

Oct. 15, 1946.

M. FALK

2,409,424

LAMINATED LOCK

Filed Sept. 27, 1944

2 Sheets-Sheet 1

FIG. 1.

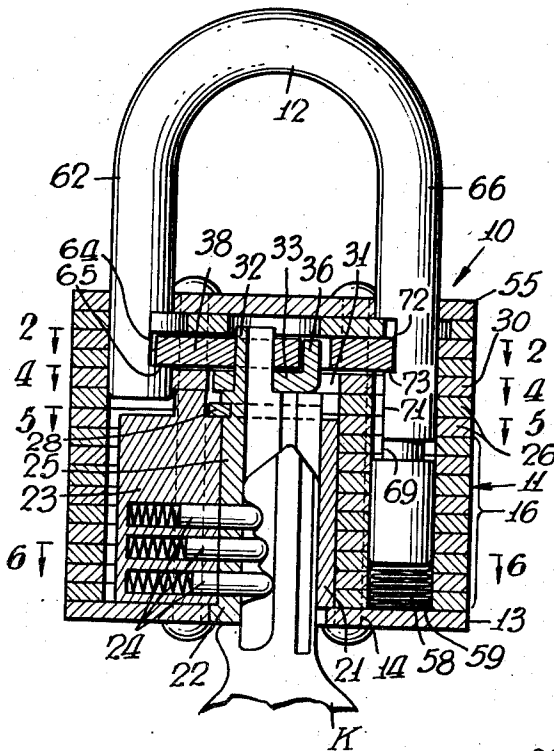


FIG. 2.

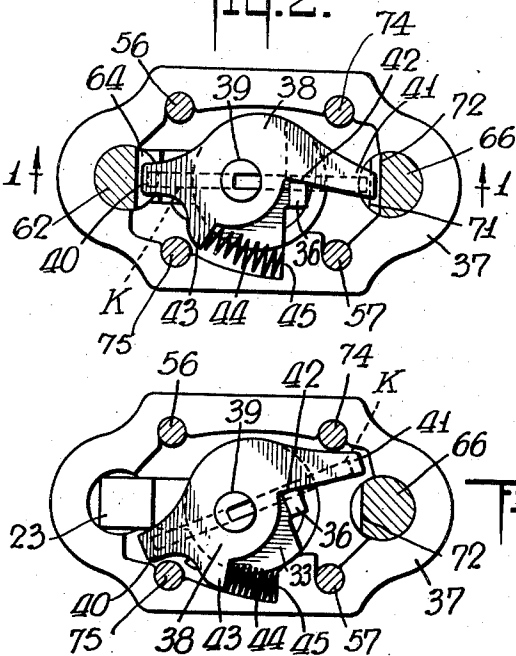


FIG. 4.

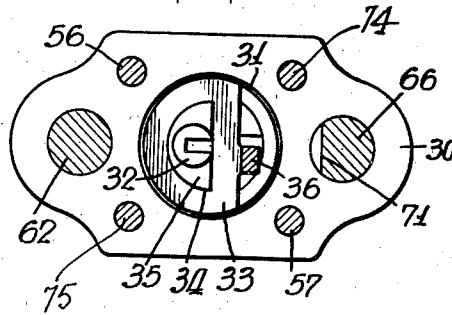


FIG. 5.

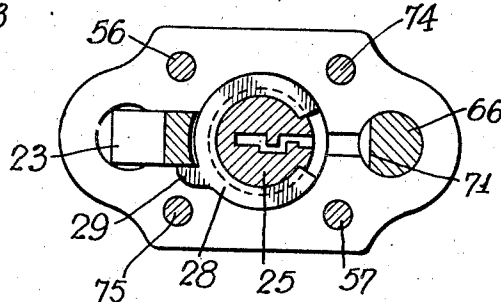


FIG. 6.

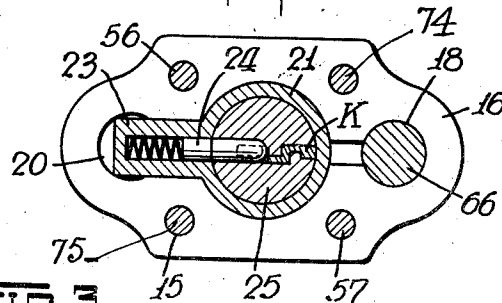


FIG. 3.

