To all whom it may concern:

Be it known that I, William G. Cheney, a citizen of the United States, residing at Marlboro, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Assembling and Lasting Machines, 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 for assembling shoe uppers upon their lasts and for laying over the upstanding margins of the uppers about the ends of the shoes, particularly the heel ends, into contact with the innersoles. The invention is herein illustrated as embodied in a machine particularly adapted for use in the manufacture of a type of shoe in which the margin of the upper is secured to the innersole in lasted position by adhesion, the machine shown having means for holding the upper in assembled relation upon a last and for laying the margin of the upper in contact with the heel seat of the innersole. It is to be understood, however, that in many of its aspects the invention is not limited to machines for operating upon this particular type of shoe nor to machines including both assembling means and lasting means.

Well known examples of shoes of the type above mentioned which are made in large numbers at the present time are so-called sneakers and tennis shoes, which usually comprise an upper of fabric and a sole of rubber or rubber composition. In the manufacture of these shoes it is the common practice to use an innersole of such character as to material and thickness that it is comparatively yielding to any pressure such as might tend to distort it, for example, the pressure of inwardly moving wipers of the usual type. The innersoles are frequently made of so-called “rag stock” comprising a mixture of unvulcanized rubber and scraps of cloth or other waste fibrous material. The inner face of the margin of the upper is coated with cement, and in the lasting of the shoe, the margin of the upper is pressed against the innersole to render the cement effective to hold the upper in lasted position. Subsequently an outersole is cemented to the shoe and the shoe is vulcanized.

Heretofore in the manufacture of such shoes the operation of assembling the upper upon the last and of laying the margin of the upper into contact with the innersole has been performed by hand, the workman first positioning the upper properly upon the last and then laying over the margin of the upper by a rocking and wiping movement of his thumb or fingers. This hand work is exceedingly laborious and, by reason of the consequent fatigue of the workman and the general unreliability of hand operation, uniform results in the course of a day’s work are difficult to obtain. As a consequence the manufacturer finds in his product a large number of defective or “reject” shoes which have to be disposed of, if at all, at a greatly reduced profit or at a loss. Furthermore it is practically impossible for the workman to hold the upper properly to the last while at the same time applying sufficient over-laying pressure to cause proper adhesion between the upper margin and the innersole.

An object of this invention is to provide a machine for doing this work more rapidly than it can be done by hand and for over-laying and pressing the upper into contact with the innersole in such manner as to avoid danger of wrinkling or displacement of the innersole and to obtain firm adhesion of the upper to the innersole.

A feature of the invention consists in an organization including a shoe support movable to carry the shoe into and out of operative relation to the machine and lasting instrumentalities which act when the shoe is in operative position to lay the margin of the upper over the shoe bottom and to force the margin into contact with the shoe bottom, the said instrumentalities in the construction shown being arranged to effect the laying over and downward pressure without application of pressure in the direction of the plane of the sole such as would tend to cause buckling or displacement of the innersole. As shown herein, the lasting instrumentalities consist of rolls arranged about the periphery of the heel seat in close
proximity to each other so as to engage substantially all portions of the margin.

Another feature of the invention consists in a novel organization comprising a roll or rolls for operating at an end of the shoe, herein shown as the rear end of the heel seat, and a roll at each corner of the shoe end with operating means arranged to operate the end rolls at one time in the cycle and the corner rolls at another time in the cycle. As herein shown, the organization is such that the end rolls are caused to operate and withdraw from position over the shoe bottom and the corner rolls are then caused to operate to do their work. This construction avoids any interference between the action of the end and corner rolls and enables the action of the end rolls to overlap the action of the corner rolls or vice versa if desired.

A further feature of the invention consists in a series of separate overlapping means arranged along each side of the heel seat including the portion that curves inwardly toward the shank, with operating means to effect inward movement of the overlapping means simultaneously. Preferably the overlapping means on each side of the shoe next to the shoe shank are given a component of movement toward the rear end of the shoe in addition to their inward movement in order better to take care of the fullness in the upper at the inwardly curved shank portions. As shown herein, the members of each series are given progressively greater movement from the rear end toward the shank. This enables the overlapping means, in their inward movement, to act on the heel seat in the narrower portions adjacent to the shank and increases their movement of withdrawal from the shoe to afford room for movement of the shoe out of operative relation to the overlapping means. Preferably the overlapping means at the sides of the shoe consist of rolls each independently mounted, the mounting including a yielding element to enable them to yield upwardly and press evenly upon the overlaid upper.

Another feature of the invention consists in an organization comprising means for holding the upper and counter in assembled relation closely to the contour of the last at the rear end of the last in combination with rolling means for lasting in the margin of the upper extending above the shoe bottom. The upper holding means, as herein shown, comprises a band which is arranged to be closed by pressure of the shoe rearwardly into the band and the rolls are arranged to act above the plane of the upper edge of the band.

A further feature of the invention consists in a machine organized for power operation having upper overlapping means and means for effecting conforming pressure about the end of the shoe to force the upper into contact with the side and end of the last with means responsive to pressure of the shoe into the upper conforming means for effecting power operation of the overlapping means. Preferably and as shown, the upper conforming means comprises a band which is bodily movable to effect power operation of the machine.

Still other features of the invention consist in a construction and arrangement of the roll mounting for inward and outward swinging movement about a pivot over the shoe bottom, in novel means permitting bodily yielding movement of the pivot when movement of the rolls is limited, in a novel construction of the rolls, and in various details of construction and combinations of parts, all of which will be described with reference to the accompanying drawings and pointed out in the appended claims.

In the drawings,—

Fig. 1 is a side elevation of a machine embodying the present invention;

Fig. 2 is a detail in plan of the rolls which act on the rear end of the shoe;

Fig. 3 is a plan view of the heel band mechanism;

Fig. 4 is a front elevation, partly in section, of the head of the machine;

Fig. 5 is a side elevation, partly in section, of the head of the machine;

Fig. 6 is a plan view of the machine, certain parts being omitted for the sake of clearness;

Fig. 7 is a sectional plan view illustrating the action of the rolls upon the shoe upper;

Fig. 8 is a detail of one of the side or corner rolls in a modified form; and

Fig. 9 is a perspective view of the rear end of the shoe after it has been operated upon by the machine.

