F. B. KEALL & J. GOULDBOURN.

MACHINE FOR OPERATING ON SHOES.

APPLICATION FILED JUNE 14, 1910.

1,006,484.

Patented Oct. 24, 1911.

4 SHEETS—SHEET 1.

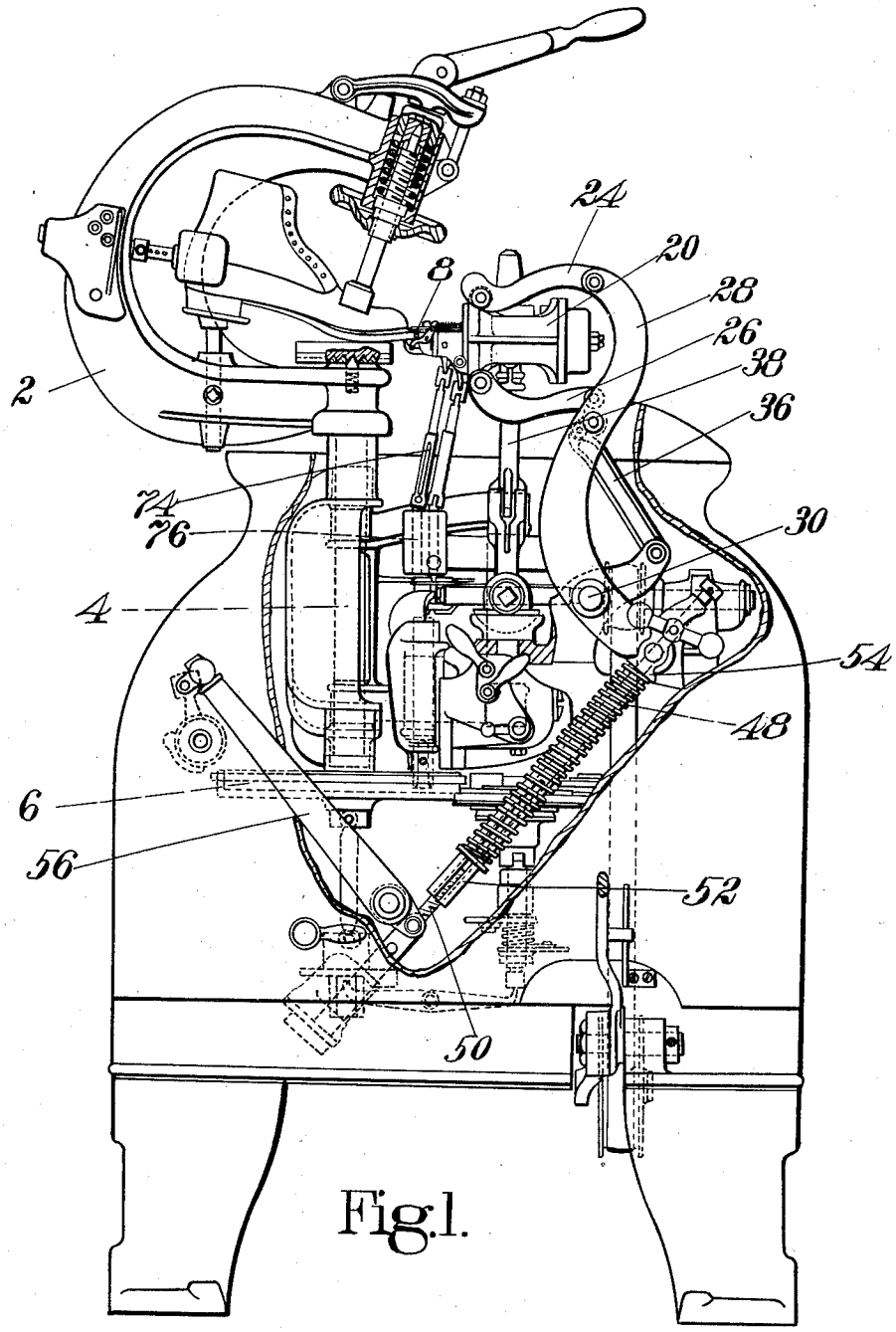

Fig. 1.

