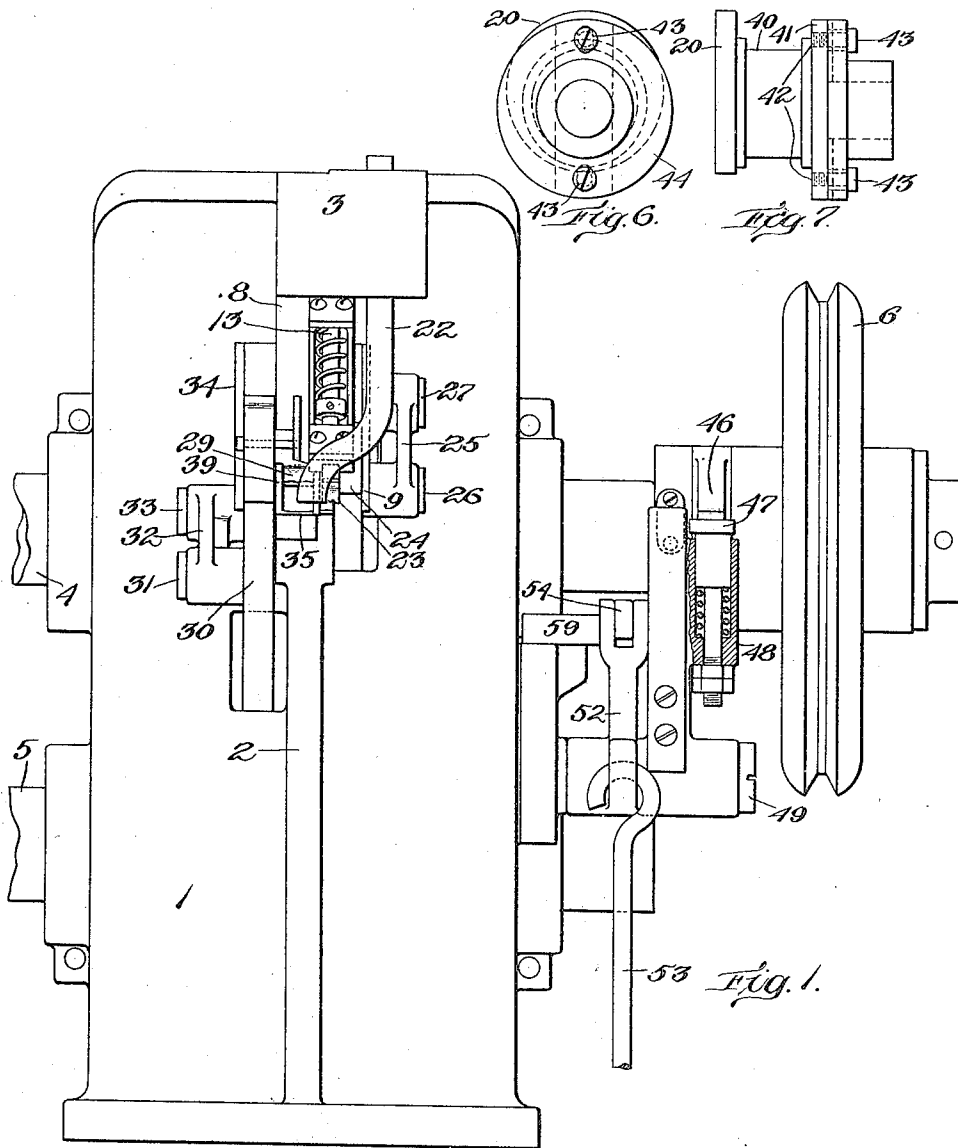


L. G. FREEMAN.  
 TACK PULLING AND REDRIVING MACHINE.  
 APPLICATION FILED NOV. 5, 1912.

1,214,908.

Patented Feb. 6, 1917.

