

E. O. KRENTLER.
HINGED LAST.
APPLICATION FILED MAY 3, 1909.

936,138.

Patented Oct. 5, 1909.

Fig. 1.

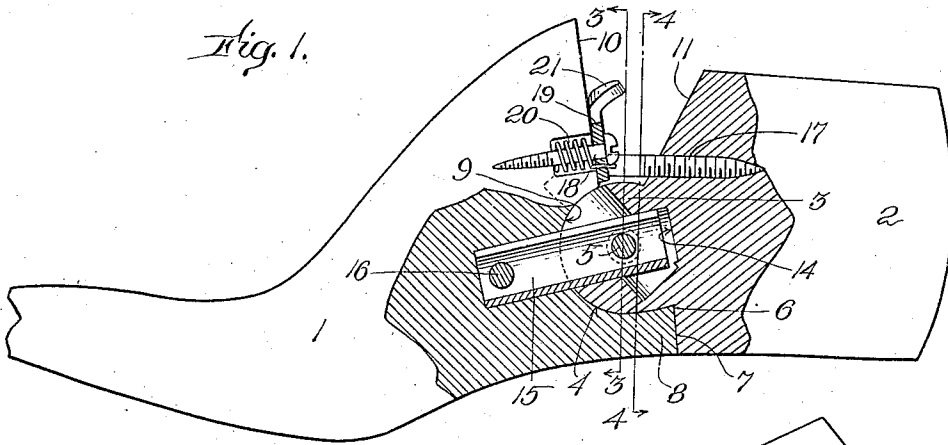


Fig. 2.

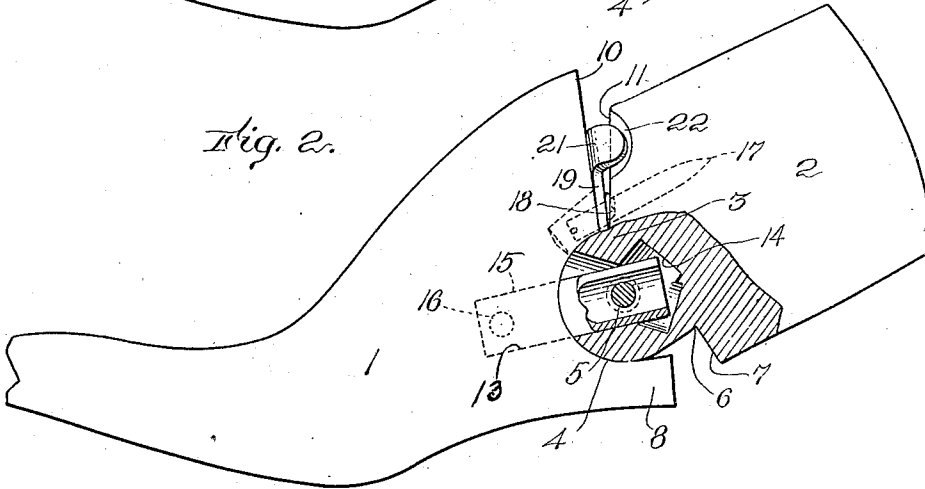


Fig. 3.

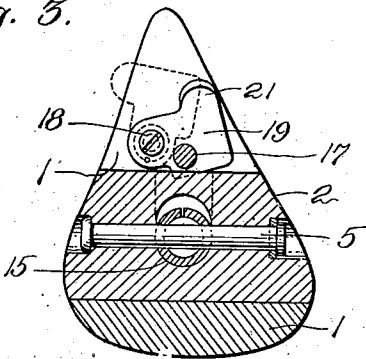
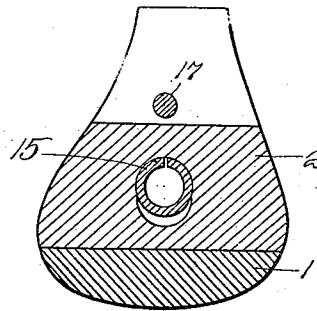


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

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HINGED LAST.

936,138.

Specification of Letters Patent.

Patented Oct. 5, 1909.

