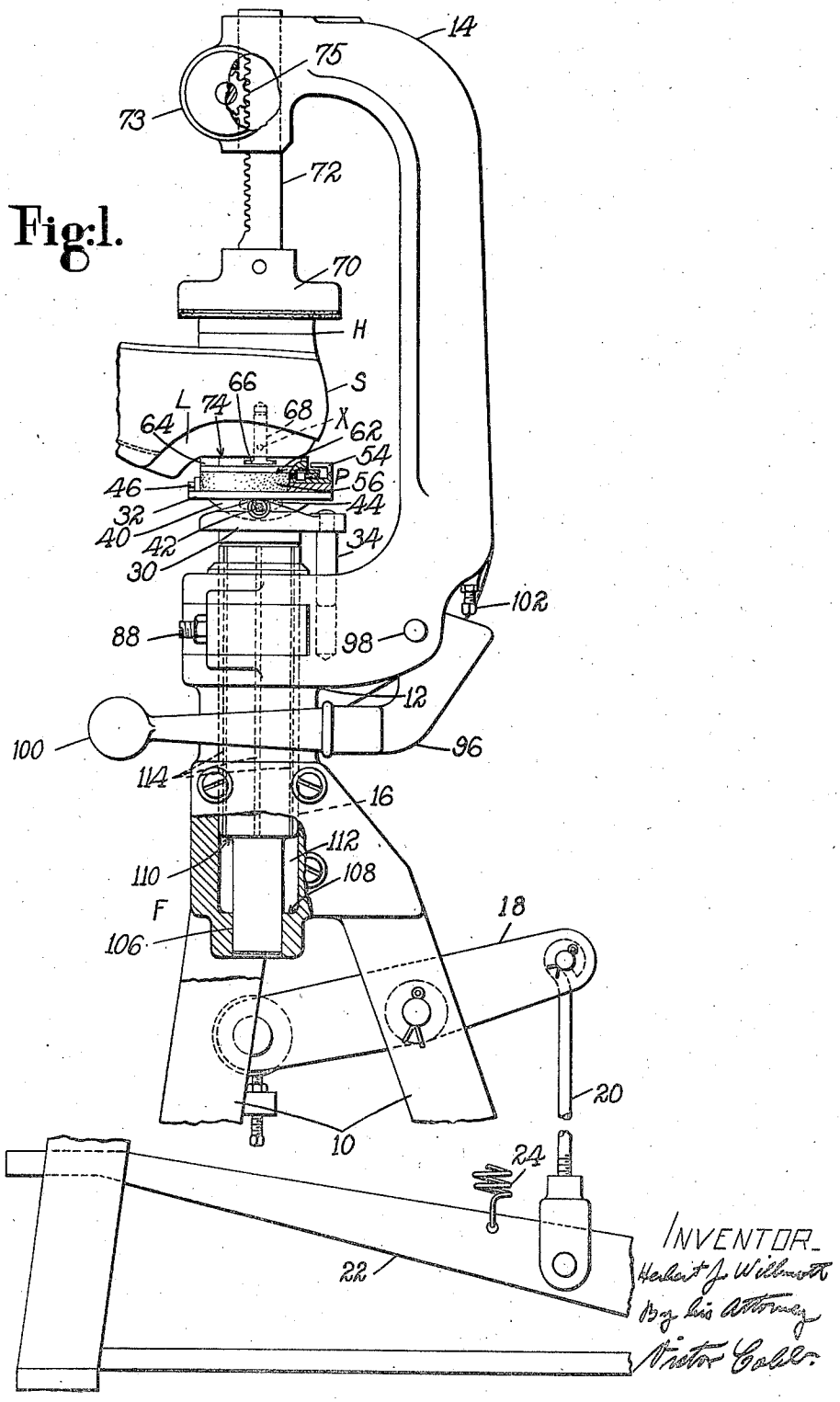
Dec. 3, 1940. H. J. WILLMOTT 2,223,474

WORK SUPPORT

Filed Nov. 18, 1938 3 Sheets-Sheet 1

Fig. 1.



