Aug. 27, 1935. S. J. FINN 2,012,272

PAD STRUCTURE FOR USE IN THE MANUFACTURE OF COMPO SHOES

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Fig. 1.

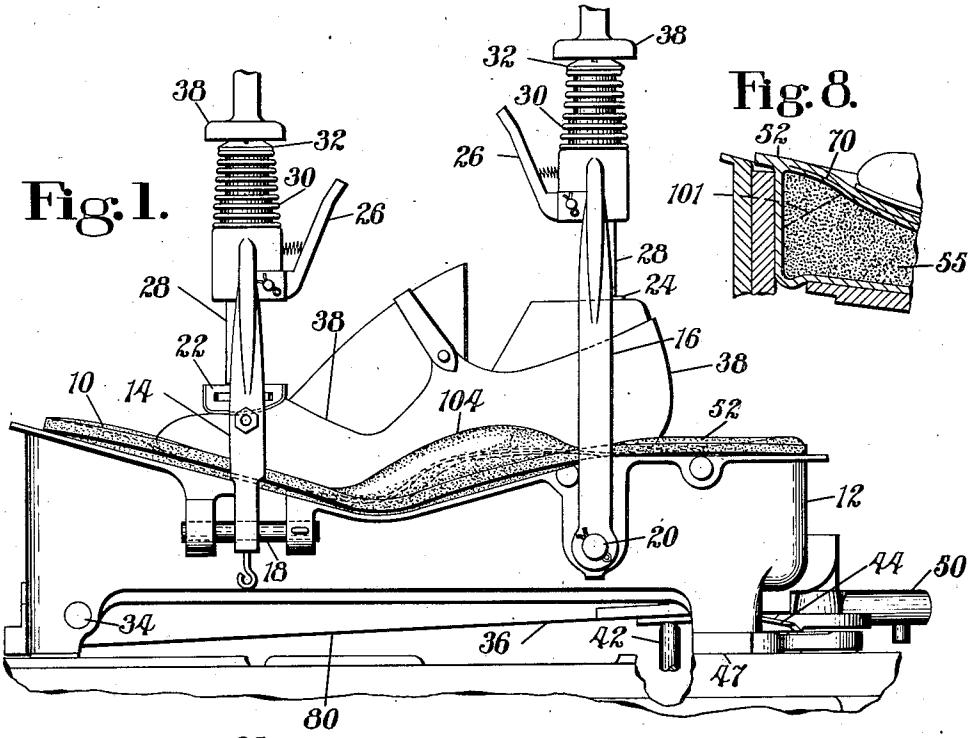


Fig. 8.

Fig. 2.

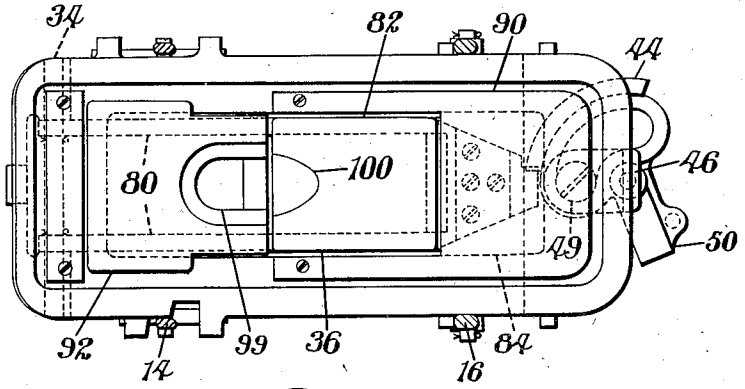
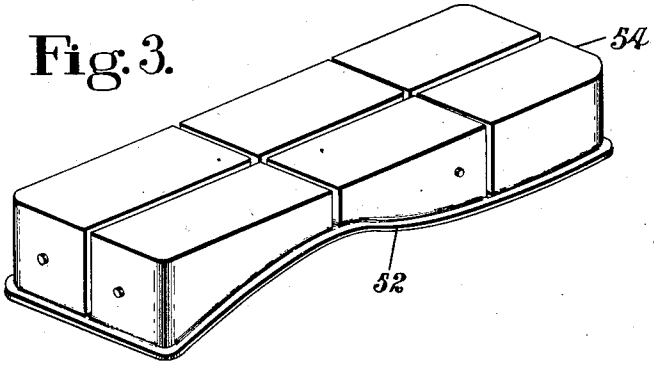


Fig. 3.



