R. W. GLASNER.

DIE CUSHION.

APPLICATION FILED MAY 28, 1920.

1,434,949. Patented Nov. 7, 1922.

3 SHEETS—SHEET 1.

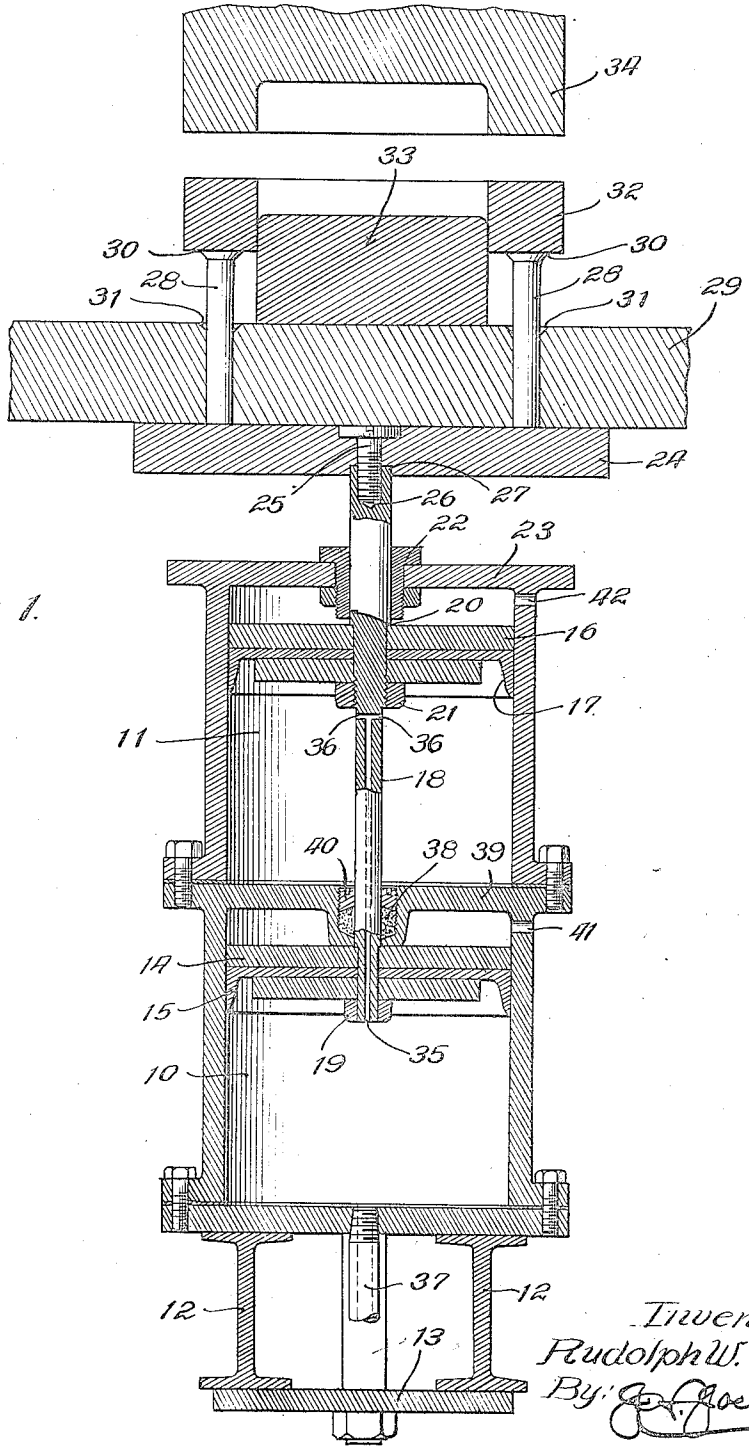


Fig. 1.

