

(No Model.)

3 Sheets—Sheet 1.

G. C. MOORE.

MACHINE FOR MAKING SHOES OR COVERS FOR PNEUMATIC TIRES.

No. 518,112.

Patented Apr. 10, 1894.

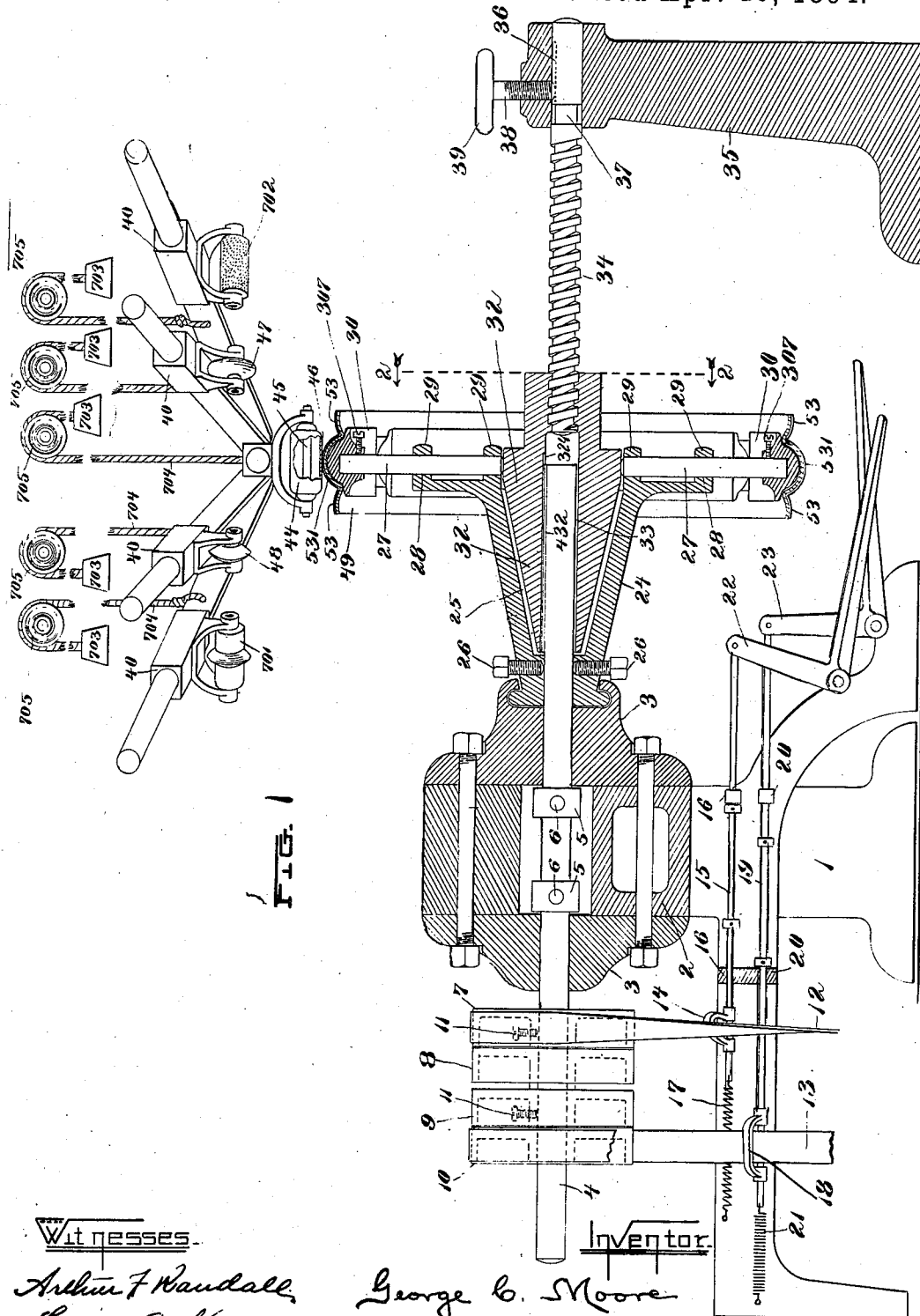


FIG. 1

Witnesses.

