

Dec. 6, 1949

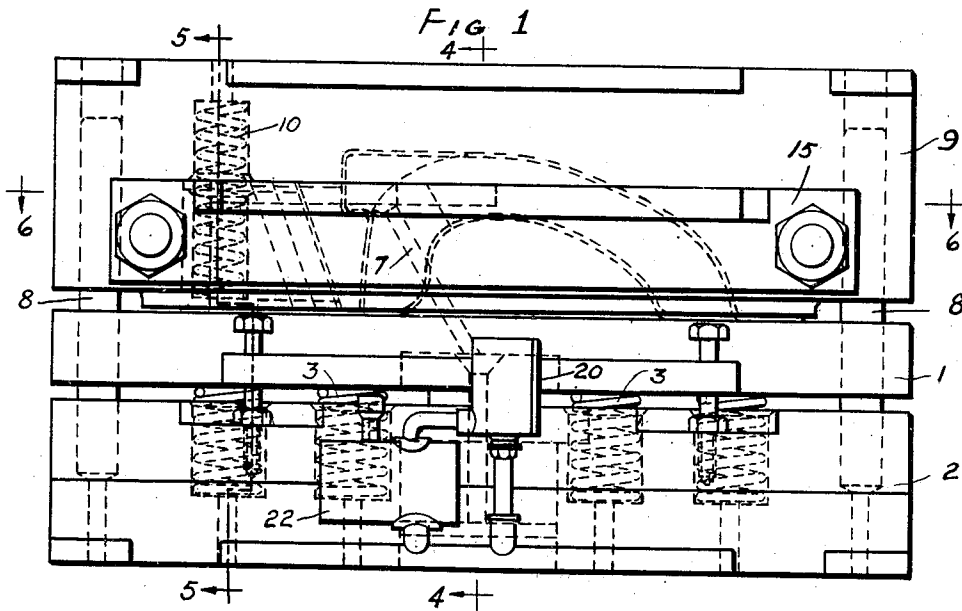
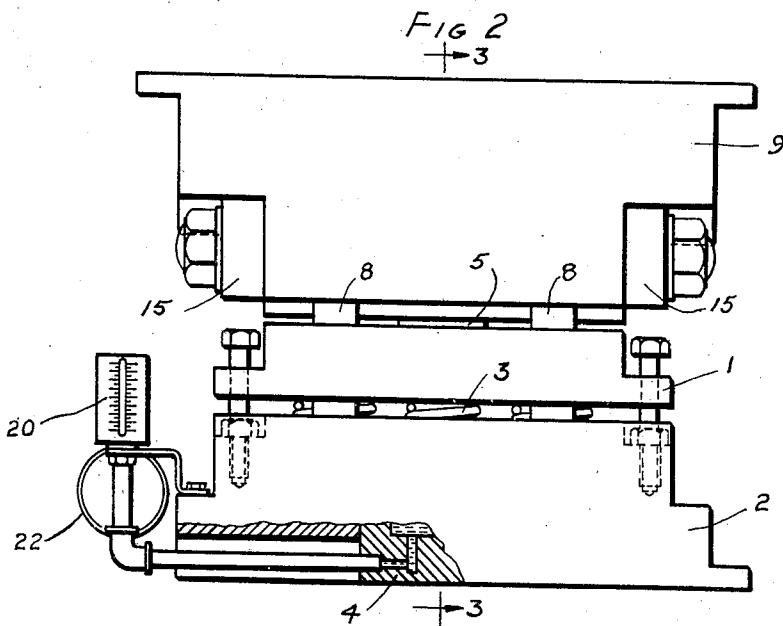
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2,490,695