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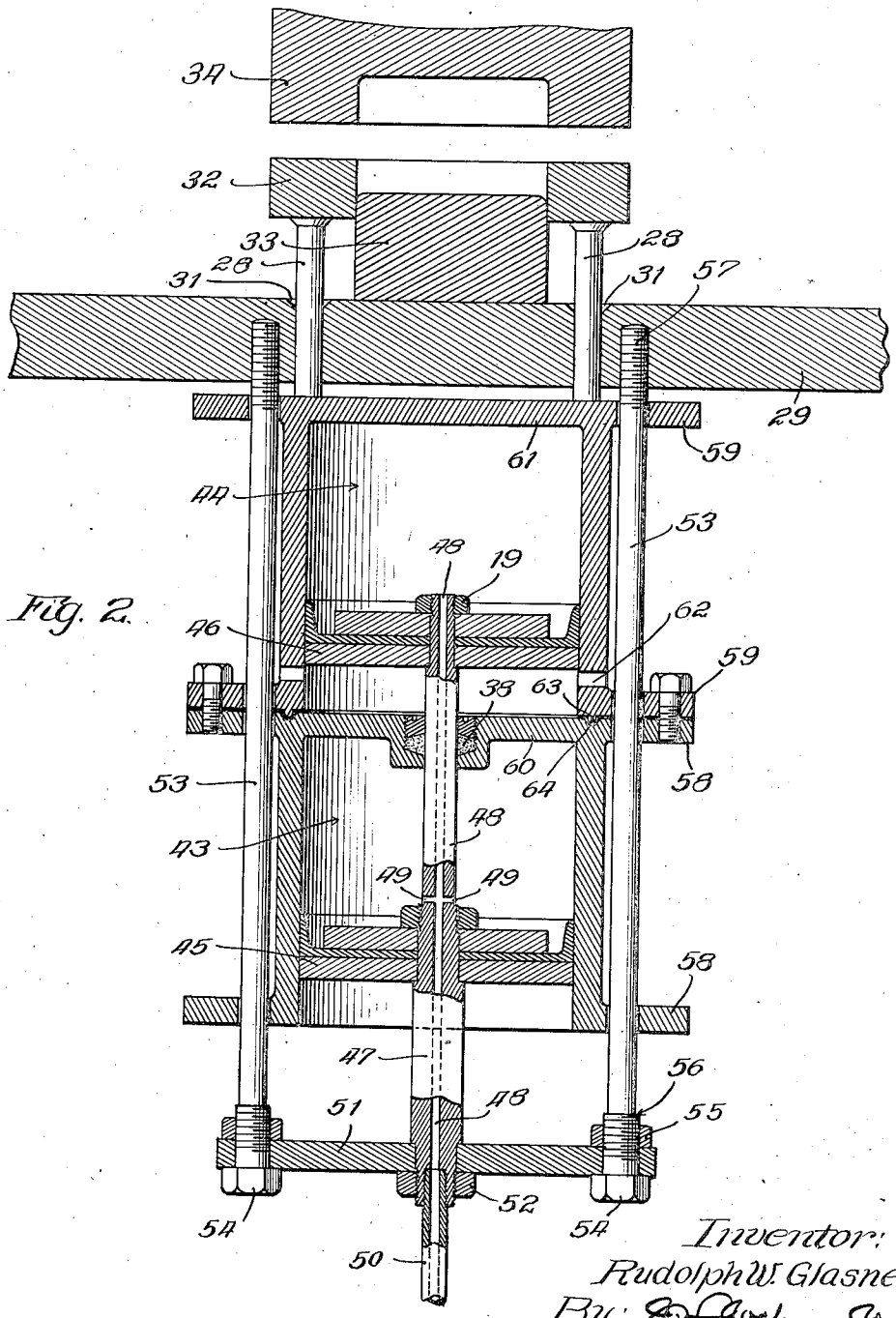


Fig. 2.