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WORK SUPPORT

Filed Nov. 18, 1938 3 Sheets-Sheet 2

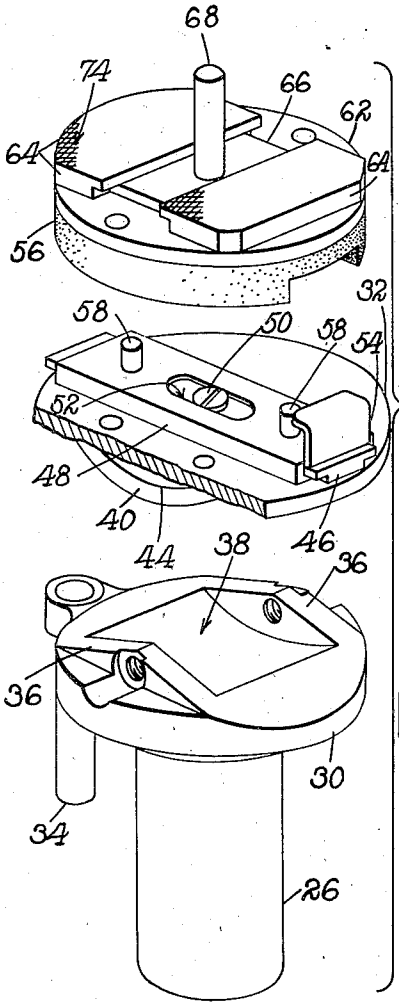


Fig. 3.

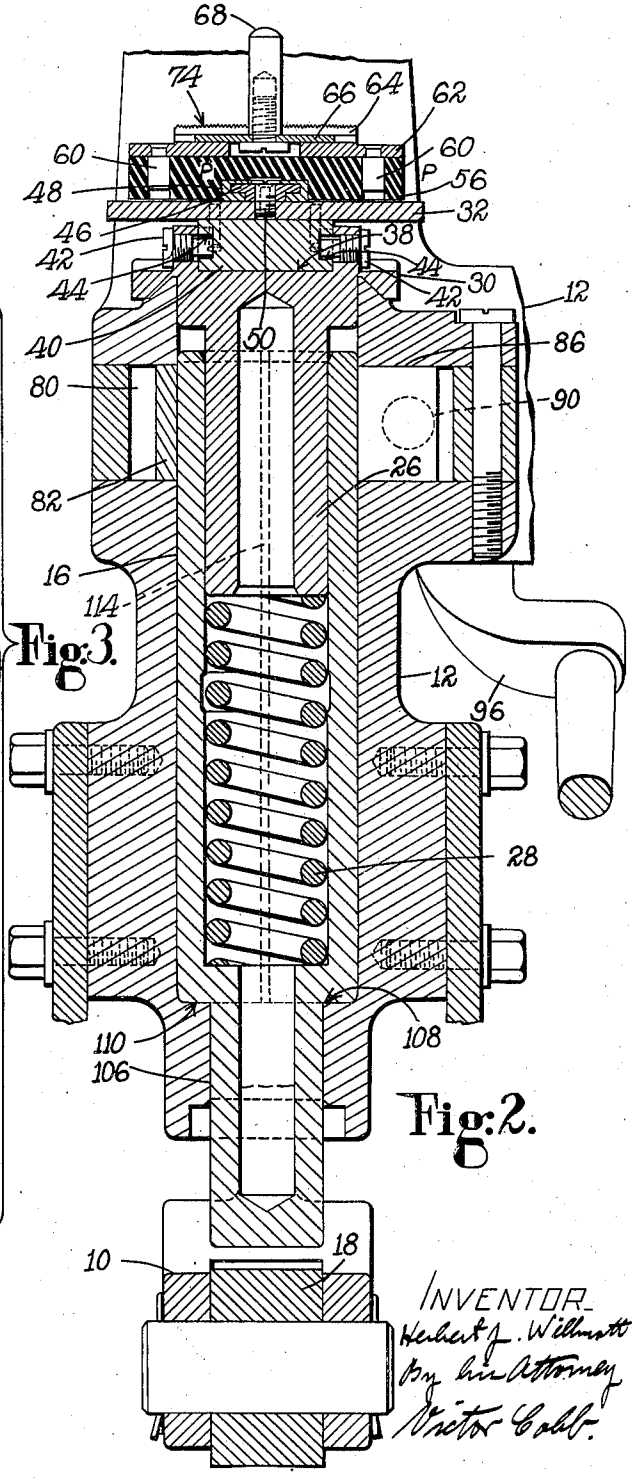


Fig. 2.

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Fig. 4.

