L. A. CASGRAIN.

WORK SUPPORT.

APPLICATION FILED MAY 10, 1910.

**1,108,133.** Patented Aug. 25, 1914.

3 SHEETS—SHEET 1.

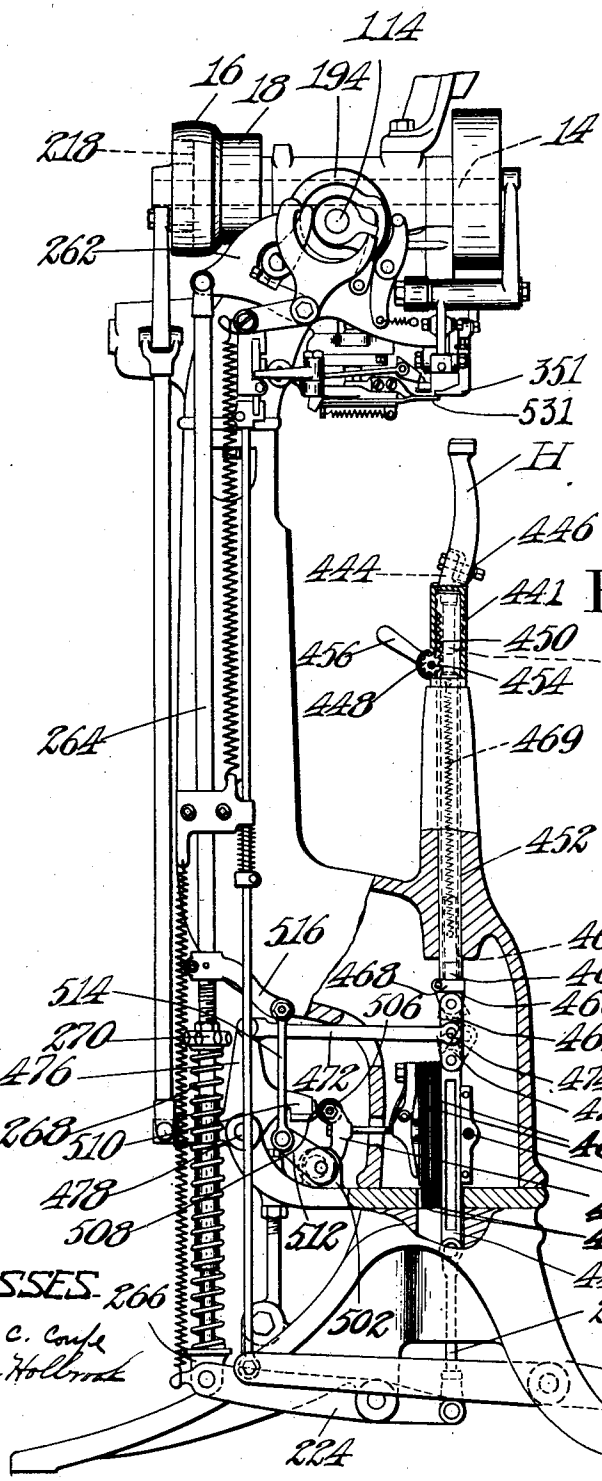
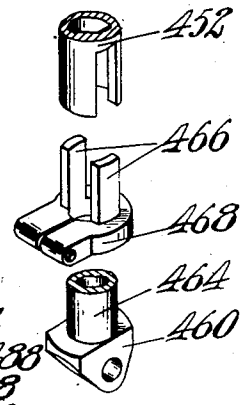



Fig. 1.

Fig. 2.




WITNESSES.

Elizabeth C. Coufe

Ellick C. Holbrook

INVENTOR.

