Dec. 13, 1938. E. A. BESSOM 2,139,658

MACHINE FOR SEPARATING SHOES FROM LASTS

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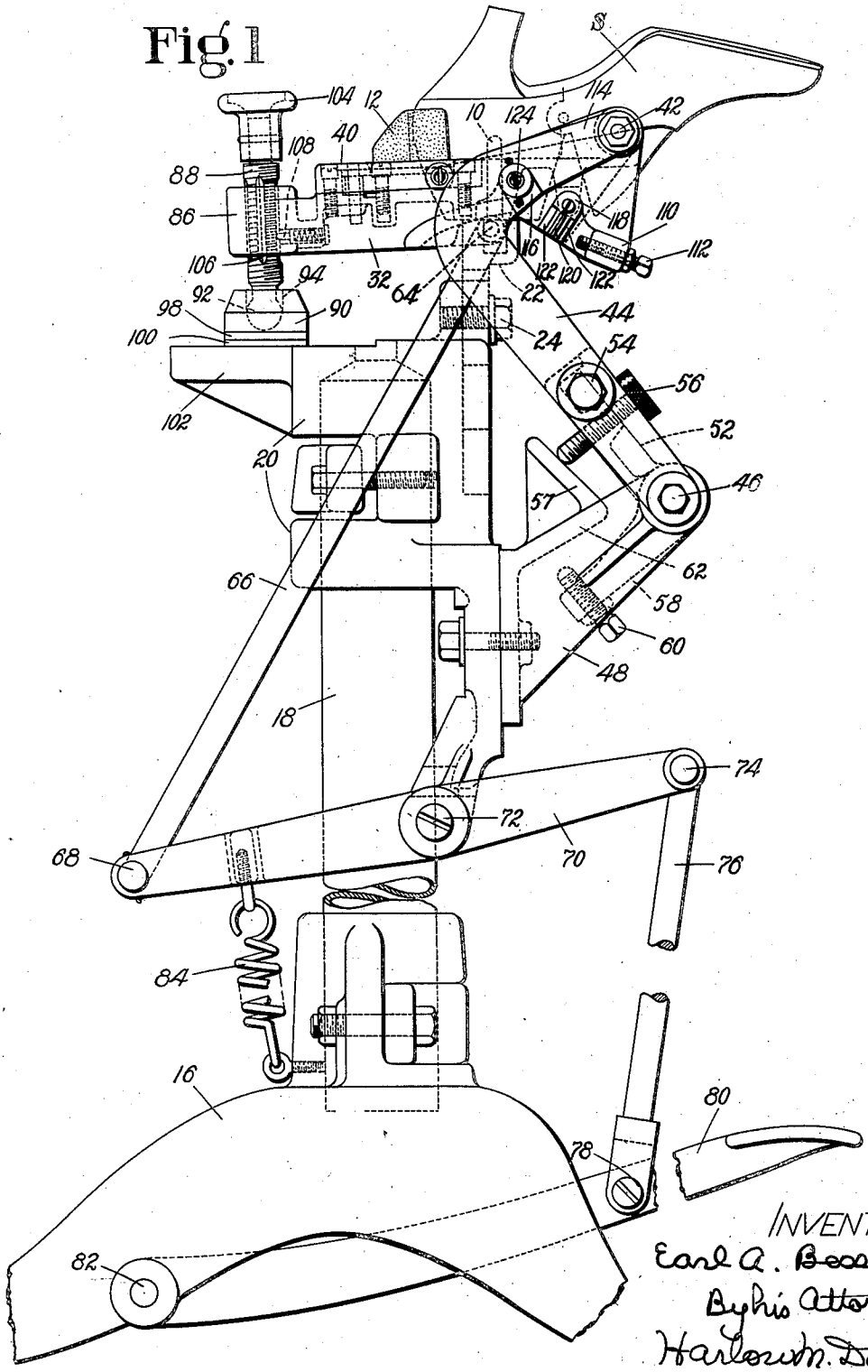
Fig. 1



