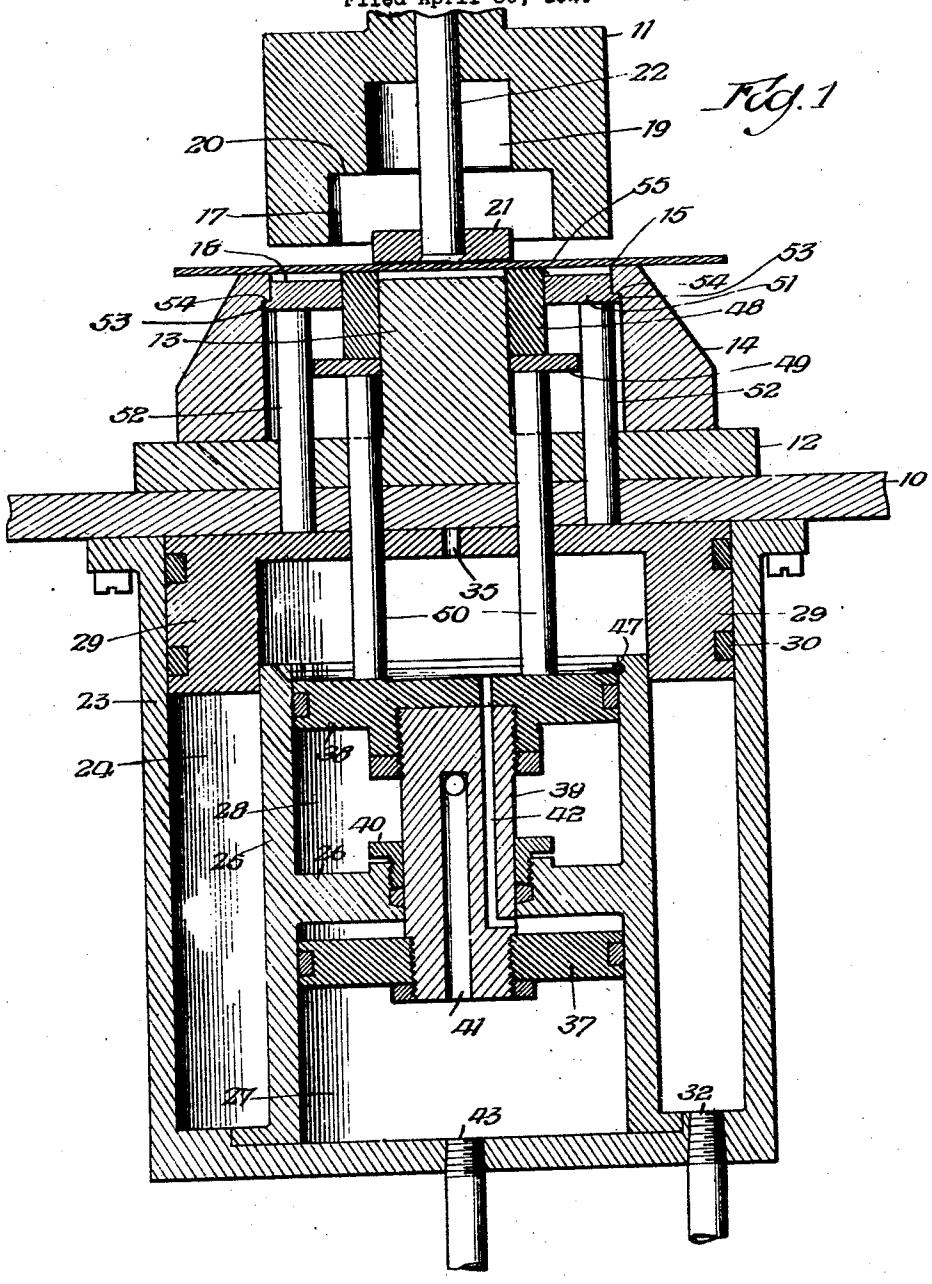
Aug. 18, 1925. 1,550,387

O. G. NILSON ET AL

DIE AND BLANK HOLDING MEANS

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Fig. 1



