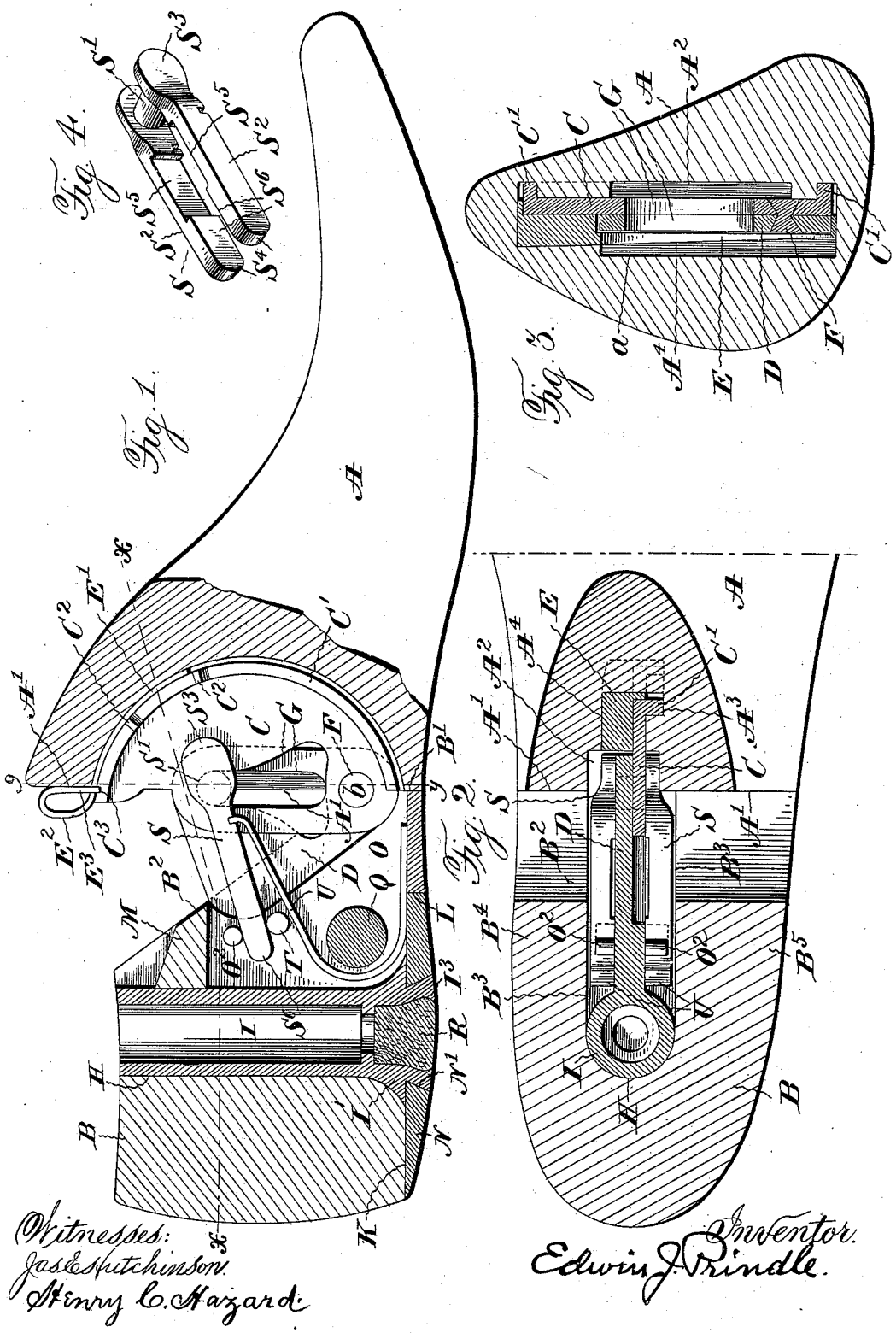
No. 648,525. Patented May 1, 1900.

E. J. PRINDLE.

LAST.

(Application filed Jan. 26, 1900.)

(No Model.) 2 Sheets—Sheet 1.



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Inventor.
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(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

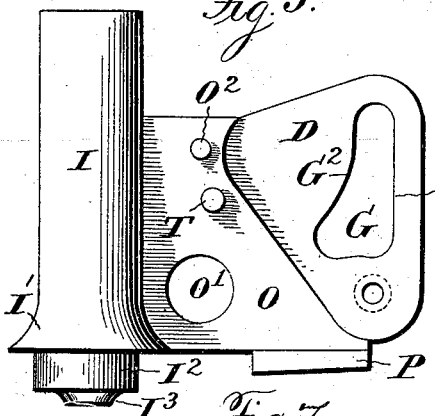


Fig. 6

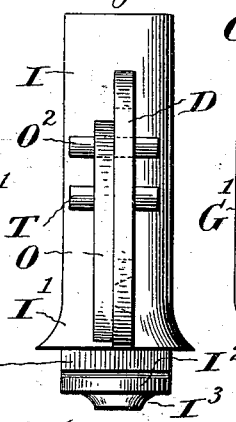


Fig. 8.

Fig. 9.

Fig. 7.

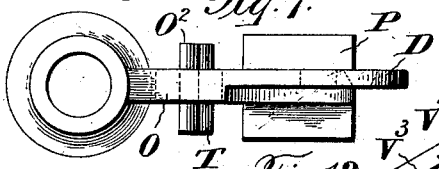


Fig. 14.

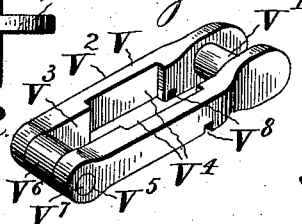


Fig. 10.

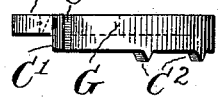


Fig. 12.

Fig. 11.

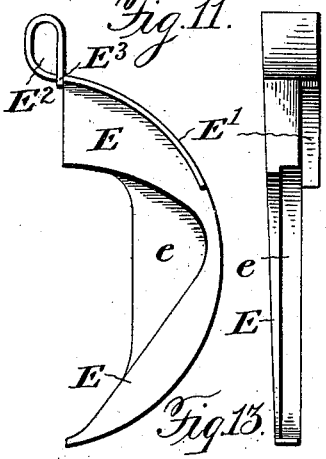


Fig. 13.

Fig. 15.

