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SHOE TONGUE FORMING APPARATUS
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This invention relates in general to a forming apparatus and more particularly to an apparatus for forming parts of shoes. More specifically, the invention relates to an apparatus for forming the tongues of shoes.

An important object of the present invention is the provision of a new and improved material forming apparatus for forming shoe tongues whereby the tongue when removed from the forming apparatus has assumed the proper shape and proportion, being stretched in two directions for form fitting purposes and to remove all wrinkles from the leather from which the tongue is made.

A further object of the invention is the provision of a simple positively operating and efficient mechanism or apparatus for drawing or forming leather to make shoe tongues, the leather being drawn in two directions during the forming operation to provide the proper shape and to remove all wrinkles and creases from the material.

Another important object of the invention is the provision of a rigid economically constructed and positively operating apparatus comprising few parts arranged in correlation so as to effect a proper drawing operation in two directions on a piece of leather forming a shoe tongue so as to stretch and draw the material to a proper shape and to render the same smooth and free of wrinkles.

Still another object of the invention is the provision of a shoe tongue forming apparatus constructed and arranged so that the parts are free to move if necessary because of the varying thickness of leather or otherwise, there being springs provided to effect relative yielding of the various parts comprising the forming dies whereby breakage of the parts or other damage is prevented by excess pressures or should relatively thick material be used.

Numerous other objects and advantages will be apparent throughout the progress of the following specification.

The accompanying drawings illustrate a selected embodiment of the invention and the views therein are as follows:

Fig. 1 is a detail side elevational view of the improved shoe tongue forming apparatus;
Fig. 2 is a detail front elevational view thereof, the parts being shown in normal open position;
Fig. 3 is a detail transverse sectional view on the line 3--3 of Fig. 1, but showing the parts in a different position; the parts being drawn together in forming position;
Fig. 4 is a detail longitudinal sectional view on the line 4--4 of Fig. 3; and
Fig. 5 is a detail perspective view of a formed shoe tongue.

The particular apparatus herein shown for the purpose of illustrating the invention comprises a base 1 properly mounted on suitable supports 2 for securing the apparatus in place on a suitable support such as a workbench 3.

Base 1 has mounted thereon angle members 4 and 5 properly spaced at a predetermined distance apart to support the side members 6 and 7 respectively of a lower female die which is indicated generally by the numeral 9. This lower female die member 9 not only includes the side members 6 and 7, but also includes the hollow female die 9, Figs. 2 and 3. The side members 6 and 7 are provided with threaded openings 10, Fig. 3, to receive the threaded ends of bolts or studs 11. These bolts or studs 11 pass through openings 12 in Fig. 3 provided in the opposed angle members 4 and 5 to receive the bolts or studs 11. Springs 13, Fig. 3, are arranged between the inner surfaces of the angle members 4 and 5 and the outer surfaces of the members 6 and 7 to urge normally the side forming members 6 and 7 inwardly. The inward movement of the members 6 and 7, however, is limited by the heads 14 on the bolts or studs 11. The side forming plates 6 and 7 are therefore limited as to their inward movement, but are free to expand or spread apart outwardly.

Plates 6 and 7 may therefore be said to be yielding mounted. There are sufficient bolts 11 to guide the plates properly, to hold the plates in proper relative position and to prevent canting or accidental shifting of the side plates. Moreover, the springs 13 are sufficiently inflexible or rigid to maintain normally the parts in proper position, but are free to give sufficiently when a predetermined amount of pressure is applied.

The bottom hollow female die member 9 is arranged between the side forming plates 6 and 7, but the side walls thereof are in relative close contact with the inner side walls of the members 6 and 7. The member 9 is therefore mounted for proper operation with respect to the side members 6 and 7 without having any frictional contact therewith. The member 9 is maintained in proper position by means of set screws or studs 15 having their upper ends threadedly engaging a threaded opening in the under side of die 9 as indicated at 15, Fig. 4. These bolts or studs 15 extend through openings 17 in the base 1 and have heads 18 larger than the opening 11 to prevent withdrawal as well as to limit the
upward vertical movement of the female die member 9. Urging springs 10 are properly positioned and supported between the upper surface of base 1 and the lower surface of the female die member 9 which are rigidly fixed to the lower face of die 9 in an upwardly direction. The upward movement of the member 9, therefore, is limited because of the engagement of the heads 18 contacting the underside of the base 1, Fig. 3. The lower die 8, therefore, comprises side members 6 and 7 which are resiliently mounted so as to move outward when sufficient pressure is applied as well as to allow the lower member 9 to move downwardly when sufficient pressure is applied. The lower die 8 has its sides arcuate or curved as indicated at 20, Figs. 1 and 2, while the upper operating surface of the die member 3 is concave as indicated at 21, Figs. 2 and 3.

