Jan. 12, 1932. B. A. BRIEST 1,840,657

METAL WORKING MACHINE

Filed Aug. 12, 1930 2 Sheets-Sheet 1

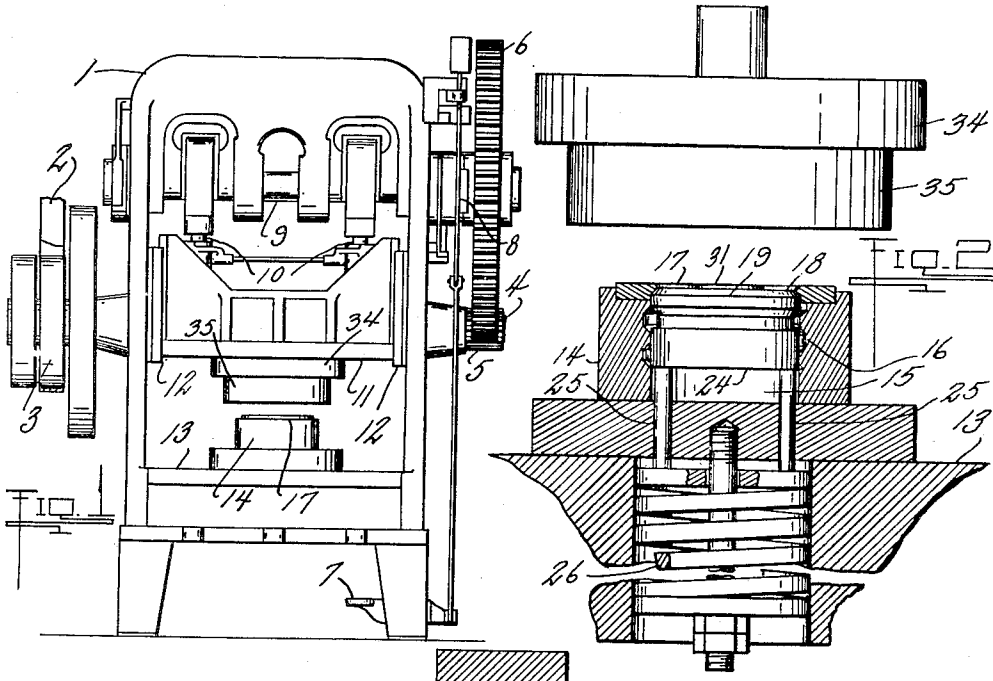


FIG. 1

FIG. 2

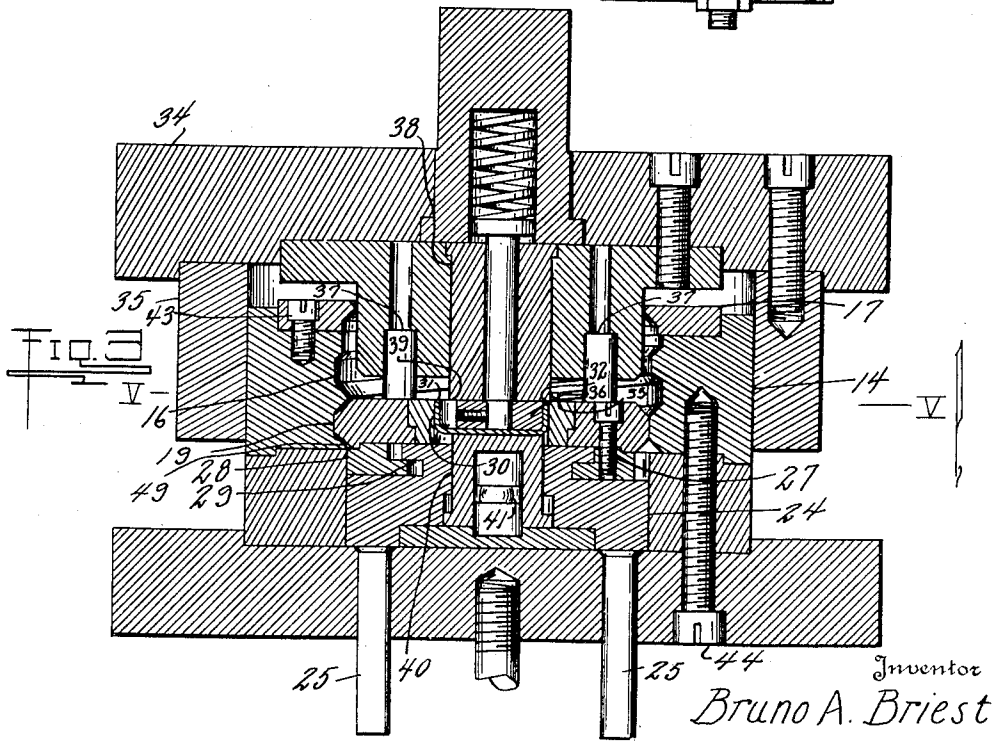


FIG. 3

Inventor
Bruno A. Briest

By

Attorney

Jan. 12, 1932. B. A. BRIEST 1,840,657

METAL WORKING MACHINE

Filed Aug. 12, 1930 2 Sheets-Sheet 2

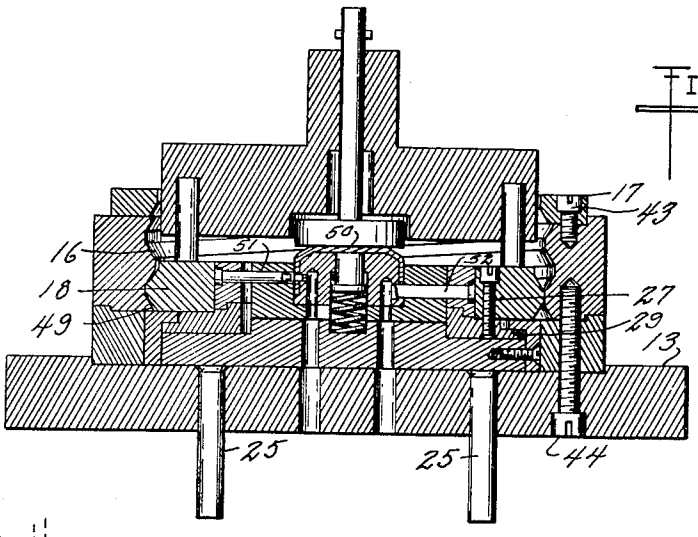


FIG. 4

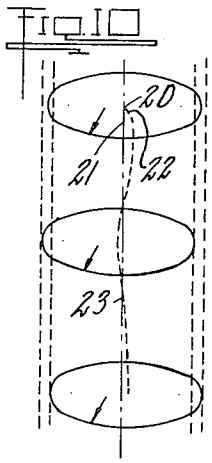


FIG. 10

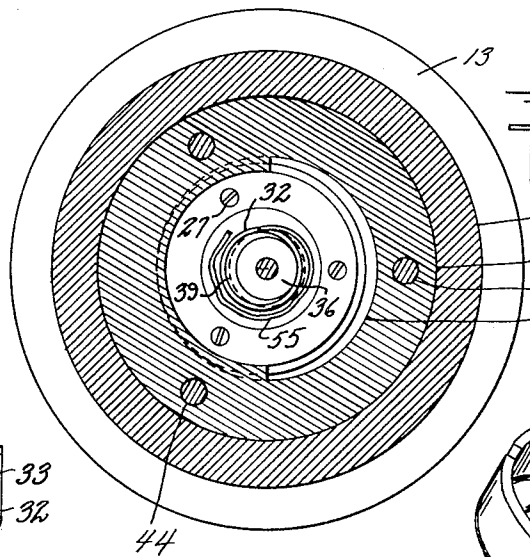


FIG. 9

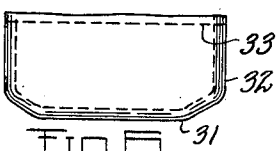


FIG. 8

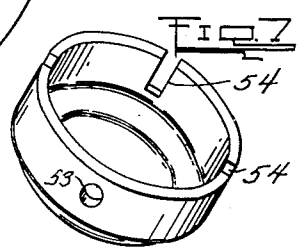


FIG. 7

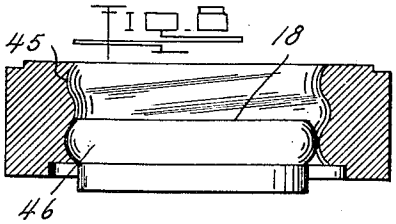


FIG. 6

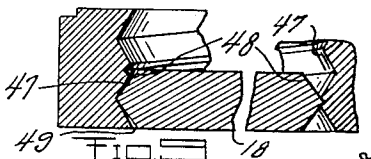


FIG. 5

Inventor
Bruno A. Briest

By

Attorney

Patented Jan. 12, 1932

1,840,657

UNITED STATES PATENT OFFICE

BRUNO A. BRIEST, OF TOLEDO, OHIO

METAL WORKING MACHINE

Application filed August 12, 1930. Serial No. 474,682.

This invention relates to the conversion of motion in one direction into motion in a direction transversely thereto, more particularly in a helical orbit.

This invention has utility when incorporated in plunger or press operation for trimming, piercing, shaving, notching or forming of metal or other material, such as drawn shells, an instance being the trimming of a drawn sheet metal cup to a definite height by a continuous progressive cutting.

Referring to the drawings:

Fig. 1 is a front view of a press having an embodiment of the invention incorporated therewith;