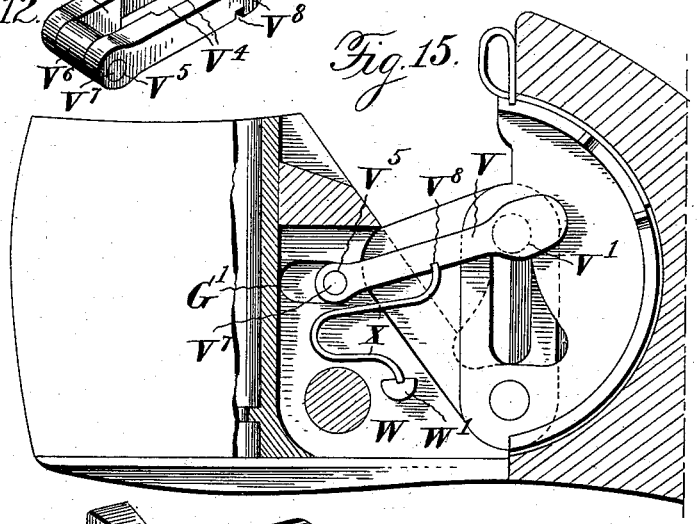
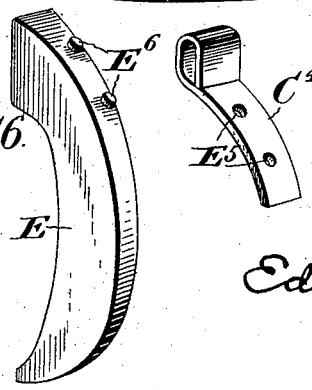


Fig. 16.



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UNITED STATES PATENT OFFICE.

EDWIN J. PRINDLE, OF WASHINGTON, DISTRICT OF COLUMBIA.

LAST.

SPECIFICATION forming part of Letters Patent No. 648,525, dated May 1, 1900.

Application filed January 26, 1900. Serial No. 2,853. (No model.)

To all whom it may concern:

Be it known that I, EDWIN J. PRINDLE, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Lasts; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 represents a partial vertical longitudinal sectional view of my last. Fig. 2 represents a partial horizontal longitudinal sectional view of the last shown in Fig. 1, the section being taken on the line $x\ x$ of said figure. Fig. 3 represents a vertical transverse sectional view, looking forward, of the last shown in Fig. 1, the section being taken on the line $y\ y$ of said figure and the locking-piece being omitted. Fig. 4 is a perspective view of the locking-piece. Figs. 5, 6, and 7 are a side elevation, a front elevation, and a top plan view, respectively, of the part comprising the heel-part plate, web, and jack-pin socket. Figs. 8, 9, and 10 are a side elevation, a front elevation, and a top plan view, respectively, of the fore-part plate. Figs. 11, 12, and 13 are a side elevation, a front elevation, and a top plan view, respectively, of the removable wedge. Fig. 14 is a perspective view of a modified form of wedge, its combined handle and flange being shown before attachment to the wedge. Fig. 15 is a perspective view of a modified form of last, and Fig. 16 is a perspective view of the locking-piece used in the last shown in Fig. 15.

The object of this invention is to provide a last designed especially for use in lasting and similar machines, but whose features of construction are susceptible of embodiment in followers, stretchers, display-forms for shoes, &c.; and to this end my invention consists in the last, follower, stretcher, display-form, or like structure having the construction substantially as hereinafter set forth.

In making my invention my aim has been to provide a last capable of easy separation from and insertion into the shoe, which shall have ample strength, and to provide a last which shall embody any or all of the features of being easily unlocked at the instant of the separation of the last and shoe, such unlocking being possible without the use of the hands, so as to leave them free for manipulating the shoe, of being automatically extensible and self-locking, not only against collapse, but also against strains tending to move its parts farther apart than their extended positions, of having a separable or easily-removable fore part, and of having a construction by which anvil-heel seats of various sizes and shapes can be used.

My improvements are capable of application to various forms of lasts; but it will be sufficient to illustrate the invention to show the same embodied in a hinged last. In Figs. 1 to 13, inclusive, I show such a last that is divided, so that the fore part A has a rear face A′, the plane of which is preferably perpendicular to the length of the last. The heel part B has a short vertical face B′ at its front lower portion, which face when the last is extended abuts against the rear face A′ of the fore part A, and the front face B^2 of the heel part above the short vertical face inclines backward and upward in a transverse plane. The opposite surfaces of the fore and heel parts may, however, be given any desired shape or inclination, so long as a recess is formed between them when the last is extended. My connection between the fore and heel parts causes the heel part B to turn on or substantially on the line b where the planes of the vertical and inclined portions B′ and B^2 meet or intersect the planes of the front face of the heel part and enables that line b to be located low in the last, thereby securing the great shortening of the last that is due to the low center of movement of the heel part. The connection I employ between the fore and heel parts consists, in general, of two substantially-vertical longitudinal plates, one of which, C, is attached to the fore part and extends across the recess between the fore and heel parts and preferably, although not necessarily, into a slot B^3 in the heel part, and the other of which plates D is secured to the heel part B, overlaps the fore-part plate C, and preferably, although not necessarily, extends into a slot A^2 in the fore part. These plates C and D are connected together, preferably by a hinge connection, at or about the line of meeting between planes of the two surfaces B′ and B^2 on the front face of the heel part B. The vertical surfaces A′ and B′ on the fore and heel parts abut below

the hinge-center and prevent the portions of the last parts above the hinge-center from moving farther apart than their normal position. The plates C and D, which are connected to the parts of the last and extend into or across the recess between the parts of the last when the last is extended, can be made to abut against each other and not overlap when the last is extended, or they can overlap and not extend into recesses in the parts of the last opposite those to which they are attached, respectively, when the last is extended, or one of such plates can span the recess and enter a slot in the opposite part of the last while the second plate merely extends into the recess, but not into a slot in the part of the last opposite that part to which the second plate is attached when the last is extended, or a single plate can be used, which plate can extend across the recess and into a slot in the part of the last opposite that to which said plate is attached when the last is extended, or a single plate can be used, which plate merely extends from one wall of the recess toward the opposite wall of said recess, but does not enter a slot in said opposite wall, means being provided whereby the plate can engage said opposite wall when the last is extended. My invention includes all of the above-stated constructions and includes any last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended and having a plate or other strengthening part having considerable width, which plate or other strengthening part projects from one wall of the recess or is attached to one of the parts of the last, and said last being so constructed that said plate or strengthening part can directly or indirectly engage the wall of the recess or the part of the last opposite that wall or part from which it projects or to which it is attached, respectively. Instead of a single pair of plates any number of pairs which extend into or across the recess or any number of such plates used singly can be employed. While I have shown the plates as perpendicular to the axis of motion *b*, such plates can be placed in the last so that they are parallel to the axis of motion *b* and extend across the recess between the last parts and are curved concentric to the axis of motion *b*.