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Fig. 4.

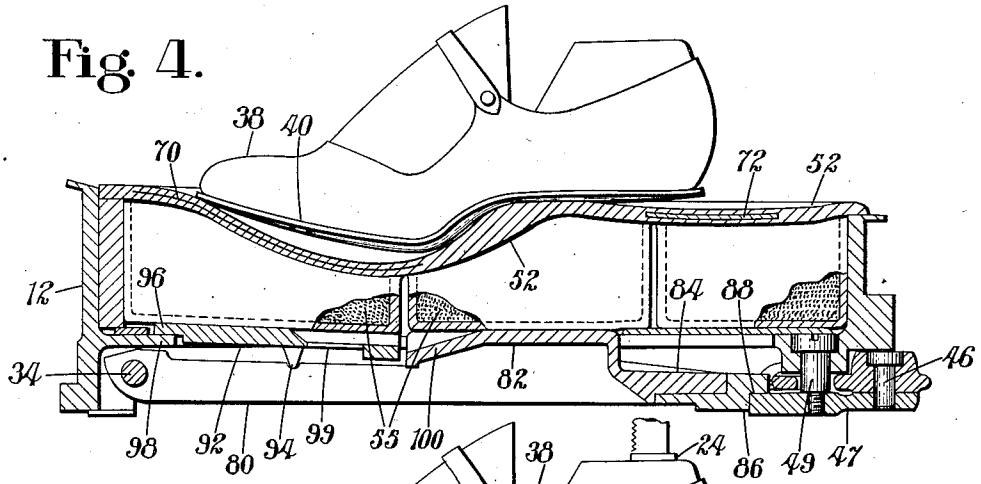


Fig. 5.

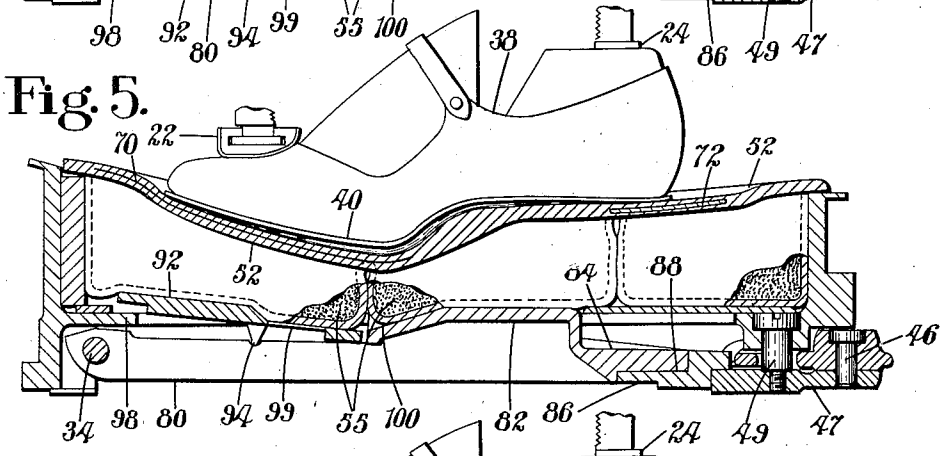


Fig. 6.

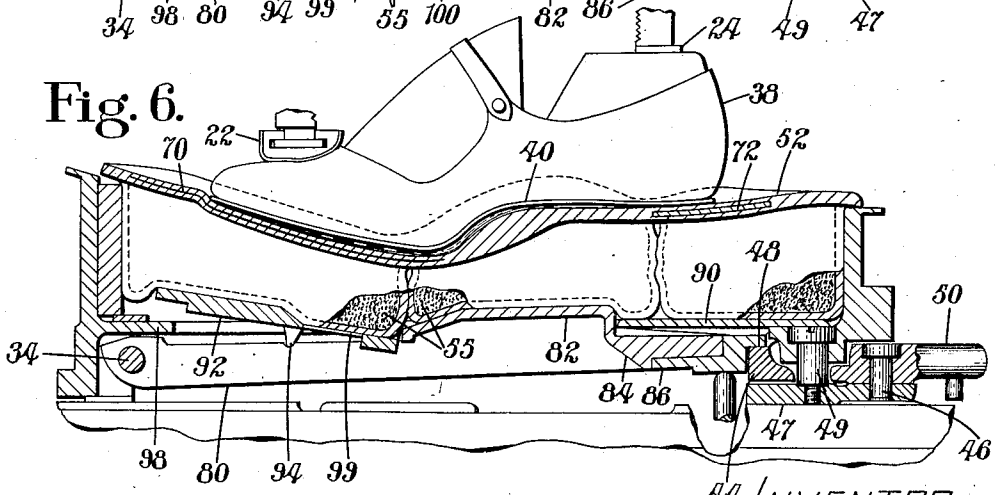


Fig. 7.



