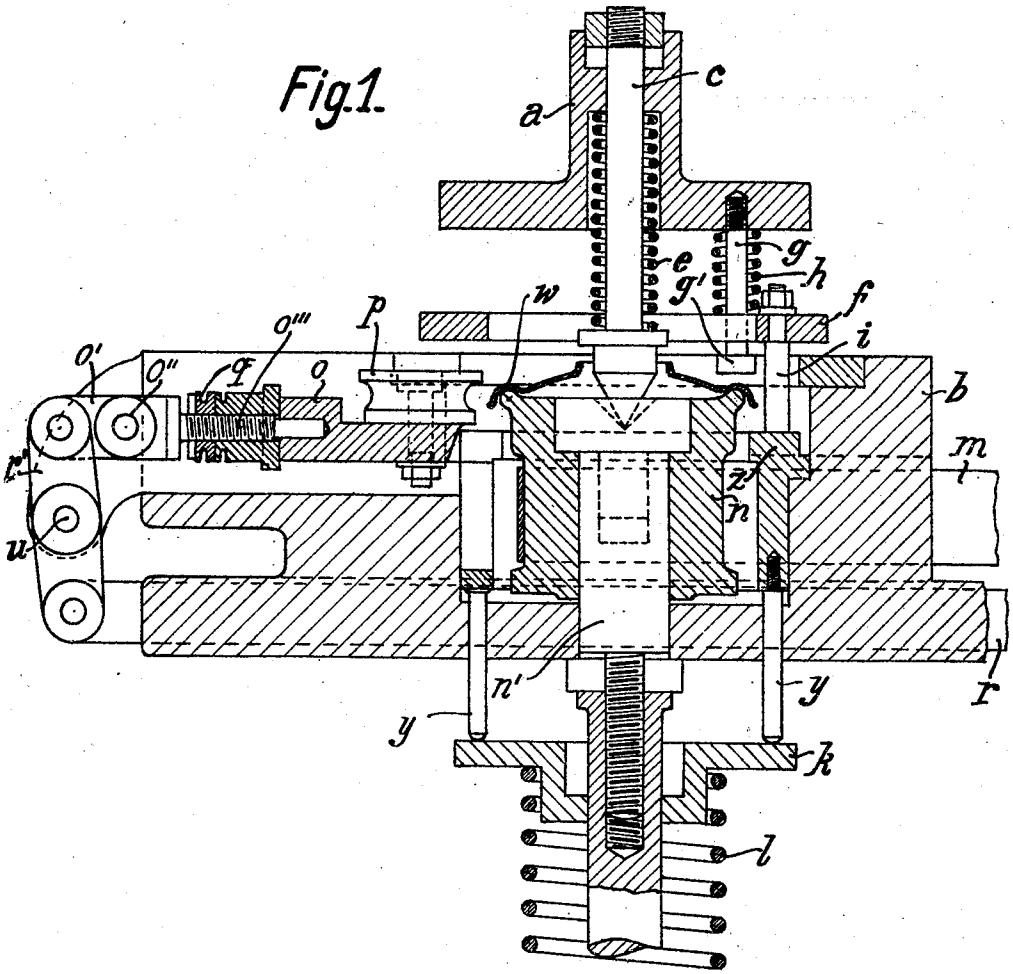
Dec. 9, 1930. E. B. NIER 1,784,745

MEANS FOR EFFECTING ROTARY OPERATIONS IN STEP PRESSES

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Fig.1.



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Fig.2.

