No. 693,466.

Patented Feb. 18, 1902.

A. D. TYLER, JR.

BOOT TREEING MACHINE.

(Application filed Oct. 26, 1900.)

(No Model.)

5 Sheets—Sheet 1.

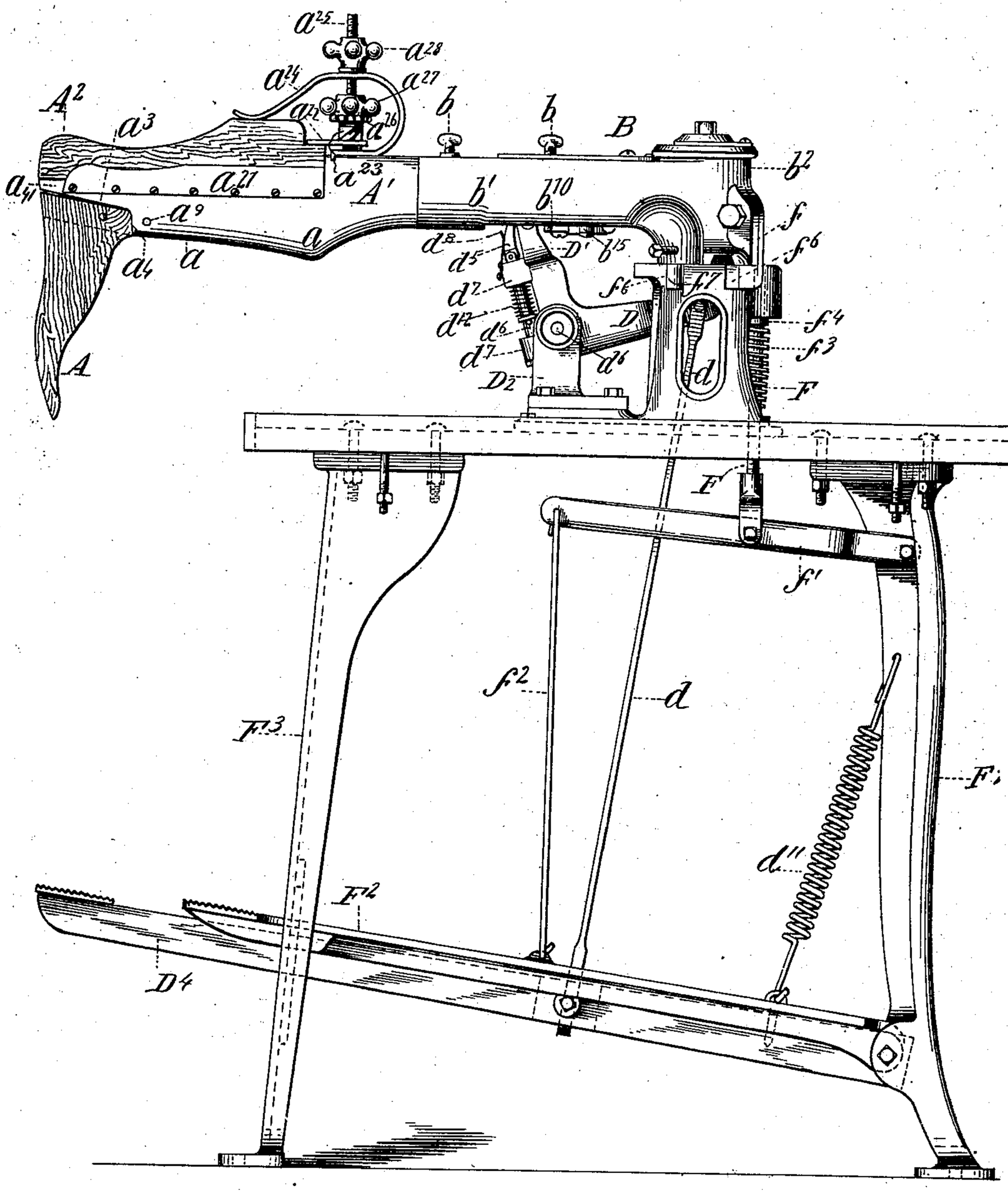

Fig. 1.

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(No Model.) 5 Sheets—Sheet 2.

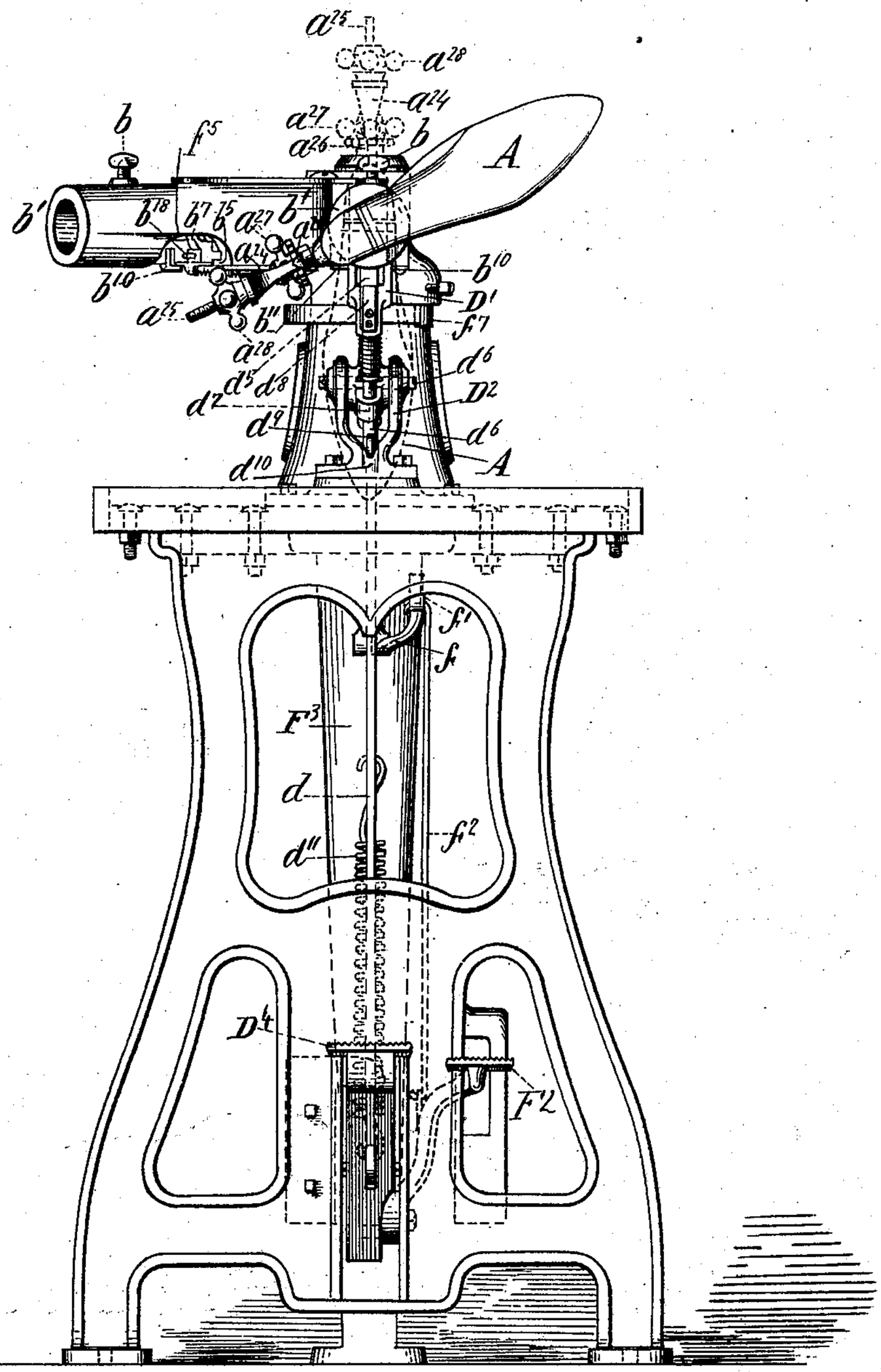

Fig. 2.

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(Application filed Oct. 26, 1900.)

(No Model.) 5 Sheets—Sheet 3.

