

(No Model.)

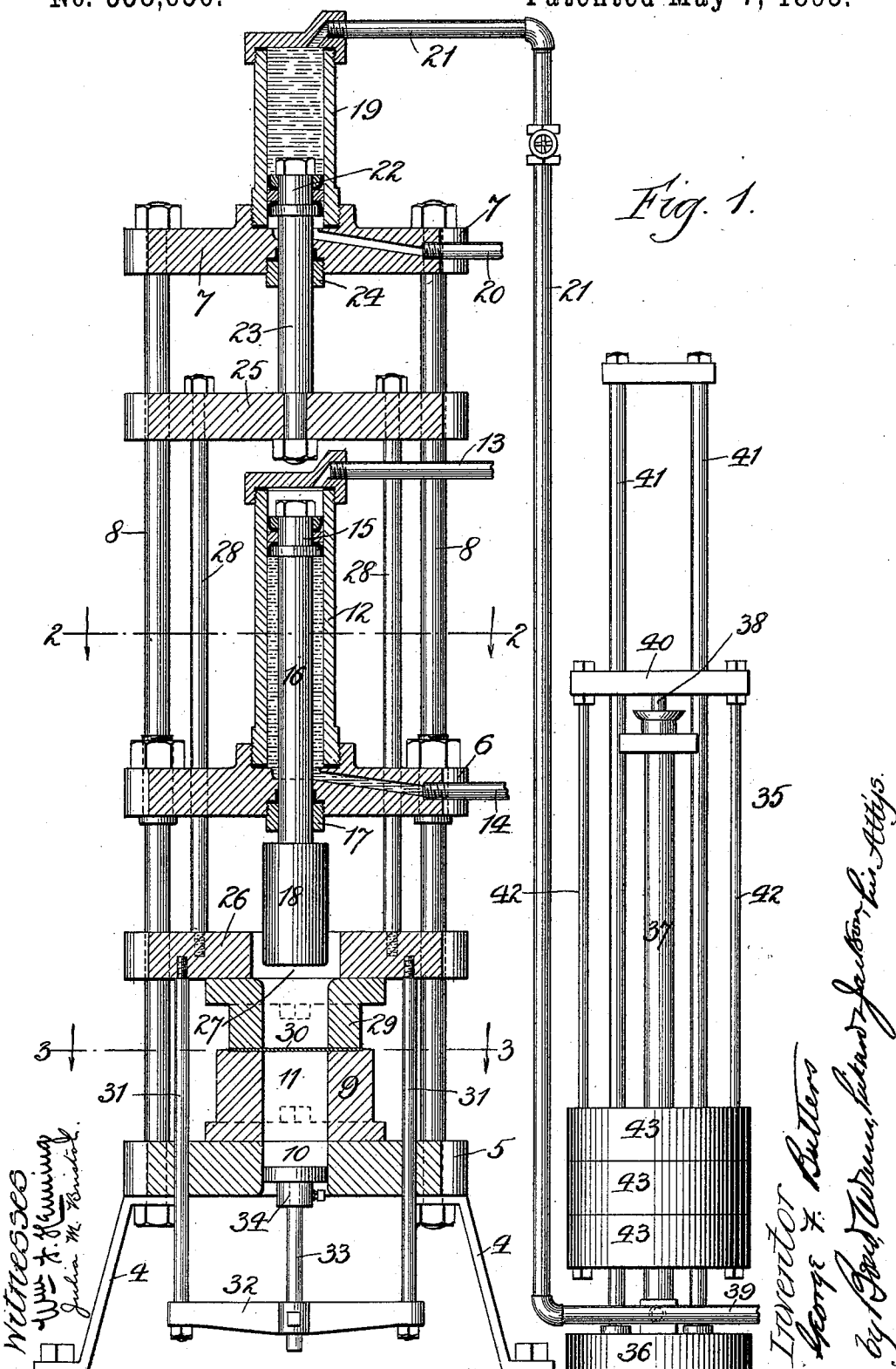
2 Sheets—Sheet 1.