Louis A. Casgrain

By his Attorney

Edward Howard

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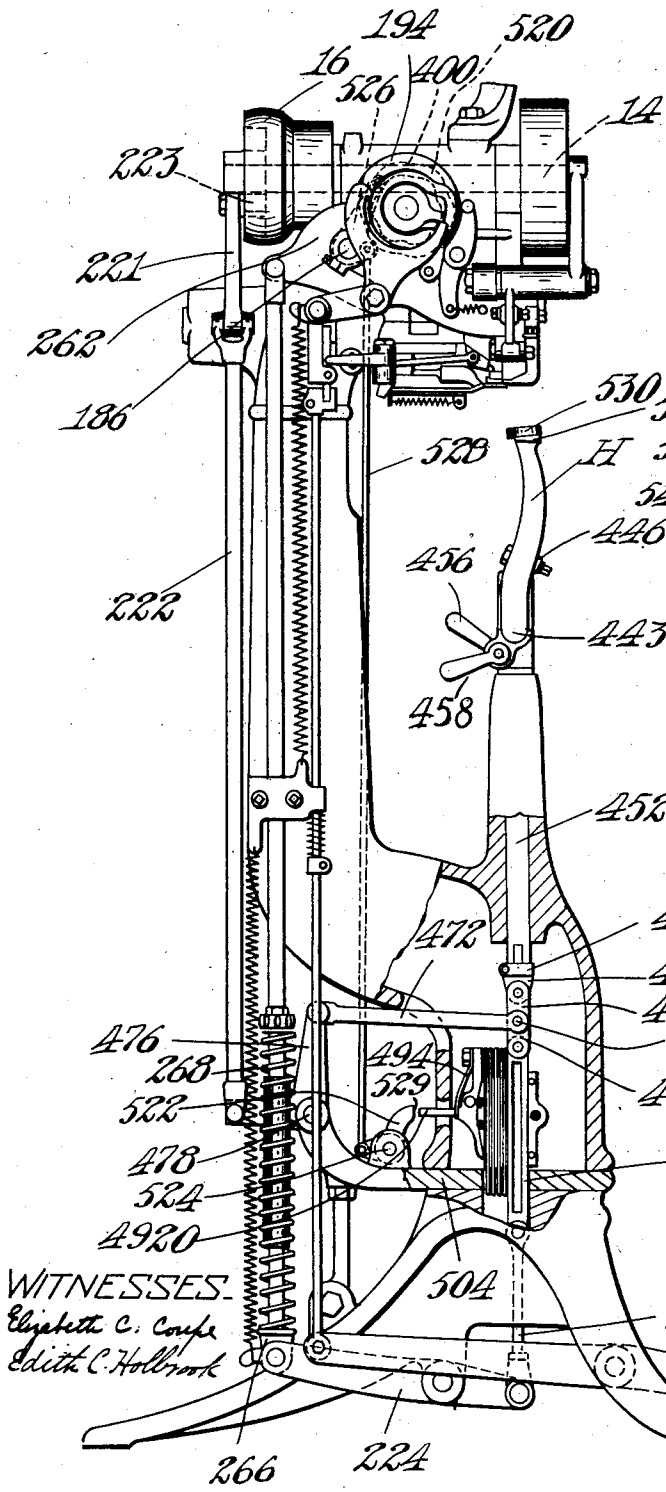



Fig. 3.

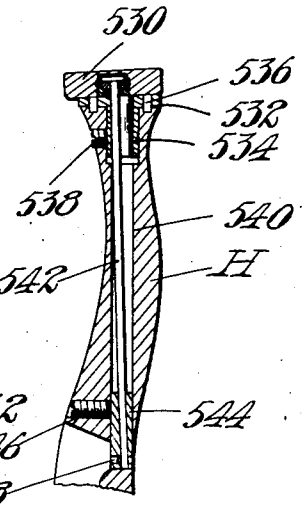



Fig. 4.

WITNESSES.
Elizabeth C. Coupe
Edith C. Holbrook

INVENTOR.
Louis A. Casgrain
By his Attorney
Nelson W. Morrell

L. A. CASGRAIN.

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3 SHEETS—SHEET 3.