Referring to Fig. 1 of the drawings, the numeral 2 indicates the column of the machine near the base of which is pivoted at 4 a jack post 6 in which is telescoped a jack rod 8. The jack rod extends through a slot in a lever 12 and carries an adjustable sleeve 10 which rests on the upper face of the lever 12. The lever 12 is fulcrumed at 14 to a bracket on the column 2 and is lifted at the proper time in the cycle of the machine by an edge cam 16 (Figs. 5 and 6) which operates through a lever 18 fulcrumed at 19 (Fig. 5) to exert an upward pull on a rod 20 which is yieldingly connected to the lever 12 through a spring 22. The sleeve 10 is threaded on the rod 8 so that it may be turned to adjust it up or down on the rod. To limit the upward movement of the lever 12, an adjustable stop 24 is provided which is in the form of a screw threaded through a lug on the machine frame. On the upper end of the rod
8 is a heel pin 26 upon which is placed a last and shoe the heel seat of which is to be lasted in the rod 9. While the rod 8 is in its outwards swung position, a last with a shoe upper and innersole placed thereon is placed upon the pin 26. The operator, having arranged the upper in proper relation to the last and innersole, swings the shoe toward the machine. In this movement the rear part of the shoe is embraced by a band having the construction shown in Fig. 3. The band comprises a lining 30 of suitable material, for example, leather, which is backed up by a chain 32 connected at its ends 34 and 36, respectively, to arms 38 and 40 of bell crank levers pivoted at 42 and 46 to a supporting head 48. The other arms 50 and 52 of the bell crank lever are connected together to the central portion of the chain 32. By this construction rearward pressure of the shoe against the band causes first the end of the band and then the sides to be pressed against the end and sides of the shoe to force all portions of the rear part of the shoe upper into conformity to the last and to hold them in assembled relation during the subsequent operation of laying the margin of the upper which extends above the plane of the sole into contact with the sole.

After the band has been fully closed against the rear part of the shoe it is arranged to have a movement bodily to bring the shoe into proper relation to the devices for laying the upper against the shoe bottom and this movement is preferably utilized to start the machine. To effect this the band supporting head 48 has a stem 54 (Fig. 5) mounted in the frame 56 of the head of the machine for inward and outward movement and is held outwardly by a spring 58 which spring is sufficiently stiff to withstand the rearward pressure of the last and the shoe into the band until the band has been tightly closed against the rear part of the shoe and then to allow bodily movement of the band by compression of the spring 58. A rod 60 is connected to the stem 54 and extends rearwardly of the machine head where there is connected to it a strut 62 carrying a rod 64. Mounted on the rod 64 is a block 65 in which is mounted for vertical movement a pawl 66 which is pressed upwardly by a spring 67 and has an inclined upper face. The block 65 is preferably guided for horizontal movement by a rod which extends forwardly therefrom and slides in a hole in a boss 69 on the machine frame. The pawl 66, when moved rearwardly by pressure of the shoe into the band, engages the lower end of a trip lever 68 fulcrumed at 70 and connected at its upper end to a sliding pin 72 which lies normally in the path of a clutch stop lug 74. When moved rearwardly the pawl 66 engages the lever 68 and causes it to remove the pin 72 from the lug 74 allowing the clutch to go in and the machine to start. Rearward movement of the pawl 66 is sufficient to pass the end of the lever 68 and allow the stop pin 72 and lever 68 to be restored to normal position by a spring 76 acting on the pin 72. The arrestment of the stop lug by the pin 72 of course throws out the clutch after a single revolution of the shaft 17. When the pawl 66 moves forwardly again upon removal of the shoe from the band, its inclined upper face engages the end of the trip lever and is depressed against its spring 67 which restores it to normal position behind the lever when the end of the lever is passed.

To relieve the operator of the exertion of holding the shoe in the band and to exert greater rearward pressure of the shoe into the band than can conveniently be exerted by the operator, means shown in Figs. 1 and 5 is provided for locking the shoe in the band and exerting additional rearward pressure thereon during the operation of the machine. For this purpose a bar 80 is pivoted at 82 to the rod 8 and extends through the column 2 to the rear of the machine where it is supported by a yoke 84 attached to the lower end of a lever 86 fulcrumed at 88 to the head 56 and having on its upper end a roll which contacts with the edge of a cam 90 on the shaft 17. On the lower end of the lever 86 above the bar is pivoted at 92 a pawl 94. Below its pivot the pawl 94 is engaged by a pin 96 on the machine frame which, in the normal or stop position, holds the pawl raised so that it will not engage teeth 98 formed on the upper face of the arm 80. When the machine is started the cam 90 operates to move the pawl rearwardly away from the pin 96 and allow it to engage the teeth 98 whereupon further movement of the lever 86 will draw the rod 8 rearwardly and force the shoe more tightly into the band.

To hold the innersole firmly against the last during the jacking and lasting operations, a yielding sole presser is provided which is organized to permit movement of the shoe while in engagement with it without tending substantially to displace the innersole relatively to the last. In a forward projection 100 of the frame 56 a plunger 102 is mounted for vertical movement and is held depressed by a spring 108. In the lower end of the plunger is mounted a roll 104 on an axis extending transversely of the shoe. The roll 104 holds the innersole against the last while permitting substantially free movement of the last and innersole under it longitudinally of the shoe.