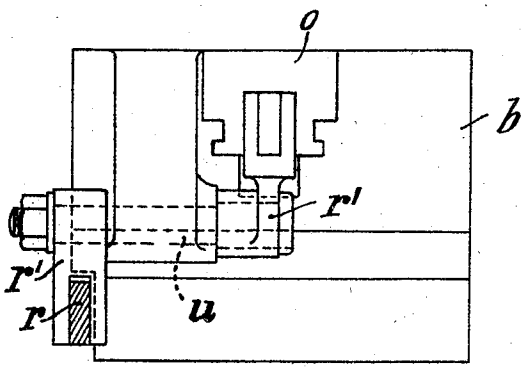
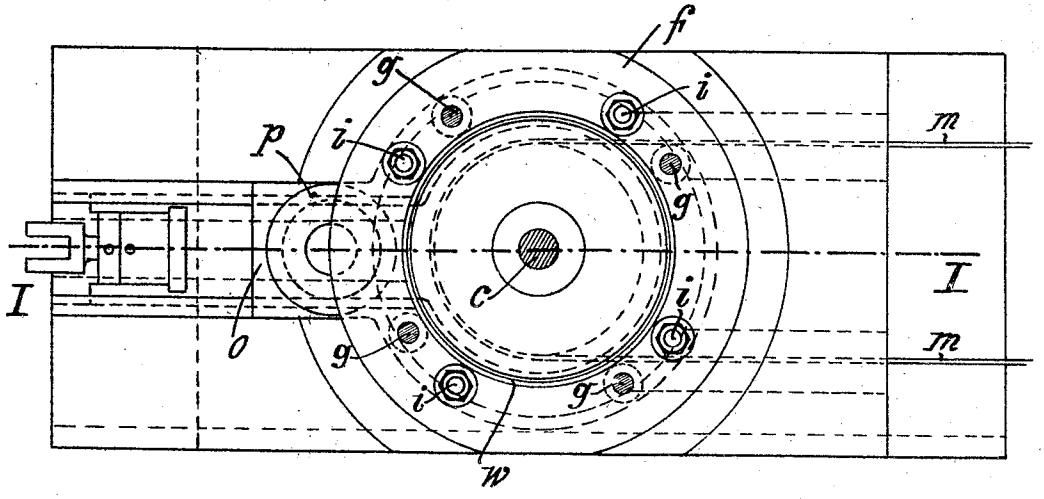


Fig.3.



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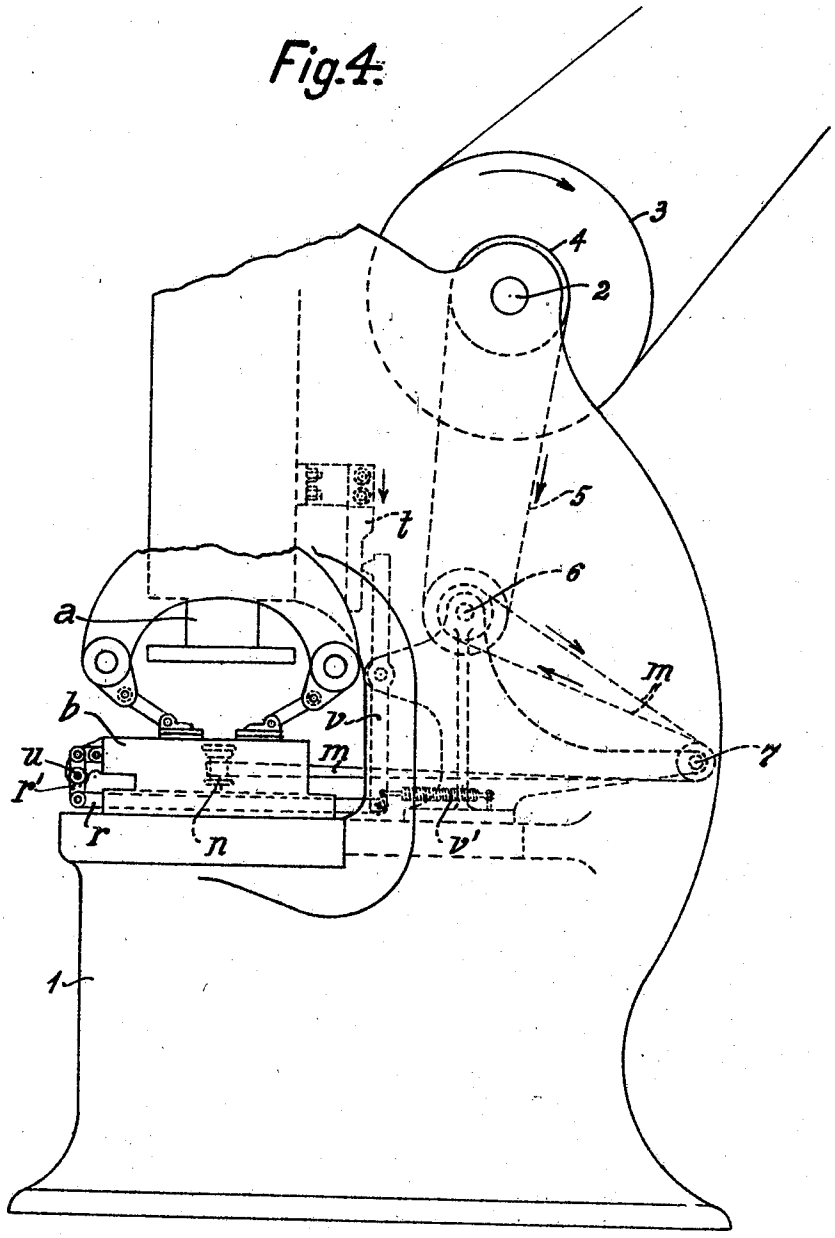
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MEANS FOR EFFECTING ROTARY OPERATIONS IN STEP PRESSES