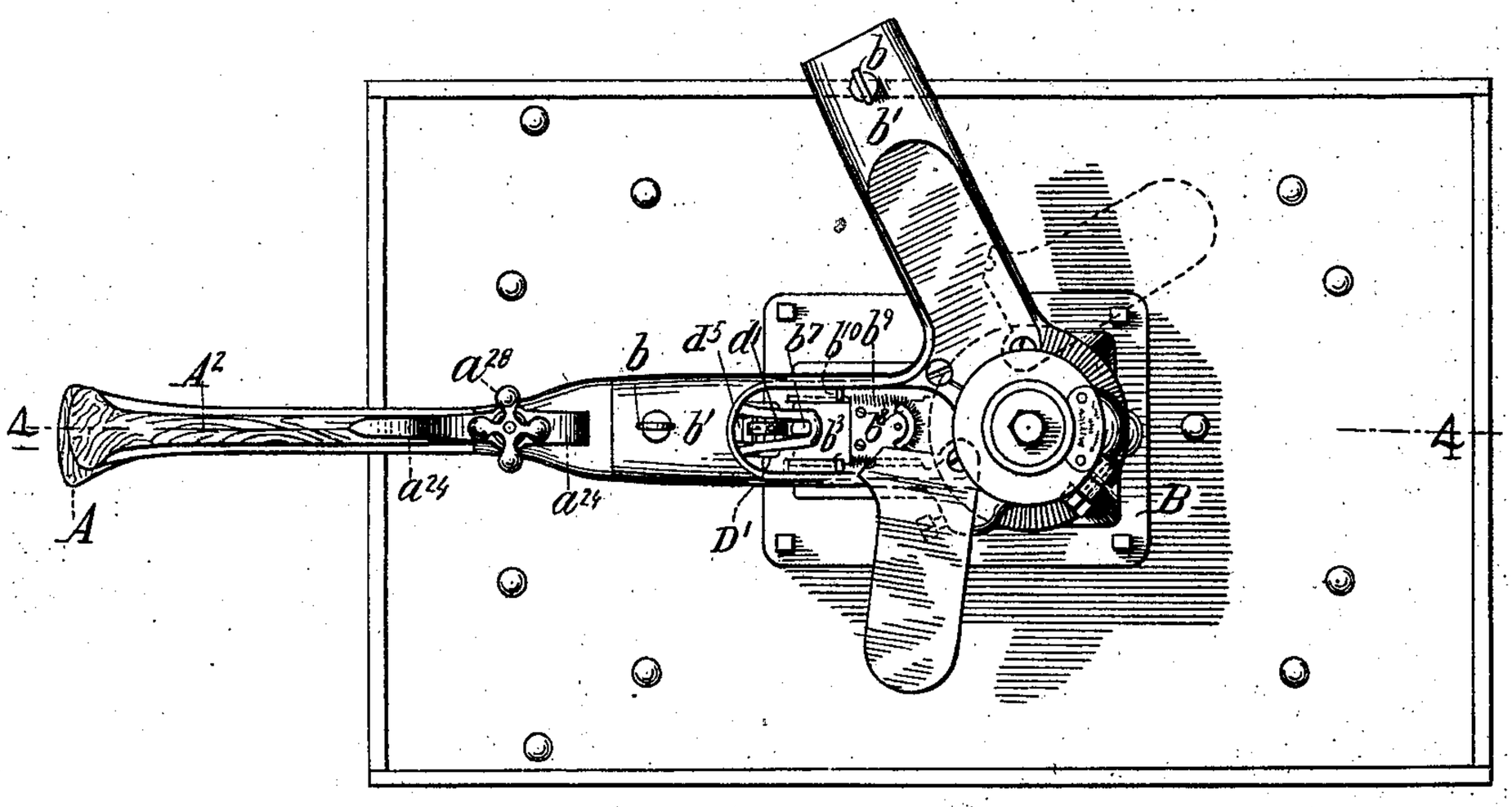

Fig. 3.

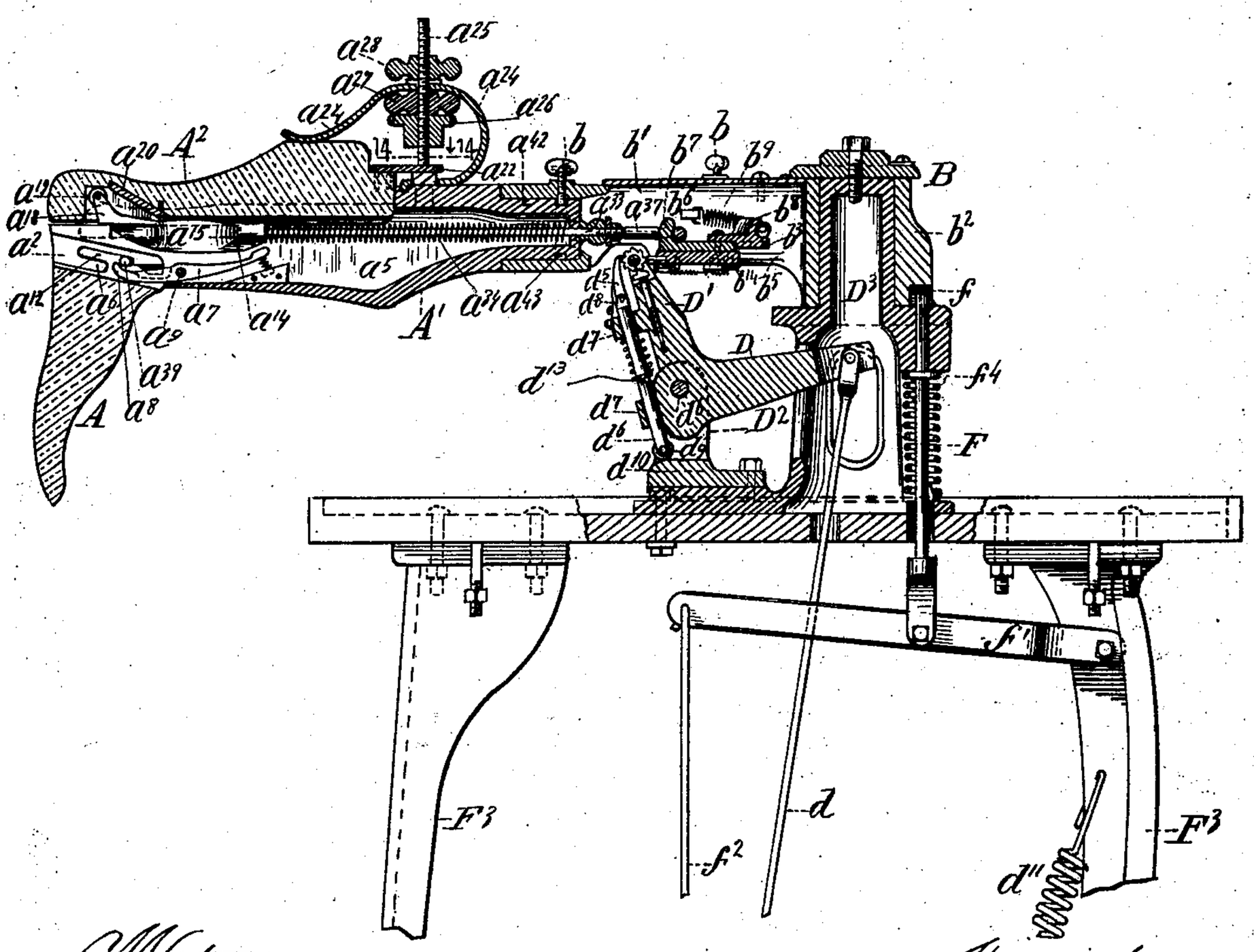

Fig. 4.

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(Application filed Oct. 26, 1900.)

(No Model.) 5 Sheets—Sheet 4.

