April 29, 1924. 1,492,126

M. E. FERNALD

WORK POSITIONING APPARATUS

Filed Nov. 22, 1918

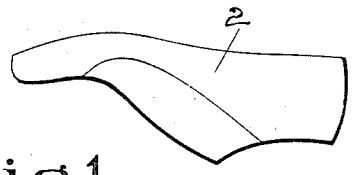


Fig 1

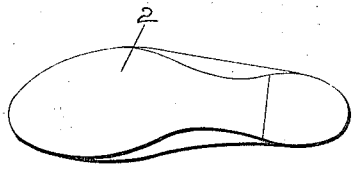


Fig 2

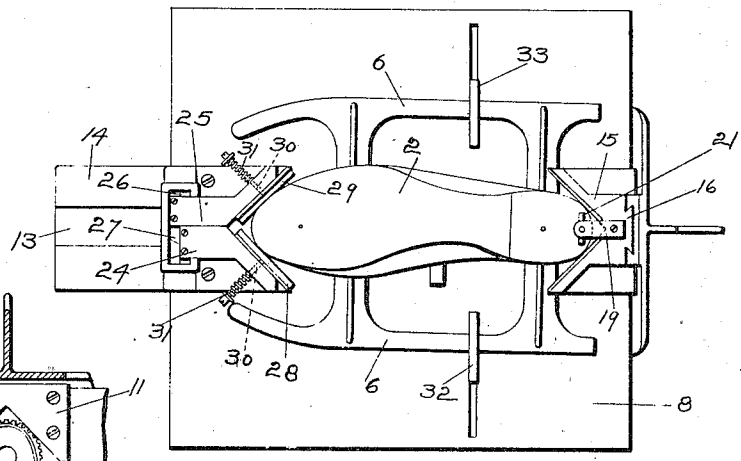
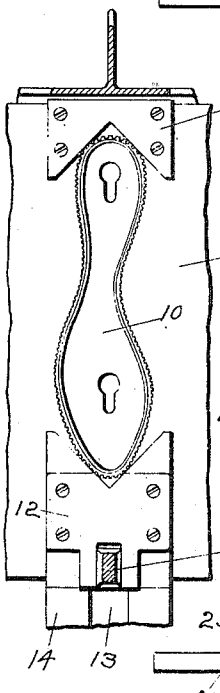


Fig 3



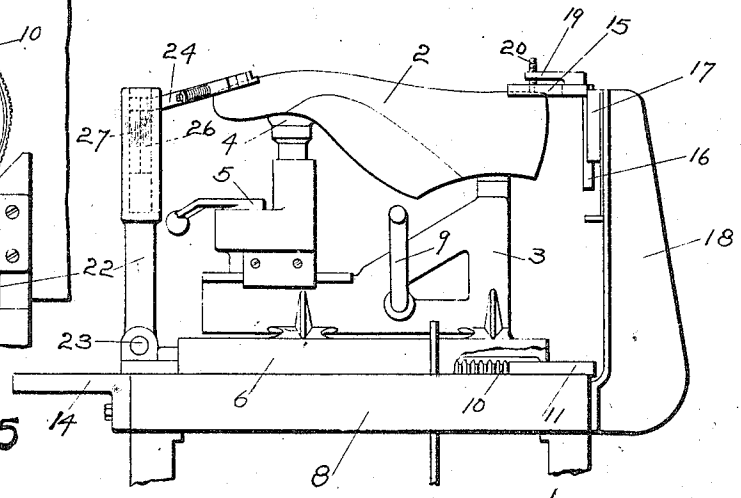


Fig 5

Fig 4

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UNITED STATES PATENT OFFICE.

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WORK-POSITIONING APPARATUS.

Application filed November 22, 1918. Serial No. 263,740.

To all whom it may concern:

Be it known that I, MARK E. FERNALD, a citizen of the United States, residing at Saugus, in the county of Essex and State of Massachusetts, have invented certain Improvements in a Work-Positioning Apparatus, 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 apparatus for positioning work with reference to the tool or tools of a machine that is to operate on it and is particularly concerned with the positioning of a last, shoe, or part thereof, with reference to such a machine.

