No. 864,654. PATENTED AUG. 27, 1907.

E. O. KRENTLER.

HINGED LAST.

APPLICATION FILED JAN. 3, 1906.

Fig. 1.

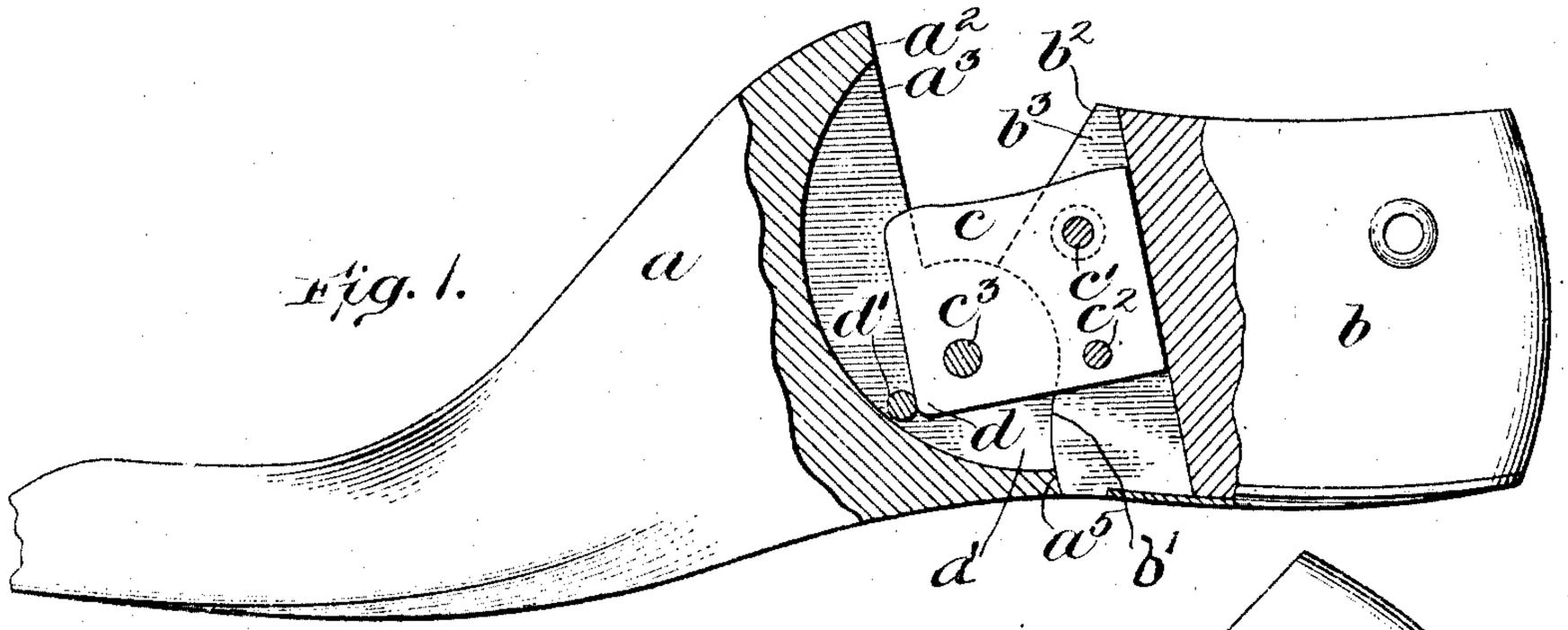


Fig. 2.