The lasting instrumentalities by which the upstanding margin of the upper materials is laid over the bottom of the shoe and
pressed into engagement therewith, will now be described. These instrumentalities include means for operating upon the upper at the rear end of the heel seat and separate means, preferably operating subsequently, for laying over the upper at the corners and sides of the heel seat. The first means comprises a pair of rolls 110, 110 arranged on axes inclined to each other, as shown in detail in Fig. 2. The rolls are mounted in a block 112 (Fig. 5) having a stem 114 extending lengthwise of the shoe through a block 116, the stem permitting rocking movement of the rolls to insure their bearing with equal pressure upon the shoe bottom. On the block 116 is a spindle 118 extending substantially vertically of the shoe bottom through the lower portion of a lever 120. The spindle 118 is reduced for a portion of its length to accommodate a spring 122 located between the shoulder formed by the reduction of the spindle and the upper portion of the lever 120 through which the spindle extends and which is provided with nuts 124 which may be set to maintain the spring 122 at any desired degree of compression. The spring 122 allows the rolls 110 to yield upwardly as they pass over the shoe bottom and causes them to apply yielding pressure to the upper as they roll it down against the innersole.

The lever 120 extends through an opening 125 in the projection 120 which opening is elongated lengthwise of the shoe. The lever 120 is fulcrumed at 121 between the arms of a yoke 126 which yoke has a cylindrical portion 128 mounted for rocking movement in a boss 130 on the frame 50. The inner part of the portion 128 is reduced to accommodate a spring 123 located between the shoulder formed by the reduction and the boss 130, the reduced part being extended through the boss and provided with a nut 134 and washer 135 by which the spring 132 may be maintained at any desired degree of compression. This construction provides a rearwardly yielding pivot for the lever 120 which may come into action when movement of the rolls 110 over the shoe bottom is arrested by a cage or stop 136. This stop has a stem 137 mounted in a split clamp 138 on the block 116, the clamp being operated by a screw 140 (Fig. 2) to hold the stem and stop in different positions of adjustment. The stop 136 engages the rear end of the band and may be set to limit movement of the rolls over the shoe bottom at the desired point. Above its pivot 121 the lever 120 extends upwardly and rearwardly and has an inclined or offset portion 142 in which is a ball socket receiving the spherical end of a link 144, the usual ball cap 145 being provided to retain the end of the link in place.

The other end of the link 144 is similarly formed and mounted in the forward arm 148 of a lever (Figs. 5 and 6) fulcrumed at 149 to the frame 50 and having on its rear arm 150 a cam roll engaging a path 152 in a cam block 154 on the shaft 17. The cam acts through the lever 150, 148 and link 144 to push downwardly upon the inclined or offset portion 142 of the lever 120 to cause the lower portion to swing inwardly over the shoe bottom. The rolls 110 are thus caused to engage the upwardly extending margin of the upper at the rear end of the shoe and roll it into engagement with the innersole bottom at the rear end of the heel seat and, in the type of shoe for which the present invention is particularly designed, causing the upper to adhere to the surface of the innersole, the rolls acting yieldingly through the spring 122 upon the stock and being arrested in their overlying movement by the stop 138. When this occurs, further movement of the lever 148 is taken up by the rearward yielding of the yoke 126 against the spring 132 as described.

At the corners and sides of the heel seat the upper is acted upon by independently mounted single rolls 157, 156 (Fig. 7) which are actuated simultaneously in timed relation to the action of the end rolls 110. In the construction shown herein, the machine is organized to cause the rolls 110 to act on the end of the shoe and then withdraw rearwardly to permit operation of the corner rolls. It is recognized, however, as within the invention to arrange the end and corner rolls for operation in other timed relations.

The construction and means for operating one of the side rolls as shown in Fig. 4 will now be described, it being understood that the corner rolls 157 and side rolls 156 are all of similar construction and are operated at the same time by a single operating lever. Each of the side rolls 156 and corner rolls 157 is mounted for rotation between bifurcations of a member 185 having a stem 159 mounted to rock in a block 160 having a spindle 161 extending upwardly through a bore in a depending portion or arm of a lever 162. The spindle 161 is reduced for a portion of its length to accommodate a spring 164 arranged between the shoulder formed by the reduction and the upper portion of the lever arm 163, the reduced portion of the spindle being extended through the lever and provided with nuts 166 by which the spindle is retained in place and the spring 164 maintained under a suitable degree of compression. The lever 162 is fulcrumed at 170 to a lever 172 which embraces an upwardly and outwardly inclined or offset portion 174 of the lever 162 and is formed with a cylindrical portion 173 rotatably mounted in a boss 176 formed on a forwardly ex-
tending U-shaped portion 178 of the frame 56. The reduced portion of yoke 172 extends through the boss 176 and is provided with a nut 182 and washer 183. Between the shoulder formed by the reduction of the portion 173 and the bottom of the hole in the boss is a spring 184. The nut 182 maintains the spring under a suitable degree of tension and the pressure of the washer 183 on the frame produced by the tension of the spring holds the yoke 172 frictionally against free turning movement. The upper portion 174 of the lever 169 has an inclined face 186 in which is a ball socket to receive the spherical end of a link 188, the opposite end of which is similarly mounted in one of the branches 190, 191 (Fig. 6) of the U-shaped end of an arm 192 of an operating lever fulcrummed at 149 on the same shaft as the lever 148, and having an arm 194 (Fig. 6) operated by a cam path in a cam block 196 on the shaft 17. Depression of the forward branches 190, 191 of the lever by the cam 196 causes the corner rolls 157 and the side rolls 156 which are all organized similar to the one described, to move over the shoe bottom, the pressure normal to the shoe bottom being rendered yielding by the springs 164.

Movement of the overlying means or rolls over the shoe bottom is limited by stops 197 having stems adjacentlly held in split clamps on the blocks 160. The stops 197 engage the outer face of the upper portion of the band 30 and limit movement of the overlying means over the shoe bottom. When the stops 197 engage the band further movement of the operating lever 192, 194 is permitted by reason of the yielding connection including the springs 184, which permit outward bodily movement of the yokes 172 and pivots 120 in response to the pressure of the link 188 on the offset 174, the inclined arrangement of the links causing them to exert a component of pressure outwardly axially of the portions 173 and against the springs 184 which will yield to take up the movement of the lever arm 192 including the branches 190, 191 in excess of that required to carry the overlying means over the shoe bottom as far as permitted by the stops 197. It will be observed that the links 188 and offset 174 constitute a toggle in the operating connection for the overlying portions or rolls which toggle is bent to effect movement of the overlying means.