As stated in my Patent No. 1,328,144, granted June 13, 1920, one type of automatic shoe machine requires the use of a leader or pattern plate to control the relative movements of the work and the tool or tools that operate on the work. This pattern plate or leader usually has a contour or outline like the outline of a shoe sole and the usual arrangement is to mount the work on a jack to which the leader is secured. The work is superposed with reference to the leader and obviously it is necessary to have the work positioned very accurately so that its sole-shaped contour or outline, if projected on the plate of the leader, will coincide with the outline or contour of the leader, or the parts of this contour or outline will be concentric with the corresponding parts of the contour or outline of the leader. The peculiar contours of these parts and the fact that the work is curved longitudinally as well as laterally, make the problem of correctly positioning the work with reference to the leader a particularly difficult one. In fact, this difficulty has proved a serious handicap to the introduction of automatic machines of this type. The present invention provides both a novel method and a novel apparatus for solving these difficulties.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, in which—

Figures 1 and 2 are side and bottom views, respectively, of a last;

Fig. 3 is a plan view of an apparatus embodying the present invention;

Fig. 4 is a side elevation of the apparatus shown in Fig. 3; and

Fig. 5 is a plan view, partly in cross section, showing the devices that gage the position of the leader.

In the apparatus shown the work, in this instance a last 2, is mounted on a jack 3 which preferably is of the construction disclosed in Patent No. 1,314,385 granted August 26, 1919. This jack has a heel pin to enter the socket of the last, an adjustable saddle 4 to support the toe portion of the last, and a locking device 5 arranged to act through the adjustable support for the saddle to lock the last on the jack. The base of the jack is provided with two shoes or runners, best shown at 6 in Fig. 3, which are spaced apart far enough to receive a leader between them. The lower faces of these runners lie in the same plane so that they are adapted to rest on the surface of a table 8 with which the apparatus is provided. The leader also rests on this table and a mechanism arranged to be operated by the handle 9 is provided to securely lock the jack and leader together when they have been brought into the desired relationship.

The leader is shown at 10 and preferably is made by the method disclosed in my Patent No. 1,266,113 granted May 14, 1918. This leader is provided with a peripheral flange that is toothed on its outer face to engage and be driven by a toothed pinion with which the automatic machines that are to operate on the last, sole, shoe, or other article of work, are provided, and the inner face of this flange forms its guiding surface. The automatic machines in which the leader and jack are used are designed to move the jack past the tool in such a path that the tools will operate along a path on the work agreeing exactly in contour with the inner face

of the flange of the leader 10. The problem, therefore, in positioning the work relatively to the leader in those cases in which the work already has a contour agreeing with the contour of the leader is to superpose the sole-shaped contour of the work upon the corresponding contour of the leader, and then to lock the leader and jack together when the work and leader have been adjusted in the desired relationship to each other.

To this end the apparatus shown comprises positioning means for the leader consisting of two V-shaped gaging members, best shown in Fig. 5, and indicated at 11 and 12, respectively. These two members are shaped to embrace the toe and heel portions, respectively, of a leader, such as that indicated at 10, and they operate through engagement with points on the periphery of the leader at the opposite sides of its median line to bring the leader into a definite relationship to the members 11 and 12. In other words, these members move the leader into the only position that any leader of the same shape and size can have when clamped between these members; or, stated in another way, they center the leader with reference to the gaging members. Both the members 11 and 12 are mounted on the table 8, the member 11 that engages the heel end of the leader being fixed to the table and the member 12 being mounted to slide back and forth in a straight line toward and from its companion member 11, in order to enable these members to clamp or release a leader and also to enable them to accommodate leaders of different shapes and sizes. The movement of the member 12 may be produced in any convenient manner as, for instance, by hand or by foot treadle connections. In the arrangement shown this member is secured to a dove-tail piece that slides in a dove-tail groove 13 formed partly in the table 8 and partly in a bracket 14 secured to one end of the table. In clamping or releasing the leader, therefore, the workman simply grasps the member 12 and slides it backward or forward as desired. This arrangement, however, prevents any relative movement of the members 11 and 12 in directions other than that just described.

The work positioning apparatus comprises a pair of members similar to the members that gage the position of the leader. One of these members 15 which gages the position of the heel end of the work is mounted immediately over the member 11 and has fixed thereto a dove-tail shank piece 16 sliding in a vertical dove-tail groove formed in the member 17 that is secured fast to the upper end of a bracket 18 which is bolted to the table 8. The member 15, therefore, can be moved up and down relatively to the leader gaging member 11 but is held against any other movement relatively to the member 11. In order to facilitate the operation of properly adjusting the work in the gage member 15 a small bracket 19 is secured to the part 15, and a stem 20 having a small foot 21 at its lower end is threaded through the bracket 19 so that the foot may be adjusted vertically with reference to the gaging edges of the member 15.