INVENTOR
Earl A. Bessom
By his Attorney
Harlow M. Davis

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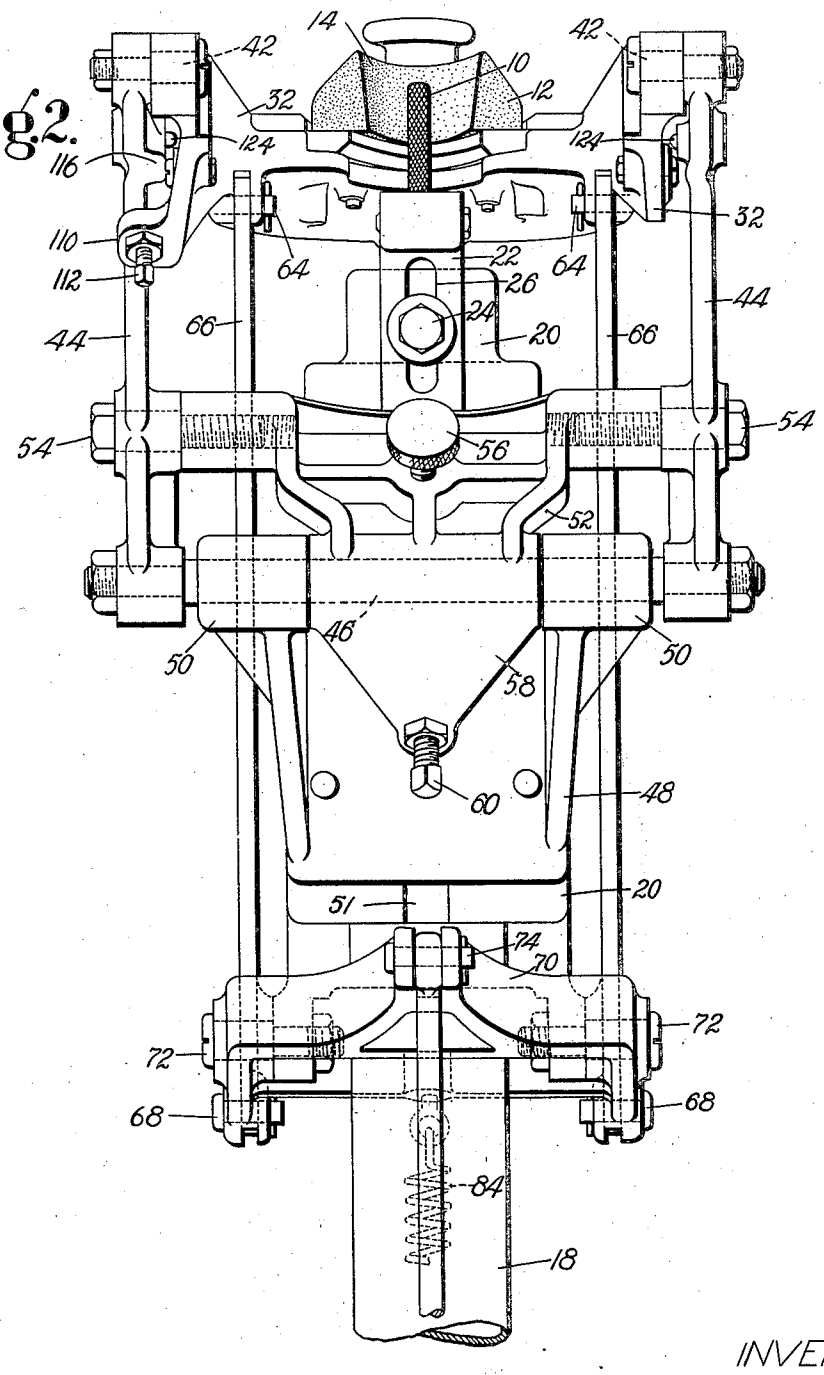
Fig. 2.



INVENTOR

Earl A. Bessom

By his Attorney,

Harlow M. Davis

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Fig. 3.

