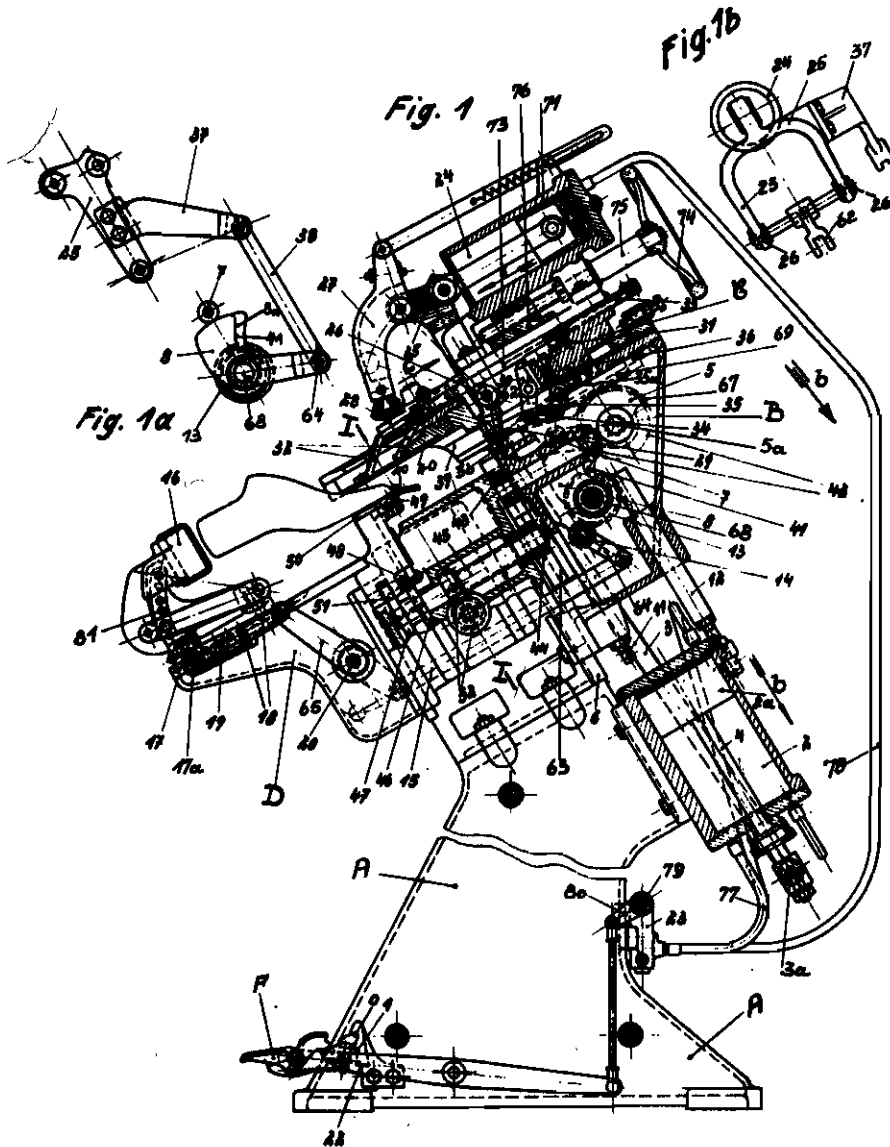


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6 Sheets-Sheet 1

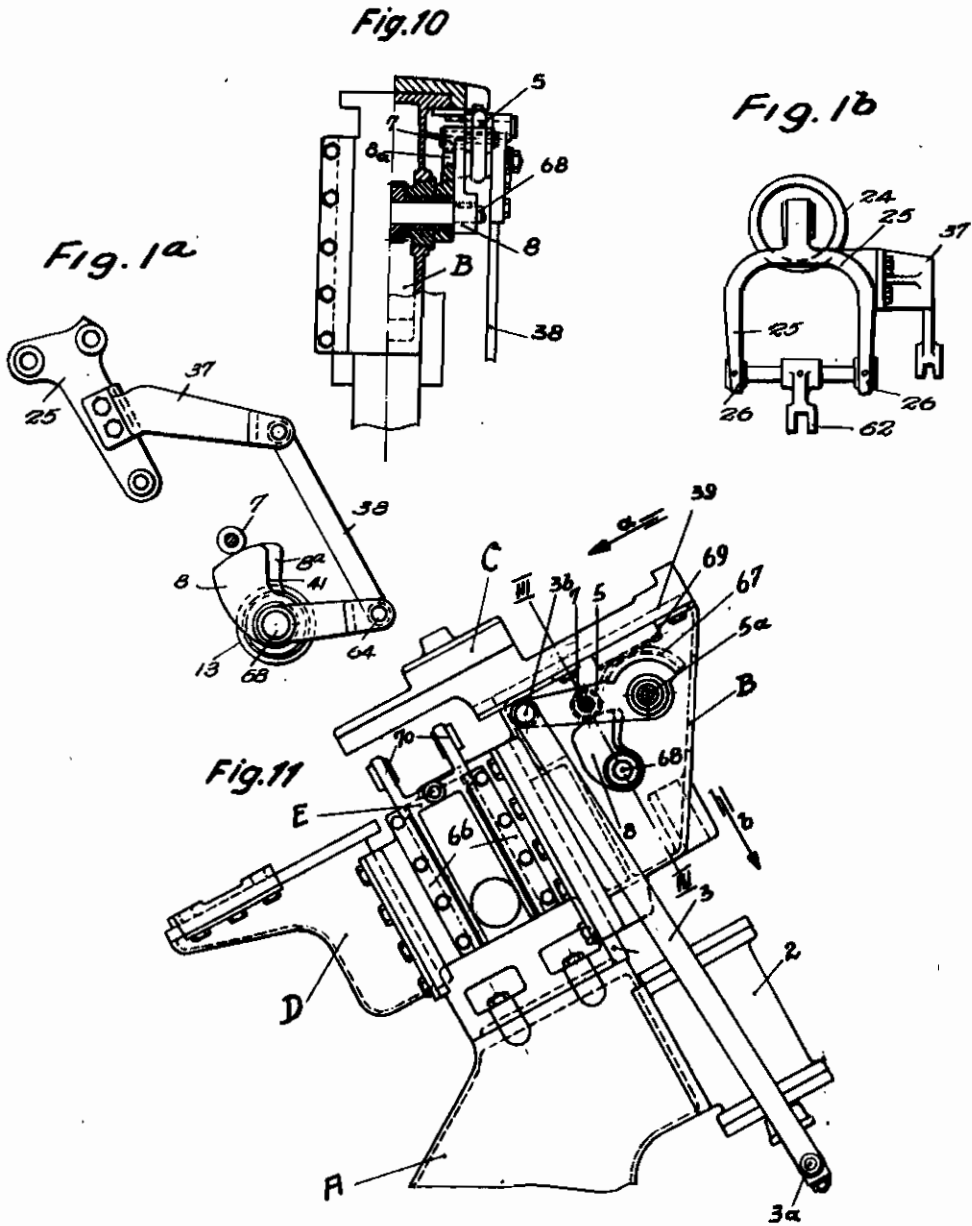