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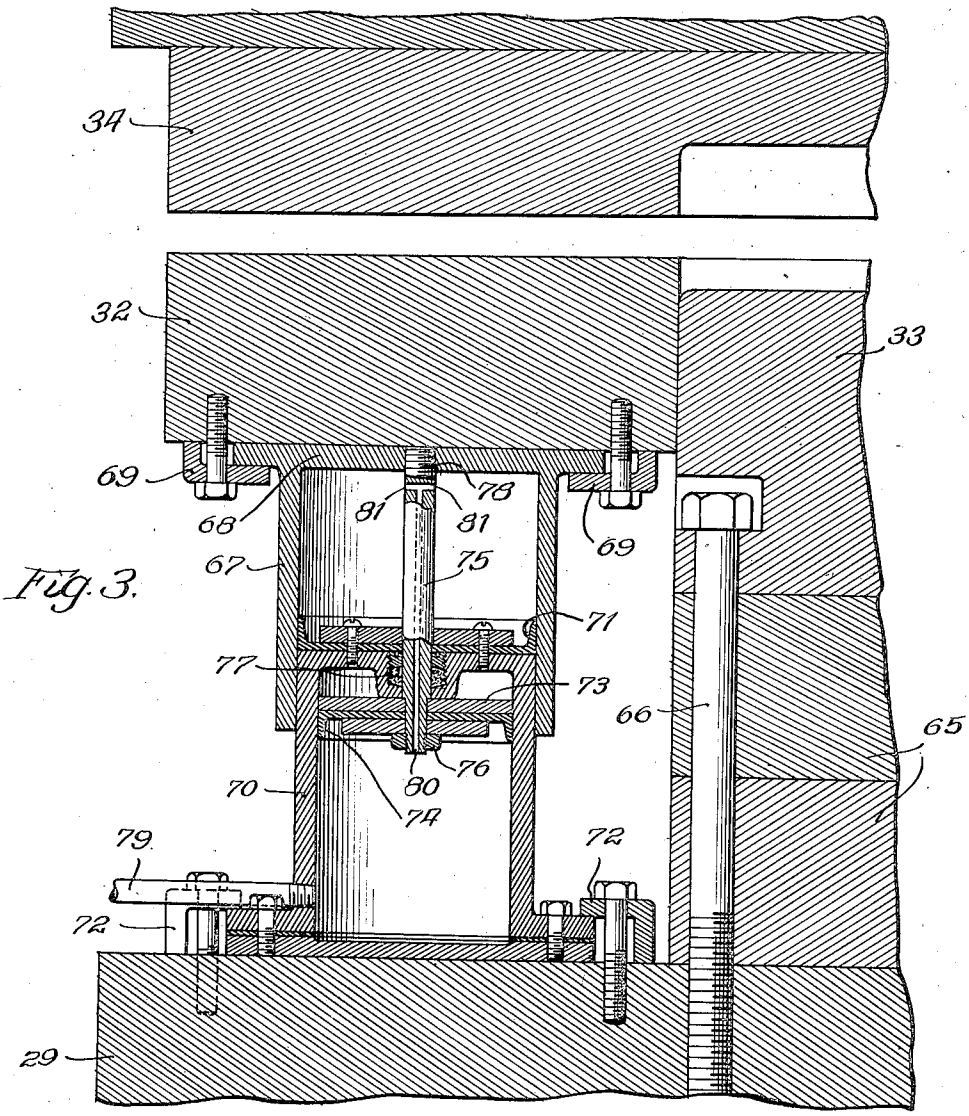


Fig. 3.

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Patented Nov. 7, 1922. 1,434,949

UNITED STATES PATENT OFFICE.

RUDOLPH W. GLASNER, OF CHICAGO, ILLINOIS.

DIE CUSHION.

Application filed May 28, 1920. Serial No. 384,861.

To all whom it may concern:

Be it known that I, RUDOLPH W. GLASNER, a citizen 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 Cushions, of which the following is a specification.

This invention relates to improvements in die cushions of the fluid pressure type embodying cylinder and piston elements, and which cushion is adapted to be readily installed or secured to a die press.

In the installation of die presses it is customary to provide under the press a space for the cushioning device that is to be employed with the press. These spaces are very limited and if a single cushion is employed, a very large press is necessary in order to permit a cushion of sufficient size to be employed so as to obtain the desired pressure on the draw rings, and this is not desirable for obvious reasons.

It is one of the objects of the present invention to overcome these difficulties and objections and to provide an improved cushion embodying any desired number of superposed cylinders for the purpose of increasing the piston displacement within a limited area, so as to adapt a small press for a greater range of work which ordinarily requires great pressure.

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 accompaying drawings illustrating this invention and in which

Figure 1 is a vertical sectional view of a die cushion of this character showing the same as applied to a draw press a portion of the draw press being illustrated in section.

Figure 2 is a view similar to Figure 1 of another form of the invention.

Figure 3 is a view similar to Figure 1 of still another form of the invention.

In the form of the invention as shown in Figure 1, the cushion embodies two superposed cylinders 10—11 secured together, the end of one cylinder forming the end of the other cylinder, each of the cylinders being out of communication with the atmosphere on the release side of the piston, or on that side of the piston from which the pressure is released. These cylinders are supported in position in any suitable manner such as by means of a support 12 secured to any fixed part of the machine by means of suitable suporting elements 13.

