

Feb. 10, 1953

D. D. DUNCAN
MACHINE FOR OPERATING A PIERCER-CARRYING PLUNGER BOTH
TO PIERCE AND ADVANCE THE WORK BEING OPERATED ON
Filed April 22, 1950

2,627,923

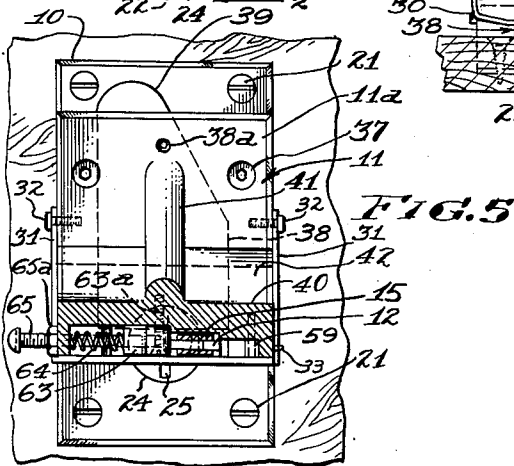
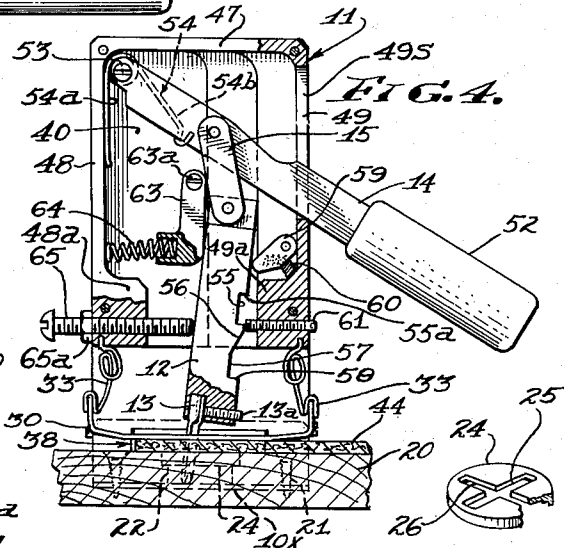
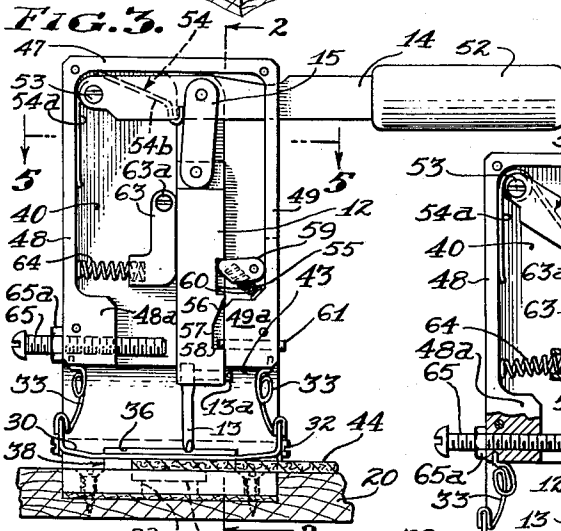
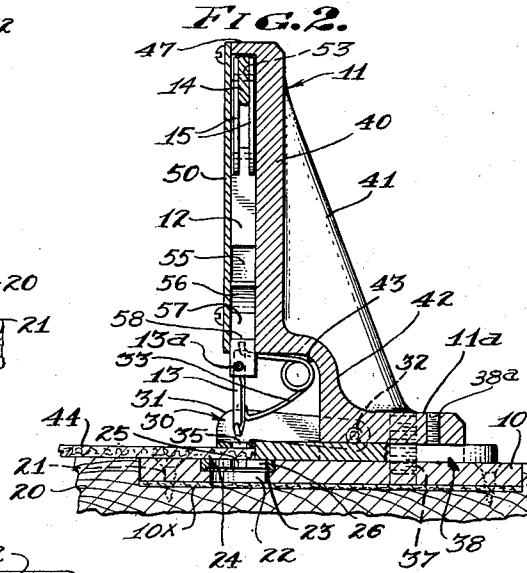
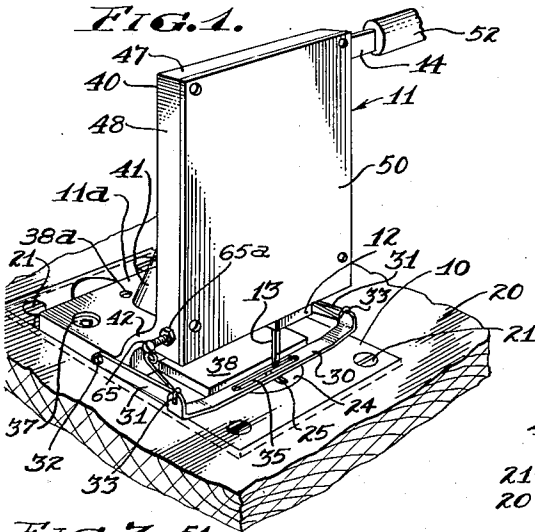