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UNITED STATES PATENT OFFICE

2,012,272

PAD STRUCTURE FOR USE IN THE MANUFACTURE OF COMPO SHOES

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Application July 7, 1932, Serial No. 621,231

14 Claims. (Cl. 12—33)

This invention relates to apparatus for use in the manufacture of shoes and is illustrated herein as embodied in a pressure applying pad box for cement attaching soles to compo shoes.

When attaching soles to compo shoes it is usual to support the shoe and sole on a pad or cushion, commonly filled with a fluid, either air or water, and to support the shoe and last against upward movement by suitable abutments when the sole attaching pressure is applied through the fluid-filled pad. Before positioning the shoe and sole on the pad pyroxylin cement is applied to the suitably prepared shoe bottom and to the attaching face of the sole. After the cement has become dry, it is softened and activated on one or both of the shoe parts with a softening material and, after the shoe and sole are positioned relatively to each other and placed on the pad, pressure is applied and maintained until the softened cement has acquired sufficient strength to maintain the sole properly in position on the shoe bottom after the pressure is released.

While these fluid-filled pads have been used successfully in attaching soles to many millions of pairs of compo shoes, nevertheless they have certain inherent characteristics which are quite disadvantageous under certain conditions. For example, since the pressure in a fluid is equal in all directions there is a strong tendency to force the top of the pad, usually a wall of rubber or a diaphragm of rubber with a leather cover, upwardly beyond the edge of the sole and into engagement with the shoe upper adjacent to the edge of the sole, at the same time rolling the edge of the sole, which is often considerably reduced in thickness, into close contact with the upper. Such a condition is unobjectionable in many cases. Thus in the case of the so-called French edge, it is desired to roll the edge portion of the sole into engagement with the upper at the forepart as well as at the shank portion of the shoe. On the other hand, if the edge of the sole is to have any appreciable extension, as is, for example, often desired in the case of welted shoes, this rolling of the edge of the sole toward the upper is bothersome since it requires that the edge of the sole be subsequently "boned" out, away from the upper, and on account of the stiffening effect of the pyroxylin cement the boning operation is laborious and time-consuming.

Another respect in which the fluid-filled pressure pads are capable of being markedly improved upon arises from the manner in which their use tends to reproduce on the surface of the sole irregularities that may exist in the shoe bottom. It is quite impractical always to prepare the bottoms of shoes in such a way that they will be entirely smooth before the outsoles are attached. If a sheet filler is used, as is usually the case in compo shoes, there are almost certain to be spaces or cracks between the edge of the filler and the overlasted marginal portion of the upper. The filler cannot be relied upon to be always of exactly the same thickness as the overlasted marginal portion of the upper. In the shank portions of the shoe the edges of the metal shank piece cannot be depended on to contact accurately with the edges of the overlasted marginal portion of the upper. If the shoe is staple lasted the bars of occasional staples may project slightly and if the shoe is lasted with pyroxylin cement (the upper being held temporarily by tacks while the cement sets) there may occasionally be lumps or ridges of cement which are not softened by the activating material. Any of these conditions may, if the soles are of soft leather or are in temper as they should be and if the sole attaching pressure is maintained for any considerable time, say fifteen or twenty minutes, produce minor irregularities or markings visible on the surface of the sole. Such markings are objectionable to a greater or less extent, from the point of view of the salability of the shoe, according to their conspicuousness.

In view of the foregoing, it is an object of my invention to provide a pad structure of such a character that any objectionable wrapping of the edge portion of the sole about the shoe upper will be eliminated and of such a character that minor irregularities of the shoe bottom will not be reproduced as markings on the surface of the sole even though the shoe remains under pressure for fifteen to twenty minutes or even longer.

It is a further object of my invention to provide an improved pad and support therefor of such a nature that the pad will be self-adjusting to conform to large variations in the pitch of the shank portion of the soles of shoes, such as results from differences in the heel heights of, particularly, women's shoes.