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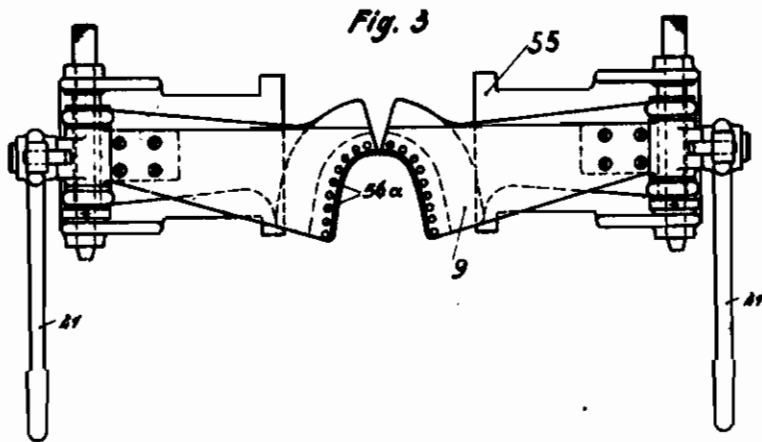
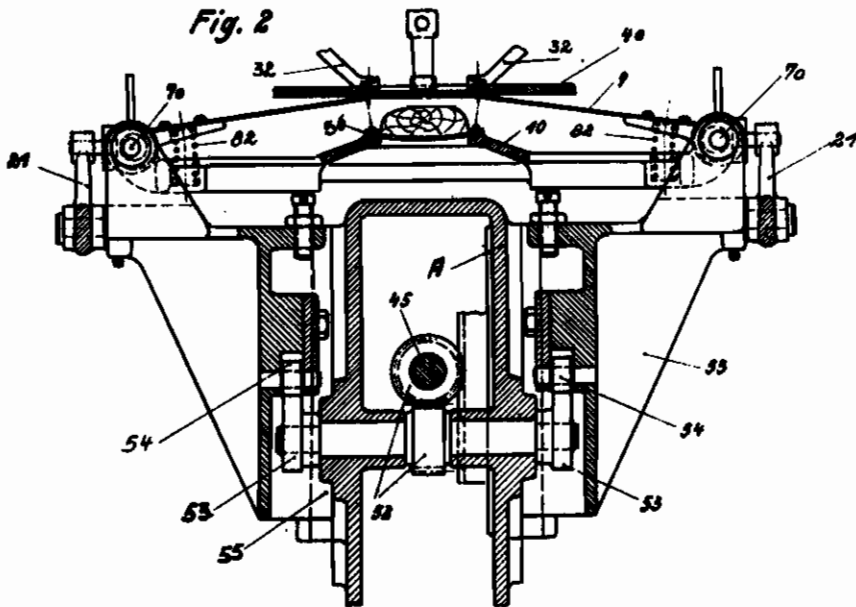