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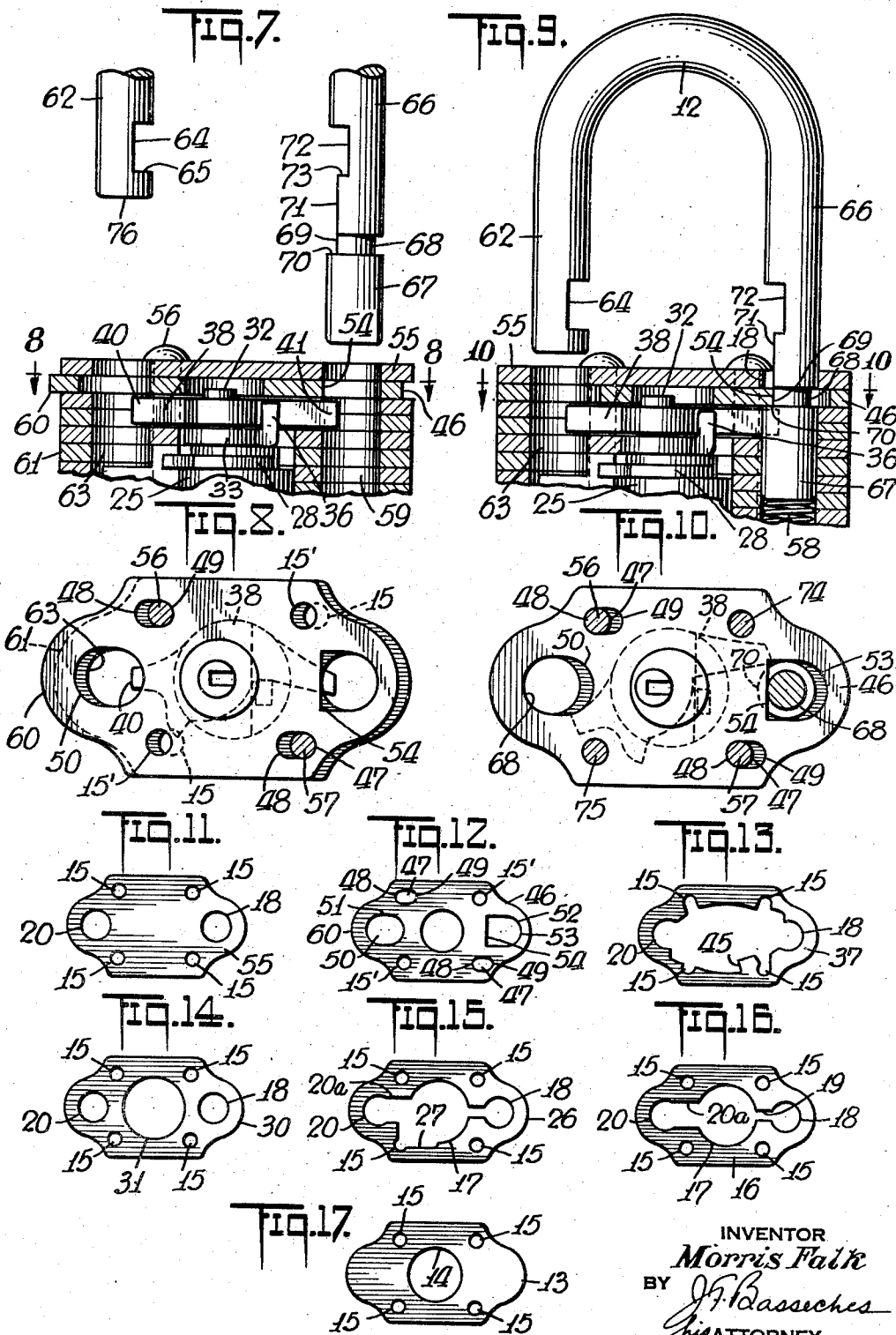
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LAMINATED LOCK

Filed Sept. 27, 1944

2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,409,424

## LAMINATED LOCK

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Application September 27, 1944, Serial No. 555,915

15 Claims. (Cl. 70—38)

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This invention relates to padlocks; more particularly, to a laminated padlock.

My invention concerns itself with the type of padlock comprising a casing body and a shackle in which the casing is made of a plurality of laminated metallic plates united by rivet pins, generally referred to in this field as a laminated lock. The casing is made of a plurality of plates or laminations, substantially similarly contoured exteriorly, secured together by rivets which pass through aligned openings in each of the plates, with the plates provided with round holes to form wells to receive the shackle branches, and with some of the plates cut out to form part of, and to accommodate the locking mechanism for the shackle.