In order to eliminate or reduce the wrap or roll of the marginal portion of the sole about the shoe upper and to prevent the marking of the sole of the shoe, as referred to above, I have made a comprehensive study of many kinds of "fluent" material, that is, more or less finely divided solid material of such a character that, while not entirely reproducing the pressure transmitting characteristics of liquid, it will, nevertheless, flow

to a considerable extent, and I have found that moderately coarse sand the grains of which are relatively smooth is well adapted as a filling material for pads to be used in cement attaching soles to shoes. Natural wind-blown sand, the grains of which run from about two hundredths (.02) to about four hundredths (.04) of an inch in diameter and which show a decided tendency to approximate the spherical in shape, I have found to be particularly good for this purpose. The surfaces of the grains of this sand, when suitably magnified, approximate the appearance of rather finely ground glass and very definitely do not appear polished. Such grains flow and rearrange themselves freely when not under pressure but when substantial pressure is applied are "locked" and form a substantially rigid structure. Thus, when a pad comprising an envelope of flexible material filled with such sand is used in cement sole attaching the grains of sand flow readily to permit the wall of the pad upon which the shoe rests to conform to the shape of the shoe bottom. After the pad is conformed in this way, however, the pressure which then begins to build up locks the grains of sand against further movement and the shoe which is being operated on is supported by a structure which is in effect a mold shaped in accordance with the characteristics of that particular shoe. Since, however, the sand beyond the edge of the shoe bottom is not under any considerable pressure its grains are free to move relatively to each other and since the application of further pressure does not reduce the volume of the "locked" sand only a small relative movement of the shoe and the pad is necessary to build up the required sole attaching pressure and there is nothing to roll the wall of the pad beyond the edge of the sole into engagement with the shoe upper. Moreover, the locked sand beneath the shoe bottom, acting as a substantially rigid member, does not tend to force the sole of the shoe into any minor cavities or cracks that may exist in the shoe bottom. Thus, any tendency to form markings on the surface of the sole in accordance with irregularities in the shoe bottom is eliminated.

Such a pad, particularly if, as illustrated herein, it is made of a series of cells or compartments connected only through the sole engaging wall of the pad, is well adapted to be supported by adjustable means by which it may be caused more readily to conform, automatically or otherwise, to the longitudinal contours of different shoes. In the illustrated construction, and in accordance with a feature of the invention, such an adjustable support is made up of two sections one of which, at the forepart of the shoe, is pivoted between its ends but slightly to the rear of its center, so that when pressure is applied to the shoe the plate will be tipped to an extent which will be determined by the angular relation of the shank portion and the forepart of the sole of the shoe.

In order to prevent the application of excessive pressure to the central portion of the sole at the expense of the pressure applied to the peripheral portion where the sole attaching cement bond is to be formed, another feature of the invention contemplates the provision of a recess or cavity formed by cutting away the portions of the pad supporting structure at the ball portion of the shoe over a width considerably less than that of the smallest shoe which is to be operated on so that at the start of the application of the sole attaching pressure the sand-filled cushion or pad can sink into the recess or cavity thereby insuring adequate engagement with and the application of sufficient pressure to the peripheral portion of the sole.

With the above and other objects and features in view the invention will now be described with reference to the accompanying drawings and pointed out in the claims.

In the drawings,

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

Fig. 2 is a plan view of the box itself partly in section, the pad having been removed;

Fig. 3 is a perspective view of the pad removed from the box and in inverted position thereby illustrating its cellular construction;

Figs. 4, 5 and 6 are longitudinal sectional views through the pad and pad box of Fig. 1, illustrating the structure in Fig. 4 before any pressure has been applied, in Fig. 5 after the application of a comparatively light or preliminary pressure, and in Fig. 6 after the final pressure has been applied;

Fig. 7 is a diagrammatic view on an enlarged scale illustrating the shape of the grains of the sand with which the pad is filled; and

Fig. 8 is a diagrammatic view illustrating the "locking" of the sand when the pressure is applied.

