# JOHN M. HUNTER.

## Improvement in Shoe-Soles.

No. 114,145. Patented April 25, 1871.

Fig. 8ª,

Fig. 7,

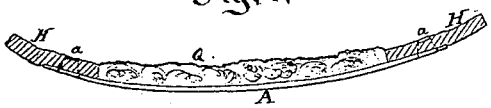


Fig. 8,

Fig. 1,

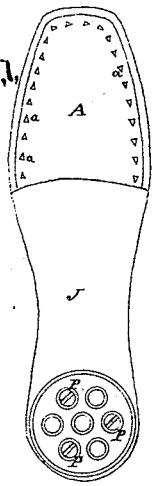


Fig. 2,

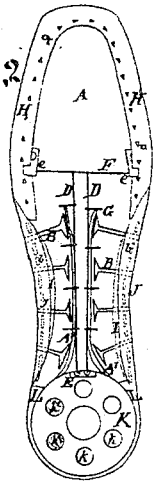


Fig. 3,

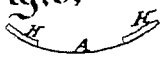


Fig. 4,

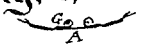


Fig. 5,

Fig. 6,

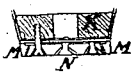


Fig. 10,

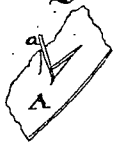


Fig. 12,

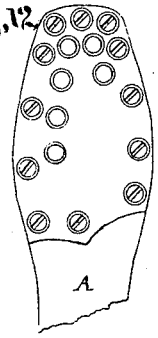


Fig. 11,

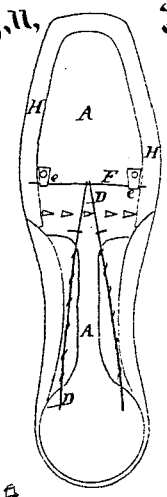


Fig. 13,

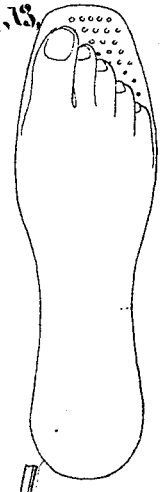
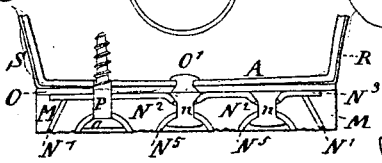


Fig. 14,

Fig. 9,



Witnesses,
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C. C. Livingston

Inventor;
J. M. Hunter
by his attorneys, H. B. Stetson

# United States Patent Office.

JOHN MORRISON HUNTER, OF NEW YORK, N. Y.

Letters Patent No. 114,145, dated April 25, 1871.

## IMPROVEMENT IN SHOE-SOLES.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, JOHN MORRISON HUNTER, of the city and county of New York, State of New York, have invented certain new and useful Improvements in Shoe-Soles.

My improved sole contains some of the features shown in my patent dated June 16, 1868.

The following is a description of what I consider the best means of carrying out the present invention.

The accompanying drawing forms a part of this specification.

Figure 1 is a bottom view, by which I mean a view of the face which is toward the ground.

Figure 2 is a top view, by which I mean the face which is uppermost when in use.

It will be understood that there may be an outer sole exterior to the face shown in fig. 1, if desired, and that there will always be an inner sole, with a suitable filling of hair or analogous material, between the face shown in fig. 2 and the inner sole nearer the foot.

The drawing represents the novel parts; their relation to the ordinary parts will be very readily understood.

Figures 3, 4, 5, and 6 are cross-sections, arranged up and down the side of fig. 2. Each represents a cross-section on a line opposite to where the figure is placed; that is to say, fig. 3 is a cross-section near the broadest part of the ball of the foot. Fig. 4 is a cross-section further back, and beginning to show the shank-springs. Fig. 5 is a cross-section through the main portion of the heel.