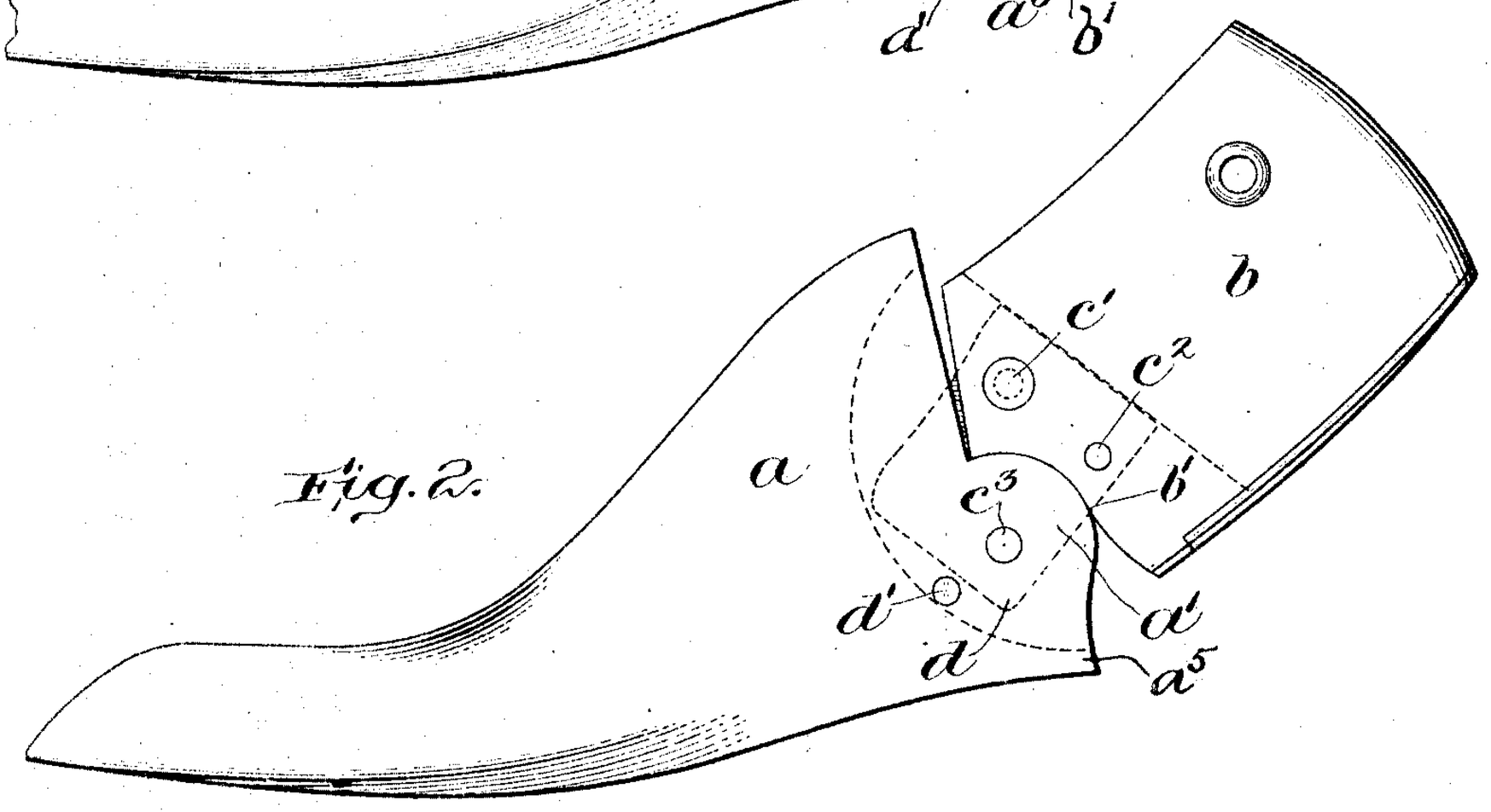
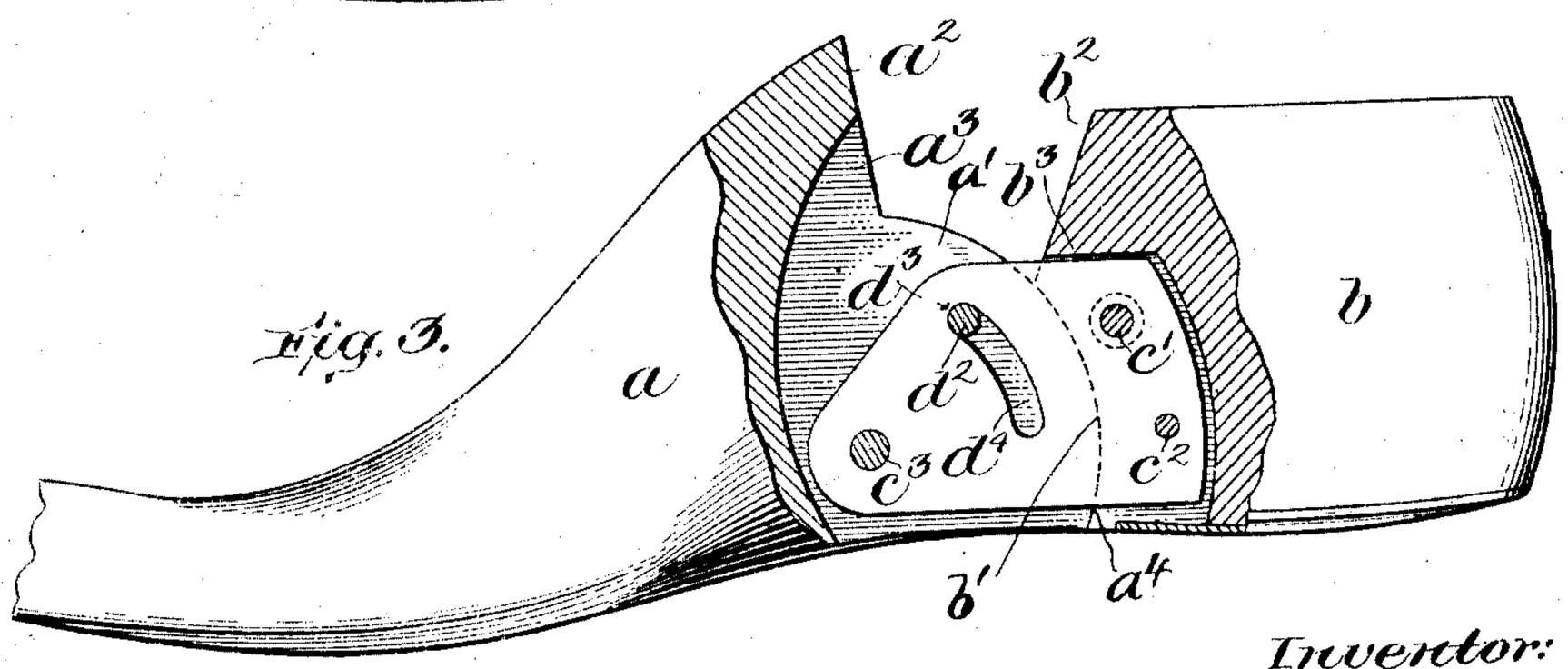


