

May 22, 1934.

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1,959,565

EXPANSIBLE LAST FORM FOR ATTACHING SOLES TO SHOES

Filed Nov. 16, 1931

3 Sheets-Sheet 1

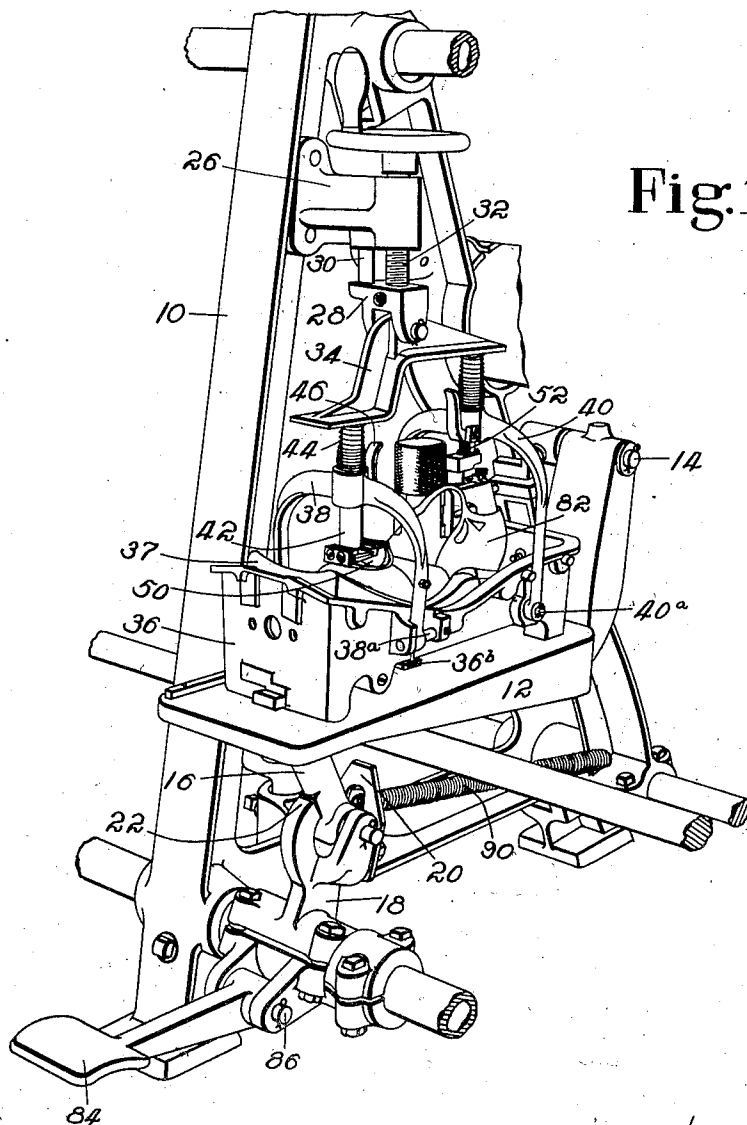


Fig. 1.

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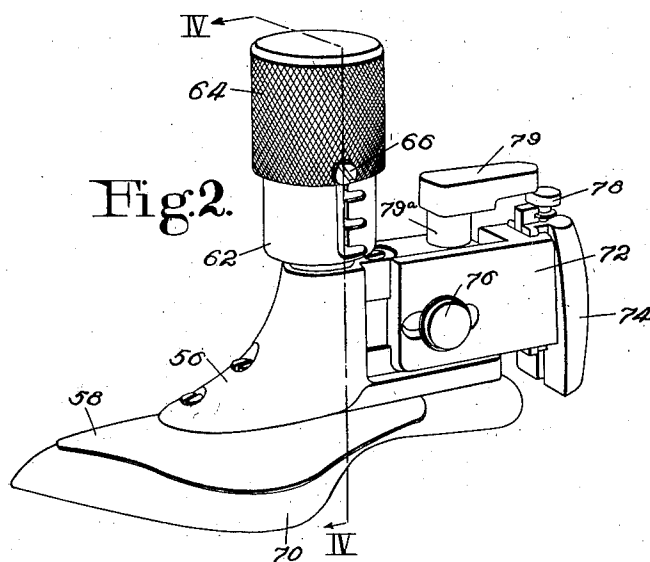


Fig. 4.