An upper male die member 22 is adapted to cooperate with the lower female die 8 so as to press properly a shoe tongue 23 therewith, Figs. 2 and 4. The upper die 22 is convex as indicated at 24, Figs. 2 and 3, and is also curved longitudinally as indicated at 25, Fig. 1, so as to have proper nesting or interfitting relationship with the lower die member 8. This upper die 22 is rigidly secured to a top plate 26 by means of bolts 27 and is normally maintained in upward position by means of springs 28 which surround a plurality of supporting rods 29. The rods 29 are preferably threaded into the top of the base 1 and carry nuts 30 at their upper ends to limit the upward movement of the upper die 22. The springs 28 are confined between the under side of the top plate 25 and the upper side of the base 1. The springs 28, therefore, normally keep the forming members 9 and 22 apart as shown in Figs. 1 and 2, but permit the downward movement of the upper die 22 towards the lower die 8 when sufficient pressure is applied to the foot treadle 32.

The upper cooperating die 22 is adapted to be brought into forming relationship with the lower die 8 by pulling downwardly on the operating links or rods 31 which are operatively connected to the treadle 32, Fig. 1. These links or rods 31 pass through the base 1 and through the upper plate 26, there being nuts 33 on the extreme upper ends of the rods or links 31 above the top plate 25. So that when a downward pull is applied to these rods 31 the top plate 26 will move downwardly against the urging action of the springs 28 and bring the die 22 into complementary engagement with the lower die 8. When the downward pull or pressure is removed from the rods or links 31, the upper die will return to normal position because the upper plate 26 will be returned to normal position by the springs 28. The upward movement of the plate 26 by the springs 28 will cause the rods or links 31 to attain their normal position as shown in Fig. 2.

The rods or links 31 are operatively connected to the foot treadle mechanism 32. This treadle mechanism 32, Fig. 1, comprises a member 34 suitably pivoted at 35 to a supporting member 36 such as a part of the bench 3. The rods 31 pass through the member 34 and carry nuts 37 so that when the foot pedal 38, Fig. 1, is pressed downwardly to swing the member 34 on its pivot 35 the rods or links 31 will be pulled downwardly. The treadle mechanism 32 is so constructed to permit sufficient movement so that the upper die 22 is adapted to come into die forming relationship with the lower die 8. The lever 39 is pivoted at 40 to the member 34 of the treadle mechanism 32 so that the dies may be locked in forming relationship if desired. The lever 39 extends through an opening 41 provided in the base 1 and is engaged by the lower face of the lower die member 9 at the front thereof, there being a plurality of consecutively spaced notches or teeth in the member 9 as indicated at 42 so that the member can be brought into locking engagement with a keeper or locking pin 43. Therefore, when it is desired to lock the dies together 32 into proper relation with the lower die 8, pressure is applied to the foot pedal 38 whereby the rods or links 31 will be forced downwardly. The downward movement of the member 34 by pressure applied to the foot pedal 38 will cause the lever member 39 to move downwardly thereby bringing an upper notch into registration with the keeper pin 43, holding the parts in locked position. The lever 39 is preferably positioned at an angle as clearly shown in Fig. 1 so that it will lean forwardly. The teeth on the forward side of the locking pin 43 are inclined so that when the pedal 38 is depressed the teeth will slide over the locking pin or keeper 43, but the parts will be maintained in locked position preventing movement in an opposite direction until the lever 39 is lifted to the right, Fig. 1, to release the lever from the locking pin or keeper 43. The latter means for maintaining the dies in locked position is desirable inasmuch as one operator can attend to several apparatus, letting one or more of the devices remain in locked position while the others are being released and primed with material to be operated upon. Therefore, the operator can set the first die and lock it in position and allow it to remain in locked die forming position while other devices are being unlocked, loaded or unloaded.

