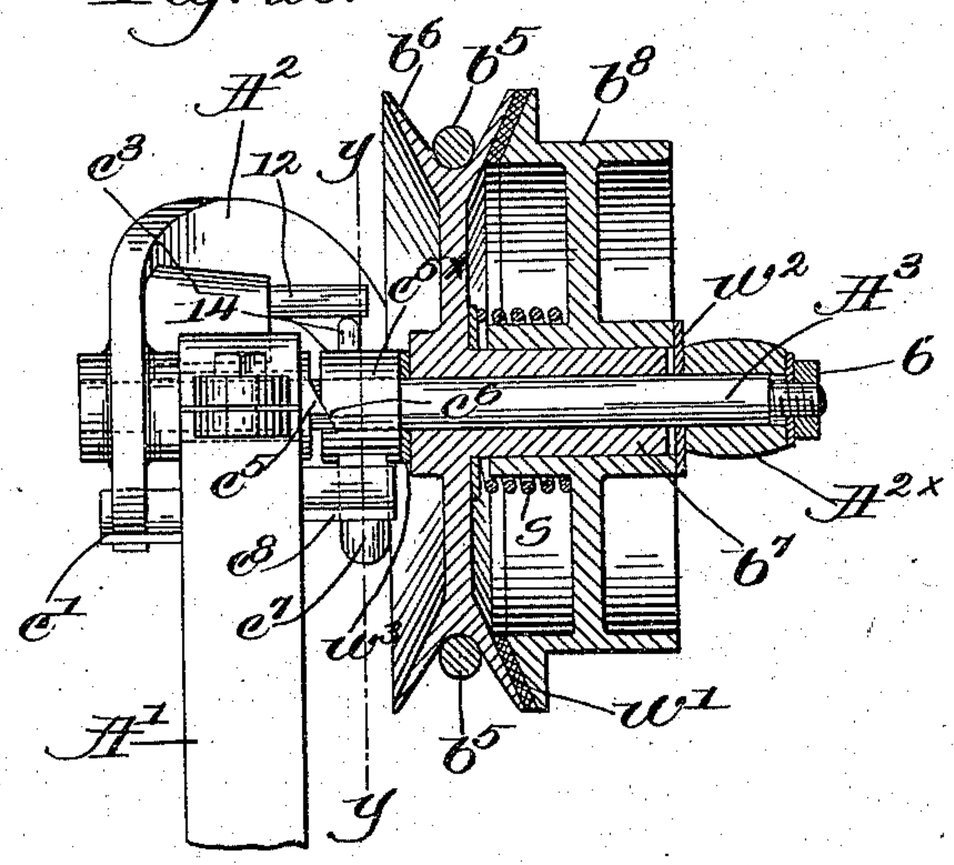
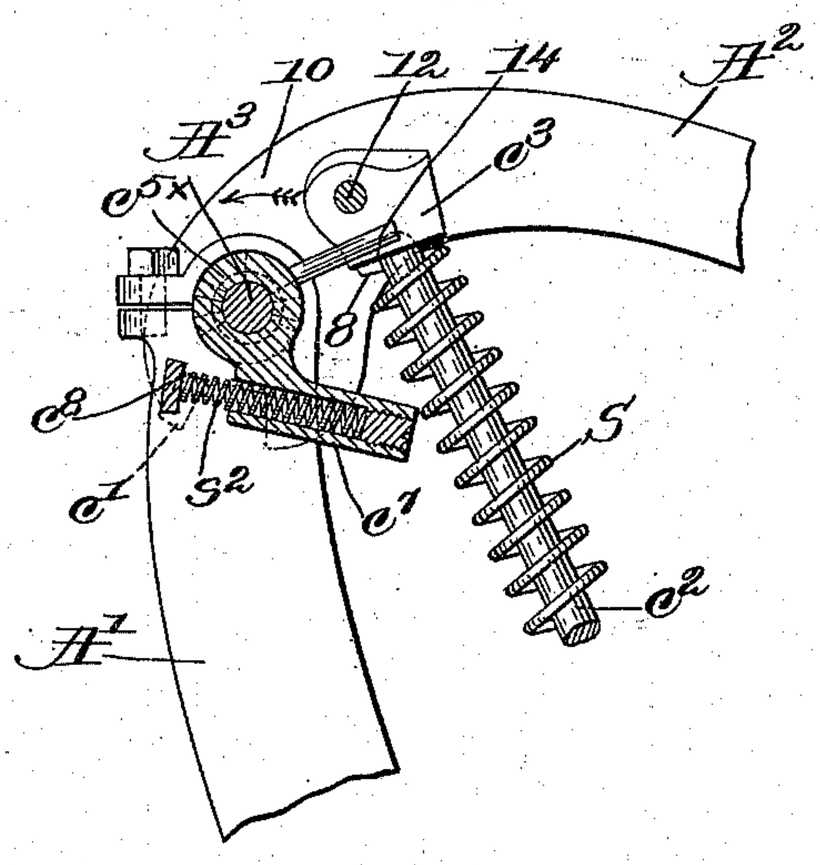