HYDRAULIC DIE

Filed Sept. 11, 1946

4 Sheets-Sheet 1



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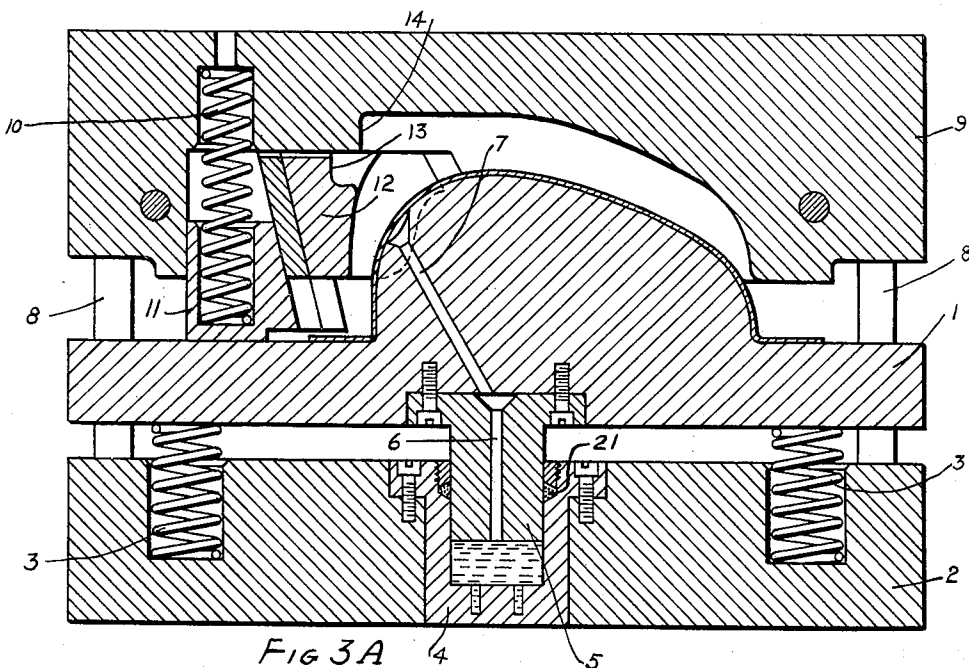
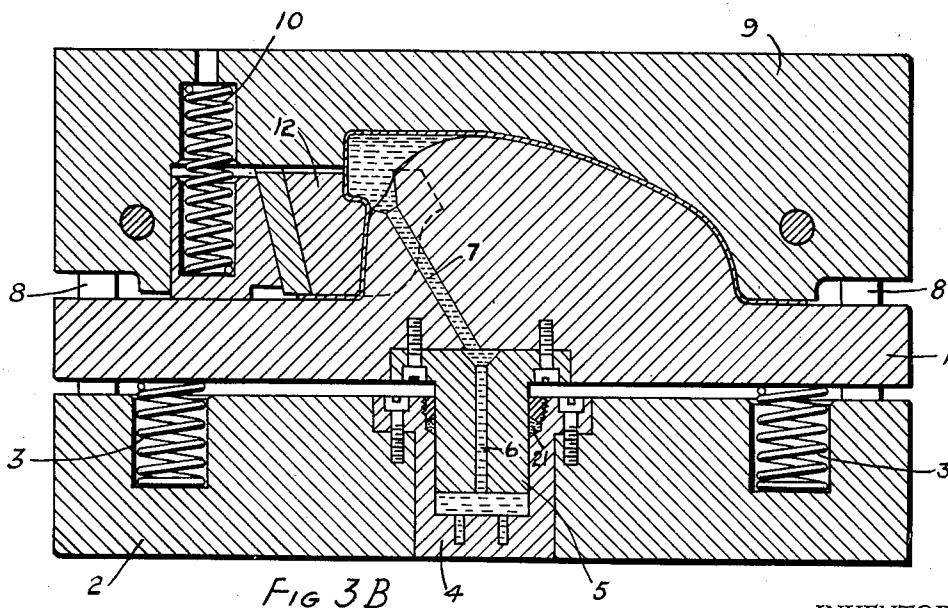
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FIG 4