By reference to Fig. 7 it will be observed that the rolls 157 are arranged one at each corner of the heel seat and a series of three rolls 156 at each side of the heel seat and also that the cylindrical portions 173 of the yokes 172 are arranged with their axes extending in directions substantially radially of the curve of the shoe bottom so that the corner and side rolls will move over the shoe bottom with their axes substantially parallel with the portion of the edge of the last adjacent to which they act or parallel with a tangent to the said portion of the edge. The rolls which engage the upper adjacent to the shank of the shoe may, however, be so inclined to the edge of the last as to have a component of movement rearwardly of the shoe to assist in gathering the stock toward the rear of the shoe and cause it to be tightened in the shank portion of the shoe. It will be noted also that the rolls which are located toward the shank of the shoe, in order to clear the shoe when retracted, should have greater total movement than the rolls at the rear end of the shoe. For instance, the corner rolls. This is effected in the construction shown by reason of the fact that the forward ends of the branches 190, 191, which communicate movement to the forward rolls, receive greater movement from the cam than the other portion of those branches from which movement is communicated to the rearward rolls; that is, the movement communicated to the rolls is progressively greater according as their operating links 188 are connected to the lever 192 at greater and greater distances from the pivot 149 of the lever. The rolls 156 and 157 may, with advantage, have the form shown in Fig. 8 where a roll 156 is shown which has its ends corners rounded and its acting face slightly concave. The rounded corners prevent the ends of the roll from digging into the work and the concaved faces enable the rolls to obtain a better bearing against the convex edge of the last as they roll the stock into place.

Although the operation of the several parts of the machine has been given in connection with the description of the mechanism, it will be of advantage in understanding the operation of the machine as a whole and in elucidating certain details, briefly to summarize the operation of the machine.

The jack is swung outwardly and a last having an innersole laid thereon and covered by an upper, is placed upon the pin 26. It will be understood that in rubber work, for which the machine is especially though not exclusively adapted, the inner face of the margin of the upper will be coated with cement and the innersole will be of rubber composition to which the upper will readily adhere when brought in contact therewith. The upper is then positioned on the last so that its back seam is vertical and located at the center of the rear end of the last, and so that a suitable amount of upper material extends above the plane of the innersole. The last and shoe are then swung rearwardly on the jack which is adjusted by turning the sleeve 10 so that the surface of the innersole

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Please note that the text is a continuation of the previous document and the last sentence might not make sense in isolation. The content appears to be a mechanical description, possibly related to machinery or tooling.
will engage the roll 104 which determines its vertical position. The innersole is held upon the last bottom by the operator's fingers and the roll 104 permits free movement of the shoe without tending materially to displace the innersole on the last.

Inward pressure on the shoe causes the band 30 first to press on the rear end of the shoe and then to close against the side of the shoe, thus holding the upper tightly in assembled relation upon the last. Continued pressure on the shoe effects bodily movement of the band to trip the clutch and start the machine. The lever 86 is operated to cause the pawl 94 to engage one of the teeth 98 to lock the shoe against outward movement and to apply additional inward pressure to the shoe through the spring 80. Substantially at the same time the rod 20 is operated to lift the lever 12 through the spring 22 and apply upward pressure to the last to sustain the shoe during the operation of the lasting instrumentalities. Next the lever 145, 160 is operated by its cam to cause the end rolls 110 to move forwardly over the shoe bottom at the rear end of the last and to lay a portion of the upper against the innersole and cause it to adhere thereto. The rolls 110 are then withdrawn or begin to withdraw and the corner rolls 157 and side rolls 156 are caused by operation of the branches 190, 191 of the lever 192, 194 to lay the remaining portions of the upper about the heel seat into firm contact with the innersole and cause them to adhere thereto, the relative timing of the movement of the end and corner rolls being such as to avoid any interference between them. As the rolls approach their limit of inward movement over the shoe bottom the stops 136, 137 engage the upper margin of the band 30 and cause it to press tightly against the shoe additionally to shape the upper to the last. When further movement of the rolls is arrested by the stops the further movement of the operating mechanism is taken up by outward movement of the cylindrical members 128, 173 against the springs 182, 184. The condition of the shoe after the operation of the machine upon it is represented in Fig. 8.

The levers 192 which carry the corner and the side rolls can turn on the cylindrical members 173 to permit relative movement of the rolls in the direction of the last edge in case there should be interference of one roll with another when they reach their inward position over the shoe bottom which may occur in case a small shoe is being treated.

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

1. In a machine of the class described, the combination of shoe supporting means movable lengthwise of the shoe, a series of separate rolls normally out of contact with the shoe and acting substantially in the plane of the heel seat of the sole of a shoe on the supporting means and arranged with their axes substantially parallel with the edge of the last adjacent to which they act, and means for operating the rolls to lay the upper against the heel seat of the sole while the supporting means is at rest.

2. In a machine for assembling a shoe upper and lasting the heel seat thereof, the combination of lasting instrumentalities, and a shoe support arranged for movement lengthwise of the shoe toward and from the lasting instrumentalities, said lasting instrumentalities consisting of rolls arranged to act independently of movement of the work support radially of the heel seat and substantially in the plane of the sole to roll in the upper about the periphery of the heel seat.

3. In a machine for assembling a shoe upper and lasting the heel seat thereof, the combination of lasting instrumentalities, and a shoe support arranged for movement lengthwise of the shoe toward and from operative relation to the lasting instrumentalities, said lasting instrumentalities consisting of rolls arranged to act independently of movement of the work support substantially in the plane of the sole to roll in the upper about the periphery of the heel seat.

4. In a machine of the class described, the combination of lasting instrumentalities, a shoe support movable to carry a shoe into and out of operative relation to said lasting instrumentalities, said instrumentalities comprising a series of rolls arranged about the periphery of the end of the shoe on the support in such close proximity that movement of the rolls inwardly of the shoe will effect treatment of substantially all portions of the upper margin and cause them to be laid into intimate contact with the innersole, and power means for actuating the rolls in different time relation to do their work while the shoe remains at rest.

