

No. 756,595.

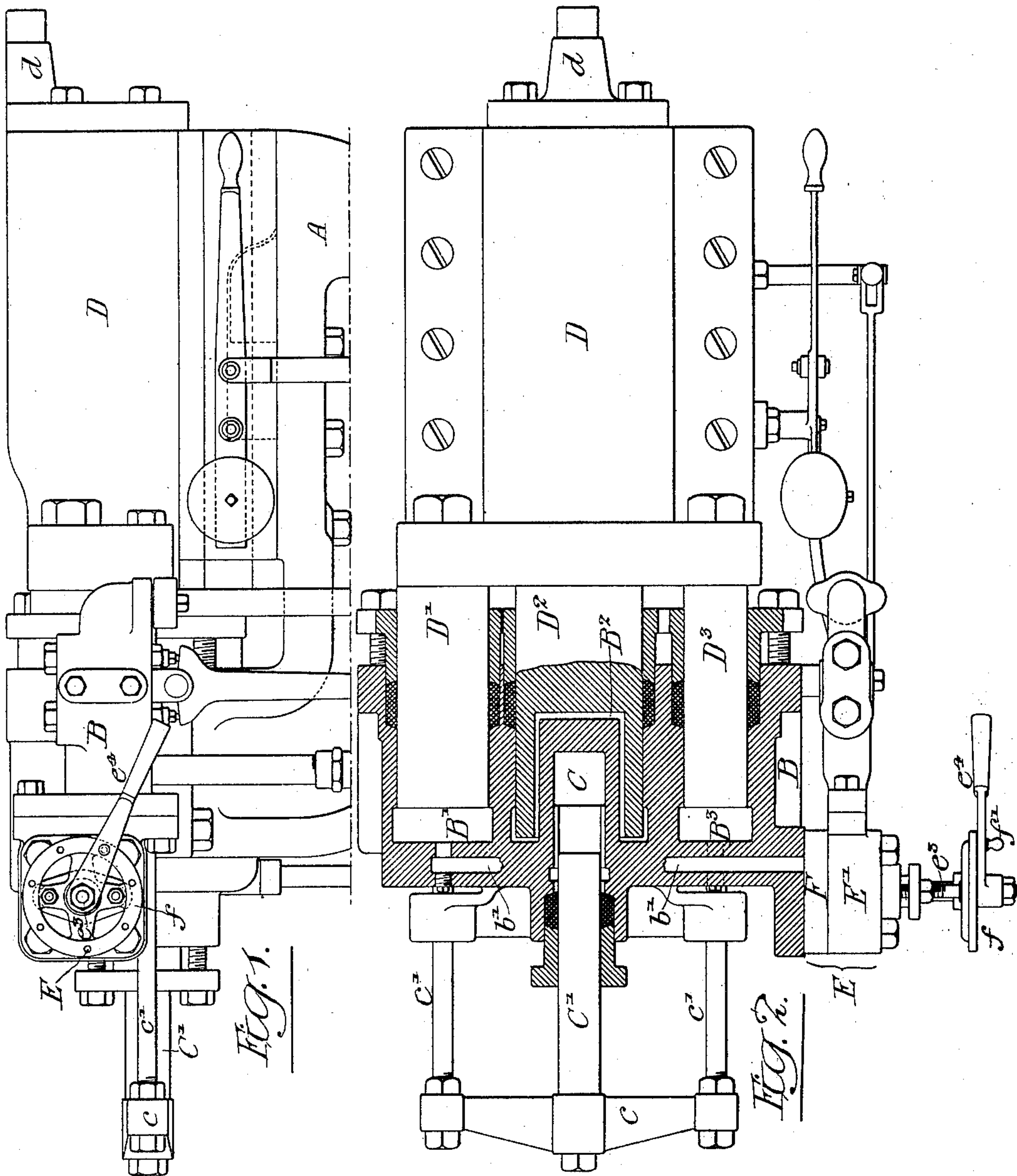
PATENTED APR. 5, 1904.