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Fig.4.



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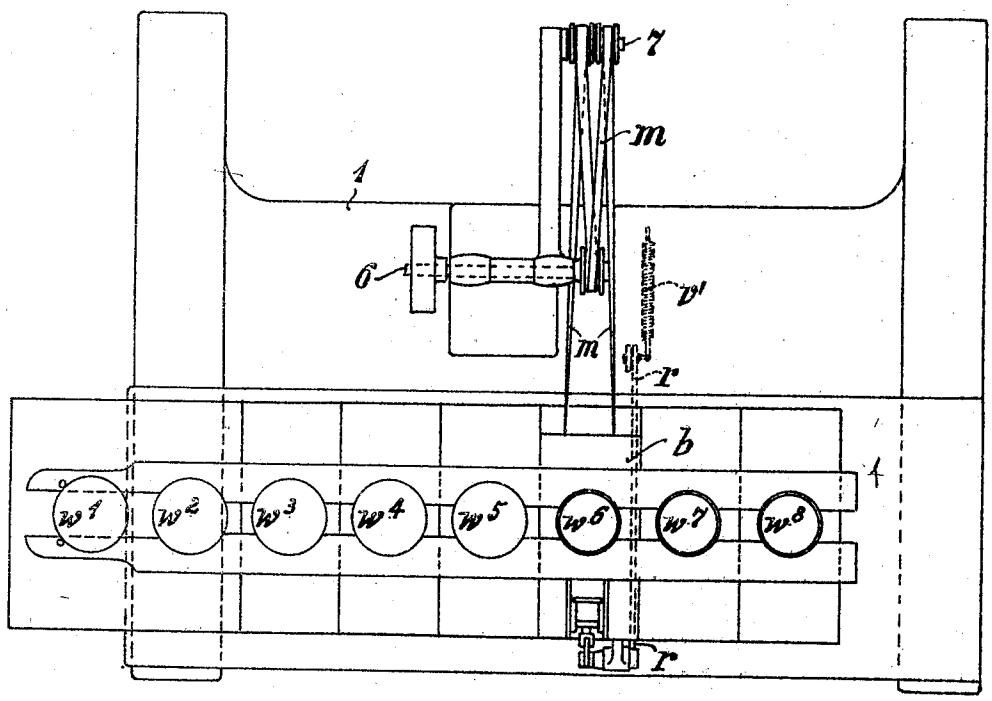
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MEANS FOR EFFECTING ROTARY OPERATIONS IN STEP PRESSES

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Fig. 5.