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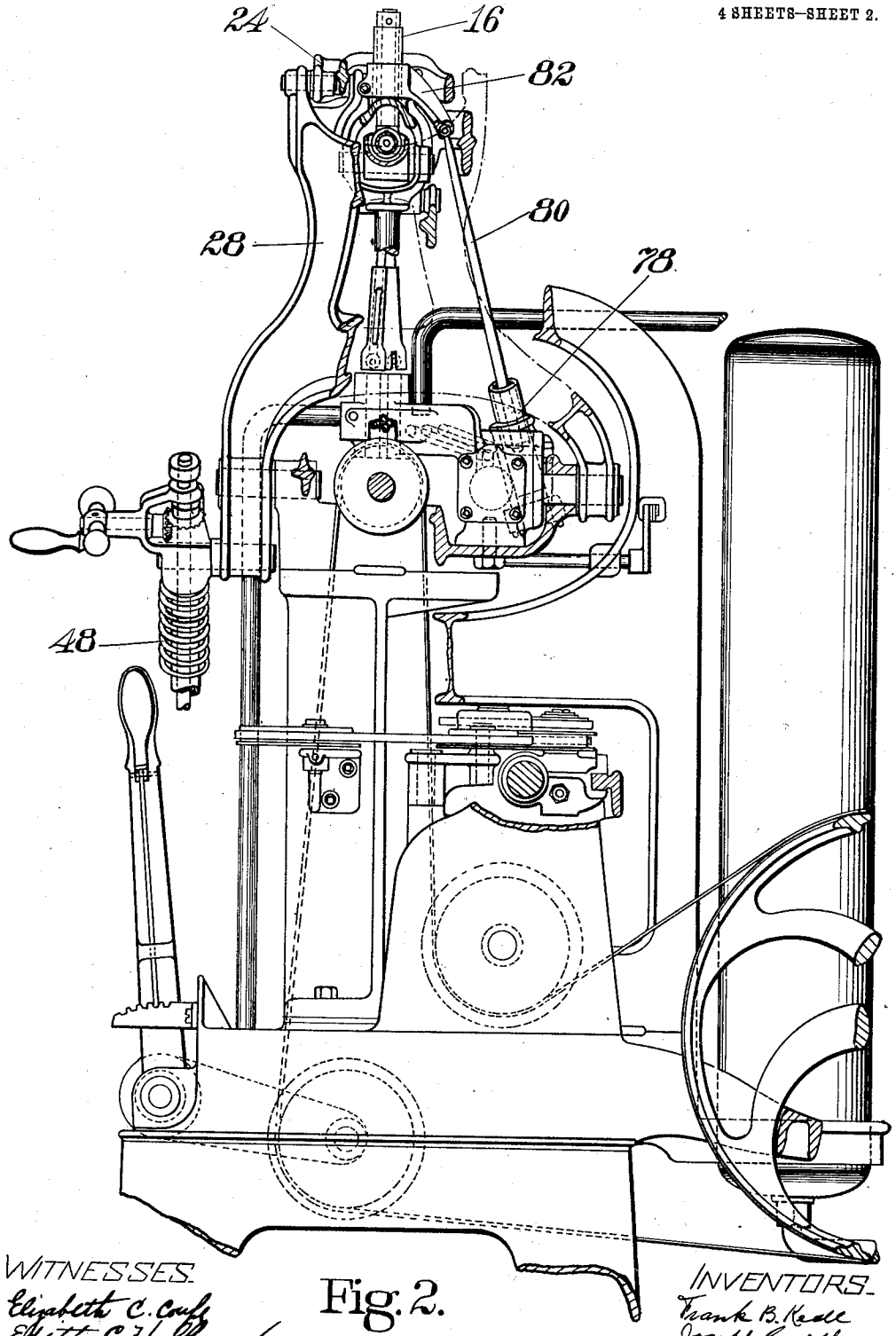

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Fig. 2.