Arthur F. Randall,
Lizzie R. Kemp

Inventor.

George C. Moore
by Mackay Calver & Randall
his Attorneys.

(No Model.)

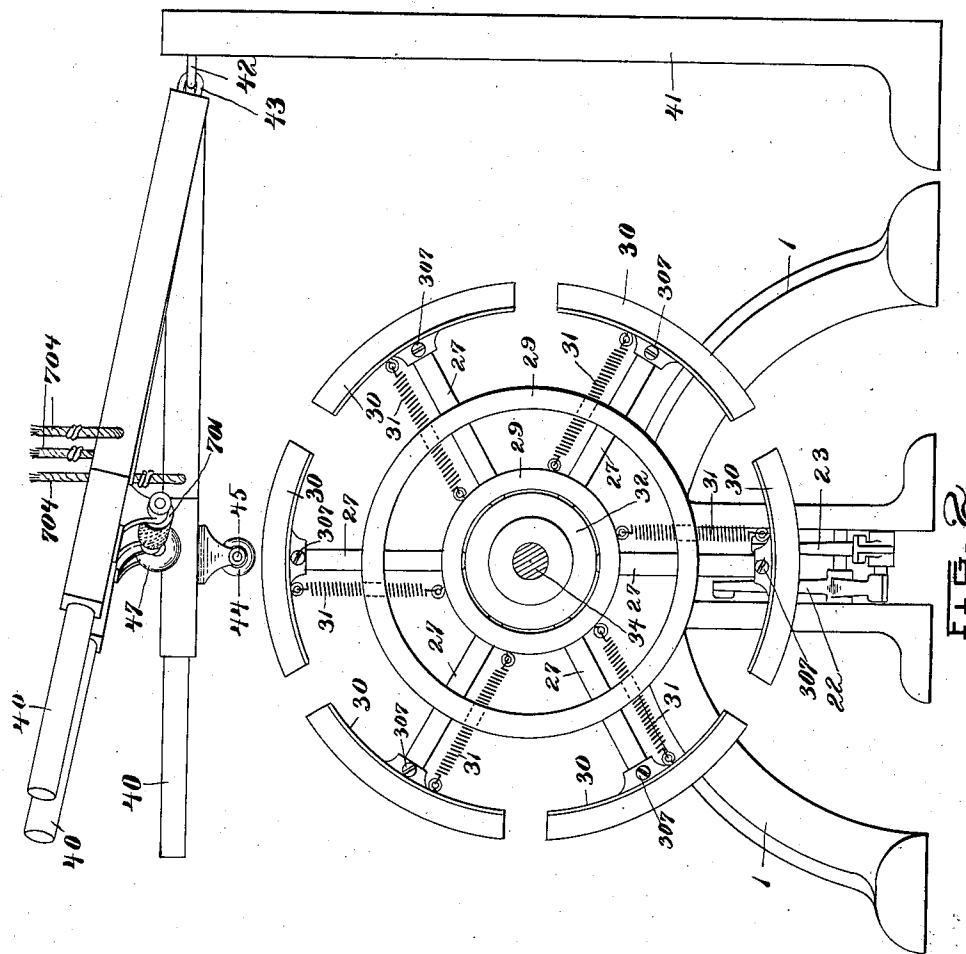
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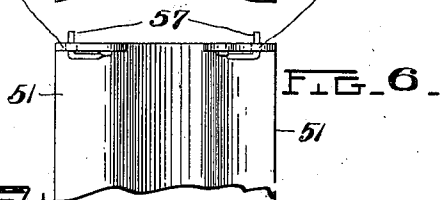
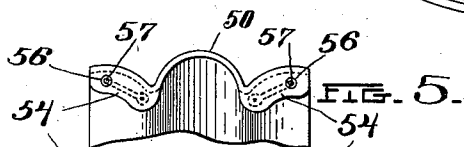
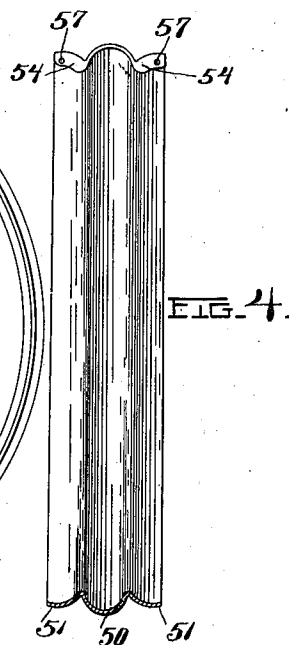
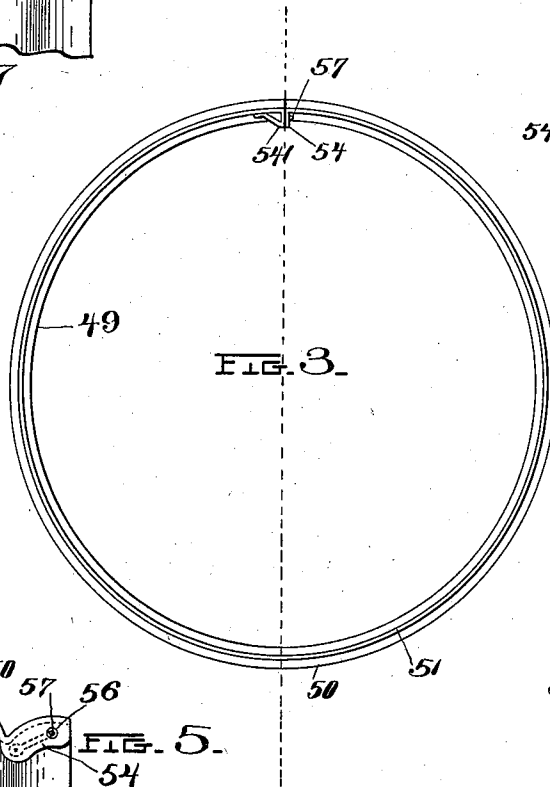
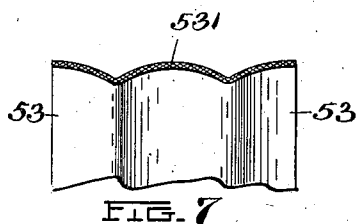
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Witnesses.