3 SHEETS—SHEET 1.



Witnesses:  
 Edward Maxwell  
 James R. Hodder

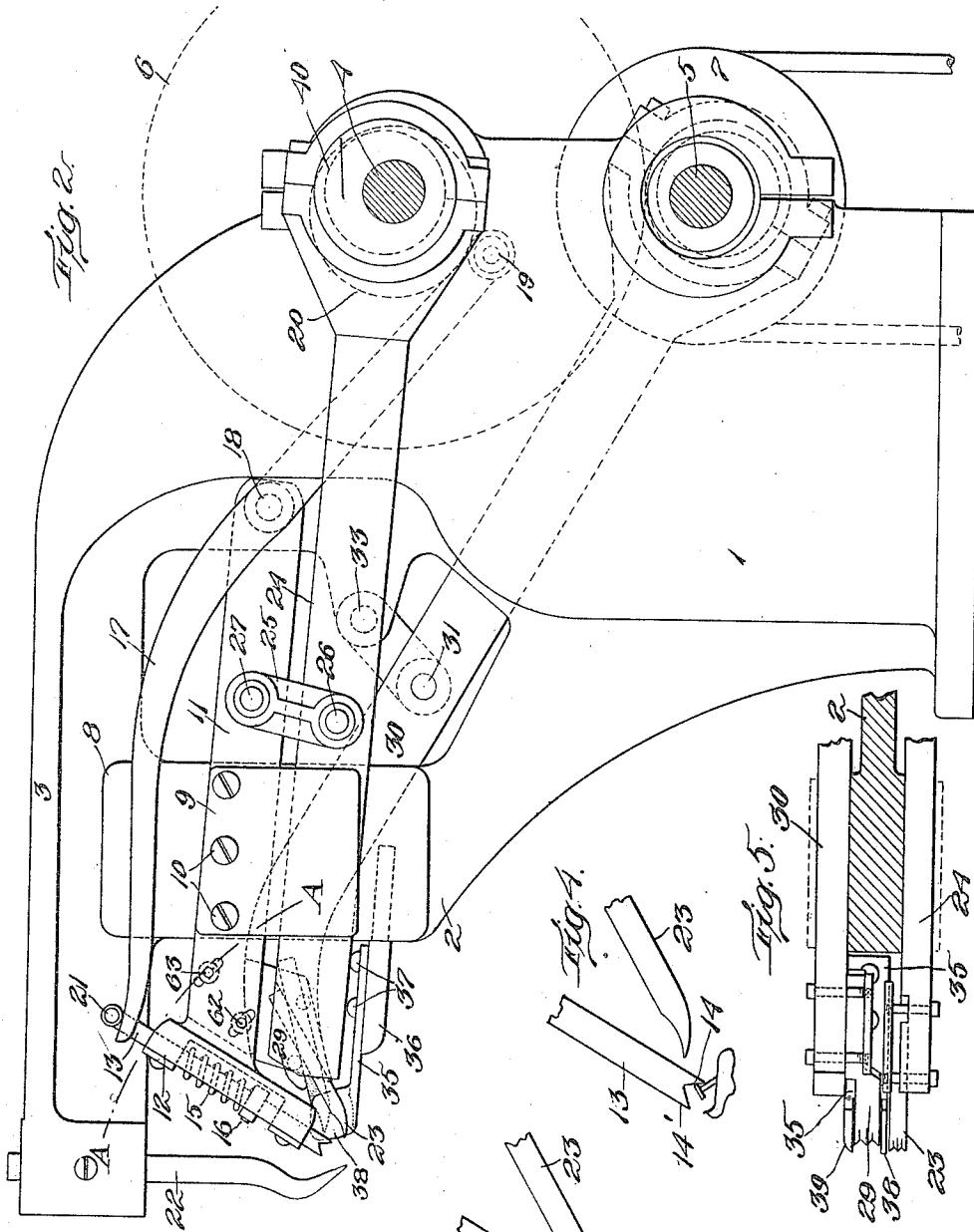
Inventor:  
 Louis G. Freeman,  
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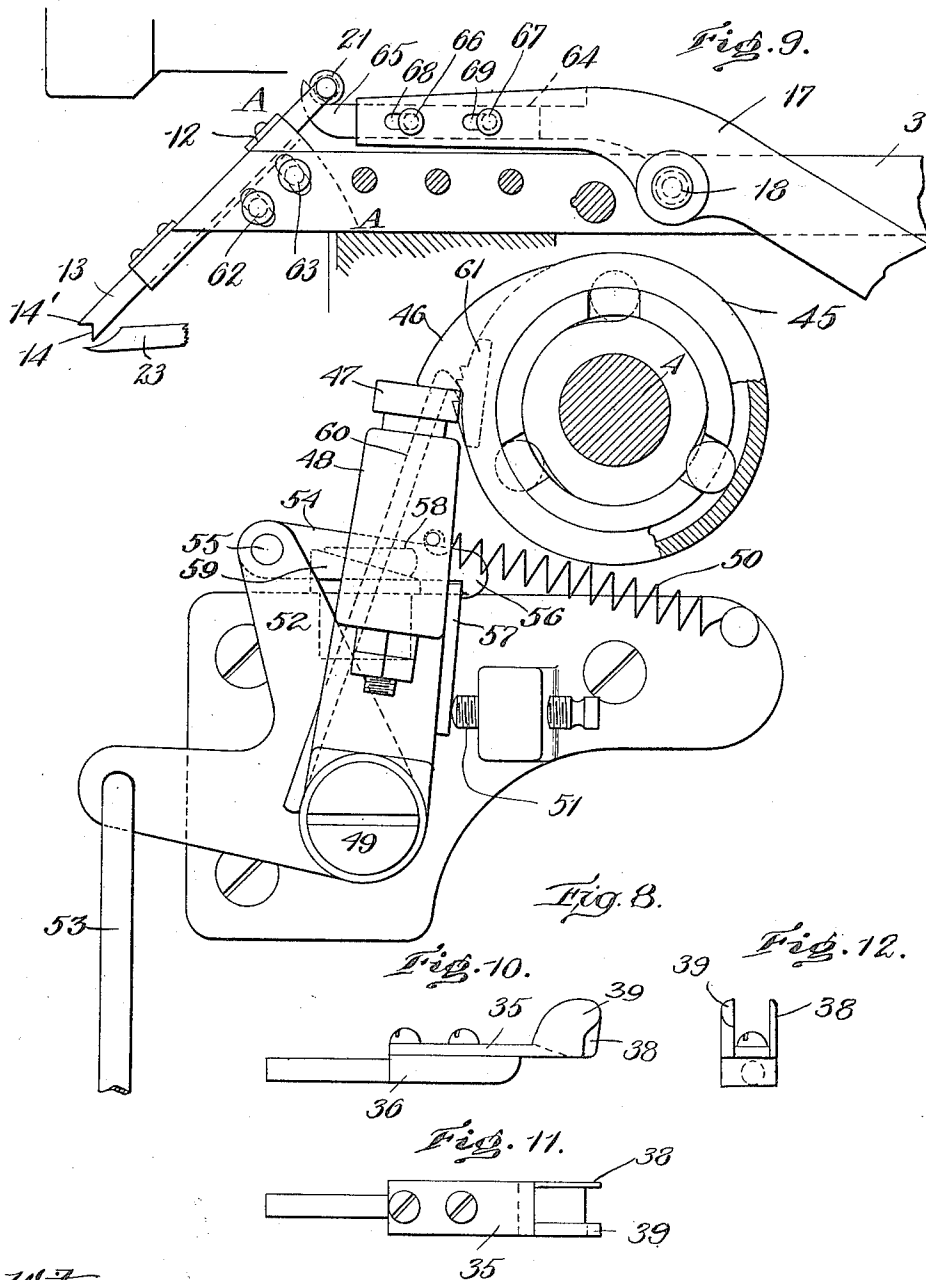
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