Fig. 3.



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HINGED LAST.

No. 864,654. Specification of Letters Patent. Patented Aug. 27, 1907.

Application filed January 3, 1905. Serial No. 239,386.

To all whom it may concern:

Be it known that I, EDWIN O. KRENTLER, a citizen of the United States, residing at 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 letters on the drawings representing like parts.

My invention is an improvement on the knuckle-joint last (Pym Patent No. 608,006, dated July 26, 1898).

The knuckle-joint last has proved to be well adapted to use as a first last, as it is exceedingly strong, being capable of withstanding the severe vertical and rocking strains to which first lasts are subjected, and it permits a quick swinging or shortening movement of the heel-part with relation to the fore-part. In further explanation of the last point above, it is to be borne in mind that a first last must shorten at once when the heel-part begins to turn on its pivot, in order that the last may be removed from the shoe without injury to the latter, and hence it is desirable that the pivot point shall be as low as possible. In view, however, of the hollow at the inside of the shank and the curvature at the arch of the foot, as well as for other reasons, it has been considered necessary to raise the pivot point to approximately the middle of the last in order to secure sufficient strength against splitting and breaking and tearing out the wood of the last, and this materially retarded the rapid introduction of hinged lasts as first lasts, but the knuckle-joint construction has made it possible to lower the pivot point decidedly, on account of the interlocking or bracing and strengthening action of the concave heel surface with relation to the convex knuckle-surface which coöperates with the vertical plate hinge and transverse rivets to constitute the so called knuckle joint last. I have found, however, that under some conditions of use this form of joint is apt to permit the wood to batter or give so as to cause the contacting bottom edges of the last-parts to get out of alinement, and accordingly my present invention resides in providing means for preventing the same and likewise preventing all tendency of the last to pull the pivot pin lengthwise in the last.