Fig. 2 is a detail view of the opposing relatively movable members of the press of Fig. 1, the lower or stationary member being shown in section with the holder therein;

Fig. 3 is a view in section of the members and holder at operation completing position, as distinguished from Fig. 2 disclosure of position for starting the press operation;

Fig. 4 is a view similar to Fig. 3 with the dies adapted for piercing or notching operations;

Fig. 5 is a section on the line V—V, Fig. 3;

Fig. 6 is a side elevation of the cup to be trimmed under the disclosure in Fig. 3;

Fig. 7 is a perspective view of the completed article from the operations disclosed in Fig. 4;

Fig. 8 is a view of a sinuous cross-section thread or helical way and its coacting holder;

Fig. 9 is a view of a V-cross-section thread or helical way and its coacting holder, parts being broken away; and

Fig. 10 is a diagrammatic view of the helical orbit of travel or relative movement for the holder.

Press frame 1 may provide the medium for an installation under this invention. Driving belt 2 may operate belt pulley 3 to rotate shaft 4 in the frame 1 carrying the pinion 5 in mesh with gear 6. Treadle 7 mounted in the frame 1 is effective thru clutch device 8 to effect one rotation driving cycle connection of the shaft 9 with the gear 6. Connecting rods 10 from this crank shaft 9 operate crosshead 11 in guides 12 of the frame 1, toward and from the opposing table 13 in the frame 1.

Mounted on the table 13 is member 14 having central opening or pocket 15 in the outer face or pocket wall of which is helical way 16 as a groove or thread. This thread is coarse and in practice of a depth to its root for the range of transverse shifting. This way 16 is shown as terminating in a throat 17 concentric with the pocket 15 and approximately half the root depth of the groove 16 larger than the pocket 15.

Located in the pocket 15 is holder 18 having peripherally thereof way coacting means or endless rib 19, determining a diameter greater than the diameter of the pocket 15 by approximately the depth of the groove 16. This holder 18 and its rib 19 thus center at the throat 17 over the pocket 15. The holder diameter approximates half the sum of the outside and inside diameters of the way 16. The holder 18 may not remain coaxial and move axially of the pocket 15, but with the rib 19 entering the way 16 at one side the rib 19 may clear the inside of the pocket 15 at the opposite side. This means that travel of the holder 18 into the pocket 15 is by transverse progressive shifting defining a helical orbit of the diameter of the depth of the way 16 from the side wall of the pocket 15. Center point 20 of the holder 18 thus starts from axis 21 of the pocket 15 as concentric of the way 16, and moves off center by path section 22 into helical path portion 23, usually free to rotate, altho may be keyed to or not to rotate.