LOUIS G. FREEMAN, OF CINCINNATI, OHIO, ASSIGNOR TO HIMSELF AND CHARLES F. FREEMAN, TRUSTEES, OF CINCINNATI, OHIO.

## TACK PULLING AND REDRIVING MACHINE.

1,214,908.

Specification of Letters Patent.

Patented Feb. 6, 1917.

Application filed November 5, 1912. Serial No. 729,612.

*To all whom it may concern:*

Be it known that I, LOUIS G. FREEMAN, a citizen of the United States, and resident of Cincinnati, county of Hamilton, State of Ohio, have invented an Improvement in Tack Pulling and Redriving Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to machines for operating upon boots and shoes after the lasting process, and more particularly to prepare a lasted shoe for the sewing operation. In the manufacture of boots and shoes of the "welt" type it is customary to assemble the upper and inner sole on a last, then to draw the upper tightly about the last and to tack the upper to the inner sole, this operation constituting the lasting process. After the shoe is thus lasted it is necessary to prepare it for the subsequent sewing operation by withdrawing the lasting tacks so that they will be out of the way of the sewing needle and to drive or to leave in only a few "stay" tacks to hold the upper in place until a completion of the sewing operation. The pulling of the lasting tacks necessarily loosens the fitting of the upper about the last and the few tacks left in or which are driven in as stay tacks simply prevent the upper from becoming entirely loosened. It is an object of this invention to increase or tighten the lasting hold of the few stay tacks which are used to hold the upper in lasted condition so as to offset the loosening effect caused by the withdrawal of most of the lasting tacks. The great value of this feature of the invention will be readily appreciated as the most important step in shoe manufacturing and one on which the appearance and fitting of a shoe mainly depends, is the lasting process. The constant effort of shoe making has been to draw the upper leather close to the wood of the last and to hold it under tension until it is permanently secured to the inner sole, but heretofore no means has been provided to offset the loosening effect of withdrawing the lasting tacks. My invention enables the upper to be even more tightly drawn about the wood of the last than when first lasted, in preparation for the permanent attachment of the upper to the insole. This "tighten-