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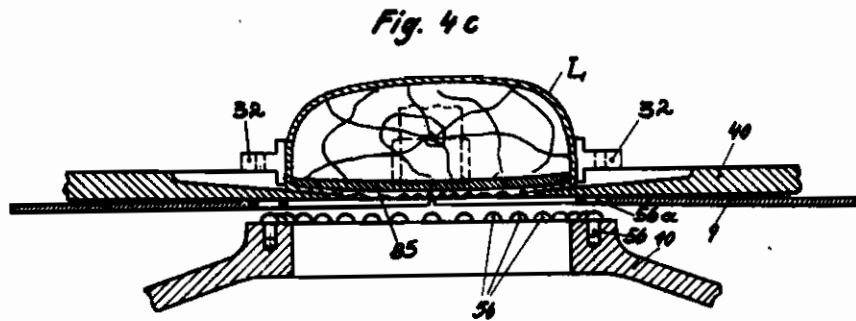
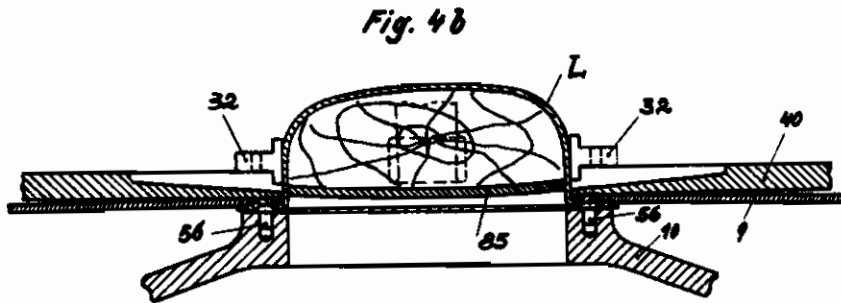
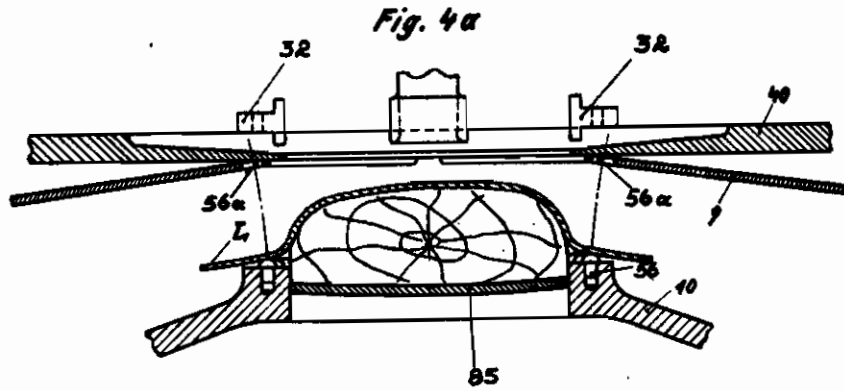