FIG. 6.

DANIEL D. DUNCAN,
INVENTOR.

BY
[Signature]
ATTORNEY

UNITED STATES PATENT OFFICE

2,627,923

MACHINE FOR OPERATING A PIERCER-CARRYING PLUNGER BOTH TO PIERCE AND ADVANCE THE WORK BEING OPERATED ON

Daniel D. Duncan, Glendale, Calif.

Application April 22, 1950, Serial No. 157,452

6 Claims. (Cl. 164—88)

1

My invention relates to a machine for operating a piercer-carrying plunger both to pierce and advance the work being operated on.

Heretofore leather puncturing machines have utilized the piercing member only to puncture the work, and such machines have therefore been provided with auxiliary means independent of said piercing member to advance the work in the required step-by-step fashion between puncturing operations. By the present invention there is provided an assembly of guide members for the piercer-carrying plunger which guides the plunger in such a manner that, at the completion of each puncturing operation said member advances the work to the position required for the next puncturing operation, said assembly of guide members automatically restoring the plunger to its original position after each puncturing operation.

A more specific object is to provide, to cooperate with the aforesaid assembly of plunger guiding members, a strap metal plunger having a side edge portion so contoured as to form a cam face engageable by a stationary adjustable part which, when encountered by said cam face causes said plunger, during the final part of its downward movement to swing in a direction to cause the piercer carried by its lower end to advance the sheet material being operated upon to the proper position for having the next puncture made through it.

Also it is an object of the present invention to provide an improved presser foot stripper to keep in place the sheet material being operated upon by the machine.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, which illustrates a preferred embodiment of the invention, now reduced to practice,

Fig. 1 is a front perspective view of the device, showing the same mounted upon a work table, fragmentarily shown, a part of the operating lever being broken away to contract the view.

Fig. 2 is a vertical section on line 2—2 of Fig. 3.

Fig. 3 is an elevation looking at the front side of the device, the front casing cover being removed, the needle or piercer being in the elevated position shown in Fig. 2.

Fig. 4 is a reproduction of Fig. 3 except that parts are shown in section and the piercer and operating lever are shown at the lower, instead of upper, limit of their travel.

Fig. 5 is a transverse section on line 5—5 of Fig. 3.

2

Fig. 6 is a perspective view separately showing the needle or piercer guide disk.

Referring in detail to the drawing, the invention therein illustrated is embodied in a leather punching or piercing machine comprising a base plate 10 to which is secured an upstanding casing 11, said casing housing an upwardly and downwardly extending plunger 12 which carries at its lower end a needle or piercer 13 and which has its upper end portion operatively connected with a manually operable lever 14 by means of a pair of toggle links 15.

The aforementioned base plate 10 is shown countersunk flush with the upper surface of a sub-base 20 which may be the top of a bench or work table, screws 21 or other fasteners securing said base plate to said sub-base. As well shown in Fig. 2, the thick base plate 10 has through it a circular bore 22 the upper part of which is diametrically enlarged to form an annular shoulder 23 upon which is seated the peripheral, flanged portion of a needle or piercer guide disk 24 which fits within the enlarged upper part of said bore 22. Said disk is provided with guide slots 25 and 26 for the piercing member 13, said slots extending diametrically of the disk and intersecting each other at a right angle. The slots 25 and 26 are substantially equal in length, but the former slot is somewhat wider than the latter. The disk 24 frictionally maintains itself in rotationally adjusted position when set for either the use of the wider slot 25 or of the narrower slot 26. Said two slots accommodate different sizes of piercers used upon the work.

