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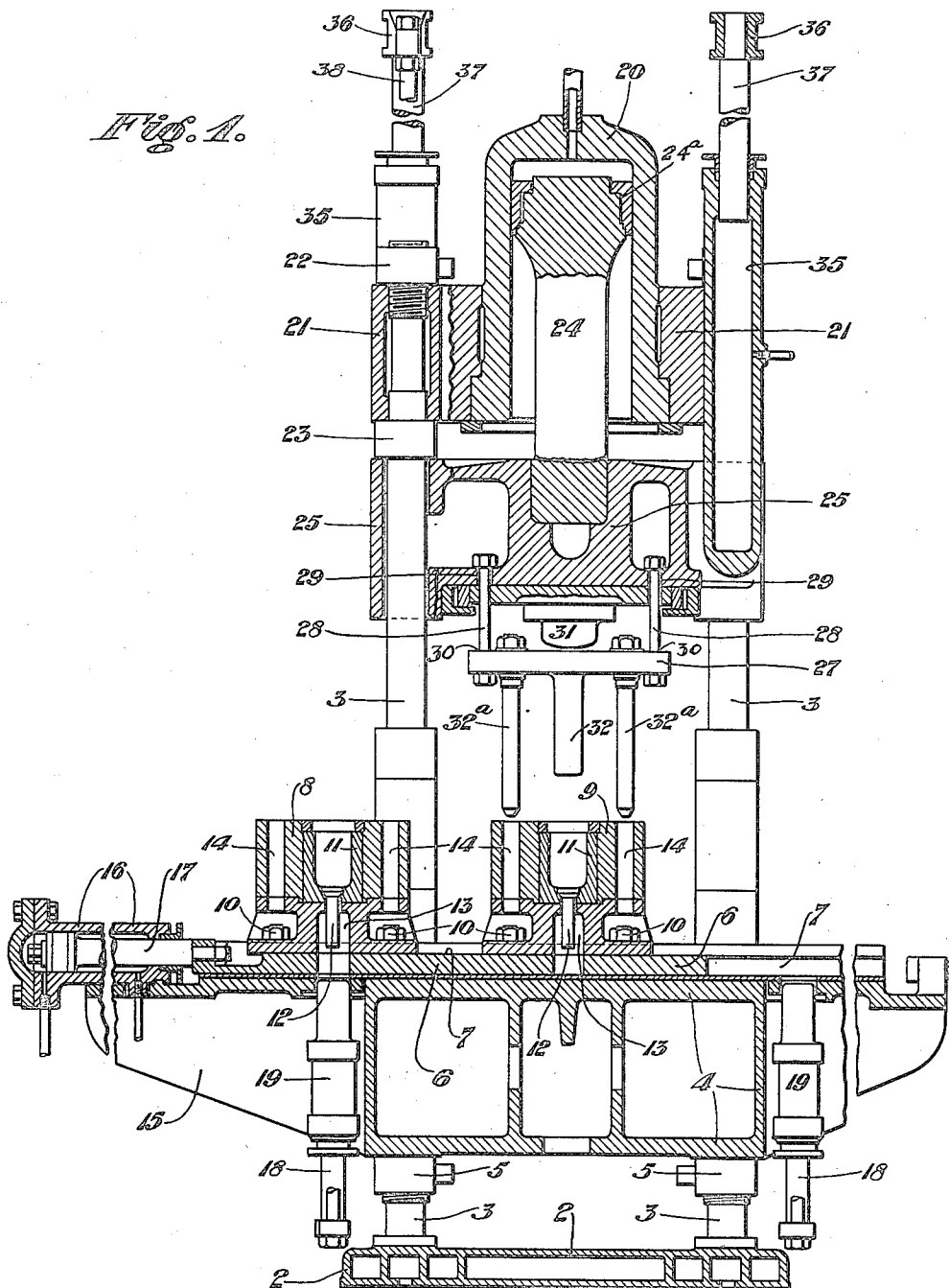
F. E. BROWN

METAL SHAPING MACHINE

Filed Aug. 4, 1921

2 Sheets-Sheet 1

Fig. 1.