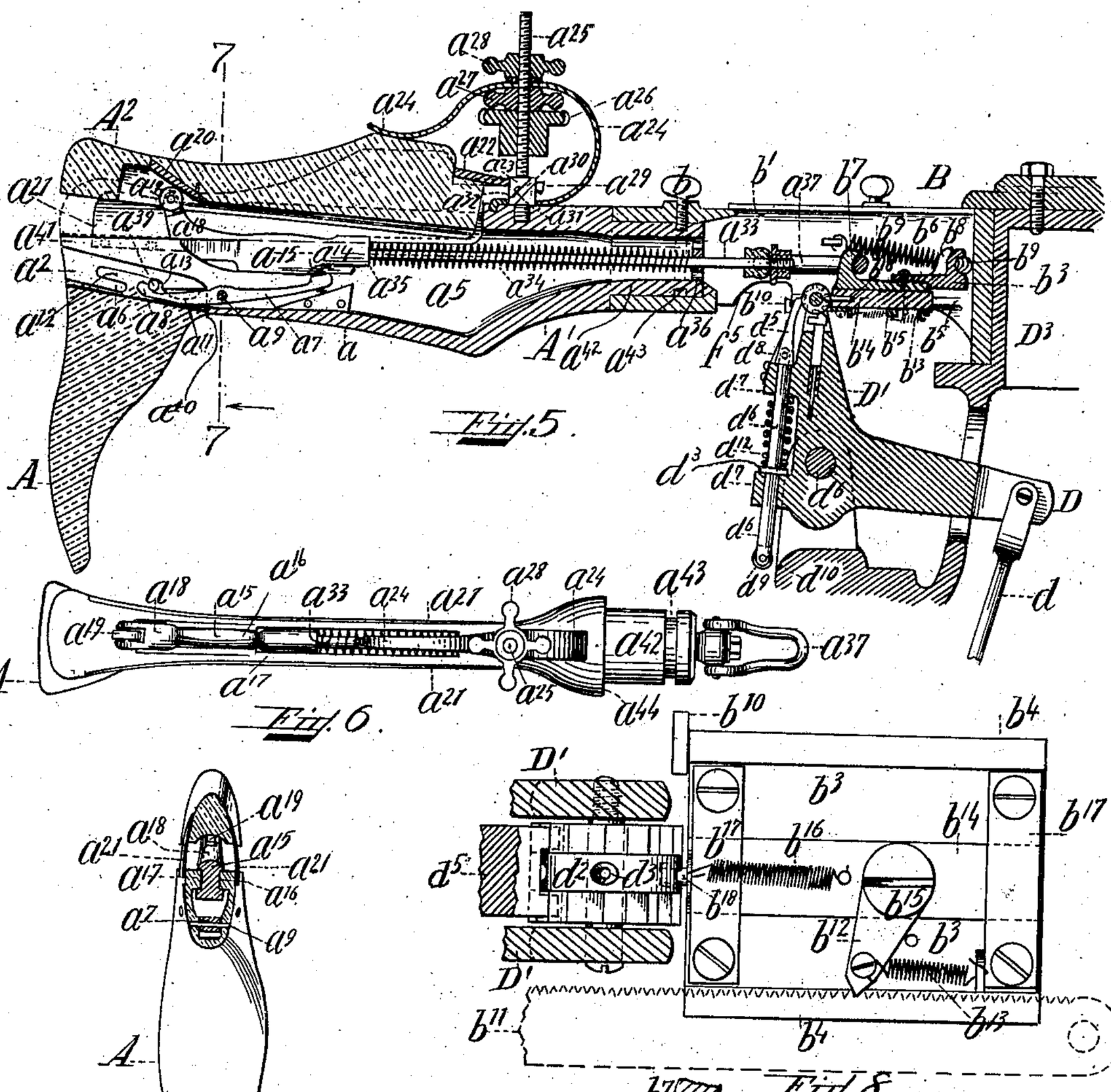

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

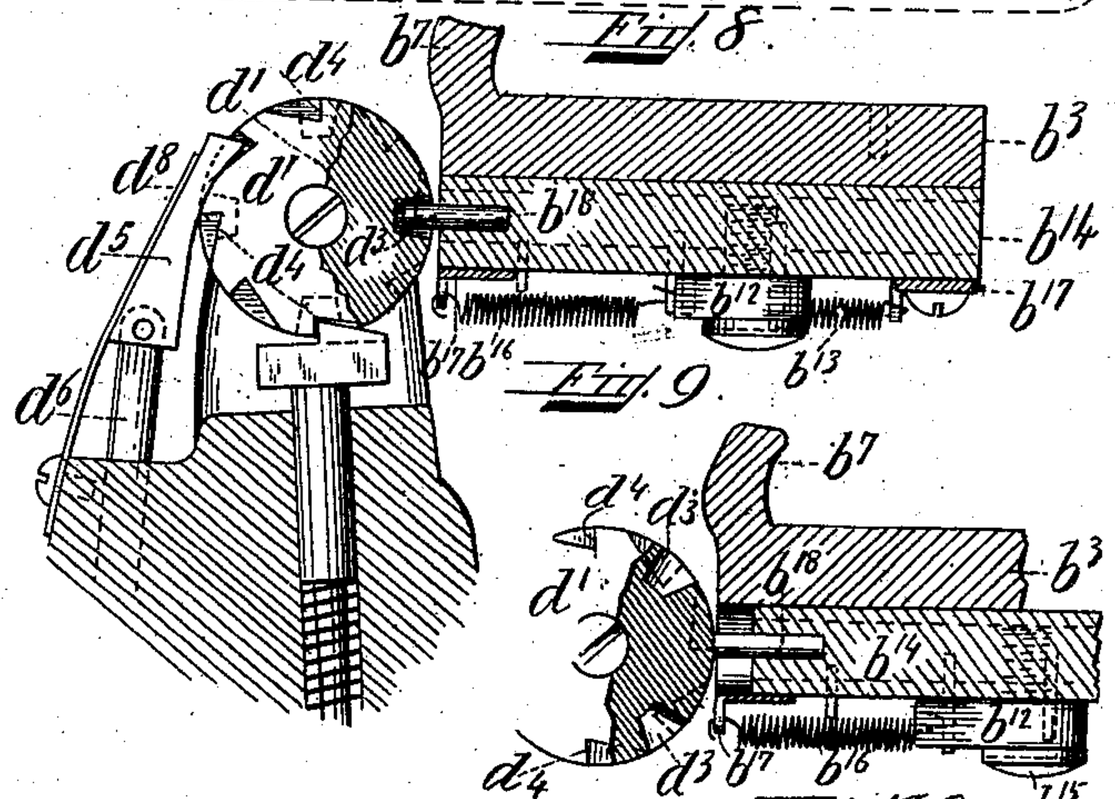

Fig. 9.

Fig. 10.

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BOOT TREEING MACHINE.

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(No Model.) 5 Sheets—Sheet 5.

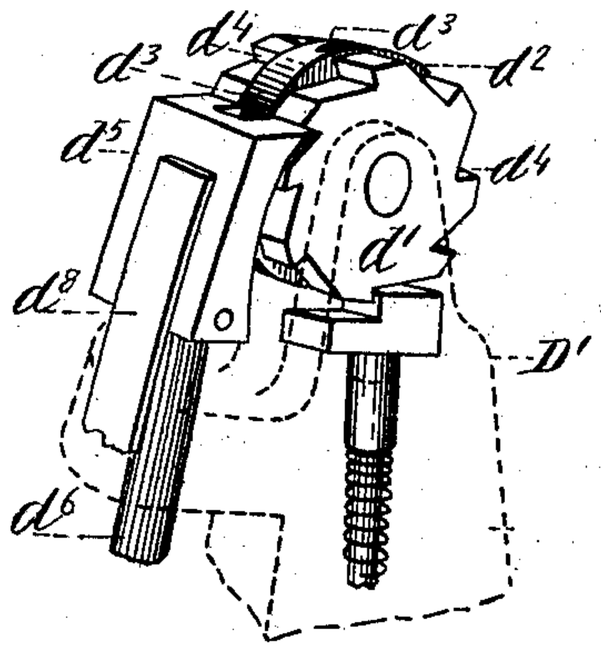


Fig. 11.

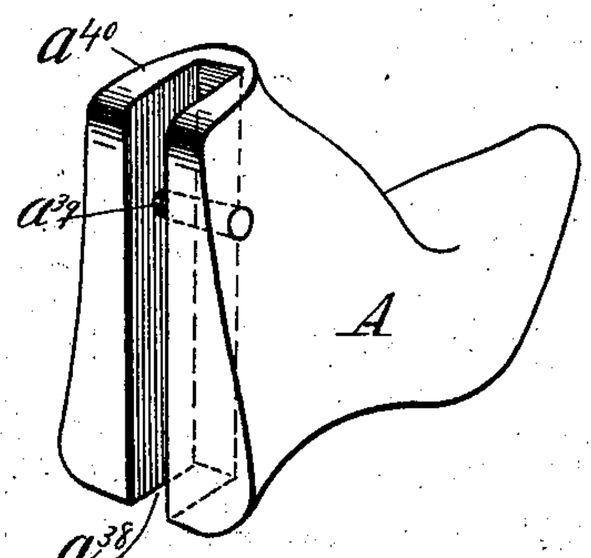


Fig. 15.

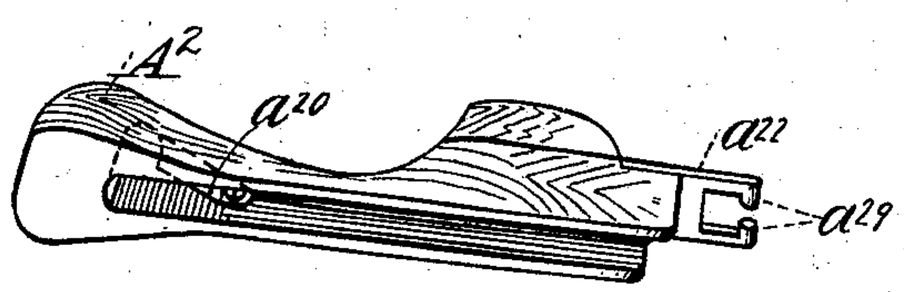
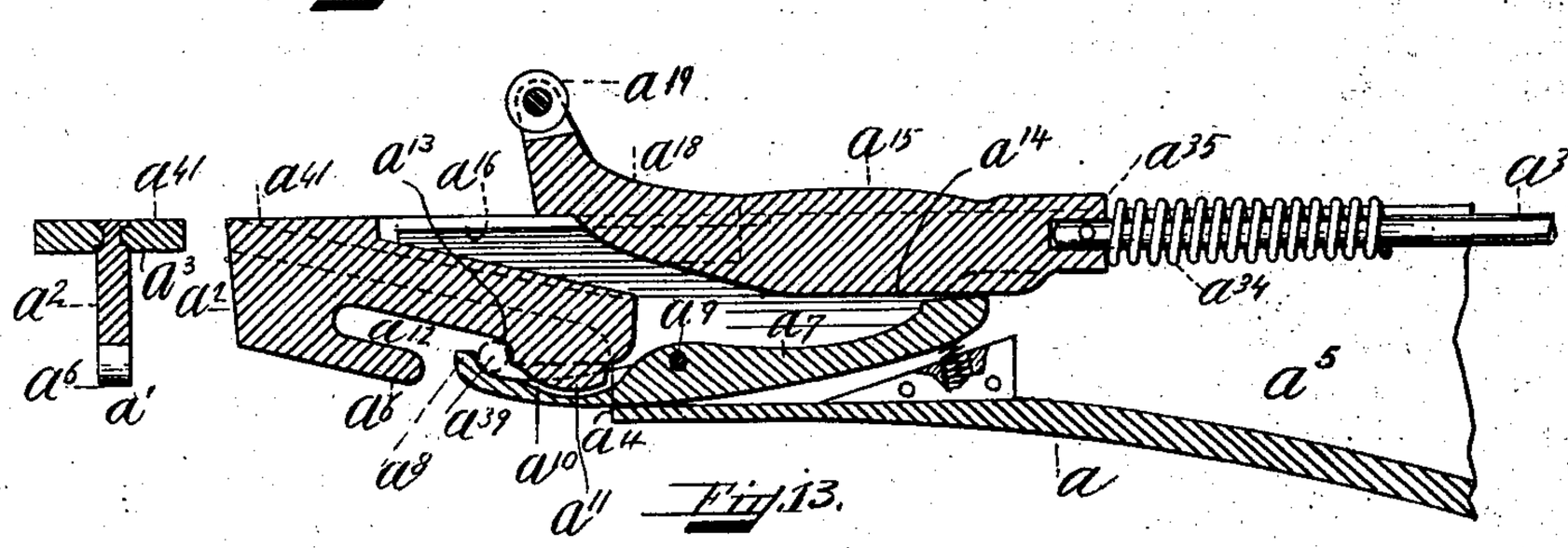


