March 10, 1964 E. LOEFFEL 3,124,027

RECIPROCATING AIR NOZZLE FOR PUNCH PRESS MACHINES

Filed May 8, 1961

Fig. 1

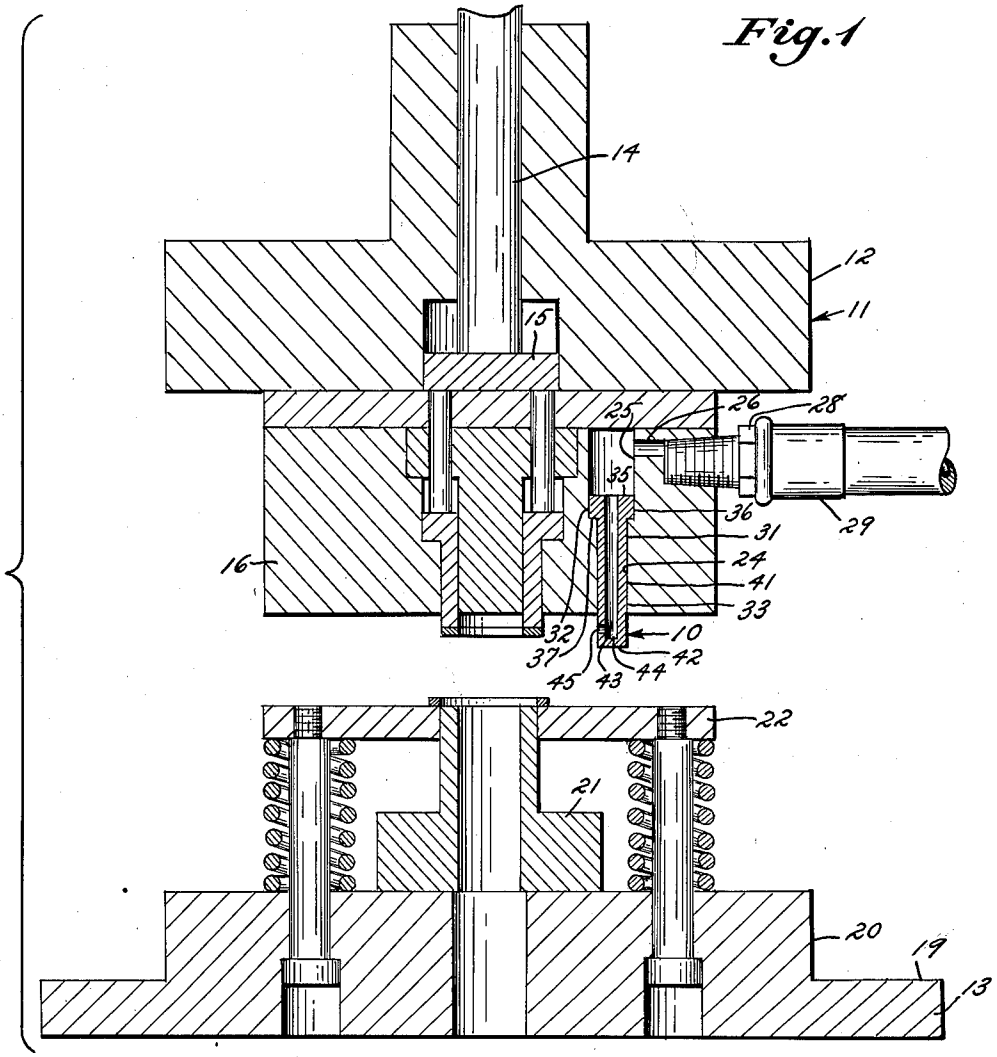
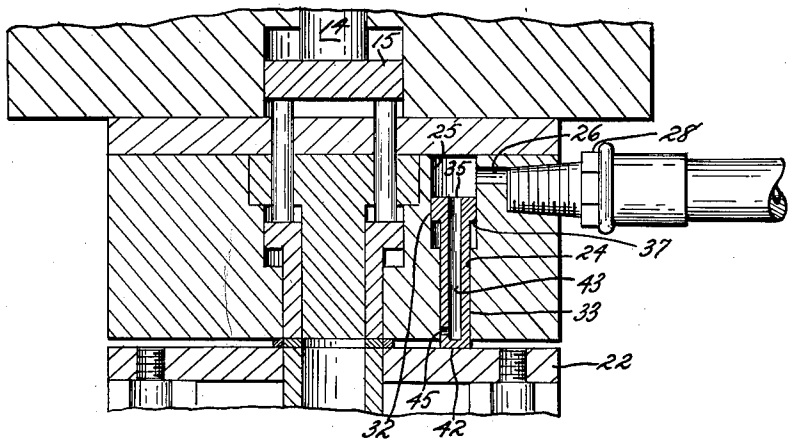