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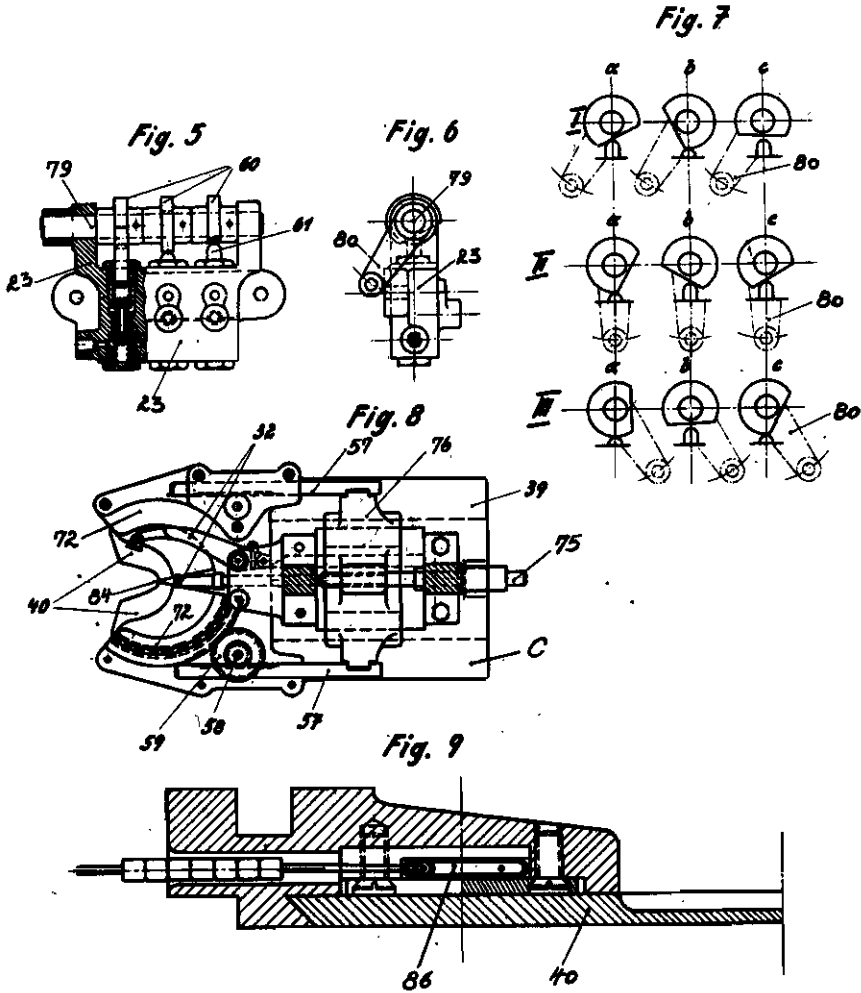


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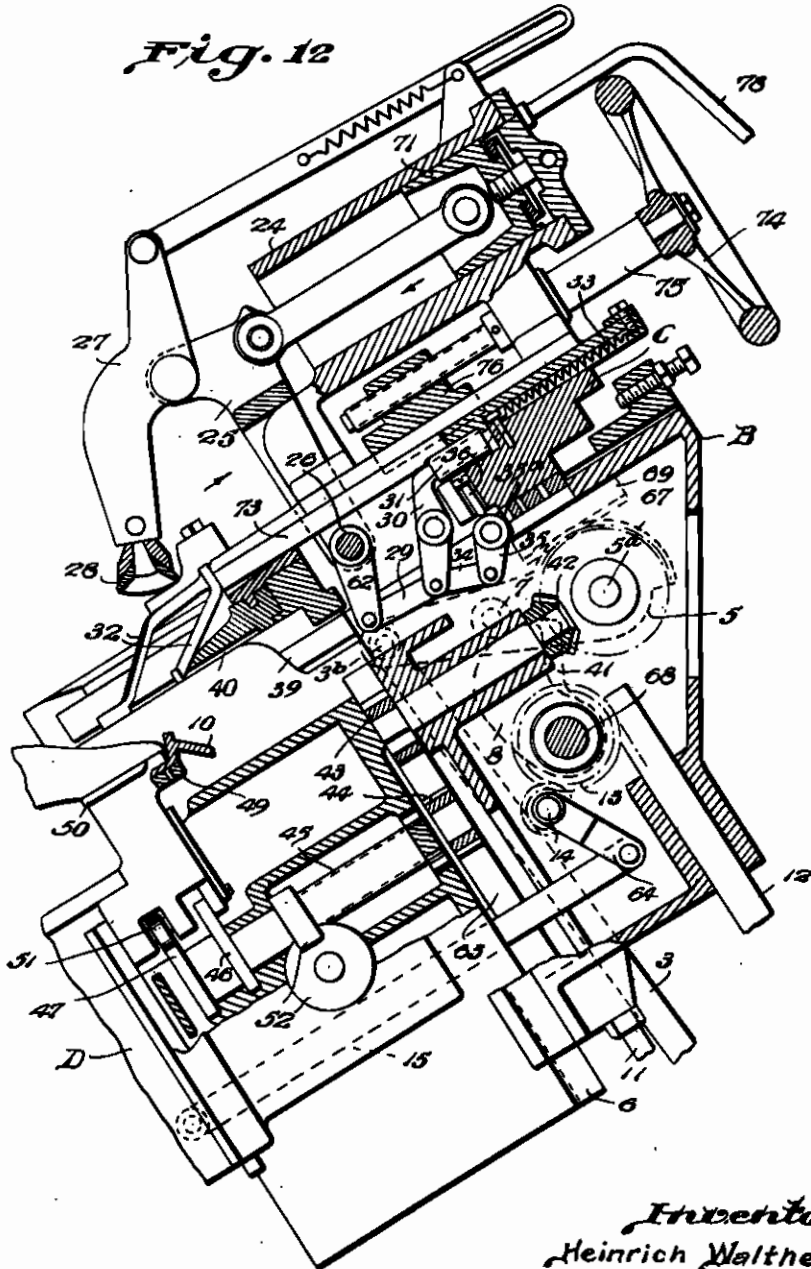
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Fig. 12