My plate or plates C and D by extending into or across the recess and occupying a considerable portion of such recess in the last when the latter is extended—that is, projecting into such recess to a sufficient extent to strengthen the last—give great strength to the last to resist racking or twisting strains, such as occur during lasting, and when locked to each other or to the part of the last opposite the part to which they are attached they furnish with the use of a minimum amount of metal or material a maximum strength to resist either strains tending to force the parts of the last apart beyond their normal extended positions or strains tending to collapse the last. The said plates also furnish a convenient part to which to apply the locking part and the means for extending the last, and they are when perpendicular to the axis of motion easily susceptible of attachment to the parts of the last, which parts have greater vertical than horizontal width at the instep, and of attachment to the jack-pin socket. The fore and heel part plates are preferably formed separate from and are attached to the last parts, and they are preferably formed of metal; but they can, if desired, be integral with the last parts.

To attach the fore-part plate C to the fore part, said plate is provided with an arc-shaped flange C′ on its outer face—*i. e.*, the face opposite to the heel-part plate—and this flange C′ fits into an arc-shaped groove A^3, formed in the wall of a slot A^2 in the fore part A. Teeth C^2 and C^2, formed on the arc-shaped flange C′, bite into the wood in the groove A^3 and prevent the flange from turning in the groove. The plate C is held with the flange C′ in the groove A^3 by a wedge E, that also occupies the slot A^2 and that is semicircular in form and tapers from top to bottom and from the rear edge toward the front, although it is not necessary to have it taper in both these directions. The wall A^4 of the slot A^2 in the fore part is inclined to fit the wedge E and is cut out at *a* to permit sufficient lateral movement of the heel-part plate, so that the arc-shaped flange on the fore-part plate can enter the slot A^2 until it is opposite the arc-shaped groove A^3. The opposite wall of the slot A^2 and the wedge E are cut out to permit proper movement of the enlarged ends of the arms on the locking-piece. The wedge E is also recessed at *e* to permit movement of the heel-part plate. This wall A^4 might be cut to form a spiral surface, such as is formed on a screw. The wedge E is provided along its upper circular edge with a flange E′, that fits over the circular edge of the fore-part hinge-plate A, and this flange E′ is at its outer end bent up into a spring-handle E^2, a portion of whose free end E^3 engages a notch C^3 in the fore-part hinge-plate C, thus locking the wedge E in place and through it the fore-part hinge-plate C. The flange E′ and spring-handle E^2 can, if desired, be formed of a strip C^4 of spring-steel, as shown in Fig. 16, and may be fastened to the wedge E by having holes E^5 and E^5 formed in it and lugs E^6 and E^6 formed on the wedge E, the lugs being passed through the holes and headed over. The wedge E can be inserted and removed by hand, thus providing convenient means for readily removing one fore part and substituting another. The difference between lasts of the same size, but of different styles, lies almost entirely in the shape of the toe, and one heel part can thus with my means for detachably securing the fore part thereto be used with any number of fore parts. The cost of adapting a last to a different fashion

is thus reduced to the mere cost of a fore part. Moreover, the wear on a last comes almost entirely on the fore part, especially when the anvil-heel seat is used, so that by my mechanism the life of the last is increased many times solely at the cost of new fore parts. My detachable fore part thus results in great economy.

The fore-part plate C is hinged to the heel-part plate D by a rivet F, which occupies oppositely-countersunk holes in said plates, its ends being preferably flush with the outer faces of said plates, as shown in Fig. 3. Each of these plates C and D is provided with a slot G above the hinge, each of which slots G and G has a straight wall G′ on the side toward the outer edge of the plate and an opposite wall G^2, that is straight at the top only for a very short distance, from which point it sweeps out in a compound curve or in an oblique line, as preferred, and around to the straight wall. One of the slots G may, if preferred, have both of its walls straight.

In the heel part a vertical hole H is bored to receive the jack-pin socket I. A horizontal and a vertical saw-cut K and L are made, thus removing material to form a socket for the anvil-heel seat N, and a vertical slot B^3 is made from the jack-pin-socket hole H forward to the front face B′ of the heel part, but leaving a portion M, of wood, uniting the two sides of the heel part at its front upper corner. The heel-part plate D, jack-pin socket I, and the anvil-heel seat N are all preferably formed in one piece and when so made are formed, preferably, by forging. Back of the portion where the fore-part plate overlaps the heel-part plate the forging is made as thick as the two plates together, thus forming a web O, uniting the heel-part plate to the jack-pin socket. The web O is extended down to the top of the anvil-heel seat N. A block P on the web fills the slot from the front wall of the anvil-heel seat N to the vertical wall B′ of the heel part. A pin of wood Q is glued into holes in the parts B^4 and B^5 of the heel part, which are separated by the slot B^3 in the heel part, and this pin passes through an alined hole O′ in the web O. The pin Q fastens the forging in the heel part and firmly unites the wood of the front lower portions B^4 and B^5 of the heel part B where they are separated by the web O. The anvil-heel seat N is formed separately from the jack-pin socket I, so that such heel-seats of different sizes and styles can be used with the same hinge mechanism. The jack-pin socket I is formed with a flaring portion I′ near its lower end, which portion forms a shoulder, against which the anvil-heel seat N can firmly rest. Below the flaring portion I′ of the jack-pin socket I is a cylindrical portion I^2, at the lower end of which is an annular lip I^3. The anvil-heel seat N is provided with a circular countersunk hole N′. In fastening the anvil-heel seat it is placed over the lower cylindrical end I^2 of the jack-pin socket I and against the shoulder formed by the flaring portion I′. The lower end I of the jack-pin socket M is then expanded or upset in the countersunk hole N′ in the anvil-heel seat N. To provide for the heel-tack of the insole, a plug of wood R is dropped into the lower end of the anvil-heel seat N and is fastened in place by turning the annular lip I^3 before mentioned. The web O affords a support for the front portion of the anvil-heel seat N, and the block P prevents its turning on the jack-pin socket I.

A locking-piece S occupies the slots G and G in the fore and heel part plates C and D and serves to lock the parts A and B of the last both against strains tending to collapse the last and against strains tending to move the said parts away from each other beyond their normal position. The locking-piece also acts to extend the last. Said locking-piece S consists of a preferably-cylindrical pin S′, occupying the slots G and G in the fore and heel part plates and connecting two parallel arms S^2 and S^2, which are enlarged at their forward ends S^3. The fore part A is cut out at each side of the slot A^2 to allow the locking-piece arms S^2 to play. The arms S^2 are for the purpose of affording convenient means to move the locking-pin S′, and for that purpose such arms S^2 are most conveniently maintained in a substantially-horizontal position. The opposite faces S^4 and S^4 of the arms S^2 and their enlarged ends S^3 and S^3 are in parallel planes and serve to hold the fore and heel part plates C and D together, thereby greatly stiffening or bracing them. The said faces S^4 of the arms S^2 are cut away at their middle portions S^5 to reduce the friction on the plates. The rear ends S^6 of the arms S^2 play between alined lugs O^2 and O^2, formed on opposite sides of the web O, and the ends of a pin T, driven through a hole in the web O. The locking-piece S is combined with the hinge-plates A and B by holding it with its arms S^2 and S^2 extended upward and threading one arm S^2 through the superposed slots G and G in the plates C and D, preferably before the rivet F is put in place which forms the pivot of the hinge. The arms S^2 and S^2 of the locking-piece are then swung down to their normal position to rest on the lugs O^2 and O^2 on the web O, and the pin T is driven into the hole in the web. If the upper and lower surfaces of the arms S^2 and S^2 are parallel, the pin T and lugs O^2 and O^2 must be somewhat farther apart than the vertical thickness of the arms S′ and S′; but a close fit may be had by making the arms S^2 and S^2 elliptical in vertical cross-section. It will be seen that this locking-piece S can be forged at a single operation and requires no further finishing. The locking-piece S can, if desired, be made flaring at each end like the rivet F and the walls of the slots G and G be countersunk, in which case the locking-piece ends can be flush with the outer surfaces of the plates C and D and need not project beyond them.