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DIE AND BLANK HOLDING MEANS

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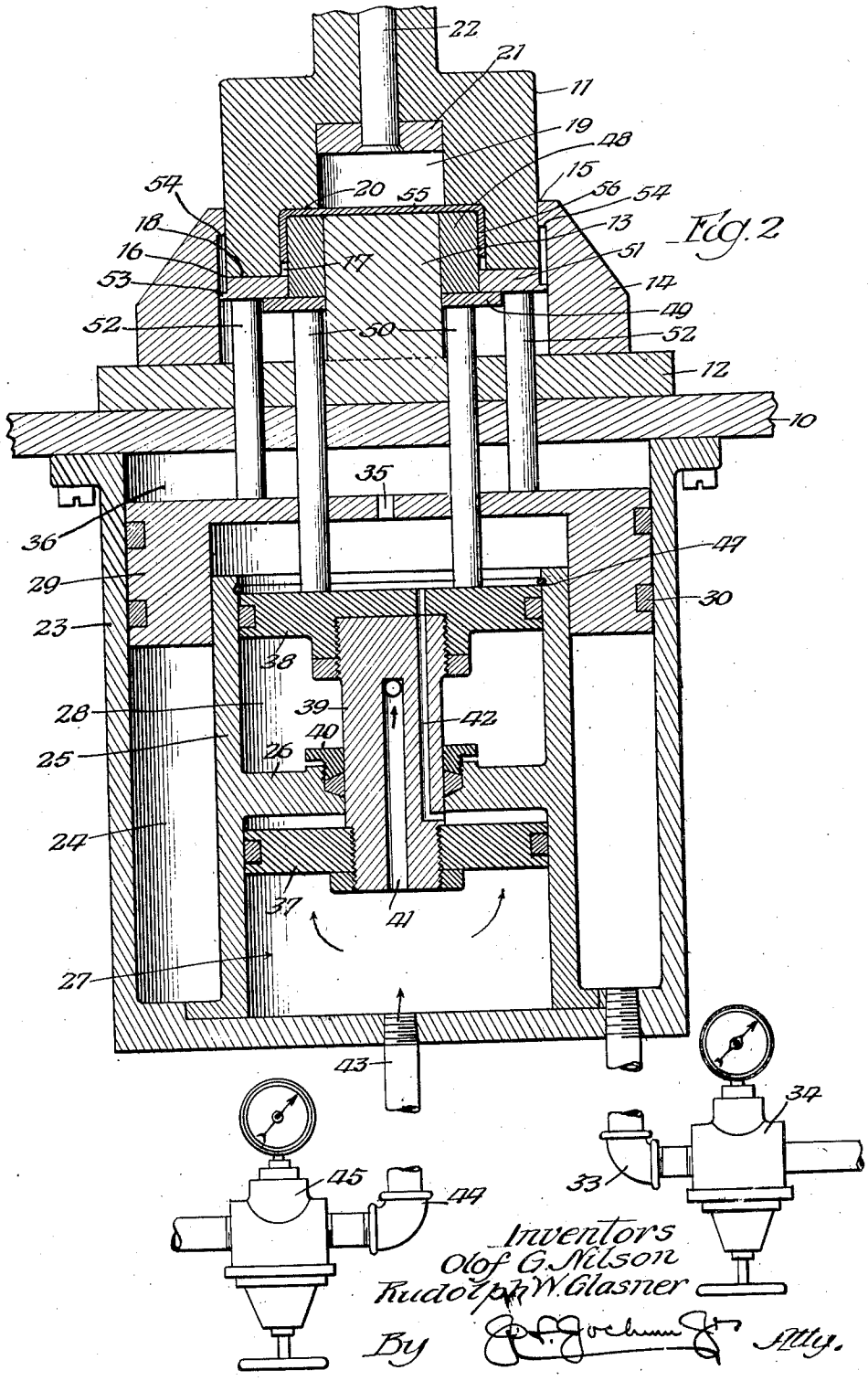