Fig. 12.



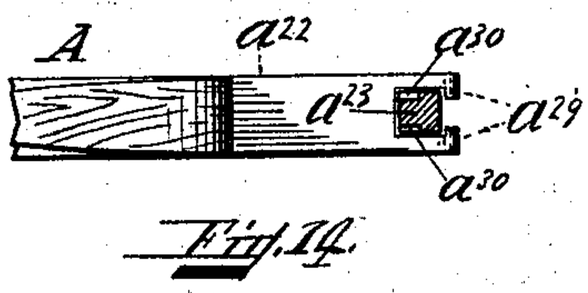


Fig. 14.

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UNITED STATES PATENT OFFICE.

ABEL D. TYLER, JR., OF BROCKTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MAWHINNEY LAST COMPANY, A CORPORATION OF MASSACHUSETTS.

BOOT-TREEING MACHINE.

SPECIFICATION forming part of Letters Patent No. 693,466, dated February 18, 1902.

Application filed October 26, 1900. Serial No. 34,445. (No model.)

To all whom it may concern:

Be it known that I, ABEL D. TYLER, Jr., a citizen of the United States, residing at Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Machines for Treeing Boots or Shoes, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a side elevation of a treeing-machine embodying my invention. Fig. 2 is a front elevation of the same, showing a boot-tree in one arm of the boot-tree carrier and also showing another arm of the boot-tree carrier without a thereby-supported boot-tree. Fig. 3 is a top plan view of the machine, showing a back plan of one boot-tree. Fig. 4 is a sectional view on line 4 4 of Fig. 3, a part of the frame of the machine being shown in elevation. In Fig. 4 the back piece of the boot-tree is shown closed. Fig. 5 is a lengthwise sectional view of the boot-tree on a line corresponding to line 4 4 of Fig. 3, the tree-foot being shown in locked position and the back piece being shown as "distended"—that is, moved rearwardly from the central portion of the boot-tree. This view also shows a lengthwise sectional view of the arm of the tree-carrier and a vertical sectional view of a bell-crank lever and connected parts which coöperate with the slide mechanism in the carrier-arm. Fig. 6 is a rear view of the boot-tree with the back piece detached. Fig. 7 is a sectional view of the boot-tree on line 7 7 of Fig. 5. Fig. 8 is an under plan view of the slide mechanism contained in the carrier-arm and of the bell-crank lever and mechanism carried thereby, which coöperates with said slide mechanism, said bell-crank lever appearing in section. Fig. 9 is a sectional view of the slide mechanism, as shown, partly in section and partly in elevation, the ratchet-and-pawl mechanism that operates with the slide mechanism, the outer end of the slide-bar forming a part of the slide mechanism being shown in a recess in the middle portion of the ratchet-wheel. Fig. 10 is a sectional detail showing the slide-bar which forms part of the slide mechanism contained in the carrier-arm in contact with the solid portion of the ratchet-wheel. Fig. 11 is a perspective view of the ratchet-wheel which forms part of the actuating mechanism for the slide mechanism contained in the carrier-rod. Fig. 12 is a perspective view of the back piece of the boot-tree, and Fig. 13 is an enlarged sectional detail of the catch and hook-shaped rib which project from the tree-foot recess of the tree-leg. This view also shows the method of mounting said rib in the tree-leg and the guideways of the reciprocating tree-leg rod. Fig. 14 is an enlargement at line 14 14 of Fig. 4, showing the back-piece tang in connection with the grooved projection from the rear side of the tree-leg. Fig. 15 is a perspective view of the rear end of the tree-foot.

In the drawings illustrating the principle of my invention and the best mode now known to me of applying that principle, A is the tree-foot; A′, the tree-leg; A^2, the back piece of my new boot or shoe tree, wherein the front or shin edge of the tree-leg is indicated by a and the tree-foot socket by a'. The tree-foot socket a' (see Fig. 13) is at the lower front part of the tree-leg, which is made with a rib a^2, projecting from the front face of the longitudinally-extending wall a^3 of the socket. The transverse wall a^4 of the socket is provided with an opening into the chamber a^5 of the tree-leg. The rib a^2 is provided with a hook a^6, the point of which extends toward the inner or upper end of the tree-leg. Within the chamber a^5 of the tree-leg a catch a^7, having a hook end a^8, is pivoted at a^9, the hook end a^8 extending toward the point of the hook a^6. The inner surface of the catch a^7 is provided with a lengthwise groove a^{10}, which receives the guide-fin a^{11}, projecting thereinto from the outer part of the rib a^2. The upper end wall of the hook-slot a^{12} is made concave at a^{13}, and the hook end a^8 of the catch a^7 is caused to move inwardly into opposition to the concave wall at a^{13} by means of the cam-surface a^{14} on the lengthwise-reciprocating back-piece distender a^{15}, the cam-surface a^{14} engaging the inner or tail end of the pivoted catch a^7 when the distender a^{15} is drawn inwardly toward the upper end of the boot-tree, as hereinafter described. The lengthwise-reciprocating distender a^{15} (see Fig. 6) moves in the lengthwise slot a^{16}, the

slot being formed in the rear wall a^{17} of the leg-piece. The back-piece distender a^{15} (see Fig. 5) is provided with a rearwardly-projecting arm a^{18}, preferably carrying an antifriction-roll a^{19}, which engages with the cam-surface a^{20} of a recess on the inner side of the back piece A^2, which is movably mounted between the side wings a^{21} of the leg-piece and is held in operative position by means of the slotted tang a^{22}, which engages the rearwardly-projecting stud a^{23}, fast on the rear side of leg-piece A′ at a distance from the upper or inner end of the back piece A^2, and also by means of a spring a^{24}, one end of which is made fast to the inner or upper portion of the tree-leg A′ and has its free end extending toward the heel of the back piece and engaging the upper rear wall thereof to hold the back piece normally against the rear wall of the leg-piece under tension. The tension of spring a^{24} is regulated by any suitable tension device, which is made up in this instance of a screw a^{25}, integral with the stud a^{23} and the outer nut a^{28}, the inner nuts a^{26} and a^{27} limiting the movement of the tang a^{22}. It is frequently necessary to change the back pieces when, as in Fig. 4, the inner nuts are screwed up so that the nut a^{27} bears against the inner side of the spring. The nuts a^{26} and a^{27} may be adjusted on the screw into different positions. If, as in Fig. 1, the nut a^{26} be left out and the nut a^{27} be screwed down to the stud a^{23}, nut a^{26} will turn in the movement tang a^{22}, and a convenient way of making the back pieces readily detachable from the tree-leg is to form the slotted tang a^{22} with an orifice, which is a loose fit for stud a^{23}, as in Fig. 14, said orifice being open on its inner side and provided with opposed inward projections a^{29} a^{29}, one on each side of said orifice, and to form the sides of said stud a^{23} on each side with an upwardly-inclined groove a^{30}, as in Fig. 5, of a size to receive and permit the passage of the inward projections a^{29}. The tang a^{22} projects upwardly and outwardly beyond the end wall of the back piece A^2, and by passing the upper or inner end of the back piece under the free end of the spring a^{24}, so that the projections a^{29} will enter the slots a^{30}, and then forcing the back piece inwardly the projections a^{29} will pass through the slots a^{30}, past the upper wall a^{31} of the stud a^{23}, so as to engage said wall below the upper ends of the grooves a^{30}, when the tension of the spring a^{24} forces the back piece A^2 toward the leg-piece A′. The back-piece distender a^{15} moves the back piece rearwardly against the tension of said spring a^{24}, which not only helps to secure the back piece on the tree-leg, but, what is more important, gives a resiliency to the operation of the machine that tends to prevent undue stretching of the leather at the heel portion of the shoe. The direction of the grooves a^{30} is upwardly and rearwardly in relation to the tree-leg. The outer wall of the grooves a^{30} is cut off at a^{32} in order to permit the ready insertion of the projections a^{29} into the grooves a^{30}. The wall a^{31}, inwardly of the upper ends of the grooves a^{30}, forms an abutment on which the inward projections a^{29} rack, when the heel end of the back piece is moved outwardly and inwardly in relation to the tree-leg.