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UNITED STATES PATENT OFFICE

ERNST BRUNO NIER, OF BEIERFELD, GERMANY

MEANS FOR EFFECTING ROTARY OPERATIONS IN STEP PRESSES

Application filed October 29, 1926, Serial No. 145,044, and in Germany November 7, 1925.

My invention relates to presses and more particularly to machines of the "multiple" type in which a plurality of operations are successively performed on the work, and it is an object of my invention to increase the range of usefulness of such a machine by enabling it to perform operations based on straight-line motion as well as operations based on rotary motion, whereas in the usual machines only one type of operations, either straight-line or rotary, could be performed and so it was necessary to perform each type of operations in a separate machine.

In my invention, I overcome this drawback by providing in a multiple press a rotary mandrel on which the work is carried and with this mandrel I combine means for exerting radial pressure on the work while it is rotating with the mandrel.

The invention is particularly adapted to be built or fitted in step presses, that is, presses of the type wherein one and the same work-piece passes successively through different operating or working stages. These operations, however, all take place simultaneously with respect to different work-pieces, which are moved successively past the individual tools.

For instance, I may provide an appliance of this kind in a press for making cup-shaped or dished articles of sheet metal, the work being cupped, pressed, punched etc. in successive stages by a reciprocating ram as in the usual one-purpose machines. But whereas in such machines it was necessary to move the work to another one-purpose machine when it was desired to perform thereon operations based on rotary motion, as threading, rolling, spinning, crozing, flanging etc., that is, two machines were required, in my invention the two machines are combined into a single unit in which both types of operations are performed.

The necessity of providing two—or more—machines for operating on the same piece of work is evidently a serious drawback, particularly in quantity production, involving not only the initial, maintenance and depreciation costs of two machines but also the labour for attending the second machine and for moving the work from one machine to the other.

In my invention I combine two one-purpose machines into a single unit through the medium of an appliance which may be readily fitted to any existing forging machine.

In the drawings a forging machine for performing eight stages of operation on a dish shaped work is illustrated by way of example, it being understood that I am not limited to this or any other type of forging machine.

In the drawings

Fig. 1 is a section of the die head of the machine on the line I—I in Fig. 3,

Fig. 2 is an end elevation viewed from the left in Fig. 1,

Fig. 3 is a plan view of the head,

Fig. 4 is a somewhat diagrammatic elevation, and

Fig. 5 is a similar plan view, of the complete machine.

Referring first to Figs. 4 and 5, 1 is the frame of the machine, 2 is the main driving shaft, 3 is the driving pulley, 4 is a smaller pulley, both on the shaft 2, 5 is a belt on the smaller pulley 4 which imparts rotation to a lay shaft 6, m is a belt passing round a pulley 7 in the frame 1 and the mandrel n which is rotatably carried on a pin n' in the die head b of the machine, and a is the ram to which vertical reciprocation is imparted by any suitable means, not shown.

As indicated in Fig. 5, the work is successively moved past eight stations w', w^2 . . . w^8 in the table of the machine, and w^6 is assumed to be the station where an operation requiring rotary motion of the work is performed. Obviously, I am not limited to any number of stations nor to any percentage of stations where rotary operations are performed.

Referring now to Figs. 1, 2, and 3, the operation to be performed at the station w^6 consists in flanging down the edge of the dish w about a bead of substantially semi-circular cross section at the upper edge of the mandrel n.

The ram a is flanged at the base and is reciprocated vertically by any suitable means,

not shown. A pin c with a conical point is inserted in the ram a and surrounded by a coiled spring e which is inserted between a shoulder in a bore of the ram and a flange above the point of the pin, the point engaging a recess in the pin n' about which the mandrel n is rotated. Four pins g are screwed into the flange of the ram a and springs h are inserted between the flange and an annulus f in which the pins g make a sliding fit. Heads g' are formed on the lower ends of the pins g beneath the annulus f. Four studs i are inserted in the annulus f and extend downwardly therefrom to the top of the stripper z which is adapted to slide in the die head b. Studs y extend downwardly from the stripper z to a cup k which is adapted to slide on an extension of the pin n' against the pressure of a spring l. The springs h of the pins g are stronger than the spring l and when the ram a moves downwards the spring l is deformed at an earlier period than the springs h.

