Dec. 16, 1941.

H. LYON

2,266,124

FASTENING PULLING MACHINE

Filed July 29, 1940

2 Sheets-Sheet 1

Fig. 1.

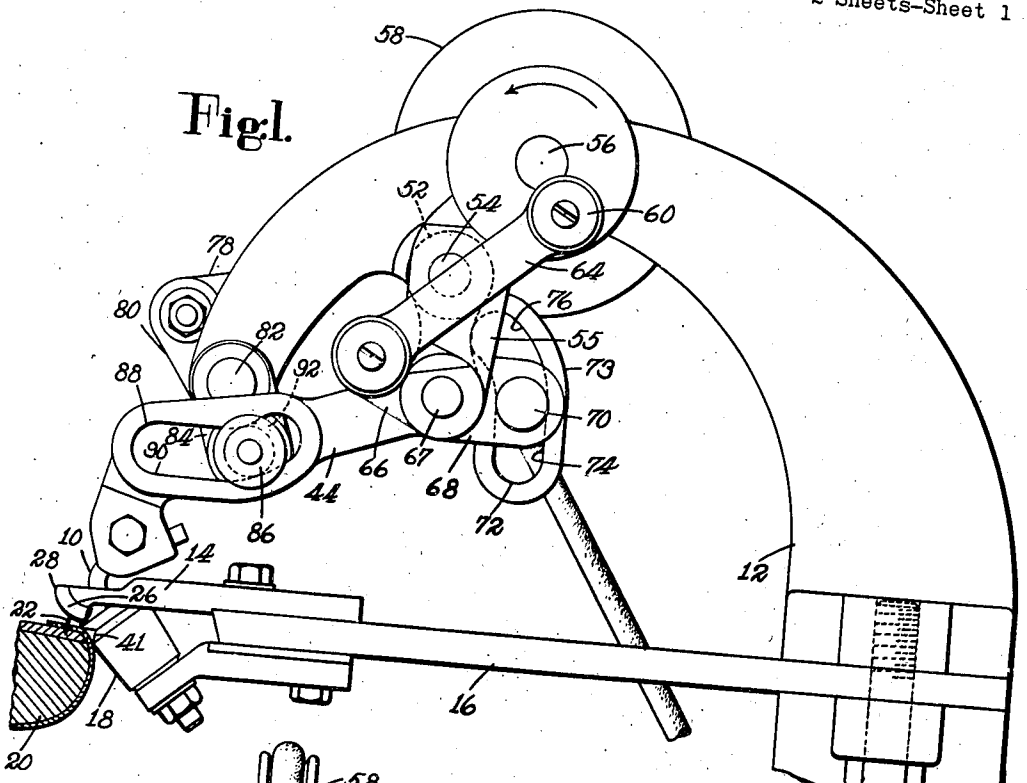
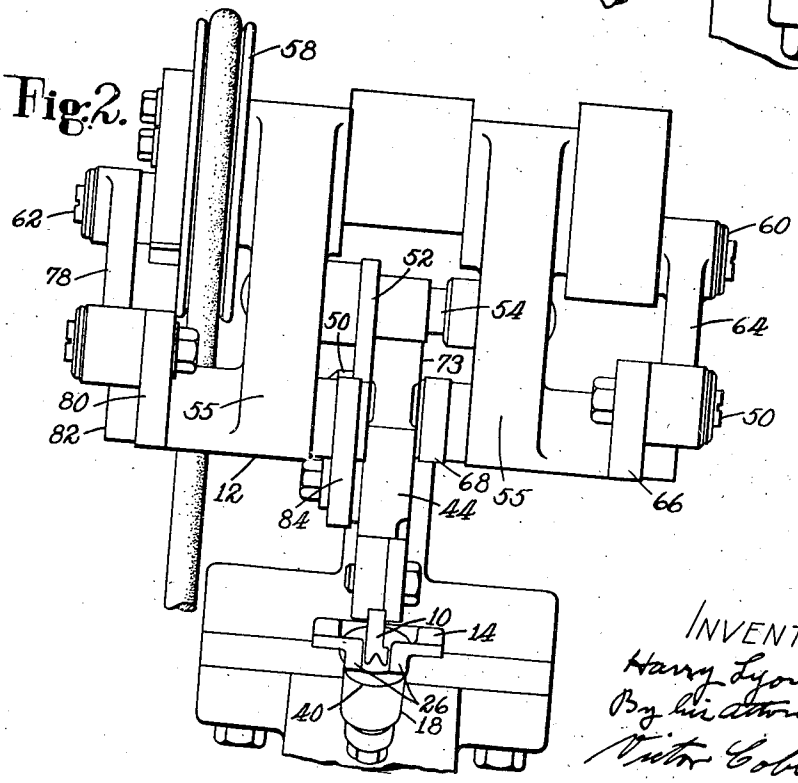