Fig. 2

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DIE AND BLANK HOLDING MEANS

Filed April 30, 1923 3 Sheets-Sheet 3

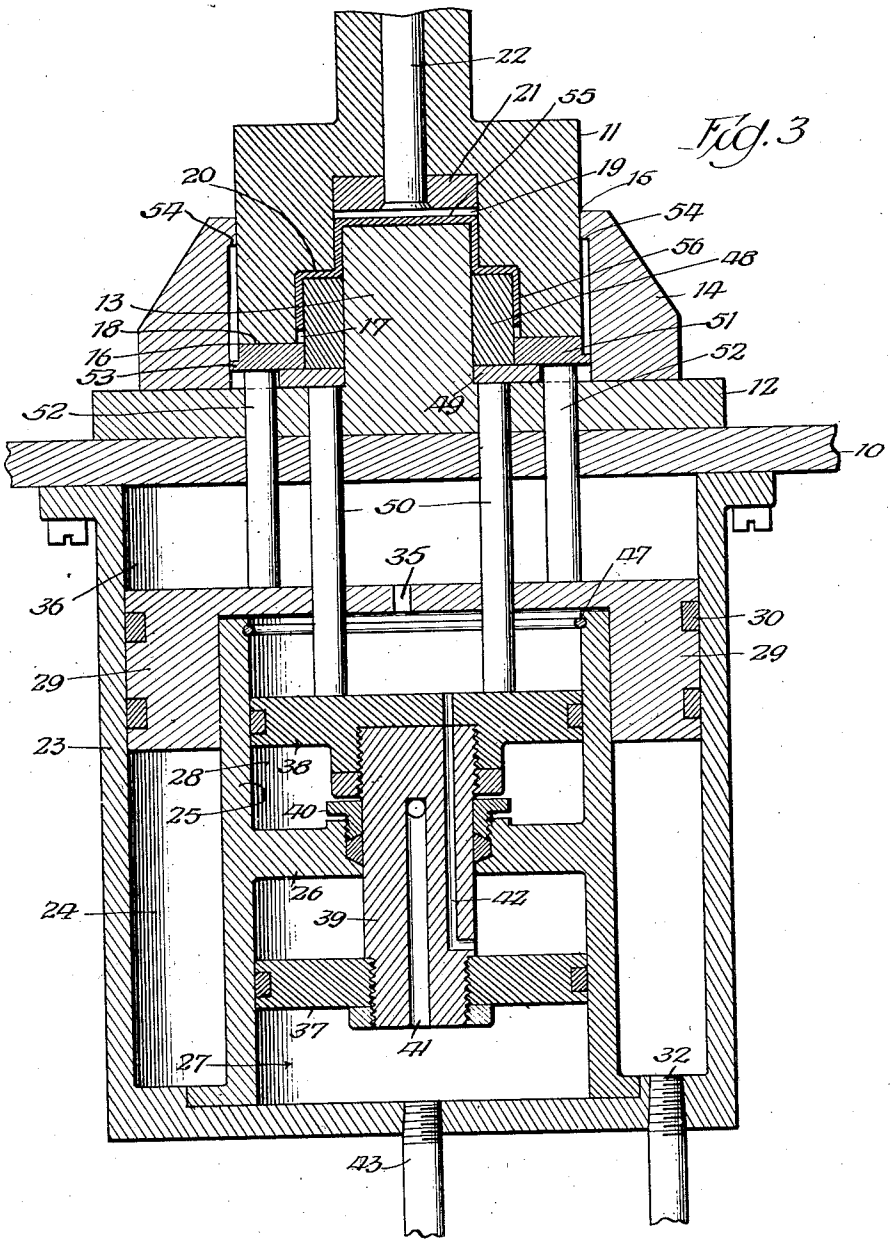


Fig. 3

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Patented Aug. 18, 1925

1,550,387

UNITED STATES PATENT OFFICE.

OLOF G. NILSON AND RUDOLPH W. GLASNER, OF CHICAGO, ILLINOIS, ASSIGNORS TO MARQUETTE TOOL & MANUFACTURING CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DIE AND BLANK HOLDING MEANS.

Application filed April 30, 1923. Serial No. 635,754.

To all whom it may concern:

Be it known that we, OLOF G. NILSON and RUDOLPH W. GLASNER, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Die and Blank Holding Means, of which the following is a specification.

This invention relates to improvements in die and blank holding means and one of the objects of the invention is to provide an improved die and blank holder which will make it possible to draw metal shells of various sizes and shapes to a greater depth in one operation of the press than was heretofore possible.

Heretofore and in practical experience it has not been possible to draw metal in one operation beyond a given depth relative to a given size of sheet. It is only by the redrawing of the partially formed article by means of separate steps and operations of the machine that it is possible to reduce the diameter and increase the depth of the shell. In order to obtain a shell of a smaller diameter and greater length in one operation of the press, and in order to reduce the handling of the material and the labor necessary in connection therewith, is one of the objects of the present invention.

A further object is to provide an improved blank holding means which will allow an application of varying pressures against the metal to be drawn into a shape during the different stages of the operation, thereby rendering it possible to form or shape the article in a plurality of clearly defined steps during one cycle of operation of the machine.

A further object is to perform these operations in one stroke of the press on a type of machine which heretofore, without the application of the present invention, would not be adapted for this work.

A further object is to make it possible to apply this invention to a standard type of press without in any way altering the press by the application of the present invention.