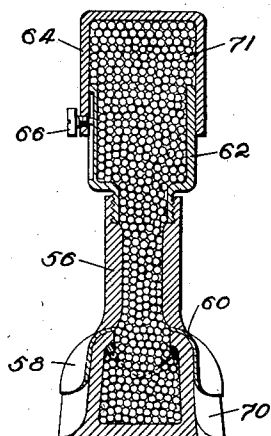
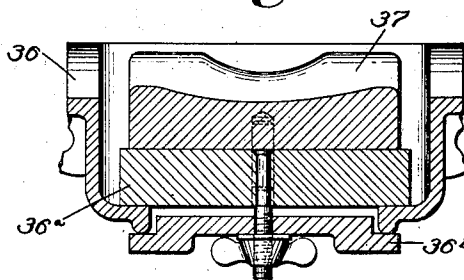


Fig. 3.



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Fig. 5.

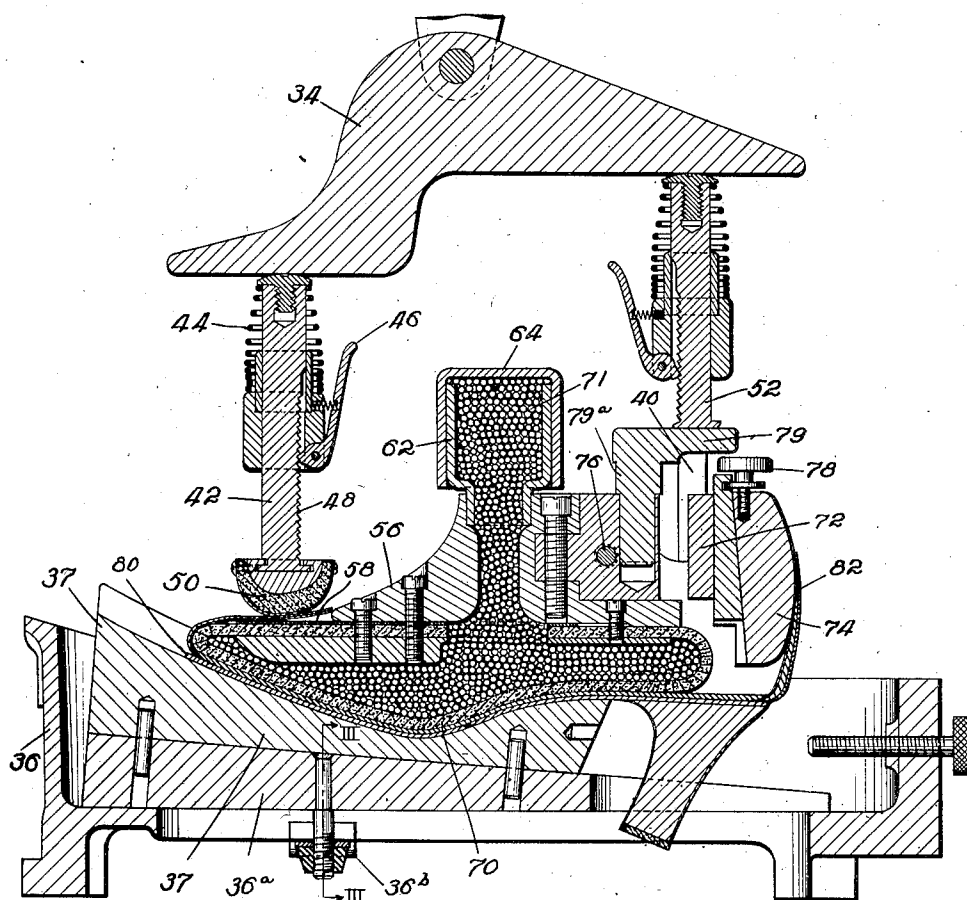
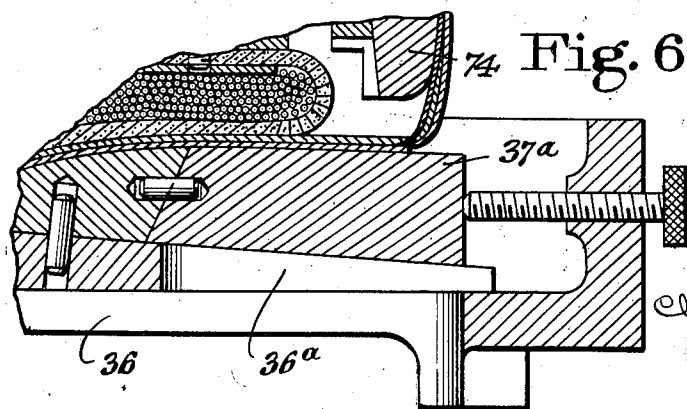


Fig. 6.