Fig. 2.



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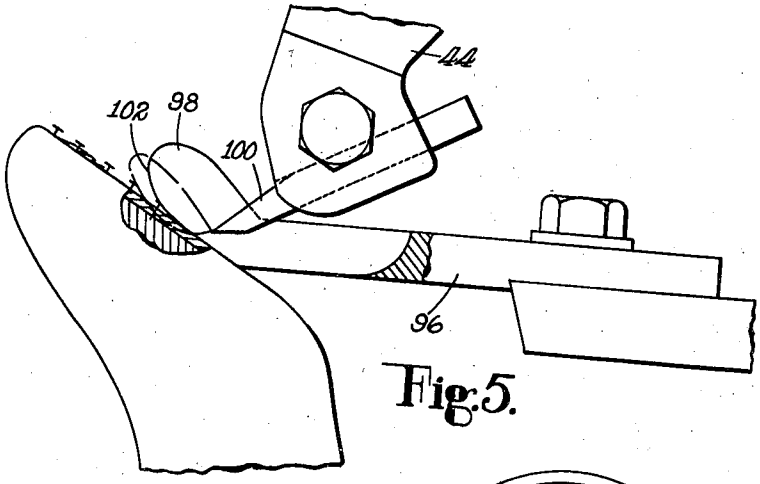


Fig. 5.

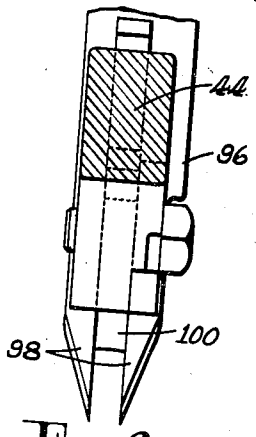


Fig. 6.

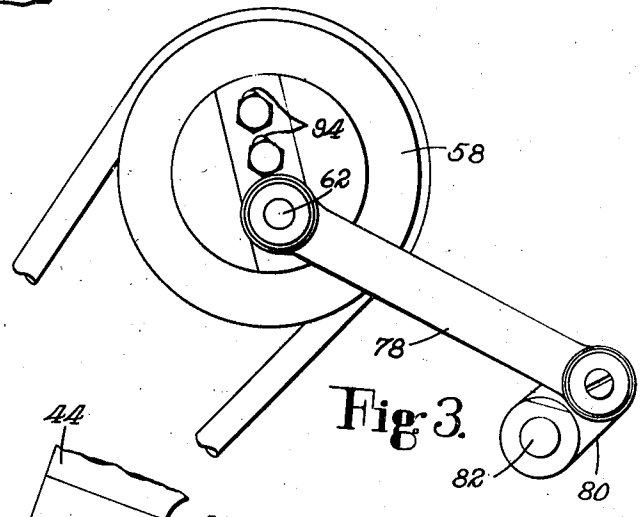


Fig. 3.