The back-piece distender a^{15} is provided with a lengthwise-extending rod a^{33}, upon which a coiled spring a^{34} is mounted, one end of the spring a^{34} abutting against the shoulder a^{35} of the distender, while the inner end of the spring abuts against the inner end wall a^{36} of the tree-leg, this wall being perforated for passage therethrough of the rod a^{33}, the inner end of which is rotatably secured in a swivel-loop a^{37} for attachment to the stud of the reciprocating stretcher-plate, hereinafter described. The distender is drawn back against the tension of spring a^{34}, so that the operator by a sense of feeling soon learns to feel or know when a prudent degree of strain is brought on the leather, and as the distending operation is a straining operation on the shoe the resiliency which the spring a^{34} imparts to the operation of the apparatus when the back piece is moved rearwardly greatly assists the operator in guarding against undue stretching of the leather.

The rear wall of the tree-foot A (see Fig. 15) has a vertical groove a^{38} of a width and depth sufficient to form a sliding fit with the rib a^2 and the catch a^7, already described. A transverse pin a^{39} through the side walls of the groove a^{38} is provided for the tree-foot. The tree-foot (see Figs. 4 and 14) is attached to the tree-leg by passing the groove a^{38} over the rib a^2, with the transverse pin or catch member a^{39} located between the upper or inner end of the hook a^6 and the lower opposed end of the catch a^7, and by then moving the rear wall of the tree-foot against the inner lengthwise wall a^3 of the tree-leg and then sliding the tree-foot inwardly, so that its upper rear wall a^{40} engages the transverse wall a^4 of the tree-leg. When in this the higher position of the tree-foot, the catch member a^{39} of the tree-foot engages the concave surface at a^{13}, and by moving the distender a^{15} inwardly—that is, toward the hub b^2 of the carrier—the cam-surface a^{14} thereof engages the inner or tail end of the pivoted catch a^7 and forces the hook end a^8 thereof over the pin a^{39}, so that the pin a^{39} is inclosed by the surface a^{13} and the hook end a^8 of the pivoted catch and the rear and upper walls of the tree-foot locked firmly against the corresponding walls a^3 and a^4 of the tree-leg. The function of the hook a^6 is to engage the pin a^{39} of the tree-foot when the latter is in its lower position, as in Fig. 16. The inner movement of the distender a^{15}, provided with this cam-surface a^{14}, which is instrumental in locking the tree-foot in position, also carries the antifriction-roll a^{19} against the heelward and outward incline of cam-surface a^{20} of the back piece, and consequently distends (to a greater or less extent) the back piece with

relation to the tree-leg and tree-foot, and it will be observed that when the back piece is thus distended (or moved away from the tree-leg) the back piece is in reality fulcrumed on the antifriction-roll a^{19}, the play of the inner end of tang a^{22} of the back piece being limited by adjustment of the inner nut a^{26}, if so desired.

The foregoing is a description of my new boot-tree whereof the described locking mechanism for securing the tree-foot to the tree-leg is one of many forms of locking mechanisms which may be used for the purpose, if so desired. An important feature of the boot-tree thus described consists in locking the front wall a^3 of the tree-foot socket and the rear wall or surface of the tree-foot back of the shank of the tree-foot, so that the end web a^{41} of the leg-piece, together with the heel end portion of the back piece, is back of the shank of the tree-foot and the tree-foot comprises the whole of the shank.

The tree-leg at its upper end (see Figs. 5 and 6) is provided with the usual cylindrical extension a^{42}, having a circumferential groove a^{43} and shoulder a^{44}. The extension a^{42} is made to fit in the recess in one of the arms b' of the tree-carrier B, the shoulder a^{44} abutting against the end surface of the arm of the carrier and the circumferential groove a^{43} in the extension receiving the inner end of the screw b, so that the tree as a whole is mounted rotatably on its longitudinal axis in its carrier. The construction above described will be best understood by reference to Figs. 1, 5, and 6.

The tree-carrier B, forming part of my present apparatus, is preferably provided with a plurality of horizontal arms b', two arms being shown in this case, as in Fig. 3, although any desired greater number may be provided. The carrier B comprises a hub b^2, from which the arms b' radially project. The arms b', with their contained mechanism, are similar, and a description of one arm and its contained mechanism will suffice for all. The arm b' is lengthwise chambered to receive within its outer end the extension a^{42} of the tree-leg, as above mentioned. Between the side walls of the chambered arm b' there is mounted a reciprocating slide b^3, conveniently formed with side ribs b^4, Fig. 8, which fit in guide-grooves b^5, Fig. 4, in opposite walls of the arm-chamber b^6. A stud b^7 projects from the slide b^3, and it is on this stud b^7 that the swivel-loop a^{37}, above referred to, is hooked for the purpose of retracting the back-piece distender a^{15}, which also is instrumental in locking the tree-foot in position. The slide b^3 is also provided with an abutment b^8, against which the spring b^9 impinges. In this instance the spring b^9 is a coiled spring, one end of which is made fast to one side wall of the arm-chamber b^6, while the other end of the spring is made fast to the other side wall of the arm-chamber b^6, (see Fig. 3,) each point of attachment of the spring to the side walls of the arm-chamber b^6 being forward of the abutment and the spring being under sufficient tension on the abutment b^8 to keep the slide at the forward end of its grooved ways b^5, where it is arrested by any convenient stop, such as b^{10}. When the slide b^3 is in its most forward position, the therewith combined rod a^{33}, which projects from the back-piece distender, is in its most forward position, as shown in Fig. 4, (by "most forward position" in this connection I mean the position nearest the foot of the tree,) and in this position the antifriction-roller a^{19} and the cam surface or incline a^{14} are respectively out of engagement with the cam-surface a^{20} of the back piece A^2 and the catch a^7, the tree-foot being then in position to be locked to the tree-leg and the back piece being closed up against the tree-leg. In this position of the parts or when the cam-surface a^{14} has been moved inwardly sufficiently to cause the tree-foot to be locked in its upper position the shoe may be treed, being placed upon the tree-foot when the tree-foot is in its lowest position. When the tree-foot is in its lowest position, the transverse pin a^{39} is in the hook-slot a^{12}, and to effect the locking of the tree-foot in its highest position and the distension of the back piece the slide b^3, connected to the swivel-loop a^{37} of the boot-tree above described, is moved inwardly toward the hub of the carrier against the tension of the spring b^9 and against the tension of the spring a^{34}. The cam-surface a^{14} is preferably so prolonged that it engages the tail end of the catch a^7 slightly before the antifriction-roll a^{19} engages the cam-surface of the back piece, and this is done in order that by a slight movement inwardly of the slide b^3 the tree-foot may be locked in its highest position. The movement away from the tree-leg or "distention" of the heel portion of the back piece requires to be regulated to suit the work in hand, and I consequently provide the slide b^3 with a mechanism which effects a locking of the slide at any desired point of its inward movement. This mechanism preferably comprises the rack-plate b^{11}, fast on the arm b', between the teeth of which the pawl b^{12} (see Figs. 4 and 8) engages step by step as the slide b^3 is moved inwardly to pull the rod a^{33} and its attached parts away from the leg-piece. When the slide b^3 is pushed inwardly and the push which carries it inwardly ceases, the pawl b^{12} engages a tooth of the rack-plate b^{11} and the slide b^3 is arrested and locked in the position whereat the rearward push on the slide ceased, the pawl being held in coöperating relation with the teeth of the rack-plate by means of the spring b^{13}, one end of which is made fast to the pawl and the other of which is made fast to the slide. To release it from its locking engagement with the rack, I provide the slide b^3 with a pin $b^\times$ and a lengthwise groove, in which is mounted a bar b^{14}, that slides endwise of said groove, and consequently in the direction of the path of the slide b^3. The

pawl b^{12} is pivoted on said bar b^{14} by means of the pawl-pivot b^{15}, and the slide-bar d^{14} is held normally forward, so as to coöperate with the spring b^{13} in holding the pawl in locking engagement with the rack-plate by means of the spring b^{16}, one end of which is fast to the slide-bar b^{14} and the other end of which is fast to the slide b^3 substantially, although specifically to the forward one of the two cross-bars b^{17}, which are made fast to the slide b^3 and keep the slide-bar b^{14} in the groove in the slide b^3. It will be evident that if an inward push is exerted upon the outward end of the slide-bar b^{14} the slide-bar will be carried inwardly in the slide b^3 and the pawl b^{12}, by coming in contact with pin b^*, swung out of engagement with rack, the butt-end of the pawl thus being carried inwardly of the position in which it must be in order to maintain its locking engagement with the rack-plate, and thereby leave the front end of the pawl b^{12} out of locking engagement with the rack-plate. When the slide-bar is in said inward position, the slide b^3 may move outward under the tension of its spring b^9, and the expansion of the spring a^{34} will cause the boot-tree rod a^{33} to move outward with its attached parts.