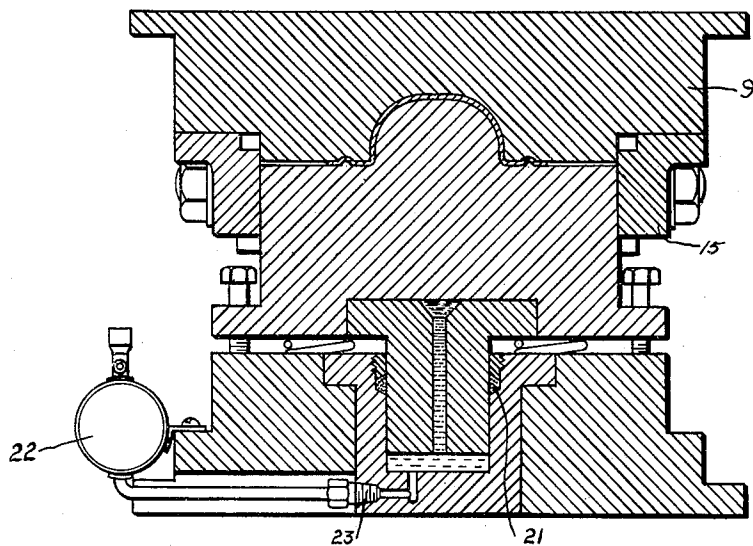
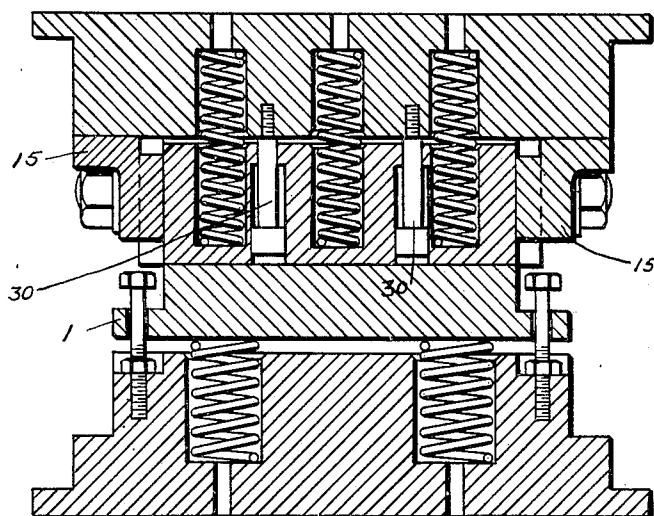


FIG 5



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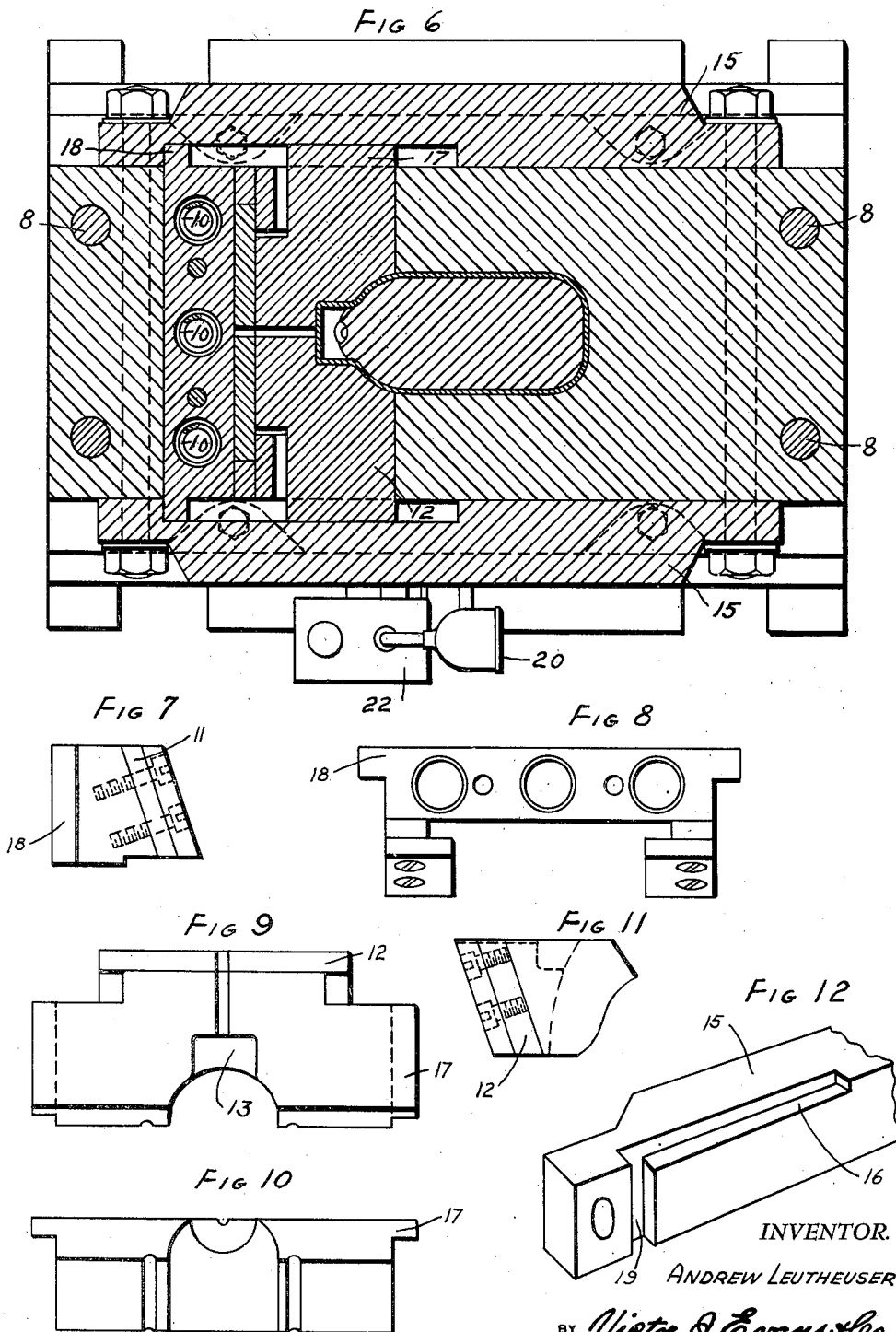
A. LEUTHEUSER