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ALIEN PROPERTY CUSTODIAN

SHOE FORMING AND TOE LASTING MACHINE

Heinrich Walther, Sr., Francfort-on-Main-Ober-rad, Germany; vested in the Alien Property Custodian

Application filed January 16, 1941

This invention relates to a stretching and toe lasting machine for boots and shoes whereof the lip of the uppers is pulled or folded towards the inside, comprising co-operating pincers and wipers for cement-lasting, similar as for the heel-lasting. In the hitherto known lasting machines of this kind the pincers are mechanically combined with the wipers in such a way that their movements relate to each other whereby the pincers are guided by vertical or oblique guide bars which, however, interfere with the control means to be arranged and with the required supports for the shoe last. In the case of such kind machines a cementing material is used wherewith the uppers to be stretched or pulled are coated prior to or during the lasting work. The machines in question have many defects, particularly that the main movements of the machines are mechanically so effected that an interruption of the motion is no more possible after the start of the working operation; the folds formed are of irregular shape and therefore undesired; besides, the uppers are not well stretched.

The new machine according to this invention which eliminates the above mentioned defects adds substantial and new features to the toe lasting which make it possible to simultaneously combine the stretching of the uppers with the folding and lasting respectively. The wipers and pincers are of similar shape so that sufficient space remains underneath the pincers for the installation of the necessary control gears and supports. The forming pincers for the pulling the uppers over the last are flat horse-shoe shaped parts similar to shears and are located, nearly parallel, directly underneath the well-known also horse-shoe shaped wipers; they are actuated in couple-connection by the movements of the wipers. The pairs of forming pincers grip the uppers of the shoe-toe by their whole horse-shoe shaped surface and not only by points. During this operation, the wipers are connected to a controlled wiper or fulling slide, and separate from it are the pincer-pairs connected to another also controlled pincer-slide so that both wipers and pincers, though they are independent in mechanical respect are correspondingly moved. The fulling-slide is guided on a main slide actuating the control-gears of the individual parts by its movements. Thus, the machine consists of four main parts, namely the machine housing, the main slide guided on the main housing, the fulling slide guided on the main slide, and the pincers-slide guided on the machine housing. The machine is driven by compressed air or hydraulically whereby it has been made possible to stop the machine at any position or to reverse its motion. It has been achieved by the suitable construction of the forming pincers that the uppers are gripped by the pincers so long until

they have been gripped by the wipers. To ensure a safe support, last-feelers, sole- and ball-pressers and heel holders are arranged which are controlled by compressed air or mechanically, whereby double-sole-pressers (pressure feet) prevent any undesired displacement of shifting of the insole. The forming pincers and sole-pressers are so controlled that the shoe last from the tip on is only gradually released in order to let the wipers turn in. All important parts are locked and so arranged that even the slightest return movement into the starting position is prevented. The wipers are heated in the well-known manner. The drive for the individual stages of operation is effected through a new control valve which follows the control steps of a pedal.

An example of the structure of the new machine may be as follows, as illustrated in the attached drawings:

Fig. 1 is a side view of the whole of the machine, partly with sections of individual parts.

Fig. 1a shows the gearing of a cam-control.

Fig. 1b shows a control yoke seen in the direction of arrow c of Fig. 1.

Fig. 2 is a section on line I—I of Fig. 1.

Fig. 3 shows the machine part according to Fig. 2, seen from above.

Fig. 4a, b, c show the various positions of the wipers and forming pincers during the lasting operation.

Fig. 5 and 6 illustrate the control valve for the compressed-air control, seen from two sides, partly in section.

Fig. 7 shows the positions of the valve stems and cams at the three steps I, II, III.

Fig. 8 is a view from above of the fulling slide with the forming pincers, wipers, feelers, and drive for the pincers.

