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MACHINE FOR PRODUCING A VENT IN CARTRIDGE-CASES

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Fig. 1

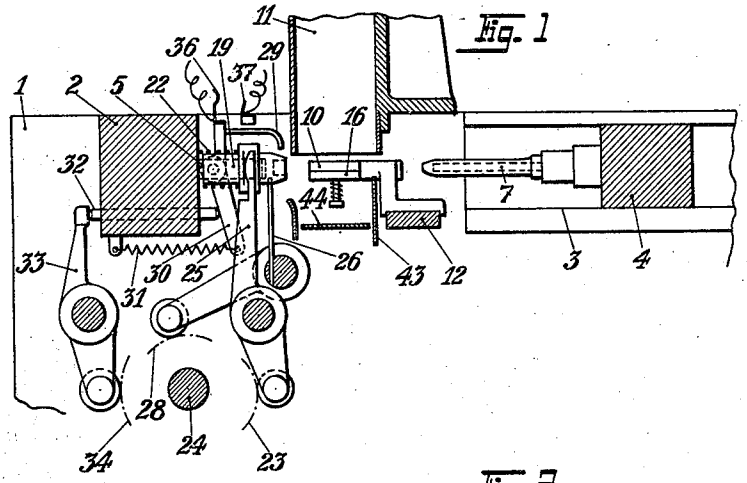


Fig. 2

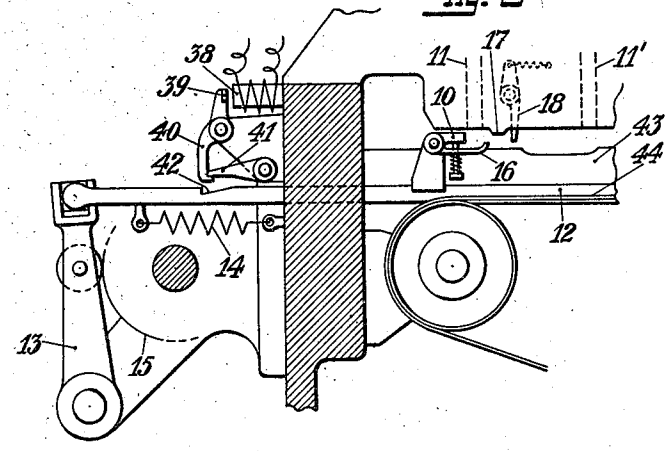
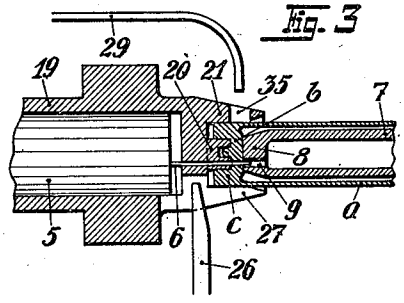


Fig. 3



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MACHINE FOR PRODUCING A VENT IN CARTRIDGE CASES

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This invention relates to the manufacture of cartridge-cases of the type provided in their bottom with one or more essentially equal-sectioned, usually cylindrical holes or vents the diameter of which is often substantially less than the length of the vents. These vents are generally produced by boring. The invention has for its object to provide a machine making it practical to produce said vents by punching and thereby materially to reduce the cost of the operation in question, and this particularly in case of iron cartridge-cases.

The invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawing and pointed out in the claims hereunto appended.

The drawing shows by way of example the essential parts of a specific embodiment of the invention particularly adapted for musket cartridge-cases, and therein

Figure 1 is a sectional elevation of the machine,

Figure 2 is a cross-sectional view thereof along the longest axes of belt 44 in Fig. 1 and

Figure 3 is a detail section, on an enlarged scale, of the punching tools and a cartridge-case.