Figures 7, 8, and 9 are cross-sections on a larger scale. They are about the full size for a man's shoe or boot. Fig. 7 is a cross-section through the broadest part or ball of the foot. Fig. 8 is a cross-section through the shank, and fig. 9 is a central section across the lower or bearing portion of the heel.

Figure 10 is a perspective view of the points, which perform an important function in confining my metallic portion to the welt or soft material around the edge and at other parts of the sole. The metal is cut in V-shaped incisions and the point is turned up nearly or quite at right angles and passing through the material above. A line of these points extends around all the front part of the sole—not on the edge, but near the edge.

The remaining figures show modifications of certain parts, which may be preferable in some instances or for some purposes.

Figure 8* is a modification of the shank portion, showing the same general construction of the shank, with stout canvas or analogous material folded over the edge and secured both above and below the metal by the points near the edge, just described.

Figure 11 shows another modification of the means of making the shank and adjacent portions. In this the metal is cut quite narrow, and the peculiar T-shaped incisions are omitted. The springs are held in place by cord or by stitching, as shown. There is also in this modification a line of V-shaped incisions across just in rear of the ball of the foot, which aid in securing the metal to the adjacent parts.

Figure 12 shows an outer sole, of leather or of some strong and durable substitute for leather, secured exterior to my metallic sole by means of Japan varnish and of my peculiar concave washers and screws. Rivets are used to hold additional washers to the wearing sole.

Figure 13 is a view looking down upon the foot and showing how the front portion of the in-sole, which is not ordinarily covered by the foot, is provided with holes to allow air to be received down through the in-sole into the interstices within the hair filling and be ejected again at each movement of the foot in walking. It forms a slight but very important ventilation of the shoe by inducing a slight movement of the air alternately inward and outward along the space within the shoe between the shoe and the foot.

Figure 14 shows a heel-shell struck up in a separate piece and adapted to be attached by rivets to a shank of leather or analogous material.

Similar letters of reference indicate corresponding parts in all the figures.

A is a piece of rolled brass, or other suitable sheet metal, struck by dies, at one or more operations, into the form represented, corresponding to the contour desired, or according to the prevailing fashion for the exterior or outer surface of the entire sole and heel.

Along a line near the outer edge of the entire front portion are cut V-shaped scores, and the angular points *a*, thus determined, are bent up at the same or a subsequent operation of a pair of dies. The points thus raised are subsequently thrust through and clinched upon another layer or partial layer of material, which will be presently described.

The shank is peculiarly provided, to give proper strength, with a highly-elastic action. The metal here is cut through, forming T-shaped scores of the form and arrangement represented by B. The metal left remaining between these scores B may be provided with one or more points, *a*, before described, or it may be secured all together by stitching through holes *b* formed near the edge to receive the shoe-thread or other stitching material.

Fig. 8* shows what I esteem the preferable mode of forming this part. Here the edges of the metal are inclosed between two parts of a folded strip of stout canvas, which is secured thereon by two series of the

points *a* alternately directed upward and downward. Those which project up extend through and are clinched upon the upper half of the folded strip C. Those which extend downward extend through and are clinched upon the lower half of the folded strip C. The folded edge is allowed to project enough beyond the metal to allow of being sewn. By this means the stitches are not necessarily located in any particular position, as would be necessary in order to stitch through the holes *b*. It will, of course, be understood that the metal of the sole along the shank, where this position is made, must be cut sufficiently narrow to allow the folded canvas C to extend over a little and form a firm holding-piece without projecting beyond the general contour of the finished sole.

The scores B render the sole highly elastic. I esteem it important to fortify the strength after so much of the metal has been removed.

To this end I solder or otherwise affix strips A', extending along the entire shank just within the T-shaped scores B.

I furthermore provide springs D extending along near the same lines. They may be formed of round steel wire, as represented. The rear end of these wires may be bent downward nearly or quite at right angles, and is held in sockets E riveted upon the front of the heel-shell.