ing" feature of my invention is believed to be broadly new and I desire to claim the same broadly. A further feature of the invention is to so drive the stay tacks that they will not endanger the breaking of the sewing needle. The ordinary lasting tacks are driven directly across the line of operation of the insole sewing needle, and the removal of these lasting tacks is necessary in order that the sewing operation may be carried out, without the needle striking against the shanks of the lasting tacks and breaking. When ordinary stay tacks are driven in, it of course merely diminishes the danger of the sewing needle striking them instead of eliminating this danger. In order to obviate this difficulty tack lifting machines have been devised which pulled and removed the lasting tacks, but, at the will of the operator, only partially lifting an occasional tack, leaving it as a stay tack, but lifting it high enough from its original position so that its lasting hold was so loosened that if the needle struck it, it would tend to drive the tack out instead of breaking the needle. My invention, however, comprises means to drive a stay tack or to redrive a lifted tack, so that they may secure a better hold for staying purposes and yet will be easily displaced if struck by the sewing needle. Preferably this driving means operates to drive the tack at an angle to the line of drive of the regular lasting tacks.

I have preferably embodied my invention in a machine of the type shown in United States Patent No. 859,107 wherein an ordinary lasting tack is utilized as a stay tack during the withdrawal of most of the lasting tacks, any tack being left as a stay tack at the will of the operator. I provide mechanism for actuating these tacks which are left for staying purposes so as to tighten their lasting hold. Preferably this result is accomplished by lifting the lasting tacks which it is desired to leave in for staying purposes, and not to pull them entirely but when lifted a predetermined distance then to reset or redrive said tacks a less distance in the insole and last than when first driven, and to bend the shank of such tacks inwardly toward the rib of the insole. These tacks are not entirely lifted from the upper and therefore are redriven practically in the same location and in the same hole through

the shoe upper as made when originally driven, although their points may catch in a new and different part of the insole or last than when originally driven, being redriven

at an angle to the line of original drive  
 The tightening feature just described is not to be understood as limited to the type of machine shown in the patent above mentioned, but it is, of course within the scope of my invention to tighten the lasting hold of any tacks, when such tacks are originally driven for staying purposes or otherwise, preferably by bending the shanks inwardly in any suitable manner.

In the preferred embodiment of the invention as herein shown, a feature of particular importance is the provision of means whereby the redriving and bending mechanism is uniform in its action and in the power exerted, and automatically allows for any differences in the thickness of the work, and which, should any obstruction be interposed will result in no damage to the machine. I have also provided means to adjust the amount of power to be exerted and furthermore to adjust the extent of the tack lifting mechanism, to regulate the height to which the tacks will be lifted and therefore also the extent to which they will be redriven. This feature of the invention is of especial importance in enabling the machine to operate upon all classes of work whether long or short tacks are to be lifted.

Other novel features of invention, details of construction and combinations of parts will be hereinafter more fully pointed out and claimed.

Referring to the drawings, illustrating a preferred embodiment of the invention,

Figure 1 is a front view of the machine; Fig. 2 is a side view;

Figs. 3 and 4 are details illustrating the operation of the tack lifting fork and resetting driver as they operate on a lasting tack;

Fig. 5 is an enlarged plan view of the lifting fork, driver and guard therefor;

Figs. 6 and 7 are details illustrating an adjustable cam;

Fig. 8 is a view of the clutch mechanism;

Fig. 9 is a view showing an adjustable form of the lifting lever; and

Figs. 10, 11, and 12 are enlarged detail views of the guard which protects the shoe from the tack lifter.