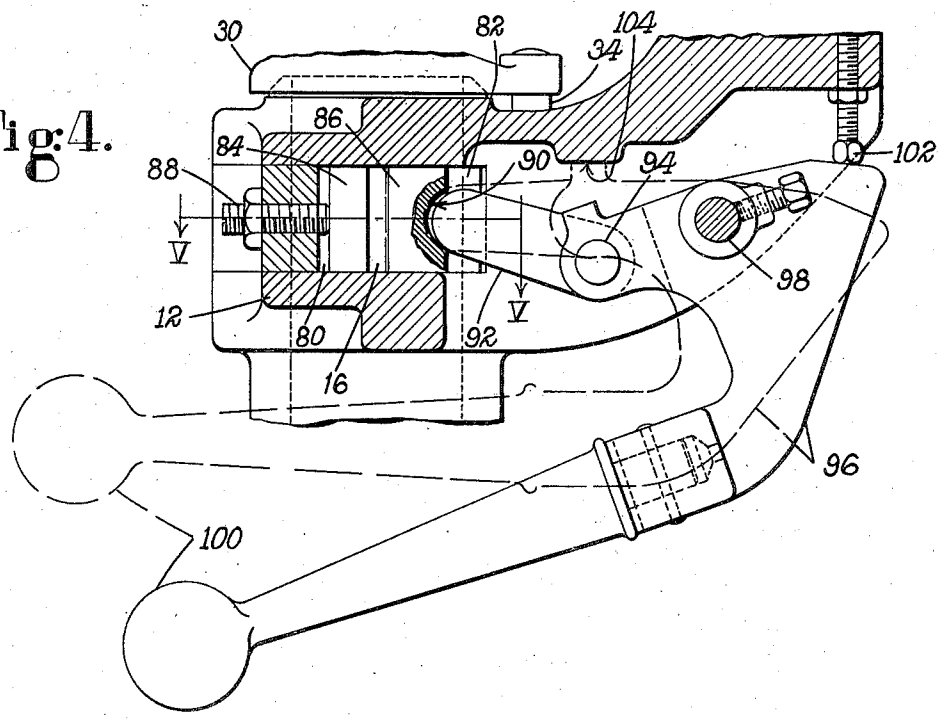
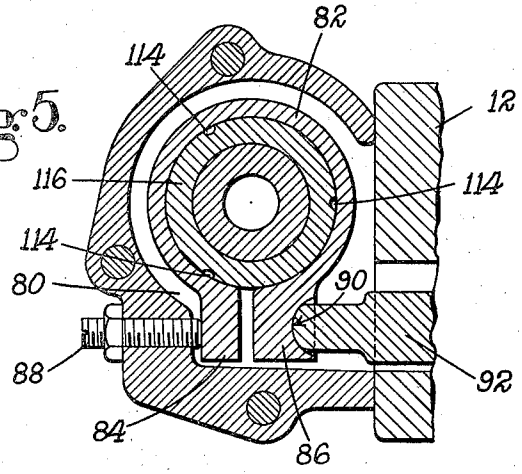


Fig. 5.



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UNITED STATES PATENT OFFICE

2,223,474

WORK SUPPORT

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Application November 18, 1938, Serial No. 241,214

24 Claims. (Cl. 12—123)

This invention relates to supports for work upon which some operation is being performed, it having particularly to do with means upon which shoe-parts are carried when subjected to pressure. An example of an operation in connection with which the invention may be used advantageously is the adhesive attachment of heels to shoes.

It is an object of my invention to so support the work that it may be positioned readily and accurately and thus maintained securely during the application of pressure or other operation upon it.

A feature of the invention by which this object is attained involves that portion of the support which more directly co-operates with the work, as such a device as a last-bed-piece. This has spaced or upper and lower work-carriers and an interposed member, as a cushion or layer of yieldable material, which permits a relatively universal rocking and bodily movement between the carriers and a corresponding movement of the work, so this may adjust itself under the influence of pressure which may be applied to it. The yield may further be utilized to secure a portion of the support after it has been positioned. This is effected by mounting upon the lower carrier a member or slide movable laterally thereof, the yieldable member being supported upon said movable member and having resting upon it the upper carrier. Then, under the influence of pressure, when the yieldable member is forced down against the lower carrier, as through an intervening space, the movable member is held fast laterally, and the work similarly secured against movement in this direction. Upon the second carrier, and having a projection entering the work, is a member which may be movable laterally upon a slide or otherwise, and this member, too, may be secured in its adjusted lateral position under pressure by the forcing of the work along the projection into engagement with the upper carrier. The two lateral movements of the elements allow the supported work to be located horizontally as desired and there held during the operation upon it. To provide for a tilting together in one direction of the elements in more direct co-operation with the work, the carriers are arranged to oscillate upon a mounting member or support. In the embodiment of the invention in a last-bed-piece, as herein disclosed, there is a support having an arcuate depression receiving a complemental projection from a lower carrier-plate. This plate has ways in which a slide is movable, said slide carrying a cushion upon which rests an upper carrier-plate having a projection entering the work.