Fig. 9 shows the wipers with a heating arrangement.

Fig. 10 shows the cam path according to Fig. 1a in section on line III—III of Fig. 11.

Fig. 11 shows the four main parts of the machine according to Fig. 1 with the main drive.

The new stretching and toe lasting machine consists of four main parts, namely the machine housing A, the main slide B, the fulling slide C, and the pincers-slide E (Fig. 11). The main slide B slides on the slide-ways 6, Figs. 1 and 11 of the housing A, whereas the fulling slide C with the guide 39 slides on the main slide B. On the housing A, an overhang and sliding machine-body D is mounted which carries the supporting devices for the shoe-last. The pincers-slide E slides on the housing A.

The main movements of the above parts are as follows:

The main-slide B with the fulling slide C slides on housing A. The fulling slide C slides in rela-

tion to the main slide B, and the driving gears of the supporting body D depend on the relative movements between main slide B and housing A and between main slide B and fulling slide C, Figs. 1 and 11.

On housing A a pressure cylinder 2 is fixed whose piston 2a is connected by its piston rod 4 with a butt strap 3 at joint 3a. At the other end of butt strap 3, i. e. at joints 3b a swing-lever 5 is turnable about the axis 5a. This lever bears a toothed arc 67 at its other end (Fig. 11). Furthermore, this lever 5 bears also a roller 7 which rests on cam 8. This cam has double curves 6 and 8a (Figs. 1a and 10), and swivels round the pin 66 in the main slide B. The toothed arc 67 gears with rack 69 on fulling slide C.

On fulling slide C another pressure cylinder 24 is arranged whose piston is connected with yoke 25, Figs. 1 and 1b, swivelling at pivot 26. On top of yoke 25 a swing-arm 27 is pivoted carrying the ball-pressure 26. On the side of yoke 25 a control device with the rods 37, 38 is mounted which are connected with the curves 8 and 8a at joint 84. The lower joint 26 is coupled with butt strap 62 which is connected through a hinged joint strap 26 with the pivoted stop pin 30. This stop pin 30 is situated on a locking rock 31 (fluted) which connected to the feelers 32 with springs 33. Joint strap 29 is also connected with the bell crank 35 which is provided with a cam 35a for pressing the locking pin 36 against rack 31.

On the tenon 5a a bevel gear system 42 with pinion 43 is mounted. This pinion 43 and also the pinion 44 on axle 45 gear with a displaceable toothed rack 83. Pinion 43 is supported in the main slide and pinion 44 in the housing A. On the axle 45 cams 46, 47 and the worm gear 52 are fitted. Cam 46 actuates through roller 48 the front sole-presser 49, and cam 47 through roller 51 the rear sole-presser 50.

On the axle 68 of the cams 8 a toothed wheel 13 is fitted which gears with rack 12 on the pressure cylinder 2 and with a pinion 14 on lever 64. This lever 64 actuates through a connecting rod 15 the lever 65 which is supported at 20 and provided with a friction clutch. Lever 65 is connected with the heel-holder 16. For locking purposes, a locking pin 17 and a fluted locking cleat 16 are provided.

The worm gear on axle 45 actuates the cams 53 upon which the rollers 54 of the pincers-slides E, 55 are running, Figs. 1 and 2, sliding on the slide-guides 66 of housing A. On the slides 55 the forming pincers 9 and 10 are pivoted at 70 above which the wipers are abutting, nearly in parallel. The top pincers 9 can be deflected against the bottom pincers 10, due to their spring action. These pincers have nearly the shape of a horse-shoe and consist of members moving towards each other, in order to be adapted to the shape of the respective last. The wipers 40 have the similar usual shape, but are connected with the slide-guide 39 on the upper or fulling slide C, Figs. 1 and 8. As Fig. 8 shows, on slide 39 an arrangement of separately operating feelers and wipers is provided. The feelers 32 with the feeler-holders 73 are subjected to the pressure from spring 33. Three feelers 32 are arranged, namely two on the sides and one at the tip. The adjustment of the plates 72 of the wipers is effected by means of a hand-wheel 74, Fig. 1, through a spindle 75, Fig. 8 connected with the block 76 upon which toothed bars are mounted. The latter gear with pinion 56 the axle of which

bears another pinion 59 gearing with the toothed arc of the plates 72 and adjusting these plates.

