W. E. HEMENOVER.

APPARATUS FOR APPLYING RUBBER SOLES.

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1,160,983. Patented Nov. 16, 1915.

Fig. 1.

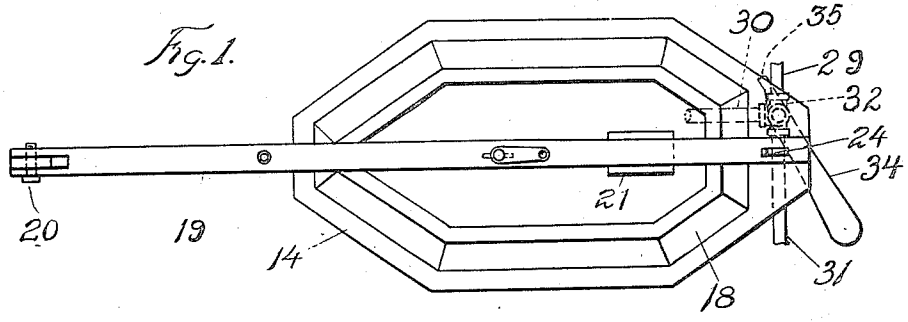


Fig. 2.

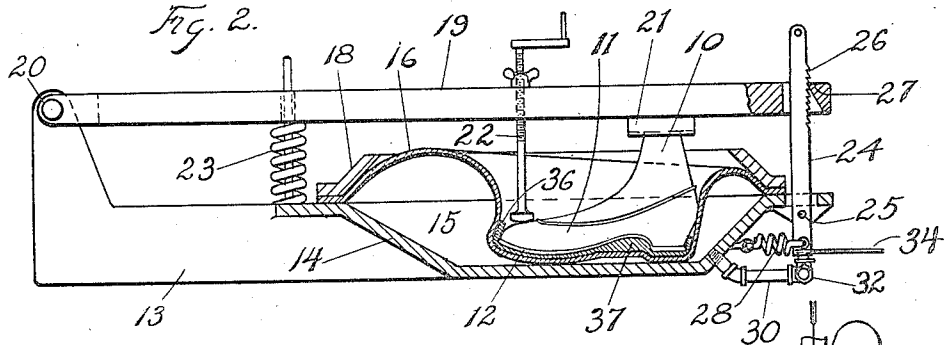


Fig. 3.

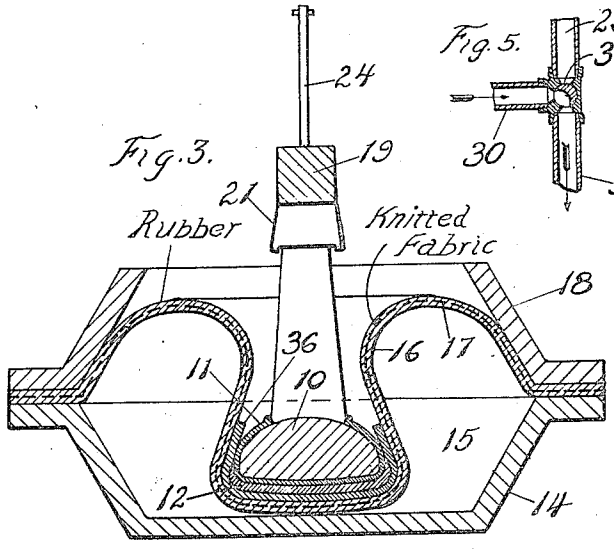


Fig. 5.

Fig. 4.

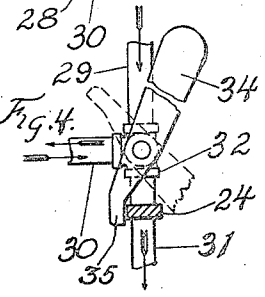
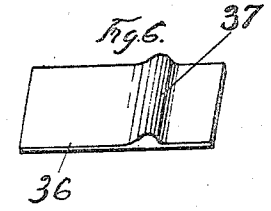


Fig. 6.



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APPARATUS FOR APPLYING RUBBER SOLES.

1,160,983. Specification of Letters Patent. Patented Nov. 16, 1915.

Application filed January 24, 1913. Serial No. 744,017.

To all whom it may concern:

Be it known that I, WILLIAM E. HEMENOVER, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Apparatus for Applying Rubber Soles, of which the following is a specification.

