Sept. 16, 1947. S. KOVACH 2,427,358

PNEUMATICALLY OPERATED MARKING MACHINE

Filed Aug. 20, 1945 3 Sheets-Sheet 1

Fig. 1

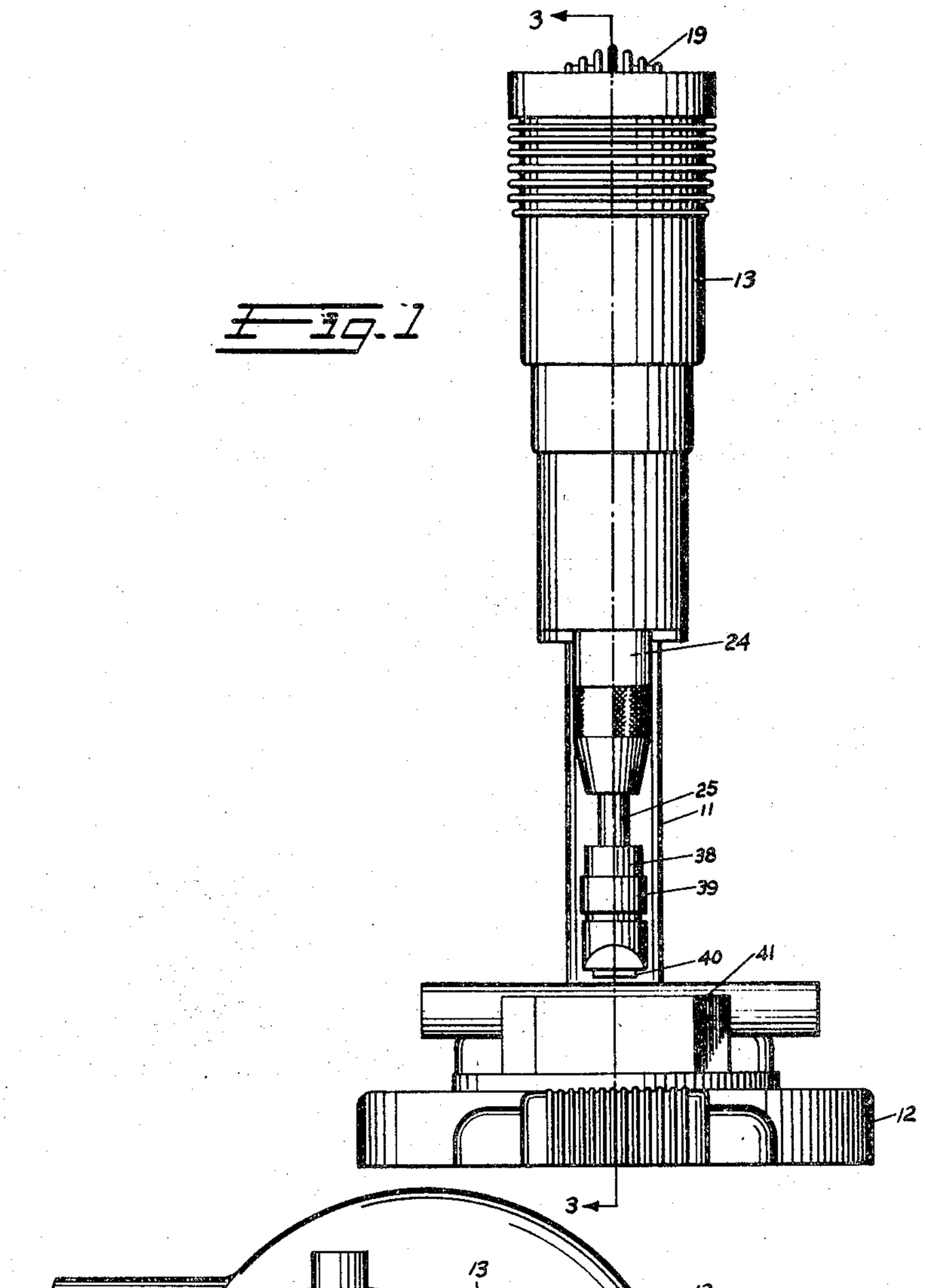

Fig. 2

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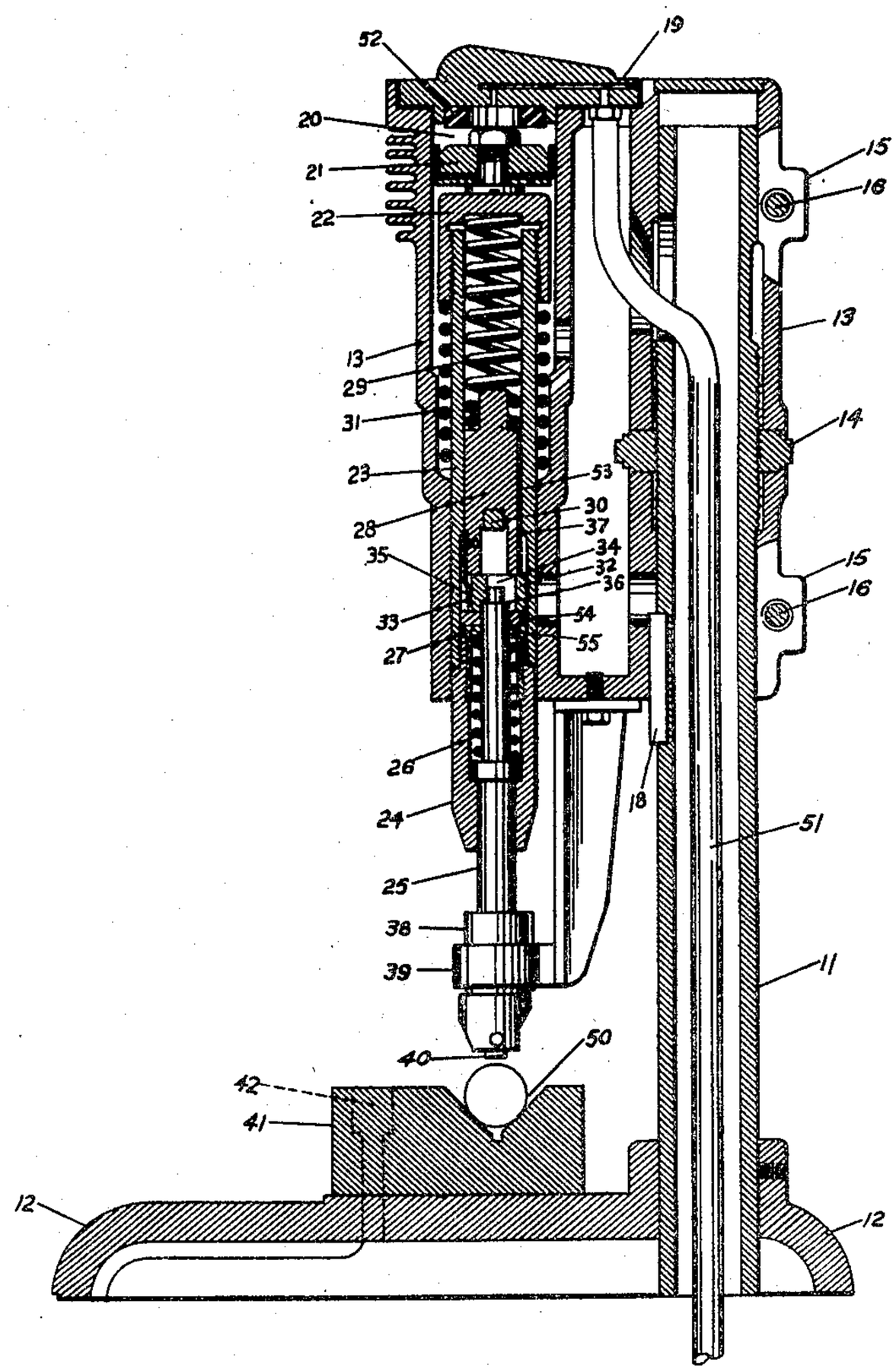