In the forming of the shoe tongues it is desirable that the dies are maintained at a predetermined temperature, therefore, a heating element such as a gas burner 50 is arranged beneath the metal supporting base 1. The burner 50 is operatively connected to a gas pipe 51 which leads to and through the supporting base 1, preferably, there being a shut-off valve 52 provided in the line 51. The heat provided by the gas from the jet or burner 50 is thus transmitted to the members 6, 7 and 9 of the lower forming die 8. The temperature of the lower forming die 8 may be regulated by operating the valve 52 to increase or decrease the supply of gas as required.

When a shoe tongue 23 is to be formed, it is placed across the lower die 8 as indicated in Fig. 2. The foot pedal 38 is then stepped upon with sufficient force to bring the upper die 22 into registration with the lower die 8 whereby the parts will assume the position shown in Figs. 3 and 4. The thickness of the leather tongue, the application of pressure and the positioning of the contour of the die members will cause the tongue to be spread longitudinally and pulled transversely so as to effect a drawing of the leather in both directions, that is, longitudinally and transversely. Because of the shape of the members, the tongue will be drawn both longitudinally and transversely to form the shoe tongue 23 in Fig. 5, whereby the tongue will be curved transversely as indicated at 44 and curved longitudinally as indicated at 61, Fig. 5. The longitudinal stretching or drawing of the leather is caused by the curved or arcuate shape of the dies longitudinally while the transverse
stretching or drawing of the tongue is caused by pressing the leather between the upper rounded edges of the side members 6 and 7. Also, the movement of the tongue transversely is caused by the cross-sectional shape of the dies. The longitudinal curve is caused also by the longitudinal curve of the members. In actual practice it has been found that the present forming apparatus will stretch or draw the material in two directions, giving it the proper foot forming shape as well as ironing out and smoothing the leather so as to remove all wrinkles therefrom. While the die forming apparatus is particularly applicable for forming tongues for skatling shoes sold under the well-known brand of "Alfred's," it is of course understood that the invention is applicable for making tongues for all types of shoes.

It has also been found that the application of heat is desirable in effecting the proper drawing and ironing operation whether the tongues are operated upon in a dry or wet state. This invention provides a relatively simple apparatus comprising few and simple parts for efficiently forming shoe tongues at a relatively low cost. Also, the invention provides an apparatus which may be economically manufactured to perform the efficient operation of making properly shoe tongues of the desired shape or configuration.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A forming member comprising a lower die, an upper die spaced from the lower die, spring means for urging one of said dies away from the other, means for limiting the movement of one die with respect to the other, a depressible foot treadle for moving the upper die against the lower die to bring the dies into nesting relationship, lever means fastened to the foot treadle, and means for locking said lower means in position to maintain said dies in operative forming nested position.

2. A forming member comprising a lower die, an upper die spaced from the lower die, spring means for urging one of said dies away from the other, means for limiting the movement of one die with respect to the other, a depressible foot treadle for moving the upper die against the lower die to bring the dies into nesting relationship, lever means fastened to the foot treadle, means for locking said lower means in position to maintain said dies in operative forming nested position, one of said dies having resiliently mounted sides to permit yielding movement when the dies are brought together.

3. A forming member comprising a pair of spaced plates yieldingly mounted to permit lateral movement, means restraining said plates against vertical movement, a die member positioned between said plates and yieldably mounted to permit vertical movement with respect to the plates, and a cooperating member adapted to be brought into registration with said first named member and to effect vertical movement of said die member between said plates, whereby a longitudinal and transverse drawing operation is effected on material arranged between said forming members by moving one member towards the other into forming relationship.

4. A forming apparatus for shoe tongues and the like comprising a pair of expandable side members for a forming die, means supporting said side members for movement towards and away from each other but restraining the members against vertical movement, spring means for urging said side members towards each other, means for limiting movement of said side members under urging action of said spring means, a central die member positioned between said side members, means supporting said central die member independently of the support for said side members, said supporting means for said central die member providing for vertical movement of the central die member between said side members, and spring means for normally urging said central die member to a predetermined vertical position with respect to said side members while permitting vertical movement of the central member with respect to the side members.