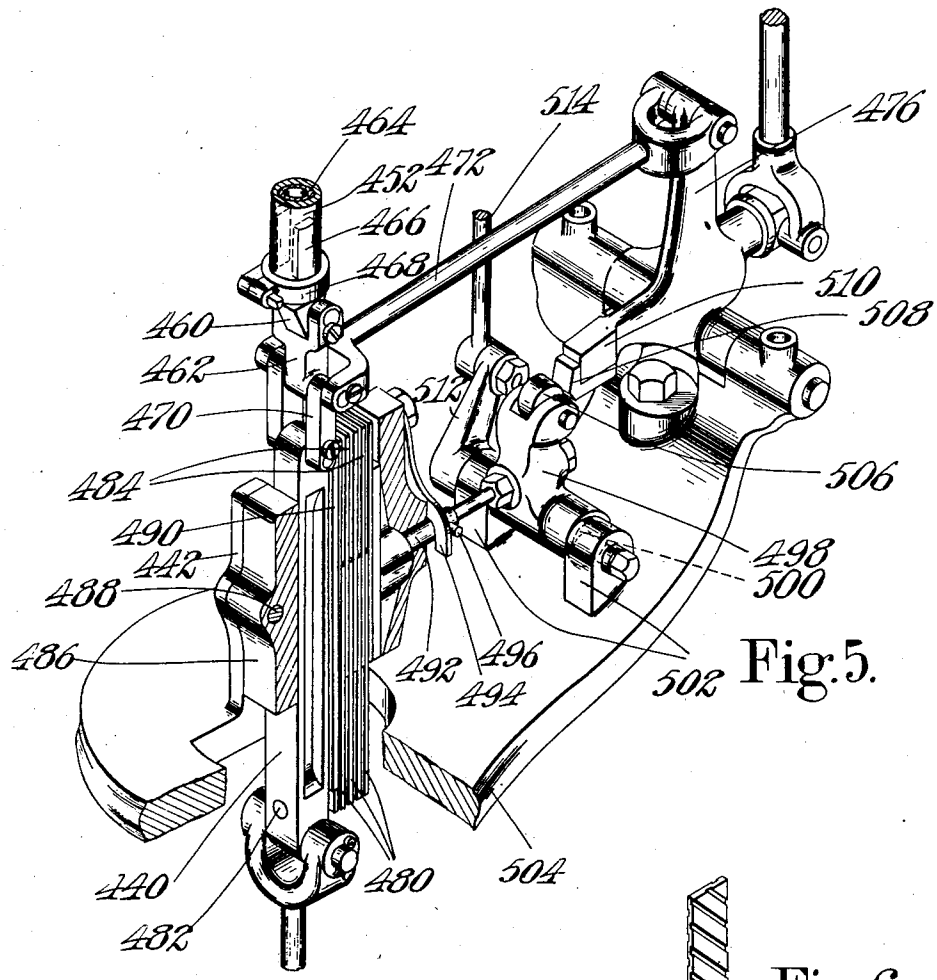



Fig. 5.

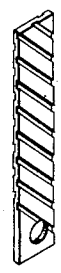


Fig. 6.

WITNESSES.

Elizabeth C. Coyle

Edith C. Holbrook

INVENTOR.

Louis A. Casgrain

By his Attorney,

Nelson W. Howard

# UNITED STATES PATENT OFFICE.

LOUIS A. CASGRAIN, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## WORK-SUPPORT.

1,108,133. Specification of Letters Patent. Patented Aug. 25, 1914.

Application filed May 10, 1910. Serial No. 560,459.

*To all whom it may concern:*

Be it known that I, LOUIS A. CASGRAIN, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain Improvements in Work-Supports, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to work supports and particularly to work supports for use in the manufacture of boots and shoes.

An object of the invention is to improve the construction and operation of work supports and to provide improved means for determining the operative positions of a movable work support and for effecting and controlling its movements.

Work support controlling mechanisms of the type commonly called "horn releases" are well-known and extensively used. Moreover very satisfactory results have been obtained with the known horn releases when employed with machines which are operated at ordinary speeds. When, however, it has been attempted to employ such horn releases with machines which operate at high speed, difficulties have been encountered, due, principally, to the fact that the operations of the work support controlling mechanism do not bear a proper time relation to the operations of the machine.

It is important, particularly in machines for successively inserting fastenings, that the work support be in proper clamping relation to the work at the time the machine operates upon the work, and that its work releasing movement be substantially uniform for all thicknesses.

A particular object of the invention, therefore, is to provide improved work support controlling mechanism of the horn release type which is so positively operated and controlled and so correlated with the other mechanisms of the machine that its movements into and out of work clamping position may always bear a proper time relation to the operations of the other mechanisms.

Another object of the invention is to provide work support controlling mechanism which is so constructed and arranged that the work support will be locked against downward thrusts upon the work at the time the machine is operating upon the work, and that the means which effects such locking will also serve to lock against action during the work release operation the means by which the adjustment of the work support for a different thickness of the work is effected.