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To all whom it may concern:

Be it known that I, EDWIN O. KRENTLER, a citizen of the United States, and resident of Detroit, in the county of Wayne and State of Michigan, have invented an Improvement in Hinged Lasts, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

To keep pace with the modern machinery and processes used in shoe manufacture, it becomes constantly necessary to provide still stronger hinged lasts, as the early forms of hinged lasts, although sufficiently strong and practical for shoe manufacture as then conducted, fail to stand up to the present requirements. Accordingly my present invention aims to provide a hinged last capable of enduring the utmost degree of vertical and twisting strains, blows, and rough usage to which a last is subjected at the present time. I have secured this desired object by providing an interlocking construction of such shape at the hinge joint that the vertical and twisting strains (as for instance those brought on the last during the leveling process) are sustained almost entirely by the contacting surfaces or walls of the wood itself, and by providing a forepart and heel-part as nearly as possible with uncut, intact or integral abutting ends.

As heretofore constructed, it has been considered necessary in hinged lasts to provide saw cuts and kerfs in the abutting ends of the last-parts at the hinge joint for receiving the hinging means, locking means, etc., and I have found that most of the weaknesses and breakages and defects of the hinged last in use have been due to this cutting away of the wood and the consequent introduction of lines and planes of weakness which promote the splitting and breaking down of the lasts. I eliminate all these simply by providing a relatively small and high knuckle joint of considerable overlapping extent, and connect the last-parts by a central cylindrical dowel-like hinge which necessitates merely the boring of a short longitudinal hole into the end of the forepart and into the end of the heel-part the hole in the latter being enlarged slightly to permit the required pivotal movement of the heel-part. By this means the concave-convex surfaces of the short radius knuckle

joint take up all twisting strains and give mutual support against vertical, longitudinal and all other strains, while the single dowel-like hinge in the said two bored holes mentioned is surrounded on all sides by the virgin wood, which, being intact or uncut, affords the greatest strength possible against splitting and the like. As neither last-part contains any angular recess, kerf, or cut transversely through or across its secant end, there is present no tendency to split or to start a cleavage in any particular direction. Furthermore, as my last depends for its main strength upon the intact wood and the firm interlocking relation of the curved surfaces of the wood at the knuckle joint, I provide special locking means for maintaining the contacting surfaces of the wood always in unyielding, mutual-supporting engagement when the last is in lengthened position.

The further constructional details of my invention and advantages thereof will be pointed out more at length in the course of the following description, considered with reference to the accompanying drawings, in which I have shown a preferred embodiment of the invention.

In the drawings, Figure 1 represents in side elevation, partly broken away, a last constructed according to my invention: Fig. 2 is a view thereof in side elevation showing the last collapsed: Fig. 3 is a cross-sectional view thereof at the joint taken on the line 3—3, Fig. 1, looking toward the forepart: and Fig. 4 is a cross-sectional view looking toward the heel-part taken on the line 4—4, Fig. 1.

For convenience of illustration, I have shown a conventional form of last, comprising a forepart 1 and a heel-part 2. Instead of severing these parts from each other along the usual lines which have been long followed in hinged lasts, I provide a knuckle 3 of short radius in the heel-part having its surface 4 curved concentrically from the pivot center 5 and carried at its lower end considerably toward the rear to a point 6, which is preferably about half an inch more or less (depending upon the style of shoe, height of arch, heel, etc.) above the bottom of the last, the cut 7 extending from the point 6 to the bottom, thereby affording a relatively strong rear end 8 of the forepart, overlapping practically the entire