My invention will be further explained in the course of the following description, reference being had to the accompanying drawings in which I have shown preferred embodiments of the invention, the latter being more particularly defined in the appended claims also forming a part of this specification.

In the drawings, Figure 1 represents in side elevation a knuckle-joint last provided with my invention, parts being broken away for clearness of understanding; Fig. 2 is a similar view in side elevation showing the last collapsed; and Fig. 3 is a similar view showing a modification of my invention.

By the term knuckle last I mean a divided last having the upper portions of the adjacent ends of its jointed parts normally separated by a wedge-shaped gap sufficient to permit shortening without first lengthening, and having the lower meeting ends of said jointed parts interlocked by a horizontally projecting twin-knuckle on one part fitting against and partially contained in a concave recess formed transversely in the overhanging end of the opposite part, said interlocked meeting lower ends or corners being held in contact, and the last maintained in alinement, by a vertical plate pivoted low down or adjacent the bottom of the last, concentrically of said projecting twin-knuckle.

Referring to the drawings, I have shown a fore-part a provided with a knuckle a', and a heel part b provided with a socket b' fitting over said knuckle for approximately two thirds or three quarters of the length of curvature of the latter, the fore-part extending approximately vertically at a^2 from the upper end of the knuckle, and the heel-part extending obliquely upward at b^2 from the overhanging front end of the recess b', thereby permitting the last to shorten by a swinging movement, as shown in Fig. 2.

Mounted vertically in suitable slots a^3, b^3, is a vertical hinge-plate c secured rigidly in the heel-part b by a rivet c' and a pin c^2, and pivoted at c^3 concentrically of the knuckle to permit the desired swinging movement.

The great advantage of the knuckle last, is its capability of quick shortening movement coupled with great strength and rigidity of position, inasmuch as the parts interlock and brace each other in all positions so that no shifting or twisting is possible, and there is always a considerable extent of overhanging or interlocking wood to withstand vertical strains, especially when the last is bottom up, as in leveling, and the other processes required of a first last. It will be evident, however, that, as the knuckle and recess or socket must be cut on substantially the arc of a circle, there is a tendency to permit the heel-part to swing toward the bottom too far, especially when the knuckle is cut on the arc of a circle to its extreme lower end, as indicated at a^4 Fig. 3, and even when the saw cut is deflected, as indicated at a^5 Fig. 1, so as to provide a resisting shoulder, I have found that, under severe strains, there is a similar tendency of the heel-part to swing toward the bottom, pinching and forcing the wood at a^5 away and gradually breaking down more or less. To prevent this, without losing any of the advantages of the knuckle-joint, low down pivot-construction and quick shortening action, I have provided a metal stay-support located out of horizontal alinement with the pivot, being shown in Figs. 1 and 2 as consisting of

an angular projection d projecting diagonally downward from the pivot c^3 in engagement with a stop or a transverse pin d' located below the pivot c^3 adjacent the bottom and as far from the rear end of the knuckle as possible, and in Fig. 3 the same is shown as consisting of a stop in the form of a transverse pin d^2 located in the knuckle a' considerably above the pivot c^3 in engagement with the projecting metal at d^3 which constitutes the end of a slot d^4 formed in the body of the hinge-plate to permit the desired swinging movement and enable said part d^3 to engage the pin d^2 the same as the oppositely located and formed angular projection d engages the pin d', Fig. 1. The pivot pin and stop-pin in both cases are located in the general direction or plane of the rear-wall b^2 of the wedge-shaped gap of the last, so that if the stop-pin is above the pivot it comes in the broadest and strongest cross-sectional portion of the waist and hence has a maximum resistance even though rather close to the end of the forepart, and if the stop-pin is below the pivot it is sufficiently back from the end in the body of the last to provide a maximum resistance, even though located in the narrow shank-part of the last.