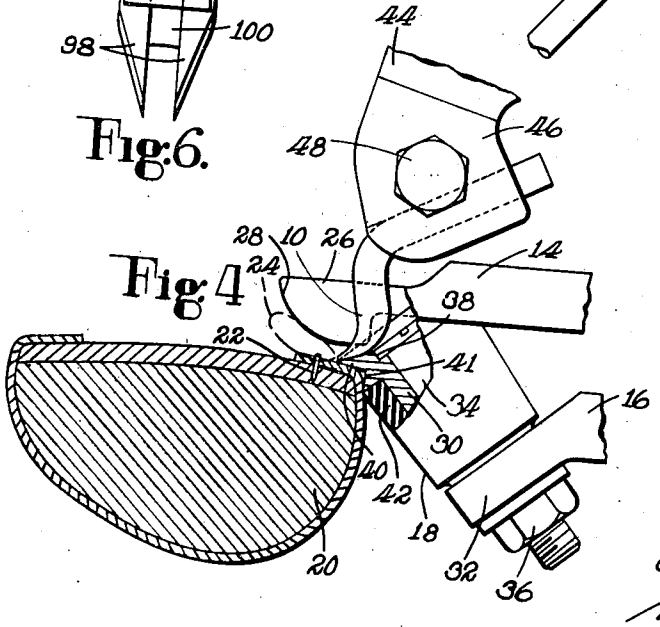


Fig. 4

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UNITED STATES PATENT OFFICE

2,266,124

FASTENING PULLING MACHINE

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Application July 29, 1940, Serial No. 348,252

14 Claims. (Cl. 12—16)

My invention relates to improvements in machines of the type in which a tool is driven in a cyclic path at such high speed that in normal operation the appearance of the tool is indistinct, thereby making accurate presentation of work to the tool difficult, and the invention is herein illustrated as embodied in a machine for pulling fastenings, such as the tacks or staples used to secure temporarily the upper of a shoe to the insole thereof.

Machines as heretofore constructed for pulling temporary fastenings inserted in a shoe usually comprise a claw or pick tool driven in an orbital path at comparatively high speed, the work being advanced past the tool to present the fastenings successively thereto in position to be pulled. Difficulty has been experienced in connection with the operation of machines of this kind in locating deeply embedded fastenings in proper position to be pulled without causing the pulling tool to engage the work in such a way as to cause injury thereto.

Accordingly, it is an object of the present invention to provide an improved fastening pulling machine, which is especially adapted to facilitate the location of fastenings relatively to the pulling tool quickly, and in such a way as largely to eliminate any likelihood of injury to the work during the fastening pulling operation. To this end, and as shown, I have provided a fastening pulling machine, in which there is a fastening pulling tool mounted for movement in an orbital path along a work rest against which work, such as a shoe, can be positioned, together with mechanism for causing a dwell in the movement of the tool at a point in its path immediately in advance of its fastening pulling movement, so that the operator can observe the position of the tool at that point and can readily present a fastening in the shoe to the tool in position to be pulled. The tool is preferably driven at high speed but the length of dwell during each cycle is sufficient to cause the tool to appear to be stationary at a point immediately in advance of its pulling movement. This construction is advantageous in that any fastening, and particularly a deeply embedded fastening, can readily be brought accurately into operative position relatively to the tool without likelihood of causing the tool to dig into the work in such a manner as to damage it.

Another feature of the invention consists in the provision of gaging and guarding means for facilitating the presentation of the work to the tool, and for further eliminating likelihood of injury to the work. As illustrated, this means comprises guard members extending along the path of the tool on opposite sides thereof, and a work rest in the form of a roll positioned adjacent to the tool and the guard and rotatably mounted on the frame of the machine to facilitate the movement of the work past the tool.

These and other features of the invention are disclosed in the following specification and the accompanying drawings and are pointed out in the claims.

In the drawings,

Fig. 1 is a view in side elevation of the upper portion of a staple pulling machine embodying one form of my invention;

Fig. 2 is an end view of the machine shown in Fig. 1;

Fig. 3 is a side view of a portion of the mechanism for controlling movement of the fastening pulling tool;

Fig. 4 is a side view, partly in section, showing on an enlarged scale the fastening pulling tool and the guard and work rest with a shoe having a staple in position to be pulled;

Fig. 5 is a side view, partly in section, showing a modified form of the invention and illustrating a tack pulling tool and guard with a shoe having a tack in operative position to be pulled; and

Fig. 6 is a plan view, partly in section, showing the tack pulling tool and gage of Fig. 5.