The various parts of the machine are mounted on a frame-work 1 having a cross-beam 2 and a suitably horizontal guide-way 3 for a cross piece 4 movable towards and away from the cross-beam. Mounted on the latter is a preferably cylindrical holder 5 for a thin-sectioned punch 6 extending in the direction of motion of the cross piece. Secured to the latter in a position opposite that of the holder is a tube-shaped punching die 7 with a closed, preferably chamfered end portion 8 facing the holder 5 and having a hole 9 provided therein just opposite the punch 6. The cartridge-cases are to be subjected to the punching operation after complete pressing of their bottom portion but before the formation of a throat thereon, and the punching die 7 is designed to be insertable into such a substantially cylindrical case *a* into contact with the bottom *b* thereof. As seen from Fig. 3 the said bottom is provided on its outside with a central bulb or anvil and an axial, annular flange *c*, between which the vent should be located. By means of any suitable driving mechanism for the cross-piece 4, such as an eccentric gear, the punching die is positively moved between the position shown in Fig. 1 and a position in essential accordance with Fig. 3 and wherein the punch 6 extends through the hole or a part of the hole 9 in the punching die. Preferably, the diameter of this hole is considerably,

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say about 50%, greater than the diameter of the punch.

A mechanism for advancing the cartridge-cases and mounting them on the punching die comprises, preferably, a reciprocating pusher or the like, adapted laterally to displace the foremost cartridge-case of a suitably vertical magazine, into a transfer position between the punch and the punching die. In the embodiment shown such a pusher 10 is movable under a magazine 11 for a pile of cartridge-cases extending parallel to the punching die 7. Preferably, the pusher is mounted on a slide-bar 12 which is slidably mounted in the frame-work and operatively connected to a pivot-arm 13 which by means, for instance, of a spring 14 extended between the slide-bar and the frame-work, is kept in contact with a shaped cam 15 driven from the main drive of the machine and adapted to move the pusher from the position shown in Fig. 2 to a transfer position to the right thereof. As soon as the pusher has occupied said first-mentioned position the lowermost cartridge-case in the magazine is free to descend ahead of the pusher onto a resilient pressing member 16 mounted on the pusher and adapted in the transfer position to press the cartridge-case against a stationary abutment 17 positioned adjacent the path of travel of the pusher, whilst a stationarily mounted, resilient pressing member 18 is pressing the cartridge-case against the pusher, so that the case is held substantially axially relatively to the punching die.

In the embodiment shown a sleeve 19 is slidably mounted on the holder 5 for guiding the cartridge-case as well as the punch and for stripping the former off the punch after punching. For the purpose of guiding the punch all the way to the work piece the sleeve is provided with a central stop 20 adapted to rest against the bottom within the annular flange *c* and having a bore exactly suiting the punch. For the purpose of guiding a cartridge-case mounted on the die into correct position relatively to the punch the sleeve is provided with a substantially annular, external guide flange 21 which is higher than the stop 20. By means of a spring 22 or the like the sleeve is operated upon in the direction towards the free end of the punch, its movement in this direction being limited by some suitable abutment, preferably an arm 25 controlled by a cam 23 on a shaft 24 connected to the main drive of the machine. To aid in removing the cartridge-case from the sleeve after punching, a finger 26 or the like, actuated by a cam 28 on the shaft 24, may be adapted to perform in a slot 27 of the guide flange 21 a recipro-

cating motion in timed relation to that of the punching die.

In view of the heavy strain on the punch the machine should be provided with a periodically, preferably after every punching operation, automatically acting device for detecting a detrimental breakage of the punch, said device being, preferably, adapted to make the feed mechanism inoperative upon breakage of the punch. In the embodiment shown this control device comprises a feeling stick 29 mounted on a vertically swingable arm 30 which, by mediation of a pin 32 slidably mounted in the cross-beam 2, is held against a pivot arm 33 under the influence of a spring 31 or equivalent means, the arm 33 being actuated by a cam 34 preferably mounted on the shaft 24. After the punching operation and the return movement of the punching die the arm 25 is adapted to hold the sleeve 19 in the position shown in Fig. 3, wherein an opening 35 provided in the guide flange 21 is situated opposite the path of the feeling stick 29 and the free end of the punch. The shape of the cam 34 is such that, in the above position of the sleeve, the arm 33 and consequently also the feeling stick 29 will be once swung back and forth, the feeling stick being arrested by the punch, if the latter is unfractured, and free to perform its motion if the punch is broken. A contact member 36 carried by the arm 30 and a contact member 37 stationarily mounted in the path of the former, are adapted upon mutual contact to close the circuit of an electromagnet 38, Fig. 2, having its armature 39 mounted on a pivotal catch 40 adapted normally to hold in raised, inoperative position a pawl 41 mounted on the frame-work for co-operation with a notch 42 in the slide-bar 12.