G. F. BUTTERS.

APPARATUS FOR DRAWING METAL INTO CUPS, &c.

No. 538,656.

Patented May 7, 1895.



(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

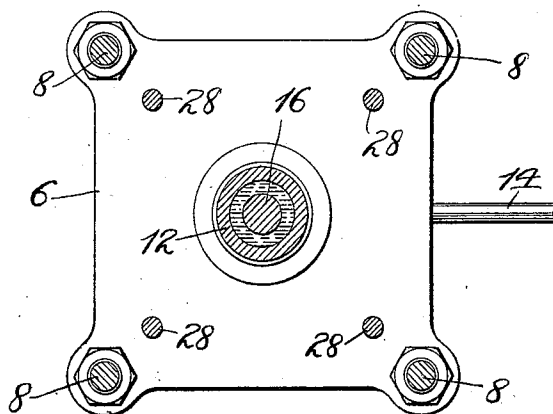
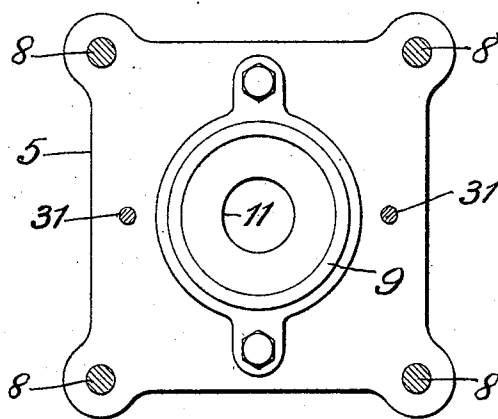


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE F. BUTTERS, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF
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APPARATUS FOR DRAWING METAL INTO CUPS, &c.

SPECIFICATION forming part of Letters Patent No. 538,656, dated May 7, 1895.

Application filed October 8, 1894. Serial No. 525,321. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. BUTTERS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and Improved Apparatus for Drawing Metal, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation partially in vertical cross-section. Fig. 2 is a cross-section upon line 2 2 of Fig. 1. Fig. 3 is a cross-section upon line 3 3 of Fig. 1.

This invention relates to apparatus for drawing metal into cups and similar forms, and has for its object to provide new and improved means for holding a plate of metal on a die, and drawing said plate of metal in said die; and to provide novel means whereby the metal, when drawn, can be readily raised and removed from the die.

To accomplish these objects my invention consists in the combination of devices hereinafter described and claimed.

In the drawings, 4 represents supports, 5—6—7 represent base plates, and 8 represents standards, all forming a support and framework for the hydraulic presses hereinafter described. The base plate 5 is mounted upon the supports 4, the standards 8 are rigidly mounted in the base plate 5, and to the standards 8 are rigidly secured the base plates 6—7.

9 indicates a mould or die, which may be of any desired form and size, and rests upon the base plate 5. The base plate 5 is provided with an opening 10 located below the opening 11 in the die 9, for the purpose hereinafter explained.

12 indicates the cylinder of a hydraulic press, which is mounted upon the base plate 6 above the die 9, and is provided with the usual water inlets 13—14.

15 indicates the piston.

16 indicates the piston rod, which passes through suitable packing 17 in the base plate 6, and is provided upon its lower end with a plunger 18 adapted to pass downward into the opening 11 of the die 9 for the purpose of drawing a metal disk placed thereon.

19 indicates the cylinder of a hydraulic

press, which is mounted upon the base plate 7 in line with the cylinder 12, and provided with water inlet pipes 20—21.

22 indicates a piston, and 23 a piston rod which passes through suitable packing 24 in the base plate 7.

25 indicates a cross-head, which is secured to the lower end of the piston rod 23, through which cross-head the standards 8 pass, so that the cross-head may slide vertically thereon.

26 indicates a cross-head which is slidingly mounted upon the standards 8 below the base plate 6 so as to slide freely upon said standards 8. The cross-head 26 is provided with an opening 27 through which the plunger 18 may pass, and is secured to the cross-head 25 by rods 28 which are bolted or otherwise secured to the cross-heads 25—26, and which pass through suitable openings in the base plate 6 so as to slide freely vertically therein.