It is desirable to have the last automatic-

ally extend itself and also to have it automatically lock itself. For these purposes, as well as to keep the locking-piece in locked position while the last is in use, I provide elastic means which tend to raise the locking-piece to the top of the slots in the fore and heel part plates. The particular means employed consist of a spring or springs U and U, preferably one on each side of the web, which rest on the block P at the bottom of the web O, extend in a curve around the wooden plug Q, and then extend forward and upward, where their upper ends are inserted in notches in the forward portions of the lower faces of the arms S^2 and S^2 of the locking-pieces S.

The tops of the slots G and G are so positioned with reference to the center *b* of the hinge that when the pin S′ of the locking-piece S occupies and consequently alines them the last parts are in normal extended position. When the pin S′ of the locking-piece S is at the top of the slots G and G, the last is locked, for the pin is then in a portion of the slots where the walls are parallel and where they can consequently have no tendency to cam the pin to another position. The curve or curves at the bottoms of the slots G and G are full enough so that the pin S′ of the locking-piece S can remain between these curved walls G^2 and G^2 and at the bottom of the slots when the last is collapsed. The curvature of the curved wall or walls G^2 and G^2 of the slots is such that when the pin S′ of the locking-piece S is forcibly raised it, through its action on the curved wall or walls G^2 and G^2, is caused to force the fore and heel part plates C and D apart, throwing the heel part B back into extended position and locking the last. I can, if desired, form the cam-surface G^2, which serves to extend the last, directly on one of the last parts A or B instead of on the connecting mechanism between these parts.

I have shown the locking-piece S as having a movement away from the hinge center *b* to lock the last and as having a movement toward such center *b* to unlock the last; but these movements could by properly shaping the slots G and G easily be reversed so that the locking-piece S should move toward the hinge center *b* to lock the last and away from the center to unlock the last. I can also make the locking-piece S separate from the fore and heel part plates C and D—for instance, in the form of a pin or plug—and can lock the last by passing such pin between surfaces or into openings or notches on the plates C and D after the last has been extended, or by tapering such pin or plug I can extend the last in the act of inserting the plug between said surfaces or into the said openings or notches. The plug can either be a connected part of the mechanism or can be entirely separate and removable, so that it is guided by the hand in being placed in position in the last. I can dispense with one plate C or D, using a single plate and using any of the above-described locking pieces or arrangements thereof.

The plates C and D in any or all of the forms described and used with any or all of the described forms of slots, locking-pieces, springs, &c., are capable of use in other relations.

The last shown in Fig. 15 differs from the last shown in the previous figures only as regards its locking-piece and the actuating-spring therefor. This locking-piece V consists principally of a cylindrical pin V′, connecting two parallel arms V^2 and V^2, having vertical faces V^3 and V^3, that hold between them the hinge-plates. The vertical faces V^3 and V^3 of the parallel arms are cut away along their central portions V^4 and V^4 to reduce the friction. At their rear ends the arms V′ and V′ are provided with alined holes V^5 and V^5, through which holes and a roller V^6 a pin V^7 is thrust, after which its ends are headed over. This roller V^6 travels in a slot G′, formed in the heel-part hinge-plate W. On each side of the hinge-plate W a notched lug W′ is formed, in which rests one end of a spring X, the other end of which engages a notch V^8 in one of the arms V′ of the locking-piece V. The connection between the rear ends of the arms V′ and V′ gives them greater strength to hold the fore and heel part plates against each other.

The operation of the form of last shown in the drawings is as follows: In the normal position of the last, into which position the parts of the last are thrown by the spring, the locking-piece S, owing also to the action of the spring, is at the top of the slots G and G. When it is desired to remove the last from a shoe, the locking-piece S is forced toward the hinge center *b* against the action of the springs U and U and the fore and heel parts A and B are swung toward each other, thus materially shortening the last, and the last is withdrawn from the shoe. As soon as the last is released the springs U and U throw the locking-piece S upward, which latter by its action on the curved walls G^2 and G^2 of the slots G and G swings the fore and heel part plates C and D apart and with them the fore and heel parts A and B and extends the last. The locking-piece S then passes above the curved walls G^2 and G^2 and between the parallel straight walls, in which position it locks the last, thus automatically restoring it to proper position for having the parts of a shoe assembled thereon. If it is desired to insert the last into a finished or partly-finished shoe, the locking-piece S is forced far enough down in the slots G and G—about half-way—for the curved walls G^2 and G^2 to properly engage the pin S′ of the locking-piece S, when, if the heel part B be thrown toward the fore part A, the curved walls G^2 and G^2 will throw the pin S′ of the locking-piece S the remainder of the distance to the bottom of the slots G and G. The last being now collapsed can be inserted into the shoe. If the

springs U and U should not be strong enough to raise the locking-piece S and extend the last, a hook can be inserted into the recess between the fore and heel parts A and B and the locking-piece S be raised, or pressure can be applied to the heel part B to force it into extended position, and the springs U and U will raise the locking-piece S to locking position during such movement of the heel part. When it is desired to detach the fore part A, the end E^3 of the spring E' on the wedge E, by means of the fingers applied to the handle E^2 on the wedge E, is raised out of the notch C^3 in the fore-part plate C and the wedge E is turned toward the heel part B and about the center of the arc-shaped flange C' until the flange E' on the wedge E is disengaged from the circular edge of the fore-part plate C, when the wedge E can be lifted out of the slot A^2 in the fore part A. The fore part A is now moved laterally until the arc-shaped flange C' on the fore-part plate is disengaged from the arc-shaped groove A^3 in the fore-part slot A^2, when the fore part A can be moved forward until it is clear of the fore-part plate C. A reversal of these steps will fasten the fore part on the fore-part plate. It will be observed that the fore part does not require that any metal part be fastened permanently to it, so that there is no metal part to be furnished with a new fore part. The wedge which fastens the fore-part plate into the fore part can, if desired, be fastened in place merely by the friction caused by forcing it home, thus dispensing with the spring-catch on the wedge, which catch engages the notch on the fore-part plate.