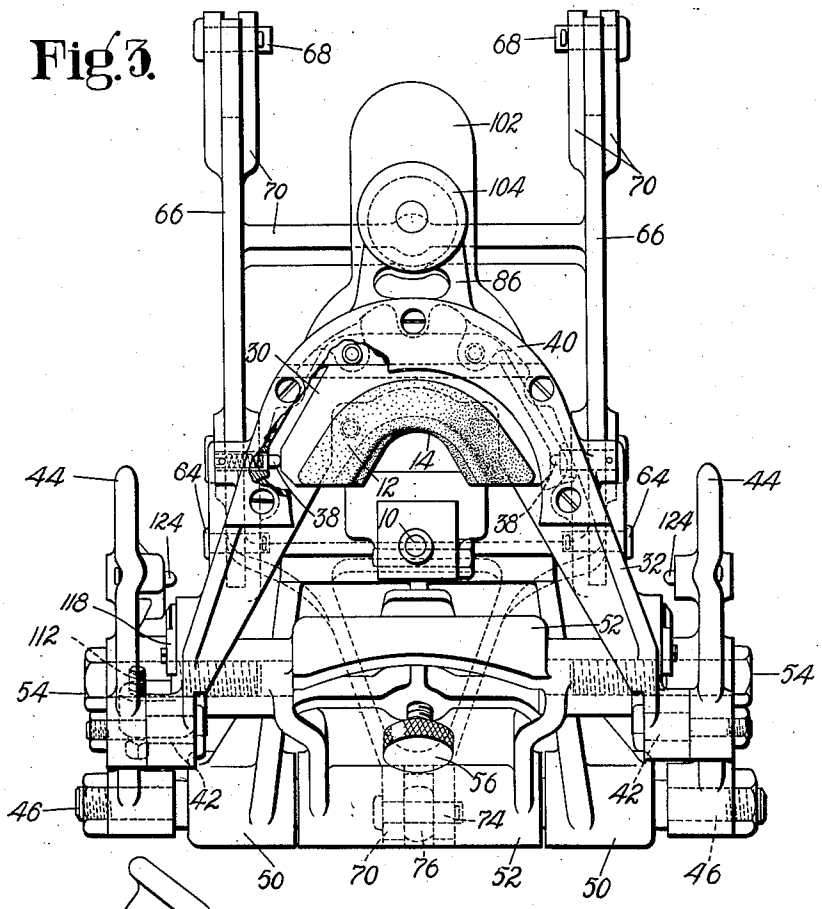
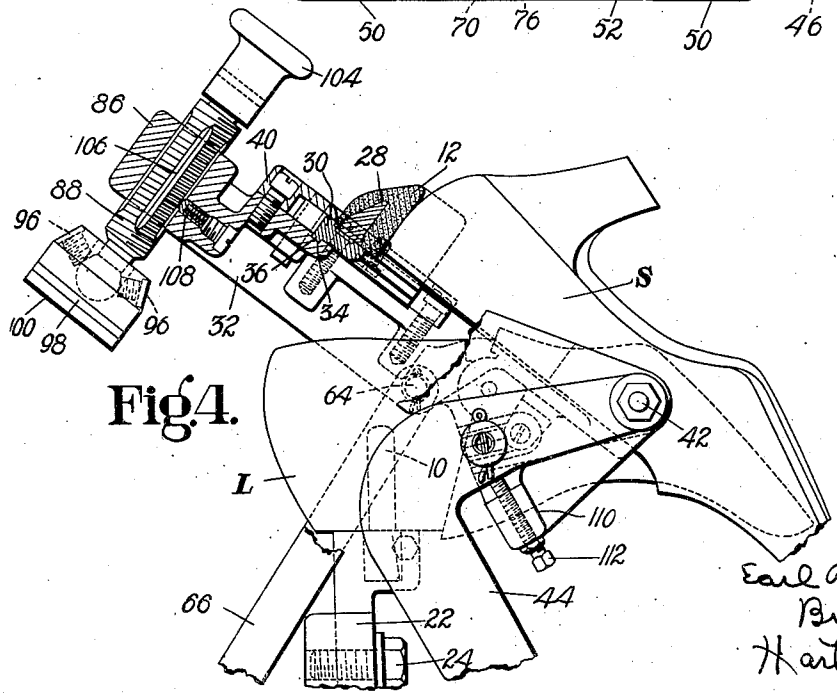


Fig. 4.



INVENTOR

Earl A. Bessom

By his Attorney

Harlow M. Davis

Patented Dec. 13, 1938

2,139,658

UNITED STATES PATENT OFFICE

2,139,658

MACHINE FOR SEPARATING SHOES FROM LASTS

Earl A. Bessom, Marblehead, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application July 14, 1936, Serial No. 90,547
In Great Britain April 1, 1936

19 Claims. (Cl. 12—15.1)

This invention relates to machines for separating shoes from lasts and is herein disclosed as embodied in a treadle-operated machine provided with a shoe-removing tool which engages the heel end of a shoe on a last. The illustrated machine is provided with a stationary last pin upon which the last is mounted in inverted position.