29 indicates a casting which is bolted to the under side of the cross-head 26.

30 indicates a disk or plate of metal which it is desired to draw or cup, and which rests in a suitable recess on the top of the die or mold 9.

The casting 29 is provided with an opening through which the plunger 18 may pass, and is of suitable size and shape to press upon the plate 30 and hold it against the upper surface of the die 9.

31 indicates rods, which are secured to the under side of the cross-head 26 and pass downward through suitable openings in the base plate 5 so as to slide freely therein.

32 indicates a cross-head which is secured to the lower ends of the rods 31.

33 indicates a rod which is secured to the cross-head 32.

34 indicates a head which is mounted upon the upper end of the rod 33 in the opening 10 of the base plate 5, and moves vertically therein.

35 indicates an accumulator, which may be of any well known and approved form common in hydraulic presses.

The form of accumulator shown in Fig. 1 of the drawings is briefly described as follows: It consists of a bed-plate 36, a water cylinder 37, a piston rod 38 provided with a piston (not

shown) moving in the cylinder 37, a water supply pipe 39, cross-head 40 which is mounted upon the upper end of the piston rod 38, and guide rods 41 which are mounted upon the base 36 and upon which the cross head 40 slides by means of suitable openings in the cross-head through which the guide rods 41 pass.

42 indicates rods which are secured to the cross-head 40, and upon which are removably mounted weights 43, the number of which may be varied according to the pressure which it is desired to produce in the hydraulic cylinder 19.

The accumulator 35 works in the usual manner and is designed to effect a constant pressure in the cylinder 19, compensating for any leakage which may occur in said cylinder; which pressure may be varied and adjusted to any desired amount by means of varying the number of weights 43 on the accumulator. The precise form of accumulator shown in Fig. 1, however, is not of the essence of my invention, as any other well known form of accumulator, or other device for adjusting and making constant the pressure in the cylinder 19, may be used.

The operation of my device is as follows: A die or mold of size and form suitable for the plate which it is desired to press or draw is placed upon the base plate 5 and bolted or otherwise removably secured thereon; the pistons of the two hydraulic cylinders above being in their uppermost position. The plate which it is desired to draw or stamp is then placed in position upon the mold or die 9 and the accumulator weights adjusted to produce the pressure with which it is necessary that the plate to be drawn should be held against the die in order to prevent buckling, which pressure, as stated above, is a known quantity, the thickness and area of the plate to be drawn and the amount of drawing to be done with the stroke of the plunger being known. The valves opening into the cylinder 19 are then opened and the piston 22 forced downward therein, carrying with it the cross-heads 25—26 and the casting 29, which, pressing against the plate 30, presses it against the die or mold 9 with the proper pressure, as above described. Water under pressure is then admitted by suitable valves through the pipe 13 into the hydraulic cylinder 12, forcing the piston rod 16 and plunger 18 downward into the opening 11 of the die 9, giving the plate 30 its first drawing. The plunger 18 is then raised by turning off the pressure from the pipe 13 and admitting water under pressure through the pipe 14, thus lifting the piston 15 and with it the plunger. The pressure is then turned off from the pipe 21 and water under pressure is admitted in the pipe 20, thus lifting the piston 22, piston rod 23, and with them the cross-heads 25—26—32, thus causing the rod 33 and head 34 to rise in the opening 11 of the die 9, lifting the drawn metal out. When the given number

of plates have received their first drawing, they are annealed in the usual manner, a second die of suitable size and dimensions is placed upon the base plate, another casting similar to the casting 29 and of suitable size and shape to hold the drawn metal against the die is secured to the cross-head 26, and the operation is repeated as many times as may be necessary to press or draw the metal into the desired shape.

The hydraulic press by means of which the water under pressure is conveyed to the accumulator and to the hydraulic cylinders is not shown in the drawings, but may be of any approved form and connected with the pipes 13—14—20—39 in any well known and ordinary manner, and it therefore is not necessary to show such press in detail.