Fig. 21.



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UNITED STATES PATENT OFFICE.

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LASTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 559,130, dated April 28, 1896.

Application filed December 18, 1895. Serial No. 572,576. (No model.)

To all whom it may concern:

Be it known that I, LOUIS GODDU, of Winchester, in the county of Middlesex, in the State of Massachusetts, have invented an Improvement in Lasting Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object the production of an apparatus for facilitating the lasting of boots and shoes wherein the boot or shoe to be lasted is mounted upon a suitable support, and power-driven nail-driving mechanism which is normally inoperative or at rest is supported in such manner as to be moved at the will of the operator toward and from said work-support, the power-transmitting mechanism which at times actuates the nail-driving mechanism being automatically controlled or governed as to its operation by bodily movement of the nail-driving mechanism. Means are also provided whereby when the nail-driving mechanism is in operative position manually-operated means effect a connection between the driver-actuating devices of the nailing mechanism and the power-transmitting mechanism.

In the apparatus herein shown when a nail or tack has been driven the power-transmitting mechanism and the driver-actuating means are automatically disconnected, so that when another tack or nail is to be driven or inserted the driver-actuating means must be manually connected or brought into operative engagement with the power-transmitting mechanism.

Other features of my invention will hereinafter appear and be fully described in the specification, and particularly pointed out in the claims.

Figure 1, in side elevation, represents the upper portion of a lasting apparatus embodying my invention, the bodily movable nailing mechanism being shown as ready for use. Fig. 2 is a side elevation of the work-support to be described, partially broken out, and with the arm to which the upright standard is secured. Fig. 3 is an enlarged sectional view of the joint connecting the work-support and its standard. Fig. 4 is a greatly-enlarged side elevation of the nailing mechanism shown in Fig. 1 detached and partially broken out. Fig. 5 is a sectional view on the line $x\ x$, Fig. 4, of the mechanism to the right thereof. Fig. 6 is a front elevation, partially broken out, of the nail-driver and its coöperating devices. Fig. 7 is a perspective view of the driver-actuating and clutch-controlling cam-block. Fig. 8 is a side elevation thereof. Fig. 9 is a right-hand end view of said cam-block. Fig. 10 is a transverse section on the line $x'\ x'$, Fig. 8. Fig. 11 is a similar view on the line $x^2\ x^2$. Fig. 12 is a detail of the clutch-controlling mechanism. Fig. 13 is a longitudinal sectional view taken on the driver-actuating shaft and through the clutch devices. Figs. 13^a and 13^b are end and perspective views of a part of the clutch. Fig. 14 is an enlarged side elevation of the guideway detached. Fig. 15 is an opposite view of the nose or throat thereof. Fig. 16 is a top or plan view of the guideway. Fig. 17 is a transverse section thereof on the line $x^3\ x^3$, Fig. 16, and Fig. 18 a similar section on the line $x^4\ x^4$. Fig. 19 is an end view of the hopper with the cap or cover removed. Fig. 20 is an enlarged view, partly in section, of the clutch for the power-transmitting mechanism; and Fig. 21 is a sectional view on the line $y\ y$, Fig. 20, looking to the left.