It is an object of the present invention to provide an improved machine of the type under consideration. In the illustrated machine the shoe removing tool consists of a friction pad mounted upon a lever which, in turn, is fulcrumed upon the free end of a pivotally supported arm, the lever being operated by a rod pivotally connected thereto, and the rod being urged by positive connections from the treadle in a direction having a heightwise and a lengthwise component with respect to the shoe to cause the friction member to move the shoe upwardly and forwardly off the last. The path of the friction pad in the course of its operative movement is determined by the shape of the last itself. The pad is mounted for lateral movement upon the lever to enable it to center itself upon engaging the shoe. Means are provided for holding the friction pad out of engagement with the last during its return movement.

The invention further includes features of construction and combinations and arrangements of parts hereinafter described in the claims, the advantages of which will be apparent to those skilled in the art from the following description.

The invention will be described with reference to the accompanying drawings, in which

Fig. 1 is a view in side elevation of the improved machine;

Fig. 2 is a view in front elevation of the upper portion of the machine shown in Fig. 1;

Fig. 3 is a plan view of the machine; and

Fig. 4 is a view in side elevation of the operating instrumentalities of the machine in process of removing a shoe from a last.

The illustrated machine is provided with an upstanding last pin 10 upon which a last L with a shoe S thereon is mounted in inverted position. The shoe-engaging instrumentality of the machine comprises a friction pad 12 of rubber having a concave recess 14 shaped to engage the rear portion of a shoe upper. The pad 12 is urged, by mechanism which will presently be described, into engagement with the rear end of the shoe S with sufficient pressure to grip the shoe frictionally, whereupon the pad is urged upwardly to raise the rear portion of the shoe from the last L.

The supporting structure of the machine comprises a base 16 adapted to rest upon the floor and a column 18 extends upwardly from the base 16 and supports a head 20. A bracket 22 is mounted for vertical adjustment in the head 20 and is secured in adjusted position to the head by a clamping bolt 24 passing through a vertical slot 26 formed in the bracket 22. The last pin 10 is mounted in the bracket 22.

The rubber pad 12 is molded over a brass core 28 (Fig. 4) which is secured to a slide 30. A U-shaped frame 32 is provided with a guideway 34 which is slidably engaged by a flange 36 extending from the slide 30. The frame 32 is so arranged that its arms extend forwardly on opposite sides of the shoe S while the guideway 34 is directed transversely of the shoe to enable the pad 12 to center itself relatively to the shoe upon engaging the shoe. The pad 12 is yieldingly maintained in a neutral position by two opposed spring-pressed plungers 38 (Fig. 3) secured in the frame 32. The slide 30 is retained against the frame 32 by a cover plate 40. The pad 12 extends into the concavity of the U-shaped frame 32, with the recess 14 of the pad disposed to receive the rear end of the shoe. The frame 32 is pivotally mounted upon a pair of coaxial studs 42, the forward ends of the arms of the frame 32 having bearings formed therein to receive the studs 42, respectively. Each of the studs 42 is carried in the upper portion of one of a pair of links 44, the two links 44 being parallel to each other and being pivotally mounted at their lower ends upon the opposite end portions of a stationary pin 46. Bolted to the head 20 is a bracket 48 having a pair of spaced bearings 50 for the pin 46. The head 20 is provided with a vertical guideway 51 for engagement with a rib on the bracket 48 to enable the height of the bracket 48 to be adjusted relatively to the head 20. Mounted upon the pin 46 between the bearings 50 is a frame 52 which is secured to the links 44 by bolts 54. The frame 52 and the links 44 thus constitute a unitary structure which is freely pivotal about the axis of the pin 46. Threaded through the frame 52 above the pin 46 is a stop screw 56 which is engageable with an abutment flange 57 extending from the bracket 48 to limit the rearward swinging movement of the links 44. The frame 52 has a depending portion 58 through which is threaded a stop screw 60 engageable with a portion 62 of the

bracket 48 to limit forward swinging movement of the links 44.

Pivotally connected by pins 64 to the arms of the frame 32 are a pair of parallel spaced push rods 66 which extend downwardly and rearwardly from the pins 64 at an angle of about thirty degrees from the vertical. The lower ends of the push rods 66 are pivotally connected by pins 68 to the rear end of a yoke-shaped lever 70 which embraces the column 18 and which is fulcrumed upon a pin 72 mounted in the lower portion of the head 20. Pivotally connected by a pin 74 to the forward end of the lever 70 is a rod 76 having its lower end pivotally connected by a pin 78 to a treadle 80 which is fulcrumed upon a pin 82 mounted in the base 16. A tension spring 84 having its lower end anchored in the base 16 and its upper end secured to the lever 70 tends to hold the push rods 66 down and the treadle 80 up, with the stop screw 56 against the abutment 57.