Another feature of the invention has to do with means for fixing the work support as a whole in the position to which it may be moved, as for the application of pressure. The support has a spindle, guided for movement in a frame; a divided or spring-sleeve surrounding the spindle and having spaced projections at opposite sides of the division; an abutment, with which one of the projections contacts; and a lever fulcrumed upon the frame and engaging the other projection. The sleeve is shown as contained in a recess in the frame, and the lever preferably consists of a toggle by which a heavy spindle-clamping force may be applied to the sleeve with little effort on the part of the operator. The abutment which the sleeve-projection engages may be variable in position, and there may be a similarly variable abutment limiting the movement of the lever. By adjusting these abutments, the normal position and extent of movement of the toggle may be controlled.

Still another feature involves the prevention of interference with the free movement of the work-engaging device, as through the accumulation of dirt between a portion of it and its guiding means. This is effected by means which delivers a current of air between such portion of the device and its guide, such means preferably being caused to act by movement of the device. In the illustrative embodiment of the invention, the work-engaging device is carried by a spindle movable in the frame and furnishing therewith an air-chamber, which delivers through passages extending longitudinally between said spindle and frame upon movement of the former. The current of air thus delivered effectively removes particles which might tend to gather and find their way into contact with the spindle.

A further feature of the invention provides means by which continuing pressure is maintained upon the work after the spindle has been clamped. There is an abutment mounted upon the frame to receive contact of the work. The work-supporting spindle is tubular and has an upper section movable upon it, the section carrying a work-engaging member co-operating with the abutment when the spindle is elevated by means actuated by the operator. Within the spindle is a spring supporting the upper section, this spring being compressed during the upward movement of the spindle and then expanding to apply pressure to the work after the spindle-movement ceases.

In the accompanying drawings is illustrated one of the several forms which my invention may assume,

Fig. 1 being a broken side elevation;

Fig. 2, an enlarged section through the support proper, taken on a plane at right-angles to Fig. 1;

Fig. 3, a separated perspective of the elements included in the last-bed-piece;

Fig. 4, a vertical sectional detail through the spindle-clamping mechanism, and

Fig. 5, a horizontal section on the line V—V of Fig. 4.

My improved work support is herein disclosed in connection with a simple apparatus for applying pressure to the heel-portions of shoes. It might be utilized for the adhesive attachment of heels. At F appears a frame having a lower portion 10, a body-portion 12 and an overhanging arm 14. Guided for vertical reciprocation in the body-portion of the frame is a spindle 16, which may be raised by contact with its lower extremity of a lever 18, fulcrumed upon the portion 10 of the frame. The lever is shown in Fig. 1 of the drawings as actuated through a link 20 joined to an operator-depressed treadle 22. This treadle may be returned to its normal position by a spring 24, and the spindle may be lowered by gravity. The upper portion of the spindle is tubular and contains a section 26, resting upon a helical spring 28 interposed between it and a shoulder in the axial bore. At the top of the section 26 is a head or enlargement 30, upon which is mounted a carrier-plate 32, this being the bottom element of a last-bed-piece P. The spindle-section and its head are held against rotation by a depending projection 34 from the head, movable vertically in a bore in the frame-body.