Figs. 4a, 4b, 4c illustrate the operation method of the wipers and forming-pincers. Above the wipers 40 the feelers or fingers 32 are arranged. Below the wipers the two forming pincers 9, 10 are arranged of which each differs from the other. The top pincers 9 are provided with a row of holes 56a, Fig. 3, which are faced by the bolt heads 58 of the bottom pincers 10. The bolt heads enter into the holes 56a when the pincer-pairs are closed, Fig. 4b: in this case it must be noticed that the wipers 40 are supported on the fulling slide, and the pincers 9, 10 in the slides 55 on the housing 1. The wipers are electrically heated, Fig. 9. The machine is driven in a new manner by means of compressed air through a treadle control F, Fig. 1, where the control steps or notches 1 and 22 are provided. This control leads to a new valve controlling device 23, Figs. 1, 5 and 6, the control steps of which are shown in Fig. 7. The valve gear 23 controls the admission of compressed air through the pipe lines 77 into cylinder 2 and through line 76 into cylinder 24 on the fulling slide. The valve gear comprises a valve body 23, Figs. 5 and 6, in which a cam shaft 79 with three cams 80 is journalled. The cam shaft is turned by the crank 80 of the treadle control. The cams 80 actuate the valve stems 61 and are interlocked so that according to the position of the control notches 0, 1, 22 the three stems are kept each in a different position. When changing from the first notch 0, i. e. the neutral position, into the second notch 1 the position II results of Fig. 7, that means, the stem 61 of the first cam 80 is pushed in (IIa) and the compressed air is admitted to the top of cylinder 2 whereas the other stems (IIb, IIc) are at rest. When changing is continued into the third notch 22, position III results as per Fig. 7. In this case the stems IIIa as well as IIIc have been pushed down, so that compressed air flows through line 78 also to the fulling slide cylinder 24; reversing back into the 0-notch then position I results where only the second stem 1b is pushed down for the admission of compressed air under the piston 2a. Fig. 7 illustrates also the position of the crank 80 at every position of the reversing lever.

The machine works as follows:

By displacing the pedal F, Fig. 1, into the second notch 1, the position of the valve 23 is changed into position IIb, Fig. 7. This causes compressed air to flow through line 77 into cylinder 2 above the piston 2a. Piston 2a is moved in the direction of arrow b and drives the connecting rod 3 by means of piston rod 4 at its end 3a. On the housing A, two cylinders 2 of this kind with the moving rods are fixed by bolts. When piston 2a with its connecting rod 3 moves, the main slide B together with the fulling slide C and with the parts belonging to it is moved down in the direction of arrow b. This has been made possible, because the cam 8 locks roller 7 and, therefore, the roller arm 5 cannot swivel about its axis of rotation 5a, Figs. 1 and 11. The main slide B is hollow Fig. 10 in its middle portion on both sides of which a moving means 3, 5, 7 each is provided, generally all outer parts are provided in double (one on both sides).

The down movement of the main slide B causes other special movements. The rack 12 rigidly fixed on cylinder 2 turns the pinion 13 being lowered in the direction of arrow b. Pinion 13 actuates pinion 14 with its splined axle, thus causing a swing movement of the butt strap 64. This

movement is transmitted through the rods 15, 20, 65, 19, whereby the heel holder 18 is pressed against the shoe-last. This heel holder is provided with an air cushion or the like on its inner surface, in order to save the fine quality uppers and to ensure a close abutting. As soon as the heel holder is resisted by the shoe-last it binds with the fluted bolt 17 in the fluted rack 10. The friction clutch 20 serves for balancing small differences in size of the shoe-last and, besides this, the size of the respective last is met with by an adjustment of the bolt 17a in the notched rack 18. The heel height of the last is adjusted by another adjusting arrangement 81.

When the main slide B is lowered, also the fulling slide C with the wipers 40 is lowered. Thereby, the wiper-parts 40 exert pressure upon the forming pincers 8, Fig. 2 and 4a-c and deflect it against the clamping springs 82, until they rest upon the bottom pincers 10. As the shoe uppers have been already inserted before between the top and bottom pincers 9 and 10, the leather is now gripped by both pincer pairs. To ensure a safe gripping, during this movement the bolt heads 56 enter into the holes 56a of the top pincers 9 and clamp the uppers there fast, Fig. 4b. The bolts are of a longer size at the side of the bottom pincers 10, in order to keep the uppers there somewhat longer for the following lasting operation. Thereby it has been achieved that the folds formed at the shoe tip are kept small and of regular shape so that the hitherto irregularly placed, thick, and undesired wrinkled folds are eliminated. The uppers gripped by the pincer pairs, 9, 10 are stretched down so far as per Fig. 4b until the pincers are underneath the edge of the insole. This movement is effected by the cams 53 on the rollers 54 with the slides 55, Fig. 2.