The pad box illustrated in Fig. 1 was built for use with a cement sole attaching machine of the character disclosed in Letters Patent of the United States No. 1,897,105, granted Feb. 14, 1933, on an application filed in the name of Milton H. Ballard. This structure comprises a pad or cushion **10** supported in a box-like casting **12** of, for example, an aluminum alloy, provided with a pair of bails **14**, **16** (Fig. 1) near the two ends of the casting. As illustrated, the bail **14**, near the end of the pad which receives the forepart of the shoe, is mounted for longitudinal sliding adjustment as indicated at **18** while the bail **16**, at the heel or rear end of the box, is pivoted at **20** so that it can be swung rearwardly out of the way while the shoe is being applied to or removed from the pad. The bail **14** is provided with a holddown in the form of a toe rest **22** arranged to engage the vamp portion of the shoe at the throat thereof while the bail **16** is provided with a holddown member **24** to engage the cone of the last. The holddowns **22**, **24** are mounted for vertical sliding movement in the bails **14**, **16**, being held in adjusted position while the shoe is under pressure by pawls **26** engaging suitable ratchets (not shown) formed on the stems **28** of the holddown members while springs **30**, engaging beneath heads **32** formed on the upper ends of the stems **28**, tend to lift the holddowns when the pawls **26** are released. Pivoted at **34** at the forward end of the box **12** is a supporting member **36** upon which the pad **10** rests.

When sole attaching pressure is to be applied to a shoe **38** and sole **40** which have been positioned upon the pad **10**, the bails **14**, **16** are brought into proper position and the holddowns **22**, **24** are forced downwardly by pressure applying members **38** (Fig. 1) with which the sole attaching machine is provided, the holddowns being then locked in position by the pawls **26**. The preliminary pressure applied in this way may be of the order of fifteen or twenty pounds per square inch. Then the member **36** is forced upwardly, by upward movement of a plunger **42** (also shown in Fig. 1) with which the sole attaching machine is provided, thus applying a

pressure of eighty pounds to the square inch, more or less. The member 36 is locked in adjusted position by a rotatable wedge or cam 44 pivoted at 46 to a support 47 secured to the box 12 at 49 (Figs. 2, 4, 5 and 6) and bearing against the member 36 at 48, as best shown in Fig. 6. The cam member 44 is provided with a projecting arm 50 by which it may be rotated in a manner clearly described in said Ballard patent.

As illustrated herein, the pad 10 is formed with a continuous upper wall 52 from which depend a plurality of cells 54 (Fig. 3) each of which is filled with sand or the like. These cells are structurally independent except that they are connected through the top or shoe-supporting wall 52, the vertical walls of the adjacent cells being spaced apart ⅛ of an inch or so when the pad is in its idle or undistorted position. As illustrated, the pad is two cells wide and three cells long, the rearmost walls of the forward cells and the foremost walls of the intermediate cells extending transversely of the pad substantially at the ball line of a shoe located on the pad and permitting the pad to be bent readily at the ball line so that its shape can be adjusted in accordance with the angular relation of the shank portion and the forepart of the shoe which is to be operated upon (Figs. 4, 5 and 6). The top wall 52 is reinforced forwardly of the ball line with a piece of canvas 70, vulcanized into the rubber of which the wall of the pad is formed, while a piece of sheet steel 72 is vulcanized into the portion of the pad engaged by the heel portion of the shoe since the heel portion of the sole is ordinarily not cement attached to the upper and it is not desired that its marginal portions shall be forced into close engagement with the shoe upper.

The cells 54 are filled with comminuted material such as wind-blown sand (indicated at 55) the grains of which may advantageously run from about two hundredths (.02) to four hundredths (.04) of an inch in diameter. The shapes of a number of typical grains of this type of sand are indicated on an enlarged scale in Fig. 7 from which it will be seen that while they show a decided tendency to approximate the spherical in shape, nevertheless most of them differ from a true sphere by a substantial extent being, therefore spheroidal. Many of them are grains which might reasonably be described as ovate. Others still further depart from the spherical but all of the corners and edges have been worn off and the surfaces are relatively smooth though by no means polished. Sand of this character when under pressure acts substantially as a solid while when not under pressure the grains flow readily. Tests made with similar pads filled with small steel spheres comparable in size and having smooth surfaces indicate, by reason of their failure to lock when pressure is applied, that these characteristics of smooth sand are of real value if the sand is to be used as filling for cement sole attaching pads.

While a sand pad of this structure consisting of a single chamber is entirely practicable, the multi-cell construction is more desirable since, when the pressure is released, the resiliency of the cell walls is helpful in automatically unlocking the sand so that the pad is immediately ready for the reception of another shoe.