Between walls 36, 36 rising from the head 30 is an arcuate depression 38, upon which rests the complementally curved surface of a downward projection 40 from the plate 32. The plate is thus arranged to tilt or oscillate in a direction from front to rear of the apparatus. Bodily displacement of the plate from the section 26 is guarded against by screws 42, 42 threaded through the walls 36, 36 and having their points lying in arcuate slots 44 in the plate-projection 40. Secured diametrically of the upper face of the plate 32 is a guide member 46, having opposite longitudinal edges furnishing ways along which a slide 48 is movable to an extent permitted by a screw 50 threaded into the guide member, with its head lying in a longitudinal slot 52 in the slide. This slide has at one end an upward angular extension 54. Resting upon the slide and extending downwardly, but with its lower face normally out of engagement with the opposed face of the plate 32, is a yieldable cushion 56, which may be of rubber. This is retained against lateral displacement upon the slide, while being readily separable for renewal, by pins 58, 58 extending upwardly from the slide and entering openings in the cushion. Carried upon the top of the cushion and held against lateral movement thereon by depending pins 60, 60 lying in openings in said cushion is an upper carrier-plate 62. Spaced guide members 64, 64, attached to the top of the plate, provide ways for a slide 66, from which rises a projection 68 adapted to enter the pin-hole of a last, as that appearing at L in Fig. 1. The slides 48 and 66 move in directions substantially at right-angles to each other, so the projection is capable of universal movement along the planes of the two slides. This enables the operator to locate the work, which may be a shoe S upon the last L, with a heel H applied to the heel-seat, in correct relation to a co-operating element. This element may consist of a rear fork or other backstop, but herein is shown as an abutment 70, carried by a slide 72 adjustable vertically through the frame-arm 14. Its movement may be effected by a hand-wheel 73 acting through a pinion and a rack upon the slide, these meshing at 75. By tilting the lower carrier-plate 32 to its forward position, the application of the last-hole to the projection 68 is facilitated, and there is furnished angular accommodation fore and aft of the apparatus when the work is pressed against the abutment 70 by elevation of the spindle 16. Further, the compressibility of the cushion 56 allows the upper carrier-plate 62 with the slide 66 and projection 68 to yield angularly in all directions, so there is a capacity for universal self-adjustment of the projection. This capacity for angular accommodation is always present, since the cushion at all times prevents contact between the elements which it separates. The projection of the inturned end of the slide-extension 54 over the plate 62 prevents displacement of the cushion 56, with the elements upon it, from the pins 58. Otherwise, this might occur under the influence of a lasted shoe held upon the projection 68 and with an excess of weight at the forward extremity.

After engagement of the work, as the tread-surface of the heel H with the abutment 70, and when the plate 32 and the slides 48 and 66 are in positions for the application of final pressure, it is desired that these members shall be held against displacement until the operation has been completed. Under the influence of the pressure, the under surface of the cushion 56 and the upper surface of the plate 32 are forced together. Consequently, the cushion is frictionally secured to the plate, and the slide 48, with its pins 58 in the cushion-openings, is maintained against lateral movement. The end of the cone of the last L rests upon the upper surface of the guide members 64, which may be roughened, as appears at 74. Under pressure, this engagement will prevent movement of the last over the member 64, and since the projection 68 fits in the last-hole, the slide 66 is locked in its ways. The center of curvature of the surface 38, along which the lower plate 32 tilts, lies within the last. This center is indicated at x in Fig. 1. Therefore, when the work is held by the applied pressure, the plate will be incapable of oscillation, even though the abutment 70 be pivotally mounted. Thus, all the elements of the last-bed-piece P are locked.

To hold the supported work in its elevated position against the abutment 70, a clamping member is applied to the spindle 16. In the body 12 of the frame F is a recess 80, in which rests a divided spring-sleeve 82 surrounding the spindle. From the spaced ends of the sleeve within the recess are two projections 84 and 86. The projection 84 rests against an abutment-screw 88 threaded through the frame. The projection 86 has at its outer side a depression 90, which receives the rounded end of a link 92. The opposite extremity of the link is pivoted at 94 to the short, horizontally projecting arm of a lever 96 fulcrumed at 98 upon the frame. The longer arm of the lever extends toward the front of the apparatus, where it has a hand-hold 100, convenient to be grasped by the operator. The link and the short lever-arm together furnish a toggle, acting upon the sleeve and held in a definite broken rela-

tion against an adjustable abutment-screw 102, threaded into the frame and with which the upper rear edge of the lever 96 contacts. When the toggle is straightened, upon elevation of the hand-hold 100, to an extent permitted by engagement of the lever with the frame at 104, the sleeve-projection 86 will be forced toward the stationary projection 84, and the diameter of the sleeve reduced, so it is clamped to the spindle 16. As the sleeve is held in its recess against downward movement, the spindle is similarly secured in the position to which it has been raised by the treadle 22.