FIG. 3

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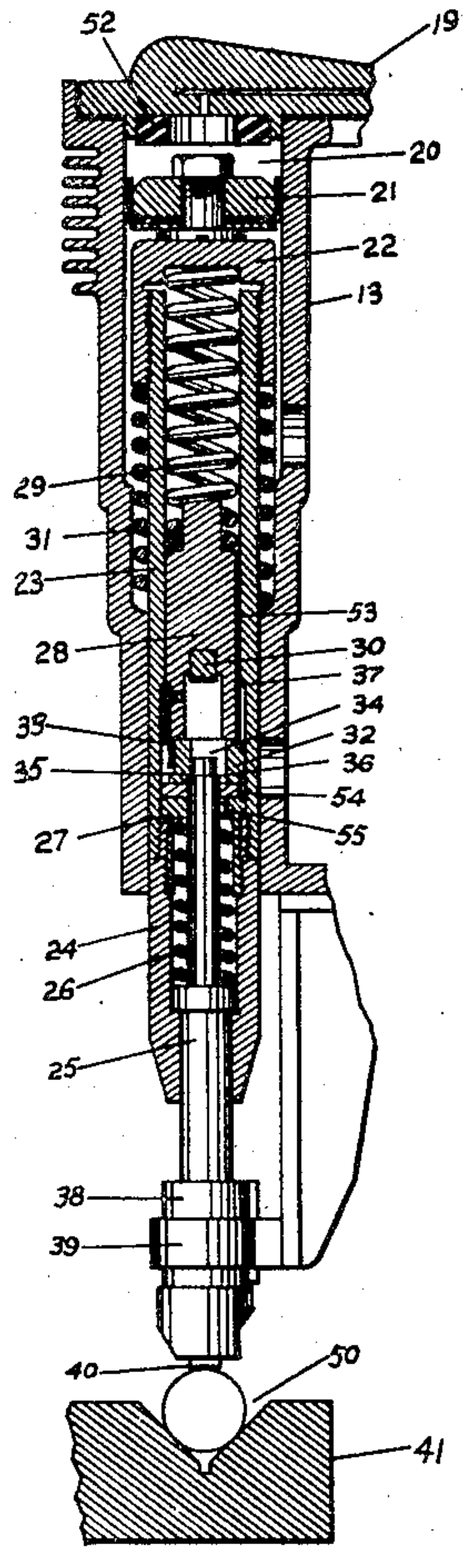

Fig. 4

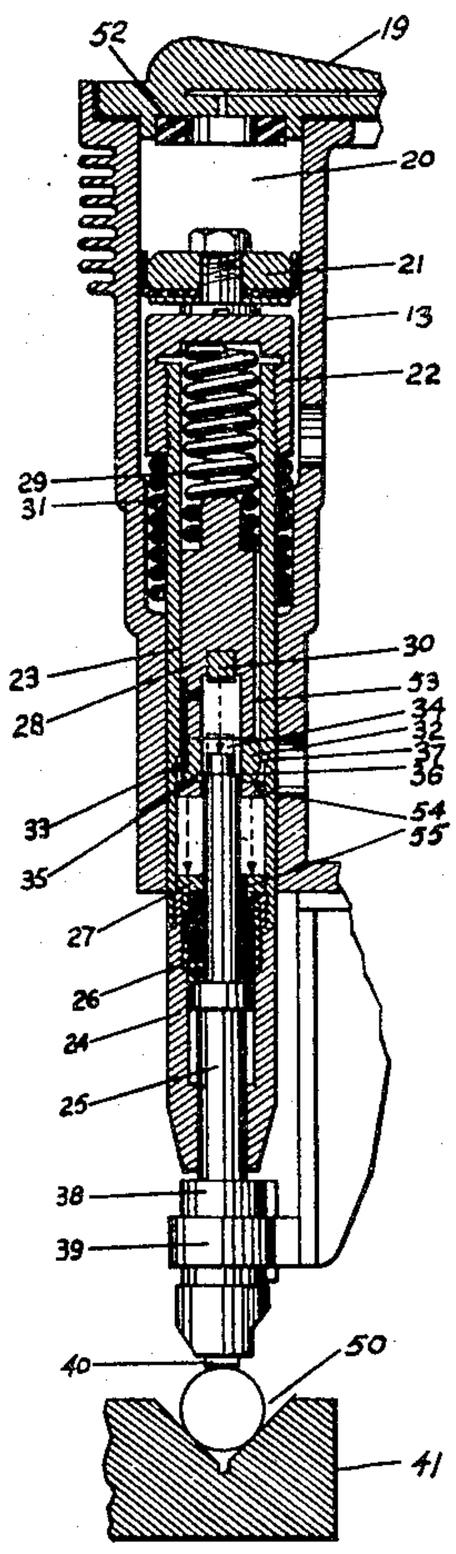

Fig. 5

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UNITED STATES PATENT OFFICE

2,427,358

PNEUMATICALLY OPERATED MARKING MACHINE

Stephen Kovach, New York, N. Y.

Application August 20, 1945, Serial No. 611,676

1 Claim. (Cl. 101—3)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention relates to an impact machine, particularly useful for stamping identification marks and symbols on metal parts.

It is an object of this invention to provide a semi-automatic stamping machine capable of marking large numbers of metal parts with a minimum of handling.

Another object is to provide a stamping machine easily and quickly adjustable to mark various sizes and shapes of metal parts.

Still another object is to provide a pneumatically operated stamping machine.

A further object is to provide a stamping machine capable of storing energy to a predetermined amount and delivering it in a sharp blow.

Further objects and advantages of this invention, as well as its construction, arrangement and operation, will be apparent from the following description and claims in connection with the accompanying drawings, in which

Figure 1 is a front elevation of the stamping machine of this invention.

