Aug. 10, 1926. 1,595,678

J. T. MURPHY

PUNCH PRESS

Filed June 30, 1925 3 Sheets-Sheet 1

Fig. 1.

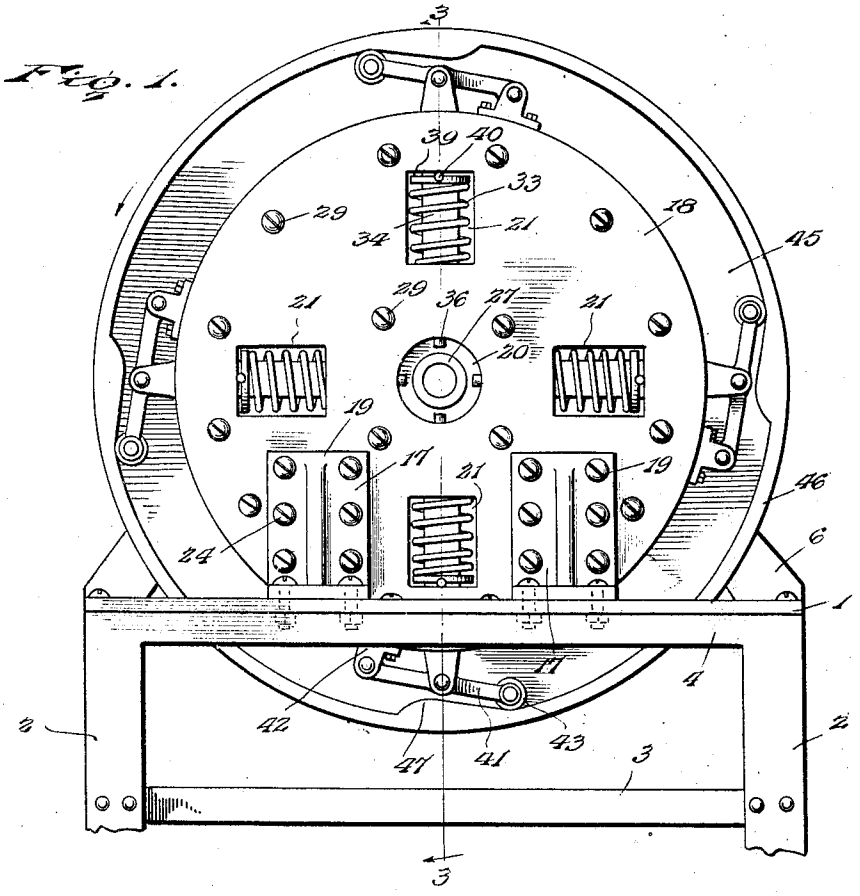
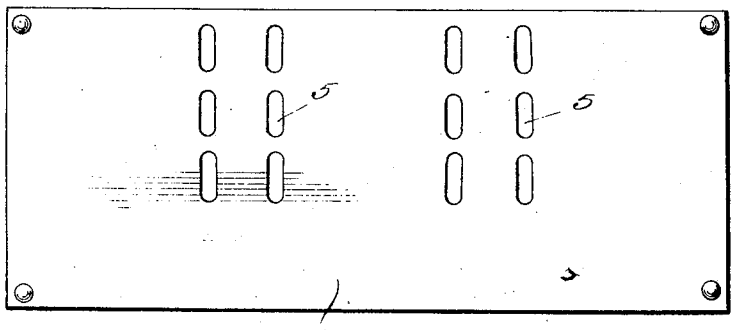


Fig. 2.