Movable in the cylinder 10 is a piston 14 provided with a flexible and preferably substantially cupped shaped packing 15, and a similar piston 16 having a similar packing 17 is movable in the cylinder 11.

These pistons 14 and 16 are connected together and held in a fixed relation with respect to each other by means of a piston rod 18 one end of which is secured in any suitable manner such as by means of a fastening nut 19 to the piston 14 and the piston rod passes through the other piston 16. The piston rod is secured to this piston 16 in any suitable manner such as by means of a shoulder 20 on the rod against which the piston 16 rests and a fastening nut or collar 21 is preferably threaded upon the piston rod 18 and co-operates with the shoulder 20 for securing the piston and piston rod together. The piston rod 18 passes through a suitable bushing or stuffing box 22 in the end 23 of the cylinder 11 and extends for any desired distance beyond the end of the cylinder and is secured in any suitable manner to a pin plate 24. The securing means preferably embodies a bolt 25 which passes through the opposite side of the pin plate 24 and is threaded as at 26 into the end of the piston rod 18, the end of the piston rod being recessed into the pin plate 24 as at 27.

The pin plate 24 operates upon the pins 28 which latter pass through a bolster plate 29 and rests upon the pin plate 24. In order to prevent the pins 28 from dropping out of position when the pin plate 24 is lowered to the extent of its lowering movement the pins 28 may be provided with heads 30 adapted to enter recesses 31 in the bolster plate.

Supported by the pins 30 is a draw ring or gripping element 32 which is of an annular construction so as to permit a forming block or die 33 to be positioned upon the bolster plate 29 within the draw ring 32 and so as to permit the draw ring to operate adjacent the periphery of the forming block 33.

A die member 34 co-operates with the forming block 33 and the draw ring 32. The draw ring 32 co-operates with the die 34 to

grip and hold the material while the material is being formed over the block 33 in the same manner as is well-known in devices of this character.

The piston rod 18 is provided with a passageway 35 opening through the lower end thereof and this passage extends for any suitable distance into the piston and is provided with radial or laterally disposed discharge outlets 36 which are so positioned that the outlets 36 will always remain open and in such a position with respect to the movement of the piston 16 and the end of the cylinder 11 that fluid which is delivered into the cylinder 10 below the piston 14, after having filled the cylinder 10 will flow through the passage 35 and be discharged through the outlets 36 into the cylinder 11, the fluid being supplied through any suitable supply pipe 37, which latter may be connected with the supply or equalizing tank (not shown).

A stuffing box 38 may be provided in the end 39 of the cylinder 10 and through which stuffing box the piston 18 passes, an adjusting nut 40 may be provided for compressing the packing in the stuffing box.

In order that the movement of the pistons will not be retarded there may be provided in the cylinder 10 between the head 39 and the piston 14 a vent opening 41 and a similar vent opening 42 may be provided in the cylinder 11 between the head 23 and the piston 16.

With this improved construction it will be manifest that the fluid being supplied into the lower cylinder 10 through the supply pipe 37 will fill the end of the cylinder and will then pass through the passage 35 into the cylinder 11 to operate upon the piston 16 and this will raise the draw ring 32 with respect to the forming block 33 as will be manifest. When the die 34 descends the material will be gripped between the die 34 and the gripping ring 32 and a continued movement of the die 34 in the same direction will force the gripping ring 32 downwardly to allow the material to be shaped over the block 33. This downward movement of the draw ring 32 will through the medium of the pins 28 force the pin plate 24 downwardly and with it the pistons 16 and 14 causing any fluid which may be held in the cylinder 11 to flow through the opening 36 into the passage 35 in the piston rod to be discharged into the cylinder 10. At the same time any fluid in the cylinder 10 will be forced through the pipe 37 back to the equalizing tank.