When a support of this character is employed with some classes of work, as that in connection with which trimming is done, particles may gather and enter between the spindle 16 and the wall of the frame-bore, in which it is guided. This may clog the spindle, so it will not fall to its normal position when the clamping device is released by depression of the hand-hold upon the lever 96 and the consequent breaking of the toggle. This clogging I avoid by the provision of means which delivers currents of air between the spindle and the wall of the frame-bore toward the last-bed-piece P. The lower portion of the spindle and the bore are reduced at 106, giving opposite surfaces 108 and 110 upon the frame and spindle, respectively, above this reduced portion. Normally, these surfaces are in engagement, see Fig. 2, but when the spindle is raised to its operating position, as appears in Fig. 1, an air-chamber 112 is created within these surfaces and the circumferential walls. Extending longitudinally of the periphery of the spindle are grooves 114, shown as three in number and separated from one another by 120° (Fig. 5). These passages lead from the air-chamber to the top of the spindle, they emerging through the frame. As the spindle rises to the work-clamping position, air is drawn down through these grooves to fill the chamber 112, as this is formed by the separation of the surface 110 from the surface 108. When, at the completion of the operation, the spindle is released from the clamp and allowed to fall, the volume of the chamber is rapidly reduced, so sharp blasts of air are ejected through the grooves 114 and between the spindle and the frame. These divert or dislodge any dirt which tends to gather, so the spindle and the frame-bore remain clean.

In using this work support, the operator, with the abutment 70 raised if necessary by the hand-wheel 73 and with the last-bed-piece P tilted forward, finds the projection 68 conveniently located to apply to it the hole in a last L carrying a shoe S. Assuming that a whole heel H is to be adhesively attached, the operator, having coated the work-surfaces which are to contact, places the heel upon the heel-seat of the shoe, restores the last-bed-piece to its operating position and depresses the treadle 22 to elevate the spindle 16 with its section 26, together with the bed-piece and the supported work, until the tread-surface of the heel bears against the abutment. In doing this, he shifts the work as he holds it upon the projection in any direction horizontally, to present the heel in the best relation to the abutment and, having attained this, exerts such force upon the treadle as the work requires. During this operation, the toggle-lever 92, 96 has been broken, with the hand-hold 100 down, as appears in full lines in Fig. 4. With the work thus under pressure, the operator, grasping the hand-hold, raises the lever 96 to the dash-line position, straightening the toggle. The sleeve 82 is thereby contracted and the spindle clamped. During the rise of the spindle, the spring 28 was compressed after the engagement of the tread-surface of the heel with the abutment 70, and its expansion after the clamping will exert a continuing pressure upon the work to take up any looseness which might be caused by the yield of the material, as that of the heel-seat. After leaving the work under pressure for the necessary time, the spindle-clamp is released by depressing the lever 96, the spindle 16, with the last-bed-piece P and the supported work, falling to its normal position. As this occurs, the jets of air issuing from the passages 114 prevent work-particles or other dirt from clogging the spindle. The operator may remove the last and heeled shoe from the projection 68, when the apparatus is ready for another operation.

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

1. In a work support, spaced carriers for the work, and a member interposed between the carriers and permitting a relative universal rocking and bodily movement between them.

2. In a work support, lower and upper carriers for the work, and a layer of yieldable material interposed between the carriers and preventing contact between them, said yieldable material permitting universal rocking movement of the upper carrier.

3. In a work support, lower and upper carriers for the work, a member mounted upon the lower carrier for movement laterally thereof, and a yieldable member supported upon said movable member and upon which the upper carrier rests, there being relative movement between the yieldable member and the lower carrier to produce their engagement.

4. In a work support, lower and upper carriers for the work, a member mounted upon the lower carrier for movement laterally thereof, and a yieldable member supported upon said movable member and upon which the upper carrier rests, said yieldable member being normally spaced from the lower carrier but engaging it upon application of pressure to the work.

5. In a work support, a carrier, and a member movable upon the carrier laterally thereof and having a projection entering the work, the work being movable along the projection to engage the carrier and thereby hold the member against lateral movement.

6. In a work support, a carrier, a second carrier movable laterally thereof, a work-engaging member movable laterally upon the second carrier, and means for securing the work-engaging member and the second carrier against lateral movement upon the application of pressure to the work.

7. In a work support, a carrier, a second carrier movable laterally thereof, a yieldable member compressed between the carriers upon the application of pressure to the work to secure the second carrier against lateral movement, and a work-engaging member movable laterally upon the second carrier, the pressure of the work forcing said work against the second carrier to secure the work-engaging member against lateral movement.