Another object of the invention is to provide improved locking means for use with work support controlling mechanism.

In the illustrated embodiments of the invention the work support and its controlling mechanism are shown as arranged to cooperate with mechanism for inserting slugs into the heels of boots and shoes of the type disclosed in the co-pending application of Louis A. Casgrain, Ser. No. 452,755, filed September 12, 1908, for Letters Patent for improvements in machines for inserting fastenings. It will be understood that the variations in the thickness of the work will not be very marked in this class of work, and that, therefore, the adjustments of the work support to different thicknesses of the work will not be very extensive. Advantage being taken of this fact, a feature of one of the illustrated embodiments of the invention is the operation of a single locking means from a single cam in such manner that the locking of the work support against downward thrusts upon the work at the time the machine is operating upon the work, the locking of the work support adjusting spring at the time the work releasing operation takes place and the unlocking of said spring to permit the work support to adjust itself to a different thickness of the work are all effected by connections to the said cam.

Other features and objects of the invention will be apparent from a consideration of the following description in connection with the accompanying drawings, in which,—

Figure 1 is a side elevation of the machine of the co-pending application above referred to having embodied therein the present invention; Fig. 2 is a detail of the horn shaft

and the support therefor; Fig. 3 is a side elevation of the machine showing a slight modification of the invention; Fig. 4 is a section of the horn showing the provision for lateral movement of the horn top; Fig. 5 is a perspective view of the locking mechanism and associated parts; and Fig. 6 is a perspective view of one of the locking plates.

The machine illustrated and described in the co-pending application above referred to comprises a constantly operated main shaft 14 having thereon fast and loose pulleys 16 and 18, respectively, the fast pulley 16 being provided with a cam groove 218 through which certain of the movements of the horn are controlled.

In Figs. 1 and 3 the horn H is shown in its work receiving position. From this position the horn is raised into work clamping position through connections with a cam formed upon the back side of the cam disk 194 upon the cross shaft 114 which is geared to the main shaft 14, this cam operating through a lever 262 to which is connected a rod 264. The rod 264 is arranged to slide in a hole in a block 266 pivoted upon a lever 224 fulcrumed in the base of the machine. Between the block 266 and a nut 270 upon a threaded part of the rod 264 is confined a comparatively heavy spring 268 by which yielding clamping pressure is brought to bear upon the work as the horn is moved into work clamping position. The other end of the lever 224 is connected by a link 226 to a slide 440 guided in a casing 442 in the base of the machine. Connections comprising a toggle are provided between the slide 440 and the horn H.

The illustrated work support or horn comprises the horn proper H which is mounted upon a hollow casing 441 and is constructed and arranged to embrace the upper end of said casing, the forked extensions of the horn being curved at their lower ends and resting in correspondingly curved seats 443 upon the side of the casing 441. The horn H is connected to a stud 444 by means of an adjusting screw 446 by which it may be moved transversely to the line of feed of the work. Also carried by the casing 441 is a pinion 448 arranged to engage a rack 450 formed upon the upper end of the horn shaft 452, the pinion shaft 454 carrying at one end a handle 456 by which it may be turned to effect a relative vertical adjustment between the horn and horn shaft, said pinion shaft being threaded upon its end remote from the handle and provided with a handled set nut 458 by which the pinion may be locked in any position to which it has been turned, a split being formed in the casing 442 to aid this locking action.

The horn shaft 452 rests upon a support 460 to which the upper link 462 of the toggle is pivotally connected, the support 460 comprising a stud or spindle 464 which projects up into the hollow interior of the horn, and ears 466 which enter slots in opposite sides of the horn shaft to prevent the horn shaft from turning about the support 460, said ears being carried by a clamping collar 468 by which they are clamped to the stud or spindle 464 in different positions of angular adjustment with respect to said stud or spindle, whereby the horn may also be adjusted angularly. A spring 469 within the horn shaft 452 is connected at one end to said shaft and at its other end to the upper end of the stud or spindle 464.