The holder 18 is sustained against tilting in the pocket 15 by plate 24 having depending pins 25 thrust upwardly by compression helical springs 26, as the yielding means tending to locate the holder 18 for initial position in the throat 17.

In order that in the recover travel, or under other circumstances the holder 18 may not become tilted, but still be free for its orbital travel, bolts 27 through the holder 18 engage collar 28 having clearance for riding under overhang 29 of the plate 24. This collar 28 is of less diameter than the pocket 15 and as it shifts eccentrically with the

holder 18, holds the holder in position. The holder 18 is provided centrally thereof with seat 30, herein shown as a removable fitting for article of work 31. This article of work or cup 31 is shown as having upstanding rim or flange 32 to be given definite trim or height shearing off at line 33 (Fig. 6).

Opposing the first or pocket member 14 is second member 34, as the plunger carried from the crosshead 11 of the press. The member 34 is shown as having depending guide 35 descending about the member 14 for holding the members for relative axial travel. Drop member 36 may be yieldably thrust into the cup of the work 31 as a cooperative guide, while pins 37 bear against the holder 18 to overcome the spring 26 and cause the holder 18 to descend in the pocket 15 in describing the orbit 22, 23, in passing from the initial concentric position in the throat 17. This second or movable member 34 also has a seat 38. In the instance herein, such seat carries die 39 instead of work. For this trimming operation the die 39 as progressing radially from the central initial position with the flange 31 between the member 36 and the upper edge of the seat 30, effects a shearing cut continuous in its progress during the relative movement between the way 16 and the holder 18.

Importance attaches to accurate location of the work as closeness to prescribed dimension is sought. To this end the work height in the seat 30 may be supported by inverted cap 40 having anti-friction thrust bearing 41, while grinding off of pins 37 and die 39 may be to a selected gage. Bolts 43 permit replacement of the throat 17, while by bolts 44, substitute members 14 may be supplied for different eccentric path radii, and different pockets, even conforming to a group of articles which may be of non-circular form.

For the motion conversion, member 14 may have rounded edge thread 45, while the holder 18 has coacting curved rib 46 (Fig. 8). Again for a flat side way 47 in the member 14, there may be the holder 18 with rib 48 of an extent and configuration for the orbit travel. Inasmuch as the rib of the holder 18 is endless and thus of a horizontal extent when the instance is of relative vertical travel, there is ample clearance 49 at the inner diameter portions of the rib to permit entrance of the rib into the helical way to compensate for the pitch of such way without tilting the holder 18.

The die 39 (Fig. 3) is shown as held to axial shifting, while the work in the holder 18 describes the eccentric orbit. In Fig. 4 article of work 50 is held axially and the holder 18 is effective for shifting dies 51, 52 for effecting piercing operation 53 and notching operation 54.

After the descent of the plunger and the performance of the working operation in such stroke, the plunger recovers with the plate 24 following to relocate the holder 18 in the throat 17 at the initial position. With the plunger lifting the member 34 clear, trimming 55 together with the article of work 31 as now completed may be removed. A succeeding article is placed in the seat, and the treadle 7 depressed for a repetition of the cycle of operations.

It is thus seen that in carrying out the motion conversion hereunder, if the holder has a helical thread or rib, the coacting member should have coacting means or way controlled for relative movement against tilting in the relative movement axially regardless of which undergoes the actual translation. The disclosure for die operations, herein shown as vertical instead of horizontal, permits accurate and economical quantity output for the mechanism is simple, readily adaptable to a wide range and possible of installation in standard machine tools. Furthermore the machine attendant need not be skilled.