5. In a machine of the class described, the combination of lasting instrumentalities, a shoe support movable to carry a shoe into and out of operative relation to said lasting instrumentalities, said instrumentalities comprising a series of rolls arranged about the periphery of the end of the shoe on the support in such close proximity that movement of the rolls inwardly of the shoe will effect treatment of substantially all portions of the upper margin and cause them to be laid into intimate contact with the innersole, and means for actuating the rolls relatively to the work support and independently thereof to do their work.

6. In a machine for assembling upon a last a shoe upper and for laying over the up-
standing margin of the upper upon the shoe
bottom, the combination of a shoe support
arranged for movement lengthwise of the
shoe supported thereon to carry the shoe
into and out of position to be operated upon,
means acting during movement of the shoe
into position to be operated upon for press-
ing the upper into conformity to the contour
of the last about the rear end of the last, and
rolls acting to roll the upstanding margin
of the upper against the shoe bottom while
the upper is held about the rear of the last
in conformity to the last.

7. In a machine for assembling a shoe up-
per and lasting the heel seat thereof, the
combination of lasting instrumentalities, a
shoe support arranged for movement length-
wise of the shoe to carry the shoe toward and
from operative relation to the lasting in-
strumentalities, said lasting instrumentalities
consisting of end rolls and corner rolls, and
means for causing the end rolls to operate
at one time in the cycle and the corner
rolls to operate at another time in the same
cycle.

8. In a machine for lasting the heel seat of
a shoe, the combination of lasting instrumentalities, a shoe support arranged for
movement lengthwise of the shoe to carry
the shoe toward and from the lasting instru-
mentalities, said instrumentalities consisting of a set of end rolls and a set of corner rolls,
means for effecting operation of one set of
rolls to overlay the upper upon the shoe bot-
tom, and means acting subsequently for op-
erating the other set of rolls to overlay the
upper.

9. In a machine for lasting the heel seat of
a shoe, the combination of lasting instrumentalities, a shoe support arranged for
movement lengthwise of the shoe to carry
the shoe toward and from the lasting instru-
mentalities, said instrumentalities consisting of a set of end rolls and a set of corner rolls, means for operating one set of rolls to overlay the upper upon the shoe bottom and withdrawing the rolls from position over the shoe bottom, and means for thereafter operating the other set of rolls to do its work.

10. In a machine for assembling a shoe
upper and lasting the heel seat thereof, the
combination of lasting instrumentalities, a
shoe support arranged for movement length-
wise of the shoe to carry the shoe toward
and from the lasting instrumentalities, said
lasting instrumentalities comprising a set of
d end rolls and a set of corner rolls, and
means for withdrawing from operative posi-
tion the end rolls prior to the operation of
the corner rolls.

11. In a machine for lasting the heel seat
of a shoe, the combination of lasting instru-
mentalities, a shoe support arranged for
movement lengthwise of the shoe to carry
the shoe toward and from the lasting instru-
mentalities, said lasting instrumentalities
comprising end rolls and corner rolls, means
for operating the end rolls to overlay the
upper upon the shoe bottom, and means
for thereafter operating the corner rolls.

12. In a machine for lasting the heel seat
of a shoe, the combination of lasting instru-
mentalities, a shoe support arranged for
movement lengthwise of the shoe to carry
the shoe toward and from operative relation
to the lasting instrumentalities, said instru-
mentalities consisting of a set of end rolls,
a set of corner rolls and a set of side rolls,
and means to effect operation of one set of
rolls at a different time in the cycle from
that in which the other sets are operated.

13. In a machine for lasting the heel seat
of a shoe, the combination of lasting instru-
mentalities, a shoe support arranged for
movement lengthwise of the shoe to carry
the shoe toward and from operative relation
to the lasting instrumentalities, said instru-
mentalities consisting of a set of end rolls,
and a set of side rolls, the machine being
organized to effect operation of one set at
one time in the cycle and the other set at
another time in the cycle.

14. In a machine for assembling a shoe
upper and lasting the heel seat thereof, the
combination of lasting instrumentalities, a
shoe support arranged for movement length-
wise of the shoe to carry the shoe toward
and from operative relation to the lasting instru-
mentalities, said lasting instrumentalities
consisting of end rolls and corner rolls, and
means for causing the end rolls to operate
and withdraw and then causing the corner
rolls to operate.

15. In a machine for assembling a shoe
upper and lasting the heel seat thereof, the
combination of lasting instrumentalities, a
shoe support arranged for movement length-
wise of the shoe to carry the shoe toward
and from operative relation to the lasting instru-
mentalities, said lasting instrumentalities
comprising a set of end rolls and a set of corner rolls, and
means for withdrawing the end rolls rear-
wardly of the shoe prior to the operation of
the corner rolls.

16. In a machine for assembling a shoe
upper and lasting the heel seat thereof, the
combination of means for holding an upper in
assembled relation upon a last, lasting instru-
mentalities, a shoe support arranged for
movement lengthwise of the shoe toward and
from operative relation to the lasting instru-
mentalities, said lasting instrumentalities
comprising end rolls and corner rolls, means
for operating the end rolls to overlay the
assembled upper upon the shoe bottom, and
means for thereafter operating the corner
rolls to last the end of the heel seat.

17. In a machine for assembling a shoe
upper and lasting the heel seat thereof, the
combination of means for holding an upper
in assembled relation upon a last, lasting instrumentalities, a shoe support arranged for movement lengthwise of the shoe toward and from operative relation to the lasting instrumentalities, said instrumentalities consisting of a set of end rolls, a set of corner rolls and a set of side rolls, and operating means for the rolls organized to effect operation of one set of rolls at a different time in the cycle from that in which the other sets are operated.

18. In a machine for assembling a shoe support for movement lengthwise of the shoe toward and from the machine, and a shoe support arranged for movement lengthwise of the shoe toward and from the machine, a bend for holding the upper in assembled relation upon a last presented to it on the support, lasting means consisting of a set of end rolls, a set of corner rolls, and a set of side rolls, the machine being organized to effect operation of one set of rolls over the heel seat and then the other sets of rolls over the heel seat.