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UNITED STATES PATENT OFFICE

2,490,695

HYDRAULIC DIE

Andrew Leutheuser, Somerset, Mich.

Application September 11, 1946, Serial No. 696,138

2 Claims. (Cl. 113-44)

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This invention relates to dies, and more particularly to improvements in hydraulic dies.

In the manufacture of fenders, doors, door pillars, roofs, airplane parts, etc. it is many times very difficult or impossible to make such parts with ordinary dies. It is, therefore, an object of this invention to provide a hydraulic die for forming parts which cannot be made by ordinary dies.

A further object is the provision in a die means for returning wedging parts to their initial positions for formation of parts, without jamming of the wedging parts.

A further object is to provide in a hydraulic die means for regulating the hydraulic pressure so that the die can be used in forming metals of different thicknesses.

A further object is to provide a hydraulic die of simple structure, relatively inexpensive to manufacture, and with few parts.

These and other objects are attained by the novel construction and arrangement of parts hereinafter described and illustrated by the accompanying drawings, forming a part hereof, and in which:

Fig. 1 is an elevational view of a die embodying the invention.

Fig. 2 is an end view of the hydraulic die.

Fig. 3a is a sectional elevational view showing one step in the operation of the die.

Fig. 3b is a sectional view showing another step in the operation of the die.

Fig. 4 is a sectional view taken on line 4-4 of Fig. 1.

Fig. 5 is a sectional view taken on line 5-5 of Fig. 1.

Fig. 6 is a sectional view taken on the line 6-6 of Fig. 1.

Fig. 7 is an end view of a vertically movable wedge used in the die.

Fig. 8 is a plan view of the wedge shown in Fig. 7.

Fig. 9 is a plan view of a horizontally movable wedge used in the die.

Fig. 10 is a front elevational view of the wedge shown in Fig. 9.

Fig. 11 is an end view of the wedge shown in Fig. 9.

Fig. 12 is a perspective view of a portion of a guide for the wedges.

Referring to the drawings, the die is shown to comprise a lower die 1, which rests on springs 3 positioned in recesses in a post or support 2. Mounted in the post or support 2 is a steel cyl-

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inder 4 in which moves a piston attached to the lower die 1, the piston 5 having a passage 6 communicating with the cylinder 4, which contains a liquid such as oil. The passage 6 has an extension 7 which leads to the upper surface of the lower die 1. Guide posts 8 supported by the post or support 2, serve to guide the lower die 1 and the upper die 9, which has a plurality of recesses in which are positioned springs 10, the latter being also positioned in recesses in a vertically movable wedge member 11.