8. In a work support, a mounting member, a carrier oscillatable upon the mounting member, a second carrier movable laterally of the first, a yieldable member interposed between the car-

riers, and an engaging member projecting from the second carrier and entering the work.

9. In a last-bed-piece, a lower plate provided with ways, a slide movable upon the ways, a cushion carried by the slide, an upper plate resting upon the cushion, and a last-pin carried upon the upper plate.

10. In a last-bed-piece, a lower plate provided with ways, a slide movable upon the ways, a cushion carried by the slide out of contact with the lower plate but compressible into engagement therewith, an upper plate resting upon the cushion, and a last-pin carried upon the upper plate.

11. In a last-bed-piece, a lower plate provided with ways, a slide movable upon the ways, a cushion carried by the slide out of contact with the lower plate but compressible into engagement therewith, an upper plate resting upon the cushion, said cushion being separably engaged by the slide and the upper plate to prevent relative lateral movement, and a last-pin carried upon said upper plate.

12. In a last-bed-piece, a support having an arcuate depression, a lower plate provided with a complemental projection arranged to rock in the depression under the influence of force applied to the work, and an upper plate having a last-pin and being yieldable upon the lower plate.

13. In a last-bed-piece, a lower plate provided with ways, a slide movable upon the ways, a cushion carried by the slide, an upper plate resting upon the cushion and provided with ways, an upper slide movable on the ways of the upper plate, and a last-pin rising from the upper slide.

14. In a last-bed-piece, a lower plate provided with ways, a slide movable upon the ways, a cushion carried by the slide, an upper plate resting upon the cushion and provided with ways, an upper slide movable on the ways of the upper plate, and a last-pin rising from the upper slide, the upper plate at each side of its ways being arranged to receive contact of the cone of a last upon the pin.

15. In a work support, a frame, a spindle movable therein, a divided sleeve surrounding the spindle, means for retaining against movement the sleeve at one side of the division, and a lever fulcrumed upon the frame and engaging the sleeve at the other side of the division.

16. In a work support, a frame, a spindle movable therein, a divided sleeve surrounding the spindle and having spaced projections at opposite sides of the division, an abutment with which one of the projections contacts, and a lever fulcrumed upon the frame and engaging the other projection.

17. In a work support, a frame, a spindle movable therein, a divided sleeve surrounding the spindle and having spaced projections at opposite sides of the division, an abutment with which one of the projections contacts, a lever fulcrumed upon the frame, and a link pivoted upon the lever and engaging the other projection, the lever and link furnishing a toggle-lever.

18. In a work support, a frame, a spindle movable therein, a divided sleeve surrounding the spindle and having spaced projections at opposite sides of the division, an abutment variable in position upon the frame and with which one of the projections contacts, a lever fulcrumed upon the frame and engaging the other projection, and an abutment variable in position upon the frame and limiting the movement of the lever.

19. In a work support, a frame having a recess, a spindle movable through the frame, a spring-sleeve contained in the recess and surrounding the spindle, and a lever fulcrumed upon the frame and engaging the sleeve to clamp it upon the spindle.

20. In a work support, a guide, and a work-engaging device having a portion movable in the guide and with which is associated means for delivering a current of air between said portion and the guide.

21. In a work support, a guide, and a work-engaging device having a portion movable in the guide and with which is associated means made effective by the movement of the work-engaging device for delivering a current of air between said portion and the guide.

22. In a work support, a frame, a spindle movable therein, there being a longitudinal passage between the spindle and frame, and a work-engaging member carried by the spindle, the frame and spindle furnishing a chamber arranged to deliver air through the passage toward the work-engaging member upon movement of the spindle.

23. In a work support, a frame having a bore, a spindle arranged to reciprocate vertically in the bore and provided with longitudinal grooves in its periphery, there being an air-chamber formed between the spindle and frame when said spindle is elevated and opening into the grooves, and a last-bed-piece carried by the spindle and toward which the grooves deliver air upon depression of the spindle.

24. In a work support, a frame, a work-abutment carried thereby, a tubular spindle mounted to reciprocate in the frame toward and from the abutment, an upper secion movable within the spindle, a spring within the spindle supporting the section, a work-engaging member carried by said section, means arranged to elevate the spindle to press the engaged work against the abutment, and means for clamping the spindle against movement in the frame with the section free to be elevated by the spring.

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