The pivoted member 36 through which the pressure is applied to the bottom of the pad 52 comprises a pair of parallel bars 80 pivoted at 34 to the box 12, the bars 80 carrying a plate 82 positioned beneath the shank portion of the shoe, having an offset portion 84 beneath the heel end of the shoe and provided with a hardened member 86 to receive the thrust of the plunger 42. This hardened member 86 also provides the surface 48 arranged to engage the cam 44 by which the pivoted member 36 is located in pressure applying position. As indicated in Figs. 4, 5 and 6 the offset portion 84 of the plate 82 underlies a portion of a bottom plate 90 of the box 12.

A plate 92 is fulcrumed at 94 to the bars 80, the fulcrum being near but somewhat to the rear of the middle of the plate 92, as shown in Figs. 4, 5 and 6. When the pad box is idle the plate 92 is substantially horizontal with its forward end 96 overlying a plate 98 forming a part of the bottom of the box 12. When, however, pressure is applied the plate 94 tilts more or less, in a clockwise direction as indicated in Figs. 5 and 6, to an extent determined by the angular relation of the forepart to the shank portion of the shoe which is being operated upon, thus automatically adjusting the shape of the pad or cushion to conform approximately to the contour of the shoe bottom.

In order to insure that there will be no excess of pressure applied to the central part of the sole forwardly of the ball line and thus to insure that adequate pressure is applied to the peripheral portion of the sole, the plate 92 is recessed or cut out rearwardly of its fulcrum 94, as shown at 99 in Fig. 2 and as indicated also in Figs. 4, 5 and 6. Similarly a cavity or recess, indicated at 100 in Figs. 2, 4, 5 and 6, is formed at the forward portion of the plate 82. This construction permits the pad or cushion 10 to sink into the cut-out 99 and the cavity 100 at the start of the application of the preliminary pressure, as indicated in Fig. 5, so that the top wall 52 of the pad is conformed to the shape of the shoe bottom and particularly to its transverse curvature. With the pad in this condition the application of further pressure locks the sand beneath the shoe (as indicated in Fig. 8) so that it acts as a rigid member transmitting pressure to the peripheral portion of the sole. Since, however, the sand beyond the edge of the sole is not under any substantial pressure it fails to lock, does not transmit any substantial pressure, and does not wrap the top wall 52 of the pad about the edge of the sole and the shoe upper as would a fluid-filled pad. The approximate location of the area of demarcation between the locked and the free or non-locked sand is indicated in Fig. 8 by the broken line 101.

Methods appropriate to the manufacture of a cellular pad of the type herein illustrated will be familiar to manufacturers of rubber goods of this general character. One way in which such a pad may be made comprises forming the bottoms and side walls of the cells of unvulcanized rubber, filling the cells with water and ammonia and then engaging their upper edges with a semi-cured sheet of rubber reinforced with canvas in the forepart and having thickened walls at the sides of the shank portion of the shoe (the portion indicated at 104 in Fig. 1). The top wall of the pad is then sealed to the edges of the sole by wheeling and the whole placed in a properly shaped mold and vulcanized, the evaporation of the ammonia providing sufficient internal pressure to press the cell walls against the wall of the mold. After vulcanization holes are made in the walls of the cells, the liquid re-

moved, and the cells filled with sand and the holes plugged. Or, if preferred, the cells may be formed and filled with sand before they are applied to the top wall of the pad, thus avoiding the making of holes in the cell walls.

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

1. A pad for cement sole attaching comprising a flexible container consisting of a group of cells separated by resilient walls and having a shoe-supporting wall common to the group of cells, and sand confined in said cells.

2. A pad for cement sole attaching comprising a plurality of separate compartments having a common shoe supporting wall formed and arranged to engage the sole of the shoe over at least its entire forepart, said compartments being substantially filled with hard spheroidal particles adapted to pack under pressure and thus having a substantial resistance to movement from beneath a shoe when sole attaching pressure is applied but moving freely relatively to each other when not under pressure.

3. A shoe supporting structure for cement sole attaching comprising a cushion and a support therefor comprising a plurality of relatively movable sections, a section beneath the forepart of the shoe being pivoted between its ends for free rocking movement lengthwise of the shoe thereby automatically substantially equalizing the pressure applied to various portions of the forepart of the shoe and being cut away to prevent the application of excessive pressure to the central part of the sole forwardly of the ball line of the shoe.