In the drawings a suitable base 1 is shown, which is adapted to be fitted on to a pedestal, as illustrated in the patent above mentioned. This base is provided with a forward extension 2 and an overhanging arm 3, and has suitably journaled at the rear thereof shafts 4, and 5 driven by pulleys 6, 7 respectively, which may be belted to any appropriate source of power, preferably at the base of the pedestal. Secured to the

forward extension or bracket 2, and to the overhanging arm 3, is a brace 8 to which is secured a guide plate 9 by suitable screws or bolts 10. The same bolts 10 may be used to hold rigid with the frame a bar 11, shown in Fig. 2 as secured also to the rear of the base 1 and with its forward portion having an adjustable forked bracket 12 which is arranged to carry a sliding driver bar 13. This driver bar is held in the bearings of the bracket 12 at an appropriate angle so that it may operate on the lasting tacks to redrive the same at an angle to their original line of drive and to bend the shank of the tacks inwardly. It is this means which serves to redrive a lasting tack so as to tighten its lasting hold upon the upper. The lower end of the redriving bar 13 is provided with a lip 14 which will positively engage the side of the head of a lasting tack (see Fig. 3) and also assist in the bending action of the driver. In order to secure a uniform action of the driving bar 13, and to provide automatic means to allow for any obstruction to the operation of this driver without danger of breaking the machine, I have shown yielding means to actuate said driver. This yielding means comprises the spring 15 preferably coiled about the driver 13 between the bearings of bracket 12, with one end of the spring 15 resting against the upper bearing 12 and the lower end of said spring bearing against an adjustable block 16 secured to the shank of the driver. The block 16 may be adjustably secured by means of a set screw, and movement of said block relatively with the driver 13 will serve to vary the power of the spring 15 as may be desired. In order to raise or lift the bar 13 against the action of its driving spring 15, I have provided a lever 17 suitably pivoted at 18 to the bar 11, and with one end carrying a roll 19 arranged to bear upon a cam 20 operated by the shaft 4 at the rear of the machine, and with the forward end of the lever 17 bearing underneath a roll 21 mounted on the upper part of the driver bar 13. Rotation of the shaft 4 and actuation of the cam 20 serves to rock the lever 17 on its pivot 18, raising or lifting the driver bar 13 and compressing the driving spring 15. When the cam 20 releases the roll 19, the spring 15 will of course move the driving bar 13 downwardly. Secured to a suitable socket in the forward part of the overhanging arm 3 is a work rest 22 against which the operator may position the shoe. It will be readily understood that the driving and bending mechanism just described could be utilized to drive and bend inwardly the lasting tacks or any stay tacks of a lasted shoe, and thus tighten the lasting hold of such tacks, enabling this feature of my invention to be applied independently. However, I prefer to combine

this with tack pulling and lifting mechanism similar to the machine of said patent. My present machine, therefore, includes means to pull and remove the lasting tacks of a lasted shoe, which means preferably are in continuous action, together with means to lift or partially pull any lasting tack which it is desired to utilize as a stay tack, and to redrive such tack for staying purposes as well as to simultaneously bend the shank of said tack inwardly to tighten its lasting hold. The lifting and redriving mechanisms are herein shown as operable at will. It should be noted that only an occasional tack is needed for staying purposes, usually such tacks being necessarily at the toe part, at either side of the forepart, and at either side of the shank of a shoe. My machine, therefore, provides means to bring the tack lifting and redriving members into operation intermittingly, a suitable clutch being shown for this purpose as will be hereafter described.

To cooperate with the driver 13 so that a tack may be lifted, but not removed entirely from the shoe, I employ a lifter claw 23 arranged adjacent the lower end of the driver 13, and secured to a carrier 24 held by a link 25 pivoted thereto at 26 and to the arm 11 at 27. This carrier 24 extends to the shaft 4 and is actuated by an eccentric 40 which, in combination with the supporting link 25, imparts to the pulling claw 23 an orbital movement similar to that of the tack lifting claw shown in said patent. The carrier 24 is held in the proper lateral position, during its to and fro reciprocation caused by the eccentric 40, by the guide brace 8 and plate 9, as clearly shown in Fig. 2. The operation of the carrier 24 and of the lever 17 are so timed that as the lifter claw 23 engages the head of a tack and lifts the same, it will simultaneously contact with the lips 14 and 14' of the driver bar, which driver acts as a stop to prevent the tack from being entirely pulled and drawn out. As the claw 23 reaches the upward limit of its lifting orbit and starts retractively, being drawn backwardly by the carrier 24, the lip 14 of the driver holds the head of the tack and positively scrapes it from the lifting claw and as soon as the head clears said claw, the driver acts to re-drive the tack and bend the shank, as shown in Fig. 4.