A further object is to provide improved means for exerting pressure on a metal blank to be formed into a shape, the amount of pressure of which may be predetermined and varied at will during the different stages of one cycle of operation.

A further object is to provide an improved die construction which will cut the blank to the desired shape out of the sheet and form a shape of desired dimensions, without removing the shell from the die, and then reform the shell thus shaped into a final shape during one cycle of operation of the press.

A further object is to provide an improved die and draw ring by the use of which a single shell may be given two different and distinct shapes during one cycle of operation.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention, and in which

Figure 1 is a view in longitudinal section of a portion of a draw press having a die and blank holding means constructed in accordance with the principles of this invention applied thereto and showing the parts in their normal or initial positions.

Figure 2 is a view similar to Figure 1, showing the parts in another position or the positions they will assume during the first step of the forming operation.

Figure 3 is a view similar to Figure 2, showing the position the parts will assume at the completion of the final forming step.

Referring more particularly to the drawings, the numeral 10 designates a supporting plate or bolster of a draw press and 11 designates a reciprocating die which latter is adapted to be reciprocated in the ordinary and well-known manner in machines of this character.

Supported by the bolster plate is a die shoe 12, which latter holds the die or forming block 13. The forming block may be of any desired size and configuration according to the article to be shaped.

Encompassing the forming block 13 is an annular member 14, having a cutting edge 15, which latter co-operates with the edge 16 of the reciprocating die 11 to cut the material into proper shape.

The die 11 is provided with a recess 17 opening through the end 18 thereof and the recess is reduced in size as at 19 to form a shoulder 20 spaced from the edge 18.

Within the recess 19 is arranged a suitable knock out member 21, which may be operated in any desired or suitable manner such as by means of a pin 22 connected therewith, and which pin is adapted to be engaged by any suitable moving portion of the press, as is well understood.

Arranged beneath the bolster plate 10 and supported thereby is a cylinder 23 of any desired size and configuration and disposed within the cylinder 23 and spaced from the wall thereof to form a fluid pressure space 24 is another cylinder 25, preferably provided with a partition 26 dividing the same into two chambers 27—28. Reciprocable in the cylinder 23 is a piston 29, having a portion 30 which is adapted to reciprocate within the space 24 between the cylinders. Fluid pressure is supplied to the cylinder 23 through a suitable opening 32 and from any suitable source through a supply pipe 33. Arranged within the supply pipe 33 is a pressure controlling and regulating valve 34, of any ordinary and well-known construction, by means of which the fluid pressure in the space 24 may be controlled at will.

The piston 29 is preferably provided with an aperture 35 therethrough so that the portion 36 of the cylinder 23 above the piston 29 will have communication with the atmosphere to maintain atmospheric pressure in the space 36.

Arranged within the chamber 27 is a piston 37 and a piston 38 is arranged with the chamber 28 of the inner cylinder. These pistons are connected by means of a suitable piston or connecting rod 39, which latter is adapted to reciprocate through a suitable opening in the partition 26 and suitable packing 40 is arranged to provide a fluid tight joint.

Passing through the piston rod 39 is a passage 41, which forms communication between the chambers 27—28 of the cylinder 25 on the pressure sides of the pistons 37—38. A second passage 42 also passes through the piston or connecting rod 39 and through the piston 38 so as to form communication between the cylinders 27—28 on the other or atmospheric side of the pistons.

The pistons 37—38 operate in unison and are adapted to be raised by means of fluid pressure, the fluid being supplied preferably to the chamber 27 through a suitable opening 43, and by means of a suitable pipe 44 receiving its supply from any suitable source. Arranged within the pipe line 44 is a pressure regulating and controlling valve 45 of any desired and well-known construction and by means of the use of which the pressure in the chambers 27—28 may be varied or controlled at will.

The top of the chamber 28 is preferably open and any suitable means may be provided for limiting the upward movement of the pistons 37—38, such for instance as stops 47.

Encompassing the forming block 13 is a blank holding ring 48 which is supported preferably by means of a suitable plate 49, and which plate rests upon the ends of suitable supporting pins 50, any number of which pins may be provided. These pins 50 pass loosely through the die shoe 12, bolster plate 10 and piston 29 and engage and rest upon the upper surface of the piston 38 in the chamber 28 and the plate.

Encompassing the blank holding ring 48 is a second blank holding ring 51, which latter is supported by means of suitable pins 52, any number of which pins may be provided. These pins 52 pass loosely through the die shoe 12 and bolster 10 and engage and rest upon the upper surface of the piston 29.