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EXPANSIBLE LAST FORM FOR ATTACHING
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Application November 16, 1931, Serial No. 575,434

14 Claims. (Cl. 12—123)

This invention relates to the art of attaching soles to shoes by the cement process and embraces the aspects of both method and apparatus. It is illustrated in connection with an apparatus for attaching repair soles to worn shoes.

Such work as this is normally performed in shoe repair shops which are not equipped to attach the soles according to the methods used in shoe factories manufacturing cement process shoes. Soles are attached to new shoes of this type by bringing together a shoe on its last and a sole with a film of cement between them, and pressing the shoe and sole against a flexible pad to cause the shoe and sole to adhere. The repair shop will not have the last on which the shoe was made, and even if such last were available there would sometimes be considerable difficulty in using it owing to the alteration in the shape of the shoe through wear. Furthermore, the expensive machinery used in the attaching of soles to new shoes is not available in the repair shop.

An object of the present invention is to provide a method and apparatus for attaching soles to worn shoes which can be used in repair shops to produce satisfactory work at an expense within the means of the operators of such shops.

In view of the unavailability of the last on which the shoe was made an important problem to be solved is the provision of a form to go inside the shoe. I have provided for this purpose a shoe receiving member adapted to be automatically conformed to the shape of at least the lower portion of the interior of the shoe. This, as illustrated, comprises an elastic bag filled with fluent material, by which I am herein to be understood to mean material capable of flow such as gaseous liquid, or finely or substantially uniformly divided solid material such as sand or the like. As illustrated herein, this material is a granular solid, in the form of small steel balls. Means is also provided to hold this material in sufficiently tight and close formation to prevent material alteration in the shape of the form under pressure.

It is contemplated that the shoe, with this form in it and a cemented sole applied to its bottom, shall be placed on a mold or pad member the operative sole-engaging surface of which may be rigid and shaped substantially to that of the shoe bottom, or flexible, as for example formed by a rubber pad, and that the whole structure thus far described, including the shoe and sole, shall be placed in a pressing machine to force the form and the pad or mold toward each other. I have found that the illustrated fluent material under

such treatment partakes of the characteristics of both a solid and a fluid; that it flows sufficiently to bring suitable pressure to bear all over the shoe bottom, but that its internal friction enables it to stand up under a pressure adequate to effect satisfactory adhesion between the shoe and sole without tending to force it out laterally into bulged and weakened places in the shoe upper to the further detriment thereof.

These and other features and aspects of the invention will be understood from the following description of the method involved, and of an apparatus by means of which it may be practiced, taken in connection with the accompanying drawings, in which

Fig. 1 is a perspective view of the pressing machine with the shoe in operative position;

Fig. 2 is a perspective view of the inside form;

Fig. 3 is a detail cross-section of the box which holds the outside form;

Fig. 4 is a cross-section of the form shown in Fig. 2;

Fig. 5 is a longitudinal vertical cross-section of the shoe and forms; and

Fig. 6 is a detail showing an alternative form of the apparatus shown in Fig. 5.

The drawings illustrate a pressing machine in connection with the inner form and the outer mold or pad member discussed above. The illustrated machine will be described first.

Its main frame 10 carries a pad box supporting arm 12 pivoted at its rear end to the frame at 14. This arm is supported at its front end and operated up and down by toggle links 16, 18 provided with stops 20, 22 to prevent overthrowing in either direction.

A bracket 26 mounted on the frame 10 above the arm 12 carries a lug 28 vertically adjustable in it by means of a slide rod 30 and a screw 32. In this lug is pivoted an equalizing lever 34.

The box 36 for the outer mold or pad member stands on the arm 12. It is not attached to the arm and is freely removable, as will be seen. The bottom of this box consists merely of a flange around its lower inside edge on which rests a plate 36a which is substantially smaller than the horizontal cross-section of the box. The plate 36a is screw bolted to a clamp bar 36b which extends across the bottom of the box on the outside. This structure permits the longitudinal adjustment of the plate 36a in the box. The outside pressing form 37 is carried by the plate 36a and is doweled to it to prevent accidental displacement. As illustrated, this form is arranged for the attachment of a repair sole or "half sole" and it therefore ex-