The tack pulling mechanisms, which are in constant action and pull or draw out the lasting tacks successively as same are brought into engagement therewith, may be arranged closely adjacent to the lifting and redriving mechanism just described, so that the operator may easily manipulate the shoe to present a lasting tack either to the pulling mechanism or to the lifting and redriving mechanism. The tack pulling claw 29

is shown as secured to the forward part of a carrier 30, which carrier is pivoted at 31 to a link 32 having its other end pivoted at 33 to the frame of the machine. This carrier 30 has its rear portion clamped about an eccentric on the shaft 5 and is in continuous actuation, as above mentioned. The carrier 30 is also preferably held in proper lateral relation by being slidingly held between the brace 8 and the guide 34, similarly to the guide 9, but on the opposite side of the brace 8. The tack pulling claw 29 will have a similar orbital movement to that of the lifter and in practice I have found it desirable to operate this tack pulling mechanism at the rate of approximately sixteen hundred revolutions per minute, whereas the tack lifter and resetter will work more satisfactorily at the rate of about three hundred revolutions per minute.

To facilitate the action of the tack puller 29 and the tack lifter 23, I have arranged a novel form of guide and guard 35 which is herein shown as secured by screws to a holder 36 which is fitted into a socket in the forward bracket 2. I prefer to make this guard 35 adjustable upon the holder 36 by providing enlarged apertures in the shank of the guide 35 where the securing screws 37 pass through, although of course a considerable adjustment may be obtained by moving the holder 36 more or less within its containing socket. The guard 35 is best shown in Figs. 2 and 5, and it will be seen that the rapidly moving tack puller 29 is guarded on either side by the vertical partition 38 between the claws 23 and 29 and the outer vertical flange 39, these portions, viz., 38 and 39, being formed integrally with the guard 35. It will be noted that the outer flange 39 is curved at its edges to facilitate the drawing of the lasted shoe across the lower surface of the guard 35, the operator ordinarily drawing the shoe from left to right, resting it against the work rest 22 and the guide 35, and presenting each successive lasting tack to the puller 29, or presenting any tack intended to be utilized for staying purposes, to the lifter 23. Preferably the under portion of the guide 35 is extended under the pulling claw 29, as indicated in dotted lines in Fig. 2, so that this claw cannot mar the upper.

It may be desirable to vary the height to which the stay tack should be lifted by the tack fork or lifter 23. Therefore I have made the eccentric 40 adjustable, as illustrated in Figs. 6 and 7. By arranging the eccentric 40 with a flange 41 having therein threaded sockets 42 to receive bolts 43, which may pass through enlarged holes in a flange 44 fixed on the cam shaft 4, it will be seen that a considerable range of adjustment is provided to determine the throw of the eccentric.

In order to actuate the lifter 23 and the driver 13 intermittingly, any suitable clutch may be employed, but I have devised a specially effective clutch for this machine as is illustrated in Fig. 8. It will be understood that the shaft 4 is in rotation, and by means of a "Horton" clutch device the clutch member 45, which is operatively connected with the cam shaft carrying the cam 20 and the eccentric 40, may be given a single revolution and then stopped in order to actuate the tack lifter 23 and the driver 13 to lift and drive a single tack. Formed on the clutch member 45 is a lug 46 normally bearing against a spring pressed plunger 47 held in a sleeve 48 pivoted at 49 to the frame of the machine. A spring 50 tends to hold the sleeve 48 in position so that the lug 46 will contact therewith, said spring also holding the sleeve 48 against an adjustable stop 51. Pivotaly mounted at 49 is a bell crank lever 52 having a foot treadle 53 attached to one arm and a latch 54 pivoted at 55 to the other arm. This latch has its forward end 56 hooked to catch a plate 57 on the sleeve 48. It will be readily understood that on depression of the foot treadle 53, the bell crank lever 52 will be oscillated and the latch 54 will act to swing the sleeve 48 and plunger 47 away from the lug 46, so that the clutch member 45 may be clutched and rotated by the "Horton" clutch device. In order that the sleeve 48 and the plunger 47 may be at once replaced against the stop 51 in position to be engaged by the lug 46 at the completion of one revolution, the latch 54 is provided with an inclined dog 58, which rests upon a fixed incline 59, shown in dotted lines in Fig. 8. As the latch 54 is moved to the left, these inclined bearings will lift it until the hooked member 56 is freed from the plate 57, and the sleeve 48 will at once be swung back by the spring 50 into position to stop and disengage the clutch 45 after a single revolution. A spring arm 60 is also provided to engage with stop notches 61 to hold the clutch 45 from rebound after the lug 46 has struck the spring plunger 47 at the completion of its revolution.