The toe gaging member for the work is mounted in the upper end of an arm 22 which is pivoted at 23 on the lower toe gaging member 12 for the leader. This upper member thus can partake of the sliding movement which the lower member 12 has, as above described, and it can also swing toward and from the member 15 in the vertical plane extending longitudinally of the work and leader when these two members are in their gaged positions, in which plane said movement of the part 12 takes place. This toe gaging member preferably is made in two pieces, indicated in Fig. 3 at 24 and 25, respectively, these two parts being mounted side by side and secured to shank pieces 26 and 27, respectively, which also are mounted side by side for vertical adjustment in a vertical guideway formed for them in the upper part of the arm 22. Each of the parts 24 and 25 carries a face member, or work engaging part, indicated, respectively, at 28 and 29, these members being angularly adjustable with reference to the respective parts 24 and 25 on which they are mounted. For this purpose each of the face pieces 28 and 29 has a rod 30 fixed thereto and each rod is encircled by a spring 31 which acts on a head or collar carried by the outer end of the rod to force the respective face pieces 28 and 30 against the inner faces of the members 24 and 25, respectively, and thus frictionally hold them in any angular position into which they may be adjusted about the axes of their respective rods.

It will now be understood that in using the apparatus the workman first secures a last, or other article of work mounted thereon, in the jack 3. He then places the leader for this particular size and style of last on the table 8 and locates the jack on this table with the leader between the runners 6 of the jack. The heel end of the leader is pushed into the V-shaped opening in the heel gaging member 11 and the toe gaging member 12 is then moved toward the member 11 until it clamps the leader firmly against the latter member. The leader is now clamped in a definite position with reference to the other parts of the apparatus. The workman next proceeds to position the work, which he does by moving the jack and the work clamped thereon to bring the heel end of the work into engagement with the edges of the V-shaped member 15 substantially as shown in Figs. 3 and 4. In performing this operation it may be necessary to raise or lower the gage 15 by

sliding the shank 16 up or down in the guideway 17, the friction between these parts being sufficient to hold the member in any position into which it is adjusted. The engagement of the heel end of the work with the gage 15 is facilitated by the foot 21 which is adjusted to bear against the tread face of the heel part of the work when the lateral edges of the heel end of the work lie in the plane of the lower edges of the V-shaped faces of the gaging member 15.

When the steps so far described have been completed it is obvious that the only remaining positioning step necessary is to swing the work to bring it into alinement with the leader. That is, the heel end of the work has already been positioned, and the only movement that the work can have and still retain the edges of the heel in engagement with the gaging faces of the member 15 is a swinging movement about a point near the heel end of the work as a center. This last positioning step is effected by swinging the toe gaging member into contact with the work and positioning the work substantially as shown in Figs. 3 and 4, where the lateral faces of the toe portion of the work are engaged by the edges of the V-shaped toe gaging member.

Different styles of lasts vary substantially in the longitudinal and lateral curvatures of the bottom face of the forepart. In some instances this curvature is such that the point of engagement of the gage with one side of the last is slightly higher than the corresponding point on the other side; and in other cases, particularly those instances in which there is considerable longitudinal curvature in the forepart of the last, the lines tangent to the contacting points at opposite edges of the median line of the toe will be inclined substantially with reference to the horizontal plane. It is obvious that the first of these conditions can readily be accommodated by moving one of the members 24 or 25 up or down with reference to the other member, while the second condition can be met by tipping one or both of the face pieces 28 and 29 angularly with reference to the members 24 and 25, respectively. There is sufficient friction to the movement of these parts to retain them in their adjusted positions. This peculiar construction of the toe gage thus enables a workman to adjust this gage to suit any style of last or other article of work that he is required to handle.

When the work has been adjusted into the position in which it is shown in Figs. 3 and 4 with the edges of the sole shaped outline of the work engaging the V-shaped gaging devices, as shown in said figures, this outline or contour then will be in a superposed relationship to the leader and a projection of the outline of the work upon the plane of the leader will coincide with, or be concentric with, the corresponding outline of the leader depending, of course, upon the manner in which the leader has been constructed. In the specific arrangement shown, the inner face of the flange of the leader constitutes its guiding face, as above described, and consequently when the work and leader have been positioned in the manner described, the projection of the sole-shaped outline of the bottom face of the last will exactly coincide with the inner face of the peripheral flange of the leader. At the same time this projection will be concentric with the outer face of the flange of the leader, which face is utilized in performing the positioning operation above described.

After the work and leader have been positioned in the manner just described the handle 9 is moved to lock the jack and the leader securely together. If desired clamps, indicated respectively at 32 and 33 and arranged to be operated by a foot treadle, as completely disclosed in my application, Serial No. 263,739, filed of even date herewith, may be employed to clamp the jack against the upper face of the table 8 after the work positioning operation has been completed in order to secure the jack against movement while it is being clamped to the leader. After the jack and leader have been clamped together they may then be removed from the positioning apparatus and taken to one or more of the various automatic machines that are to operate on the work with assurance that the proper relative movements of the work and the tool or tools of these machines will be produced because the work has been accurately located with reference to the leader.