Arthur F. Randall
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UNITED STATES PATENT OFFICE.

GEORGE C. MOORE, OF EASTHAMPTON, MASSACHUSETTS.

MACHINE FOR MAKING SHOES OR COVERS FOR PNEUMATIC TIRES.

SPECIFICATION forming part of Letters Patent No. 518,112, dated April 10, 1894

Application filed December 5, 1893. Serial No. 492,828. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. MOORE, a citizen of the United States, residing at Easthampton, in the county of Hampshire and State of Massachusetts, have invented certain new and useful Improvements in Machines for Making Shoes or Covers for Pneumatic Tires, of which the following is a specification, reference being had therein to the accompanying drawings.

The object of my invention is to provide a machine on which the shoes or covers of the pneumatic tires used on the wheels of bicycles, &c., may be conveniently and expeditiously manufactured.

The invention consists in certain novel features of construction and combination, and will first be described with reference to the accompanying drawings, after which the features thereof will be particularly pointed out and distinctively defined in the claims at the close of this specification.

The accompanying drawings show the best form of my machine which I have yet devised, but it is to be understood that various changes may be made therein without departure from the spirit of my invention.

In the drawings, Figure 1 is a view of my machine mainly in central longitudinal section. Fig. 2 is a view in vertical section on line 2—2 Fig. 1, looking toward the left in the latter figure, the shell being removed from the expanding former. Fig. 3 is a view in side elevation of the shell. Fig. 4 is a view of the shell in vertical section on line 4—4 Fig. 3, looking toward the left in the latter figure. Figs. 5 and 6 are views showing details of the shell. Fig. 7 is a view indicating the character of the lining fabric that I may use.