19. In a machine of the class described, a series of separate means arranged about the end of a shoe for movement over the shoe bottom and each arranged to lay into lasted position a portion of the shoe upper, a common actuating lever for all of said overlapping means, on an axis located above the shoe bottom and extending transversely thereof and normally tensioned springs permitting each overlapping means to yield independently of the other overlapping means in a direction normal to the shoe bottom, after a predetermined pressure has been applied by the overlapping means to the overlaid upper.

20. In a machine of the class described, a series of separate means arranged about the end of a shoe for movement over the shoe bottom and each arranged to lay into lasted position a portion of the shoe upper, common actuating means for said overlapping means, yielding means permitting each overlapping means to be arrested by the work while movement of the common actuating means continues, and a stop on each overlapping means arranged to limit the action of each overlapping means after it has moved a predetermined distance over the shoe bottom.

21. A machine of the class described having, in combination, a shoe support movable into and out of operative relation to the machine, a series of rolls arranged about the periphery of the end of a shoe on the support and mounted to swing inwardly over the shoe bottom to lay the upper portion of the shoe upper into contact with the shoe bottom, and power means arranged to be set in operation by manual movement of the shoe on the support into operative position, for causing swinging movement of the rolls to do their work.

22. In a machine of the class described, the combination of a roll for laying the upper over the last bottom at the end of the shoe, separate means acting later in the cycle for laying the remainder of the upper margin at the end of the shoe over the last bottom, and a shoe support movable to carry the shoe into and out of operative relation to said roll and overlapping means.

23. In a machine of the class described, the combination of operating means organized to perform its cycle and stop, shoe supporting means, a roll operated first to lay the upper over the last bottom at the end of the heel seat, separate means operated later in the cycle for laying the remainder of the upper margin about the heel seat over the last bottom, and means for withdrawing both the roll and the overlapping means before the machine stops.

24. In a machine for laying the upper margin of an upper into contact with the heel seat of a shoe, the combination of a shoe support movable to carry a shoe into and out of operative position, a series of carriers pivoted above the bottom of the shoe carried by the support when in operative position, a roll on each of said carriers, and a common actuator for said carriers to move the rolls over the last bottom to force the upper perpendicularly to the shoe bottom into intimate contact with the undersole.

25. A machine of the class described having, in combination, a shoe support, a series of rolls arranged about the periphery of the heel end of a shoe on the support and mounted to swing inwardly over the shoe bottom to lay the upper margin of the upper into contact with the shoe bottom, the rolls adjacent to the shank of the shoe having a movement in the direction of the heel end of the shoe as they swing in, and means for causing swinging movement of the rolls to do their work.

26. A machine of the class described having, in combination, a shoe support, a series of rolls arranged about the periphery of the heel end of a shoe on the support and mounted to swing inwardly over the shoe bottom to lay the upper margin of the upper into contact with the shoe bottom, and means for effecting swinging movement of the rolls arranged to cause progressively greater movement of the rolls relatively to the shoe toward the shank of the shoe.

27. A machine of the class described having, in combination, a shoe support, a series of rolls arranged about the periphery of the heel end of a shoe on the support and mounted to move inwardly over the shoe bottom to lay the upper margin of the upper into contact with the heel seat, and means for effecting movement of the rolls arranged to cause greater movement of the
rolls which are located adjacent to the shank of the shoe than of the rolls located rearward of said rolls.

29. In a machine for laying the upstanding margin of an upper into contact with the heel seat of a shoe, the combination of a shoe support movable into and out of operative position, a series of carriers pivoted above the bottom of the shoe carried by the support when in operative position, a roll on each of said carriers, a common actuator for said carriers, and connections comprising a bent toggle between the carriers and the actuator which is further bent by the actuators to move the rolls over the last bottom to wipe the upper into intimate contact with the innersole.

30. In a machine of the class described having, in combination, a shoe support, an arm pivoted a substantial distance above the shoe support, means on the lower end of said arm arranged to engage the margin of a shoe upper on the support and lay it over the shoe bottom when the arm is moved on its pivot, an operating lever, and toggle connections between said arm and lever to swing the arm when the lever is operated.

31. In a machine of the class described, the combination of means for laying an upper over a last, a work support movable toward and from operative relation to the overlaying means, a rack-bar including a yielding element connected to the work support, a power operated lever, a pawl on the lever arranged to engage the rack-bar, and means for normally holding the pawl out of engagement with the rack-bar and allowing the pawl to engage the rack when the lever is moved.

32. In a machine for lasting the heel seat of a shoe, the combination of lasting instrumentalities consisting of a set of end rolls and a set of corner rolls, means for operating one set of rolls to lay the upper over upon the shoe bottom and for withdrawing the rolls from position over the shoe bottom in the plane of their overlying movement, and means for thereafter operating the other set of rolls to do its work.

33. In a machine of the class described, the combination of a series of separate lasting members arranged adjacent to each other about the periphery of the heel end of a shoe and for movement radially of the heel seat, said lasting members being constructed and arranged to yield to pressure tending to force the innersole and upper inwardly and to apply substantial pressure perpendicularly to the innersole to lay all portions of the upper margin into contact with the innersole, and power means for operating said separate members independently of movement of the shoe.

34. In a machine of the class described, the combination of a series of separate lasting members arranged adjacent to each other along each side of the heel end of a shoe to lay the side portions of the upper margin into contact with the innersole and for movement radially of the corner and shank curves of the heel seat, and a single power operated lever for causing said separate members to operate upon the shoe.

35. In a machine of the class described, the combination of power mechanism for working the margin of an upper into last position about the periphery of the heel seat of a shoe, a work support movable horizontally to carry the work toward and from lasting position, and means for causing the last passing mechanism to operate automatically when the shoe on the support reaches lasting position.

36. In a machine of the class described, the combination of power operated end lasting mechanism for working the margin of an upper into last position about the periphery of the heel seat of a shoe, a work support movable to carry the work toward and from lasting position, and means for automatically setting into operation the lasting means when the shoe on the support has reached and come to rest in lasting position.