The lower link 470 of the toggle is pivotally connected to the slide 440. In the construction shown in Fig. 1, means is provided for breaking and straightening the toggle twice during each rotation of the main shaft 14, the two toggle breaking operations being necessary in this construction, as will be noted from the following description, to permit the single locking means to be controlled by the same cam by which the toggle breaking operations are effected. The means for breaking and straightening the toggle comprises a rod 472 pivotally connected at one end to the knee joint 474 of the toggle and at its other end pivotally connected to one arm of a bell-crank lever 476 fulcrumed at 478 in the base of the machine. The bell-crank lever 476 is rocked upon its fulcrum by connections with the cam groove 218 in the driving pulley 16 comprising a lever 221 carrying a cam roll 223 which travels in the cam groove 218 and a rod 222 connected at one end to the lever 221 and at its other end to a second arm of the bell-crank 476.

Means is provided for locking the slide 440 against movement by the spring 268 when the toggle is broken, and also for locking the slide 440 when the toggle is straightened to provide a rigid support for the work during the fastening inserting operation. The illustrated means comprises a plurality of locking plates 480 spaced from each other and attached by a rivet 482 to the slide 440, the plates 480 alternating with a second set of locking plates 484 attached to and carried by the casing 442. For convenience in assembling the locking mechanism, the casing 442 is made in two parts comprising a cap 486 to which the plates 484 are attached, which is connected by a bolt or set screw 488 to the fixed part of the casing. To keep the locking plates from contact with the slide 440 a plate 490 is arranged between the locking plates and said slide, the lateral edges of said plate 490 being confined in grooves in the casing 442.

The illustrated means for pressing the respective sets of plates into locking engage-

ment with each other comprises a sliding bolt 492 which is guided in an opening in the casing 442, this bolt being pressed normally toward an inoperative relation to the locking plates by a forked leaf spring 494 which engages a pin 496 passed through a transverse opening in the bolt. The bolt 492 is adjustably connected at its end remote from the plates to a lever 498 fulcrumed upon an eccentric 500 which is journaled in bearings in ears 502 upon the casting 504. At its upper end the lever 498 carries a roll 506 which bears against a cam 508 upon the end of a third arm 510 of the bell-crank lever 476. By means of the eccentric 500 the locking means can be rendered inoperative. Connected to one of the journals of the eccentric 500 is an arm 512 by which this journal may be turned to turn the eccentric, the outer end of this arm being connected by a link 514 to a rigid arm 516 clamped upon the rod 264.

When the machine is to be rendered operative to insert fastenings and the cam 194 is turned into the position to depress the rod 264 and raise the work support into its initial work clamping position, the link 514 is moved downward by its connection with the rod 264 thereby turning the arm 512. This movement of the arm 512 serves to bring the eccentric 500 into such position that the bolt 492 is brought into clamping relation to the locking plates 480 and 484 when the toggle is in its straightened position and the bell-crank 476 is in the position shown in Figs. 1 and 5. In the position of the parts shown in these figures the cam 508 upon the arm 510 of the bell-crank presses the roll 506 into such a position that when the eccentric 500 has been turned into its operative relation to the lever 498 the lever 498 will press the bolt 492 into locking relation to the plates 480 and 484. When, however, the eccentric 500 is in the position shown in Figs. 1 and 5 the lower end of the lever 498 will be moved back far enough so that the bolt 492 will be moved out of locking relation to the plates 480 and 484, in all positions of the cam 508, this movement being effected by the spring 494.

The cam 218 is so shaped that the operation of the mechanism thus far described is as follows: The main shaft 14 being normally kept in operation, the cam 218 through its connections with the bell crank 476 causes this bell crank to rock back and forth during every rotation of said main shaft. Assuming the eccentric 500 to have been turned to bring the parts controlled by it into operative position, the rocking of the bell crank 476 toward the right in Fig. 1 will cause the toggle to be broken to depress the horn H and release the work to permit it to be fed into position for the succeeding operation, during which time the slide 440 will be locked against movement under the action of the spring 268, the cam 508 being so shaped that the bolt 492 maintains the plates in locking relation to each other while the toggle is broken to depress the horn for the work feeding operation and also while it is straightened during the fastening inserting operation. After the bell crank has completed its movement toward the right in Fig. 1, or its clockwise movement, it again moves toward the left to bring the toggle into its straightened position, this movement continuing so that the toggle is again broken upon the other side of its straightened position. This second breaking movement of the toggle is very slight and is only necessary to permit the bell crank to move far enough toward the left so that the cam 508 will release the bolt 492, thereby unlocking the slide 440 and permitting the spring 268 to adjust the position of the horn to the thickness of the work. Before the fastening inserting operation, the bell crank 476 again moves toward the right until the toggle is straightened, and the slide 440 is again locked. The slide is kept locked during the fastening inserting operation and during the succeeding work releasing operation, the only time the slide is unlocked, in the construction shown in Fig. 1, being when the toggle is broken by the movement of the bell crank toward the left in this figure to permit the adjustment of the work support to the new thickness of the work which has been fed into operative position and when the eccentric moves the lever 498 into its inoperative position as the fastening inserting mechanism is rendered inoperative.