The front ends of the springs D are formed into loops or small eyes, and made to embrace a cross-spring, F, which may be of small round steel wire, held in eyes *e*, riveted or otherwise secured upon the sole-plate A.

Along the shank are placed guides G, which may be passed through and through the suitable holes in the sole, and secured by soldering or by simply pressing the metal down thereon, or by both these means.

The inner ends of the guides should be adapted to the form and condition of the longitudinal spring.

With the round wire springs D the guides may be formed in correspondingly-rounded hooks. I propose in some instances to use a flat spring cut from ordinary steel and extending along the central line of the shank. In such case the guides G may rise and bend the other way from that here represented, so as to reach over a little upon the edge of the flat spring.

The function of these guides G is to sustain the springs D or the corresponding springs of spring there employed in position, and allow it to contribute its elasticity and strength to the sole without a possibility of its getting misplaced.

H is a welt of leather, prepared felt, or other suitable material, projecting over the edge of the metallic sole A, and firmly secured by the clinching-points *a*, as above intimated. The stitches for securing the outer sole to the upper portions of the shoe pass through the overhanging edge of this welt.

I and J are pieces of thin material covering the base of the shank and stiffening the cut metal into a single, harmonious, but flexible and strong shank.

The inner envelope I is preferably of woven fabric, as linen. The outer piece J may be thin leather. Split-leather or other ordinary qualities may serve. The edges of both are folded over and the whole of the surfaces are cemented by Japan varnish or other suitable cementing material which will endure weather and all the conditions to which boots and shoes are subjected.

When the edges of the shank are sewed to the work above, the stitches may pass through these double envelopes I J as well as through the folded strip of canvas C.

Stitches pass through the edge of the inner envelope, the edge of the outer envelope covering said stitches being cemented and tucked into the crevice, as described in the attachment of the heel to the upper.

I have devoted much attention to the construction of the heel to produce the best possible construction with a due regard to economy. The interior of this portion of the shell A is filled out largely with wood. There may be two principal modifications of this work. In one the wood is perforated with large holes, *k*, and the holes are filled with moderately-compressed hair, *k'*. In the other the filling is solid. My experiments have indicated pear-wood as the best for this use; but where this is scarce apple-wood or any wood may be employed which is light and not liable to split.

A small annular space exists around the block K which receives a piece of stout canvas, L, which extends up above the edge of the metal portion A and forms a body to be sewed. This canvas is firmly nailed to the wood K by small nails before the insertion of either into the shell A. These parts may be also further secured by Japan or other suitable varnish.

Outside of the heel portion of the shell A I secure, by Japan varnish or other suitable cement, two thicknesses of fine woven fabric, R S. The lower edges of both project a little under and are secured upon the bottom of the heel part of the sole A. The upper edges of each extend above the metal A and also above the canvas L. The innermost, R, is folded over the edge of the canvas, and is secured in that position on the boot or shoe by the stitches, not represented, which pass through the canvas. The outermost, S, is left with its upper edge loose until the stitching just referred to is completed and the boot is nearly finished, when it is slightly varnished and tucked over and confined tightly within the crease, which it helps to fill, between the upper or vamp and the sole, as will be readily understood by workmen.

I provide very efficiently, by novel means, against the very common difficulty of unequal wearing of the heel. The bearing portion is in two principal parts, each capable of being separately revolved or partially revolved under peculiar conditions. The outermost ring M is revolved easily, the motion being resisted only by friction. It is intended to turn this to a greater or lesser extent at short intervals either by the finger and thumb or by a suitable tool, which I propose to furnish to purchasers, adapted to firmly clasp on the metal and take hold of a large surface so as to act efficiently without abrading anything.

The ring M may be entirely of iron or steel, or its body may be of either of these metals with an outer surface of brass, nickel, or other more tasty material. I propose for ordinary use a ring of malleable iron case-hardened. It is desirable to produce this ring with economy, in large quantities, and to secure as high a degree of hardness as possible.