Extending rearwardly from the frame 32 is a lug 86 through which is threaded a screw 88 carrying at its lower end an abutment 90. The connection between the abutment 90 and the screw 88 provides for relative universal tilting of the abutment, the screw having a ball 92 formed on its lower end which is received in a recess 94 in the abutment. A pair of screws 96 threaded through the abutment engage the ball 92 to prevent withdrawal of the same from the abutment. The abutment 90 has its under surface padded with a disk of leather 98 which, in turn, is covered with a disk 100 of fibre composition. The abutment 90 normally rests upon a table 102 extending rearwardly from the head 20, the under surface of the fibre disk 100 being in sliding engagement with the upper surface of the table. The screw 88 is provided with a knob 104 by which it may be turned to adjust the height of the pad 12 relatively to the shoe S. In order to retain the screw in any given position of adjustment the screw has a plurality of grooves 106 formed in the threaded portion of its shank, these grooves being engageable by a spring-pressed plunger 108 mounted in the frame 32.

It will be evident from the foregoing description that the frame 32 is supported at its forward end by the studs 42 and at its rear end by the adjustable abutment 90. The frame 32 is free to swing upwardly about the studs 42. In order to provide a limit to such upward movement of the frame 32 one of the forwardly extending arms of the frame has formed in it a lug 110 through which is threaded a stop screw 112. The links 44, as will be evident upon inspection of Fig. 1, do not extend in a straight line from the pin 46 to the studs 42 but are L-shaped, the long bar of the L extending upwardly and rearwardly from the pin 46 and the short bar, which is identified in the drawings by the reference character 114, extending upwardly and forwardly to the studs 42. On one of the bars 114 is formed an abutment 116 which is engaged by the end of the screw 112 to limit further swinging movement of the frame 32 about the studs 42. Upon each of the forwardly extending arms of the frame 32 is a plate 118 having formed in it a groove 120 having beveled walls. The edges of the plate 118 are beveled, as indicated by the reference character 122. In each of the bars 114 is mounted a spring-pressed plunger 124. When the frame 32 swings upwardly about the studs 42 and is approaching the limit of its movement in that direction the spring-pressed plunger 124 will ride up on the bevel 122 and then engage the groove 120. The adjustment of the screw 112 should be such as to limit further swinging movement upon such engagement of the groove 120 by the plunger 124. The frame 32 is thus yieldingly locked against movement in a reverse direction for a reason which will later be explained.

In the operation of the machine the last L with a shoe S mounted thereon is placed in inverted position on the last pin 10. The screw 88 should be adjusted to bring the friction pad 12 to a desired height relatively to the rear end of the shoe upper. Depression of the treadle 80 will cause the push rods to transmit to the frame 32 a thrust having upward and forward components, the relative magnitudes of which will be proportional to the cosine and the sine, respectively, of the angle which the push rods make to the vertical. As this angle is in the neighborhood of thirty degrees (varying somewhat slightly as the movement progresses) it will be evident that while the vertical component exceeds the horizontal component, the latter is nevertheless in substantial proportion to the former. As the treadle 80 is depressed, the principal resistance to the thrust of the push rods 66 will be the result of friction and will be relatively slight. This resistance will be overcome by the horizontal component of thrust in the push rods, and the frame 32 will advance, with the disk 100 sliding over the table 102 and the friction pad 12 approaching the rear end of the shoe upper. It will be observed that the line of thrust of the push rods comes relatively close to the fulcrum 42 of the frame 32. The center of gravity of the frame, on the other hand, is a considerable distance from the fulcrum 42. The weight of the frame 32 and its associated parts will therefore be more than sufficient to over-balance the relatively slight upward component of thrust of the push rods during this period of the operation, and the disk 100 will remain in contact with the table 102 as the frame advances. This forward movement of the frame 32 is terminated by the engagement of the pad 12 with the heel end of the shoe upper. As the pad comes into contact with the shoe the operator feels an increased resistance from the treadle. The thrust in the push rods increases, and with the increase of the horizontal component the pad, which has centered itself relatively to the shoe, is compressed against the shoe, conforming to the exact contour of the shoe. Further forward movement of the frame 32 is now impossible, and the operator is enabled, through the treadle, to develop a considerably greater thrust in the push rods, causing this thrust to build up to a point where it is sufficient to overcome the weight of the frame 32. The frame 32 now tends to swing upwardly about the fulcrum 42. The relatively heavy pressure of the pad 12 against the shoe, however, causes the pad to grip the shoe frictionally with a force sufficient to prevent relative slip. Further downward movement of the treadle raises the frame 32 about its fulcrum, and the pad 12 draws the rear portion of the shoe upwardly off the last. The operator, if a jointed last is being used, may assist the removal of the rear portion of the shoe by pressing downwardly upon the sole of the shoe to break the last.