Engaging the wedge member 11 is a horizontally movable wedge member 12, which has a recess 13 cooperating with a corresponding recess 14 in the upper die 9, the member 12 also having a surface arranged to tightly fit the lower die 1 (see Fig. 3a). Mounted on the sides of upper die 9 are guides 15 having horizontal surfaces 16 to guide the flange 17 on wedge 12 horizontally, and a slot 19 to guide the flange 18 on wedge 11 vertically. Further guide means for the vertical wedge 11 are provided by rods 30 attached to the upper die 9 and passing through apertures in the wedge 11 (see Fig. 5).

In operation, the part to be formed which has already been passed through the first draw, is placed on the lower die 1, which is held aloft by springs 3. The dies are moved towards each other, and when wedge 11 strikes the flat upper surface of the lower die 1, the wedge 12 is forced horizontally by wedge 11 towards the part being formed, and the upper die 9, which is part of the form as shown by recesses 13 and 14, is made airtight through pressing wedge 12 against the lower die 1, except for an air vent which allows the air to escape from the form, enabling the forming of the part.

The pressure of the press overcomes springs 3 and forces piston 5, which is attached to the lower die 1, into the cylinder 4, and forces the liquid upward through the passages 6 and 7 and completely finishes the part being formed. The pressure can be regulated by the stroke between die 1 and post 2, and also by the relief valve 20, leakage about the piston being minimized by suitable packing 21.

The pressure relief valve allows the surplus fluid to drain into the tank 22.

When upward movement of the press begins, die members 9 and 1, and the piston 5 rise, and through the suction produced in cylinder 4, liquid will be taken in through check valve 23 from tank 22, thus preventing the produced part from being deformed by suction. The liquid also returns

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through valve 23 to tank 22, keeping the liquid oil level so that the hydraulic cylinder is submerged to a certain level. The check valve 23 may be of the spring-opened pressure closed type such as is shown in Patents 1,381,049 or 2,136,163 respectively.

By raising die members 9 and 1, the spring pressure drives wedge 11 out, and through positive return pulls the wedge 12 back and relieves the pressure on the part formed so that it can be removed from the lower die 1.

It will be seen that the hydraulic die is simple in structure with few parts, and positive in action, with no parts to jam and cause difficulty in removing formed parts.

The above description is to be considered as illustrative and not limitative of the invention of which modifications can be made without departing from the spirit and scope of the appended claims.

The invention having been described, what is claimed is:

1. In a hydraulic die, a support having a cylinder therein, vertically disposed guide posts carried by the support, a lower die guided by the posts and having a piston attached to and movable in the cylinder, spring means on the support normally urging the lower die upward, an upper die having recesses therein, springs positioned in the recesses, a vertically movable wedge having recesses receiving the last mentioned springs, a horizontally movable wedge adapted to be moved by the vertically movable wedge, said wedges being carried by said upper die said piston and

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lower die having passages therethrough, and liquid in the cylinder.

2. In a hydraulic die, a support having a cylinder containing a liquid, a lower die having a piston movable in the cylinder, an upper die, means on the support to guide the lower die and the upper die, springs normally urging the lower die upward, a vertically movable wedge, springs engaging said wedge and the upper die to normally move the wedge downward, a horizontally movable wedge adapted to be moved when the vertical wedge is moved vertically with respect to the upper die, said wedges being carried by said upper die means to guide said wedges, said piston and lower die having passages for the flow of liquid from the cylinder to the upper surface of the lower die, and means to regulate the pressure of the liquid.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,207,326	Rehbein	Dec. 5, 1916
1,753,680	Batie	Apr. 8, 1930
1,839,501	Rollason	Jan. 5, 1932
1,878,520	Huges	Sept. 20, 1932
2,101,888	Ambrosius	Dec. 14, 1937
2,158,312	Terrell	May 16, 1939
2,341,002	Volrath	Feb. 8, 1944