Known to me in this field of laminated locks is the loose assembly of the plates, with one plate or shackle keeper plate formed with a larger shackle receiving hole which admits of sufficient movement of this particular lamination to create a clear passage for the shackle branch or post which, after insertion into the loosely stacked laminations, permits of a sliding movement of this lamination, to bring it in alignment with the other laminations. This keeper plate, so-to-speak, has a shackle hole with a straight wall for engaging a shoulder portion of the shackle branch or post. After insertion of the shackle in the wells formed by the holes in the stacked plates, the keeper plate is slid to project the straight walled portion beyond the circular wall of the well formed by a plurality of the other laminations and to align all of the plates with their rivet holes in alignment, whereupon the rivets are inserted in the rivet perforations, and the ends thereof headed to complete the lock casing.

This form of lock while effective in conjunction with some shackle latching mechanism, or more particularly, with a shackle which is keyed in the casing only at the heel or anchoring post, has not presented substantial manufacturing or assembling problems where the effectiveness of the padlock is not too critical and a rather crude lock mechanism is provided in the lock assembly.

I have found deficiencies in laminated locks of the character heretofore described which lead to considerable economic waste of material and labor. This has been occasioned by the recognized necessity to make locks "pick proof" with the minimum amount of clearances between the operating parts, especially the shackle and the locking mechanism, of a magnitude not achieved by the earlier laminated locks. This problem is

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magnified as greater security of locking action is sought by a toe and heel locking of the shackle in respect of the casing, as distinguished from cruder forms of laminated locks where merely a heel locking of the shackle is effected.

Improvement of the laminated lock for purposes of security, to effect the minimum amount of clearances, or broadly to effect a toe and heel locking action of the shackle to the casing, has created problems in the endeavor to form a close fit between the locking mechanism and the shackle, particularly in respect to both the toe and heel of the shackle.

The production of earlier types of laminated locks has not accomplished a workmanlike product and has resulted in loss by reason of rejects and the expenditure of unnecessary labor in interfitting the padlock parts.

Accordingly, it is an object of my invention to provide a laminated lock which effects substantial economies, while achieving durability and the tamper-proof requirements of a lock of this character.

More particularly, it is an object of my invention to provide an arrangement of the plates of the laminated lock to form a casing, in association with which the shackle member may be assembled, in a way to interfit or test out the locking mechanism carried by the casing in respect of the shackle to assure that proper operation will be secured in the merchandizable article, and thereby minimize rejects heretofore experienced in a lock of this character.

Still further, it is an object of my invention to provide a laminated lock whereby temporary connection between the shackle and casing may be secured to permit inspection of the operation of the locking mechanism of the casing, discover defects, if any, and cure the same before permanently assembling the laminations or plates forming the casing, and which will thus preliminarily disclose any defects, while the casing containing the lock mechanism is sufficiently rigidly assembled to manipulate the locking elements and to thereafter permit disengagement of the shackle from the casing to cure any detectable defects in the locking mechanism, before permanently uniting the laminations or plates constituting the casing in association with the shackle.

Still further, it is an object of my invention to provide casing parts of a padlock formed of laminated plates which will permit of facile assembly of the shackle and casing and permit testing of the lock parts and a removal of the shackle from the assembly, to effect proper inter-

fitting, if necessary, and still more particularly, to provide a laminated lock which satisfies the close working or tolerance requirements of a toe and heel locking of the shackle of a padlock of this character, by an assembly method which effects substantial economies in production.

Broadly stated, it is an object of my invention to provide an assembly of plates forming the laminations of a laminated padlock or the like to an intermediate assembled stage where inspection of the locking mechanism may be made, and defects cured, without the waste heretofore experienced in making laminated padlocks.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, I make reference to the accompanying drawings, forming a part hereof, in which

Figure 1 is a longitudinal sectional view of a laminated padlock taken on line 1—1 of Figure 2;

Figure 2 is a section taken on line 2—2 of Figure 1;

Figure 3 is a view similar to Figure 2 with the bolt of the locking mechanism moved and the shackle released to the unlocked position;

Figure 4 is a section taken on line 4—4 of Figure 1;

Figure 5 is a section taken on line 5—5 of Figure 1;

Figure 6 is a section taken on line 6—6 of Figure 1;

Figure 7 is a fragmentary longitudinal sectional view of the lock and shackle with the casing at an intermediate stage of assembly to receive the shackle;