4. A shoe supporting structure for cement sole attaching comprising a cushion and a support therefor comprising a plurality of relatively movable sections, a section beneath the forepart of the shoe being pivoted somewhat to the rear of its center for rocking movement about a transverse axis thereby automatically substantially equalizing the pressure applied to various portions of the forepart of the shoe, sections of the support being cut away beneath the central part of the sole of a shoe on the cushion to prevent the application of excessive pressure to said central part.

5. A pad for cement sole attaching comprising a plurality of compartments two or more of which have adjacent walls substantially at the ball line of the shoe, in combination with means for automatically causing relative adjustment of said compartments about an axis extending transversely of the shoe constructed and arranged automatically to vary the contour of the pad in accordance with the pitch of the shank portion of the shoe.

6. A pad for cement sole attaching comprising a plurality of compartments filled with comminuted material and two or more of which have separate but substantially contacting transverse walls substantially at the ball line of the shoe, in combination with means for automatically causing relative adjustment of said compartments about an axis extending transversely of the shoe constructed and arranged automatically to vary the contour of the pad in accordance with the pitch of the shank portion of the shoe.

7. A pad for cement sole attaching formed to receive a sole and shoe, a support for the pad pivoted at one end thereof, means at the other end of the support for locking the support in pressure-applying position after it has been brought thereto, and a member interposed between said support and the forepart of the shoe carried by the support, mounted for rocking movement relatively thereto and serving itself to apply pressure to the forepart of the pad and to the shoe as said support is moved to pressure-applying position, thereby equalizing pressure applied to different portions of the forepart of the shoe.

8. A pad for cement sole attaching comprising a resilient cushion in combination with a support engaging the cushion, and a member carried by the support and engaging the surface of the cushion opposite that occupied by a shoe positioned for sole attachment, said member being cut away to receive the cushion, when sole attaching pressure is applied, opposite the central portion of the sole thereby preventing concentration of the pressure on the central portion of the sole.

9. A pad for cement sole attaching comprising a resilient cushion in combination with a support for the cushion, and pressure applying means pivoted at one end to the support and engaging the surface of the cushion opposite that occupied by a shoe positioned for sole attachment, said member being cut away to receive the cushion, when sole attaching pressure is applied, opposite the central portion of the sole thereby concentrating the pressure on the peripheral portion of the sole.

10. A pad box for cement sole attaching comprising a cushion containing comminuted material, a support engaging the cushion, and means carried by the support and arranged to engage the face of the cushion opposite the peripheral portion of the sole of a shoe on the cushion and movable relatively to the support and toward the shoe to apply pressure to the peripheral portion of the sole, the portion of said means which underlies the central part of the sole at the ball portion of the shoe being recessed to receive the cushion when the sole attaching pressure is applied.

11. A shoe-supporting member for cement sole attaching comprising a cushion containing comminuted material, a support for the cushion, and a member pivoted to the support and arranged to engage the face of the cushion opposite the peripheral portion of the sole of a shoe on the cushion and movable toward the shoe to cause the cushion to apply pressure to the sole, the portion of said means which underlies the central part of the sole at the ball portion of the shoe being recessed to receive the cushion when the sole attaching pressure is applied.

12. A pad box for cement sole attaching comprising a cushion consisting of a receptacle of resilient material filled with sand, a support for the cushion, and a pressure applying member pivoted to the support and underlying the cushion and arranged when moved toward a shoe upon the cushion to apply sole attaching pressure, a portion of said member opposite the ball portion of the shoe being recessed to receive the cushion when the sole attaching pressure is applied.

13. A pad box for cement sole attaching comprising a cushion consisting of a receptacle of resilient material filled with coarse sand, a support for the cushion, and a pressure applying member pivoted to the support adjacent to one end of the cushion and underlying the cushion and arranged when moved toward a shoe upon the cushion to apply sole attaching pressure, the portion of said member opposite the ball portion

of the shoe being cut away to receive the cushion when the sole attaching pressure is applied.

14. A shoe-supporting member for cement sole attaching comprising a cushion containing comminuted material, a support for the cushion, a member pivoted to the support and arranged to engage the face of the cushion opposite the peripheral portion of the sole of a shoe on the cushion and movable toward the shoe to cause the cushion to apply pressure to the sole, the portion of said means which underlies the central part of the sole at the ball portion of the shoe being recessed to receive the cushion when the sole attaching pressure is applied, and a lock for holding said pivoted member in pressure applying position.

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