The staple pulling machine illustrated in Figs. 1 and 2 comprises a claw-shaped pulling tool **10**, mounted in a frame **12** for movement in an orbital path, there being a forked guard **14** extending adjacent to the path of the tool and supported upon a bracket **16** carried by the frame. The bracket **16** also carries a work rest **18** for engaging a shoe **20** having an upstanding staple **22** to be located in position relatively to the tool, so that it can be pulled. As shown in Fig. 4, the path of the tool is indicated by a dash line **24**. The guard **14** has two forwardly extending portions **26** embracing the tool **10** and upwardly curved edge portions **28** which extend along the upper portion of the path of the tool. The shape of the guard is such that the forwardly extending portions will prevent injury to an operator or to a shoe upon movement toward the tool from the side, but does not interfere with the presentation of a shoe to the tool. The work rest **18** comprises a spindle **30**, Fig. 4, rotatably mounted on a downwardly extending portion **32** of the bracket **16** with the axis of the spindle extending at an inclination to the bracket. The spindle is retained in position on the extension **32** by a bolt **34** and nut **36**. The upper end of the spindle is cup-shaped at **38**, and terminates in a thin edge portion **40** across which the tool **10** moves. This edge portion serves as a guard to prevent scuffing of the adjacent parts of a shoe when the latter is moved past the tool. Below the edge portion **40** is an annular recess **41** adapted to receive the edge of the forepart of a lasted shoe to guide the same past the tool. The spindle is provided with a yielding covering **42**,

preferably of rubber, which may be frictionally engaged by the side of the shoe as the shank portion thereof is moved past the tool, thus to assist in guiding the shoe.

The tool 10 is secured to the lower end of a puller bar 44 by means of a clamping plate 46 and a nut 48. The puller bar extends rearwardly of the machine and carries a stud 50, which is pivotally carried by a link 52, the upper end of which is mounted upon a shaft 54 carried by depending portions 55 of the frame. The puller bar 44 is oscillated by means of a driver shaft 56, continuously rotated by a pulley 58, and carrying at its opposite ends two crank pins 60 and 62, which serve to impart to the puller bar variable motions to effect movement of the tool in an orbital path. The crank pin 60 carries a link 64, which is connected to one arm 66 of a bell crank lever mounted upon a stud 67 in one of the frame portions 55. The other arm 68 of the bell crank lever carries a pin 70 positioned in a cam track 72 in an arcuate-shaped extension on the rearward end of the puller bar 44. The cam track 72 has a straight portion 74 at one end thereof and at the other end a curved portion 76, the axis of which is concentric with the axis of the stud 67. Thus, as the crank pin 60 oscillates the stud 67, the pin 70 engages the walls of the slot 72, effecting a movement of the puller bar 44 back and forth, the movement varying depending upon the position of the pin in the track. While the pin is in the straight portion of the track, the movement is substantially horizontal, but, when the pin advances into the curved portion of the track, the pin 70 will rotate in the track about the stud 67 without causing any movement of the puller bar.

The crank pin 62 is connected to a link 78, which is pivotally secured to one arm 80 of a bell crank lever mounted upon a stud 82 in one of the frame portions 55, and the other arm 84 has a pin 86 positioned in a cam slot 88 in the puller bar 44. The slot 88 has a straight portion 90 at one end thereof and a curved portion 92 at the other end thereof, the axis of the curved portion coinciding with the axis of the stud 82. Thus, upon operation of the crank pin 62, the pin 86 will be oscillated, and while the pin is located in the straight portion of the slot 90 the puller bar will be moved up or down, but when the pin is located in the curved portion 92 of the slot the pin will rotate about the stud 82 without causing movement of the puller bar.

The combined movements caused by the operation of the crank pins 60 and 62 can be made to effect movement of the puller bar 44 and tool 10 in an orbital or closed path. The arrangement of the parts is such that the curved portions of the slots 72 and 88 are effective simultaneously, with the result that the puller bar 44 and the tool will be stationary in the position shown in Fig. 4 during a considerable portion of the cycle, preferably about 120°. When the machine is operating at high speed, in practice, at about 1200 R. P. M., the effect of this dwell will be to make it appear that the staple pulling tool 10 is at rest adjacent to the edge 40 of the work rest 18 in position to commence its forward tack pulling movement, as a result of which a fastening in a shoe in engagement with the work rest 18 can readily be located in the path of the tool.