It will be observed that my connection between the fore and heel parts is such that the center of motion of the hinge does not have to occupy any precise relation to the heel and toe of the last, and consequently any size or shape of fore part can be used with a particular heel part. It will also be observed that, since the only requirement as to the transverse recess is that enough material shall be removed to allow the last to collapse to the desired extent, I am enabled to preserve the entire instep-curve on the top of the fore part, which is an advantage in assembling the parts of the shoe on the last in performing the operation of lasting the shoe and in removing the shoe from the last.

Having thus described my invention, what I claim is—

1. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening part having considerable width and attached to one of the last parts, said last being so constructed that such strengthening part extends into and occupies a considerable portion of said recess and can engage an opposite part of the last when the latter is extended, substantially as described.

2. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening part having considerable width in the plane of motion of the parts of the last, said last being so constructed that such strengthening part extends into and occupies a considerable portion of said recess and can engage an opposite part of the last when the latter is extended, substantially as described.

3. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening part having considerable width and projecting from one wall of the recess and occupying a considerable portion thereof, said last being so constructed that said strengthening part can engage an opposite wall of the recess when the last is extended, substantially as described.

4. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening part having considerable width in the plane of motion of the parts of the last and projecting from one wall of the recess and occupying a considerable portion thereof, said last being so constructed that said strengthening part can engage an opposite wall of the recess when the last is extended, substantially as described.

5. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening-plate attached to one of the last parts, said last being so constructed that such strengthening-plate extends into and occupies a considerable portion of said recess and can engage an opposite part of the last, when the last is extended, substantially as described.

6. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening-plate constructed separate from and attached to one of the last parts, said last being so constructed that such strengthening-plate extends into and occupies a considerable portion of said recess and can engage an opposite part of the last, substantially as described.

7. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening-plate having considerable width in the plane of motion of the parts of the last, said last being so constructed that such strengthening-plate extends into and occupies a considerable portion of said recess and can engage an opposite part of the last when the last is extended, substantially as described.

8. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening-plate having considerable width and projecting from one wall of the recess and occupying a considerable portion thereof, said last being so constructed that

said strengthening-plate can engage an opposite wall of the recess when the last is extended, substantially as described.

9. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening-plate having considerable width in the plane of motion of the parts of the last and projecting from one wall of the recess and occupying a considerable portion thereof, said last being so constructed that said strengthening-plate can engage an opposite wall of the recess when the last is extended substantially as described.

10. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening part projecting from one of the last parts, across said recess and occupying a considerable portion thereof and projecting into a recess in the other part and having extended bearing in said second recess when the last is extended, substantially as described.

11. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening-plate projecting from one of the last parts across said recess and occupying a considerable portion thereof and projecting into a recess in the other part and having extended bearing in said second recess when the last is opened, substantially as described.

12. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a plate attached to one part of the last and spanning the transverse recess, a considerable portion of which recess it occupies, and a locking-piece serving to prevent movement of the parts of the last, substantially as described.

13. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a plate projecting from one of the last parts, across said recess and into a recess in the other part and having extended bearing in said second recess, and a locking-piece adapted to be interposed in the path of movement of said plate, substantially as described.

14. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a plate attached to one part of the last and spanning the transverse recess, and a locking-piece situated in the recess and serving to prevent movement of the parts of the last, substantially as described.

15. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a plate attached to one part of the last, spanning the transverse recess and entering a slot in the opposite part of the last, and a locking-piece situated in the recess and serving to prevent movement of the parts of the last, substantially as described.

16. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, portions projecting from the parts, overlapping each other, spanning the transverse recess in the last, and occupying a considerable portion of such recess, substantially as described.

17. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a plate attached to one part of the last and spanning the transverse recess and a plate attached to the opposite part of the last and spanning the transverse recess, said plates occupying a considerable portion of said recess, substantially as described.

18. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, and a plate attached to each of said parts, each of said plates spanning the transverse recess, occupying a considerable portion of such recess and entering a slot in the opposite part of the last, substantially as described.

19. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, and plates attached to each of said parts, overlapping each other, spanning the transverse recess and entering slots on the opposite sides of the transverse recess, substantially as described.

20. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, strengthening portions projecting from the fore and heel parts into said recess, and occupying a considerable portion of such recess, and means for holding the last extended, substantially as described.

21. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, portions projecting from the parts into the recess and occupying a considerable portion, and overlapping each other, and locking means for holding the last extended, substantially as described.

22. A divided last having a plate attached to the fore part, a plate rigidly attached to the heel part, said plates overlapping each other and means for locking said plates together, substantially as described.

23. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, fixed overlapping plates projecting from the respective parts into said recess, and connections between the plates where they overlap, substantially as described.

24. A divided last having a part that is bodily movable with relation both to the fore part and to the heel part and that acts to

move said parts relative to each other, and means whereby said member is connected to the last in all its positions, substantially as described.

25. A divided last one of whose parts has a cam-surface, and a part movable with relation to both of the last parts and acting on said cam-surface to move the last parts, substantially as described.

26. A divided last one of whose parts has a slot, and a locking device adapted to traverse said slot and to act upon a cam-surface to move the last parts, substantially as described.

27. A divided last each of whose parts has a slot, and a locking device adapted to traverse said slots and to act upon a cam-surface to move the last parts, substantially as described.

28. A divided last one of whose parts has a slot, and one of whose parts has a cam-wall, and a locking device adapted to traverse said slot and to act upon said cam-wall to move the last parts, substantially as described.

29. A divided last having a plate attached to the fore part, a plate attached to the heel part, each of said plates having a slot therein, and a locking device situated in said slots and connecting said plates, substantially as described.

30. A divided last having a plate, attached to the fore part, a plate attached to the heel part, said plates being movably connected together, each plate having a slot therein, and a locking-piece situated in said slots and connecting said plates, substantially as described.

31. A divided last having a plate attached to the fore part, a plate attached to the heel part, said plates being movably connected together, each plate having a slot therein, one of said slots having a cam-wall, and a locking-piece situated in said slots and acting upon said cam-wall to move the last parts, substantially as described.

32. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, plates attached to each of said parts, overlapping each other, spanning the transverse recess and entering slots on the opposite sides of the transverse recess, and means for holding said parts against each other, substantially as described.

33. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, plates attached to each of said parts, overlapping each other, spanning the transverse recess projecting a considerable distance into said recess and entering slots on the opposite sides of the transverse recess, and a locking-piece for preventing relative motion between the plates, substantially as described.