Figure 8 is a section taken on line 8—8 of Figure 7;

Figure 9 is a fragmentary longitudinal sectional view showing the casing modified to shackle-engaging position;

Figure 10 is a section taken on line 10—10 of Figure 9;

Figure 11 is a plan view of the top plate;

Figure 12 is a plan view of the second plate from the top exemplifying the shackle keeper plate;

Figure 13 is a plan view of plates 3 and 4 from the top exemplifying the bolt housing plates;

Figure 14 is a plan view of the fifth plate from the top exemplifying the bearing plate for the key barrel and pin cylinder housing;

Figure 15 is a plan view of the sixth and seventh plates from the top exemplifying the clearance plate for the key barrel casing;

Figure 16 is a plan view of the eighth to the sixteenth plates to the top exemplifying the plates for the pin cylinder housing; and

Figure 17 is a plan view of the bottom plate.

Making reference to the drawings, I have illustrated a padlock 10, having a casing 11, and a shackle 12. The casing 11 is made of a plurality of laminated plates, details whereof are more specifically shown in Figures 11 to 17.

In assembling the casing 11, I first make reference to the bottom plate 13 (Figure 17) which is formed with a central pin cylinder bearing orifice 14 and round rivet-receiving holes 15 at each corner.

In accordance with the embodiment of the invention illustrated, I then overlay nine plates 16, of the configuration shown in Figure 16, each of which is formed with round rivet-receiving holes 15, aligned with the holes 15 in plate 13 shown in Figure 17. Each of the plates 16 is interiorly formed with a central cut-out 17 a part of which is generally circular and merges in one

direction into a shackle heel-receiving orifice 18 by a cut-out slit 19, and at its leftmost direction into a substantially circular shackle toe-receiving orifice 20 by a slotted portion 20a. The configuration of the cut-outs 17 and 20 and 20a is arranged to receive a pin cylinder barrel housing 21 whose flange 22 fits within the orifice 14 of the bottom plate 13. The configuration of the slotted portion 20a is arranged to receive the extension 23 retaining the tumbler pins 24. Within the pin cylinder barrel housing 21, the key barrel 25 is located, in a manner which will be readily understood.

Superimposed on the nine plates 16, stacked as previously described, there are positioned two plates 26 (Figure 15), each having four substantially round rivet-receiving orifices 15, a shackle heel-receiving orifice 18 and a central cut-out 17 merging into a slotted portion 20a for receiving the pin cylinder barrel housing 21 and its extension 23. The plates 26 are formed at their interior with an off-set cut-out 27 to receive the lock washer 28 and its finger 29 which holds the key barrel 25 rotatably located within the pin cylinder housing 21 at its upper end, the finger 29 limiting the movement of the barrel in one direction.

Superimposed upon the plates 26 there is positioned a plate 30 (Figure 14) having four round rivet-receiving orifices 15, circular heel and toe shackle receiving orifices 18 and 20, and a central circular cut-out 31. Through the circular cut-out 31 the finger 32 projects. The finger 32 is of general cylindrical contour, forming a bearing for purposes which will appear more clearly as this description proceeds.

Within the cut-out 31 there is nested a disk 33 having a crescent-shaped opening 34 mounted upon the crescent-shaped shoulder 35 of the finger 32. The disk 33 carries an eccentrically positioned finger 36, whose operation will be described in greater detail as this description proceeds. The plate 30 serves as a retainer for the pin cylinder housing 21 and its extension 23.

Superimposed upon the plate 30, I position a pair of plates 37 (Figure 13). These plates each are formed with substantially rounded rivet-receiving orifices 15 to be aligned with the orifices 15 of the plates shown in Figures 14 to 17 previously described. The plates 37 include a cut-out defining the substantially circular heel and toe shackle-receiving orifices 18 and 20. The interior of the plates 37 is cut out to provide a chamber for the swinging bolt 38 and this member is formed with an orifice 39 to receive the finger 32 previously mentioned. For rotation of the swinging bolt on the finger 32 the swinging bolt has one finger 40 arranged to extend in the well formed by the plates which outline the orifice 20 and a finger 41 arranged to swing within the well formed by the plates which outline the orifice 18. The swinging bolt has a cut-out defining a shoulder 42 engaged by the eccentric finger 36 in one direction. A lug 43 is engaged by a coiled spring 44 and abuts a shoulder 45 formed on the interior of the plate 37, normally tending to swing the bolt 38 to align the fingers 40 and 41 in the well formed by the orifices 18 and 20, previously described.