Figure 2 is a top plan view of the stamping machine of Figure 1.

Figure 3 is a vertical section through the machine, taken on the line 3—3 of Figure 2, the mechanism being shown in normal position.

Figure 4 is a partial view similar to Figure 3, the mechanism being shown in mid-stroke.

Figure 5 is a partial view similar to Figure 3, the mechanism being shown near the end of a stroke.

A preferred embodiment of the machine comprises an upright post 11 supported by a base 12 (Figures 1, 2 and 3). One portion of housing 13 encloses the upper end of post 11, and is retained in threaded engagement therewith by adjusting collar 14. Housing 13 is slotted in two places, and lugs 15 are provided adjacent said slots (Figure 3). A clamp screw 16 extends through one of each of the pairs of lugs 15 and is in threaded engagement with the other. Ball-ended lever rods 17 extend from the outer ends of clamp screws 16, and are the means by which clamp screws 16 may be rotated, and housing 13 clamped tightly thereby on post 11 or loosened for linear adjustment. Key 18 prevents rotation of housing 13 relative to post 11.

Housing 13 comprises two spaced cylindrical chambers, one of which encloses post 11. The

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other cylindrical chamber of housing 13 is closed at its upper end by end plate 19, and constitutes a pneumatic cylinder 20. In pneumatic cylinder 20 is a piston 21, which rests upon a cap 22. Cap 22 is in threaded engagement with the upper end of a tubular body shell 23, and the other end of body shell 23 is in threaded engagement with body nose 24. Striker rod 25 is held against an internal shoulder in body nose 24 by coil spring 26, which is retained by retainer 27.

Hammer 28 is contained within body shell 23 and is held away from cap 22 by coil spring 29. A hardened steel hammer insert 30 is provided in hammer 28 in position to strike the upper end of striker rod 25. Coil spring 31 encircles the exterior of body shell 23, and is contained between cap 22 and an internal shoulder in housing 13. A rectangular-cross-section opening extends through hammer 28 near its lower end, and slidably retained in said opening is a trip 32. Constant pressure is exerted on trip 32 by trip spring 33, affixed to hammer 28, tending to keep trip 32 in contact with that part of body shell 23 opposite trip spring 33.

Trip 32 is provided with a drilled bore 34 of such diameter as to permit striker rod 25 to extend therethrough. Bore 34 is provided with an offset portion at the base of which lies offset shoulder 35, which is adapted to bear upon and engage a cooperating shoulder 36 near the upper end of striker rod 25. The end of trip 32 opposite that acted upon by trip spring 33 is spherical in shape. In body shell 23 is provided an internal trip shoulder 37, adapted to bear upon and displace the spherical end of trip 32 upon movement of body shell 23 relative to hammer 28. Stamp holder 38 is affixed to the end of striker rod 25 extending from body nose 24 and is slidably retained by bracket 39, which is bolted or similarly affixed to housing 13. Stamp 40 is retained in stamp holder 38, preferably by set screws.

Compressed air is carried to pneumatic cylinder 20 by flexible hose 51, which extends through base 12 and post 11 and through registering holes in the walls of post 11 and housing 13 to end plate 19, through which drilled passages provide access to pneumatic cylinder 20. An annular bumper 52, of synthetic rubber or similar material, is secured to the inside surface of end plate 19 and prevents piston 21 from striking

end plate 19 on return strokes of the machine. The other end of flexible hose 51 is preferably connected to a foot-operated three-way valve (not shown), by means of which pneumatic cylinder 20 may be alternatively opened to a source of compressed air or to the atmosphere.

A plurality of slots 53 are provided in the sides of hammer 28 to provide free movement of air from the chamber containing coil spring 29 to the opening containing trip 32, and air passage holes 54 are drilled through the lower end of hammer 28 below trip 32. The inner shoulder of retainer 27 which bears upon spring 26 is also provided with a plurality of drilled holes 55 for the passage of air. Slots 53 and holes 54 and 55 permit free passage of air between the various chambers contained within cap 22, body shell 23 and body nose 24, so that proper functioning of the machine is not hampered by the formation of pockets of high pressure air or vacuum between relatively moving parts.

The operation of the machine is as follows. Stamp base 41 is set upon base 12 to position the type of article to be stamped, illustrated in Figure 3 as being set up to position cylindrical objects such as bolts. A stamp 40 containing the identification marks to be imbedded in the work pieces is selected and secured in stamp holder 38. The grip of housing 13 on post 11 is loosened by turning clamp screws 16 by means of lever rods 17, and housing 13 is adjusted vertically by rotating adjusting collar 14 until stamp 40 is positioned a suitable distance above the work piece, preferably from ⅛'' to ¼''. When housing 13 has been properly positioned, it is locked on post 11 by turning lever rods 17.