When the machine is to be used upon work which varies considerably in thickness at different parts, it is preferable to provide separate control of the locking means, so that it will not be necessary to straighten the toggle against the locking means after a work releasing operation. It will be noted from an inspection of the construction shown in Fig. 1 that if the thickness of the work has varied materially between successive operations, as for example, when the thickness of the work to be clamped after a work releasing operation is very much greater than that for which the horn is previously adjusted, there will not be room between the upper limit of movement of the horn determined by the increased thickness of the work and the slide 440, which is locked at this time against downward movement, to permit the toggle to be straightened without springing some part of the machine.

Where the variations in thickness of the work are not very marked between successive operations, the material will usually yield

sufficiently to permit the toggle to be straightened while the slide 440 is still locked, this being especially true when the machine is being used for slugging the heels of boots and shoes. As above suggested, however, it is preferable to provide separate control of the locking means when the machine is to be used on work which varies considerably in thickness.

In Fig. 3 of the drawings, is shown a modification of the invention in which separate control of the locking means is provided. In the construction shown in Fig. 3 a cam groove 520 is provided in the cam disk 400 upon the side of the machine opposite to that shown in this figure, this cam groove being utilized to control the movements of a bell crank 522 fulcrumed at 524 between ears upon the casting 504, the connections between the cam groove 520 and the bell-crank 522 comprising a lever 526 which carries a cam roll traveling in the cam groove 520 and a rod 528 connected at one end to one arm of the bell-crank lever 522 and at its other end to the lever 526. The lever 526 is loosely mounted upon the rock-shaft 186 which passes through the machine head. The bolt 4920 which serves to press the locking plates into locking relation to each other is arranged to be engaged by a face 529 upon one arm of the bell crank 522 and moved in the direction to press the plates into locking relation to each other, the return movement of the bolt being effected by the spring 494, as in the construction shown in Fig. 1.

In the construction shown in Fig. 3, the timing of the cams 218 and 520 is such that the toggle is broken at only one side of its straightened position and that, as the toggle comes into straightened position, the bell crank 522 will move into position to unlock the slide 440 to permit the spring 268 to adjust the work support to the thickness of the work then in position to be operated upon, and will then move into position to cause the slide 440 to be again locked while the work is being operated upon and also while the toggle is broken to release the work for the succeeding work feeding operation.

As hereinabove suggested, an object of the invention is to improve the construction of work supports, and an important feature of the invention is an improvement in the construction of the horn whereby the horn top may have provision for lateral movement to adjust itself in the work during the work clamping operation, the work being relatively fixed in its location by reason of its engagement with a gage, for example the gage 531. The horn, as a whole, may be adjusted laterally to bring the horn top into different transverse relations to the path of feed of the work by means hereinabove described comprising the adjusting screw 446 which enters the stud 444. The lateral adjustment of the horn is principally used to determine the best average position of the horn for the class of work being operated upon. It frequently happens, however, that conditions upon the inside of the work may vary considerably in the same class of work so that the horn top will not seat itself in the highest part of the inside of the work and thus the work will not be as firmly supported as it might be during the fastening inserting operation. To insure the proper seating of the horn top in the inside of the work during the work clamping operation without the necessity for lateral adjustment of the horn for each shoe to be operated upon, provision is made in the construction shown in Fig. 4 for yielding lateral movement of the horn top with respect to the horn.