As soon as the heel end of the shoe clears the heel end of the last, the frame 32 is again free to move forwardly under the influence of the forward component of thrust in the push rods.

Continued downward movement of the treadle therefore causes the pad 12 to push the shoe forwardly off the last. The operator, grasping the forepart of the shoe, may complete the removal of the shoe with little or no effort. The forward movement of the frame 32 is finally arrested by the engagement of the stop screw 60 with the abutment 62. The frame 32 will then swing upwardly about the studs 42 until the stop screw 112 engages the abutment 116, as shown in Fig. 4.

The screw 112 is so adjusted as to stop the frame just as the plungers 124 snap into the beveled groove 122 to latch the frame yieldingly in upward position relatively to the links 44. Upon release of the treadle, the spring 84 will draw the push rods downwardly, causing the frame 32 and with it the links 44 to swing as a unit rearwardly about the pin 46. The frame 32, only by reason of the fact that it is held up by the plungers 124, will clear the last in its rearward movement. When the stop screw 56 engages the abutment 57 the rearward swinging movement of the links 48 will be arrested suddenly. The inertia of the frame 32, however, aided by the downward pull of the spring 84 and by the weight of the frame, will be effective to free the beveled grooves 122 from the plungers 124, thereby enabling the frame to swing downwardly about the studs 42 until the abutment 90 engages the table 102. The operator now removes the last from the last pin 10, leaving the machine in readiness for another operation.

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

1. A machine for effecting relative movement between shoes and lasts comprising a support for a last with a shoe thereon, a member adapted frictionally to engage the shoe, a carrier for said friction member, an arm upon which said carrier is pivotally mounted, a pivotal support for said arm, a rod pivotally connected to said carrier, and means for urging said rod in a direction having a heightwise and a lengthwise component with respect to the shoe to cause said shoe-engaging member to move the shoe upwardly and forwardly off the last, said lengthwise component being sufficient to develop a frictional gripping pressure between a shoe-engaging member and the shoe.

2. A machine for separating shoes from lasts comprising a support for a last with a shoe thereon, a member adapted frictionally to engage the shoe, a carrier for said friction member, an arm upon which said carrier is pivotally mounted, a pivotal support for said arm, a rod pivotally connected to said carrier, a treadle, and positive connections between said treadle and said rod constructed and arranged to transmit through said rod to said carrier a force having a forward component relatively to the shoe sufficient to develop a frictional gripping pressure of the shoe-engaging member against the shoe and having a heightwise component relatively to the shoe to cause the shoe-engaging member to move the shoe upwardly from the last.

3. A machine for separating shoes from lasts comprising a support for a last with a shoe thereon, a member adapted frictionally to engage the shoe, a carrier for said friction member, an arm upon which said carrier is pivotally mounted, a pivotal support for said arm, a rod pivotally connected to said carrier, means for supporting said carrier to maintain said pad at a predetermined height for presentation to the shoe, and means for urging said rod in a direction having a forward component with respect to the shoe sufficient to bring the shoe-engaging member, as the arm swings forwardly about said pivotal support, into frictional gripping engagement with the shoe and having a heightwise component which, when the lengthwise movement of the shoe-engaging means is arrested by engagement with the shoe, causes the shoe-engaging member to raise the shoe from the last.

4. A machine for separating shoes from lasts comprising a support for a last with a shoe thereon, a friction pad, means for supporting said pad at a predetermined heightwise position relatively to said last support, means for adjusting said supporting means to vary said predetermined height, a treadle, and mechanism for transmitting from said treadle to said pad a force which operates first to bring the pad while in said predetermined heightwise position into frictional engagement with the shoe and then, while pressing the pad against the shoe, to raise the pad from said predetermined heightwise position to separate the shoe from the last.