The inner surface of the ring M is conical. Within this lies a compound part, separately secured, which I will designate in the mass by the single letter N, designating by $N^1$, $N^2$, &c., the several parts thereof.

$N^1$ is an external ring, made conical and fitting nicely within the conical interior ring M. It serves as a means of keeping the filling or inclosed material from spreading against the ring M. Within this ring N is a piece of substantial leather or of some of the various substitutes therefor. I propose, in ordinary cases, to employ felted hair united by rubber or by some suitable cementing material. It is secured by a central rivet and by several additional rivets and screws peculiarly mounted, as will presently appear.

The ring M and its interior work do not rest directly against the inwardly-folded edges of the material R S. A continuous sheet or disk of metal, O, is interposed, secured, by a rivet, O', to the center of the base of the heel portion of the sole A. The ring M is held and turns between this plate O and the ring $N^1$. The ring $N^1$ and its interior filling-piece or main bearing-piece $N^2$ bear thereon through the medium of an interposed plate of metal, $N^3$.

This plate $N^3$ holds rivets *n*, which reach down through the filling-piece or body $N^2$, and rivet on the lower side through the agency of the peculiar concave washers $N^5$, which allow for a large amount of wear without destroying the washers or the large heads of the rivets received therein.

I esteem it very important that the ring M shall cover and properly match over the edge of the plate $N^3$. For this purpose I form it with the offset represented on its face, which is broader, one side of the offset fitting against the plate $N^3$ and the other against the material O. The ring M is alone presented on the exterior or edge of the heel, and the edge of the plate $N^3$ is entirely concealed.

I propose in some cases, as, for example, in military shoes, to interpose an outer metal plate correspondingly indented to match to the conical washers $N^5$, and by preference roughened on its outer surface to afford a better hold on ice or slippery surfaces generally.

P are screws sunk into corresponding concave washers $N^5$, and pass through all the several portions of the compound part N, and through holes not before described in the metal O A.

The threads of these screws take in the wood part K within the heel.

The positions of the holes for these screws are very carefully determined by templets or otherwise, and are preferably made by machinery in so exactly-determined positions that the entire compound portion N may be shifted around as many times as may be required and the screws and holes will match in any position.

Now, to compensate for any inequality of the wear on the ring M it is necessary simply to turn it by taking hold of it with the hand or with any suitable tool; but to turn the compound heel-piece N it is necessary to remove the three screws P and to turn the piece N exactly a third of its revolution, and then reinsert the screws in their new positions.

This adjustment may be done as often as may be required; but it is evidently more laborious than the simple turning of the ring M, and will ordinarily be performed with less frequency.

I might have mentioned at an earlier period that the space within the welt H is filled with a thick mat or mass of hair, either in its natural condition or slightly cemented together with rubber or other suitable material. This makes a highly-elastic bed on which the inner sole, not represented, rests.

By making a series of holes in the toe portion of the inner sole which is not covered by the foot it will follow that the alternate compression and expansion of the hair Q will cause the air to alternately move inward and outward through the holes in the inner sole, and thus induce a slight but very important ventilating effect on the entire foot.

At each rise of the foot the space below the in-sole expands, and air is drawn down along the side of the foot toward the holes in the front of the in-sole.

At each tread upon the sole the space below the in-sole is reduced and air is driven up through the holes and outward along the sides of the foot.

It may not be necessary to say that the upper portion of my boots and shoes may be of any ordinary or suitable construction.

My soles are adapted to be used with any size or style of boot or shoe. It may be made light for ladies, or extra stout for miners and others employed in rocky situations or where the soles are, for any reasons, subjected to unusually rough usage.

I propose to make all sizes, and to provide two sets of dies to make rights and lefts for each size.