Witnesses:
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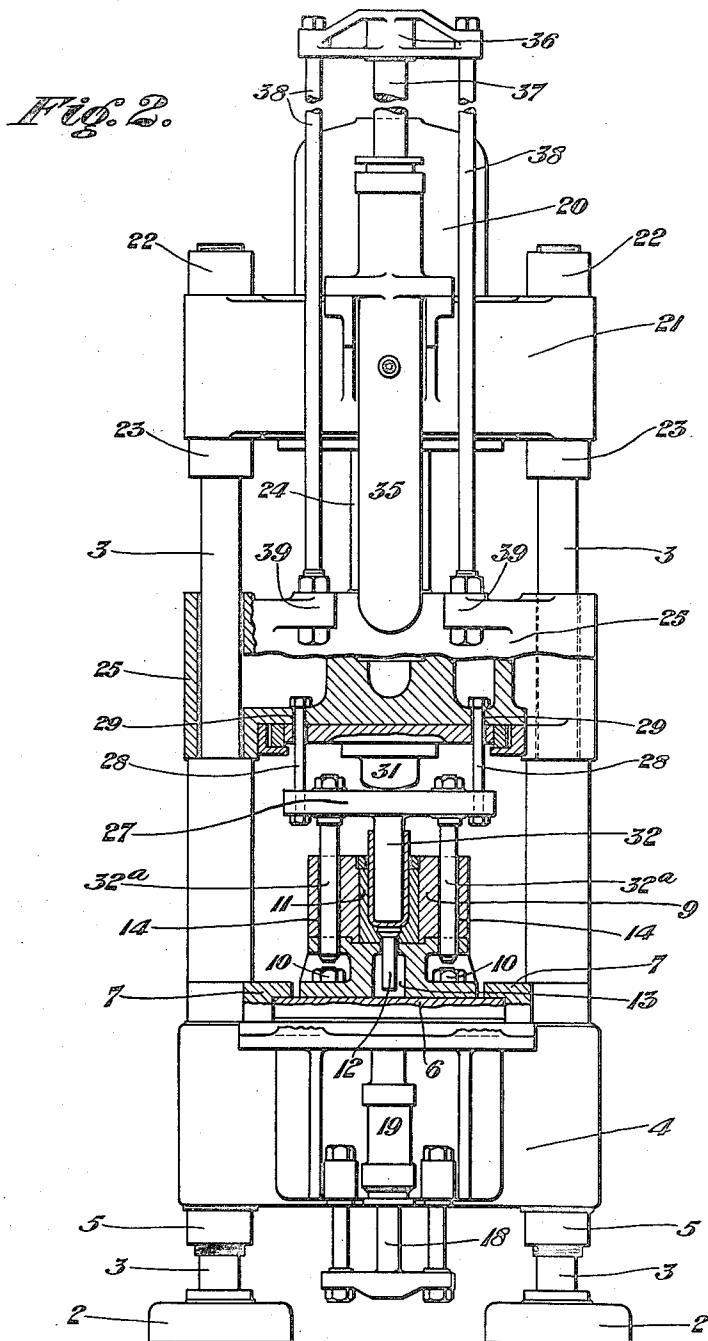
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METAL SHAPING MACHINE

Filed Aug. 4, 1921

2 Sheets-Sheet 2



Witnesses:
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UNITED STATES PATENT OFFICE.

FREDERICK E. BROWN, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO NATIONAL TUBE COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

METAL-SHAPING MACHINE.

Application filed August 4, 1921. Serial No. 489,829.

To all whom it may concern:

Be it known that I, FREDERICK E. BROWN, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Metal-Shaping Machines, of which the following is a specification.

This invention relates to power presses and more particularly to power presses of the type used in forming the hollow metal billets or blanks from which gas storage cylinders and similar containers are afterward fabricated.

One object of my invention is the provision on a power press having a shaping plunger and coacting die of novel means whereby the shaping plunger and die cavity are alined axially and maintained in axial alinement during the metal shaping operations.

Another object of this invention is the provision on a power press having a shaping plunger and plunger operating ram of improved means for securing the plunger to the ram, whereby a limited relative lateral movement between the shaping plunger and attached ram is effected, and axial alinement of the plunger and a die during the blank shaping operation is secured and maintained.