W. H. DERBYSHIRE.
HYDRAULIC MACHINE AND VALVE THEREFOR.

APPLICATION FILED NOV. 23, 1901.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses:-

Hamilton D. Turner
Wm. A. Rann.

Inventor:-

William H. Derbyshire,

by his Attorneys:

Shuman & Shuman

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4 SHEETS—SHEET 2.

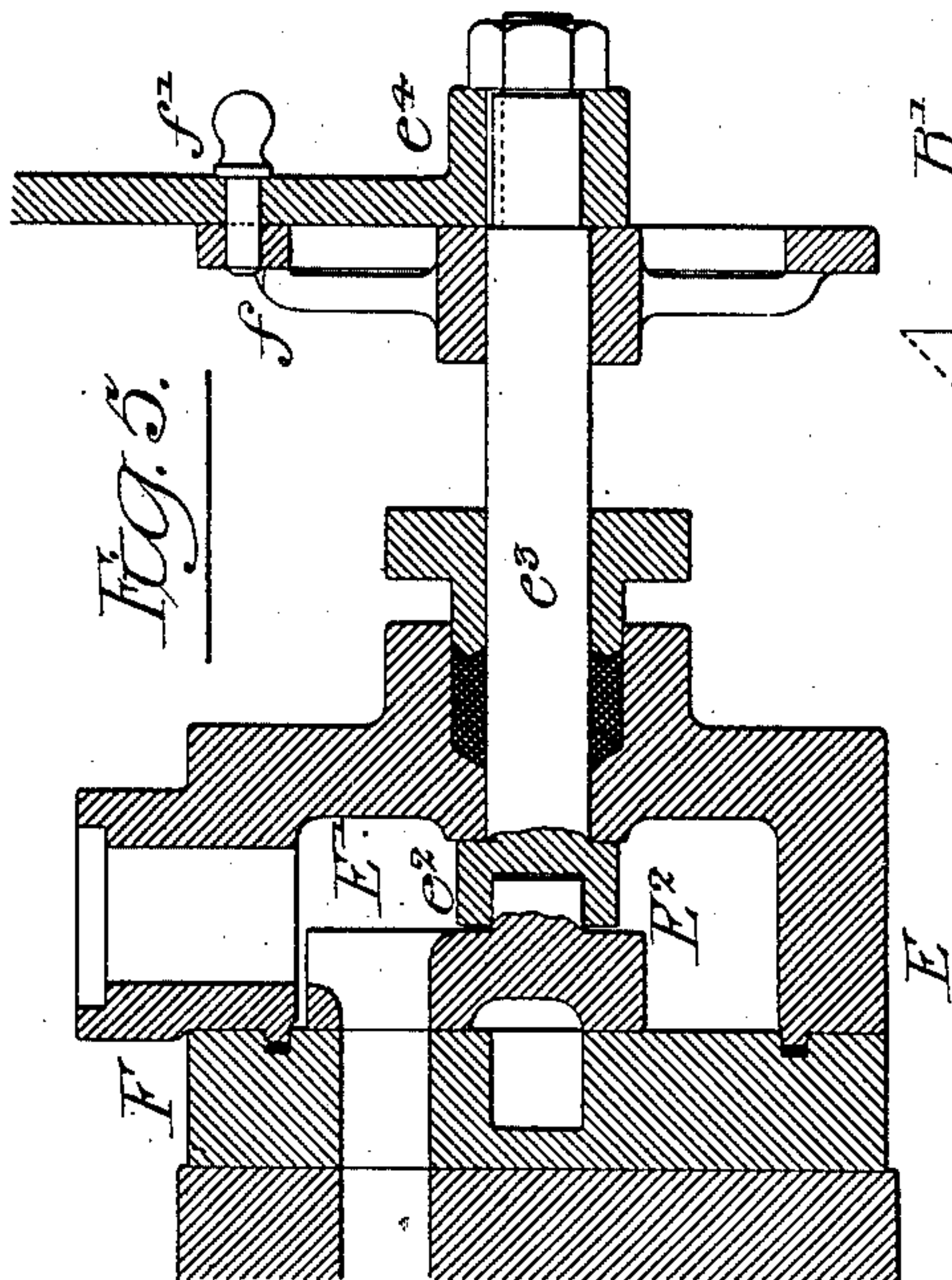


Fig. 5.