Fig. 2



United States Patent Office 3,124,027 Patented Mar. 10, 1964

3,124,027
RECIPROCATING AIR NOZZLE FOR PUNCH PRESS MACHINES

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Filed May 8, 1961, Ser. No. 123,330
1 Claim. (Cl. 83—98)

This invention relates generally to the field of machine tools, and more particularly to an improved air nozzle for use in conjunction with punch or forming presses operating at relatively high speed to form a plurality of stampings from sheet metal stock.

It is known in the art to provide for clearing of the finished parts by means of a compressed air supply which blows the formed articles to one side of the press, other means being provided for the clearing of scrap from the forming area. Pneumatic clearing means is, of course, chiefly usable where the formed parts are relatively light in weight, and in some cases the clearing action is assisted by the action of gravity operating upon the mass of the articles so formed. Where the compressed air is allowed to flow from a discharge nozzle in more or less continuous fashion, a very high volume of compressed air must constantly be supplied to the nozzle in order that adequate pressure may be obtained. In an attempt to conserve compressed air where the same is not required, as, for example, during the actual pressing cycle, cam means have been provided to interrupt the flow of air to the nozzle. While such devices are not entirely without utility, it has been necessary to position the nozzle, as a rule, some distance from the point of forming, so that much of the initial force of the compressed air is dissipated by the time it reaches the formed articles to be cleared from the forming area. In order to be operative with each pressing cycle, the cam driven means of necessity is driven by the eccentric which raises and lowers the press, and to some degree may suffer from vibration at high speed.

It is among the principal objects of the present invention to incorporate into a die block forming a part of a reciprocating press, an air nozzle which may be situated much closer to the forming area than has heretofore been the practice in the prior art, with a correspondingly increased efficiency.

Another object of the present invention lies in the provision of an air nozzle of the class described which may dispense a jet of compressed air at periodic intervals directly controlled by the raising and lowering of the press mechanism, and in the absence of any camming or other timing means.

Still another object of the invention lies in the provision of an improved reciprocating air nozzle which may be mounted within the die block for reciprocation with respect thereto in such manner that in a first position the flow of air through the nozzle is completely interrupted, and in a second position in which the nozzle extends outwardly of the die block, a blast of air is imparted to the work disposed within the forming area and requiring clearing therefrom.

A further object of the invention lies in the provision of a reciprocating air nozzle means of the class described in which the reciprocating action is performed in a first direction under the influence of the same compressed air which is used to clear the formed articles, and in an opposite direction by contact of the reciprocating die block with a fixed die block mounted on a fixed portion of the press, so that mechanical linkages have been reduced to a bare minimum without accompanying loss of function.

Still another object of the invention lies in the provision of a reciprocating air nozzle of the class described,

and possessed of the above advantages, in which the cost of fabrication may be of such a low order as to permit permanent installation within an individual die block which may be removed, and which may be removed together with the die block from a press at the completion of a production run.

Still another object of the invention lies in the provision of a reciprocating air nozzle which may be of diminished size by virtue of its location within the die block.

A feature of the invention lies in the fact that the reciprocating nozzle orifice may be of relatively small size owing to its relatively close position to the work, as contrasted with prior art constructions.

Another feature of the invention lies in the ease with which servicing of the reciprocating nozzle may be accomplished, owing to the reduction of complication in structure to a single moving part.