34. A last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, plates attached to each of said parts, overlapping each other, spanning the transverse recess and entering slots on the opposite sides of the transverse recess, and a locking-piece for preventing relative motion between the plates, said locking-piece also serving to bind said plates together, substantially as described.

35. A hinged last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening part projecting from one of the last parts across a considerable portion of said recess and into a recess in the other last part and having extended bearing in said recess when the last is opened, substantially as described.

36. A hinged last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a strengthening-plate projecting from one of the last parts, across a considerable portion of said recess and into a recess in the other part and having extended bearing in said second recess when the last is opened, substantially as described.

37. A divided last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a plate attached to the fore part and a plate attached to the heel part said plates extending into and occupying a considerable portion of said recess and being movable relative to each other along a curve, substantially as described.

38. A divided last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a plate attached to the fore part and a plate attached to the heel part said plates extending into and occupying a considerable portion of said recess and being movable relative to each other about a center, substantially as described.

39. A divided last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a plate attached to the fore part and a plate attached to the heel part and overlapping the plate that is attached to the fore part, said plates extending into and occupying a considerable portion of said recess and being movable relative to each other along a curve, substantially as described.

40. A divided last having a portion removed between the fore and heel parts, forming a recess lying transversely of the last when extended, a plate attached to the fore part and a plate attached to the heel part and overlapping the plate that is attached to the fore part, said plates extending into and occupying a considerable portion of said recess and being movable relative to each other about a center, substantially as described.

41. A divided last having a plate attached to the fore part, a plate attached to the heel

part, said plates being movably connected together, each plate having a slot therein, one of said slots having a cam-wall, and a locking-piece situated in said slots and acting upon said cam-wall to extend the last, substantially as described.

42. A divided last having a plate attached to the fore part, a plate attached to the heel part, said plates being pivoted together, each plate having a slot therein, one of said slots having a cam-wall, and a locking-piece situated in said slots and acting upon said cam-wall to extend the last, substantially as described.

43. A divided last having a portion removed between the fore and heel parts forming a recess lying transversely of the last when extended, having a connection between its fore and heel parts near the bottom of the last and having a member which is located in said recess and is bodily movable with relation to both of the last parts and which is adapted to be interposed between the fore and heel parts to prevent the collapse of the last, said member being movable to a position to permit the last to be shortened, and means whereby said member is connected to both parts of the last in both of said positions, substantially as described.

44. A divided last having a transverse recess between the fore and heel parts when the last is extended and having a connection between the fore and heel parts that is located in said recess and is movable to positions toward and from the bottom of the last, that respectively permit the shortening of the last, and cause it to be locked, substantially as described.

45. A divided last having a transverse recess between the fore and heel parts when the last is extended and having a connection between the fore and heel parts that is located in said recess and is movable to positions toward and from the bottom of the last, that respectively permit the shortening of the last, and cause it to be locked, and means to hold said connection in last-locking position, substantially as described.

46. A divided last consisting of a foot-form having a transverse recess between the fore and heel parts when the last is extended, having a connection between the fore and heel parts that is located in said recess and is movable to positions toward and from the center of motion, that respectively permit the shortening of the last, and cause it to be locked, substantially as described.

47. A last having a transverse recess between the fore and heel parts when the last is extended, and having a locking connection situated in said recess movable toward the sole of the last to unlock the last, substantially as described.

48. A last having a transverse recess between the fore and heel parts when the last is extended and having a locking part that is movable toward the sole of the last to unlock the last, and that extends the last when it is moved in the opposite direction, said locking part being situated in said recess, substantially as described.

49. A divided last having a transverse recess between the fore and heel parts when the last is extended and having its fore and heel parts bearing against each other, said last having a connection between said fore and heel parts, said connection being movable to positions toward and from the bottom of the last, that respectively permit the shortening of the last and cause it to be locked, and said connection being located in said recess, substantially as described.

50. A divided last having a recess lying transversely of the last when extended and having a hinge connection between its fore and heel parts, and a locking part to lock the last parts against movement away from each other, said locking part being shiftable into and out of alinement with a space that is concentric with the axis of the hinge connection and being located in said recess, substantially as described.

51. A divided last having a transverse recess between the fore and heel parts when the last is extended and having a hinge connection between its fore and heel parts, and a locking part to lock the parts of the last from motion in both directions, said locking part being shiftable into and out of alinement with a space that is concentric with the axis of the hinge connection and being located in said recess, substantially as described.

52. A divided last having a hinge connection between its fore and heel parts, and a shiftable locking part coöperating with slots in said parts, a portion of one or both slots being concentric with the axis of the hinge connection, whereby said locking part may be situated so as not to oppose movement of the last parts on the hinge connection, substantially as described.

53. A last having a locking part connected to both the fore and heel parts, and having automatic means for moving said part in one direction, substantially as described.

54. A last having a locking connection between the fore and heel parts that is movable toward the sole of the last to unlock the last, and automatic means for restoring the locking connection to locked position, substantially as described.

55. A last having a locking connection between the last parts that is movable toward the sole of the last to unlock the last, and automatic means to move the locking connection in the opposite direction, substantially as described.

56. A last having a locking part that is movable to unlock the last, and automatic means to extend the last, and lock the parts against further movement away from each other, substantially as described.

57. A last having a locking part that is movable toward the sole of the last to unlock the

last, and automatic means to extend the last and lock the parts against further movement away from each other, substantially as described.

58. A last having a locking device movable toward the sole of the last to unlock the same, and constructed to coöperate with an unlocking-tool, substantially as described.

59. A divided last having means by which it is automatically extended, and means which lock the last parts from relative movement in either direction, substantially as described.

60. A divided last having means by which it is automatically extended, and means which automatically lock the last parts from relative movement in either direction at the end of the last-extending movement, substantially as described.

61. The combination in a last, of overlapping plates, each of which plates is attached to one of the last parts, and a locking-piece for engaging said plates, said locking-piece consisting of a pin having a head or enlargement on each end, substantially as described.

62. The combination in a last, of overlapping plates, each of which plates is attached to one of the last parts, and a locking-piece for engaging slots in said plates, said locking-piece consisting of a pin having a head or enlargement on each end, each of said heads or enlargements engaging an outer face of one of said plates, substantially as described.

63. The combination in a last, of overlapping plates, each of which plates is attached to one of the last parts, and a locking-piece for engaging said plates and consisting of a pin and an arm or arms attached to or formed on the end or ends of said pin, and means for maintaining said arms substantially at a given angle with reference to one of said parts, substantially as described.

64. The combination in a last, of overlapping plates, each of which plates is attached to one of the last parts, a locking-piece for engaging said plates and consisting of a pin and an arm or arms attached to or formed on the end or ends of said pin, and a fulcrum against which said arm or arms are adapted to bear, substantially as described.