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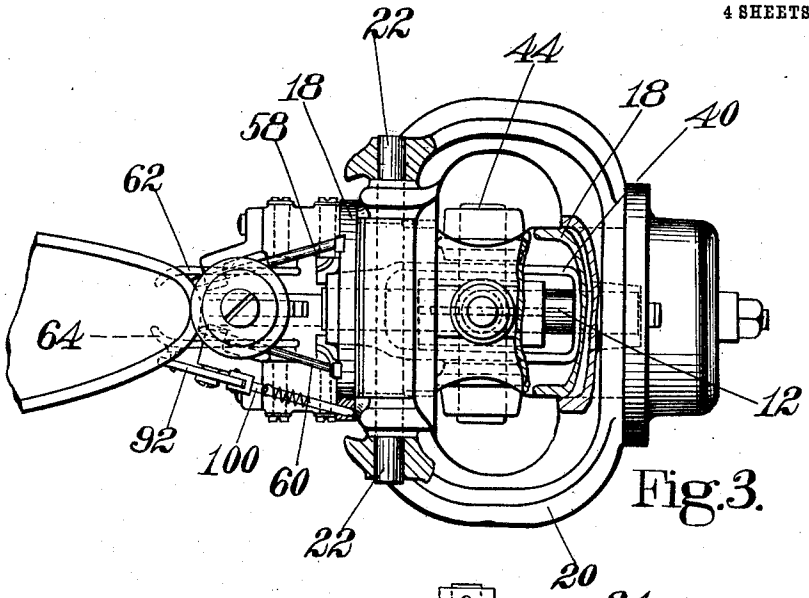

Fig.3.

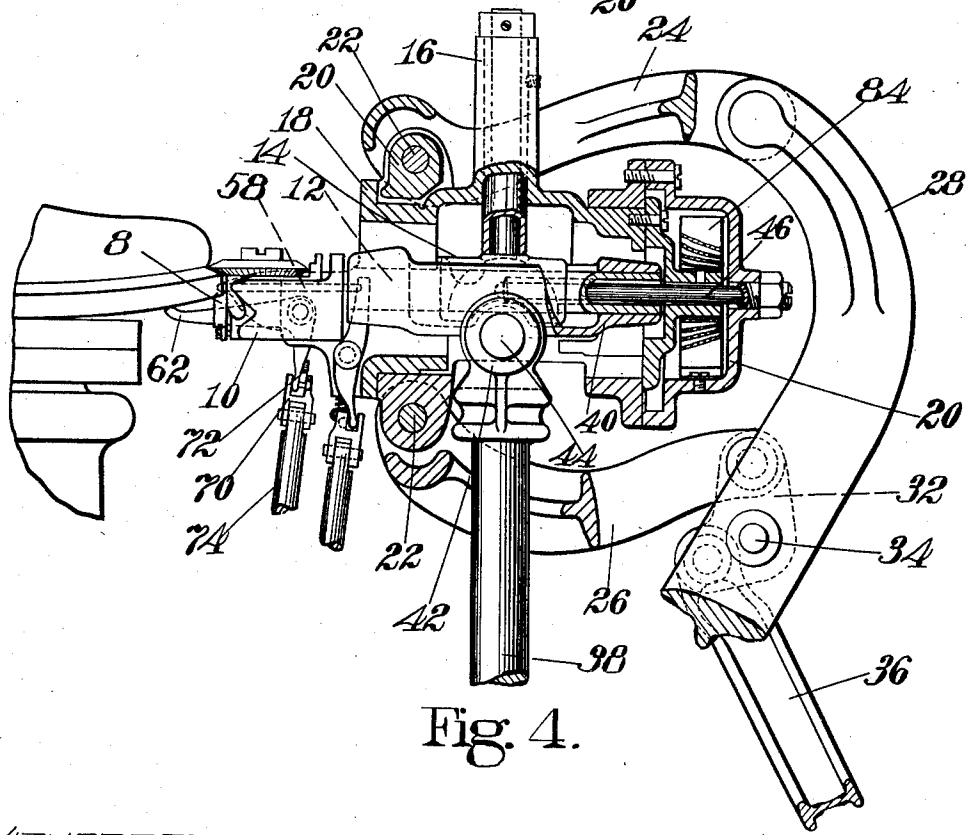

Fig. 4.

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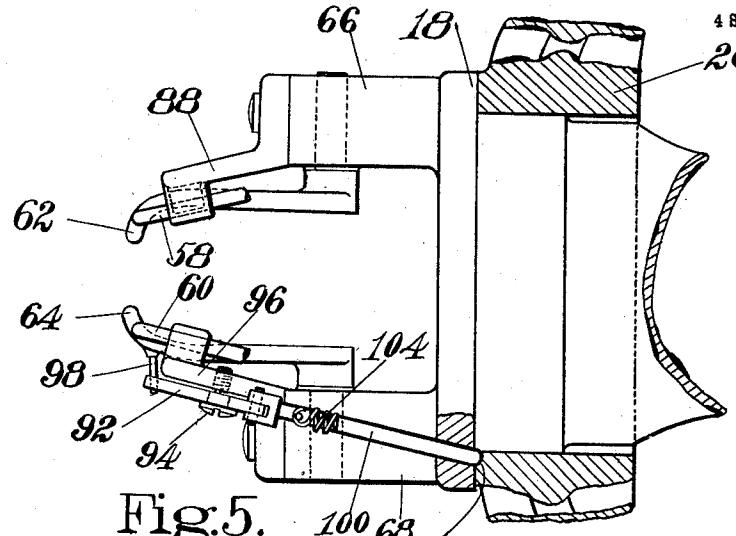

Fig. 5.