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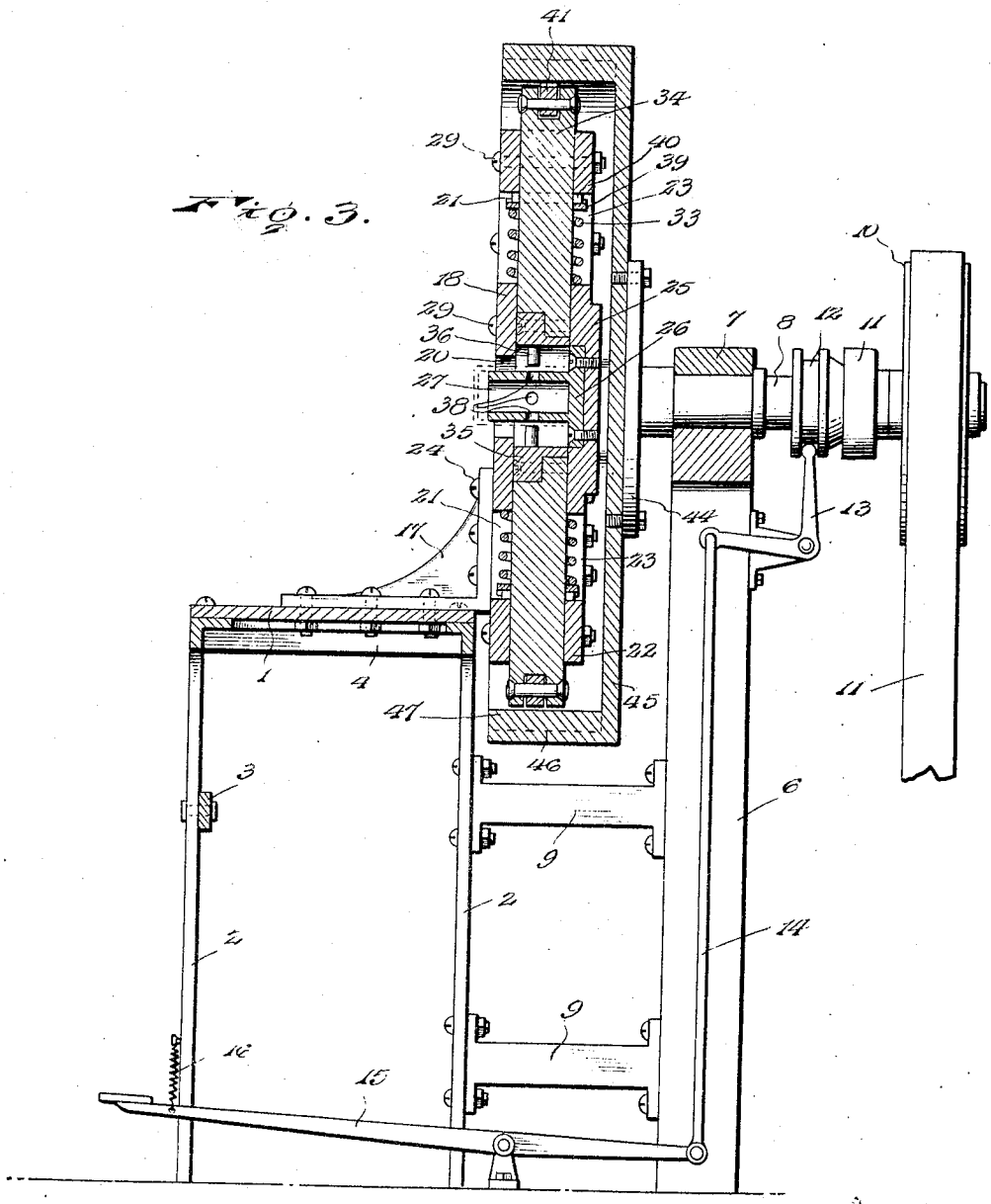
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Fig. 3.



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Fig. 4.