65. The combination in a last, of overlapping plates, each of which plates is attached to one of said last parts, a locking-piece for engaging said plates and consisting of a pin and an arm or arms attached to or formed on the end or ends of said pin, a fulcrum against which said arm or arms are adapted to bear, and means to hold said arm or arms in contact with said fulcrum, substantially as described.

66. The combination in a last, of overlapping plates, each of which plates is attached to one of said last parts, a locking-piece for engaging said plates and consisting of a pin and an arm or arms attached to or formed on the end or ends of said pin, one of said plates having an opening therein, and a projection on said arm or arms which occupies said opening in said plate, substantially as described.

67. The combination in a last, of overlapping plates, each of which plates is attached to one of said last parts, a locking-piece for engaging said plates and consisting of a pin and arms attached to or formed on the ends of said pin, one of said plates having an opening therein, and a part occupying said opening and uniting said arms, substantially as described.

68. The combination in a last, of overlapping plates, each of which is attached to one of the parts of the last, a locking-piece for engaging said plates, and a spring for moving said locking-piece, substantially as described.

69. The combination in a last, of overlapping plates, each of which is attached to one of the parts of the last, a locking-piece for engaging said plates, and a spring for moving said locking-piece to locked position, substantially as described.

70. The combination in a last, of overlapping plates, each of which is attached to one of the parts of the last, a locking-piece occupying slots in said plates, and a spring for moving said locking-piece to locked position, substantially as described.

71. The combination in a last, of overlapping plates, each of which is attached to one of the parts of the last, a locking-piece occupying a slot in one of said plates, one of said plates having a cam-surface for engagement with said locking-piece and a spring for moving said locking-piece, substantially as described.

72. The combination in a last, of overlapping plates, which are movably connected together and each of which is attached to one of the parts of the last, a locking-piece occupying a slot in one of said plates, one of said plates having a cam-surface for engagement with said locking-piece, and a spring for moving said locking-piece, substantially as described.

73. The combination in a last, of overlapping plates, which are movably connected together and each of which plates is attached to one of the parts of the last, a locking-piece occupying slots in said plates, one of said slots having a cam-wall for engagement with said locking-piece, an arm formed on said locking-piece a bearing on one of said plates for a portion on said arm, and a spring engaging said arm and tending to move the locking-piece to locked position, substantially as described.

74. The combination in a last, of overlapping plates, which are pivoted together and each of which plates is attached to one of the last parts, a locking-piece occupying slots in said plates, one of said slots having a cam-wall for engagement with said locking-piece, arms formed on or attached to said locking-piece, one of said plates having an opening

therein, a part occupying said opening and uniting said arms, and a spring engaging one of said arms and tending to move the locking-piece to locked position, substantially as described.

75. The combination in a last, of overlapping plates, each of which is attached to one of the parts of the last, said plates being pivoted together and each of said plates having a slot extending substantially in line with said pivot but not extending to said pivot, and a locking-piece occupying said slots, one or both of said slots having a portion that is concentric with said pivot, substantially as described.

76. The combination in a last of overlapping plates, each of which is attached to one of the parts of the last, said plates being pivoted together by a rivet whose ends are countersunk in the said plates so that the rivet does not project beyond the outer surfaces of said plates, each of said plates having a slot extending substantially in line with said rivet but not extending to said rivet, a locking-piece occupying said slots, and having flanges on its ends by which it holds said plates against each other, one or both of said slots having an enlargement into which said locking-piece is received when in unlocking position, substantially as described.

77. A last having a portion removed between the fore and heel parts forming a recess lying transversely of the last when extended, in combination with a plate or strengthening part projecting a considerable distance into said recess from the fore part and adapted to engage the fore part when the last is extended, and a jack-pin socket to which said plate or strengthening part is attached, substantially as described.

78. The combination in a last having a portion removed between the fore and heel parts forming a recess lying transversely of the last when extended, of a jack-pin socket, overlapping plates each of which plates is attached to one of the last parts and projects a considerable distance into said recess, said plates being movably connected together and one of said plates being attached to or formed on the jack-pin socket, substantially as described.

79. The combination in a last, of a jack-pin socket having a shoulder above its lower end, an anvil-heel seat having a hole therein, said anvil-heel seat being passed over the lower end of the jack-pin socket and seated on said shoulder, and the lower end of the jack-pin socket being upset in said hole, substantially as described.

80. The combination in a last, of a jack-pin socket having a web with a substantially-vertical shoulder formed thereon or attached to said jack-pin socket, and having a shoulder above its lower end, an anvil-heel seat having a hole therein, said anvil-heel seat being passed over the lower end of the jack-pin socket and being made to abut against the shoulder on the jack-pin socket and also against the shoulder on the web whereby said anvil is prevented from turning on the jack-pin socket, the lower end of the jack-pin socket being upset in said hole, substantially as described.

81. A hinged last having a connection between its parts, said connection having unyielding means to positively prevent such movement of the fore part as would carry the rear portion of the sole thereof inward, said fore part being readily detachable from such connection, substantially as described.

82. A divided last having a connection between its parts, said connection having unyielding means to positively prevent such movement of the fore part as would carry the rear portion of the sole thereof inward, and permitting movement of the upper portions of the fore part and heel part toward each other, said fore part being readily detachable from such connection, substantially as and for the purpose described.

83. A divided last having a member movably connected to the heel part, said member having a lateral projection, a detachable fore part with a lateral recess therein and detachable means for holding said lateral projection in said lateral recess, substantially as described.

84. A divided last having a member movably connected to the heel part, said member having a lateral projection, a detachable fore part having a substantially longitudinally extending recess and a lateral recess communicating therewith, and detachable means for holding said lateral projection in said lateral recess, substantially as described.

85. A divided last having a member movably connected to the heel part, said member having a lateral projection, a detachable fore part having a substantially longitudinally extending recess and a lateral recess communicating therewith, and a removable wedge for holding said lateral projection in said lateral recess, substantially as described.

86. A divided last having a plate movably connected to the heel part, said plate having a lateral projection, a detachable fore part having a substantially longitudinally extending slot therein and a lateral recess communicating therewith, and removable means for holding said lateral projection in said lateral recess, substantially as described.

87. A divided last having a plate movably connected to the heel part, said plate having a lateral projection, a detachable fore part having a substantially longitudinally extending slot therein and a lateral recess communicating therewith, and a removable wedge for holding said lateral projection in said lateral recess, substantially as described.

88. A divided last having a plate movably connected to the heel part, said plate having a flange thereon, a detachable fore part having a substantially longitudinally extending slot therein and a lateral recess communicating therewith, and removable means for hold-

ing said flange in said lateral recess, substantially as described.

89. A divided last having a plate movably connected to the heel part, said plate having a flange thereon, a detachable fore part having a substantially longitudinally extending slot therein and a lateral recess communicating therewith, and a removable wedge for holding said flange in said recess, substantially as described.