5. A forming apparatus for shoe tongues and the like comprising a pair of expandable side members for a forming die, means supporting said side members for movement towards and away from each other but restraining the members against vertical movement, spring means for urging said side members towards each other, means for limiting movement of said side members under urging action of said spring means, a central die member positioned between said side die members, means supporting said central die member independently of the support for said side members, said supporting means for said central die member providing for vertical movement of the central die member between said side members, spring means for normally urging said central die member to a predetermined vertical position with respect to said side members, a second forming die movable into nesting engagement with said first forming die, and means for effecting relative movement between said dies to shape work material placed between the dies.

6. A forming apparatus for shoe tongues and the like comprising a pair of expandable side members for a forming die, means supporting said side members for movement towards and away from each other but restraining the members against vertical movement, spring means for urging said side members towards each other, means for limiting movement of said side members under urging action of said spring means, a central die member positioned between said side die members, means supporting said central die member independently of the support for said side members, said supporting means for said central die member providing for vertical movement of the central die member between said side members, spring means for normally urging said central die member to a predetermined vertical position with respect to said side members while permitting vertical movement of the central member with respect to the side members, a second forming die movable into nesting engagement with said first forming die, and means for effecting relative movement between said dies to shape work material placed between the dies, said second forming die causing vertical movement of said central die member with respect to said side die members.

7. A forming apparatus for shoe tongues and the like comprising a pair of expandable side
members for a forming die, means supporting said side members for movement towards and away from each other but restraining the members against vertical movement, spring means for urging said side members towards each other, means for limiting movement of said side members under urging action of said spring means, a central die member positioned between said side die members, means supporting said die member independently of the support for said side members, supporting means for said central die member providing for vertical movement of the central die member between said side members, spring means for normally urging said central die member to a predetermined vertical position with respect to said side members while permitting vertical movement of the central die member between said side members, spring means for effecting relative movement between said dies to shape work material placed between the dies, said second forming die causing vertical movement of said central die member with respect to said side die members, and said central die member and said second forming die being curved both longitudinally and transversely, a forming apparatus for shoe tongues and the like comprising a pair of expansible side members for a forming die, means supporting said side members for movement towards and away from each other but restraining the members against vertical movement, spring means for urging said side members towards each other, means for limiting movement of said side members under urging action of said spring means, a central die member positioned between said side die members, means supporting said central die member independently of the support for said side members, supporting means for said central die member providing for vertical movement of the central die member between said side members, spring means for normally urging said central die member to a predetermined vertical position with respect to said side members while permitting vertical movement of the central die member with respect to the side members, a second forming die movable into nesting engagement with said first forming die, and means for effecting relative movement between said dies to shape work material placed between the dies, said second forming die causing vertical movement of said central die member with respect to said side die members, and said central die member and said second forming die being curved both longitudinally and transversely, spring means positioned between said dies and normally separating the same, treadle operated mechanism for effecting said relative movement between the dies against action of said last named spring means, and locking means operatively associated with said treadle mechanism for locking said dies in nesting forming relationship.

10. Forming apparatus of the character described comprising a forming die having a pair of expansible side members, means supporting said side members for movement towards and away from each other but restraining the members against transverse movement, resilient means for urging said side members towards each other, means for limiting movement of said side members under urging action of said resilient means, a central die member positioned between said side members, means supporting said central die member for movement independently of the movement of said side members, said supporting means for said central die member providing for movement of the central die member between said side members and transversely thereof, and spring means normally urging said central die member to a predetermined position between said side members while permitting movement of the central die member with respect to the side members.

11. Forming apparatus of the character described comprising a forming die having a pair of expansible side members, means supporting said side members for movement towards and away from each other but restraining the members against transverse movement, resilient means for urging said side members towards each other, means for limiting movement of said side members under urging action of said resilient means, a central die member positioned between said side members, means supporting said central die member for movement independently of the movement of said side members, said supporting means for said central die member providing for movement of the central die member between said side members and transversely thereof, and spring means normally urging said central die member to a predetermined position between said side members while permitting movement of the central die member with respect to the side members.