A further object of the invention is the provision on a power press having a shaping plunger and plunger actuating ram and a co-operating die of improved means for securing the plunger to the ram, whereby said plunger is automatically alined and maintained in axial alinement with the die in the blank shaping operations, and the production of hollow cylindrical vessels is made possible, and the difficulties experienced heretofore in shaping such blanks are avoided and overcome.

Still another object of the invention is to provide the novel constructions, arrangements, and combination of parts set forth in the following specification and illustrated in the accompanying drawings forming part of this specification, in which—

Figure 1 is a vertical sectional side elevation showing a hydraulic press for shaping billets having my invention embodied therein.

Figure 2 is an end elevation, partly in section, of the press of Figure 1.

In the drawings, the numeral 2 designates the base of the press which supports the lower ends of the rods or posts 3. The posts 3 extend upwardly through suitable apertures in a die table 4, this die table being adjustably supported on said posts by means of collars 5 which are screw threaded on the posts 3 and engage the bottom face of said table 4.

A horizontally movable die carriage 6 is slidably mounted between suitable guides 7 on the top of the table 4 and carries two die blocks 8 and 9 thereon.

The die blocks 8 and 9 are of duplicate construction, and therefore similar reference numerals are used to designate like parts thereof.

The die blocks are secured to the carriage 6 by bolts 10 and each die block is provided with a central recess for the reception of a die 11. An ejector pin 12 is mounted in the bottom of each die 11 and extends downwardly into a recess 13 in the die block which is in line with an aperture in the carriage 6. A series of guide pin sockets or apertures 14 are formed in the die blocks for a purpose to be described.

The table 4 has an extension 15 at one side thereof to support an operating cylinder 16 for the carriage 6. A hydraulic cylinder 16, of the double acting type, has its piston 17 secured to one end of the carriage 6 and is provided to move the carriage 6 transversely on the table 4.

Stripper cylinders 18 at each end of the table 4 are mounted on stationary plungers 19, the cylinders moving upwardly into the recess 13 to operatively engage the ejector pins 12 when the die blocks are moved into blank discharging and receiving positions. It will be readily seen that the pierced blanks are easily and quickly discharged or ejected from the holding dies through the medium of the stripper cylinders.

A single acting fluid pressure piercing cylinder 20 is mounted in a suitable cross-head 21 which is fastened to the upper ends of the tie rods or posts 3, being held in position thereon by the screw threaded collars or nuts 22 and 23.

The cylinder 20 has a ram 24 mounted therein which is provided at its upper end with a packing ring 24^a, and has its lower

end secured in a cross-head 25 which is slidably mounted on the guide rods or posts 3 to permit of vertical movement of the cross-head 25 toward and away from the die blocks 8 and 9.

A plunger head 27 is loosely hung from the cross-head 25 by bolts 28 which pass through alined apertures 29 and 30 in the cross-head and plunger. The apertures 29 and 30 are of slightly larger diameter than the bolts 28 so as to form a loose connection which will permit of a limited lateral movement of the shaping plunger relative to the cross-head 25.

A centrally arranged spacing and contact-head 31 extends downwardly from the lower face of the cross-head 25, and has its lower face rounded so as to allow for a slight rocking movement as the plunger-head 27 aligns itself axially with respect to the die.

The plunger-head 27 has a centrally arranged shaping point or plunger 32 and guide pins 32^a extending downwardly therefrom, which tool and pins are adapted to register with the cavity in the die 11 and the apertures 14 in the die blocks 8 and 9, when such blocks are in position for the blank shaping operation.

The guide pins 32^a are appreciably longer than the shaping point or plunger 32, and, therefore, it will be readily apparent that should the plunger-head not be in exact axial alinement with the cavity in the die, the head will be automatically moved by the pins 32^a entering the sockets or apertures 14 in advance of the shaping point entering the cavity of the die 11, since the plunger-head 27, due to its loose connection with the cross-head 25 will readily move transversely relative to the cross-head 25.