The flanging tool is a steel roller p on the inner end of a slide o which is guided in the die head b. Reciprocation is imparted to the slide by a bar r and a double-armed lever r' on a shaft u. A short link o' connects the upper eye of the lever r' with a fork o'' which is inserted in the slide o with its threaded end o'''. A lock nut q serves for holding the threaded end in position on the slide o. In this manner the position of the roller p with respect to the mandrel n is exactly adjusted.

Reciprocation is imparted to the slide o in time with the reciprocation of the ram a through a cam t on the ram, Fig. 4, and a double-armed lever v which is fulcrumed in the frame 1 and is engaged by the cam t at one end and linked to the bar r at the other. A spring v' tends to hold the end of the lever v engaged with the cam t. The stripper z is cut away opposite the slide o so as to permit the reciprocation of the roller p.

The operation of my improved appliance is as follows:

When the work w has been placed on the constantly rotating mandrel n—which may be effected by hand or by automatic means, not shown—the ram a descends and forces down the stripper z against the action of its spring l until it rests on a shoulder in the die head b. When the cam t reaches the upper end of the lever v, the roller p is moved towards the mandrel n and flanges the edge of the work w about the bead on the mandrel n. When the flanging operation is finished the ram a is raised, the cam t allows the roller p to recede from the work under the action of the spring v' and the stripper z ejects the work.

My invention has been described in connection with a multiple forging machine and with the machining of a dish-shaped article which is stationary and held in a chuck or the like on the machine while the ram is reciprocating. As mentioned, my appliance may be fitted to any type of forging machine and not only to the type described, and it may be fitted to new machines as well as to existing ones. Nor am I limited to a flanging operation as described but any other rotary operations may be performed, and obviously the station or stations at which such rotary operation is, or such operations are, performed may be arranged as desired, the flanging operation at the station w^6 being described merely by way of example.

I claim:

1. In a press having a row of tools adapted to perform drawing, punching, stamping, or similar operations, apparatus for producing hollow, dished, cover-shaped, or similar bodies, comprising devices capable of vertical operations, and a device capable of rotational operation, said last named device being adapted for drawing, rolling, beading, flanging, and the like, and means for controlling and operating said devices, whereby vertical rectilinear operations and a horizontal rotary operation may be performed simultaneously in a single machine.

2. Apparatus for producing dished cover-shaped or similar bodies in combination with a press having a driving shaft, a rectilinearly movable element, a horizontally adjustable and rotatable tool, a rotatable mandrel, means for rotating said mandrel derived from the driving shaft of the press and means for imparting movement to the tool comprising a system of arms and levers whose movement is derived from the rectilinearly movable element.

3. Apparatus according to claim 2 in which the means for operating the system of arms or levers comprises a cam and a spring, said cam being secured to the rectilinearly movable element and descending therewith and in operative relation to said levers.

4. A machine of the character described, including a die head, a vertically reciprocating element thereabove, a mandrel adapted to support the work and arranged within the head and coaxially with said element, means for rotating the mandrel, a rotatable flanging tool mounted to slide horizontally on the die head and adapted to cooperate with said mandrel, and means for varying the position of said flanging tool with respect to said mandrel in time with the motion of said reciprocating element.

5. A machine of the character described, comprising a die head, a vertical reciprocable element above the die head, a mandrel adapted to support the work and arranged within the die head and coaxially with said element, means for rotating said mandrel, a rotatable flanging tool mounted to slide on the die head and adapted to cooperate with said mandrel,

and means operably connected with said reciprocating element for varying the position of said flanging tool with respect to said mandrel in time with the motion of said reciprocating element.

In testimony whereof, I have signed my name to this specification.

ERNST BRUNO NIER.