The cams 53 are actuated through a shaft 45 and a worm gear 52 by a pinion 44 which gears with the rack 83. This rack is lowered down together with the main slide B and actuates by means of pinion 44 the shaft 45, the cams 48 and 47 for the sole-pressers 49, 50, and the worm 52, so that the position of fig. 4b is reached. Hereby, the first working operation is finished. Now, it is suitable to additionally actuate the forming pincers by the aid of the two levers 21, fig. 2, whereby the uppers on the top of the shoe last may be adjusted, if necessary.

For the second operation, the treadle control F is displaced into the second notch 22, and the valve gear position III, fig. 7, is engaged at cam 23 so that compressed air flows also into the top cylinder 24 on the fulling slide. The main cylinder 2 remains under the hitherto existing pressure whereby the movement of the piston remains stopped by the stop dog 11. The piston 71 of cylinder 24 is now moved in the direction of arrow a and turns the yoke 24 about its fulcrum 28. At the same time, the ball presser 27 is moved forward and brought at rest on the shoe-last. The applied surface of the ball presser is designed as an air cushion 28 or the like which suits well any shape of the last, makes a close fit, and saves the fine uppers. By the movement of yoke 25 the butt strap 82 rigidly connected with it is caused to swing out; this movement is transmitted through the butt strap 29 on the one hand up to the finger lever 38 and through the butt strap 34 to the cam lever 35 with cam 35a on the other hand. The finger lever 30 is supported in the fulling slide. When the finger lever has swung off the locking rack 31 in consequence

of the movement of butt strap 29, then, the thereby released feeler holders 73 are shifted by their springs 33 towards the shoe-last and adjoin against same. Three feelers 32 are arranged, Fig. 8, of which the one is directly applied to the tip and the two others to the sides, whereas the three respective feeler holders 73 may be shifted horizontally side by side in the fulling slide. After the feelers 32 have set up to the shoe-last they must be locked. This is effected by means of the cam lever 35, as this lever is swivelled by butt strap 34, the cam 35a is pressed against the fluted locking pins 36 which in turn binds upon the locking rack 31 on the feeler holders 73.

The control gearing 37, 38, 8 is also mounted on yoke 25 and joins in the movements of the yoke whereby the curves 8, 8a supported by axle 68 are swivelled. At the same time, roller 7 on the lever 5 is thereby released so that it can be swivelled about its fulcrum 5a by means of the connecting rod 3 (which is still being moved downwards under the piston pressure). Thereby, roller 7 moves along curve 41.

The toothed arc 87 gearing with rack 69 is also swivelled together with lever 5 and shifts the rack together with the fulling slide 39. Together with the slide 39, the wipers 40 (Figs. 1 and 8) are also displaced, folding the uppers L which have been stretched before by the forming pincers 8, 10, over the edge of the last and then pressing onto the insole. During this, the wipers are also turned about their hinge point 84 by means of the arrangement provided according to Fig. 8.

As lever 5 swings about 5a, the bevel gear 42 is also driven and turns through the second bevel gear, the pinion 43 transmitting the movement onto the rack 83 on the main slide B. When rack 63 is moved, the pinion 44 is turned and sliding also the shaft 45. This is the second movement of shaft 45 (the first is effected when the main slide B is lowered) which causes the action of the sole-pressers or press-feet 49, 50, in the right moment. In order to ensure that the wipers can sufficiently swivel-in, it is necessary to lift off or deflect the front sole-presser 49. This is done by the special curve 48 and roller 48, the rear sole-presser 50 giving still sufficient support in this case. As during the lasting-operation the rear sole-presser 50 is at a higher level than the wipers, it must, all lasting-operations being finished, be also swivelled downwards that is effected by means of cam 47 and roller 51. Now, the wipers bring the uppers L to a perfectly close fit on the insole 85, Fig. 4c. In order to have the heel of the last also joined in this movement, it is arranged displaceable so that it is also somewhat lowered together with the rear-press-foot 58.

When the machine is brought back into the starting position by the third command, i. e. notch 0, position I of the valve gear, Fig. 7, appears, that means, line 78 is disconnected from: cylinder 24 at the position Ic of the valve gear, also line 77 from the top inlet of cylinder 2 at the position Ia of the valve gear, whereas line 77 opens into the bottom inlet of cylinder 2 at the position Ib. The piston 2a and together with it the connecting rod 3 and the main slide B with the fulling slide C are pressed upwards again, and all before described movements are made in the reverse sense so that the machine is again in its starting position.

Fig. 9 shows the heating arrangement for the wipers comprising an electrical heating element placed in the wipers.

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