In the construction shown in Fig. 4 the horn top comprises a disk 530 which rests upon a wedge-shaped piece 532 having a cylindrical extension 534 which projects into a counterbore in the upper end of the horn H. The wedge-shaped piece 532 is reversible to adjust the horn top 530 so that it will have different inclinations to the work abutment, said wedge-shaped piece being confined in either of its positions by pins 536 which enter the top of the horn. The cylindrical extension 534 is clamped in the counterbored opening in the horn by a set screw 538. The horn is also provided with a vertical bore 540 into which extends a spring rod 542 by which the horn top 530 is held on the horn and also held yieldingly in a predetermined transverse relation to the horn, the rod passing through a comparatively large central opening in the wedge piece 532 and its extension 534.

The rod 542 is confined at its lower end in a cylindrical block 544 fitted within the lower end of the bore 540, the rod 542 being confined in an eccentric opening in said block whereby turning of the block in the bore 540 causes the rod 542 to press the top 530 toward different sides of the opening in the wedge piece 532. A set screw 546 holds the block 544 in adjusted position, pin openings 548 being provided in the block at different points about its circumference to permit the insertion of pins or other means by which the block may be turned. The rod 542 is loosely connected to the horn top 530.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a machine of the class described, a work support movable between a work clamping position and a work releasing position, a spring arranged to move said work

support into work clamping position and a single means for locking said work support in work clamping position and for locking said spring against action upon the work support during the work releasing movement of the latter.

2. In a machine of the class described, a work support movable between a work clamping position and a work releasing position, a spring tending normally to maintain said work support in work clamping position, a single means for locking said spring against action during the work releasing movement and for locking said work support in its work clamping position, and means for operating said locking means constructed to permit the spring to adjust the work support to the thickness of the work between the locking operations.

3. In a machine of the class described, a work support movable between a work clamping position and a work releasing position, a spring tending normally to maintain said work support in work clamping position, a single means for locking said spring against action during the work releasing movement and for locking said work support in its work clamping position, and a single means for operating said locking means and for depressing and raising the work support constructed to permit the spring to adjust the work support to the thickness of the work between the locking operations.

4. In a machine of the class described, a work support, a spring, a toggle operatively connecting the work support and spring, and a single means for locking said spring to permit the toggle to draw down the work support and for locking said toggle against longitudinal movement when it is in straightened position.

5. In a machine of the class described, a work support, a spring and a toggle arranged to transmit pressure from the spring to the work support, and means acting simultaneously to prevent said spring from exerting pressure upon the work support and to lock said toggle against longitudinal movement in either direction.

6. In a machine of the class described, a work support, a spring, a toggle interposed between the spring and work support and arranged to transmit pressure from the spring to the work support, means for intermittently breaking and straightening said toggle and a single means for locking said spring against action when the toggle is broken and for locking said toggle against longitudinal movement when straightened.

7. In a machine of the class described, a work support, a work abutment, a spring tending normally to move said work support into work clamping relation to said work abutment, means for locking said work support in work clamping position, and a toggle arranged to lower said work support while said locking means remains operative to lock said spring.

8. In a machine of the class described, a work support, a spring, a toggle operatively connecting said work support and spring, means for breaking said toggle to depress said work support and frictional means for locking said spring against action while said toggle is broken, said means operating also to lock said work support in work clamping position.

9. In a machine of the class described, a work support movable between work clamping position and work releasing position, means for effecting the movements of the work support, a spring connected to said work support and arranged to yield to compensate for variations in thickness of successive portions of the work, and a single means constructed and arranged to lock said spring against action during the work releasing movement of the work support, then to release said spring to permit the work support through the action of the spring to adjust itself to the thickness of the work and thereafter to lock the work support during the operation of the machine upon the work.

10. In a machine of the class described, a work support, a slide, a spring arranged to exert pressure upon said slide, a toggle interposed between said slide and said work support, a single means for locking said slide against movement in either direction and means for controlling the operation of said locking means whereby it is caused to lock the slide while the toggle is broken to depress the work support, to permit said slide to adjust itself to the thickness of the work, and again to lock the slide to maintain the work support rigidly against downward thrusts when the toggle is straightened.

11. In a machine of the class described, a work support movable between a work clamping position and a work releasing position, a spring connected to the said work support and tending normally to press it into work clamping position, and a single mechanism constructed and arranged to lock said spring, to move said work support into work releasing position and again into work clamping position, then to unlock said spring to permit the work support to adjust itself to the thickness of the work, and thereafter to lock the work support during the operation of the machine upon the work.