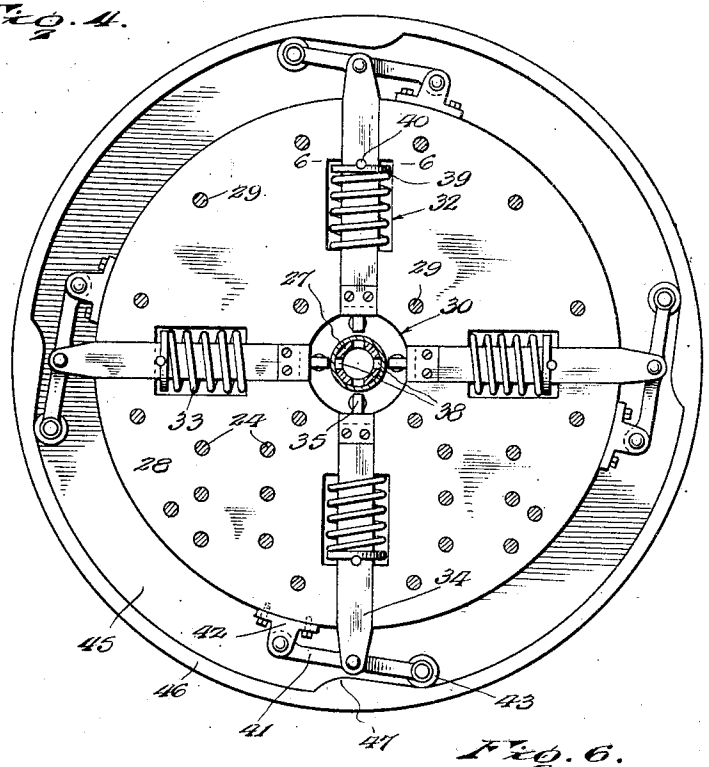


Fig. 5.

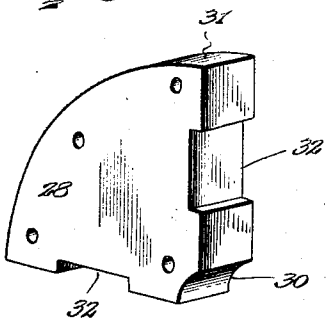


Fig. 6.

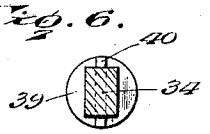


Fig. 8.

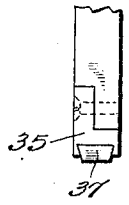
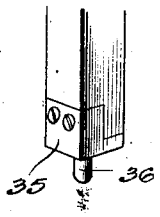


Fig. 7.



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Patented Aug. 10, 1926. 1,595,678

UNITED STATES PATENT OFFICE.

JOSEPH T. MURPHY, OF SYRACUSE, NEW YORK.

PUNCH PRESS.

Application filed June 30, 1925. Serial No. 40,607.

This invention relates to machines for forming openings in the sides of a sheet metal cup or cylinder, and the object of the invention is to provide a compact, easily operated and efficient device whereby a plurality of openings may be formed in such a sheet metal structure simultaneously so that it will be unnecessary to shift the cylinder to permit the formation of the openings, thereby expediting the work and reducing the cost of production. One embodiment of my invention is illustrated in the accompanying drawings, and the invention resides in certain novel features which will be hereinafter first fully described and then more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is an elevation of the operating portion of my improved press;

Fig. 2 is a plan view of the stand or bench upon which the working elements are mounted;

Fig. 3 is a vertical section of the entire apparatus upon the line 3—3 of Fig. 1;

Fig. 4 is a view of the working parts with the face plate removed;

Fig. 5 is a detail of one of the blocks which constitute guides for the plungers;

Fig. 6 is a detail section on the line 6—6 of Fig. 4, and

Figs. 7 and 8 are detail views showing different forms of punches or movable dies.

In carrying out my invention, I employ a bench or support for the punching mechanism which consists of a top 1 and legs 2, upon the upper ends of which the top 1 is firmly secured, the legs 2 being braced by one or more cross bars 3 and being preferably connected at their upper ends by an integral frame, indicated at 4. The top 1 is preferably a substantial metal plate bolted at its corners upon the frame 4 and provided at opposite sides of its transverse center with longitudinally extending slots 5 for a purpose which will presently appear. In rear of the rear legs 2 is erected a standard 6 which has its upper end portion arched to carry a bearing 7 for a driving shaft 8, coupling bars 9 being interposed between said standard and the rear legs 2 and rigidly secured to the same, as will be understood upon reference to Fig. 3. The shaft 8 has loosely mounted thereon a pulley 10 over which a belt 11 is trained whereby to operatively connect the pulley with any convenient motor, and a clutch member 11 is connected with the said pulley. Slidably mounted upon the shaft 8 but constrained to rotate therewith is a clutch member 12 adapted to engage the clutch member 11 so that the rotation of the pulley and the loose clutch member will be transmitted to the clutch member 12 and thence to the shaft, as will be understood. The clutch may be of any preferred form, and I have illustrated conventionally a friction clutch. The shiftable clutch member 12 is controlled by an angle lever 13 which is fulcrumed upon a suitable bracket carried by the standard 6 and connected by a connecting rod 14 with the rear end of a foot lever 15 fulcrumed upon the floor of the workroom and extending beyond the legs 2 of the stand, as shown in Fig. 3, a retractile spring 16 being connected to the foot lever and the stand so as to hold the forward end of the lever normally raised and the clutch normally open.