For actuating the slide b^3 and its contained slide-bar b^{14} (see Figs. 1, 5, 8, and 9) I provide the bell-crank lever D, one end of which is attached to the treadle-rod d and the other end D′ of which projects upwardly into the arm-chamber b^6. The lever D is fulcrumed conveniently in a yoke D^2, secured to frame F^3. Journal D^3, on which the hub b^2 of the boot-tree carrier B is rotatably mounted, is formed on a standard, also secured to frame F^3. The upper arm D′ of the lever D is forked and provided with a rotatable ratchet-wheel d', the circumferential middle portion d^2 whereof is made without teeth and with recesses d^3. The peripheral margins of the ratchet-wheel d' are toothed at d^4. The ratchet-wheel d' is rotated by the lengthwise-reciprocating pawl d^5, which is mounted upon a rod d^6, endwise movable in lugs d^7, projecting from the outward side of the upwardly-projecting lever-arm D′. The pawl d^5 is pivoted to the upper end of the rod d^6 and forced inwardly to engage the teeth of the ratchet-wheel d' by means of the spring d^8, the rod d^6, which carries the pawl d^5, reciprocating, Fig. 5, and being moved upwardly in its supporting-lugs d^7 when the lever-arm D′ is swung outwardly by the engagement of its lower end (preferably provided with a cam-roll d^9) with the cam-surface d^{10}, conveniently formed on the frame D^2. The upward rectilinear movement of the pawl-carrying rod d^6 pushes the pawl d^5, which is in engagement with the teeth of the ratchet-wheel, upwardly, so as to rotate the ratchet-wheel step by step or tooth by tooth. When the treadle D^4, connected to the treadle-rod d, is up—that is, when the upwardly-projecting arm D′ of the lever D is in its outer position—the pawl d^5 is in inoperative position with relation to the ratchet-wheel d', and when on every second depression of treadle-rod d one of the recesses d^3 in the middle portion d^2 thereof is by pawl d^5 brought opposite and in position to receive the pin b^{18}, which is the outward rigid projection of the slide-bar b^{14}, above described, the treadle-rod d carries the lever-arm D′ inward, the pin being received in said recess d^3. (See Fig. 9.) The consequence is that the contact of the lever D′ and the therein-contained ratchet-wheel with the front end of the slide b^3 moves the slide b^3 inwardly against the tension of its spring the desired distance according to the depression of the treadle, so that the tree-rod a^{33} and its connected parts are pulled inwardly to lock the tree-foot and to distend the back piece, as already described, the pawl b^{12} coöperating with the rack-plate b^{11} to lock the slide in the desired position. Removal of the foot from the treadle D^4 or of the pull on the lower arm of the lever D permits the lever-arm D′ to move away from the outer end of the slide b^3, spring d^{11} being conveniently provided for this purpose and connecting the treadle with the frame of the machine or otherwise. By the movement of the upper end of the lever-arm D′ toward the opposed end of the slide b^3 the end of the rod d^6 is carried out of engagement with the cam-surface d^{10}, and the coiled spring d^{12} on the rod d^6, having for its necessary abutments the under surface of the upper lug d^7 and a shoulder d^3 on rod d^6, forces the pawl-carrying rod d^6 downwardly, and thereby carries the pawl d^5 downwardly over ratchet-wheel d' into position for engagement with tooth d^4 thereof. The ratchet-teeth d^4 and holes d^3 are so disposed in relation to the other that when the lever-arm D′ is moved toward the slide b^3 the next time after the forward movement which has left the slide in locked position an imperforate part of the center portion d^2 of the ratchet-wheel is brought against the pin b^{18}, so that the slide-bar b^{14} is moved inwardly toward the hub of the machine and the pawl b^{12} moved against pin $b^\times$ on slide b^3 and out of locking engagement with rack-plate. If the foot be now taken from the treadle D^4, the slide b^3 and the ratchet-carrying end of the lever-arm D′, will move together toward the tree-leg to release the tree-rod a^{33} and its connected parts. The construction of the ratchet-wheel d' by which I secure the stated coöperation of the ratchet-wheel with the slide-bar b^{14} consists in providing the middle portion d^2 of the ratchet-wheel with an imperforate part opposite every other of the marginal ratchet-teeth with which the wheel is provided, so that a hole d^3 and an imperforate part of the middle portion d^2 are alternately presented to the projecting pin b^{18} of the slide-bar b^{14}.

As above stated, the hub of the carrier is preferably rotatably mounted on the journal D^3 and provided with a plurality of tree-carrying arms b', and where the tree-carrier is

provided with more than one arm it is practically desirable that the carrier be rotary on the journal D^3 on the standard on frame F^3. I consequently provide the frame and carrier with a mechanism for locking the carrier in such position that the lever-arm D′, with its contained mechanisms, may coöperate with one of the desired carrier-arms b' and the parts supported thereby. A great variety of such locking mechanisms may be contrived, of course, without departure from my invention; but that which I have now incorporated (see Fig. 4) consists of a recess f in the under wall of the hub b^2 and a spring-controlled rod F, pivoted to the locking-lever f', which is fulcrumed to the frame of the machine and connected with the locking-treadle F^2 by means of the treadle-rod f^2. The frame of the machine is marked F^3. The rod F is provided with a suitable spring f^3, (in this case a coiled spring,) the spring abutting at one end against the frame F^3 and at its upper end on a shoulder f^4 of the rod F. When the treadle F^2 is depressed, the lever f' is pulled down, and the rod F is thereby pulled out of engagement with the recess f against the tension of its spring f^3. The hub b^2 may be now rotated on the supporting-journal D^3, and when another recess f, with which the hub is provided, is brought over the end of the locking-bar F (the operator's foot being removed from the treadle) the spring will cause the bar to project into the recess f. The recess f corresponds to an arm b', so that when a recess f is in engagement with the bar F one of the arms b' will be in operative position with relation to the lever-arm D′ and the parts carried thereby. In the present machine, in which two arms are shown, each of the inner walls of the arms is cut away, as at f^5, (see Fig. 2,) so that the arms may be swung over the upwardly-projecting end of the lever-arm D′. The hub b^2 and its standard (see Fig. 1) are provided with coöperating abutments which arrest the swing of the carrier when it is moved to bring one of the other arms into working position with the lever-arm D′ and connected parts. These coöperating abutments are conveniently formed by the two shoulders f^6 f^6 on the standard, between which the downwardly-projecting pin f^7 on the hub b^2 plays.

In my new treeing-machine the back piece is automatically secured in its distended position substantially as soon as the operator perceives that the rearward motion of the back piece has pulled the toe portion of the shoe properly tight upon the toe portion of the tree-foot. There are, of course, various mechanical ways of obtaining this result; but in the present instance I obtain it by automatically stopping the outward movement of the distending-rod a^{33} and the swivel a^{37} or equivalent connection, which is secured to the stub b^7 of the reciprocating slide b^3 when in their inward positions. In the operation of the machine the operator after the shoe is in place on the tree (when in the position shown in Figs. 1 and 4, for example) depresses the treadle D^4 and through the connecting-rod d moves the lower arm of the elbow-lever D downwardly. Its upper arm D′ is thereby moved inwardly, as already described, and the distending-rod a^{33} is drawn inwardly, so that the back piece A^2 is moved rearwardly, as already described. When the operator perceives that the toe portion of the shoe is drawn with the requisite degree of tightness upon the toe portion of the tree-foot, he removes pressure from the treadle D^4, and the pawl b^{12}, already described, engages automatically with that tooth of the ratchet-bar b^{11} with which it is in contact at that time. This is one of the many mechanical ways of automatically arresting the outward movement of the distending-rod and the parts carried thereby and of arresting the rearward movement of the back piece.

It will be readily seen that a great variety of differently-constructed tree-legs may be used in my new treeing-machine in lieu of the particular form of tree leg here shown, and the automatic arresting of the rearward movement of the back piece may be obtained independently of any specific construction thereof by attaching its usual distending-rod to the automatically-operating slide device b^3, which forms part of the head or tree-carrier of my new machine.

The foregoing now preferred embodiment of my invention contains a feature of my invention which is of great importance. It will be seen from the drawings that the bottom end portion of the web a^{41} of the tree-leg is much thinner than usual, that the front wall of said web a^{41} inclines upwardly and forwardly toward the transverse wall a^4 of the tree-leg, that the angle formed by the front wall of web a^{41} and the transverse wall a^4 is an obtuse angle, and that the rear edge of the heel portion of back piece a^3 and the rear end of the foot-piece A (when the latter is assembled with tree-leg and in its higher position, as shown in Fig. 1, for example) are approximately parallel, in consequence of which practical or approximate parallelism it is possible to lower the tree-foot into its lowest position without any lengthening, as heretofore, of the shoe-containing parts of the apparatus. Consequently there is no binding of the heel portion of the back piece in the shoe during the process of removal, and the workman is able to work faster and without distorting the heel portions of the shoe (or any of its other parts) in pulling off the shoe. This is very important. In consequence of the obtuse angle above mentioned it is possible to have practically all of the shank portion of the apparatus a part of the all-wood tree-foot, or, in other words, to give a maximum length to the tree-foot from its toe to its rear bottom corner, so that a maximum portion of the complete foot portion of the apparatus, taken as a whole, is made up of the tree-foot,

the bottom of which, together with the outer end of the web, forms a continuous bottom for as much of the tree as is forward of the back piece when the latter is distended. This insures a better shaping of the shank portion of the shoe than is practicable where the rear end of the tree-foot is in the shank of the shoe, and the slant of the web a^{41} is such that when the tree-foot is pulled down to put on or take off the shoe the distance between the toe and heel of the back piece shortens by nearly a shoe size, thereby preventing binding and distortion and facilitating the work of the operator.