5. A machine for separating shoes from lasts comprising a support for a last with a shoe thereon, a shoe-removing tool, means for supporting said shoe-removing tool at a predetermined heightwise position relatively to said last support, means for adjusting said supporting means to vary said predetermined height, a treadle, mechanism for transmitting a force from said treadle to said shoe-removing tool, and means for controlling the movement of said shoe-removing tool under the influence of said force to cause the shoe-removing tool while in said predetermined heightwise position to come into operative position relatively to the shoe and then to raise the shoe-removing tool from said predetermined heightwise position to separate the shoe from the last.

6. A machine for separating shoes from lasts comprising a support for a last with a shoe thereon, a shoe-removing tool, mechanism for supporting said shoe-removing tool, a rod pivotally connected to said supporting mechanism, and means for transmitting through said rod to said supporting mechanism a force having a component acting in a direction to bring the shoe-removing tool into frictional gripping engagement with the shoe and a component acting in a direction to cause the shoe-removing tool to separate the shoe from the last, said supporting mechanism being constructed and arranged to cause said shoe-removing tool to yield first to the first-mentioned component to insure operative engagement between the shoe-removing tool and the shoe and then to yield to the second-mentioned component to separate the shoe from the last.

7. A machine for separating shoes from lasts comprising a support for a last with a shoe thereon, a friction member, a carrier for said friction member, a support for said carrier, said carrier support being movable in a direction to bring said friction member into engagement with the shoe and said carrier being mounted on said carrier support for movement of said friction member in a direction to separate the shoe from the last, a treadle, and positive connections for transmitting from said treadle to said carrier a force having a component directed to urge the friction member into gripping engagement with the shoe and a component directed to urge the shoe off the last, said carrier support being constructed and arranged to yield before said carrier to en-

able said friction member to engage and to press against the shoe whereupon the carrier yields and the friction member urges the shoe off the last.

8. A machine for separating shoes from lasts comprising a support for a last with a shoe thereon, a shoe-engaging member, a carrier for said shoe-engaging member, a support for said carrier mounted for movement in a direction to enable said shoe-engaging member to engage the shoe, said carrier being mounted on said carrier support for movement of said shoe-engaging member in a direction of separation of the shoe from the last, a treadle, and means for transmitting from said treadle to said carrier a force having a component tending to move the shoe-engaging member into contact with the shoe with frictional gripping pressure and a component tending to move the shoe-engaging member in a direction to cause separation of the shoe from the last, said carrier support being constructed and arranged to yield to said force before said carrier to enable said shoe-engaging member first to be brought into contact with the shoe and then, when movement toward the shoe is arrested by such contact, to exert upon the shoe a force tending to remove the shoe from the last.

9. A machine for separating shoes from lasts comprising an upstanding last pin for supporting a last with a shoe thereon, a friction pad, a lever on which said friction pad is mounted, a rod pivotally connected to said lever, means for exerting through said rod upon said lever a force urging said friction pad in a direction to engage with frictional gripping pressure the rear portion of the upper and also in a direction to raise the rear portion of the shoe relatively to the last, and a movable fulcrum for said lever constructed and arranged to yield under the influence of said force in a direction to enable said pad frictionally to engage the rear portion of the shoe, whereupon said force operates to swing said lever upwardly about said fulcrum to cause said pad to raise the rear portion of the shoe relatively to the last.

10. A machine for separating lasts and shoes comprising a support for a last with a shoe thereon, a shoe-engageable member constructed and arranged to exert upon the shoe a force tending to move the shoe relatively to the last, a carrier upon which said shoe-engageable member is mounted, a movable support to which said carrier is pivotally connected to enable said shoe-engageable member to follow a path determined by the last, means for operating said carrier to cause said shoe-engageable member to urge the shoe off the last, a pair of stops for limiting the operative and the return movements respectively of said movable support, and a yieldable latch for holding said carrier fixed relatively to said movable support during return movement to insure clearance between said shoe-engageable member and the last, said latch being constructed and arranged to engage upon stopping of the operative movement and to disengage upon stopping of the return movement of the movable support.

11. A machine for separating lasts and shoes comprising a support for a last with a shoe thereon, a shoe-engageable member constructed and arranged to exert upon the shoe a force tending to move the shoe relatively to the last, a carrier upon which said shoe-engageable member is mounted, a movable support to which said carrier is pivotally connected, means for operating said carrier to cause said shoe-engageable member to urge the shoe off the last, and means for latching said carrier against pivotal movement relatively to said support during return movement of the carrier to assure that the carrier in its return movement will clear the last.