Secured upon the table top 1 are brackets 17 which are preferably of the right angular form shown clearly in Figs. 1 and 3, being secured upon the table top by suitable bolts inserted through the lower web of the brackets and the slots 5 in the top. This arrangement permits the brackets to be adjusted more or less from front to rear of the stand or work bench so that the working mechanism will be supported in proper relation to the stand, as will be understood. Carried by the upright webs of these brackets 17 is a face plate 18 which is secured to the brackets by bolts 19 inserted through the brackets and the face plate in an obvious manner. This face plate 18 is provided with a central opening 20 through which the work is inserted in the operation of the machine, and disposed upon diameters of the plate are slots or radial openings 21, four of said openings being shown in the illustrated embodiment of the invention, although it will be understood that any desired number of the openings may be provided as may be desired without involving any departure from the invention. In rear of the face plate 18 and in spaced relation thereto is provided a back plate 22 which is provided with radial openings 23 corresponding in number and location to the openings 21 in the face plate, and this back plate 22 is carried by the same bolts 24 which secure the face plate to the bracket

17. The back plate is offset at its center, as shown at 25, thereby providing a central recess in which is secured the rear or basal end 26 of a mandrel or fixed die 27 which projects forwardly through the opening 20 in the face plate and is arranged concentric therewith. The offset 25 of the back plate provides a strong support for the mandrel or stationary die and permits the base of the mandrel to be secured to the back plate in such position that the front surface of the base will not project beyond the plane of the front face of the back plate, as will be understood upon reference to Fig. 3. Between the face plate and the back plate, I provide fillers or guide blocks 28 which are substantially quadrantal in outline and maintain the face plate and the back plate in fixed spaced relation, the fillers being rigidly secured to and between the face plate and the back plate by bolts 29 inserted through registering openings provided therefor. The corners of the fillers are concave, as shown at 30, the radius of the concavity being slightly greater than the radius of the opening 20 in the face plate and preferably equal to the radius of the base 26 of the mandrel or stationary die. Between the concave surface 30 and the outer convex edge 31 of the filler blocks, recesses 32 are formed in each straight edge of each filler and these recesses are so located that they will register with the openings 21 in the face plate and the openings 23 in the back plate, thereby defining housings or chambers to receive expansion springs 33. Slidably mounted in the channels defined by the opposed edges of adjacent fillers and by the front plate and the back plate are plungers 34 which are flat-sided so that they will fit easily and closely within the said channels or passages and will be prevented from rotating about their own axes therein. At the inner end of each plunger is secured a die or punch 35 which may be of any preferred form so that an opening in the work of any desired outline may be made. I have illustrated a punch 36 adapted to form a circular opening and also a die or punch 37 which is adapted to make a straight sided opening, but it will be understood that the particular design of the punch is immaterial and they may be given any design which may be desired. It will also be understood that the mandrel or stationary die 27 is provided with openings 38 through its walls which correspond in outline to the outline of the punch, and it may also be noted that the mandrel is hollow so that the waste pieces struck from the work may collect therein and be easily drawn therefrom by hand or by the use of any convenient implement. The springs 33 are preferably in the form of coiled springs encircling the respective plungers, and they rest at their inner ends against the inner walls of the slots 21 and 23 and at their outer ends bear against abutment plates 39 which are fitted upon the respective plungers and held thereto by pins 40 inserted through the plungers at the outer side of the abutment plates. The springs tend constantly to hold the plungers in retracted position and the parts are so proportioned that the ends of the punches 36 or 37, as the case may be, will be normally spaced from the mandrel a sufficient distance to permit the work to be easily inserted over the mandrel and between the same and the punches.

Extending across the outer end of each plunger and pivotally connected therewith is a lever 41 which is fulcrumed at one end upon a bracket 42 secured upon the peripheries of the base plate and the back plate, the opposite end of the lever being free and equipped with an anti-friction roller 43.