The operation of the machine is as follows: After a cartridge-case has been brought into transfer position by the pusher 10, the punching die 7 enters the case and moves it towards the punch, correct axial position being thereunder ensured to the cartridge-case by the guide flange 21 of the sleeve 19 which, in this stage, should be situated so far to the right in Fig. 3 that the punch 6 does not protrude from the stop 20. By the continued motion of the die 7 the bottom of the cartridge-case will be seated on and forced against the stop 20 of the sleeve 19, the latter yielding against the action of the spring 22 and the punch piercing the bottom *b* and entering the hole 9 of the die. Under the subsequent return movement of the latter into the position shown in Fig. 1 the sleeve is brought back into its position before the punching operation, the cartridge-case being swept off the punch, possibly accompanying the die from which it will then be removed by some member mounted in the path thereof, such as a shoulder on the side-wall 43 of a collecting channel for the cartridge-cases punched, the bottom of said channel being, preferably, constituted by a conveyer belt 44. Before the return of the die, possibly as soon as the cartridge-case has been seated thereon, the pusher 10 left the transfer position for fetching another cartridge-case. The portions punched out are free to leave the interior of the tube-shaped die through a lateral opening provided in the die or its mounting. After removal of the cartridge-case from the punch the finger 26 will be once swung back and forth, a cartridge-case possibly sticking within the guide flange 21 being thereby removed in order to drop on to the conveyer belt 44. About the same time the sleeve 19 is brought by the arm 25 into the position shown in Fig. 3, whereupon the feeling stick 29 is released to move under the action of spring 31. If the punch is still unfractured, it arrests the stick before the members 36, 37 would touch one another, but if the punch is fractured the feeling stick performs its motion until the circuit of the electromagnet 38 is closed causing the armature 39 to be attracted and the pawl 41 to be released, the latter dropping down into engagement with the notch 42, so that the pusher 10 cannot perform its feed motion under the action of spring 14 until the pawl which may be spring-operated, after change of punches, has been raised into engagement again with the catch 40. After the feeling stick has returned automatically into the shown position at rest, the sleeve 19 is returned by the spring 22 into its outer terminal position, whereupon the operations described are repeated in respect to another cartridge-case that may have been brought into transfer position before the above return movement of the sleeve 19.

While in the embodiment above described the cartridge-case is pushed off the needle by the action of a spring 22, it may sometimes be better to operate the sleeve 19 mechanically during the push-off motion or to provide a special, preferably mechanically guided, member for pushing or drawing the cartridge-case off the punch. Such member could also, instead of the sleeve 19, be provided with the guide flange 21. If the cartridge-case is to be provided with two, diametrically opposite vents, these may be produced simultaneously by means of two punches with a common holder and a common die and having each one of two independently movable feeling members, the punches being preferably arranged in a common horizontal plane. The feeling stick may alternatively be mounted to move rectilinearly, and the same may be operatively connected to the pawl 41 or some equivalent arresting device by, for instance, mechanical or pneumatic, instead of electric means. Instead of making the feed mechanism inoperative upon detection of a punch fracture, the feeling device may be adapted at such instances to operate a signal device and/or a device for separately collecting cartridge-cases delivered after the punch fracture, such as a shovel or the like to be lowered on to the conveyer belt 44. Preferably, a plurality of punches with appendant feed pushers and jointly movable dies are arranged side by side, the pushers being suitably mounted on a common slide-bar or the like. In Fig. 2 numeral 11' indicates the magazine of a second punch mounted on the beam 2.

The embodiment described is susceptible to modifications also in other respects, and also other embodiments are possible within the scope of the invention which is not limited, for instance, to a horizontal arrangement of punch and die. Thus, the punch may be reciprocating and the die be stationary or, together with a plurality of dies, secured to a revolver head having distinct positions for mounting the cartridge-cases, punching them and removing them from the dies. Cartridge-cases of a type differing from that shown, may require or admit of another, possibly simplified execution of the machine or parts thereof. In machines for cartridge-cases of a larger calibre the cartridge-cases may thus be mounted, during the punching op-

eration, upon the punch holder and not on the die which in such case may have to be provided with an exterior guide flange. Instead of a feeling member movable into contact with the punch it is possible to use as detecting member a suitably pneumatic device co-operating with the cartridge-cases after their removal from the punch, for detecting a lack of normal length of the punch by ascertaining, whether the cartridge-cases have got a hole in their bottom.