12. In a machine of the class described, a work support movable between a work clamping position and a work releasing position, mechanism for effecting such movement of the work support, and means for

varying the effective length of the connections through which the work releasing movement of the work support is effected by said mechanism comprising two sets of interlocking friction plates arranged for relative longitudinal movement, the plates of one set alternating with the plates of the other set, and means for pressing the plates of the two sets into locking relation to each other at any point within the range of their relative longitudinal movement.

13. In a machine of the class described, a work support movable between a work clamping position and a work releasing position, mechanism for effecting such movement of the work support, and means for varying the point at which the work releasing movement of the work support begins in accordance with variations in the thickness of the work, comprising two sets of interlocking friction plates arranged for relative longitudinal movement, the plates of one set alternating with the plates of the other set, and means for pressing the plates of the two sets into locking relation to each other at any point within the range of their relative longitudinal movement.

14. In a machine of the class described, a work support movable between a work clamping position and a work releasing position, mechanism for effecting such movement of the work support having a positively determined amount of operative movement, and means for compensating for the thickness of the work whereby the amount of releasing movement effected by said mechanism will be uniform for all thicknesses of work, comprising a single locking means for locking the work support in different adjustments and a spring for automatically adjusting said work support when said locking means is inoperative, said locking means being so constructed that it serves both to lock said work support in adjusted position and to lock said spring against action during the operation of said mechanism.

15. In a machine of the class described, a work support movable between a work clamping position and a work releasing position, mechanism for effecting such movement of the work support having a positively determined amount of operative movement, and means for compensating for the thickness of the work whereby the amount of releasing movement effected by said mechanism will be uniform for all thicknesses of work, comprising two sets of interlocking friction plates arranged for relative longitudinal movement, the plates of one set alternating with the plates of the other set, means for pressing the plates of the two sets into locking relation to each other at any point within the range of their relative longitudinal movement, and a spring for automatically adjusting said work support to the thickness of the work when said plates are out of locking relation to each other.

16. In a machine of the class described, a work support movable between a work clamping position and a work releasing position, mechanism for effecting such movement of the work support having a positively determined amount of operative movement and means for compensating for the thickness of the work whereby the amount of releasing movement effected by said mechanism will be uniform for all thicknesses of work, comprising two sets of interlocking friction plates arranged for relative longitudinal movement, the plates of one set alternating with the plates of the other set, means for pressing the plates of the two sets into locking relation to each other at any point within the range of their relative longitudinal movement, and a spring for automatically adjusting said work support to the thickness of the work when said plates are out of locking relation to each other so arranged that said plates lock said spring against action when said mechanism is operated.

17. In a machine of the class described, a horn and a horn top carried by and connected to said horn with provision for lateral movement in all directions in substantially the same plane.

18. In a machine of the class described, a horn and a horn top having provision for lateral movement in all directions in substantially the same plane and means for holding said top in frictional contact with the upper end of said horn.

19. In a machine of the class described, a horn and a horn top confined upon said horn against vertical movement and yieldingly held against lateral movement with respect to the horn, under the pressure of the work, provision being made for movement of said top with respect to said horn in all lateral directions.

20. In a machine of the class described, a horn, a horn top having provision for lateral movement in all directions with respect to the horn under the pressure of the work, and means for frictionally and yieldingly holding said top in a predetermined relation to the horn.

21. In a machine provided with a work gage, a rotatable horn bearing a determined relation to said gage and movable between a work clamping position and a work releasing position, and a horn top having provision for lateral movement in all directions under the pressure of the work whereby said top may automatically suit itself to work bearing against said gage during the work clamping movement of said horn.

22. In a machine of the class described, a

horn having at its upper end a central bore, a horn top and means connected to the central part of said horn top and entering said bore for holding said horn top in engagement with the top of the horn, said bore and said means being so proportioned and so constructed and arranged that provision is made for lateral movement of the horn top in all directions.

23. A horn having a bore central with respect to its upper end, a horn top, a spring rod confined at its lower end in said bore and connected at its upper end to said horn top, said rod and bore being so proportioned as to provide for lateral movement of the horn top in all directions.

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

LOUIS A. CASGRAIN.

Witnesses:
H. DORSEY SPENCER,
FREDERICK L. EDMANDS.