It will now be understood that the invention provides a very convenient method and apparatus for positioning the work with reference to the leader, in which great accuracy is assured and which requires only ordinary care on the part of the workman. Furthermore this positioning operation can be performed very quickly with the aid of the apparatus disclosed. While a convenient form of apparatus has been herein described for carrying out the method of this invention, it is obvious that this method can be practised by a great variety of forms of apparatus differing in arrangement and details of construction from the specific form shown. It will also be seen that the apparatus could be modified in many particulars within the skill of the mechanic while still retaining the essential features and characteristics of the invention.

What is claimed as new, is:

1. An apparatus for positioning a last, shoe, or other article of work, having a portion presenting a sole shaped contour, with reference to a leader having a similar con-

tour to bring said contours into superposed relationship to each other, said apparatus having, in combination, position gaging means for the leader, and similar position gaging means for the work, one of said means being mounted in substantial superposed relationship to the other.

2. An apparatus for positioning a last, shoe, or other article of work having a portion presenting a sole shaped contour with reference to a leader having a similar contour to bring said contours into superposed relationship to each other, said apparatus having, in combination, two superposed gaging members for positioning like ends of the leader and work, respectively, constructed to perform their gaging functions in substantially the same manner, and additional means to gage the positions of the opposite ends of said leader and work.

3. An apparatus for positioning a last, shoe, or other article of work having a portion presenting a sole shaped contour with reference to a leader having a similar contour to bring said contours into superposed relationship to each other, said apparatus having, in combination, two superposed gaging members for positioning like ends of the leader and work, respectively, constructed to perform their gaging functions in substantially the same manner, and additional gaging devices arranged to engage the lateral edges of the work and leader, respectively, to position the ends of the leader and work opposite those positioned by the first-named gaging members.

4. An apparatus for positioning a last, shoe, or other article of work having a portion presenting a sole shaped contour with reference to a leader having a similar contour to bring said contours into superposed relationship to each other, said apparatus having, in combination, two superposed V-shaped gaging members for positioning like ends of the leader and work, respectively, in a like manner and additional means for gaging the positions of the opposite ends of the leader and work.

5. An apparatus for positioning a last, shoe, or other article of work having a sole shaped contour with reference to a leader having a similar contour to bring said contours into superposed relationship to each other, said apparatus having, in combination, two superposed gaging members operative to position the heel ends of the leader and work, respectively, and toe gaging devices for the work and leader, respectively, mounted in superposed relationship, the toe gage for the work being adjustable in direction and extent to accommodate different lateral and longitudinal curvatures of the work.

6. An apparatus for positioning a last, shoe, or other article of work having a sole shaped contour with reference to a leader having a similar contour to bring said contours into superposed relationship to each other, said apparatus having, in combination, a pair of opposed centering gages for positioning a leader, said gages being relatively movable toward and from each other to accommodate leaders of various lengths, a similar pair of centering gages positioned above the leader gages and operative to gage the position of the work, said pairs of gages being relatively adjustable in a vertical plane extending longitudinally of the work and leader when the latter parts are in their gaged positions but being fixed against relative movement in other directions.

7. An apparatus for positioning a last, shoe, or other article of work having a sole shaped contour with reference to a leader having a similar contour to bring said contours into superposed relationship to each other, said apparatus having, in combination, superposed V-shaped heel gages for the work and leader, respectively, mounted for relative adjustment vertically but fixed against relative movement in other directions, a pair of V-shaped toe gages for the work and leader, respectively, movable toward and from their cooperating heel gages and relatively movable vertically but fixed against relative movement in other directions.

8. An apparatus for fixing the position of a last, shoe, or other article of work having a sole shaped outline, comprising a toe engaging member having parts provided with work engaging faces lying at an angle to each other and arranged to engage the toe portion of the work at points on opposite sides of its median line, means supporting said parts for angular adjustment in planes extending substantially normal to the plane of the tread face of the work to facilitate the adjustment of said parts into positions substantially tangent to their points of contact with the sole shaped outline of the work, and additional means for engaging a part of the work behind the toe to cooperate with said member in determining the position of the work.

9. An apparatus for gaging the position of a last, shoe, or similar article of work having a sole shaped contour, comprising a gage having a V-shaped notch therein, a device carried by said gage for engaging the face of a piece of work positioned in said gage, and means supporting said device in a position overlying said V-shaped notch and enabling said device to be adjusted toward and from the face of said piece of work.

10. An apparatus for positioning a last, shoe, or other article of work having a sole shaped contour with reference to a leader having a similar contour to bring said con-

tours into superposed relationship to each other, said apparatus having, in combination, two superposed V-shaped gaging members for positioning like ends of the leader and work, respectively, additional means for gaging the positions of the opposite ends of the leader and work, and a device overlying the V-shaped notch in said work gaging member and positioned for engagement with the face of the work.

In testimony whereof I have signed my name to this specification.

MARK E. FERNALD.