These objects and features, as well as other incidental ends and advantages, will more fully appear in the progress of the following disclosure, and be pointed out in the appended claim.

In the drawing, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIGURE 1 is a fragmentary sectional view of an embodiment of the invention.

FIGURE 2 is a similar fragmentary sectional view of the embodiment showing certain of the parts in altered relative position.

In accordance with the invention, the device, generally indicated by reference character 10, is shown in FIGURE 1 in installed condition with respect to a conventional punch press 11, the press 11 including an upper reciprocating element 12, and a base element 13. The details of construction of the press 11 form no part of the present invention and disclosure. As is well known in the art, the press 11 may include a conventional knock-out bar 14 communicating with a knock-out member 15 extending through an upper die block 16, the knock-out member 15 serving to eject a formed part at the completion of a forming cycle.

The base element 13 may include a base member 19, and an upstanding portion 20 supporting a corresponding die block member 21 surrounded by a reciprocating member 22.

Disposed in the upper die block 16 is a first vertical passage 24 communicating with a counterbored passage 25. A horizontal passage 26 is provided with a tapped counterbore 27 accommodating a fitting 28 for an air hose 29.

Arranged for limited sliding non-rotational motion within the passage 24 is a reciprocating nozzle member 31 preferably formed as a unitary machined part. It includes a first cylindrical portion 32 and a second cylindrical portion 33 of substantially smaller diameter. The first cylindrical portion 32 is bounded by an upper planar surface 35, an outer cylindrical surface 36 and a lower planar annular surface 37. The second cylindrical portion 33 is bounded by an outer cylindrical surface 41, and a bottom planar surface 42. A continuous bore 43 extends from the upper planar surface 35 to terminate a short distance above the bottom planar surface 42 at a wall 44. A small horizontal bore 45 communicates with the lower portion of the bore 43 and the outer cylindrical surface 44.

The operation of the device 10 will be apparent from a comparison of FIGURE 1 with FIGURE 2 in the drawing. As the upper reciprocating element 12 is lowered to forming position, the surface 42 strikes the member 22, and is immediately forced upwardly with respect to the passage 24 as the element 12 descends. When the

forming action has been completed, and the element 12 raised, the pressure of the air compressed within the passage 24 will force the nozzle 31 downwardly to the position shown in FIGURE 1, and as soon as the horizontal bore 45 has cleared the die block 16, a blast of air will be directed toward the formed work (not shown). This action will take place at the time of actuation of the knock-out member 15, and at a time when the pressure within the nozzle member 31 has been allowed to build up to the pressure in the hose 29 during the period in which the flow of air from the nozzle member 31 has been interrupted. By providing an upper planar surface 35 against which the compressed air may act, it is not necessary to provide a spring within the passage 24, since air pressure will serve not only to force air from the horizontal bore 45, but also to move the entire nozzle member 31 into operative position. Thus, the device need include only a single moving part which reciprocates within the passage 24, only during the period of operation of the press 11.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

I claim:

In a forming press having a first relatively stationary base member, a second relatively movable member having a die block movable toward and away from said base member, and air blast nozzle means disposed in the area between said base and movable members for pneumatically clearing formed articles, the improvement comprising: said die block including a first elongated bore having a principal axis substantially parallel to the line of movement of said movable member, compressed air supply means communicating with said bore, air blast nozzle means disposed within said bore and arranged for limited reciprocating motion with respect thereto between first and second relative positions; said nozzle means in said first position being disposed wholly within said bore and having a portion partially projecting from said bore when in said second relative position; said nozzle means having an inner surface arranged transversely with respect to the axis of said first bore, and a substantially axially disposed second bore communicating with said air supply means; there being a third bore arranged laterally within said projecting portion of said nozzle means, and communicating with both said second bore and an outer surface of said nozzle means; said last-mentioned outer surface being concealed within said first bore when said nozzle means is in said first position to interrupt passage of air through said third bore; said nozzle being urged to said first position by contact of said projecting portion thereof with a portion of said base member, and normally urged to said second position by the action of pneumatic pressure upon said inner surface.

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