In the form of the invention shown in Figure 2 the superposed cylinders 43—44 are movable while the pistons 45—46 remain stationary and to that end the pistons 45—46 are connected with the piston rod 47 having a passage 48 opening through one end thereof and a passage 49 opening through the sides of the piston rod, the fluid being supplied through a supply pipe 50. The piston rod 47 is held stationary in any suitable manner preferably by being connected with a support 51 by means of a suitable fastening collar 52 and which support 51 is anchored to any fixed part of the machine here shown as the bolster plate 29, although it is of course to be understood that this fixed portion of the machine may be any part of the machine other than the bolster plate. This is accomplished by means of the tie rods or anchoring bolts 53 having heads 54 at one end, the rod passes through the support 51 so that the head 54 will rest against one face thereof and the fastening collar 55 is mounted upon the threads 56 of the bolts or rods 53 and clamp the support 51 between the head 54 and collar 55. The further end of these rods or bolts are anchored as at 57 by means of a threaded engagement with the bolster plate 29.

The cylinders 43—44 are respectively provided with flanges 58—59 having openings therethrough and through which the bolts or rods 53 pass so that the cylinders will have a free vertical movement upon the rods or bolts 53. In this form of the invention the lower end of the cylinder 43 is preferably left open and as the fluid flows through the pipe 50 and passage 48 it will be discharged through the outlets 49 into the cylinder 43 between the piston 45 and the head 60 thereof. At the same time fluid will flow through the open end of the passage 48 to be discharged into the cylinder 44 between the piston 46 and the head 61 thereof. By reason of the provision of the open end of the cylinder 43 no vent opening is necessary but the cylinder 44 is provided with a vent opening 62 between the piston 46 and the end 60 of the cylinder 43 and which end 60 forms a closure for the open end of the cylinder 44.

It will therefore be seen that in this form of the invention the pistons remain stationary while the cylinders reciprocate with respect thereto and the pin plate may be dispensed with as the end 61 of the cylinder 44 serves as the pin plate for supporting and operating the pins 28.

Obviously the cylinders 43—44 may be connected in any suitable manner and may, if desired, be provided with tongue and groove connections 63—64.

In the form of the invention shown in Figure 3 the cushion is of a construction and size as to permit it to be arranged between the bolster plate 29 and the draw ring 32, the forming block 33 being preferably supported by means of the usual shims 65 and is fastened by means of suitable bolts 66.

In this form of the invention there is provided a cylinder 67 having an open end its

closed end 68 being secured to the draw ring 32 in any suitable manner such as by means of fastening clips 69. The lower cylinder 70 is closed at both ends, one end thereof telescoping into the cylinder 67 and operating as a piston within the cylinder 67 and to which end of the cylinder is secured a cup shaped element 71 held in position in any suitable manner. The cylinder 70 rests upon the bolster plate 29 and is secured thereto in any suitable manner such as by means of fastening clips 72 similar to the clips 69. Within the cylinder 70 is a piston 73 preferably provided with a cup shaped washer or element 74. A piston rod 75 is secured by one end as at 76 to the piston 73. This piston rod 75 passes through a suitable stuffing box 77 in the end of the cylinder 70 and extends through the cylinder 67 and is anchored as at 78 to the end 68 of the cylinder 67.

With this construction it will be manifest that the cylinder 67, the piston rod 75 and the piston 73 are fixed with respect to each other, the cylinders 70 and 67 being movable relatively one with relation to the other. The fluid is supplied into the cylinder 70 by means of a supply pipe 79 which is connected with the supply or equalizing tank or from any suitable source and discharges the fluid between the piston 73 and the lower end of the cylinder. When the cylinder is filled the fluid will flow through a passage 80 opening through the end of the piston rod 75 and will be discharged into the cylinder 67 through the openings 81 when the cylinders and pistons are moving with respect to each other in one direction. When however the cylinders and pistons are moving in opposite directions with respect to each other the fluid will be forced out of the cylinder 67 through the openings 81, passage 80 into the cylinder 70 and from there the fluid will be forced through the outlet pipe 79.

Obviously with this form of the invention any suitable number of these cushions may be employed and arranged in any suitable position between the bolster plate and the draw ring 32.

With this improved construction any suitable number of cylinders may be alined and superposed one upon the other to meet the existing conditions and inasmuch as the cylinders are superposed the cushion may be arranged within the limited space provided under the press for that purpose. Furthermore by superposing the cylinders and pistons any number of elements may be employed that are necessary and for the purpose of increasing the piston displacement within a limited area. This arrangement is advantageous inasmuch as it permits a small press to be adapted for a greater range of work which ordinarily requires great pressure.

It is not always possible to arrange beneath the press or in the limited space provided for the cushion, a cushion of a sufficient size to produce the piston displacement necessary, but with the provision of any number of cylinders superposed as in the present invention, these results may be obtained.