The cross-head 25, ram 24 of the cylinder 20 and the plunger-head 27, are moved into lifted position by a pair of return cylinders 35 which are of the single acting type, and have yokes 36 secured to the free ends of their pistons 37, the yokes having tie rods 38 secured on the ends thereof. The lower ends of the rods 38 are secured in suitable lugs 39 on the cross-head 25, so that as fluid is supplied to the cylinders 35 the pistons 37 are forced upwardly, and the rods 38 connecting the yokes 36 to the cross-head 25 will lift the cross-head, its ram 24, and the plunger-head 27.

The detailed operation of the device is as follows—

The apparatus being in the position shown in Figure 1, fluid under pressure is admitted to the cylinder 20, thus forcing down the piston 24, cross-head 25, and plunger-head 27. If, as often is the case, the plunger tool 32 is not in exact axial alinement with the cavity of the die 11, it will be aligned by the guides 32^a which enter the

sockets or apertures 14 in the die block prior to the entrance of the shaping tool into the die 11.

After the piston has moved its entire length, the apparatus is returned to starting position by the cylinders 35. Fluid is admitted to the cylinders 35 which will force the pistons 37 upwardly, thus carrying the yokes 36 and rods 38 upwardly and lifting the cross-head 25, plunger-head 27, and piston 24 up into starting position.

While I have shown only one embodiment of my invention, it will be understood I do not wish to be limited thereto, since various modifications and substitutions of equivalents may readily be made by those skilled in the art. It will be expressly understood that, if desired, the guide pins 32^a may be mounted on the die block and be adapted to enter apertures in the plunger-head, that other flexible or loose mountings may be used for securing the plunger-head 27 to the cross-head 25, that operating mechanisms other than fluid pressure cylinders may be employed, and that a stationary or rigid die block may be used instead of the laterally movable die blocks 8 and 9.

Other changes in the design and combination of the parts may readily be made without departing from the spirit of my invention as defined in the appended claims.

I claim:—

1. In a metal shaping machine for forming one piece cylindrical vessels, the combination of a ram, a die block movable laterally relative to said ram, a metal shaping plunger mounted on and capable of universal movement relative to said ram, and guide rods secured to said plunger and adapted to co-operate with suitable guide openings in said die to insure a fixed alinement of the shaping plunger with the die irrespective of the alinement of the ram therewith.

2. In a metal shaping machine for forming one piece cylindrical vessels, the combination of a ram, a die block movable laterally relative to said ram, a shaping plunger hung loosely from said ram, and a plurality of guide rods mounted rigidly on the head of said plunger, said plunger and guide rods being capable of lateral movement relative to said ram, said die block being provided with a plurality of openings, and said guide rods being of such length as to register and pass within said guide openings before said plunger enters the cavity of said die and to pass out of said openings during the upward movement of said plunger, and thereby insuring the axial alinement of said plunger with respect to said die cavity.

3. In a metal shaping machine for forming one piece cylindrical vessels, the combination with a ram, a shaping plunger hung loosely from said ram so as to have a limited universal movement relative to said

ram, and a plurality of guide rods mounted rigidly on and projecting downwardly from the head of said plunger, of a horizontally movable die carriage mounted below said plunger, a plurality of die blocks mounted on said carriage, said carriage being adapted to be moved to locate said die blocks in substantial axial alinement with said plunger, each of said die blocks being provided with guide openings adapted to receive said guide rods, and said guide rods being of such length as to register and pass within said guide openings before said plunger enters the die block and to pass out of said openings during the upward movement of said plunger, thereby insuring the axial alinement of said plunger with respect to said cavity.

4. In a metal shaping machine for form-

ing one piece cylindrical vessels, the combination with a ram, a shaping plunger hung loosely from said ram so as to have a limited universal movement relative to said ram, and a horizontally movable die carriage mounted below said plunger, a plurality of die blocks mounted on said carriage, said carriage being adapted to be moved to locate said die blocks in substantial axial alinement with said plunger, of means adapted to be engaged with both said plunger and said alined die block just prior to the entrance of said plunger into said die block to automatically aline said plunger with said die block.

In testimony whereof, I have hereunto set my hand.

FREDERICK E. BROWN.