90. A divided last having a plate movably connected to the heel part, said plate having a flange thereon, a detachable fore part having a substantially longitudinally extending slot therein and a lateral recess communicating therewith, one of the walls of said slot being inclined to the other wall, a removable wedge coacting with the inclined wall of said slot and serving to hold said flange in said lateral recess, substantially as described.

91. A divided last having a plate movably connected to the heel part, said plate having an arc-shaped flange, a detachable fore part having a substantially longitudinally extending slot having an arc-shaped groove in one of its walls, and a removable wedge serving to hold said arc-shaped flange in said arc-shaped recess, substantially as described.

92. A divided last having a plate movably connected to the heel part, said plate having an arc-shaped flange having teeth thereon, a detachable fore part having a substantially longitudinally extending slot having an arc-shaped groove in one of its walls, and a removable wedge serving to hold said arc-shaped flange in said arc-shaped recess and to cause said teeth to engage the detachable fore part, substantially as described.

93. A divided last having a plate movably connected to the heel part, said plate having a flanged, arc-shaped edge, a detachable fore part having a substantially longitudinally extending slot having an arc-shaped groove in one of its walls, and a removable wedge having an arc-shaped flange that is adapted to engage the arc-shaped edge of said plate, said wedge serving to hold said arc-shaped flange in said arc-shaped recess, substantially as described.

94. A divided last having a plate movably connected to the heel part, said plate having a flanged arc-shaped edge, a detachable fore part having a substantially longitudinally extending slot having an arc-shaped groove in one of its walls, a removable wedge serving to hold said arc-shaped flange in said arc-shaped groove, and a spring carried by one of said parts; *i. e.* said plate or said wedge, and engaging a notch in the other of said parts, substantially as described.

95. A divided last having a plate movably connected to the heel part, said plate having a flanged, arc-shaped edge, a detachable fore part having a substantially longitudinally extending slot having an arc-shaped groove in one of its walls, a removable wedge having an arc-shaped flange that is adapted to engage the arc-shaped edge of said plate, said wedge serving to hold said arc-shaped flange in said arc-shaped recess, and a spring carried by one of said parts; *i. e.*, said plate or said wedge, and engaging a notch in the other of said parts, substantially as described.

96. The combination of two parts which are relatively movable, means for guiding said relative motion overlapping plates attached to or formed on the respective parts and a connection between the plates where they overlap, substantially as described.

97. The combination of two parts which are relatively movable, means for guiding such relative motion overlapping plates each of which plates is attached to one of said parts, and projects across the recess formed by the separation of said parts and into a slot in the opposite part, and a connection between the plates where they overlap, substantially as described.

98. The combination of two parts which are relatively movable, overlapping plates, each of which plates is attached to one of said parts and projects across the recess formed by the separation of said parts, and means in said recess for locking said plates together when said parts are separated, substantially as described.

99. The combination with two parts which are relatively movable, of overlapping plates, each of said plates being formed on or attached to one of said parts, and a member that acts to move said plates relative to each other, substantially as described.

100. The combination with two parts which are relatively movable, of overlapping plates, each of said plates projecting from one of said parts, into the recess formed by the separation of said parts, and into a slot formed in the opposite part, and a member that acts to move said plates relative to each other, substantially as described.

101. The combination with two parts which are relatively movable, of overlapping plates, each of said plates being formed on or attached to one of said parts, and each of said plates having a slot therein, and a locking device situated in said slots, substantially as described.

102. The combination with two parts which are relatively movable, of overlapping plates, each of which plates being formed on or attached to one of said parts, each of said plates having a slot therein, one of said slots having a cam-wall, and a locking-piece occupying said slots and adapted to act on said cam-wall to move said plates, substantially as described.

103. The combination with two parts which are relatively movable, of overlapping plates each of which plates is formed on or attached to one of said parts, each of said plates having a slot therein, one of said slots having a cam-wall, and a locking-piece having flanges to hold said plates against each other, said locking-piece occupying said slots and adapt-

ed to act on said cam-wall to move said plates, substantially as described.

104. The combination with two parts which are relatively movable, of overlapping plates each of which plates is formed on or attached to one of said parts, each of said plates having a slot therein, one of said slots having a cam-wall, a member occupying said slots and adapted to act on said cam-wall to move said plates, and a spring to move said locking-piece to act on said cam-wall, substantially as described.

105. The combination with two parts which are relatively movable, of overlapping plates each of which plates is formed on or attached to one of said parts, each of said plates having a slot therein, one of said slots having a cam-wall, a locking-piece occupying said slots and adapted to act on said cam-wall to move the plates relative to each other and adapted to lock the plates after having moved them, and a spring adapted to actuate said locking-piece, substantially as described.

106. The combination of two plates pivoted together, each plate having a slot therein, and a locking-piece occupying said slots and connecting said plates, substantially as described.

107. The combination of two plates pivoted together, each plate having a slot therein, one of said slots having a portion that is concentric with the pintle of said hinge, and a locking-piece occupying said slots and connecting said plates, substantially as described.

108. The combination of two plates pivoted together, each plate having a slot therein, one of said slots having a cam-wall, and a locking-piece occupying said slots and adapted to act on said cam-wall, substantially as described.

109. The combination of two plates pivoted together, each plate having a slot therein, and a locking-piece occupying said slots and connecting said plates, said locking-piece having flanges which hold said plates against each other, substantially as described.

110. The combination of two plates pivoted together, each plate having a slot therein, one of said slots having a cam-wall, a locking-piece occupying said slots and adapted to act on said cam-wall to move said plates relative to each other, and a spring adapted to actuate said locking-piece, substantially as described.

111. The combination of a pivoted plate having a slot therein, a locking-piece engaging said slot, and a guide for said locking-piece, substantially as described.

112. The combination of a pivoted plate having a slot therein, said slot having a cam-wall, a member occupying said slot and adapted to act on said cam-wall to move said plate and a guide for said locking-piece, substantially as described.

113. The combination of a pivoted plate having a slot therein, said slot having a cam-wall, a locking-piece occupying said slot and adapted to act on said cam-wall to move said plate, and, at the end of such movement, to lock said plate, and a guide for the locking-piece, substantially as described.

114. The combination of a pivoted plate having a slot therein, said slot having a cam-wall, a member occupying said slot and adapted to act on said cam-wall to move said plate, a spring adapted to actuate said member, and a guide for said member, substantially as described.

115. The combination of a pivoted plate having a slot therein, said slot having a cam-wall, a locking-piece occupying said slot and adapted to act on said cam-wall to move said plate, and, at the end of such movement, to lock said plate, a guide for the locking-piece, and a spring adapted to actuate said locking-piece, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 26th day of January, A. D. 1900.

EDWIN J. PRINDLE.

Witnesses:
HENRY C. HAZARD,
JAS. E. HUTCHINSON.