Thereupon I superimpose on the stacked plates a keeper plate 46 shown in Figure 12. Keeper plate 46 is provided with two diametrically opposed circular rivet-receiving orifices 15' corresponding in position to the upper right hand corner and lower left hand corner rivet-receiving

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orifices 15 of the plates described and stacked below the same in connection with Figures 13 to 17. Diametrically opposed rivet-receiving orifices 47, 47 are elongated laterally with the limiting edges 48, 48 positioned to be aligned with the leftmost wall of the upper left hand corner and lower right hand corner orifices 15 with a limit of movement in the right hand direction and with the limiting edges 49, 49 for movement for a distance which will appear more clearly as this description proceeds. The orifice 50 in this plate is elongate, instead of circular, as in the previously described plates. The walls 51 defining the orifice 50 permit of a movement in parallelism with that permitted by elongated orifices 47, 47. The right hand end of the plate 46 has an orifice 52 formed with a semi-circular wall 53 in the right hand direction and with a straight wall 54 in the left hand direction. Orifices 47, 47 and 52 are elongated to substantially the same degree so that when the plate 46 is moved towards the left hand, the semicircular wall 53 will be aligned with the well formed by the right hand wall of the orifice 18 in the stacked plates immediately below plate 46. The straight wall 54 will thereupon be clear of the well formed by the circular orifice 18 in the plates illustrated in Figures 14, 15 and 16. Likewise, the orifice 50, when moved in a left hand direction will not constrict the well formed by the orifice 20 in the plates illustrated in Figures 13 to 16 when stacked as described.

In this position of stacking of the plates as described, I then superimpose the top plate 55 which has four circular corner rivet-receiving orifices 15 aligned with the orifices 15 and the plates illustrated in Figures 13 to 17, and circular heel and toe shackle-receiving orifices 18 and 20, respectively.

Through the stacked plates thus described, there are then inserted rivet pins 56 and 57 which pass through the aligned orifices located in position corresponding to the orifices 47, 47 of the plate 46, i. e. the upper left hand corner and lower right hand corner. The rivet pins 56 and 57 are then headed at their opposite ends to rigidly bind together the assembly of plates and the locking mechanism, at the same time positioning the plate 46 to the point where the limiting edge 49, 49 engage the right hand side of the rivet pins 56, 57.

In this position, as more clearly shown in Figure 8, the straight wall 54 forms no obstruction to the well formed by the stacked plate 55 and the plates illustrated in Figures 13 to 16.

In this position the key K is rotated counter-clockwise (as viewed in Figures 3 and 8) to swing the fingers 40 and 41 of the swinging bolt 38 to the open position more clearly shown in Figure 3, whereupon a coiled ejector spring 58 is inserted in the well 59 which corresponds to the orifice 18 in each of the plates shown in Figures 11 and 13 to 16.

At this stage, the casing 11 has been partially completed and the plate 46 is located to have the edge 60 protrude beyond the edge wall 61 formed by all of the plates shown in Figures 11 and 13 to 17, as will appear more clearly from an inspection of Figures 7 and 8.

The shackle 12 is formed with a toe portion or branch 62 which is generally circular in cross section to make a close sliding fit with the well 63 outlined by the circular opening 20 in each of the plates illustrated in Figures 11 and 13 to 16. A recess 64, formed in the toe portion 62 has

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a shoulder 65 spaced at a point to receive the finger 40 of the swinging bolt 38.

The shackle 12 has an anchoring post or heel 66 formed with a pivoting portion 67 which is generally cylindrical to conform snugly to the well 59.

Spaced from the end of the pivoting portion 67 I provide an annular groove 68 which provides a neck portion 69 generally circular in cross section (see Figure 10), leaving a shoulder 70 on one side of the neck. The inner portion of the anchoring post or heel 66 is flattened at 71 and terminates adjacent a recess 72, forming an inwardly stepped shoulder 73. The shoulders 73 and 65 are formed to lie substantially in the same plane.

With the shackle bolt constructed as described, and with the casing prepared as previously described, and more particularly in the position as illustrated in Figure 7, I thereupon insert the pivoting portion 67 of the shackle within the well 59 and, upon swinging of the bolt 38, entrance of the portion 67 within the well 59 is permitted to the point where the coiled ejector spring 58 is encountered. The toe portion 62 will thereupon likewise enter the well 63. Release of the key K will thereupon serve to swing the fingers 40 and 41 to engage the recesses 64, and 72, respectively, and prevent ejection of the shackle 12.