knuckle of the heel-part and preferably extending rearwardly to the pivot thereof. By this means not only is the convex surface of the knuckle held firmly and solidly in the concave complementary seat 9 formed therefor in the forepart, but the projecting end 8, extending as it does throughout the entire width of the last and rearwardly sufficiently to provide a broad horizontal bearing or support, insures a bracing strength or strut-like effect which adds very materially to the total strength of the last-joint. The end of the projection 8 abuts squarely against the adjacent end or wall of the heel-part, and gives an exceedingly strong bracing effect to that which has already been mentioned. Also this construction resists all tendency of the last to buckle or collapse bottomward. At its top side the last-parts are severed along the lines 10, 11 respectively so as to provide a gap or opening 12 to permit one part to turn on the other about the pivot 5. A single hole is bored at 13 into the forepart and at 14 into the heel-part corresponding in size to the hinge or tubular plug 15 (laterally enlarged vertically in the heel part to permit the pivotal action) which is then driven thereinto and secured by pins or rivets 5, 16, the former constituting the pivot or hinge pintle of the last about which the heel-part turns in moving from shortened to lengthened position or vice versa. In a last of this description, in which the wood is depended upon for giving the main strength, etc., more or less shrinkage will inevitably take place, and accordingly I screw into the heel-part a small threaded stud 17 whose forward end terminates close to the forepart when the last is in extended or lengthened position, and pivoted at 18 on the adjacent wall of the forepart a wear-plate or latch 19 which is normally held under tendency to move across the front end of the pin 17 by a spring 20. Thus when the last is turned into its fully lengthened position, the plate 19 snaps tightly in front of the pin 17 for the latter to bear against. As the last shrinks or the plate wears, the pin 17 is turned correspondingly outward so as to maintain at all times a perfectly snug tight fit. The plate 19 is provided with an ear or finger-hold 21 to permit it to be conveniently moved backward by the operator, and the heel-part is preferably cut away at 22 therefor.

I am aware that lasts have been heretofore constructed or proposed with a knuckle joint (as shown for instance in my Patent No. 864,654 or the Pym patent No. 608,006), but never as herein shown nor with the advantages herein set forth, but I do not claim the same broadly herein, but only when so constructed as to secure the advantages of strength and operation already explained and as hereinafter claimed. The special ar-

rangement of union or hinging member is also new and herein claimed in its cooperative relation to the adjacent parts and construction. Also I wish it understood that my invention is capable of various modifications in constructional details and combination and arrangement of parts without departing from the spirit and scope of the invention as hereinafter claimed.

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

1. A hinged last, comprising a fore-part and a heel part, one part being provided with a knuckle extending horizontally across the last and projecting longitudinally into the other part, and the other part containing a complementary concave socket in direct contact with which said knuckle is arranged to turn, said two last-parts at approximately the transverse and vertical middle of their knuckle and socket respectively having a longitudinal hole, a rigid plug mounted in said holes for holding the two last-parts together against longitudinal separation, with the knuckle constantly seated in the socket, means cooperating with the walls of the hole in the socket-containing part to hold said plug immovably in the last, and a pivot pin extending through the opposite end of said plug and into the adjacent last-part concentrically of said knuckle, said hole in the knuckle having vertical enlargement, sufficient only to permit the requisite pivotal movement of the heel part, the wood of said last-parts around said holes being otherwise uncut and intact.

2. A hinged last, having a heel part provided with a knuckle of relatively short radius projecting from its front end and extending horizontally across the last, a forepart provided with a complementary concave socket in contact with which said knuckle is arranged to turn, said forepart having its lower end projecting rearwardly to overlap the knuckle and abut against the heel part for resisting vertical and longitudinal pressures, said forepart and heel part having central longitudinal hinge-holes formed in their abutting socket and knuckle ends, the wood of said last-parts around said holes being circumferentially intact about the hinge-holes at the secant ends of the last-parts, a rigid plug held in said holes, a transverse pin extending through the forepart and forward end of said plug for retaining the latter immovably in the forepart, and a transverse pivot pin extending through said knuckle and the rear end of said plug on which the heel part swings with relation to the forepart.

3. A hinged last having a heel-part provided with a knuckle of relatively short radius projecting from its front end and extending horizontally across the last and

terminating on its under side within the body of the last above the bottom, and having a wall extending thence downwardly to the bottom of the last in position to resist longitudinal strains, a forepart provided with a complemental concave socket in contact with which said knuckle is arranged to turn, said forepart having its lower end projecting rearwardly to overlap the entire knuckle and abut against said wall from said knuckle to the bottom of the last for resisting vertical and longitudinal pressures, and rigid hinging means embedded within said knuckle and pivoted concentrically therein and immovably secured in the forepart.