Referring to Figs. 1 and 2, the lasting apparatus, which consists, essentially, of a support for the boot or shoe to be lasted, a bodily-movable nailing mechanism, and mechanism to transmit power to said nailing mechanism, is shown as mounted upon a suitable column A, said column having bolted or otherwise secured thereto an upwardly-extended and rearwardly-bent arm or standard A′, to the upper end of which is pivotally mounted a swinging support A^2, pivoted on a shaft A^3. (Shown more clearly in Figs. 20 and 21.)

The column A is made hollow and is split at its upper end and internally threaded to receive a hollow post or standard a, socketed at its upper end, as at a', to receive therein a ball-like portion a^2 of the last support a^3, having a suitable heel-pin 2 and adjustable toe-rest a^4 (see Fig. 2) to support the last L

upon which the boot or shoe to be lasted is placed, it being understood that the operator in lasting will with a pair of suitable hand-pincers pull the edges of the upper over the inner sole, and by means of the nailing mechanism to be described will secure the overturned edge of the upper in place upon the inner sole by tacks or other similar fastenings.

Between the ball a^2 and its socket a', which together form a ball or swivel joint, is preferably interposed a concavo-convex cushion or washer w, of leather, rawhide, or other suitable material, the said ball being cut away interiorly to form a socket a^5 in which rests the ball-like upper end a^6 of a clamping-rod a^7, extended through a suitable hole in the cushion w in the standard a, said rod a^7 being connected at its lower end by a rigid link a^8 to an eccentric a^9, (see dotted lines, Fig. 2,) fast on the fulcrum a^{10} of the counterbalanced treadle T.

Normally the counterpoise W will tend to elevate the clamping-rod a^7, so that the last-support a^3 may be moved in various directions on the socketed top of the post or standard a, the lower part of the ball a^2 being cut away conically at $a^\times$, Fig. 3, to allow free play of the ball in its socket and yet permit it to be clamped in any position by depression of the treadle T by the foot, the treadle operating the eccentric.

The split upper end of the column A is tightly clamped upon the threaded standard a by means of a suitable bolt 3 when the latter has been adjusted to the desired vertical height.

The bodily-movable nailing mechanism designated at N as a hole, Fig. 1, is suspended by a shaft b from the swinging arm A^2, said shaft being connected by a universal joint b' at its upper end to a short shaft b^2, rotatable in bearings b^3 on the outer end of the arm A^2, said short shaft having fast thereon a preferably grooved pulley b^4 intermediate the bearings and connected by a flexible band or belt b^5 to a larger driving-pulley b^6.

Referring to Fig. 20, the pulley b^6 is shown as provided with an elongated hub b^7, mounted to rotate loosely on the shaft A^3 and forming the driven member of the clutch, the other member being shown as a pulley b^8, adapted to be continuously rotated by a belt from any suitable source of power, the hub of the pulley rotating on the hub b^7 of the clutch member b^6, a suitable friction-washer w' being interposed between the adjacent faces of the clutch members.

A spring s, surrounding the hub of the pulley b^8, bears against and normally tends to separate the coöperating member b^6 therefrom to release the clutch, the pulley b^8, as shown in Fig. 20, being held from longitudinal movement on the shaft A^3 by a flange $A^{2\times}$ of the swinging arm A^2, pivotally mounted on the shaft A^3 beyond the pulley and held in place by a suitable nut 6, a washer w^2 being interposed between the pulley and the flange or arm $A^{2\times}$.