An elongated pressure foot 30 extends diametrically across and normally seats yieldably upon the upper face of the aforesaid guide disk 24. To each end portion of said pressure foot is secured a rearwardly extending strap metal arm 31, the rear part of each of these arms being pivoted at 32 to the adjacent side of a basal extension 11a that projects rearwardly from the casing 11. Each of said arms 31 is shown downpressed by a coiled wire spring 33 which acts between the arm and the superjacent part of the casing 11.

Longitudinally through the mid-length portion of the aforesaid elongated pressure foot 30 extends a slot 35, said slot being at least as wide as the wider slot 25 of the aforesaid disk 24. Said disk 24 may be rotationally adjusted to bring either of its slots into underlying registry with said slot 35 of the presser foot.

The already mentioned basal part 11a of the casing 11 has in it a broad rectangular bottom

3

recess 36 which extends all the way across the front-to-rear dimension of said foot part 11a and, at each side of said recess screws 37 extend through the intact portion of said part and secure it to the aforesaid base plate 10. In said recess 36, having a working fit across its width, is a work gage plate 38. Said plate as viewed in Fig. 5 has a rectangular front end portion and has its rear end portion beveled at one side and rounded at its extremity as indicated at 39. After loosening its set screw 38a said gage plate may be adjusted forwardly or rearwardly from the position thereof shown in Fig. 5; or it may be removed and turned end-for-end so that its rounded end portion 39 is presented to the work. In the latter position it will guide the operator in making a row of punctures or slits parallel to an in-curved edge portion of the work.

Underlying the aforesaid base plate 10 is desirably placed a sheet 10x of slightly compressible material so that the point of the piercer 13 will not be damaged by engaging material injurious thereto.

The casing structure 11 includes a sturdy, up-standing back wall 40 which is braced along its midwidth by an upwardly tapering rib 41, desirably integral with said wall and the already mentioned basal part 11a of said casing. Said wall and basal part 11a are additionally united by a forwardly and upwardly directed angular extension 42 of said basal part 11a. By this arrangement an alcove 43 (see Fig. 2) is provided, open in front and at each side, which affords a spacious clear space in which to adjust the work (shown as a strip of leather 44), forwardly and rearwardly in relation to the piercer 13.

Above said alcove 43 the casing wall 40 is provided with a horizontal, forwardly directed top flange 47 and at one side with a vertical forwardly directed flange 48, a like vertical flange 49 extending along the opposite side thereof, said flanges being respectively inwardly thickened at 48a and 49a superjacent to said alcove 43. A cover plate 50, in an overlying, attached relation to said flanges 47, 48 and 49 completes a housing for the greater portion of the punch operating means, presently to be described.

The casing flange 49 is provided with a vertical slot 49s in which swings the aforesaid lever 14. At one end said lever carries a handle portion 52 and its opposite end is swingably attached by a pivot screw 53 to the adjacent upper corner portion of the casing. A wire spring 54 has its mid-length portion coiled around said screw. Said spring 54 has one limb 54a abutted against the casing side flange 48 and has its other limb 54b provided with a hook that underlies the lower edge of the lever 14 at a point spaced away from the fulcrum screw 53. Said spring tends to swing said lever upwardly from the downswung position thereof shown in Fig. 4 to its upswung position shown in Fig. 2.

The aforesaid pair of twin toggle links 15 includes within its upper end portion the lever 14 at a point considerably spaced from the lever fulcrum screw 53, the upper end portion of the plunger 12 being narrowed where it is included within and pivoted to the lower end portion of said pair of links. Farther down said plunger has cut into its right hand side (as viewed in Figs. 3 and 4) a rectangular notch 55, and from the lower end of this notch downwardly said plunger is recessed in a manner to provide an inclined cam edge 56, a straight dwell 57 and at the lower end of said dwell an upwardly facing shoulder 58.

4

The upper end of notch 55 forms a downwardly facing shoulder 55a with which cooperates a pivotally mounted dog 59, the downwardly directed free end portion of which is continuously pressed against the plunger 12 by means of a spring 60.

With the aforesaid cam edge portion 56 and dwell 57 of the plunger 12 cooperates an adjustable guide screw 61 which extends through a screwthreaded bore provided for it through the aforementioned thickened portion 49a of the casing wall. Said guide screw 61 also cooperates with aforesaid shoulder 58 (see Fig. 3) to stop the upward movement of the plunger 12.