It may also be desirable to adjust the angle of movement and relation of the driver bar 13 with its cooperating lifter 23, and consequently I have shown means to adjust the angle of the bracket 12 with relation to its holding bar 11 by forming the bracket 12 on a separate plate and securing said plate to the forward part of the bar 11 by means of suitable bolts and slots 62 and 63, which are arranged on an arc so as to adjust the bracket radially. This adjustment radially is preferably from a point as a center, which point is the limit of the backward lifting movement of the claw or lifter 23, so that the redriving bar 13 will always have its lip 14 in position to engage the head of

the tack lifted and thereby sweep or scrape the tack from engagement with the lifter 23. This arc of radial adjustment is indicated by the dotted line A—A and the slots for the bolts 62, 63 are arranged on a concentric arc, as shown in Figs. 2 and 9.

A modified form of the lever 17 is shown in Fig. 9, wherein the extreme end portion of said lever, which is in position to lift the roll 21 carried by the redriving bar 13, is made separate and adjustable. This adjustment, comprising a suitable slotted portion indicated by dotted lines at 64, is provided in the lever 17 in which a member 65 is adjustably held by means of bolts or screws 66 and 67 passing through slots 68 and 69 respectively in the lever 17. Forming the end 65 separately enables me to make said end portion of very durable material in order to take the wear of the roll 21, at a minimum expense, the main part of the lever 17 being of usual iron or steel. Also this adjustment insures more accurate operation of the lever 17 on the driving bar 13 when the latter is moved to the extreme limits of its radial adjustment.

The importance and advantage of the curved guard 39, however, has already been noted and its curved form permits the shoe upper to be smoothly drawn past the tack pulling and lifting tools without any possibility of being damaged thereby. This form of guard projects outwardly so as to allow the tack to pass underneath, and yet the guard covers the orbit of travel of the tack fork 29 in its upward or lifting movement, thus effectively protecting the shoe without interfering with the action of the tack lifter.

The operation of my machine will, it is thought, be clearly understood, having been outlined in the description of the various mechanisms. The operator presents a lasted shoe bottom upward to the work rest 22, and slides the edge portion of the shoe where the lasting tacks are driven, along the under side of the guide and guard 35, drawing the shoe from left to right or from the rounded flange 39 to the partition 38, as shown in plan view, Fig. 5. The tack pulling claw 29 and its carrier 30 being actuated by the continuously rotating shaft 5, are in constant action at high speed, this tack puller being intended to remove the lasting tacks as they are successively brought within its orbital path as rapidly as the operator draws the shoe along. However, when it is desired to utilize one of the lasting tacks as a stay tack, the operator manipulates the shoe so that such tack will be held beyond and drawn by the path of movement of the puller 29, but will be presented to the adjacent tack lifter 23, then the operator depresses the clutch, causing the shaft 4 to actuate the cam 20, lever

17 eccentric 40 and carrier 24, so that the lifter 23 will raise said tack into engagement with the driver 13, and the driver 13 will scrape or remove the lifted tack from contact with the claw 23, and redrive said tack, bending its shank and tightening the upper as above explained.

It will thus be seen that my improved machine comprises means to tighten the hold of the lasting tacks and thus to strain or draw the lasted upper even more tightly about the wood of the last than when said tacks were originally driven. It also comprises means to partially lift and then to redrive any one lasting tack, utilizing said lasting tack as a stay tack and to tighten the upper, held by such stay tack, about the wood of the last. Thus I have provided means to counteract and overcome the loosening of the upper on a last, caused by withdrawal of the lasting tacks and thereby I am enabled to produce a better fitting shoe, as well as to facilitate the in-seam sewing operation. I have also provided yielding and adjustable mechanism to re-drive or bend each lasting tack with the same force and power, which promotes uniformity of product.