The illustrated form of my machine is constructed as follows:

At 1 is the frame supporting the main part of the said machine. The said frame has an upwardly extending portion 2 to the opposite sides of which are bolted boxes 3, 3, which are formed or provided with bearings for the horizontal shaft 4. On this shaft 4 between the boxes 3, 3, there are mounted collars 5, 5, which are secured in place on the shaft by clamping screws 6, 6, and serve by rotating in contact with the inner faces of the boxes

3, 3, to prevent movement of the shaft lengthwise in either direction. Any other approved means of preventing endwise movement of the shaft may be employed, if desired. On one end of the said shaft are mounted four band pulleys 7, 8, 9, 10, two of which, namely those marked 8 and 10 are loose upon the shaft, and free to turn thereon, while the remaining two pulleys, namely those marked 7 and 9 are fast on the said shaft, being secured thereto by clamping screws 11, or any other suitable means. To these pulleys are applied the driving bands 12 and 13, the band 12 being crossed, while the band 13 is straight or uncrossed. The crossed band passes through a loop 14 on the sliding shipper bar 15, which is supported and moves in guides 16, 16 on the frame work, and is held normally in the position which retains the said crossed band on the loose or idle pulley 8 by means of a spring 17, one end of which is connected with the said shipper bar, while the other end thereof is connected with the said frame work. The straight or uncrossed band 13 passes through a loop 18 on the second shipper bar 19, which is mounted in guides 20, 20, on the said frame work with capacity to move endwise therethrough, said shipper bar being normally held in position to retain the said straight or uncrossed band on the loose or idle pulley 10 by means of the spring 21 having one end thereof connected with the said shipper bar 19 and the other end thereof connected with the frame-work. The shipper bar 15 is connected with or engaged by a treadle or foot operated lever 22, and the shipper bar 19 is in like manner connected with or engaged by a second treadle or foot lever 23. By the pressure of the foot of the operator upon either of these treadles or foot levers, the corresponding shipper bar may be drawn endwise in opposition to the action of the spring connected thereto to shift the driving band which is controlled thereby from the loose or idle pulley around which it passes normally, onto the adjacent fast pulley, in order thereby to occasion the turning of the shaft 4 in the desired direction. To the end of the shaft 4 opposite that on which the band pulleys aforesaid are mounted is applied the head or hub 24. The said head or hub has a tapering chamber 25 formed therein and extending throughout substantially the length

of the head or hub, and is fixed or secured at its inner end to the shaft 4, as by means of clamping screws 26, 26, passing through the said inner end and taking bearing by their points against the surface of the shaft 4. The end of the shaft 4 projects to the outer end of the head or hub 24, and on the disk at the outer end of the said head or hub radial squared arms 27, 27 are mounted to slide toward and from the center of the said head or hub in guides formed on or applied to the latter. I have shown the said guides constituted by holes 28, 28, formed in two rings or flanges 29, 29 on the said disk. The said arms 27, 27 have applied to their outer ends segments 30, 30, sockets on the segments receiving the outer ends of the said arms, and the segments and arms being adjustably clamped together by means of screws 307, as shown; and the arms and segments are drawn toward the center of the head or hub, and of the shaft, by means of springs 31, 31 which are connected at their outer ends to either the segments as shown, or to the arms, and at their inner ends are connected to some fixed part of the head or hub. The segments 30, 30 together constitute an expansible ring-shaped former, and the action of the springs is to draw the parts toward the center and contract it into the smallest dimensions.

At 32 is shown a tapering or cone-shaped block fitted to pass into the interior of the head or hub 24, the said block or cone having a central opening or hole 33 therethrough which, throughout at least the greater portion of its length, is of dimensions suitable to receive the end of the shaft 4, onto which the said block or cone is intended to be passed. When the said block or cone is passed into the interior of the head or hub the inner ends of the arms will be held in contact with the outer surface thereof by means of the springs 31, 31. Said block or cone constitutes an expander, and is intended to be moved gradually into the hub so as to force the arms and segments outwardly to increase the diameter and circumference of the expansible former, or be withdrawn so as to permit said arms and segments to be moved inward toward the center under the action of the springs 31, 31, in a manner to contract the diameter and circumference of the said expansible former. At its outer end the hole or passage 33 through the block or cone is threaded to fit the screw or threaded rod 34. The said screw or threaded rod is held by one end thereof, which is not threaded, in a stand 35 which is provided with a bearing for the reception of the said end. In the said end there is formed a longitudinal groove 36, and, also, at the inner end of the said longitudinal groove, an annular groove 37, with which the said longitudinal groove 36 communicates. A clamping screw 38 having a hand-wheel 39, or suitable handle, at its outer end is fitted to a threaded hole in the said stand, and its inner end enters the annular groove 37 and longi-

tudinal groove 36 as desired, and as will presently be explained.