The draw or blank holding ring 51 is preferably provided with a circumferential shoulder 53 adapted to engage a shoulder 54 on the member 14 for limiting the upward movement of the ring 51. The outer ring 51 is adapted to be moved against the stress of the fluid pressure in the space 24 of the cylinder 23, by the engagement of the lower edge 18 of the die member 11, when the latter is depressed while the inner ring or member 48 is adapted to be moved against the stress of the fluid pressure in the chambers 27—28 by the engagement of the shoulder 20 of the die 11 against the work when the die 11 is depressed. It will be manifest that during the operation the end 18 of the die 11 will contact with a portion of the work to partially shape the article 55 by deflecting the periphery 56 of the article over the forming block 13 and the inner draw ring or member 48, as shown in Figure 2, and during this operation the member 48 will be held against movement with respect to the forming block 13, while the draw ring or member 51 is being lowered by the lower end 18 of the die 11 and against the stress of the fluid pressure in the space 24 of the cylinder 23. As the die 11 descends the shoulder 20 will contact with the work 55, which latter will be gripped between the shoulder 20 and the upper edge of the draw ring or member 48, and a further lowering of the die 11 will cause the member 48 to be depressed or moved against the stress of the fluid pressure in the cylinders 27—28 so that

the article will be formed in two clearly defined steps during one cycle of operation of the machine.

The space between the shoulder 20 and the upper edge of the draw ring or member 48 may be so proportioned as to produce the desired gripping effect upon the adjacent portions of the material of the article so as to permit the periphery 56 of the article to be shaped as shown in Figure 2, without danger of injuring the material.

Obviously the pressures in the space 24 and the cylinder 23 and in the chambers 27—28 may be varied and proportioned according to the requirements of the work being operated upon.

It is thought that the operation will be clearly understood from the foregoing but briefly stated it is as follows.

The normal or initial position of the parts is as shown in Figure 1, that is with the die 11 elevated and with the draw or blank holding rings 48—51 in a position that their upper faces will be flush with each other and flush with the top of the forming block 13, it being of course understood that the fluid in the cylinders which is operating against the respective pistons is of the desired or necessary relative pressures.

The material is then placed upon the forming block so as to extend across and rest upon the upper surfaces of the blank holding or gripping members 48—51.

The die 11 is then lowered and the first operation will be the shearing or cutting of the material to the proper shape by means of the cutting edges 15 and 16. As the die continues to descend the edge 18 will depress the portion 56 of the article and shape the same over the forming block 13 and holding ring ring 48. At the same time the ring 51 will be lowered to the position shown in Figure 2. As the ring 51 reaches the position shown in Figure 2, the shoulder 20 of the die co-operates with the upper surface of the ring or member 48 to grip the material therebetween and a further lowering of the die will depress the portion of the material in contact with the shoulders 20 so as to bend the article 55 over the forming block 13.

This will complete the formation of the article after which the die 11 recedes or is elevated and during this elevation the shaped article will be located in the recess 19 in the die and will ascend therewith. At the proper time the knock out member is operated to eject the completed article.

While the preferred form of the invention has been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of separate blank holding means for the material to be formed, and fluid pressure means operating upon the blank holding means, one of the said blank holding means being rendered inactive in advance of the other of the blank holding means.

2. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of separate blank holding means for the material to be formed operable independently of each other and against the same face of the material, and fluid pressure means operating upon the blank holding means, one of the said blank holding means being rendered inactive in advance of the other of the blank holding means.

3. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of separate blank holding means for the material to be formed, and fluid pressure means individual to the blank holding means operating upon the blank holding means, one of the said blank holding means being rendered inactive in advance of the other of the blank holding means.

4. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of separate blank holding means for the material to be formed, and fluid pressure means operating upon the blank holding means, one of the said blank holding means being rendered inactive in advance of the other of the blank holding means and during one cycle of operation of the press.

5. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, and fluid pressure blank holding means for the material to be formed, the said blank holding means co-operating with the said block and embodying mechanism operating to permit the blank to be shaped into a shell during a portion of one cycle of operation of the press, said blank holding means also embodying mechanism operating to permit the depth of the shell to be increased during another portion of the same cycle of operation of the press.