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

1. A machine for operating upon the bottoms of lasted boots and shoes, comprising means to partially withdraw a tack, and a driving tool having means to drive and to bend lasting tacks inwardly to tighten their lasting hold on the upper, after said lasting tacks have been partially withdrawn.

2. A machine for operating upon the bottoms of lasted boots and shoes, comprising means to partially withdraw a tack, and a driving tool reciprocable at an angle to the plane of the shoe bottom and with its tack engaging portion formed to partially drive a lasting tack, while simultaneously bending said tack inwardly, after said lasting tacks have been partially withdrawn.

3. A machine for operating upon the bottoms of lasted boots and shoes, comprising yielding means to deflect the shank portion of a lasting tack while driving said tack to increase the lasting tension of said tack.

4. A machine for operating upon the bottoms of lasted boots and shoes, comprising means to partially withdraw a tack, and a driver operable on a selected one of the lasting tacks to bend the tack and increase the lasting hold of said tack, after said tack has been partially withdrawn.

5. In a machine of the class described, a tack driver, means cooperating with said driver to partially withdraw a lasted tack, and means to actuate said driver to redrive said tack from the height to which it was withdrawn.

6. In a machine of the class described, a tack driver, means cooperating with said driver to partially withdraw a lasted tack, and yielding means to actuate said driver independently of said cooperating withdrawing means, to redrive the tack so lifted, at the will of the operator.

7. In a machine of the class described, a tack driver and a tack puller cooperating to partially withdraw a lasting tack, means on said driver to limit the distance to which said tack is partially withdrawn, and means to actuate said driver at an angle to the line in which the tack was lifted to re-drive said partially lifted tack.

8. In a machine of the class described, a tack driver, adjustable means cooperating with said driver to engage and to partially withdraw a lasting tack, in combination with yielding means to exert a driving pressure on said driver and to redrive said partially withdrawn tack with less force than when originally driven.

9. In a machine of the class described, means to lift a lasting tack and means to redrive said tack comprising adjustable yielding mechanism.

10. In a machine of the class described, means to partially withdraw a lasting tack, in combination with automatic mechanism to redrive and to bend the work-holding portion of said tack in a predetermined direction during the redriving operation.

11. In a machine of the class described, means to partially withdraw a lasting tack, in combination with automatic mechanism to redrive and to bend the work-holding portion of said tack inwardly during the redriving operation.

12. In a machine of the class described, means to partially withdraw a lasted tack substantially in the same vertical line in which said tack was originally driven, in combination with means to redrive said partially lifted tack at an angle to said vertical line, to increase the lasting hold of said tack.

13. In a machine of the class described, means to entirely withdraw a plurality of lasting tacks in succession, means operable at will to partially withdraw any one lasting tack, said partially withdrawing means acting substantially longitudinally of the tack operated on, in combination with means to limit the distance said tack is withdrawn, and to redrive such partially lifted tack at an angle to the line in which it was partially withdrawn, to increase the lasting hold of said tack.

14. In a machine of the class described, means to lift a lasting tack, in combination with means to redrive a tack so lifted, said redriving means being reciprocable on a line at an angle to the line of movement of the tack lifting means.

15. In a machine of the class described,

tack lifting means in combination with re-driving means, said re-driving means being coöperative during the tack lifting operation to hold the tack in engagement with the lifting means.

16. In a machine of the class described, tack lifting means in combination with re-driving means arranged at an angle to said tack lifting means, said re-driving means coöperative with the tack lifting means during the tack lifting operation to aid in holding the tack in engagement with the lifting means, and acting to positively remove the tack from engagement with the lifting means at a predetermined time preparatory to re-driving said tack.

17. A machine of the class described, comprising a tack lifting claw and a tack driver arranged to coöperate during the tack lifting operation and to re-drive said tack at the completion of the tack lifting operation.

18. In a tack pulling and re-driving machine, a guard for the pulling and lifting

instrumentalities, said guard having a rounded outer vertical flange.

19. In a tack pulling and re-driving machine, a guard for the pulling and lifting instrumentalities, said guard having a rounded outer vertical flange, and means to pull and to lift a tack, combined with a vertical partition between the tack puller and lifter.

20. In a machine of the class described, means to operate successively on lasting tacks, comprising a plurality of tack-engaging devices, a guard for the first tack engaging device and a partition between each adjacent tack-engaging device.

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

LOUIS G. FREEMAN.

Witnesses:

T. J. DERRICK,  
A. W. HAGEMANN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."