With the opposite side of the plunger 12 cooperates additional guide means comprising a pendant guide arm 63 the upper end of which is pivotally fastened to the casing by a screw 63a and the socketed lower end of which seats one end of a compression spring 64 which continually swingably presses the lower part of said arm against the plunger 12. Farther down the same side said plunger is at times engaged by the inner end of a guide screw 65, to which a screwdriver may be applied to adjust it as desired. Said screw 65 is shown extending through a screwthreaded bore provided for it through the thickened casing wall portion 48a, and is furnished with a lock nut 65a safely to keep it in adjusted position.

The aforementioned piercer 13 is shown removably held in place by a set screw 13a. As shown in the drawing this member has a flattened point portion adapting it for producing a row of short slits through the leather strip or sheet 44, but obviously various other slitting, hole-cutting or puncturing members may be substituted, if desired.

Starting the operation with the lever 14 and plunger 12 at the upper limit of their travel as shown in Fig. 3, it will be seen that, during the first part of the downward movement of the plunger the link structure 15 is positioned at one side of dead center in relation to the plunger, and from Fig. 4 it is seen that said link structure has swung to the opposite side of dead center during the downward movement of the operating lever and plunger.

During the operation of the device the lever, link structure and plunger are kept in proper operative positions between the casing back plate 40 and the face plate 50.

During the initial part of each downward movement of the lever 14 the piercer moves vertically down through the work, the inner end of the screw 61 at this time moving adjacent to the dwell 57 without causing any swinging movement of the plunger. But as soon as the piercer has advanced sufficiently through the work completely to pierce it, screw 61 starts to act upon the cam 56 to cause the plunger to swing from the position shown in Fig. 3 to that shown in Fig. 4. This swinging movement of the plunger causes the piercer to advance the work to the limit set by the adjustment of screw 65, thus completing the spacing for the next piercing of the work.

Releasing downward pressure upon the handle 52 of the lever 14 permits spring 54 automatically to elevate the lever together with the mechanism operatively connected thereto, to the normal position. During the automatic elevating of said lever 14 spring-pressed guide arm 63, in co-operation with the spring pressed dog 59, brings the plunger to the position shown in Fig. 3 preparatory to vertical downward movement during the next depression of said lever. During the upward movement of said plunger, the rounded outer

5

end of the dog 59 presses continuously against the adjacent side of the plunger, so that said plunger is maintained swung over toward its starting position until the needle is elevated out of the work. The pressure of the dog upon the plunger is particularly important as the latter approaches its uppermost position, shown in Fig. 3, for the link 15 has then ceased to pull the upper part of the plunger toward the pendant arm 63, leaving it entirely to the dog to perform that function. The point of the needle will clear the work slightly before the dog drops into the notch 55 in the plunger, and when the dog drops into said notch it allows the spring pressed pendant arm 63 to swing the plunger back to the starting position.

It will be seen that the dog 59, screws 61 and 65 and spring-pressed pendant arm 63 cooperate to form the already mentioned assembly of plunger-guiding members which guide the plunger vertically downward during the piercing operation and thereupon during the remainder of its downward movement, swing its lower end in a direction to advance the work in accordance with the spacing in a row of punctures being formed by the operation of the machine.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the subject matter claimed.

I claim:

1. In a machine of the kind described, a base plate, a casing mounted upon said base plate, an upwardly and downwardly extending plunger supported by said casing for vertical movement and carrying a piercer for operation upon sheet material resting flatwise upon said base plate, said plunger normally extending substantially vertically, a manually operable lever mounted upon said casing and linked up with said plunger so as to move the latter downwardly, a spring carried by said casing and operatively connected with said lever to lift the latter and said plunger to the upper limit of their travel after depression of said lever, guide means carried by said casing directing said plunger and the piercer carried thereby vertically downward until the latter has performed a puncturing operation through said sheet material and subsequent to the puncturing operation impart a swinging movement to said plunger to cause said piercer to advance the sheet material in accordance with the spacing between adjacent punctures in the row of punctures being formed by the operation of the machine, and means carried by said casing and cooperating with said plunger after the piercer has moved laterally to feed the work to elevate the piercer out of the work prior to swinging over to starting position.