At 40, 40 are levers, which, at their inner ends are loosely mounted or joined to an elevated support. The said support 41 has projecting therefrom a staple or half-ring 42 and each of the levers 40 has projecting from its rear end an eye 43 which is fitted onto the said staple. The described mode of connecting the levers with their support enables the said levers to be moved freely up and down as required, and to be slid laterally as may be desired in order to bring the required one thereof over the working point on the expansible former. A series of rollers or other implements is mounted on the said levers, one roller or the like to each lever, they being employed in the operations by which a tire is produced. The roller marked 44 is composed of a central shaft 45 and has an airtight cylindrical casing 46 surrounding the said shaft except at the ends thereof, the said casing being filled with air and constituting what may be termed a pneumatic roll. The roller marked 47 is of wood, while the thin or disk-like roller 48 is of metal.

At 49, see Fig. 3, is shown a shell constituted by a ring of sheet metal which is severed or split at one point. This shell is intended to have the lining applied thereto, and is shaped properly in cross section. The shell shown in the drawings has an intermediate or middle curved portion or body which, in cross section, may be made as part of a circle, and on each side thereof there is a curved wing 51. The shell is shown made of this shape in cross section in order to conform to the special form of lining fabric which is represented in the drawings, although it may be of any other desired and approved shape. The said illustrated lining fabric is woven with the middle or body part 53 and the wings 53, 53 on opposite sides thereof. At the meeting ends of the shell the said wings 51, 51, thereof are formed with inwardly extending projections 54, 54. These projections 54, 54, are perforated as at 56. To the projections marked 54 are applied catches 57, each consisting of a piece of spring wire, which is secured at one end to the lateral face of the corresponding projection, and has the other end bent to form a pin, which projects through the hole in the said projection, and is intended to pass into the similar hole in the opposite projection when the two projections are brought into the position which is shown in Fig. 3.

In making a shoe or cover for a pneumatic tire, I first take the shell and place it on the expanding former constituted by the segments. Prior to thus applying the shell to the expanding former, the latter has been caused to contract to its smallest dimensions by effecting, in a manner which will be made to appear more clearly hereinafter, the withdrawal of the expanding device constituted by the block or cone. When thus applied,

the ends of the shell overlap each other to some extent. A piece of lining fabric or material having been made into the form of an endless ring by means of cement or sewing is then put on the shell. Next, the screw or threaded rod and cone are advanced together by hand, or otherwise, as may be provided for, until the forward or small end of the cone has passed over the proximate end of the shaft, and the groove 324 in the interior of the cone has received the spline 432 on the said shaft. To permit the parts thus to be advanced, the clamping screw must first be turned slightly so as to relieve its pressure upon the screw or threaded rod 34 and leave the latter free to be moved endwise through the bearing provided therefor. As the said screw or threaded rod is thus moved the end of the clamping screw enters the longitudinal groove 36, and while the said end remains in the said longitudinal groove the screw or threaded rod is held from rotating, although remaining free to move endwise. The forward end of the expander cone having been introduced within the series of radial arms and engaged with the end of the shaft, the said clamping screw is turned to cause its inner end to bear with slight pressure against the bottom of the longitudinal groove in the screw or threaded rod in order to hold the latter from moving endwise until the force tending to occasion such movement exceeds the holding power of the screw. So long as the inner end of the said screw remains in the said longitudinal groove the screw or threaded rod will be prevented from rotating. By pressure of the foot applied to the treadle or lever 22 the shipper 15 is moved in a direction to shift the crossed belt onto the fast pulley 7. This causes the shaft 4 to be revolved in one direction, it carrying around with it not only the head or hub, and the expanding former carried thereby, but the expander cone. As the latter rotates in unison with the shaft and turns upon the non-rotating screw or threaded rod, its engagement with the thread of the latter causes the expander cone to be moved endwise into the chamber 25 of the head or hub 24, its tapering exterior acting to force outward gradually the arms 27 and the segments, thereby expanding the expansible former and the shell which surrounds the latter so as to stretch tightly the endless ring of lining material or fabric which has been applied to the said shell. When the advancing end of the expander cone comes into contact with the stop constituted by the inner end of the chamber within the head or hub its forward movement is brought to an end, the expansion of the former and parts applied thereto having been effected to the desired extent, and thereafter, inasmuch as the cone cannot advance, it presses rearwardly the screw or threaded rod 34, overcoming the friction of the clamping screw, the inner end of the clamping screw sliding in the longitudinal groove until the annular groove is presented