While the member b^8 of the clutch is continuously rotated, the coöperating member b^6 is normally at rest, and I have provided means for automatically throwing the clutch into or out of engagement by the bodily movements of the nailing mechanism from its position of rest into its operative position, (shown in Fig. 1,) and such operation of the clutch is controlled in this embodiment of my invention by the movement of the swinging arm A^2 about its pivot or fulcrum A^3.

The arm A^2 is notched at c, Fig. 1, to straddle a projection c' on the outer face of the upright A' to limit the movement of the arm A^2 in one or the other direction, the arm being shown in Figs. 1, 20, and 21 as at the upper limit of its vertical movement with the clutch in engagement to cause rotation of the depending shaft b by or through the band b^5.

A counterbalancing-spring S surrounds a rod c^2, interposed between a lug c^3 on the inner side of the arm A^2 and an adjustable bushing c^4 on the upright A', said rod having a nut 7 on its lower end below the bushing and a pin 8 (see Fig. 21) on its upper end to retain the upper end of the spring S in place, depression of the swinging arm A^2 compressing the spring, the latter tending to maintain it in a state of substantially stable equilibrium.

On the inner face of the upright A' is secured a cam c^5, adapted to coöperate with a sleeve $c^{5\times}$ longitudinally and rotatably movable on the shaft A^3, the cam c^5 engaging the inclined face c^6 of the sleeve $c^{5\times}$, so that when the arm A^2 is raised a spring s^2, Fig. 21, partially inclosed in a housing c^7 of the sleeve and bearing at its other end against a lug c^8 on the upright A', will turn the said sleeve in the direction of the arrow 10, Fig. 21. This rotation of the sleeve, by reason of its wedge-face c^6 and the coöperating fixed wedge-face c^5, moves the sleeve bodily to the right (Fig. 20) to press the movable clutch member b^6 into engagement with the continuously-rotating member b^8 to immediately throw the clutch into operation and thereby rotate the shaft b, the member b^6 and sleeve being separated by a washer w^3.

When the operator desires to stop the power-transmitting mechanism, he lowers the nailing mechanism N, drawing down the arm A^2 from the position shown in Fig. 1, a pin 12 on said arm engaging a pin or projection 14 on the sleeve $c^{5\times}$ and turning it thereby in the direction opposite to the arrow 10, Fig. 21, compressing the spring s^2, but allowing the weaker spring s then to expand to separate the two clutch members and thus stop the power-transmitting mechanism.

The two springs s^2 and s act substantially at right angles to each other, the spring s^2 being the stronger of the two, as it has to turn the sleeve against the friction of the wedge-faces c^5 and c^6 and the pressure of the spring s in throwing the clutch into operation. The

spring s has only to throw the sleeve $c^{5\times}$ toward the wedge-face c^5 in unclutching and in a direction at right angles to the expansive force of the spring s^2.

From the foregoing it will be obvious that bodily movement of the nailing mechanism N from its position of rest into operative position, or vice versa, will control the power-transmitting mechanism, the nailing mechanism being normally held in a position of rest and for convenience swung to one side to enable the shaft b to be caught into an open hook A^5 (see Fig. 1) on the upright A', a very slight movement of the operator's hand being sufficient to remove the shaft from the hook or place it in engagement therewith.

While in the apparatus herein shown the arm A^2, which sustains the nailing mechanism and power-transmitting mechanism, is swung upwardly to start said power-transmitting mechanism and swung downwardly to automatically stop it, it will be obvious that a mere reversal of these movements would come within the scope of my invention.

Referring now more particularly to Figs. 4 to 13^b, inclusive, the nailing mechanism comprises a frame D, of suitable shape to provide bearings for the operative parts, having rigidly attached thereto a handpiece or handle D', which is grasped by the operator to direct the bodily movement of the nailing mechanism, the frame D having an upright tubular extension D^2, closed by a cap D^3, in which extension reciprocates the head d of the driver-bar d', a compressing-spring S^3 of sufficient power being placed in the tubular extension D^2 between its cap and the head d of the driver, the latter being cushioned at $d^\times$, as is usual in spring-depressed drivers.