In this position the plate 46 is moved to bodily align the rivet receiving holes 15' with the orifices 15 in the upper right hand corner and the lower left hand corner of the other plates constituting the remainder of the casing 11, to permit completion of the lock casing. This will result in bringing the limiting edges 48, 48 to engage the left side of the rivet pins 56 and 57 as more clearly shown in Figures 9 and 10. This may be done in several ways.

A tool or pin approximately the size of the rivet pin and pointed at one end may have the pointed end inserted into the oval-shaped opening formed by the orifices 15 in the top plate 55, and the orifices 15' in the plate 46. This will result in a sliding movement of the plate 46, to bring the straight wall 54 into position where it projects into the well 59, to protrude over the shoulder 70.

Another method for accomplishing the alignment of the rivet orifices 15' with the orifices 15 and to project the straight wall 54 into shackle engaging position is by inserting an L-shaped tool into the well 63 to move the plate 46 from the position shown in Figures 7 and 8 to the position shown in Figures 9 and 10.

A still further method in the event that it is elected to head the rivets 56 and 57 more positively, is by giving the plate 46 a hammer blow at the edge 60, whereby the edge 60 is brought into alignment with the edge 61 of the lock casing.

The straight wall 54 projects into the well 59 to engage the shoulder 70 of the anchor post 66 of the shackle. Thus, the intermediate assembly of the lock has been completed. The assembler may thereupon test out the lock mechanism, to ascertain whether the swinging bolt operates properly to bring the fingers 40 and 41 into engagement with the shoulders 65 and 73 of the recesses 64 and 72, respectively. Other details of the proper operation of the lock may at this time be tested out so that any defects, especially those which may occur as a result of the tempering or hardening treatment to which the shackle 12 has been exposed, may be detected. Should the locking mechanism be found to be de-

fective or not smooth in operation, the plate 46 may thereupon be slid back bodily to the position shown in Figures 7 and 8, whereupon, by key operation of the swinging bolt 38, the shackle 12 may be removed for alteration, modification, or replacement by a more properly fitting shackle and for otherwise making any other adjustment which may be necessary.

Should the shackle be found to operate properly in the shackle-receiving wells 63 and 59, and to properly interfit the shoulders 65 and 79 with the fingers 40 and 41 of the swinging bolt 38, the final rivet pins 74 and 75 may be driven into position entering the circular orifices 15', 15' of the plate 46 and the orifices 15 in this location of the other plates, and after heading the rivet pins 74 and 75, the casing assembly and lock are completed and permanently clamped to prevent any movement of the plate 46.

While I have described by my procedure of assembly initially inserting and heading two of the rivet pins 56 and 57, in order to permit the plate 46 to be slid into shackle-locking position, and to permit retracting of the plate 46 by bodily sliding the same, I may, as an alternative procedure, after bodily sliding the plate into shackle-engaging position, insert the final clamping rivet pins 74 and 75 and head these members to complete and permanently clamp the plates together and inspect the operation of the lock.

In this condition the completed lock may be tested out as previously described in order to detect any defects. Should any difficulties be detected, only rivets 74 and 75 need be removed to permit the plate 46 to be bodily slid, to displace the straight wall 54 from its projecting position into the well 59. Some instrumentality may be used to move the plate 46 to the position shown in Figures 7 and 8, thereby permitting removal of the shackle 12 for adjustment and replacement while otherwise retaining the assembly of plates clamped together by the remaining two rivet pins 56 and 57. Either procedure, it will be noted, will minimize the labor heretofore found necessary in making any adjustments in the lock assembly after the shackle has been attached to the casing. The method of assembly and the construction provided thereby effect considerable economies in lock production, particularly in a lock of the preferred form herein illustrated wherein both a toe and heel shackle engagement of the swinging bolt fingers is effected.