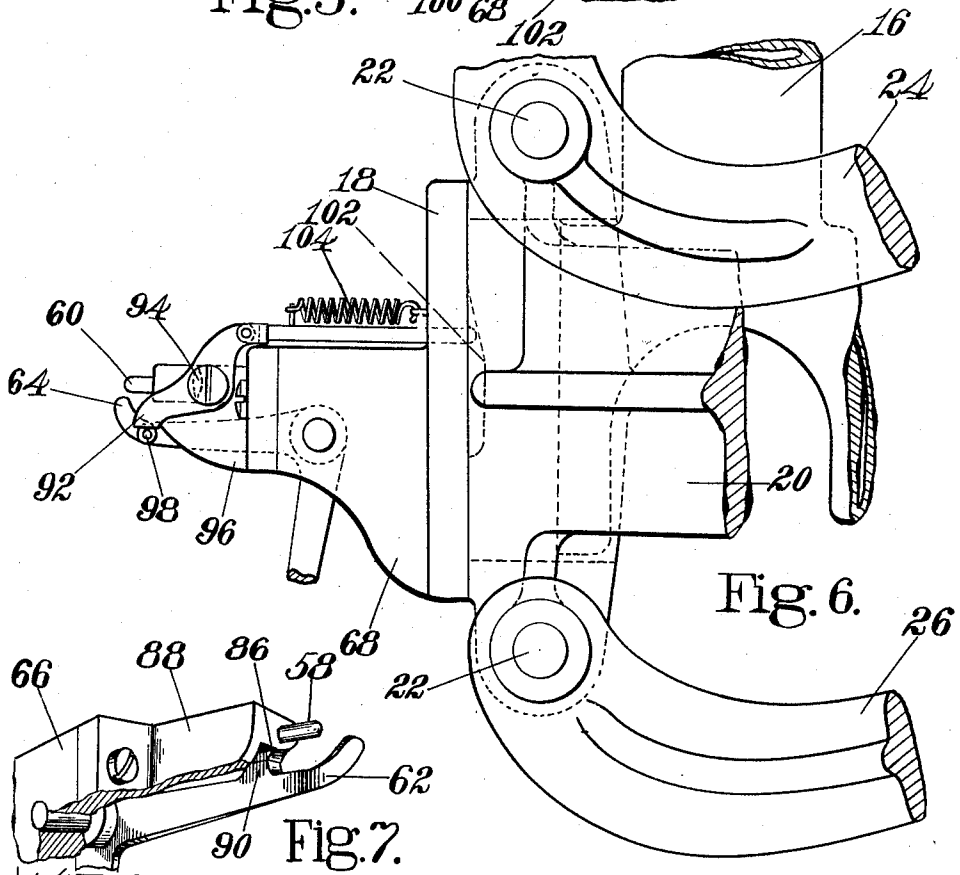

Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR OPERATING ON SHOES.

1,006,484. Specification of Letters Patent. Patented Oct. 24, 1911.

Application filed June 14, 1910. Serial No. 566,767.

To all whom it may concern:

Be it known that we, FRANK B. KEALL and JOSEPH GOULDBOURN, subjects of the King of England, and residing at Leicester, Leicestershire, England, have invented certain Improvements in Machines for Operating on Shoes, 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 machines of the general type disclosed in the United States applications Serial No. 455,211, filed September 28, 1908, and No. 505,826, filed July 3, 1909.

Machines of this general character comprise a tool and a work support arranged to have relative movement to cause the point of operation of the tool to be transferred along the work, and a correcting mechanism which operates during such transfer to control automatically the relative positions of the tool and work in accordance with changes in the direction of the path along which it is desired to have the tool operate.

In each of the machines shown and described in the applications above identified, the correcting mechanism bears directly upon the work and effects adjustment of the relative positioning of the tool and work in accordance with variations in a contour of the work itself. When the tool and correcting means are disengaged from the work, it frequently happens that they are moved into an abnormal relationship to the work and consequently considerable care must be exercised in again bringing them into operative engagement with the work. Furthermore, this movement of the correcting means and tool out of normal position causes an appreciable loss of time in starting the machine into operation again after the work has been changed.