A block d^2, secured by a set-screw 15 to the driver-bar d', plays in a vertically-slotted portion of the frame D and is adapted to be engaged by a cam projection d^3 on the cam-block $D^\times$, the latter being shown best in Figs. 7 and 8, the rotation of the said block in the direction of the arrow 25, Fig. 9, gradually lifting the driver and suddenly releasing it when at its highest position to be depressed by the expansion of the spring S^3, the driver-bar d' having secured to its lower end the driver d^4, vertically movable in the nose d^5 of the nailing mechanism, said nose having on its under side a sharpened lip or prong d^6 to enter the material of the upper at the rear of the nail-passage to assist in holding the upper in place while the tack or nail is being driven therein.

The cam-block $D^\times$ is screwed onto the reduced end e' of the shaft e, having a slight longitudinal movement, for a purpose to be described, the cam-block rotating in a bearing D^4, forming a part of the frame, and the outer end of the shaft e in a bearing D^5, also forming a part of the frame D.

The reduced portion e' of the shaft is also screwed into the hub f' of a clutch member f to be rigidly secured thereto, the inner face of said member f having radial engaging projections or teeth $f^\times$, Fig. 4, to be engaged by similar projections or teeth $g^\times$ on the inner face of the coupling clutch member g, loosely mounted on the shaft e, when the two members are pressed toward each other.

A spring s^4, interposed between the reduced portion of the hub f' of the clutch member f and the annular flange or hub g' of the member g, normally tends to separate the clutch members by forcing member f with its attached shaft and cam-block to the left, Fig. 13.

The clutch member g has a toothed periphery g^2 in mesh with a gear h on a shaft h', mounted in bearings D^6, said shaft having at its outer end a pinion h^2 in mesh with a beveled gear h^4, formed on the base of the hopper H, (see Figs. 1 and 4,) to be hereinafter described.

The clutch member g has secured to or forming a part of it a spiral gear g^3 in mesh with a worm g^4, fast on a shaft g^5, (see dotted lines, Fig. 5,) vertically mounted to rotate in vertical bearings D^7 and connected at its upper end by a universal joint g^6 to the lower end of the depending shaft b, forming a part of the power-transmitting mechanism, so that whenever the power-transmitting mechanism is in operation the loose member g of the clutch members f g will be continuously rotated, and the hopper H, through the intermediate gearing described, will also be rotated. The spiral gear g^3 and worm g^4 give a very steady and even rotative movement with little or no lost motion.

The nailing mechanism is constructed to drive a tack or other fastening at each depression of the driver, and the operation of the driver is controlled by manually-operated means to cause engagement of the clutch members f g, such engagement when the power-transmitting mechanism is in motion causing one complete revolution of the driver-actuating shaft e to lift and release the driver, the driver-depressing spring S^3 forcing the driver down quickly as soon as the cam-lug d^3 releases the block d^2 and the driver-bar.

Referring to Figs. 13^a and 13^b, an annularly-flanged collar k is loosely mounted on the hub of the clutch member f, the flanged face of said collar having thereon, preferably, two oppositely-inclined cam-lugs k', wedge-like in shape, to normally enter correspondingly-shaped recesses $k^\times$ in the adjacent face of the bearing D^4, a washer w^5 being interposed between the other end of the collar and the clutch member, one end of a spring s^5 entering a suitable recess in the collar k, the other end of the spring resting against a lug 25 on the main frame D, the said spring tending normally to maintain the collar in such position that the lugs k' thereon will enter the recesses $k^\times$ thereof.

The collar has a notch k^2, (see Fig. 13^b,) adapted to be entered at times by one tooth, as m', of a compound pawl m, pivotally mounted in a pawl-carrier, (shown best in Figs. 4 and 5,) as a lever m^3, fulcrumed at

m^4 in the frame and normally pressed outwardly by a spring s^6, (see Fig. 5,) the compound pawl shown as normally elevated by a bent spring s^7, Fig. 5.