Another feature of the method of assembly described, especially under conditions where either the rivet pins 74 and 75 are withheld from the assembly or are removed from the assembly for testing of the lock parts, resides in the ability to return the plate 46 from the shackle-engaging position shown in Figures 9 and 10 to the shackle dis-engaging position shown in Figures 7 and 8. This movement may be accomplished with ease as previously described, by applying pressure to the plate 46 at its right hand edge as viewed in Figures 9 and 10, using some instrumentality such as a screw driver. I may, however, depress the shackle to the point where the edge 76 just clears the upper surface of plate 55. This action brings the flattened edge 71 in line with the straight wall 54 of the plate 46. Rotation counter-clockwise of the shackle 12 in this position serves to cam the plate 46 slidably to retract the wall 54 from its position overhanging into the well 59, to a point where the wall 54 is in alignment with the lefthand wall of the well 59, projecting the plate 46 to the initial position of as-

sembly shown in Figures 7 and 8. The shackle bolt 12 may thereupon be removed for adjustment or replacement as previously described. Thus, at the intermediate stage of assembly, elimination of the final rivet pins 74 and 75, and especially the elimination of the rivet pin heads in the localities in which the rivet pin 75 is to be positioned, provides a simple and expedient manner for restoring the plate 46 to the position where the shackle bolt is released for removal and replacement.

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

1. A lock comprising a casing formed of a plurality of superimposed plates and including orifices through some of the plates providing wells for receiving a shackle, and locking means in said casing for said shackle, a keying plate to engage one branch of said shackle, rivet holes through said plates, said keying plate having a rivet pin receiving orifice formed to permit bodily movement of said plate to and from shackle engaging position when a rivet pin unites said laminations and keying plate together.

2. A lock comprising a casing formed of a plurality of superimposed plates and including orifices through some of the plates providing wells for receiving a shackle, and locking means in said casing for said shackle, a keying plate to engage one branch of said shackle, rivet holes through said plates, said keying plate having a pair of rivet pin receiving orifices formed to permit bodily movement of said plate to and from shackle engaging position when a pair of rivet pins unite said laminations and keying plate together.

3. A lock comprising a casing formed of a plurality of superimposed plates and including orifices therethrough providing wells for receiving a shackle, and locking means in said casing for said shackle, a keying plate to engage one branch of said shackle, rivet holes through said plates, said keying plate having a rivet pin receiving orifice formed to permit bodily movement of said plate to and from shackle engaging position when a rivet pin unites said laminations and keying plate together, said casing and keying plate having other rivet receiving orifices which, when permanently united by rivets, prevents said keying plate from being moved from shackle engaging position.

4. A lock comprising a casing formed of a plurality of laminated plates and including through some of the plates orifices providing wells for receiving the toe and heel of a shackle, locking means in said casing for the heel of said shackle, and a keying plate to retain the heel of said shackle, said keying plate having a shackle engaging portion and a rivet receiving orifice contoured in relation to said shackle engaging portion to permit bodily movement of said keying plate to and from shackle engaging position, when a rivet pin unites said laminations and keying plate together through said rivet receiving orifice.

5. A lock comprising a casing formed of a plurality of superimposed plates and including orifices through some of the plates providing wells for receiving the toe and heel of a shackle, and locking means in said casing for said shackle, a keying plate to engage the heel of said shackle, held between other plates of said casing and slidable between faces of said other plates, rivet holes through said plates, said keying plate having a rivet receiving orifice and a shackle heel engaging portion, a rivet pin uniting said plates and

passing through the rivet receiving orifice of said keying plate, said rivet pin acting as a limiting stop to the slidable movement of said keying plate to and from shackle engaging position, said rivet receiving orifice of said keying plate providing a guide for the slidable movement aforesaid.

6. A lock comprising a casing formed of a plurality of laminated plates including orifices through some of the plates providing wells for receiving a toe and heel of a shackle, and locking means in said casing for said shackle and a keying plate having a portion to extend into the heel engaging well for said shackle, guided between the faces of adjacent laminations of said casing, said keying plate having a rivet hole aligned with rivet holes of said other laminations of said casing, said rivet hole of said keying plate being formed to permit bodily slidable movement of said keying plate to and from shackle heel engaging position, while said rivet pin unites said plates together.

7. A lock comprising a casing formed of a plurality of laminated plates including orifices through some of the plates providing wells for receiving a toe and heel of a shackle, and locking means in said casing for said shackle and a keying plate having a portion to extend into the heel engaging well for said shackle, guided between the faces of adjacent laminations of said casing, said keying plate having a rivet hole aligned with rivet holes of said other laminations of said casing, said rivet hole of said keying plate being formed to permit bodily slidable movement of said keying plate to and from shackle heel engaging position, while said rivet pin unites said plates together, said rivet receiving orifice of said keying plate being elongated to permit bodily movement of said keying plate when at least one rivet pin for said plates is in position.