I do not confine myself to any of the precise materials here indicated. I have intimated some of the substitutes which may be employed in some cases. It will be understood that the materials may be varied according to the expense which may be involved or the peculiar fashions prevailing, or the tastes of the wearer, as also, and obviously, to the peculiar conditions for which the shoe is intended.

Leather may be used in place of the woven fabrics wherever mentioned, and some or all of the various substitutes for leather may be used in the places where I have described leather.

I have spoken of the exterior ring M as being surfaced with nickel or various other materials, implying that it was done by plating.

It will be obvious that where an exterior surfacing is employed the exterior material may be formed in an entirely separate shell and secured thereto by riveting, soldering, Japan varnish, or any ordinary or suitable means.

Some of the advantages of my invention may be secured by the use of a part of the improvement without the whole; thus, for example, I can dispense with the peculiarly-cut shank, and may remove the metal entirely instead of cutting the scores B. It is necessary in such case merely to make the folded strip C sufficiently wider to compensate for the extraordinary narrowing of the metal A.

I can make the entire heel-portion of the plate A with all its attachments, as herein shown, and united to a shank and front sole of any ordinary or suitable material.

Fig. 14 shows the general means for attaching such a heel-shell to a shank of leather, cloth, or other suitable material not represented.

The same kind of conical washers represented here at the heel may be employed with suitable rivets, screws, or the like to hold the outer sole upon the parts here shown.

The metal shank may, if preferred, extend over and be attached to the top of a heel of wood provided, as here specified, dispensing with the metal heel-shell.

In such case the edges of the wood heel should be covered with thin leather or other suitable material, and combined with the rotating heel-disk and ring, as described.

I propose in some cases, where a heel-shell of metal is employed, to give it a solid filling with a compound of sawdust and glue-water or other suitable composition.

The heel, whether made by any of these plans, may be attached to the upper by six or other number of long nails, passing through the heel and bent over on the inner sole by means of an iron last. This may be employed in addition to the sewing at the edge, as before described.

When a wooden heel with holes is used, as shown in fig. 2, it may be preferable in some cases to introduce in the holes a metal spring or other elastic material in place of the hair or wool described.

By the conical form of the interior of the ring M I arrest noise and give strength and surface next to the heel, where most needed, and with little weight of metal.

My improved sole may be applied by nails instead of stitches, in which case the attachment differs from the ordinary nailing only in the fact that I make use of Japan varnish with the design to so far aid in securing the parts that fewer nails may be required and the sole not made objectionably stiff.

I claim as my invention—

1. The peculiarly-cut shank A B, having slits or scores extending inward from the edge, and terminating with a cross-slit or widening, as shown.

2. The thickened lines A′, produced by soldering or otherwise firmly attaching strips of additional material, extending along the shank, as and for the purposes specified.

3. The spring or springs D and guides G, arranged

relatively to each other and to the shank, as specified.

4. The cross-spring F, arranged in front of the shank and serving therewith, as specified.

5. The sockets E in the front of the heel-shell, receiving and holding the spring or springs D, and serving in combination therewith, as represented.

6. The heel-block K, with holes *k* filled with hair or analogous soft material, as specified.

7. The freely-revolving metallic ring M, made conical on its inner surface, and with the offset shown on the upper face matching to the plate $N^2$, as shown, and mounted in a heel and adapted to serve therewith, as and for the purposes specified.

8. The exterior ring $N^1$ of the main bearing portion of the heel, arranged to serve, as represented, within the revolving ring M, to prevent the spreading of the inner materials against the same, as specified.

9. The points *a*, cut from the metal A within the line of the edge, and serving relatively to the metal A and to the welt H, as specified.

10. The covering-layers I J, or either of them, on a flexible and strengthened metallic shank, as specified.

11. The combination of the metal shank, made strong and elastic, as shown, with a heel-body of wood or analogous material, carrying a heel-disk, M N, or equivalent facing, as herein specified.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

J. MORRISON HUNTER.

Witnesses:

C. C. LIVINGS,

A. HOERMANN.