37. In a machine for assembling upon a last a shoe upper and for laying over the upstanding margin of the upper upon the shoe bottom, the combination of means acting during movement of the shoe into position to be operated upon for pressing the upper into conformity to the contour of the last about the rear end of the last, and rolls acting to roll the upstanding margin of the upper against the shoe bottom while the upper is held about the rear of the last in conformity to the last.

38. In a machine for assembling upon a last a shoe upper and for laying over the upstanding margin of the upper upon the shoe bottom, the combination of means acting during movement of the shoe to be operated upon for pressing the upper into conformity to the contour of the last about the rear end thereof, rolls arranged to be moved substantially perpendicularly to various portions of the periph-
ery of the last edge substantially in the plane of the last bottom to lay the upper upon the innersole, and means responsive to pressure of the shoe into said conforming means for causing the described movement of the rolls to be effected.

39. In a machine of the class described, means for laying the margin of a shoe upon the upper material by means of the shoe supported thereon into and out of position to be operated upon, conforming means acting during movement of the shoe to be operated upon for pressing the upper into conformity with the contour of the last about the rear end thereof, rolls arranged to be moved substantially perpendicularly to various portions of the periphery of the last edge and substantially in the plane of the last bottom to lay the upper upon the innersole, and means responsive to pressure of the shoe into said conforming means for causing the described movement of the rolls to be effected.

40. In a machine of the class described, means for laying the margin of a shoe upper in lasted position about the periphery of the end of the shoe, a band for embracing the end of the shoe and arranged to be closed upon the shoe by pressure of the shoe into the band to hold the upper material in conformity to the last, means becoming effective upon pressure of the shoe into the band during the operation of the overlaying means.

44. A machine of the class described having, in combination, shoe end embracing means operating to clamp the shoe by endwise movement of the shoe into said embracing means and arranged for bodily movement endwise of the shoe after its clamping action has been effected, means for laying over upon the shoe sole the upper material of the upper about the shoe end, and operating means for said overlaying means constructed and arranged to be set in operation by said bodily movement of the end embracing means.

45. A machine of the class described having, in combination, shoe end embracing means operating to clamp the shoe by endwise movement of the shoe into said embracing means and arranged for bodily movement by pressure of the shoe, means constructed and arranged for to lay the upper edge upon the shoe bottom, and means responsive to said bodily movement of the embracing means to cause the overlaying means to operate.

46. In a machine of the class described, a shoe support, a series of rolls arranged about the periphery of the heel end of a shoe on the support and arranged for movement over the shoe bottom, and means for moving the rolls organized to give a greater movement to the rolls adjacent to the shoe shank than to the rolls disposed toward the end of the shoe.

47. In a machine of the class described, the combination of shoe supporting means, a series of separate rolls acting substantially in the plane of the bottom of the heel end of the sole of the shoe and arranged with their axes substantially parallel with the edge of the last adjacent to which they act, the rolls adjacent to the shoe shank being arranged to have a movement in the direction of the heel end of the shoe, and means for operating the rolls to lay the upper against the bottom of the sole.

48. In a machine of the class described, a shoe support, a series of rolls arranged about the periphery of the heel end of a shoe on the support and arranged for movement over the shoe bottom, and means for moving the rolls organized to give a greater movement to the rolls adjacent to the shoe shank than to the rolls disposed toward the end of the shoe and to direct said movement toward the said end of the shoe.

49. In a machine for assembling a shoe upper and lasting the heel seat thereof, the combination of means for holding an upper in assembled relation upon a last, a shoe support arranged for movement lengthwise of the shoe toward and from said holding means, and lasting means including a set of
end rolls and a set of corner rolls, means for effecting operation of one set of rolls to overlay the upper upon the shoe bottom, and means acting subsequently for operating the other set of rolls to overlay the upper.

50. In a machine for assembling a shoe upper and lasting the heel seat thereof, the combination of means for holding an upper in assembled relation about the heel end of the shoe, a shoe support arranged for movement lengthwise of the shoe toward and from said holding means, and lasting means including a set of end rolls and a set of corner rolls, and means organized first to operate one set of rolls to lay the upper over upon the shoe bottom and to withdraw the rolls from position on the shoe bottom and then to operate the other set of rolls to do its work.

51. A machine of the class described having, in combination, means for overlaying a shoe upper against the bottom of the shoe about the periphery of the heel seat, a shoe support movable to position the supported shoe with its heel end in co-operative relation to said overlaying means, and power means for operating the overlaying means rendered effective as an incident to the presentation of the shoe on the support in co-operative relation to the overlaying means.

52. A machine of the class described having, in combination, means for overlaying a shoe upper against the bottom of the shoe about the periphery of the heel seat, a shoe support movable to position the supported shoe with its heel end in co-operative relation to said overlaying means, and power means for operating the overlaying means rendered effective by rearward pressure of the shoe on the support to bring the shoe into co-operative relation to the overlaying means.

53. A machine of the class described having, in combination, shoe end embracing means organized to hold the shoe upper in assembled relation upon the last upon endwise movement of the last into said embracing means, means for laying over upon the shoe sole the upstanding margin of the upper above the shoe end, and operating means for said overlaying means constructed and arranged to be set in operation by endwise pressure of the last into the end embracing means.

54. A machine of the class described having, in combination, shoe end embracing means operating to clamp the shoe by endwise pressure of the shoe into said embracing means, means constructed and arranged for power operation to lay the upper over upon the shoe bottom, and means responsive to increased endwise pressure of the shoe into the embracing means to cause the overlaying means to operate.

55. A machine of the class described having, in combination, separately mounted rolls arranged about the perimeter of the heel seat of a shoe arranged for movement over the shoe bottom substantially in the plane thereof, a shoe support movable manually to position the supported shoe in co-operative relation to the rolls, and means becoming operative as an incident to said positioning of the shoe to actuate the rolls to lay the margin of the upper into contact with the shoe bottom.