It is an important object of this invention to provide a machine of the general character referred to, wherein the tool and work have relative traverse and wherein during such traverse correcting means operates to determine the successive relative positions of the tool and work in acordance with changes in the path along which it is desired to have the tool operate, with means acting automatically upon the disengagement of the tool from the work to insure the return of the work and correcting means to a predetermined normal relationship.

It is a further object of the invention to provide, in a machine of the character just described, means operating automatically upon the cessation of contact between the tool and work to insure the return of the work and tool to a predetermined normal relationship.

In the illustrated embodiment of the invention the correcting mechanism comprises two feelers bearing upon the work and so disposed with relation to each other and to the work that as the tool operates along the work changes in the contour engaged by the feelers alter the relationship of the feelers and thereby actuate a mechanism that adjusts the tool so as to keep it in a definite angular relationship to the work. The feelers and tool are mounted on a common support, and the feeler controlled mechanism is arranged to move the support, and with it the tool and feelers, in effecting the adjustment just described.

This invention provides a mechanism which becomes operative upon the cessation of contact between the work and the tool and feelers to effect a relative displacement of the feelers, to an extent proportional to the displacement of said support from its predetermined normal position, and in a direction such that the feeler controlled mechanism will be actuated to move the support toward its normal position. During this movement of the support the relative displacement of the feelers is automatically reduced to zero so that upon the arrival of the feelers and tool in their normal positions the movement of the support ceases. When the machine is in inoperative condition, therefore, the tool and feelers will always be found in a predetermined position; and no special care will be required in bringing them into contact with the work again to resume operation.

Referring now to the accompanying drawings,—Figure 1 is a view in side elevation, with parts of the casing broken away, of the automatic edge setting machine shown in the United States application Serial No. 505,826, but modified in accordance with the present

invention; Fig. 2 is a rear elevation of said machine, certain of the frame parts being broken away; Fig. 3 is a plan view partly in section of the tool carrying head with the mechanism of this invention applied thereto; Fig. 4 is a vertical sectional view of said head; Fig. 5 is a partial plan view of the tool supporting head showing the feelers and the mechanism of the present invention; Fig. 6 is a side elevation of the parts shown in Fig. 5; and Fig. 7 is a perspective view of one of the feelers and its coöperating stop.

The construction and operation of the machine shown in the drawings are described in detail in application Serial No. 505,826 above referred to.

A brief description of certain features only of this machine is necessary to a thorough understanding of the present invention.

The work to be operated upon, in this instance a shoe, is clamped in a work support 2 carried by a vertical post 4 which is so mounted that the work support may have universal movement in a horizontal plane. The post is secured rigidly to a cam 6 and a hydraulic mechanism operates the cam in a manner such that the shoe is moved past the edge setting tool 8 in approximately the path desired for the proper operation of the tool on the sole edge.

The mounting for the edge setting tool comprises a tool holder 10 having a shank 12 slidably positioned in a T-shaped piece 14, the stem of the piece 14 being fulcrumed in an extension 16 from a sleeve 18 that is rotatably mounted in a bearing frame 20. The bearing frame is connected by pivots 22 to two pairs of twin levers 24 and 26. One pair of levers 24 are pivoted directly upon a lever 28 fulcrumed in the frame at 30 while the other pair of levers 26 are connected to the lever 28 through a bell crank 32 pivoted at 34 to said lever. The other end of the bell crank 32 is connected with the frame of the machine by anchor link 36. By this construction the tool holder can be vibrated laterally about the vertical axis of the T-shaped piece 14; the sleeve 18 and tool holder 10 can be angled about the common axis of the shank 12 and the sleeve 18; while the sleeve 18, tool holder 10 and bearing frame 20, during their lateral and vertical movements in following the sole edge, are maintained horizontal by the action of the twin links 24 and 26. These links in conjunction with the bell crank 32 and link 36 constitute a parallel motion device supporting the bearing frame.