When the operator desires to actuate the driver, he presses with his forefinger the tail m^5 of the pawl-carrier m^3 to bring the tooth m' of the compound pawl into engagement with notch k^2 of the collar k to turn it in the direction of the arrow 30, Fig. 13^b, on the hub of the clutch member f, such rotative movement by the cam-lugs k' acting on the inclined faces of their sockets or seats $k^\times$, moving the collar and thereby the clutch member f on its shaft e to the right, Fig. 13, to bring the adjacent faces of the clutch members f g into engagement, and immediately the rotation of the latter member is transmitted to the member f, the shaft e, and cam-block $D^\times$ to rotate them in unison.

The pawl is retained in engagement with collar k^2 until the lifting-cam d^3 engages the block d^2 on the driver-bar and begins to compress the driver-spring S^3, the resistance of such spring after the pawl has been released, as will be described, keeping the clutch members in engagement until the shaft e has been rotated sufficiently to release the driver-block and permit the driver-spring to act, the starting and stopping positions of said lifting-cam d^3 being shown in Figs. 8 and 9, so that when a tack or nail has been driven the driving mechanism is automatically stopped, the spring s^4 having sufficient power to separate the clutch members when relieved of the opposing tension of the driver-spring S^3.

The lifting-cam $D^\times$ has a peripheral groove d^{10} therein of a width corresponding to the width of the tooth m^2 of the pawl m, a projection d^{12} in said groove acting upon said tooth in the rotation of the lifting-cam to depress the pawl or lug in order to thereby withdraw the pawl-tooth m' from the notch k^2 of the collar k, the latter being immediately drawn back or rotated in a retrograde direction by its spring s^5 into normal or inoperative position, (shown in Fig. 13,) leaving the separating-spring s^4 free to act when the driver has been depressed by its spring.

It will thus be seen that while the power-transmitting mechanism may be continuously rotating the driver will be actuated once only for each movement of the manually-operated clutch-controlling means, and the operator holding the nailing mechanism in one hand can thereby move it over the bottom of the boot or shoe held on the last, as described, to insert a tack or nail from time to time as with the other hand he draws the upper over the inner sole.

A guard 50, clamped upon the extension D^2 of the frame of the nailing mechanism, loosely surrounds the lower end of the depending shaft b and prevents the nailing mechanism from entirely swinging about the joint g^6 when the operator releases the handle D'.

The frame D has at its lower portion adjacent the handle D' a seat D^{10} for a guideway n, (shown separately in Figs. 14 and 16,) the said guideway being cylindrical at its lower portion and secured in the inclined seat D^{10} by suitable screws 75, the guideway being grooved longitudinally at n' to form a passage-way for the bodies of the tacks or nails, the heads of the latter resting upon the top of the guideway and passing under a clearer n^2, covering the lower portion of the groove, and longitudinally movable in a recessed seat $n^{2\times}$ in the top of the guideway, as will be described, the lower extremity of the guideway terminating in the nose d^5, hereinbefore referred to, and having a nail-passage or throat n^3 therethrough into the side of which the groove n' opens.

The guideway is slotted transversely at n^4, Figs. 14 and 15, to permit the passage therethrough of the bifurcated end of a separator o, of usual construction, to separate the nails or tacks and permit their passage singly from the groove n' into the throat or passage n^3 in the path of the driver, said separator being mounted on the lower end of a lever o', (see Fig. 6,) fulcrumed on the main frame at o^2 and provided with a suitable roll o^3, held in engagement with an edge-cam d^{15} in the lifting-cam $D^\times$, (shown in section in Fig. 10 and in elevation in Figs. 7 and 8,) a suitable spring s^9 retaining the roll in engagement with the cam.