It is to be seen that the range of radial throw or eccentricity need be only just a little more than the gage or thickness of the work to be cut when such work be circular at the region of cut, whether there be but one article of work and that axially located, or whether there be several articles of such work disposed eccentrically, or one central and others thereabout eccentrically. When the work is non-circular, say polygonal or oblong, and there is to be trimming about the entire article, the radial range or eccentricity should be for the article thickness beyond the difference in the extremes of the region to be trimmed or acted upon, especially in the event the trimming die be circular in such work and acting to cut outwardly.

What is claimed and it is desired to secure by Letters Patent is:

1. The method of effecting die member operation as to work holding member from a single direction source of applied power comprising giving a straight line direction of movement to one member and thereby driving the other member as responsive to said movement for arc line of travel transversely of said movement and causing said responsive driving to occur progressively.

2. The method of effecting die member operation as to work holding member from a single direction source of applied power comprising giving a straight line direction of movement to one member, yieldably resisting said movement, and guiding the other member for helical travel in an arc as responsive to the movement and held by the resistance.

3. The method of effecting die member operation as to work holding member from a single direction source of applied power comprising causing one member to travel in

a helical continuous arc orbit and directing the other member axially of said orbit.

4. A press embodying a member provided with a helical way, a holder having a seat and provided with a rib for coacting with said way, and a second member having a seat radially fixed as to the way, one of said seats being for work and the other for a die, said way coacting with said rib for radially shifting the holder upon relative axial movement of said members.

5. A press embodying a member provided with a helical way, a holder having a seat and provided with a rib for coacting with said way, a second member having a seat radially fixed as to the way, one of said seats being for work and the other for a die, and an actuator for effecting relative movement of one member as to the other axially of the way for effecting radial shifting of the holder.

6. A press embodying a first member provided with a helical way, a holder having a seat and provided with a rib for coacting with said way, a second member having a seat radially fixed as to the way, one of said seats being for work and the other for a die, yieldable means locating the holder at an initial position along the way, and an actuator opposing the yieldable means in effecting relative progress of the holder along the way from said initial position.

7. A press embodying a first member provided with a helical way having a root diameter, a holder having a seat and provided with a rib for coacting with said way, the outside diameter of said holder approximating a mean of the outside and inside diameters of said way, a second member having a seat radially fixed as to the way, one of said seats being for work and the other for a die, yieldable means locating the holder at an initial position along the way, and an actuator opposing the yieldable means in effecting relative progress of the holder along the way from said initial position.

8. A press embodying a first member provided with a helical way having a root diameter terminating in a throat approximating a mean of the outside and inside diameters of said way, a holder to be centered at said throat, said holder having a seat and provided with means for coacting with said way, a second member having a seat radially fixed as to the way, one of said seats being for work and the other for a die, and an actuator for effecting relative progress of the holder along the way from said throat by shifting one of said members as to the other axially of said way.

9. A press embodying a first member having a pocket, a helically grooved way along the inside of said pocket having a diameter larger than the pocket diameter, a holder having a seat and provided with an endless rib of approximately mean diameter between that of the grooved way and the pocket, and a second member having a seat radially fixed as to the way, one of said seats being for work and the other for a die, said way coacting with said rib for radially shifting the holder upon relative movement of the members axially of the way.

10. A press embodying a first member having a pocket, a helically grooved way along the inside of said pocket having a diameter larger than the pocket diameter and terminating in a throat of approximately mean diameter between that of the grooved way and the pocket and concentric of the pocket, a holder of the diameter of said throat, said holder having a seat and provided with means for coacting with said way, a second member having a seat radially fixed as to the way, one of said seats being for work and the other for a die, yieldable means for initially locating the holder in said throat, and an actuator for effecting relative movement of the members axially of the way in progressing the holder from said throat.

In witness whereof I affix my signature.

BRUNO A. BRIEST.