In Fig. 1 of the drawings the metal plate 30 is shown as being held against the die 9 by the holder 29, the piston 22 in the cylinder 19 being in its lowest position. The piston 15 in the cylinder 12, with its piston rod 16 and plunger 18, is shown in its highest position ready to be forced down upon the metal plate so as to draw it into the die.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a frame, of a die mounted in the base of the frame, a sliding cross-head, having a holder for holding a plate of ductile metal on the die, a primary, hydraulic cylinder, a piston arranged in said cylinder, having a piston-rod connected with the holder-carrying cross-head and acting when projected from the primary cylinder to force the holder of the sliding-cross-head against the plate of ductile metal arranged on the die, a secondary, hydraulic cylinder located above the primary cylinder, and a piston arranged in the secondary cylinder and having a piston-rod provided with a plunger which is projected to draw the plate of metal in said die, substantially as described.

2. The combination with a frame, of a die mounted on said frame, a sliding cross-head having a holder for holding a plate of ductile metal on the die, a secondary sliding cross-head located above the holder-carrying cross-head and connected therewith by rods, a primary, hydraulic cylinder, a piston arranged in the said cylinder, having a piston-rod connected with the upper sliding cross-head and acting when projected to simultaneously move both cross-heads in a direction toward said die for causing the holder on the holder-carrying cross-head to press the plate of ductile metal on said die, a secondary hydraulic cylinder, and a piston arranged in said secondary cylinder and having a piston provided with a plunger for drawing the plate of metal in the die, substantially as described.

3. The combination with a frame, of a die mounted on said frame, a sliding cross-head having a holder for holding a plate of ductile metal on the die, a secondary sliding cross-head located above the holder-carrying cross-

head and connected therewith by rods, a primary, hydraulic cylinder, a piston arranged in the said cylinder, having a piston-rod connected with the upper sliding cross-head and acting when projected to simultaneously move both cross-heads in a direction toward said die for causing the holder on the holder carrying cross-head to press the plate of ductile metal on said die, a secondary, hydraulic cylinder, a piston arranged in said secondary cylinder and having a piston provided with a plunger for drawing the plate of metal in the die, and an ejector-head connected with the lower sliding cross-head and moved into the die when the lower cross-head moves away from said die for the purpose of raising and removing the drawn metal from the die, substantially as described.

4. The combination with a frame consisting of supports 4, base plates 5—6—7, and standards 8, a die 9 mounted upon said base plate 5, and a cylinder 12 mounted upon said base plate 6 and provided with a hydraulically-operated piston 15, piston rod 16 and plunger 18, of a cylinder 19 mounted upon said base plate 7, a hydraulically-actuated piston 22 mounted in said cylinder, piston rod 23, cross-head 25 secured to said piston rod 23 and slidingly mounted on said standards 8, a cross-head 26 slidingly mounted on said standards 8 below said base plate 6, rods 28 connecting said cross-heads 25—26, and a

holder 29 mounted upon said cross-head 26 and adapted to hold a plate of ductile metal against said die 9 while said plate is being drawn, substantially as described.

5. The combination with a frame consisting of supports 4, base plates 5—6—7, and standards 8, a die 9 mounted upon said base plate 5, and a cylinder 12 mounted upon said base plate 6 and provided with a hydraulically-operated piston 15, piston rod 16 and plunger 18, of a cylinder 19 mounted upon said base plate 7, a hydraulically-actuated piston 22 mounted in said cylinder, piston rod 23, cross-head 25 secured to said piston rod 23 and slidingly mounted on said standards 8, a cross-head 26 slidingly mounted on said standards 8 below said base plate 6, rods 28 connecting said cross-heads 25—26, a holder 29 mounted upon said cross-head 26 and adapted to hold a plate of ductile metal against said die 9 while said plate is being drawn, and an accumulator 35 connected with said cylinder 19 and adapted to regulate the hydraulic pressure therein and to maintain it at a constant pressure as said metal plate is being drawn, substantially as described.

GEORGE F. BUTTERS.

Witnesses:

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