Operating at 1200 R. P. M., it will be understood that a dwell during 120° will maintain the tool at rest for only one-sixtieth of a second, or for an interval less than sufficient to give the operator a clear impression of its form. However, the rapid succession of dwells causes the tool to appear stationary in the position of dwell due to persistence of vision.

In order to provide for varying the shape of the path of the tool as may be required in pulling fastenings of different kinds, I have provided slots 94 located radially of the axis of the pulley 58, in any one of which the stud 62 can be located. Variation of the position of the stud outwardly of the axis will result in varying the throw of the link 78, with the result that the heightwise movement of the puller bar is varied. If the stud is positioned in the slot on the axis of the pulley, no motion will be imparted to the link 78 and the latter will not be effective to cause movement of the puller bar in a heightwise direction. This would result in a substantially straight line movement of the puller bar.

Fig. 5 shows a modification of the machine to adapt it for pulling lasting tacks from shoes. In this instance I have provided a modified type of guard member, which comprises a shank portion 96 having two spaced nose portions 98, adapted to extend upon opposite sides of a pick tool 100 and having upturned portions 102 adapted to engage the bottom of the shoe as a tack is brought into position to be pulled by the tool.

In the operation of the machine, the continuously driven pulley 58 operates through the crank pins 60, 62 and links 64, 78 to oscillate the pins 70, 86, which engage the cam tracks 72, 88 in the puller bar 44 thereby to cause movement, in an orbital path, of the outer end of the bar and consequently of the tool 10, Fig. 1, or of the tool 100, Fig. 5, as the case may be. The curved portions 76, 92 of the cam tracks are effective to cause a dwell in each cycle of movement of the tool, such that the tool appears to be at rest at a point in its path in advance of its outward or fastening pulling movement. Thus, presentation of the work to the tool is greatly facilitated in that, after a shoe is brought into engagement with the work rest 18, or 102, the apparently stationary forward edge of the tool constitutes a guide by means of which a fastening can quickly and accurately be located in pulling position.

Although the invention is herein illustrated as embodied in a fastening pulling machine, it will be understood that the feature of the invention which relates to interrupting each cycle of operation of a high speed tool to render its form and position clear and distinct is applicable to machine tools adapted for other work.

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

1. A machine having a tool mounted for movement in a closed path, means normally operative to drive the tool along said path through a continuous series of cycles at high speed, and automatic means for momentarily interrupting movement of the tool during each cycle of operation to cause the tool to appear in a stationary position, thereby to facilitate presentation of work to the tool.

2. A machine having a tool mounted for movement in a closed path, means normally operative to drive the tool at such high speed that the appearance of the tool is indistinct, and means for interrupting the movement of the tool during each cycle of operation for a predetermined substantial portion of the cycle to cause the tool to appear in a stationary position

thereby to facilitate presentation of work to the tool.

3. A fastening pulling machine comprising a frame, a fastening pulling tool pivotally mounted in the frame, means for driving the tool in directions heightwise and longitudinally of the frame to cause the tool to move in a closed path, and means for maintaining the tool at rest during a substantial portion of each cycle of operation of the machine thereby to facilitate the location of fastenings in the work in position for removal by the tool.

4. A fastening pulling machine comprising a frame, a puller bar pivotally mounted in the frame and having a free end portion, a fastening pulling tool carried by the free end portion of the puller bar, means for driving the free end portion of the puller bar in directions heightwise and longitudinally of the frame to effect movement of the tool in a closed path, and means for maintaining the tool stationary in a predetermined position during a portion of its cycle of movement.

5. A fastening pulling machine comprising a frame, a puller bar mounted in the frame, a fastening pulling tool carried by the bar, means for driving the tool in directions heightwise and longitudinally of the frame to effect movement of the tool in a closed path, and means for rendering the driving means ineffective to move the tool during a portion of each cycle of operation thereby to maintain the tool in stationary position during a portion of each cycle.