to the inner end of the said clamping screw. When the said annular groove comes opposite to the clamping screw the screw or threaded rod becomes free to rotate in unison with the other parts and its endwise movement terminates, although the rotation is kept up at a high rate of speed during the performance of the operations which now are proceeded with. As the former expands, the overlapping ends of the shell slide upon each other until the expansion is completed, whereupon the said ends abut, the projections 54, 541, resting against each other as indicated in Fig. 3. When in this position the spring-catches 57, 57, which are now permitted to pass through the holes 56 in all of the said projections, serve to prevent the ends of the shell from slipping or moving sidewise on each other. While the parts continue to rotate, the cement is applied to the surface of the lining material or fabric and distributed uniformly by means of the roll 701, a suitable scraping knife being first applied, if desired. The cement employed consists of rubber and naphtha, mixed sometimes with a small proportion of benzine. The said roll has cylindrical portions for working upon the raised portions of the lining and a narrow raised portion for entering the depressions or angles. If desired a non-extensible twine or yarn, or suitable wire may now be wound on the lining at each side of the middle portion. Then the shell is removed and placed in a dry-room to partly dry the lining and thereby create the desired adhesive condition of the cement.

The removal of the shell is effected as follows: The distribution of the cement having been effected, the pressure upon the treadle or foot lever 22 is released and the spring 17 is permitted to move the shipper bar 15 in the reverse direction and carry the crossed belt from the fast pulley 7 to the loose pulley 8. The clamping screw is now turned down a little tighter against the screw or threaded rod and the treadle or foot lever 23 is pressed upon so as to move the shipper bar 19 in a manner to transfer the straight or uncrossed belt from the loose pulley 10 onto the fast pulley 9. This will rotate the shaft and parts moving in unison therewith in a direction which is the opposite of that in which they before were moved, and will thus cause the expander cone to move in the reverse direction along the stationary screw or threaded rod and thus gradually withdraw it from the interior of the head or hub. As the expander cone is withdrawn the arms or segments will be moved inward gradually so as to contract the expansible former. When the rotation of the parts has been continued long enough to disengage the expander cone from the end of the shaft, the pressure upon the treadle or foot lever 23 is released and the band 13 is permitted to pass onto the loose pulley 10. Then the clamping screw is turned out so as to withdraw its end from the annular groove of the screw or threaded rod 34, and

the latter is pushed outward slightly by hand or otherwise as may be provided for, so as to leave a free space between the end of the shaft and the side of the expansible former sufficient to permit the shell to pass therethrough in being taken away from the machine. The shell, which remains of the full size to which it was expanded, is now removed and taken away from the expansible former, and is set aside in a dry-room until the rubber has set upon the lining fabric or material, after which the shell is applied again to the expansible former and the succeeding operation in the manufacture of the shoe or cover is performed. In the case of the lining fabric shown in the drawings it is intended to apply the shell having such a lining fabric thereon to the expansible former two more times in succession. The second time it is thus applied, which is after the cement has set as above noted, the wings of the lining are turned down onto the intermediate or middle portion to form the tread, the rolls 47 48, being successively brought into action, smoothing and stretching the said wings into proper position and condition, the narrow roller working into the angles of the shell. Then the pneumatic roller 44 is brought into action to even up the lining and expel air from between the layers. Another coating of cement is applied to the surface and the shell is removed and again placed in the dry-room to allow such coating to set. After the said coating has set, the shell is for the third time placed on the expansible former for the purpose of having the rubber covering put on, the latter being composed usually of sheet rubber. The pneumatic roller is used on the rubber covering to expel air and work the same into proper place and position. It is not intended to remove the lining fabric or lining from the shell after having been applied thereto, until the same is finished and thoroughly set.