What we claim is:

1. In a machine for producing a vent in the bottom of metallic cartridge-cases, the combination with two punching tools adapted to open and close relatively to one another, of a sleeve for exteriorly guiding a cartridge-case, mounted on one of said tools, into proper position relatively to the second of said tools when closing, said first-mentioned tool being capable of entering a cartridge-case into contact with the bottom thereof.

2. In a machine for producing a vent in metallic cartridge-cases or the like, the combination of a blunt punching needle, a holder for said tool, and a punching die having a hole in it of considerably larger diameter than the diameter of said punching tool.

3. In a machine for producing a vent in metallic cartridge-cases or the like, the combination of a blunt punching needle, a holder for said tool, and a punching die having a hole of about 50% larger diameter than the diameter of said punching tool.

4. In a machine for producing a vent in the bottom of cartridge-cases, the combination of a punching tool, a holder for said tool, a punching die shaped to suit the interior of a cartridge-case, and a spring-operated guide-piece mounted to slide in the direction of said tool and adapted to suit the exterior of the bottom of a cartridge-case mounted on said die.

5. In a machine for producing a vent in the bottom of cartridge-cases, the combination of a punching tool, a holder for said tool, a punching die adapted to enter a cartridge-case, and a sleeve adapted exteriorly to guide a cartridge-case, mounted on said die, into proper position relatively to said tool.

6. A machine according to claim 5, in which a finger is adapted to move in a longitudinal slot in said sleeve to remove a cartridge-case sticking in said sleeve.

7. In a machine for producing vents in cartridge-cases in combination, a punching tool, a holder for said tool, a punching die mechanically operated to reciprocate relatively to said holder, a magazine for containing cartridge-cases to be punched, a reciprocating pusher for moving laterally the foremost cartridge case in said magazine into a transfer position between said holder and said die, a stationary abutment adjacent the path of said pusher, and two resilient presser members one mounted stationarily and the other on said pusher for pressing a cartridge-case against said pusher and said stationary abutment.

8. In a machine for producing a vent in cartridge-cases, the combination of a punching tool, a holder for said tool, a punching die mechanically operated to reciprocate relatively to said holder, a feed mechanism including a yieldingly

operated pusher adapted laterally to move a cartridge-case into a position in the path of the relative motion of said holder and said die, a periodically operated device adapted to detect a lack of normal length of said tool, and a pawl operatively connected to said detecting device and adapted to impede yielding motion of said pusher.

9. In a machine for producing a vent in cartridge-cases, the combination of a tool adapted to produce said vent by punching, a yieldingly operated feeling stick adapted after every punching operation to touch said tool in order to detect a lack of normal length thereof, and a guide-piece mounted to slide in the direction of said tool and having a substantially annular, exterior flange for guiding a cartridge-case into proper position relatively to said tool, said guide-piece being adapted after every punching operation to be temporarily held in a position wherein an opening provided in said guide flange is situated opposite the path of said feeling stick and the free end of said tool.

10. In a machine for producing a vent in cartridge-cases, the combination of a stationary punch having a substantially horizontal punching tool, a punching die mounted to reciprocate opposite to and in the direction of said tool and capable of entering a cartridge-case into contact with the bottom thereof, a magazine for a pile of cartridge-cases to be provided with a vent, and a feed pusher mounted to reciprocate substantially horizontally under said magazine in a transverse direction of said tool and adapted laterally to move the lowermost cartridge-case in said magazine into a transfer position in the path of said die.

11. A machine according to claim 10, in which a plurality of tools with appendant feed pushers and jointly movable punching dies are arranged side by side, said pushers being mounted on a common slide or the like.

12. In a machine for producing a vent in cartridge-cases in combination, a punching tool, a holder for said tool, a punching die mechanically operated to reciprocate relatively to said holder opposite to and in the direction of said tool and capable of entering a cartridge-case into contact with the bottom thereof, a magazine for a row of cartridge-cases to be provided with a vent, and a feed pusher mounted to reciprocate past said magazine in a transverse direction of said tool for laterally moving the foremost cartridge-case in said magazine into a transfer position between said holder and said die.

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