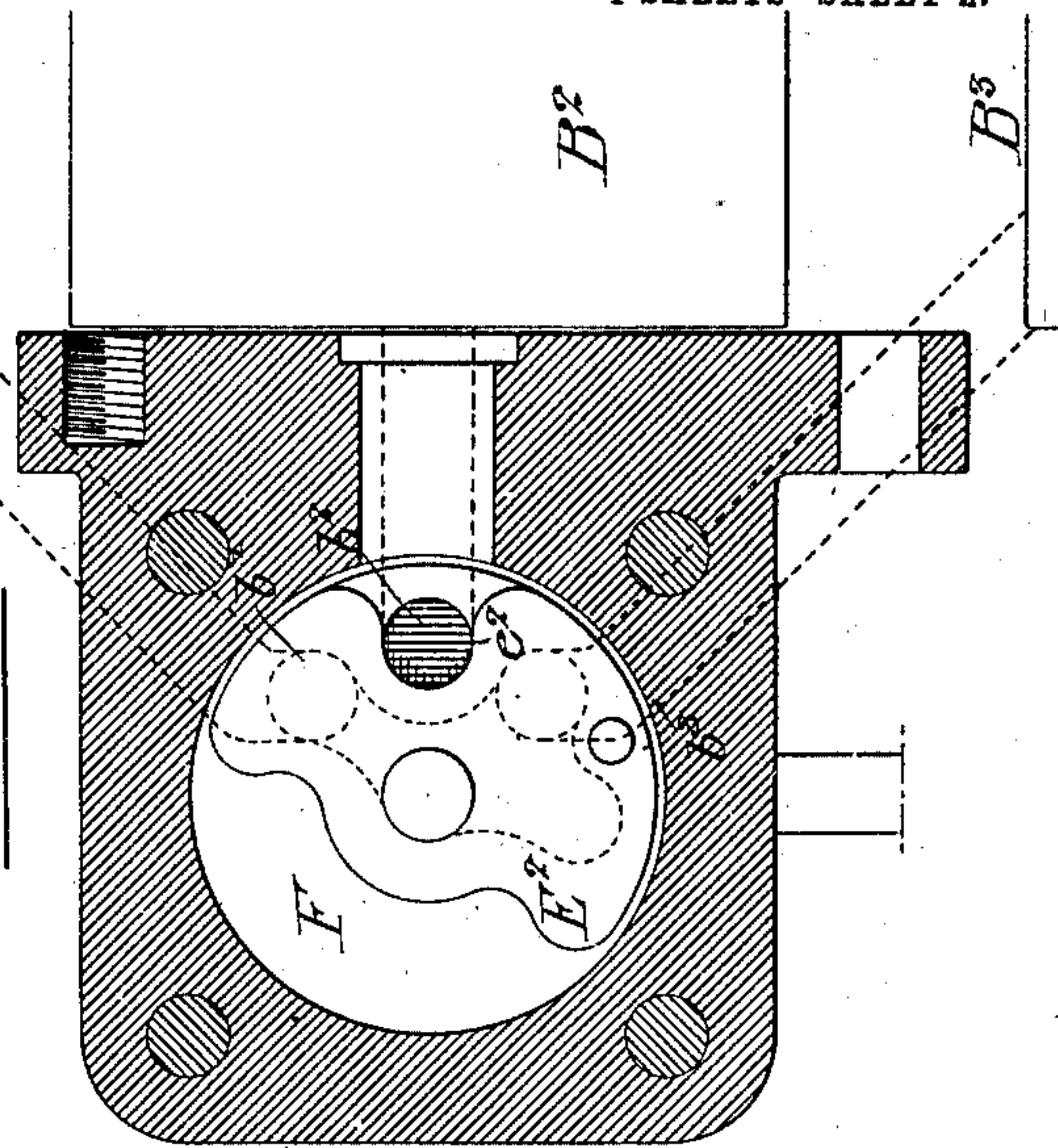


Fig. 6.