6. A fastening pulling machine comprising a frame, a link one end of which is pivoted on the frame, a puller bar pivotally mounted upon the other end of the link, a fastening pulling tool carried by the puller bar, means for actuating the puller bar comprising levers mounted for oscillation in the frame, pins carried by the levers, and two cam tracks on the puller bar respectively in engagement with the pins, and having each a straight portion and a curved portion, the straight portions being substantially normal to each other, and the axis of curvature of each of the curved portions being coincident with the axis of oscillation of the pin with which it is in engagement.

7. A fastening pulling machine comprising a frame, a puller bar pivotally mounted in the frame, a fastening pulling tool carried by the puller bar at one end thereof, and mechanism for actuating the pulling tool comprising a cam for moving the end of the puller bar heightwise of the frame and a cam for moving the end of the puller bar longitudinally of the frame together cooperable to effect movement of the pulling tool in an orbital path, each of the cams having a dwell effective to maintain the tool stationary in a predetermined position during a portion of its cycle of movement.

8. A fastening pulling machine comprising a frame, a puller bar pivotally mounted in the frame, a fastening pulling tool carried at one end of the puller bar, two levers mounted for oscillation in the frame, a cam carried by the puller bar and constructed and arranged to be engaged by one of the levers to effect movements of the tool heightwise of the frame, a second cam carried by the bar and constructed and arranged to be engaged by the other of the levers to effect movements of the tool longitudinally of the frame thereby producing movement of the tool in an orbital path, and a dwell on each of the cams together cooperable to maintain the tool at rest in a predetermined position during a portion of its cycle of movement.

9. A fastening pulling machine comprising a frame, a link depending from the frame, a fastening puller bar carried by the link, a fastening pulling tool mounted upon the bar, the bar having two cam slots each of which comprises a straight portion and a curved portion, two levers respectively engaging the cam slots and having their effective lengths respectively equal to the radii of curvature of the curved portions of the slots, and means for oscillating the levers thereby to effect movement of the pulling tool in a closed path.

10. A fastening pulling machine comprising a frame, a link pivotally mounted upon the frame, a puller bar carried by the link, a fastening pulling tool upon one end of the bar, two levers for driving the bar, pins carried by the levers, two cam slots in the bar arranged to be engaged by the pins, each of the slots having a curved portion having its axis of curvature coincident with the axis of its respective lever, and a straight portion, the straight portions of the slots being at right angles to each other, and means for oscillating the levers.

11. A fastening pulling machine comprising a tool mounted for movement in an orbital path, a work rest comprising a roll mounted adjacent to the path of the tool and having a recessed portion adapted to engage the marginal edge portion of a shoe presented to the work rest, and a cylindrical portion adapted to engage the shank portion of the shoe, and guard members located upon opposite sides of the path of the tool and positioned adjacent to the work rest.

12. A machine for pulling fastenings from shoes comprising a fastening pulling tool movable in an orbital path, a work rest located adjacent to the path of the tool and comprising a roll having an abutment positioned beneath the path of the tool and adapted to engage the marginal portion of the forepart of a shoe presented to the work rest, and a resilient cylindrical portion for engaging the shank portion of the shoe, and guard members positioned upon opposite sides of the path of the tool adjacent to the work rest.

13. A fastening pulling machine comprising a tool mounted for movement in an orbital path, a work rest adjacent to the path of the tool and comprising a roll having a projecting portion positioned beneath the path of the tool adapted to engage the marginal edge portion of a shoe presented to the work rest for guiding the shoe past the tool, and a cylindrical portion constructed and arranged to engage the shank portion of the shoe.

14. A fastening pulling machine comprising a frame, a fastening pulling tool mounted in the frame for movement in an orbital path, and a work rest carried by the frame and positioned adjacent to the path of the tool, said work rest comprising a roll having a cup-shaped upper portion extending beneath a portion of the path of the tool and constructed and arranged to engage the marginal portion of the forepart of a shoe presented to the work to guide the same past the tool, and a cylindrical portion constructed and arranged to engage the shank portion of the shoe.

HARRY LYON.