Tree-feet, as heretofore made, have sometimes been provided at their tops with metal plates, as *m* in my Patent No. 319,355, of 1885, and in other cases with "foot-irons," as H in the Mawhinney patent, No. 393,514, the foot-iron covering the top of the tree-foot and extending downwardly into the vertical groove in the rear face of the tree-foot. These metal fixtures are objectionable because of their expense and liability to work loose and also because the workmen frequently hit the lower front corner of the tree-leg and mar that corner, so that an indentation sometimes appears at the front of the joint formerly the transverse wall of the tree-leg and the top of the tree-foot. Such an imperfection is objectionable, because all surfaces of a tree should be smooth to prevent the formation of imperfections or ridges in the leather of the shoe. I accordingly prefer to make my tree-foot wholly of wood, excepting only the catch member within the vertical groove in the rear end of the tree-foot.

I have referred to the angle formed by the front face or wall of the tree-leg web at the bottom portion of the tree-leg and the transverse wall as "obtuse." This is the best form; but if the transverse wall a^4 were only slightly inclined forwardly and downwardly, so that the said angle would be acute, it is probable that the tree-foot would not be seriously weakened, as it would be were said angle very acute, so that the upper rear corner part of the tree-foot would be a sharp-cornered projection. Such a construction of the tree-foot would greatly weaken it, as will be plain to all skilled in the art. The preferred obtuseness of said angle is obtained by the described slanting of the front wall or surface of said web and by making the transverse wall a^4 at right angles to the lengthwise axis of the tree-leg. It will be observed that the upper rear corner of the tree-foot presents an obtuse angle and that the lower rear corner presents an acute angle. The top bearing-surface of the tree-foot is preferably slanted; but whatever the angle of the upper rear corner it is important to have the lower rear corner an acute angle in order that the bottom of the tree-foot may be of maximum length.

The rib a^2, above mentioned, is stationary, being fixed in the tree-leg. By making this rib stationary I greatly simplify the construction of the tree as a whole, as will be readily understood by those familiar with boot and shoe trees wherein the tree-foot is secured to an endwise-movable rib sliding in lengthwise ways in the tree-leg and involving coöperating parts which are dispensed with in my trees.

What I claim is—

1. In a treeing-machine, the combination of a tree-carrier with a tree-leg having a back piece operatively connected therewith; a back-piece distender; a spring against the tension of which the back-piece distender is moved to move the back piece away from the tree-leg; and means for automatically arresting the movement of the back piece away from the tree-leg and retaining the back piece in any of its positions in relation to the tree-leg; and means for locking said carrier in a stationary position during the treeing operation.

2. In a treeing-machine, the combination of a tree-carrier with a tree-leg having a back piece operatively connected therewith; a back-piece distender comprising a reciprocating rod and a spring against the tension of which the back-piece distender is moved to move the back piece away from the tree-leg; means for automatically locking the reciprocating rod at the limit of whatever reciprocation may be given to said rod during the distending operation; and means for locking said carrier in a stationary position during the treeing operation.

3. In a tree-carrier formed to receive a tree-leg, the combination of a tree-carrier support; a mechanism for actuating the back-piece-distending mechanism of a tree-leg when the tree-leg is mounted in the tree-carrier, said actuating mechanism being movable to move said distending mechanism to move the back piece away from the tree-leg, with means under the control of the operator for moving said actuating mechanism; means for automatically locking said actuating mechanism whenever the desired amount of movement for effecting the said distention is reached; and means for locking said carrier in a stationary position on its support during the treeing operation.

4. In a boot or shoe tree, the combination of a tree-leg having, at its bottom portion, an upwardly and forwardly slanted wall extending to a transverse wall which extends back from the front edge of the tree-leg; a back piece operatively connected with the tree-leg; a spring which presses the back piece toward the tree-leg; a back-piece distender which moves the back piece rearwardly against the tension of said spring; means for operatively connecting a tree-foot to the tree-leg; and a tree-foot having a rear end which slants from the bottom of the tree-foot upwardly and forwardly to the top of the tree-foot, and containing within itself the shank portion of the complete tree.

5. In a boot or shoe tree, the combination of a tree-leg having an obtuse-angle recess for

reception of the correspondingly-shaped rear end portion of the tree-foot; a tree-foot, the rear end and top of which form an obtuse angle; means for operatively connecting the tree-leg and tree-foot; a back piece operatively connected with the tree-leg; a spring which presses the back piece toward the tree-leg; and a back-piece distender which moves the back piece rearwardly against the tension of said spring.

6. In a boot or shoe tree, the combination of a tree-leg having a transverse wall extending rearwardly from its front edge and a thence downwardly and rearwardly extending wall; a tree-foot containing within itself the sole and shank portion of the apparatus; means for operatively connecting the tree-leg and tree-foot; a back piece; means for operatively connecting the tree-leg and back piece; a spring which presses the back piece toward the tree-leg; and a back-piece distender which moves the back piece rearwardly against the tension of said spring.

7. In a boot or shoe tree, the combination of a tree-leg; a tree-foot; a back piece; a spring which presses the back piece toward the tree-leg; a back-piece distender which moves the back piece rearwardly against the tension of said spring; the tree-foot being movable up and down on the tree-leg and, when adjusted from a higher to a lower position thereon, moving downwardly and simultaneously receding; means for holding the tree-foot in its higher position; and means for holding it in its lower position.

8. In a boot or shoe tree, the combination of a tree-leg; a tree-foot movable up and down on the tree-leg; a back piece; a spring which presses the back piece toward the tree-leg; means for operatively connecting the back piece to the tree-leg; a back-piece distender which moves the back piece rearwardly against the tension of said spring; and means for operatively connecting the tree-foot with the tree-leg; the rear end of the tree-foot slanting upwardly and forwardly from its bottom; and the path of said rear end, when the tree-foot is moved, being in approximate parallelism with the rear side of the heel portion of the back piece.

9. In a boot or shoe tree, the combination of a tree-leg having its shin and thence-upwardly-extending part and its web integral, the front face of the web being provided with a lengthwise-extending stationary rib, and being slanted downwardly and rearwardly to the bottom of the web from a transverse shoulder which extends rearwardly from the front edge of the tree-leg at the bottom of the shin portion thereof; with a back piece; a spring which presses the back piece toward the tree-leg; means for operatively connecting the back piece to the tree-leg; a back-piece-distending mechanism, which moves the back piece rearwardly against the tension of said spring; and a one-piece tree-foot having a groove vertically of its rear end and a catch member within said groove, near the upper end thereof; the rear end of the tree-foot being of the same length as the web; and the tree-foot having a top surface which bears against said shoulder below the shin part of the tree-leg; means for engaging said catch member to lock the tree-foot against the front face of the web and against said shoulder; and means for engaging said catch member to hold the tree-foot in its lower position on the tree-leg; the bottom of the web, and the bottom of the one-piece tree-foot being in line and forming forward of the back piece, when the tree-foot is in its highest position, a continuous bottom which conforms to and continuously supports the inner side of the boot or shoe sole forwardly of its heel portion to the toe thereof, during the treeing operation.

10. In a boot or shoe tree, the combination of a tree-leg having its shin and thence-upwardly-extending part and its web integral, the front face of the web being provided with a lengthwise-extending stationary web, and being slanted downwardly and rearwardly to the bottom of the web from a transverse shoulder which extends rearwardly from the front edge of the tree-leg, at the bottom of the shin portion thereof; with a back piece; a spring which presses the back piece toward the tree-leg; a back-piece-distending mechanism which moves the back piece rearwardly against the tension of said spring; and a one-piece tree-foot having vertically of its rear face a groove to receive said stationary rib and provided with a catch member near its upper end; means to engage said catch member to hold the tree-foot in its highest position; and means to engage said catch member to hold the tree-foot in its lowest position.

11. In a treeing-machine, the combination of tree-carrier with a plurality of trees mounted in said carrier and therein rotatable on their lengthwise axes; a vertical journal supporting said carrier which is rotatably mounted thereon; means for automatically locking said carrier on its journal; a slide-plate in said carrier for each tree therein mounted; each tree comprising a tree-leg; a tree-foot; a back-piece-distending mechanism connected with a slide-plate; each distending mechanism comprising a spring against the tension of which the back piece is moved away from the tree-leg; means for automatically locking each slide-plate at any position in its movement which causes the distending operation of the said distending mechanism; means for locking the tree-foot in a higher position on the tree-leg; means for holding the tree-foot in a lower position on the tree-leg; and a slide-plate-actuating mechanism common to all the slide-plates, and under the control of the operator.