- tends backward only to a point short of the heel breast portion of the shoe so that the heel of the shoe can extend downward past its rear end. This form is preferably made of wood and I have found that the same form will suffice for a large range of sizes and styles of shoes, having heels ranging from 8/8 to 24/8 in height. This form, however, can be made of other material, such as medium hard rubber, if desired.
- Two stirrups 38, 40 are attached to the box 36, one at least of which, as 40, is pivoted at 40a so that it can be swung aside to insert a shoe. The other stirrup 38 is shown as terminating in eyes sliding on pins 38a to permit longitudinal adjustment of the stirrup. These stirrups carry plungers 42 normally spring-pressed upward by springs 44 and held down in any acquired position by pawls and teeth at 46, 48. Each plunger carries at its lower end a suitable abutment 50 or 52, the one which operates on the toe of the shoe being shaped to fit the toe approximately. When the box 36 is placed in position on the supporting arm 12, the plungers 42 are under the ends of the equalizing lever 34.
- The pressing form which is placed inside the shoe constitutes an important feature of the invention. This form is shown in detail in Figs. 2 and 5. It has a metal upper portion, the lower part 56 of which is shaped approximately to the contour of the instep portion of a shoe. This portion 56 extends backward to approximately the heel breast locality of a shoe held on it and has fastened to its lower surface a shaped metal plate 58 having the contour of the vamp portion of the shoe. The front portion of the member 56 is hollow, as shown at 60, and this hollow portion opens through the plate 58. Above the hollow portion is mounted a reservoir 62, surmounted by a cap 64 which is of substantial vertical extent and has a telescoping fit on the reservoir 62. It is provided with a screw 66 which may cooperate with one of a series of slots 68 to operate as a bayonet joint to hold the cap on the reservoir in an adjusted position, or may be used as a simple set screw for the same purpose.
- A foot-shaped bag 70 of flexible material, preferably resilient, such as rubber, is fastened in any desired way below the plate 58 and member 56. The hollow 60 opens into this bag. The bag 70, hollow 60, and reservoir 62 are completely filled with granular material 71, and there is a surplus of such material confined by the cap 64. I have found steel balls of about $\frac{1}{2}$ inch diameter well adapted for the purpose. The function of this granular material is to expand the bag 70 inside of a shoe in such manner as to give it substantially the shape of the inside of the shoe.
- The rear part of the member 56 carries a horizontal sliding block 72 on which is mounted a vertically sliding heel block 74. Screws 76, 78 hold these blocks in their adjusted positions. A lug 79 is provided on the rear end of the member 56 to take the pressure of the rear plunger 42 above described. This lug 79 is mounted on a spindle 79a which is removably mounted in a hole in the member 56.
- Suppose now that a sole 80 is to be cemented to a shoe 82. The operator adjusts the heel block 74 horizontally and vertically to bring the form into an approximate fit with the shoe, removes the lug 79 and inverts the form on a bench jack pin which enters the hole normally occupied by the spindle 79a. The cap 64 is adjusted outward sufficiently to permit the balls 71 to run down out of the bag 70. The shoe is then slipped over the form which is then turned right side up. The balls 71 run back into the bag and, with a little jarring, if necessary, cause it to take the shape of the lower part of the inside of the shoe. The operator then drops the cap down until it rests upon the balls and fastens it in position, and replaces the lug 79.
- The operator now places the shoe with the form in it, and a cemented sole 80 beneath it, on the form 37 in the box 36, adjusting the stirrup 38 and the plate 36a if necessary to bring the form 37, the shoe 82 and abutment 50 into proper relation, so that the front plunger 42 will descend over the end of the plate 58 and the rear plunger over the lug 79 which, as shown, is of substantial fore-and-aft extent to insure contact. He may then lower the plungers against the pressure of the springs 44 to bring the abutments 50, 52 into contact with the toe of the shoe and the lug 79 respectively. The pawls 46 and teeth 48 will hold them in position.
- All the work so far done will be performed apart from the machine shown in Fig. 1. The operator now carries the box 36, with the shoe and form on it, to the machine and sets it on the arm 12, with the plungers under the ends of the equalizing lever 34 which he lowers into proper position by the screw 32, and applies pressure to the treadle 84, which straightens out the toggle 16, 18 and raises the arm 12 about its pivot 14, thus exerting pressure on the shoe and sole and forcing the sole to adhere to the shoe. Further movement of the plungers 42 will be held by the pawls 46 as before, and the box 36 and shoe can be then removed from the machine and set aside for the cement to set. The toggle 16, 18 is so arranged that it cannot be thrown past dead center, and the spring 90 breaks it and releases the box 36 as soon as the operator releases the treadle.
- I have found that the pressure transmitted by the balls 71 to the shoe is not like a fluid pressure, equal in all directions, since the granular material tends to lock or "arch" and does not flow as readily as a liquid or gas. It flows readily enough to force the bag 70 into contact with the shoe but as soon as it meets with any real resistance to its flow it becomes quasi solid due to its own internal friction. It thus does not flow so freely into those localities in the shoe which have been unduly stretched and weakened by wear and therefore does not tend to stretch them further, as a purely fluid pressure might do, to the further detriment of the shoe.
- I have found that this quasi-solid nature of the granular material persists under a pressure quite adequate to effect satisfactory adhesion between the shoe and the sole, just enough deformation taking place to effect sufficient pressure at all points of the shoe bottom, so that the pressure impressed by the machine is transmitted mainly vertically into the shoe bottom and sole without tending to distort the shoe laterally. I thus secure the advantages of a rigid internal form which fits the shoe with the signal advantage that the same form will serve for a considerable range of sizes and styles. The action of this granular material constitutes an important aspect of the invention.
- While I have described the invention as applied to the attachment of repair soles, it is not to be understood as limited thereto. I have practiced the invention in the attachment of full length soles. For this purpose I have provided an extension 37a for the form 37, shown in Fig. 6. The