4. A hinged last having a heel-part provided with a knuckle of relatively short radius projecting from its front end and extending horizontally across the last and terminating on its under side within the body of the last above the bottom, and having a wall extending thence downwardly to the bottom of the last in position to resist longitudinal strains, a forepart provided with a complemental concave socket in contact with which said knuckle is arranged to turn, said forepart having its lower end projecting rearwardly to overlap the entire knuckle and abut against said wall from said knuckle to the bottom of the last for resisting vertical and longitudinal pressures, said forepart and heel-part having central longitudinal hinge-holes formed in their abutting socket and knuckle ends, the wood of said last-parts around said holes being circumferentially intact about the hinge-holes at the secant ends of the last-parts, a rigid plug held in said holes, a transverse pin extending through the forepart and forward end of said plug for retaining the latter immovable in the forepart, and a transverse pivot pin extending through said knuckle and the rear end of said plug on which the heel-part swings with relation to the forepart.

5. A hinged last, having a heel part provided with a knuckle of relatively short radius projecting from its front end and extending horizontally across the last, a forepart provided with a complemental concave socket in contact with which said knuckle is arranged to turn, said forepart having its lower end projecting rearwardly to overlap the knuckle and abut against the heel part for resisting vertical and longitudinal pressures, said forepart and heel part having central longitudinal hinge-holes formed in their abutting socket and knuckle ends, shaped to receive a plug connection and permit the necessary last movements, and the surrounding wood thereof being otherwise uncut and in its original intact position, and a plug-like connection fitted and secured at its opposite ends in said hinge-holes in the forepart and heel part respectively to permit

the knuckle to turn in the socket while preventing the separation of the last-parts.

6. A hinged last, comprising a forepart and heel-part, one of which is provided with a projecting knuckle extending transversely across the last and terminating on its under side at an interior point in the body of the last above the bottom, and the other of which is provided with a complemental concave socket in which said knuckle is seated to turn, the last-part containing said socket having its adjacent bottom end arranged to overlap the socket to the extreme lower end thereof at said interior point in the body of the last above the bottom, said two last-parts from said interior point to the bottom of the last having upright abutting walls for resisting longitudinal and vertical pressures brought upon the last, said two last-parts at approximately the transverse and vertical middle of their knuckle and socket respectively having a longitudinal hole, shaped to receive a plug connection and permit the necessary last movements, and the surrounding wood thereof being otherwise uncut and in its original intact position, and a plug-like connection fitted and secured at its opposite ends in said hole in the forepart and heel-part respectively to permit the knuckle to turn in the socket while preventing the separation of the last-parts.

7. A hinged last, comprising a forepart and heel-part, one of which is provided with a projecting knuckle extending transversely across the last and terminating on its under side at an interior point in the body of the last above the bottom, and the other of which is provided with a complemental concave socket in which said knuckle is seated to turn, the last-part containing said socket having its adjacent bottom end arranged to overlap the socket to the extreme lower end thereof at said interior point in the body of the last above the bottom, said two last-parts from said interior point to the bottom of the last having upright abutting walls for resisting longitudinal and vertical pressures brought upon the last, said two last-parts at approximately the transverse and vertical middle of their knuckle and socket respectively having a longitudinal hole the hole in the knuckle having vertical elongation to permit of the pivotal action of the heel part, and the surrounding wood thereof being otherwise uncut and in its original intact position, a plug-like connection fitted and secured at its opposite ends in said hole in the forepart and heel-part respectively to permit the knuckle to turn in the socket while preventing the separation of the last-parts, and means above said knuckle for normally maintaining the last rigid in fully lengthened position, comprising a pin projecting from the adjacent face of one last-part and terminating close to the face of the opposite

last-part, and a wear-plate movable into and out of position across the end of said pin.

8. In a hinged last, a forepart and heel-part pivotally connected and separated so as to provide an opening between their adjacent upper ends, combined with a pin adjustably mounted to project across said opening from the face of one last-part, and a wear-plate mounted to move across the end of said pin and against the adjacent face of the opposite last-part.

9. In a hinged last, a forepart and heel-part pivotally connected and separated so as to provide an opening between their adjacent upper ends, combined with a pin threaded into the face of one last-part to project

across said opening close to the adjacent face of the opposite last-part, a wear-plate pivotally mounted on the face of the latter last-part to swing across the end of said pin when the last-parts are in fully lengthened position, and a spring for normally holding said plate under normal tendency to move into the last-mentioned position.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

EDWIN O. KRENTLER.

Witnesses:

W. A. FRASER,

O. E. FREEMAN.