56. A machine of the class described having, in combination, separately mounted rolls arranged about the periphery of the heel seat of a shoe arranged for movement over the shoe bottom substantially in the plane thereof, a shoe support movable manually to position the supported shoe in co-operative relation to the rolls, means for holding the upper in close conformity to the rear end of the shoe when so positioned, and means becoming operative as an incident to pressure of the shoe into said holding and conforming means to actuate the rolls to lay the margin of the upper into contact with the shoe bottom.

57. In a machine of the class described, the combination of a shoe support, lasting instrumentalties comprising a series of rolls arranged about the periphery of the end of the shoe on the support, a series of separate carriers for the rolls pivoted a substantial distance above the shoe support to permit movement of the rolls inwardly of the shoe substantially in the plane of the shoe bottom to lay the upper in lasted position, means permitting bodily yielding movement of the pivot of each carrier outwardly of the shoe, and positively actuated means for swinging the carriers to cause the rolls to do their work and having a component of its force directed in a sense tending to effect bodily movement of said pivots.

58. A machine of the class described having, in combination, a shoe support, upper overlaying means pivoted a substantial distance above the shoe support to swing inwardly over the shoe bottom, means for limiting overlaying movement of the overlaying means, power means for actuating the overlaying means, and means permitting bodily movement of the pivot of the overlaying means to allow continued movement of the power means when the overlaying means reaches the limit of its movement.

59. A machine of the class described having, in combination, a shoe support, an arm pivoted above the shoe bottom and having an offset portion to which pressure may be applied to swing the arm, overlaying means on the lower end of the arm active when the arm is swung to lay a portion of the upper against the shoe bottom, and a lever arranged to apply pressure to the offset portion to swing the arm.
60. A machine of the class described having, in combination, a shoe support, an arm pivoted above the shoe bottom and having an offset portion to which pressure may be applied to swing the arm, overlaying means on the lower end of the arm active when the arm is swung to lay a portion of the upper against the shoe bottom, means for limiting overlaying movement of the overlaying means, means for applying pressure to said offset portion to swing the arm and having a component of pressure tending to move the arm pivot outwardly of the shoe, and a yielding mounting for said pivot.

61. A machine of the class described having, in combination, a shoe support, an arm pivoted a substantial distance above the shoe support, means on the lower end of said arm arranged to engage the margin of a shoe upper on the support and lay it over the shoe bottom when the arm is moved on its pivot, an operating lever, and connections comprising a lateral projection from said arm and a thrust link between the operating lever and the projection to effect operation of the arm from the lever.

62. A machine of the class described having, in combination, a shoe support, an arm pivoted a substantial distance above the shoe support, means on the lower end of said arm arranged to engage the margin of a shoe on the support and lay it over the shoe bottom when the arm is moved on its pivot, the said arm having a lateral projection to which pressure is applied to swing the arm, means for applying pressure to said projection in an angular direction so that one component of the pressure tends to swing the arm and another component tends to displace the pivot of the arm, and a yielding mounting for the pivot to allow bodily movement thereof outwardly of the shoe when swinging movement of the arm is arrested.

63. A machine of the class described having, in combination, a shoe support, an arm pivoted above the shoe bottom and having an offset portion to which pressure may be applied to swing the arm, overlaying means on the lower end of the arm acting when the arm is swung to lay a portion of the upper against the shoe bottom, means for imparting a yielding quality to the action of said overlaying means, and a lever arranged to apply pressure to said offset portion to swing the arm and cause the upper to be laid against the shoe bottom.

64. In a machine of the class described, the combination of a series of separately mounted overlaying means arranged along the side of an end portion of a shoe for movement inwardly of the shoe to lay the margin of the upper against the bottom of the shoe, and power actuating means for the series arranged to effect progressively greater movement of the members of the series.

65. In a machine of the class described, the combination of a series of separately mounted overlaying means arranged along each side of the end portion of a shoe and arranged for movement over the shoe bottom to lay the margin of the upper against the shoe bottom, and power operated common actuating means for both series arranged to effect progressively greater overlaying movement of the members of each series, the movement increasing from the end of the shoe toward the Shank.

66. A lasting machine having, in combination, a shoe support, end lasting mechanism, means for moving the support endwise of the shoe, and a bottom rest to press the sole against the last and constructed and arranged to permit free movement of the shoe endwise in contact with the rest.

67. A lasting machine having, in combination, a shoe support, end lasting mechanism, means for moving the support endwise of the shoe, and a rest having a roll for engaging the innersole to permit movement of the shoe endwise and avoid a drag on the innersole in consequence of such endwise movement.

68. In a machine of the class described, the combination of a shoe support, a series of arms pivoted above the shoe support and having their lower ends disposed about the periphery of an end of the shoe, upper overlaying means on the ends of the arms, means for operating the arms simultaneously to overlay the upper, and means permitting lateral yielding of the arms in case the overlaying means engage each other in their overlaying movement.

69. In a machine of the class described, the combination of a shoe support, a series of arms pivoted above the shoe support to permit movement of their lower ends radially of the end of a shoe on the support, separate pivots for the arms permitting relative yielding movement of the arms laterally of their path of movement over the shoe bottom, upper overlaying means on the ends of the arms, and means for swinging the arms in said radial direction to cause the upper to be overlaid upon the shoe bottom.

70. In a machine for lasting the ends of shoes, the combination of lasting instrumentalties comprising an end roll and corner rolls, means for moving the end roll inwardly over the shoe and for then moving it in the reverse direction to withdraw it from engagement with the shoe, and means for moving the corner rolls inwardly over the shoe after the end roll has been withdrawn from its innermost position.

71. In a machine for lasting the ends of shoes, the combination of lasting instrumen-
talities comprising rolls movable over the shoe bottom in converging paths, means for operating one of the rolls to overlay the upper and for then withdrawing it in the plane of its overlaying movement from engagement with the shoe bottom, and means for operating the other roll to overlay the upper in retarded time relation to the overlaying movement of the first roll.

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

WILLIAM G. CHENEY.

Witness:

O. STANLEY TROOP.