extension 37a, as illustrated, is mounted on the form 37 at its rear end by dowels and clamped in place by a screw and extends back under the heel end of the shoe. It will be noticed that the bag 5 70 is long enough to extend somewhat to the rear of the heel breast portion of the shoe so that a full sole will be caused to adhere to the shoe back of this heel breast locality. The subsequent attachment of a heel will fasten the rear end 10 of the sole firmly in place.

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

1. An expansible hollow last-like shoe-receiving member containing finely divided solid material.

2. A hollow last-like form for supporting a shoe, having an expansible portion and a granular filling in said portion, and means for adjusting the effective internal volume of the form.

3. A hollow elastic-walled form for supporting the inside surface of a shoe, filled with granular material and constructed and arranged to hold its contained granular material against loose 25 movement when in the shoe.

4. A hollow last-like form for supporting a shoe, having an expansible portion and a granular metallic filling in said expansible portion.

5. A hollow last-like form for supporting a shoe, having an expansible portion filled with 30 metallic balls.

6. A hollow last-like form for supporting a shoe, having a flexible portion filled with metallic balls, and means for adjusting the volume 35 of the non-flexible portion of the form.

7. A last-like form for supporting a shoe having a rigid upper portion, an expansible lower portion, and a granular filling in said lower portion.

8. A hollow last-like form of variable volume for supporting a shoe, and a granular filler completely filling said form.

9. A hollow last-like form for supporting a shoe, having an expansible bottom portion, a granular filling in said expansible bottom portion, and means for varying the normal volume 45 of said expansible bottom portion.

10. A hollow last-like form for supporting a shoe, having a rigid upper portion, said rigid portion being adjustable as to volume, said form having also a lower portion having an expansible wall, and a granular filler in said form, said 80 filler being operative to expand the lower portion upon diminution of the volume of the upper portion.

11. A hollow last-like form for supporting a shoe, having a rigid upper portion shaped to contact with the instep portion and upper vamp portion of a shoe, said rigid portion constituting a reservoir and being adjustable as to volume, said form having also an expansible lower portion arranged for contact with the bottom and 90 lower vamp portion of the shoe, and a granular filling in said form.

12. A hollow last-like form for supporting a shoe, having a rigid portion and a flexible expansible portion, said rigid portion carrying a hollow cup joined thereto by a telescoping joint, a granular filler filling said form, said filler being movable to expand said expansible portion and being held in position by telescoping said cup toward the expansible portion. 100

13. A hollow last-like form for supporting a shoe, having an expansible lower portion containing solid granular material, a rigid upper portion arranged to underlie the instep portion of a shoe on said form, a rear portion adjustable 105 on said rigid portion to contact with the heel end of the shoe to effect proper fore-and-aft location of the form in the shoe, and means for expanding said lower portion.

14. A hollow last-like form for supporting a shoe, having an expansible lower portion containing solid granular material, a rigid upper portion arranged to underlie the instep portion of a shoe on said form, a rear portion longitudinally and vertically adjustable on said rigid 115 portion to contact with the heel end of the shoe to effect proper fore-and-aft location of the form in the shoe, and means for expanding said lower portion.

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