12. A machine for separating shoes from lasts comprising a stationary support for a last with a shoe thereon, a friction member engageable with the rear portion of the shoe upper, means for moving said friction member forwardly into engagement with the shoe, then upwardly to raise the heel end of the shoe from the last, then forwardly to push the shoe off the last, the path of which movement is determined by the last, and means for causing said friction member in its return movement to clear the last.

13. A machine for separating shoes from lasts comprising a support for a last with a shoe thereon, a member engageable with the rear portion of the shoe upper, means for effecting relative movement between said last support and said shoe-engageable member in a path determined by the last, said path being upward and forward relatively to the last, to cause said shoe-engageable member to raise the rear portion of the shoe relatively to the last and to push the shoe forwardly relatively to the last, and means for causing a return relative movement between said last support and said shoe-engageable member in a different path which provides clearance between the shoe-engageable member and the last.

14. A machine for separating lasts and shoes comprising a support for a last with a shoe thereon, a friction pad having a concavity adapted to engage the rear end of the shoe, a carrier for said friction pad, means for moving said carrier to cause said friction pad to operate against the shoe to urge the shoe off the last, and a guideway in said carrier in which guideway said friction pad is movable in a direction transverse to its operative movement to enable said pad to center itself relatively to the shoe.

15. A machine for separating shoes from lasts comprising a support for holding in inverted position a last with a shoe thereon, a friction pad, a carrier for said friction pad, a support for said carrier constructed and arranged to enable said carrier to move forwardly relatively to the shoe, said carrier being movable upwardly from said carrier support, a rod connected to said carrier, and means for exerting through said rod a thrust having a forward component sufficient to move said carrier forwardly, without raising said carrier from said carrier support, until said pad engages the rear portion of the shoe with frictional gripping pressure, said thrust having also an upward component which thereupon lifts the carrier from the carrier support and causes the pad to raise the rear portion of the shoe from the last.

16. A machine for separating shoes from lasts comprising a support for an inverted last with a shoe thereon, a shoe removing tool normally positioned rearwardly of the last and free to move forwardly toward the last and upwardly, a rod inclined forwardly and upwardly for operating said shoe removing tool, the forward inclination of said rod being sufficient to enable a longitudinal thrust transmitted through said rod to move the tool forwardly before raising the tool and the upward inclination serving to enable the thrust of the rod to raise the tool when forward movement of the tool is arrested, means for supporting and guiding said tool during said forward movement, and means for exerting through said rod a longitudinal thrust to cause said tool to move forwardly into operating position rela-

tively to the rear portion of the shoe and then, upon the arrest of said forward movement, to move upwardly and thereby raise the rear portion of the shoe from the last.

17. A machine according to claim 16 wherein the operating rod is pivotally connected to the shoe removing tool.

18. A machine for separating shoes from lasts comprising a last pin for supporting in inverted position a last with a shoe thereon, a shoe removing tool, a carrier for said shoe removing tool, a stationary support along which said carrier may be moved forwardly into operating position with respect to a shoe on the last, an operating rod extending forwardly and upwardly and connected at its upper end to said carrier, and means for exerting a thrust through said rod to move said carrier first forwardly along said support into operating position and then upwardly from said support to raise the rear portion of the shoe from the last.

19. A machine for separating shoes from lasts comprising a last pin for supporting in inverted position a last with a shoe thereon, a member engageable with the shoe to move the shoe relatively to the last, a carrier for said shoe engageable member, a support along which said carrier may be moved forwardly into operating position with respect to the shoe, said carrier having a rearward portion engageable with said support, an arm pivotally connected at its upper end to a forward portion of said carrier and pivotally mounted at its lower end for swinging movement forwardly and rearwardly with respect to the shoe, and operating mechanism constructed and arranged to exert upon said carrier at a locality between that portion of the carrier which is engageable with said support and that portion which is connected to said arm a force having forward and upward components, the forward component being sufficient relatively to the upward component to move said carrier forwardly along said support without raising said carrier until the shoe engageable member has arrived at operating position and can advance no further, whereupon the upward component will swing said carrier upwardly about its pivotal connection with said arm to cause the shoe engageable member to raise the rear portion of the shoe relatively to the last.

EARL A. BESSOM.