The twine, yarn or wire which is inclosed between the layers at the lines of the folds serve to give strength and to form beads or ridges as customary in bicycle tires.

The felt covered roll 702 is used in spreading and working the different coatings of cement. Mounting the different rollers upon different levers as shown enables the desired one to be forced readily with the desired degree of pressure against the lining carried by the shell and mounted upon and rotating with the expansible former. I have shown the levers as normally raised out of the way by means of weights 703, the latter being attached to the ends of the cords 704 which pass around rollers 705, suitably mounted in an elevated position, said cords being attached at their opposite ends to the respective levers. By means of the said weights and cords the levers normally are held lifted but any one of them may be grasped and easily brought down in position to present its roller to the lining on the shell. In consequence of being mov-

able freely laterally the levers may be swung laterally to bring the desired one with its particular roller over the rotating former.

I claim as my invention—

1. The combination of an expansible shell constituting a holder and support for the lining or foundation, with an expansible former to which the said shell is applied, means for supporting and rotating the said former, and means whereby the said former is expanded to also expand the said shell and stretch the lining or foundation applied thereto, substantially as described.

2. The combination of an expansible shell constituting a holder and support for the lining or foundation, and a catch for retaining the parts of the same in proper position when expanded, with an expansible former to which the said shell is applied, means for supporting and rotating the said former, and means whereby the said former is expanded to also expand the said shell and stretch the lining or foundation applied thereto, substantially as described.

3. The combination of an expansible holder and support for the lining or foundation, with means for expanding the same to extend and stretch the said lining or foundation first placed around the same, and for supporting and rotating the same, and rolls for operating on said lining or foundation while applied to and rotating with the said holder and support, substantially as described.

4. The combination of a holder or support for receiving and holding distended the lining or foundation, and means for supporting and rotating the same, of a pneumatic roll for operating on said lining or foundation while applied to and rotating with the said holder and support, substantially as described.

5. The combination with a driving shaft, means for rotating the same in either direction as desired, an expansible former rotating with said shaft, an expander constructed to be engaged and rotated in unison with the said shaft and former when placed in operative connection with the said former, and a screw operating to feed the expander when the latter is rotated, substantially as described.

6. The combination with a driving shaft, means for rotating the same in either direction as desired, an expansible former rotating with said shaft, an expander cone engaged by the said shaft, when said cone is placed in operative position, and thereby made to rotate with the said shaft and former, a feed screw engaging with the said cone and serving to move the latter endwise as required in varying the dimensions of the said former, and means for holding the said screw from rotation while the cone is feeding endwise in either direction, substantially as described.

7. The combination with a driving shaft, means for rotating the same in either direction as desired, an expansible former rotating with said shaft, an expander cone engaged by the said shaft, when the said cone is placed

in operative position, and thereby made to rotate with the said shaft and former, a feed screw engaging with the said cone and serving to move the latter endwise as required in varying the dimensions of the said former, the said screw having a longitudinal groove and a communicating annular groove, substantially as described, a support for the outer end of the said screw, and a locking screw adapted to enter said grooves, substantially as described and for the purposes set forth.

8. The combination with a rotating support or holder for the lining or foundation, of a

series of working rollers or implements, a series of levers supporting the said rollers or implements and movable vertically to carry the latter toward and from the said support or holder and also movable laterally to enable the desired one to be brought into working position, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE C. MOORE.

Witnesses:

CHAS. F. RANDALL,
WM. A. MACLEOD.