This invention relates to means for applying a flexible adhesive sole to the bottom of a boot or shoe or performing any analogous operation, and it is principally intended to be used in the manufacture of rubber boots, shoes and gaiters.

Although sole-laying on leather shoes by means of fluid-cushioned or inflated bags and diaphragms has been proposed, the usual method of attaching the unvulcanized sole to the bottom of a rubber shoe consists in applying pressure to the sole by means of a hand roller which is worked back and forth several times until the whole surface has been rolled. This operation requires considerable strength, skill and time, and the results are not always uniform.

It is the object of my invention to provide an apparatus to take the place of the hand method, and in solving this problem, I have had in view the exertion of an adequate pressure not only over the whole under surface, but also at the edges of the sole, particularly on "roll-edge" or "semi-roll edge" soles, meaning those which are more or less turned up at the edges for the purpose of affording strength and added resistance to wear.

Of the accompanying drawings, Figure 1 represents a top plan view of a sole-applying apparatus constructed according to my invention. Fig. 2 represents a longitudinal section. Fig. 3 represents a transverse section on a larger scale. Fig. 4 represents an enlarged plan, and Fig. 5 a horizontal section of the controlling valve for the air-pressure chamber. Fig. 6 represents a perspective view of a flexible pad adapted to be interposed between the diaphragm and sole.

In the drawings 10 is a last, 11 an unvulcanized shoe body built thereon, and 12 an unvulcanized sole applied to the body, said sole in the present illustration having a projecting margin which, in the completed shoe, is turned or rolled up around the lower part of the upper.

The sole-applying apparatus here shown (which of course could be variously modified in its construction without departing from my invention) comprises a frame 13, formed with a dish-like portion 14, whose interior constitutes a compressed-air chamber 15. The cover or top wall of this chamber is formed by a flexible diaphragm 16 which may be made of rubber with an internal strengthening ply or layer 17 of textile fabric. After trying various kinds of reinforcement I find that a knitted fabric is preferable for the purpose because its stretch is the same in all directions, allowing uniform pressure on the sole. The edges of the diaphragm are clamped between the frame 10 and a ring 18 suitably extended inwardly and upwardly to support the marginal portions of the diaphragm when inflated and thus prevent undue strain on the airtight joint between it and the frame. Preferably the diaphragm, when collapsed, is not perfectly flat, but has considerable fullness enabling it more readily to enwrap the shoe as hereinafter described. The diaphragm is substantially equivalent to half of a rubber bag, which might be substituted for the purpose of this invention, although I prefer the construction shown as being cheaper, more durable, and more easily manipulated.

19 is a hold-down bar or lever pivoted at 20 to the frame, and provided with a top-rest 21 and an adjustable toe-rest 22 for clamping the last in operative position. This bar is held in clamping position, against the tension of a spring 23, by means of a vertical latch lever 24, pivoted to the frame at 25, and having a series of teeth or abutments 26 engageable with an abutment 27 on the hold-down bar, whereby the latter may be quickly applied to the last and adapted for lasts of varying heights. A spring 28 attached to the latch-lever below its fulcrum, tends to keep said lever in latching engagement with the bar 19.

Compressed air is supplied to the chamber 15 through a pipe 29 and a branch pipe 30, and is exhausted through the latter and a pipe 31, there being a valve-casing 32 at the junction of said pipes, and in said casing a

plug valve 33 provided with a handle 34. An extension or toe 35 on said handle is adapted to engage the lower arm of lever 24, and cause the latter to release the hold-down lever 19 and permit the removal of the shoe, when said handle has been placed in the position shown by full lines in Fig. 4 so as to turn the valve 33 to the limit of its exhausting position as represented in Fig. 5. On turning the handle to this position, the diaphragm will first be collapsed by the discharge of pressure from the chamber 15, and then the last will be automatically released.

My invention further includes a flexible mat or pad 36, having a raised instep portion 37, and having a considerably greater length and width than the shoe, adapted to be placed between the latter and the diaphragm 16, and composed of a suitably flexible and ductile material, preferably vulcanized rubber. A number of these pads of various sizes and shapes of instep-portion 37, (or without such portion in the case of a flat-sole shoe) may be provided for different styles of shoes.