At the same time the present invention is adapted to be freely attached and detached and can be readily applied to any form of machine now on the market.

While the preferred forms of the invention have 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. In combination, a draw press embody- a forming block, blank holding means for the material to be formed, a fluid pressure cushion acting on the said blank holding means, said cushion embodying a plurality of superposed cylinders out of communication with the atmosphere on the release side of the piston, piston elements individual to the cylinders, said pistons and cylinders being movable relatively one with respect to the other, and means connecting one of the cushion elements with the said blank holding means, another of the cushion elements being connected with a fixed support.

2. In combination, a draw press embodying a forming block, blank holding means for the material to be formed, a fluid pressure cushion acting on the said blank holding means, said cushion embodying a plurality of superposed cylinders, piston elements individual to the cylinders, said pistons and cylinders being movable relatively one with respect to the other, means connecting one of the cushion elements with the said blank holding means, another of the cushion elements being connected with a fixed support whereby the cushion pressure obtained is substantially proportionate to the number of cylinders and a fluid equalizing inlet and outlet having communication with the interior of the cushion.

3. In combination, a draw press embodying a forming block, blank holding means for the material to be formed, a fluid pressure cushion acting on the said blank holding means, said cushion embodying a plurality of superposed cylinders out of communication with the atmosphere on the release side of the piston, piston elements individual to the cylinders, said pistons and cylinders being movable relatively one with respect to the other, means connecting one of the cushion elements with the said blank holding means, another of the cushion elements be-

ing connected with a fixed support, and a fluid equalizing inlet and outlet, having communication with one of the cylinders, there being communicating passage ways between the cylinders.

4. In combination, a draw press embodying a forming block, blank holding means for the material to be formed, a fluid pressure cushion acting upon the said blank holding means, said cushion embodying a plurality of superposed cylinders, piston elements individual to the cylinders, said pistons and cylinders being movable relatively one with relation to the other, means connecting one of the elements of the cushion with the said blank holding means, another of the cushion elements being connected with a fixed support, one of said cylinders having a fluid equalizing inlet and outlet, and means whereby the fluid may be successively supplied to and removed from the cylinders.

5. In combination, a draw press embodying a forming block, blank holding means for the material to be formed, a freely attachable and detachable fluid pressure cushion acting upon the said blank holding means, said cushion embodying a plurality of superposed cylinders, piston elements individual to the cylinders, said pistons and cylinders being movable relatively one with relation to the other, means connecting one of the elements of the cushion with the said blank holding means, another of the cushion elements being connected with a fixed support, one of said cylinders having a fluid equalizing inlet and outlet, and means whereby the fluid may be successively supplied to and removed from the cylinders.

6. In combination, a draw press embodying a forming block, blank holding means for the material to be formed, a freely attachable and detachable self-contained fluid pressure cushion for maintaining a substantially unvarying pressure upon the said blank holding means, said cushion embodying a plurality of alined and superposed cylinders, piston elements individual to the cylinders, said pistons and cylinders being relatively movable one with relation to the other, and means connecting one of the cushion elements with the said blank holding means, another of the cushion elements being connected with a fixed support.

7. In combination, a draw press embodying a forming block, blank holding means for the material to be formed, a freely attachable and detachable self-contained fluid pressure cushion for maintaining a substantially unvarying pressure upon the said blank holding means, said cushion embodying a plurality of alined and superposed cylinders, piston elements individual to the cylinders, said piston and cylinders being relatively movable one with relation to the other, means connecting one of the cushion elements with the said blank holding means, another of the cushion elements being connected with a fixed support, and means whereby the fluid will be successively delivered to and from the cylinders.

8. In combination, a draw press embodying a forming block, blank holding means for the material to be formed, a freely attachable and detachable self-contained fluid pressure cushion for maintaining a substantially unvarying pressure upon the said blank holding means, said cushion embodying a plurality of alined and superposed cylinders, piston elements individual to the cylinders, said piston and cylinders being relatively movable one with relation to the other, means connecting one of the cushion elements with the said blank holding means, another of the cushion elements being connected with a fixed support, and a piston rod connected with the piston in one of the cylinders, said piston rod extending through the other cylinder.

In testimony whereof I have signed my name to this specification, on this 13th day of May, A. D. 1920.

RUDOLPH W. GLASNER.