8. A lock comprising a casing formed of a plurality of superimposed plates to form a laminated lock casing, and including orifices through some of the plates providing wells for receiving the toe and heel of a shackle, locking means in said casing for said shackle, rivet holes through said plates for uniting said plates together by more than two rivet pins, a keying plate to engage the heel of said shackle, by bodily movement between adjacent laminations of said casing, said keying plate being accessible from the well for the toe, for movement to project into the well of the heel of said shackle, said locking plate having a rivet pin receiving orifice through which at least one of said rivet pins passes, enlarged to give movement in a direction between the wells, said rivet pin acting as a limiting stop for the movement of said keying plate, said keying plate having other rivet pin receiving holes for permanently locating said locking plate in shackle heel engaging position.

9. A lock comprising a casing formed of a plurality of superimposed plates and including orifices through some of the plates providing wells for the toe and heel, respectively, of said shackle, and locking means in said casing for said shackle, a keying plate positioned between other laminations of said casing and guided between said adjacent plates, and formed with a part for engaging the heel of said shackle, said keying plate having pairs of rivet pin receiving orifices, at least one pair being elongated to permit bodily movement of said keying plate to and from shackle heel engaging position when a pair of rivets unites said laminations and keying plate together, at least one pair of rivet pin receiving orifices serv-

ing permanently to unite said laminations, including the keying plate, against displacement.

10. In a laminated lock casing having locking mechanism for the toe and heel of a shackle, a keying plate bodily movable for engaging the heel of said shackle, said keying plate being movable to and from shackle engaging position when one or more rivet pins uniting said laminations are in position, said keying plate having a rivet pin engaging portion permanently to hold said locking plate in shackle engaging position by completing the riveting of the laminations.

11. A locking plate for a shackle of a laminated padlock arranged to constitute a lamination between other plates of the padlock casing, and including elongated heel and toe orifices, multiple rivet pin orifices, at least one rivet pin orifice being formed to permit movement of the locking plate in respect of the remainder of the laminations of the casing when a rivet pin unites the casing laminations.

12. A locking plate for a shackle of a laminated padlock arranged to constitute a lamination between other plates of the padlock casing, including rivet receiving orifices and elongated toe and heel orifices whereby the locking plate may be slid to and from locking engagement, and a plurality of rivet pin orifices, a pair of said rivet pin orifices being elongated substantially to the effective elongation of the toe and heel orifices, other rivet receiving orifices of the plate conforming in alignment to the rivet receiving orifices of the remainder of the plates of the casing.

13. A locking plate for a shackle of a laminated padlock and arranged to constitute a lamination between other plates by movement to and from shackle engaging position; and form part of the padlock casing, said plate having toe and heel shackle orifices and rivet pin receiving orifices in which said heel shackle orifice outlines a shackle engaging wall, the said orifices being elongated with respect to each other in the direction of said movement, at least one of said orifices being formed to permit bodily movement of said plate to and from shackle heel engaging position with a rivet pin in position uniting the laminations of the casing together.

14. A padlock comprising a casing formed of laminated plates, some of which plates include orifices therethrough providing wells for receiving the toe and heel of a shackle therefor, a locking element for engaging the shackle to hold it in locked position and means to project said shackle when disengaged by said locking element, said shackle heel having a shouldered portion, a clearance neck portion, and a flattened edge portion, the combination therewith of a locking plate disposed between laminations of said casing having a portion capable of being projected into the well for said heel, and movable to and from heel engaging position, the relative length of the toe portion to said portion of said heel and the plates permitting depression against the projection means and rotation of said shackle, when disengaged by the locking element, the said flattened edge portion in the rotation of the shackle thereby serving as camming means to slide said locking plate relatively to the shackle for free sliding movement of the locking plate to a disengaging position with respect of the shackle heel, permitting removal of the shackle bodily from the casing for testing of the locking element.

15. In a padlock comprising a casing made of laminated plates riveted together having a shackle formed with toe and heel portions, wells

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in said casing for said toe and heel portions, key operated locking means for said shackle for releasing the toe portion of said shackle, a locking plate capable of movement into and out of shackle heel engaging position by movement into and out of the well for said heel portion of said shackle, said shackle heel being formed with a camming portion to cam said locking plate bodily

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to shackle disengaging position upon movement of said shackle independently of the locking means, the relative length of the toe portion to the heel portion of the shackle and to the plates permitting movement of the shackle plate camming and disengaging position aforesaid.

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