The edge setting tool 8 is vibrated rapidly about the vertical axis of the member 14 by connections from a shaft 38 which may be oscillated by any suitable mechanism. This shaft is connected with the tool holder by a universal coupling comprising a yoke 40 which engages the shank 12 of the tool holder and a fork 42 that is secured to the shaft 38 and is pivotally connected with the yoke 40 by a pin 44 disposed at right angles to the shank of the tool holder. Backward thrust of the tool owing to its pressure upon the work is transmitted to the bearing frame 20 by a thrust rod 46 seated at one end against a set screw inserted in the frame 20 and engaging at its other end the bottom of a recess in the shank of the tool holder 12, the point of engagement being located in the axis of the T-shaped piece 14.

The tool is pressed against the sole edge by a spring 48 that surrounds the rod 50 and abuts at one end against a collar 52 threaded on to the rod and at its other end against an abutment 54 which is slidable on the rod and is pivoted to the lever 28. A starting and stopping lever 56 having a pivotal connection with the rod 50 is provided for the purpose of moving the tool into or out of operative engagement with the shoe and also, by means of suitable connections not shown, for starting or stopping the machine.

As above stated, the hydraulic operating mechanism causes the shoe to be moved past the tool in approximately the desired path. In order to bring the tool and work into exactly the desired relation during successive stages of the edge setting operation, two correcting mechanisms are provided which operate during the relative traverse of the tool and work to effect adjustments of the relative positioning of the tool and work. One of these correcting mechanisms is arranged to angle the jack 2 in a horizontal plane and serves to vary the effect of the hydraulic mechanism above referred to, to cause the shoe to be moved past the tool along exactly the desired path. This mechanism comprises two feelers 58 and 60 engaging the edge of the shoe sole one on each side of the tool 8 and a hydraulic mechanism that is actuated by the relative movement of said feelers and operates to angle the jack 2 in such a manner that the line of thrust of the tool 8 is always maintained normal to that contour of the work over which the tool is operating at any instant.

The other correcting mechanism angles the tool and tool holder about an axis that is normal to the acting face of the tool. This mechanism is made necessary by the fact that the different portions of the sole edge do not lie in the same plane, and it operates to maintain the plane of oscillation of the tool in the plane of that portion of the sole edge immediately under operation. This mechanism comprises two feelers 62 and 64 that bear upon the tread face of the sole adjacent to the tool and are formed as bell crank levers pivoted to extensions 66 and 68 respectively of the sleeve 18. It will be

noted that the sleeve 18 thus forms a common support for the tool and the feelers. The lower ends of the levers 62 and 64 are coupled by a cross bar 70, and a spring 72 bearing against said bar holds the feelers in contact with the tread face of the sole. The bar 70 is connected by a universal coupling and a rod 74 to a valve 76 that controls the admission of fluid to a cylinder 78. A piston working in this cylinder is connected by a thrust rod 80 to an extension 82 from a collar secured to the projection 16 of the sleeve 18. The thrust of the rod 80 is opposed by a coiled spring 84 (see Fig. 4) connecting the sleeve 18 and bearing frame 20.

In operation, when the feelers 62 and 64 are displaced relatively by changes in the contour of the tread face of the sole, the cross bar 70 is angled thus turning the valve 76 and causing the rod 80 to be raised or lowered by the admission of fluid on one side or the other of the piston. The sleeve 18 and the tool, tool holder and feelers carried thereby are thus turned about the axis of the tool holder shank 12 to restore the tool and sole edge to their original angular relationship. This angling of the sleeve also causes the feelers 62 and 64 to be returned to their normal positions relative to each other, thus again actuating the valve 76 and stopping the motion of the piston.

The mechanism thus far described is substantially like that disclosed in the United States application No. 505,826. It has been found with this construction that when the tool and feelers are moved out of contact with the work the sleeve 18 which supports them becomes canted into one or the other of its extreme positions. Consequently, great care is required and considerable time is lost in again bringing the tool into contact with the work. According to the present invention, this disadvantage is overcome by providing the machine with a pair of stops that control the movement of the feelers when they are freed from the work.

One stop 86 is fixed to the rotary sleeve 18, being formed on the under side of a bracket 88 that supports and guides the edge feeler 58, and this stop engages a boss 90 on the feeler 62 and limits its upward movement. It should be understood that both feelers when they are disengaged from the shoe are moved by the spring 72 to a position above the range of positions occupied by them while in contact with the work. The other stop 92 is also carried by the sleeve 18, but is so mounted as to be automatically adjustable thereon. This stop consists of a small lever pivoted at 94 on the bracket 96 in which the other edge feeler 60 is supported and guided. The stop lever 92 does not contact directly with the feeler 64, but with a stud 98 fixed to the feeler and projecting into the path of movement of the lower end of the stop lever. The upper end of the lever 92 is pivotally connected to a rod 100 that passes through a hole in the flange of the rotary sleeve 18 and bears upon a cam surface 102 formed in the forward end of the bearing frame 20. The rod end is held against said cam by a spring 104 attached to the rod and to the flange of the sleeve 18.