With a work piece in position to be stamped, compressed air is admitted to pneumatic cylinder 20 by depression of the foot-operated three-way valve. The compressed air enters pneumatic cylinder 20 above piston 21, and piston 21 and the entire mechanism below it moves downward until the work piece is engaged by stamp 40, coil spring 31 being slightly compressed meanwhile, assuming the position illustrated in Figure 4.

As the stroke continues, piston 21, cap 22, body shell 23 and body nose 24 continue to move downward. Striker rod 25, however, is held stationary by the work piece acting through stamp 40 and stamp holder 38. Trip 32 is maintained by trip spring 33 in offset position, so that striker rod 25 may not pass through bore 34, but instead shoulder 36 of striker rod 25 is engaged by offset shoulder 35 in bore 34, with the result that hammer 28 and trip 32 are likewise held stationary with striker rod 25.

As the stroke proceeds springs 26, 29 and 31 become compressed, until trip shoulder 37 engages the spherical end of trip 32 and forces it sideways against the pressure of trip spring 33 (Figure 5). This movement disengages shoulder 36 from offset shoulder 35, thereby disengaging striker rod 25 from trip 32, and the energy stored in spring 29 during its compression forces hammer 28 and trip 32 downward around striker rod 25 so that hammer insert 30 strikes the upper end of striker rod 25 with great force and causes stamp 40 to embed itself in the work piece.

This is the end of the work stroke, and when pneumatic cylinder 20 is allowed to exhaust, as by releasing the treadle of the foot operated three-way valve, the mechanism is returned to normal position by springs 31 and 26. The force of the return stroke of piston 21 is absorbed by bumper 52.

It will be seen that large numbers of work pieces can be stamped with identifying marks by the machine at great speed, the only operations required of the operator after the machine has been set up being the placing and removing of the work pieces on stamp base 41, and operation of the air valve. Stamp 40 is easily and quickly changed, and provision for different sizes and shapes of work pieces may be simply made by adjusting collar 14, and by reversing and adjusting stamp base 41, or by substituting a similar stamp base adapted to hold objects not cylindrical or hexagonal.

It will be apparent that the energy delivered through stamp 40 to the work piece will be constant in successive strokes, since the energy stored in coil spring 29 before trip 32 is tripped and the length of stroke of hammer 28 will be constant in every stroke. Should it be desired to change the energy delivered at each stroke, as may be the case when changing over to stamping work pieces of greater or lesser hardness, this may be readily accomplished in several ways, as for example by changing the coil spring 29 to a heavier or lighter spring. If desired, the machine may be made adjustable in this respect, as by providing for adjustment of cap 22 on body shell 23.

The machine may be readily adapted for work other than the stamping of identification marks in metal objects. By substituting suitable means for stamp holder 38 and stamp base 41, for example, the machine may be adapted for punching.

The machine may be powered by means other than pneumatic, a smooth downward power stroke imparted to cap 22 being all that is required for operation. The machine may be readily adapted for manual operation by a link secured to cap 22 and to a lever arm at some point between its pivot point and a hand grip.

It is to be understood that various modifications and changes may be made in this invention without departing from the spirit and scope thereof as set forth in the appended claim.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

A semi-automatic pneumatically operated stamping machine comprising a base, an upright post mounted in said base, a housing adjustably mounted on said post, said housing comprising a pneumatic cylinder positioned over said base, a piston within said pneumatic cylinder, a cylindrical shell slidably retained within said pneumatic cylinder and adapted to be displaced by said piston, a hammer slidably retained within said shell, a coil spring within said shell between said hammer and the piston end of said shell, a striker rod extending from the other end of said shell, a stamp holder affixed to the outer end of said striker rod, a trip slidably retained within said hammer and movable transversely of the axis thereof, a bore through said trip sufficiently large to permit passage of said striker rod therethrough, a trip spring tending to maintain said trip in offset relationship, whereby passage of said striker rod therethrough is prevented, means for admitting compressed air to said pneumatic cylinder, whereby said piston and said shell may be moved relative to said hammer and said striker rod against the force of said coil spring, an in-

ternal shoulder within said shell so positioned as to engage and displace said trip from its offset position when said shell has moved a predetermined distance relative to said hammer, whereby said trip bore is aligned with said striker rod and said coil spring is permitted to force said hammer into contact with said striker rod, and spring means for returning said piston, said shell, said hammer and said striker rod to their original positions.

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