12. In a treeing-machine, the combination of tree-carrier with a plurality of trees mounted in said carrier and therein rotatable on their lengthwise axes; a vertical journal supporting said carrier which is rotatably

mounted thereon; means for automatically locking said carrier on its journal; a slide-plate in said carrier for each tree therein mounted; each tree comprising a tree-leg; a tree-foot; a back-piece-distending mechanism connected with a slide-plate; each distending mechanism comprising a spring against the tension of which the back piece is distended; means for automatically locking each slide-plate at any position in its movement which causes the distending operation of the said distending mechanism; means for locking each tree-foot in a higher position on the tree-leg; and a slide-plate-actuating mechanism common to all the slide-plates, and under the control of the operator; said actuating mechanism and slide-plate comprising mechanisms which coöperate to effect the automatic locking of each slide-plate when the slide-plate is moved to effect the distending operation; and which, on another movement of said actuating mechanism, coöperate to unlock said slide-plates.

13. In a boot or shoe tree, the combination of a tree-leg having a tree-foot socket with a back piece; means for coupling the tree-leg and back piece; means for moving the back piece away from the tree-leg; a tree-foot having in its rear wall a vertical groove and a catch member therein; a catch for said catch member, the catch being pivoted to the tree-leg between the ends of the tree-leg; means for moving the catch to interlock with said catch member; and a hooked rib rigid on the tree-leg and projecting from the front face of said socket into the groove of the tree-foot, said rib having a hook end extending part way toward the outer end of the catch; the rear face of the tree-foot, at each side of said groove, bearing on an integral downwardly-projecting web of the tree-leg.

14. In a boot or shoe tree, the combination of a tree-leg having a tree-foot socket with a back piece; means for coupling the tree-leg and back piece; means for moving the back piece away from the tree-leg; a tree-foot having a vertical groove in its rear surface and a catch member therein; a catch for said catch member, the catch being pivoted to the tree-leg between the ends of the tree-leg; means for moving the catch to interlock with said catch member; and a hooked rib rigid on the tree-leg and projecting from the front face of said socket into said groove of the tree-foot, said rib having a hook end extending part way toward the outer end of the catch; the rear face of the tree-foot, at each side of said groove, bearing on an integral, downward extension of the tree-leg; and said integral downward extension sloping downwardly and rearwardly from the top wall of said socket to a point rearward of the shank portion of the tree-foot.

15. In a boot or shoe tree, the combination of a lengthwise-chambered tree-leg having a socket for a tree-foot, a stationary rib projecting from the front face of the socket, a recess for a back piece, and a fixed hook in the rib of the socket for the tree-foot; a pivoted catch projecting into said socket in line with said hook, and having a tailpiece within the chamber of the tree-leg; a tree-foot having a vertical groove in its rear face and a catch member in said groove; a back piece having its inner portion provided with an open-slotted tang formed with projections; a projection from the tree-leg, said projection being formed with inclined grooves to permit the passage of the projections on said tang; and a lengthwise-reciprocating back-piece distender mounted in said tree-leg and having a cam-surface, the back-piece distender engaging a cam-surface on the back piece to move the same away from the tree-leg and the cam-surface of the distender engaging said tail-piece to lock the tree-foot; and a tension mechanism for the back piece.

16. In a boot or shoe tree, the combination of a lengthwise-chambered tree-leg having a tree-foot socket; a tree-foot and mechanism for locking and unlocking the tree-foot, with a back piece which comprises an open-slotted tang; a projection on the tree-leg above the inner end of the back piece; a tension mechanism for the back piece; and means for moving the heel part of the back piece away from the tree-leg; said tang having inward projections near the mouth of its slot and the projection from the tree-leg having grooves which extend from near the tree-leg and are inclined rearwardly to permit the passage of said projections.

17. In a boot or shoe tree the combination of a lengthwise-chambered tree-leg with a lengthwise-reciprocating back-piece distender mounted therein, the tree-leg and distender having a coöperating connection, and the distender being provided at its rear side with an antifriction-roll and at its front side with a cam-surface; a back piece having on the inner surface of its heel portion a recess formed with a rearwardly-inclined surface against which the antifriction-roll works to move the back piece outwardly, and the back piece having an open-slotted tang; a projection on the tree-leg adapted to receive said open-slotted tang to effect a detachable union of the back piece with the tree-leg; a tension mechanism for the back piece; a tree-foot and means for locking a tree-foot on the tree-leg; the cam-surface of the distender coöperating with said tree-foot-locking mechanism.

18. In a boot or shoe tree, the combination of a tree-leg having a tree-foot socket provided with a hooked rib projecting from the front face of said socket and connected with the tree-leg by a tongue-and-grooved connection; a pivoted catch having its upper end within the tree-leg and its front end projecting toward said hook and inwardly curved; the catch and upper part of said rib having a tongue-and-grooved connection.

19. The combination with a lengthwise-chambered tree-leg; a back piece; a tree-foot;

means for holding the back piece in operative relation to the tree-leg; and means for locking the tree-foot on the tree-leg, and means for moving the back piece away from the tree-leg; of a tree-holder having a chambered tree-carrying arm; means for coupling said arm and tree-leg; a slide-plate mounted in and reciprocating lengthwise of said arm; a connection between said slide-plate and the means for moving the back piece and for locking the tree-foot; means under the control of the operator for moving said slide-plate and connections inwardly; means for locking said slide-plate automatically in any of its different positions; said means, comprising a pawl pivoted on said slide-plate; a rack-plate fast on said arm; and means to keep the pawl in engagement with said rack; means for automatically unlocking said slide-plate; and means for automatically returning said slide-plate to its starting position.

20. The combination of a tree-carrying arm with a slide-plate mounted therein and adapted to reciprocate lengthwise thereof and to be connected to a tree; a spring against the tension of which the slide-plate is moved away from the tree-carrying end of the arm; a rack-plate fast on said arm; a slide-bar mounted in said slide-plate; a pawl pivoted to said slide-bar; means for keeping the pawl in engagement with the rack-plate; a pusher under the control of the operator for pushing said slide-plate away from the outer end of said arm and to hook the slide-plate in desired position by engagement of said pawl and rack; means for automatically returning said pusher to position of rest; said pusher being provided with means which, at its next contact with said slide-plate, automatically moves said slide-bar to release the pawl from the rack and permit the return of the slide-plate to starting position.

21. The combination of a tree-carrying arm with a slide-plate mounted therein and adapted to reciprocate lengthwise of said arm; the slide-plate having a projection for connection with a boot or shoe tree and also a reciprocating bar mounted in said slide-plate lengthwise thereof; a spring engaging said slide-plate; a rack on the arm; a pawl pivoted on said bar; means for keeping the pawl in working position with relation to the rack; a movable ratchet-wheel carrier, under the control of the operator; a rotary ratchet-wheel rotatively mounted in said carrier and having alternating peripheral recesses and solid peripheral parts; an automatically-acting push-pawl for said ratchet-wheel; the ratchet-wheel being rotated intermittently by contact with said pawl, when said slide-plate is not in contact with said ratchet-wheel; a projection on said reciprocating bar, received in one of said recesses in said ratchet-wheel; said carrier being movable away from said slide-plate and its bar without unlocking the slide-plate; and the ratchet-wheel, as the carrier moves back, being turned to bring a solid part thereof against said projection to move said slide-bar inwardly in relation to the slide-plate itself and thereby unlock the pawl from the rack-plate and permit the slide-plate to return to starting position.

22. The combination of a tree-carrying arm; a slide-plate mounted therein and having means for connecting it with a tree mounted in said arm; means for locking the shoe-plate in different positions in said arm; means for automatically unlocking said slide-plate; a bell-crank lever; a treadle, treadle-rod and return-spring for said lever; a ratchet-wheel rotatively mounted on said lever, in the path of said slide-plate and having alternating peripheral recesses and solid peripheral parts; a push-pawl carried by said lever; a rod attached to said push-pawl; a spring to keep the push-pawl in working position with relation to the ratchet-wheel; the end of said rod engaging an abutment to move the rod in its upward rectilinear movement; a spring to retract the rod and pawl; said solid parts of the ratchet-wheel engaging the unlocking mechanism to operate the same, and the recesses of the ratchet-wheel permitting the lever-arm which carries the ratchet to be moved against the slide to push the same into a locked position without contact with the unlocking mechanism.

23. The combination of a tree-carrier having a hub and a plurality of chambered tree-carrying arms with a journal on which the hub is rotatively mounted; a hub-locking mechanism under the control of the operator; co-operating stop-forming abutments between the hub and journal frame; and a lever and mechanism carried thereby for coöperation with mechanism contained in each arm, said lever projecting above the under sides of said arms; the inner sides of the arms being recessed on the under side to permit the arms to pass over the upper end of said lever and contained mechanism; the locking device holding an arm in adjusted position with the lever mechanism in the chamber of the arm.

In testimony whereof I affix my signature in presence of two witnesses.

ABEL D. TYLER, JR.

Witnesses:
EDWARD S. BEACH,
E. A. ALLEN.