The cam surface 102 is so shaped that when the rotary sleeve 18 is in its mid or normal position the adjustable stop 92 will be in its normal position relative to the fixed stop 86. Any movement of the sleeve out of normal position will cause the rod end to travel along the stationary cam face 102 and thereby will result in displacing the stop 92 in a direction and to an extent depending upon the direction and extent of movement of the sleeve.

Upon the disengagement of the tool and feelers from the shoe sole, if it happens that the sleeve 18 is in its normal position, then the stops 90 and 92 also will be in their normal positions and the feelers upon contacting with them will not be moved relative to each other. If, however, the sleeve is canted to one side of its normal position, then the adjustable stop 92 will be held out of its normal position by the rod 100 and when the feelers move up into contact with their respective stops the feeler 64 will be displaced relative to its companion 62. Such displacement will result, as in the normal operation of the machine, in opening the valve 76 and admitting fluid to the cylinder 78 thereby causing the sleeve 18 to be rotated back toward its normal position. This movement is transmitted through the cam 102 and rod 100 to the stop 92 thus automatically reducing the relative displacement of the stops to zero, causing the return of the feeler 64 to its normal position, and through this movement, again actuating the valve 76 to stop the motion of the sleeve. The automatic return of the tool and feelers to their normal positions is thus insured upon each disengagement of these parts from the work.

While this invention has been described in connection with the machine disclosed in application No. 505,826 and while the specific embodiment of the invention is herein shown applied to said machine, it should be clearly understood that this description and showing are for purposes of explanation and that the invention is not limited to the particular type of machine shown, but only as such limitations are expressly included in the appended claims.

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

1. A machine of the class described comprising, in combination, a tool, means for

producing relative movement of the tool and work to transfer the point of operation of the tool along the work, means acting automatically during such transfer to effect adjustment of the relative positioning of the tool and work in a plurality of planes and means whereby the return of said tool and work to a predetermined normal relationship is insured upon the cessation of contact between the tool and work.

2. A machine of the class described comprising, in combination, a tool, a work support, means for producing relative movement of said tool and support to transfer the point of operation of the tool along the work, correcting means arranged to effect relative adjustment of the tool and work to maintain them in predetermined angular relationship during the operation of the tool thereon, and means arranged to become operative upon the disengagement of the tool from the work to act upon said correcting means to return the tool and work support to a predetermined normal relationship.

3. A machine of the class described comprising, in combination, a tool, means for producing relative movement of the tool and work to cause the tool to operate along the work, correcting means engaging the work during such operation and operating to effect adjustment of the relative positioning of the tool and work and means whereby the return of said correcting means to a predetermined normal position upon the cessation of contact between the work and tool is insured.

4. A machine of the class described comprising, in combination, a tool, a work support, means for producing relative movement of said tool and support to transfer the point of operation of the tool along the work, correcting mechanism including means arranged to engage the work to be moved thereby relative to the tool, means controlled by said work engaging means for effecting adjustment of the relative positioning of the tool and work to cause the tool to operate along the desired contour of the work, and means for insuring the return of said correcting mechanism and work support to a predetermined normal relationship upon the disengagement of said work engaging means and tool from the work.

5. A machine of the class described comprising, in combination, a tool, means for producing relative movement of the tool and work to transfer the point of operation of the tool along the work, means acting automatically during such transfer to determine the relative positions of the tool and work in accordance with changes in direction in different planes of that path of the work along which it is desired to have the tool operate and means acting automatically upon the cessation of contact between the tool and work to return said last mentioned means and said tool to predetermined normal positions.

6. A machine of the class described comprising, in combination, a tool, a work support, means for producing relative movement of said tool and support to transfer the point of operation of the tool along the work, correcting means acting automatically during such transfer to effect adjustment of the relative positioning of the tool and work in accordance with changes in the direction of that path of the work along which it is desired to have the tool operate, and automatic means for insuring the return of said work support and the tool and correcting means to predetermined normal relationships to each other after the tool and correcting means have been disengaged from the work.