2. In a machine of the kind described, a base plate, a casing mounted upon said base plate, an upwardly and downwardly extending plunger supported by said casing for vertical movement and carrying at its lower end a piercer for operating upon sheet material resting flatwise upon said base plate, said plunger normally extending substantially vertically, a manually operable lever carrying at one end a handle portion and at its opposite end being swingably attached to said casing, a link structure one end of which is attached to said lever at a point spaced away from its said attached end, said link structure extending downwardly from said lever and having its lower end pivotally connected to the upper

6

end of said plunger so that swinging said lever will move said plunger upwardly and downwardly to operate said piercer, a spring carried by said casing and operatively connected with said lever to lift the latter and said plunger to the upper limit of their travel after depression of said lever, guide means carried by said casing directing said plunger and the piercer carried thereby vertically downward until the latter has performed a puncturing operation through said sheet material and subsequent to the puncturing operation impart a swinging movement to said plunger to cause said piercer to advance the sheet material in accordance with the spacing between adjacent punctures in the row of punctures being formed by the operation of the machine, said guide means comprising mechanism to act upon the plunger to effect said swinging movement, and means carried by said casing and cooperating with said plunger after the piercer has moved laterally to advance the work to elevate the piercer out of the work prior to swinging over to starting position, said link structure swinging from one to the opposite side of dead center during the downward travel of said plunger.

3. In a machine of the kind described, a base plate, a casing mounted upon and upstanding from said base plate, a lever fulcrumed to the upper part of said casing to swing in a vertical plane, linkage pivotally connected with said lever and extending downwardly therefrom, a strap metal plunger carrying a piercer at its lower end and having an upper end portion pivotally connected with said linkage for upward and downward movement by said lever, said plunger being straight along one side edge and having its opposite edge contoured to form a cam portion, an adjustable screw carried by said casing and positioned to cooperate with said cam portion to cause said plunger when moved downwardly by said lever to swing away from said screw, an adjustable stop screw carried by said casing in a position to engage the side edge of the plunger which is opposite to the first recited screw, spring pressed means above said stop screw engaging the same edge of the plunger as the latter, said screw which acts upon said cam portion causing the plunger to swing during the final part of its downward movement in the direction and to the extent required to advance the punctured work in accordance with the spacing in a row of punctures being formed by the operation of the machine, and means carried by said casing and cooperating with said plunger after the piercer has moved laterally to feed the work to elevate the piercer out of the work prior to swinging over to starting position.

4. The subject matter of claim 3, and said cam portion extending upwardly and outwardly from a notch in the plunger, said notch having a straight bottom which forms a dwell along which the first recited adjustable screw travels during the initial portion of each downward travel of said plunger.

5. In a machine of the kind described, a base plate, a casing mounted upon and upstanding from said base plate, a lever fulcrumed to the upper part of said casing to swing in a vertical plane, linkage pivotally connected with said lever and extending downwardly therefrom, a strap metal plunger having an upper end portion pivotally connected with said linkage for upward and downward movement by said lever, said plunger being straight along one side edge and having its opposite edge contoured to form a cam

portion and a downwardly facing shoulder super-jacent to said cam portion, adjustable means carried by said casing in a position to be engaged by said cam portion during downward movement of said plunger, a spring pressed dog carried by the casing in a position to engage and move upwardly across said shoulder during the time that said cam portion is being engaged by said adjustable means, adjustable stop means carried by the casing in a position to engage that side of said plunger which is opposite to said dog and adjustable cam-engaging means, and spring pressed means above said stop means engaging the same side of the plunger as the latter, said adjustable means which is engaged by said cam portion causing the plunger to swing during the final part of its downward movement in the direction and to the extent required to advance the punctured work in accordance with the spacing in a row of punctures being formed by the operation of the machine.

6. The subject matter of claim 5 and said spring pressed means consisting of an arm pendantly pivoted to the casing, said arm having a

straight side portion against all parts of which the plunger abuts during the initial portion of the downward movement of the latter, the plunger abutting only against the lower part of said straight side during the final portion of its downward movement.

DANIEL D. DUNCAN.

REFERENCES CITED

10 The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
15 Re. 10,710	North	Apr. 6, 1886
172,540	Woodruff	Jan. 18, 1876
1,156,824	Schwimmer	Oct. 12, 1915
1,326,238	Walker	Dec. 30, 1919
1,964,910	Glasson	July 3, 1934
20 2,078,336	Merrick	Apr. 27, 1937
2,097,568	Keall	Nov. 2, 1937
2,123,875	Batchelder	July 19, 1938
2,215,643	Gorham	Sept. 24, 1940
2,582,813	Berridge et al.	Jan. 15, 1952