Secured to the front end of the shaft 8 is a head plate 44 and rigidly secured to said head plate, concentric with the face plate 18 and the back plate 22, is an actuating member consisting of a disk 45 having a forwardly projecting peripheral rim 46 which encircles the face plate, the back plate and the plungers and is spaced radially therefrom, as clearly shown in the drawings. At intervals upon the inner circumference of this peripheral rim 46 are a series of cam projections 47 which correspond in number and in location to the plungers and the levers connected with the plungers. When the machine is at rest, the plungers will be projected outwardly under the influence of the several springs 33 and the rollers 43 at the free ends of the several levers 41 will rest against the inner circumference of the rim at the base of the respective cam projections. If the rim be caused to move in the direction indicated by the arrow in Fig. 1, the cam projections will obviously ride against the rollers 43 and force the free ends of the several levers 41 inwardly thereby causing the several plungers to slide inwardly and carry the dies at their inner ends through the work and the radial openings 38 in the mandrel so that the desired holes will be made in the work.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the operation of the machine will be readily understood but it may be briefly summarized. A sheet metal cup or cylinder is inserted over the mandrel 27, as indicated by the dotted lines in Fig. 3, while the several working parts are at rest and the workman then exerts pressure through his foot upon the foot lever 15 so that said lever will be rocked and the connecting rod 14 lifted to rock the angle lever 13 and thereby close the clutch, whereupon the ac-

'uating pressure-applying member consisting of the disk 45 and the rim 46 will be rotated and will carry the cam projections against and past the rollers 43 so that the levers 41 will be rocked and the several plungers driven inwardly to make the desired holes in the work. The pressure upon the foot lever is maintained for a sufficient interval to permit the actuating member to rotate through one-fourth of a revolution so that, when it comes to rest, the several cam projections will be in proper relation to the rocking arms or levers 41 to again actuate the same immediately upon the clutch being again closed. When the pressure upon the foot lever is released, the spring 16 at once contracts and returns the parts to their initial positions, opening the clutch. It will be noted that I have provided an exceedingly compact and simple machine by the use of which openings may be formed in the sides of cylindrical sheet metal devices rapidly and without requiring excessive labor upon the part of the workman. The actuating member also forms a housing to protect the rocking arms or levers and the plungers are completely housed between the face plate and the back plate so as to be guided thereby, and the liability of any of the parts to be damaged by chance blows is practically eliminated.

Having thus described the invention, I claim:

1. In apparatus for the purpose set forth, the combination of a face plate, a back plate concentric with the face plate, the face plate having a central opening therethrough, fillers between the face plate and the back plate having their opposed edges spaced apart, means for securing the fillers, the face plate and the back plate in fixed relation, means for securing the face plate, the back plate and the fillers to a fixed support, a mandrel secured to the back plate at the center thereof and projecting through the central opening in the face plate, plungers slidably mounted between the face plate, the back plate and the fillers, punches carried by the plungers to cooperate with the mandrel, means for holding the plungers normally from the mandrel, and means for forcing the plungers to the mandrel.

2. In apparatus for the purpose set forth, the combination of a face plate, a back plate concentric with the face plate and spaced therefrom, fillers secured between the face plate and the back plate and having their opposed edges spaced apart, the face plate and the back plate being provided with registering openings and the fillers being provided in their opposite edges with recesses registering with said openings, plungers slidably mounted between the fillers, the face plate and the back plate, expansion springs housed in the openings in the face plate and the back plate and the recesses in the fillers and encircling the plungers, abutment plates carried by the plungers and receiving the outward thrust of the said springs whereby the plungers will be normally held in their outer positions, and means acting upon the outer ends of the plungers for driving the plungers inwardly.

3. In apparatus for the purpose set forth, the combination of a fixed support, a mandrel upon the said support at the center of the same, a plurality of radial plungers slidably mounted in the support, means for holding the plungers normally from the mandrel, rocking arms extending across and pivotally connected between their ends with the outer ends of the respective plungers and each fulcrumed at one end upon the fixed support, an annular rim encircling the fixed support and the said rocking arms, means for rotating said rim, and cam projections on the inner circumference of the rim arranged to ride over the free ends of the rocking arms and thereby drive the plungers to the mandrel.

In testimony whereof I affix my signature.

JOSEPH T. MURPHY. [L. S.]