In both embodiments of my invention the original strength of the knuckle-joint is maintained and the low-down position of the pivot, which is a vital essential of the knuckle-joint last, is not interfered with. Also the stop is so located and combined with the other parts as to give the desired firmness of position and certainty of bottom alinement without any tendency of splitting the last under leveling strains and the like. This is due to the fact that in the construction of Fig. 1 the pin d' receives all its thrust in a direction away from the joint or towards the toe and instep, and also is in the body of the wood so far back from the end of the fore-part, while in the construction of Fig. 3 the pin d^2 is located not only out of horizontal alinement with the pivot as before, but in the thickest portion of the waist of the last so that it has the maximum support of the surrounding wood. And in both constructions the strains due to leveling pressures and the like are distributed by the stop-pins d^1, d^2 and the pivot pins c^3 to the adjacent wood of the knuckles in such directions and with such mutual relations as effectually to prevent the battering down of the wood and the pulling out lengthwise-of-the-last of the pivot pin.

I am aware that various modifications may be resorted to without departing from the spirit and scope of my invention, provided the stop does not interfere with the quick turning low-down position of the hinge pivot or introduce a weakening or splitting tendency.

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

1. A divided wooden last, having a fore-part provided at its lower rear end with twin-knuckles projecting therefrom, separated by a vertical slot, a heel-part provided at its lower front end with a recess to receive the lower rear ends of said knuckles, leaving an approximately wedge-shaped gap above the upper sides of said knuckles and between the adjacent upright ends of the fore-part and heel-part to permit said heel-part recess to swing over said knuckles, a vertical hinge-plate occupying said slot, rigidly secured to the heel-part, and pivoted at its forward lower end in the wood of said knuckles, and a stop-pin extending transversely through said knuckles and slot out of horizontal alinement with said pivot and lying in the general plane or direction of said pivot and the rear wall of said wedge-shaped gap in position for forcibly engaging said plate when the last reaches lengthened position, a portion of said plate projecting in the path of said stop-pin.

2. A divided wooden last, having the upper portions of the adjacent ends of its fore-part and heel-part normally separated by a wedge-shaped gap, and the lower meeting ends of said parts formed with a horizontally projecting twin-knuckle on one part fitting against and partially contained in a concave recess extending transversely in the over-hanging lower corner of the opposite part, a vertical hinge-plate secured at its opposite ends directly in the wood of the last, connecting said contracting parts, a pivot pin extending transversely through the last and hinge-plate near the bottom of the last concentrically of said twin-knuckle, and a stop-pin extending through the last from side to side in the part containing said pivot pin, out of horizontal alinement with the latter, said pivot pin and stop-pin lying in the same general direction or plane as the opposite wall of said wedge-shaped gap, and said hinge-plate having a portion formed to contact with said stop-pin when the last parts are in lengthened position.

3. A divided wooden last, having its parts connected by a knuckle joint consisting of twin knuckles separated by a vertical slot, and projecting from one part into an over-hanging concave recess formed therefor in the lower adjacent corner of the opposite part, and a hinge-plate standing vertically in said slot, and secured rigidly in the opposite last part, a pivot pin extending from side to side of the last through said twin knuckles and hinge-plate, the latter having an angular projection or corner extending below and at one side of said pivot pin, and a stop-pin extending transversely through the last and resting in the wood of the last, in line with the vertical edge of said angular projection and out of horizontal alinement with said pivot pin, to be engaged on its rear side by said vertical edge when the last is swung into lengthened position and out of supporting contact with said angular projection when the last is out of lengthened position.

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

EDWIN O. KRENTLER.

Witnesses:
LOUISE KEMBLE,
CORA LAKE.