7. A machine of the class described comprising, in combination, a tool, means for producing relative movement of the tool and work to transfer the point of operation of the tool along the work, correcting means acting automatically during such transfer to determine the relative positions of tool and work in accordance with changes in direction of that path of the work along which it is desired to have the tool operate, and mechanism operating automatically upon the cessation of contact between the tool and work to return said correcting means and said tool to predetermined normal positions, said mechanism comprising a stop and means operative upon said cessation of contact for effecting relative motion between the stop and the support for the correcting means.

8. A machine of the character described comprising, in combination, a tool, means for effecting relative movement of the tool and work to transfer the point of operation of the tool along the work, correcting means engaging the work and operating automatically to maintain a predetermined relation between the tool and work during the operation of the tool thereon, and means acting automatically through the normal action of said correcting means to effect the return of said tool and correcting means to predetermined normal positions when they are disengaged from the work.

9. A machine of the character described comprising, in combination, a tool, means for producing relative movement of the tool and work to transfer the point of operation of the tool along the work, mechanism operating automatically during such transfer to maintain the tool and work in a predetermined angular relationship, said mechanism including a feeler arranged to engage the work and means operating automatically

upon the disengagement of the feeler from the work to return said feeler to a predetermined normal position.

10. A machine of the character described comprising, in combination, a tool, means for producing relative movement of the tool and work to transfer the point of operation of the tool along the work, a feeler arranged to engage the work, mechanism controlled by said feeler for effecting adjustment of the relative positioning of the tool and work during successive stages of the operation of the tool on the work and means operating automatically upon the disengagement of the tool and feeler from the work to move the feeler and thereby to actuate said mechanism in a manner such that the work and tool will be returned to a predetermined normal relationship.

11. A machine of the character described comprising, in combination, a tool, a work support, mechanism for producing relative movement of said tool and support to transfer the point of operation of the tool along the work, a pair of feelers engaging the work, mechanism controlled by said feelers for effecting angular adjustment of the relative positioning of the tool and work support to cause the tool to operate along the desired contour of the work and means operating automatically upon the disengagement of the tool and feelers from the work to effect a relative movement of said feelers such that said feeler-controlled mechanism will be actuated to restore the normal angular relationship of said support and tool, said means being so constructed and arranged that the relative displacement of the feelers is automatically reduced to zero when the normal relationship is restored.

12. A machine of the character described comprising, in combination, a tool, means for producing relative movement of the tool and work to transfer the point of operation of the tool along the work, a pair of feelers engaging the work, a support on which said tool and feelers are mounted for common movement about an axis, mechanism arranged to be actuated by the relative movement of said feelers to move said support about said axis to effect angular adjustments of the tool relative to the work, and means operating automatically upon the disengagement of the tool and feelers from the work to effect a relative movement of the said feelers in a direction such that said mechanism will be actuated to move said support toward a predetermined normal position and to an extent depending upon the displacement of said support from said predetermined position.

13. A machine of the character described comprising, in combination, a tool, means for producing relative movement of the tool and work to transfer the point of operation of the tool along the work, a pair of feelers engaging the work, a support on which said tool and feelers are mounted for common movement about an axis, mechanism arranged to be actuated by the relative movement of said feelers to move said support about said axis to effect angular adjustments of the tool relative to the work, a fixed stop carried by said support to coöperate with one of said feelers, a movable stop carried by the support to coöperate with the other feeler, means for moving said feelers into engagement with said stops when they are disengaged from the work and means controlled by the position of said support for moving one of said stops in a direction such that the relative movement of the feelers produced thereby will actuate said mechanism in a direction to move said support toward its predetermined normal position.

14. A machine of the class described comprising, in combination, a tool, means for producing relative movement of the tool and work to transfer the point of operation of the tool along the work, a pair of feelers engaging the work, a support on which said tool and feelers are mounted for common movement about an axis, mechanism arranged to be actuated by the relative movement of said feelers to move said support about said axis to effect angular adjustments of the tool relative to the work, a fixed stop carried by said support to engage one of said feelers, a lever fulcrumed on said support and having one end positioned for engagement with the other feeler, means for moving said feelers into engagement with their respective stops when they are disengaged from the work, a rod pivoted to the opposite end of said lever and guided through a hole in said support, a cam engaging the free end of said rod and a spring operating to hold the rod end against said cam.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRANK BYCROFT KEALL.
JOSEPH GOULDBOURN.

Witnesses:
KATHERINE PEXTON,
ARTHUR ERNEST JERRAN.