The upper end of the guideway n is somewhat peculiar in shape, its top slanting away at opposite sides from the longitudinal groove n', as at n^5, Fig. 18, and above such portion the guideway is cut away to form walls n^6, converging toward the groove n' to receive the tacks or nails as they fall thereupon from the lifting device of the hopper, to be described, such nails as slide lengthwise down the converging walls n^6 tipping as they reach the bottom, so that their bodies enter the groove n' to travel down the same by gravity, while those nails which fall more or less crosswise upon the guideway will either fall off and back into the hopper when they reach the outwardly and downwardly inclined walls n^5 or they will be pushed therefrom by the clearer n^2 as it is reciprocated.

The hopper H (see Fig. 4) has at its lower end a hub h^5, serrated or notched at its end, as at h^6, and surrounds the cylindrical portion of the guideway n immediately adjacent the seat D^{10}, a spider h^7, secured to the upper end of the hopper, being mounted on the reduced upper extremity n^7 of the guideway and held thereon by a suitable washer w^6 and nut n^{16}, so that the hopper is freely rotatable upon the guideway.

The notched or serrated end h^6 of the hub h^5 engages a lug n^8 on the clearer n^2 and immediately depresses it against the action of a spring s^{12}, inserted in a recess 90 of the main frame, the free end of the spring bearing against the rear of the lug n^8 and moving it in the opposite direction, so that a quick upward movement is given to the clearer to snap nails

or tacks out of the groove n' into the guideway if the heads are too large to pass beneath the clearer, and also throwing off tacks or nails resting transversely on the guideway.

Within the hopper I have secured a spiral shelf h^{15}, extending from the base of the hopper along its inner wall up to near the upper end of the hopper-body, such spiral shelf acting to lift the tacks or nails from the lower portion of the hopper and to drop them onto the converging walls n^6 of the guideway as the hopper is rotated by the mechanism described.

A cap or cover H′, having an open mouth H^2, is attached to the upper end of the hopper through the opening in which the tacks or nails may be delivered to the hopper from time to time as necessary without removing the cap or the hopper.

The bearing D^4 of the frame is cut away at one side to expose the lifting-cam $D^\times$ in order that the pawl-tooth m^2 may be engaged by the lug or projection d^{12} and the roll o^3 be controlled by the cam d^{15}.

From the foregoing description it will be apparent that the bodily-movable nailing mechanism is actuated by means of power-transmitting mechanism, the latter being controlled by bodily movement of the nailing mechanism, and that manually-operated means are provided to at times connect the driver-actuating means of the nailing mechanism with the power-transmitting mechanism by or through a normally inoperative clutch.

My invention is not restricted to the precise construction and arrangement herein shown and described, as the same may be modified or rearranged without departing from the spirit and scope of my invention.

I claim—

1. In a lasting apparatus, a support for the boot or shoe to be lasted, a nailing mechanism bodily movable relative thereto and including a driver, means to normally sustain said mechanism in a position of rest, power-transmitting mechanism controlled by bodily movement of said nailing mechanism, and manually-operated means to at times connect said power-transmitting mechanism and the driver, to actuate the latter, substantially as described.

2. In a lasting-machine, a support for the boot or shoe to be lasted, a nailing mechanism bodily movable relative thereto and including a driver, and means to actuate it, means to normally sustain said mechanism in a position of rest, power-transmitting mechanism controlled by bodily movement of said nailing mechanism, and manually-operated means to at times connect said power-transmitting mechanism and driver-actuating means, substantially as described.

3. In a lasting-machine, a support for the boot or shoe to be lasted, a nailing mechanism bodily movable relative thereto and including a driver, and means, containing a clutch member, to actuate it, means to normally sustain said mechanism in a position of rest, power-transmitting mechanism having a second clutch member, and controlled by bodily movement of said nailing mechanism, and manually-operated means to at times cause engagement of the said clutch members, whereby the driver is actuated, substantially as described.