In the operation of this apparatus, a last with the unvulcanized rubber shoe body therein has applied to it the unvulcanized sole 12, and is then clamped down against the pad 36 by the hold-down bar 19, the under side of diaphragm 16 resting on the bottom of chamber 15. Compressed air is admitted to said chamber through the valve 33 and its pressure causes the diaphragm 16 and interposed pad 36 to be wrapped around and pressed tightly against the lower parts of the shoe, thereby exerting an evenly distributed pressure on all parts of the sole, which causes the latter to adhere closely to the shoe body. During the distention of the diaphragm, the portions thereof which rise alongside of the shoe adjacent to the sides and ends of the latter exert a wiping and stretching action on the upturning marginal parts of the pad 36, which latter, by reason of its ductility, the frictional pull of the diaphragm on its outer surface, and the frictional drag on its inner surface in contact with the sole, effectively turns and presses the extreme edges of the sole around and in intimate contact with the lower portions of the shoe-upper, and produces a permanent adhesion which may thereafter be perfected by the vulcanizing process. The upward wiping and turning action exerted by the diaphragm in conjunction with the pad is particularly beneficial in applying roll-edge or semi-roll edge soles. With ordinary flush-edge soles the pad may be omitted, but even in applying soles of this character the pad, or some filler equivalent to the raised instep portion 37, may be found desirable, especially on shoes having a high instep. After the pressure has been left on for a short time, the valve 33 is turned to exhaust the chamber 15, and a further turning of handle 34 then automatically releases the last as described.

I claim:—

1. A sole-applying apparatus comprising a last-support, a fluid-pressure chamber opposed thereto and having a flexible wall adapted to press against the sole of the lasted shoe, said wall being sufficiently full and elastic to substantially enwrap the sides as well as the bottom of the shoe, a relatively thin, flexible and elastic pad overlying said wall and conformable to the bottom and sides of the shoe, and means for inflating and discharging said chamber, the wall, during its distention, being adapted to turn the margins of the pad around the edges and up the sides of the shoe with a wiping and rolling action capable of affixing the margins of a roll-edge or semi-roll edge rubber sole.

2. A sole-applying apparatus comprising a stationary chamber whose top wall is a flexible diaphragm conformable to the lower portion of a lasted shoe placed bottom-side down thereon, means for charging and discharging said chamber, and a last-clamp formed as a lever which is mounted on a pivot at one end and adapted to be turned thereon to raise and lower it and thereby release or confine the last; said clamp being provided with last-engaging means on its intermediate portion, and retaining means at the opposite end of said clamp, adapted to hold the latter in clamping position.

3. A sole applying apparatus comprising a fluid pressure chamber having a flexible sole-pressing wall, a device for holding a last with its bottom part in coöperative relation with said wall, means for charging and discharging said chamber, a controller for said means, and mechanism operated by said controller and controlling the last-holding device.

4. A sole-applying apparatus comprising a fluid-pressure chamber having a flexible sole-pressing wall, a last clamp, a valve for discharging said chamber, a member for operating said valve, and locking means for said clamp, adapted to be unlocked by the valve-opening movement of said operating member.

5. A sole-applying apparatus comprising a fluid-pressure chamber having a flexible sole-pressing wall, a pivoted last-clamp, a spring-projected latch for holding the latter in clamping position, a valve for charging and discharging said chamber, and means connected with said valve for retracting said latch at the limit of the discharging movement of the valve.

6. A sole-applying apparatus comprising a fluid-pressure chamber having a flexible wall composed of rubber with a reinforcement of knitted fabric, said wall being sufficiently full and elastic to substantially en-

wrap the sides as well as the bottom of the shoe, means for charging and discharging said chamber, and means for holding a lasted shoe in operative relation to said wall.

7. A sole-applying apparatus comprising a fluid-pressure chamber having a rigid portion, a flexible diaphragm secured thereto and composed of rubber provided with a reinforcing ply of knitted fabric, said diaphragm being sufficiently full and elastic to substantially enwrap the sides as well as the bottom of the shoe, means for charging and discharging said chamber, and means for holding a lasted shoe in operative relation to said flexible diaphragm.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses, this 20 day of January, 1913.

WILLIAM E. HEMENOVER.

Witnesses:

WALTER K. MEANS,

ILLA N. KIRN.