6. A draw press embodying a forming block, a recpirocable shaping member co-operating therewith, blank holding means for the material to be formed, the said blank holding means co-operating with the said block and embodying mechanism operating to permit the blank to be shaped into a shell

during a portion of one cycle of operation of the press, said blank holding means also embodying mechanism operating to permit the depth of the shell to be increased during another portion of the same cycle of operation of the press, and fluid pressure means operating upon the said mechanisms.

7. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, blank holding means for the material to be formed, the said blank holding means co-operating with the said block and embodying mechanism operating to permit the blank to be shaped into a shell during a portion of one cycle of operation of the press, said blank holding means also embodying mechanism operating to permit the depth of the shell to be increased during another portion of the same cycle of operation of the press, and fluid pressure means individual to and operating upon the said mechanisms.

8. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, and fluid pressure means operating upon the said blank holding means, the said blank holding means being operable against the stress of the fluid pressure means, one in advance of the other whereby the blank will be given its final shape by a plurality of clearly defined steps of operation during one cycle of operation of the press.

9. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, a fluid pressure means operating upon the said blank holding means, the said blank holding means being operable against the stress of the fluid pressure means, one in advance of the other whereby the blank will be given its final shape by a plurality of clearly defined steps of operation during one cycle of operation of the press, and means for controlling at will the stress of the said fluid pressure means upon the respective blank holding means.

10. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, and fluid pressure means individual to and operating upon the said blank holding means, the said blank holding means being operable against the stress of the respective fluid pressure means, one in advance of the other whereby the blank will be given its final shape by a plurality of clearly defined steps of operation during one cycle of operation of the press.

11. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, and fluid pressure means individual to and operating upon the said blank holding means, the said blank holding means being operable against the stress of the respective fluid pressure means, one in advance of the other whereby the blank will be given its final shape by a plurality of clearly defined steps of operation during one cycle of operation of the press, one of the said fluid pressure means encompassing the other and being out of direct communication with each other.

12. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, one of the said blank holding means encompassing the other, and fluid pressure means operating upon the said blank holding means, the said blank holding means being operable against the stress of the fluid pressure means, one in advance of the other whereby the blank will be shaped over the said block by a plurality of clearly defined steps of operation during one cycle of operation of the press.

13. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, one of the said blank holding means encompassing the other, fluid pressure means operating upon the said blank holding means, the said blank holding means being operable against the stress of the fluid pressure means, one in advance of the other whereby the blank will be shaped over the said block by a plurality of clearly defined steps of operation during one cycle of operation of the press, and means whereby a different stress of fluid pressure may be exerted upon each of the said blank holding means.

14. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, one of said blank holding means encompassing the other and both encompassing the said block, and fluid pressure means individual to and operating upon the said blank holding means, the said blank holding means being operable against the stress of the respective fluid pressure means one in advance of the other during one cycle of operation of the press.

15. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, one of said blank holding means encompassing the other and both encompassing the said block, fluid pressure means individual to and operating upon the said

blank holding means, the said blank holding means being operable against the stress of the respective fluid pressure means one in advance of the other during one cycle of operation of the press, and means for varying at will the stress of either of the said fluid pressure means.

16. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, and a plurality of fluid pressure means operating on the blank to be drawn, said fluid pressure means causing different pressures to be exerted upon the said blank during different stages in the operation of the press.

17. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of fluid pressure means operating on the blank to be drawn, said fluid pressure means causing different pressures to be exerted upon the said blank during different stages in the operation of the press, and means whereby the said pressures may be varied at will.

18. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, and fluid pressure means operating on the blank holding means, the said fluid pressure means causing different pressures to be exerted upon the said blank holding means during different stages in the operation of the press.

19. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, fluid pressure means operating on the blank holding means, the said fluid pressure means causing different pressures to be exerted upon the said blank holding means during different stages in the operation of the press, and means whereby the said pressures may be varied at will.

20. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, and a plurality of means operating upon the blank to hold the same, the said means causing different pressures to be exerted upon the said blank during different stages in the operation of the press.

21. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of means operating upon the blank to hold the same, the said means causing different pressures to be exerted upon the said blank during different stages in the operation of the press, and means whereby the said pressure may be varied at will.

22. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, and means operating upon the blank holding means with different pressures during different stages in the operation of the press.

23. A draw press embodying a forming block, a reciprocable shaping member co-operating therewith, a plurality of blank holding means for the material to be formed, means operating upon the blank holding means with different pressures during different stages in the operation of the press, and means whereby the said pressure may be varied at will.

In testimony whereof we have signed our names to this specification, on this 13th day of April, A. D. 1923.

OLOF G. NILSON.
RUDOLPH W. GLASNER.