4. In a lasting apparatus, a support for the boot or shoe, a bodily-movable nailing mechanism, including a driver and means to actuate it, means to normally sustain said mechanism in a position of rest, power-transmitting mechanism started and stopped automatically by bodily movement of the nailing mechanism in a substantially vertical direction, and a manually-operated clutch to at times connect the power-transmitting mechanism and the driver-actuating means, substantially as described.

5. In a lasting apparatus, a support for the boot or shoe, a bodily-movable nailing mechanism, including a driver and means to actuate it, means to normally sustain said mechanism in a position of rest, power-transmitting mechanism, including a primary clutch controlled automatically by bodily movement of the nailing mechanism, and a secondary clutch manually operated to at times connect said driver-actuating means and power-transmitting mechanism, to actuate the driver, substantially as described.

6. In a lasting apparatus, a support for the boot or shoe, a bodily-movable nailing mechanism, including a driver, means to sustain said mechanism, power-transmitting mechanism started and stopped automatically by bodily movement of the nailing mechanism, manually-operated means to at times connect said power-transmitting mechanism and the driver, to actuate the latter, and a releasing device to automatically disconnect said power-transmitting mechanism and the driver, substantially as described.

7. In a lasting apparatus, nailing mechanism, including a spring-depressed driver, and a driver-lifting shaft, a driven clutch member longitudinally movable with said shaft, power-transmitting mechanism, including a driving clutch member, the coöperating surfaces of said members having engaging projections thereon, means to manually move said members into engagement, the resistance of the driver-spring when compressed maintaining such engagement, and a releasing-spring to separate the clutch members when the driver-spring expands to depress the driver, substantially as described.

8. In a lasting apparatus, a nail-driving mechanism, including a driver and its actuating-shaft, a clutch member rotatable therewith, a coöperating clutch member loosely mounted on said shaft, a spiral gear rotatable with said latter member, and power-transmitting mechanism including a rotatable shaft having fast thereon a spiral gear in en-

gagement with the said clutch-gear, substantially as described.

9. In a lasting apparatus, a support for the boot or shoe, a bodily-movable nailing mechanism, a swinging support for said mechanism, a counterbalancing-spring for the support, power-transmitting mechanism between the swinging support and nail-driving mechanism, controlled by bodily movement of the latter, and a holder to normally retain the nail-driving mechanism in a position of rest, substantially as described.

10. In a lasting apparatus, a nail-driving mechanism, a vertically-swinging support therefor, power-transmitting mechanism intermediate said support and nail-driving mechanism, and including a depending shaft to which the nail-driving mechanism is connected, and a clutch for the power-transmitting mechanism, controlled by vertical movement of the support, to start or stop rotation of the depending shaft, substantially as described.

11. In a lasting apparatus, a standard, a last-support, a ball-joint connecting them, a clamping-rod for said support, and a ball-joint connecting said rod and support, substantially as described.

12. In a lasting apparatus, a vertically-adjustable hollow standard, a last-support connected thereto by a ball-joint, a clamping-rod extended through the standard, and a concentric ball-joint connecting said support and clamping-rod, whereby the last-support may be moved universally and clamped in any position, substantially as described.

13. In a lasting apparatus, a vertically-adjustable hollow standard, a last-support mounted to rock or swivel thereupon, and a clamping-rod extended through the standard and connected to said last-support by a universal joint, substantially as described.

14. In a lasting apparatus, a hollow standard having a socket in its upper end, a last-support provided with a ball portion, a cushion interposed between the ball and socket portions, and a clamping-rod extended through the standard and connected to the last-support by a universal joint, substantially as described.

15. A hopper for nailing mechanism, consisting of a cylindrical body to receive nails or tacks in bulk, an inclined support upon which it is rotatably mounted, a lifting-shelf spirally arranged upon the inner wall of said body and extending upwardly from its base, and a cover for the upper end of said body, provided with a feed-opening, substantially as described.

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

LOUIS GODDU.

Witnesses:

GEO. W. GREGORY,

MARGARET ALICE DUNN.