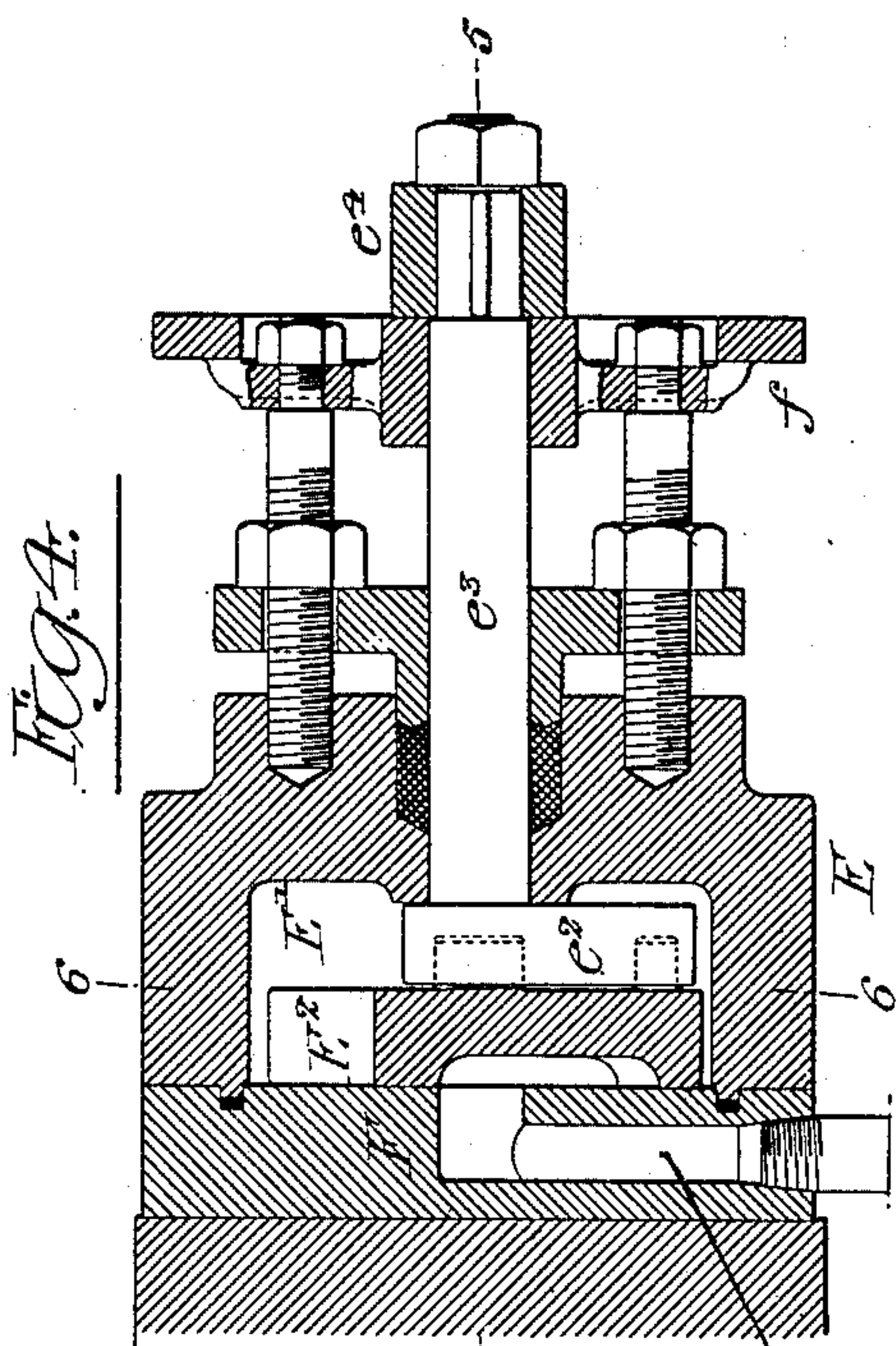


Fig. 7.

Fig. 8.

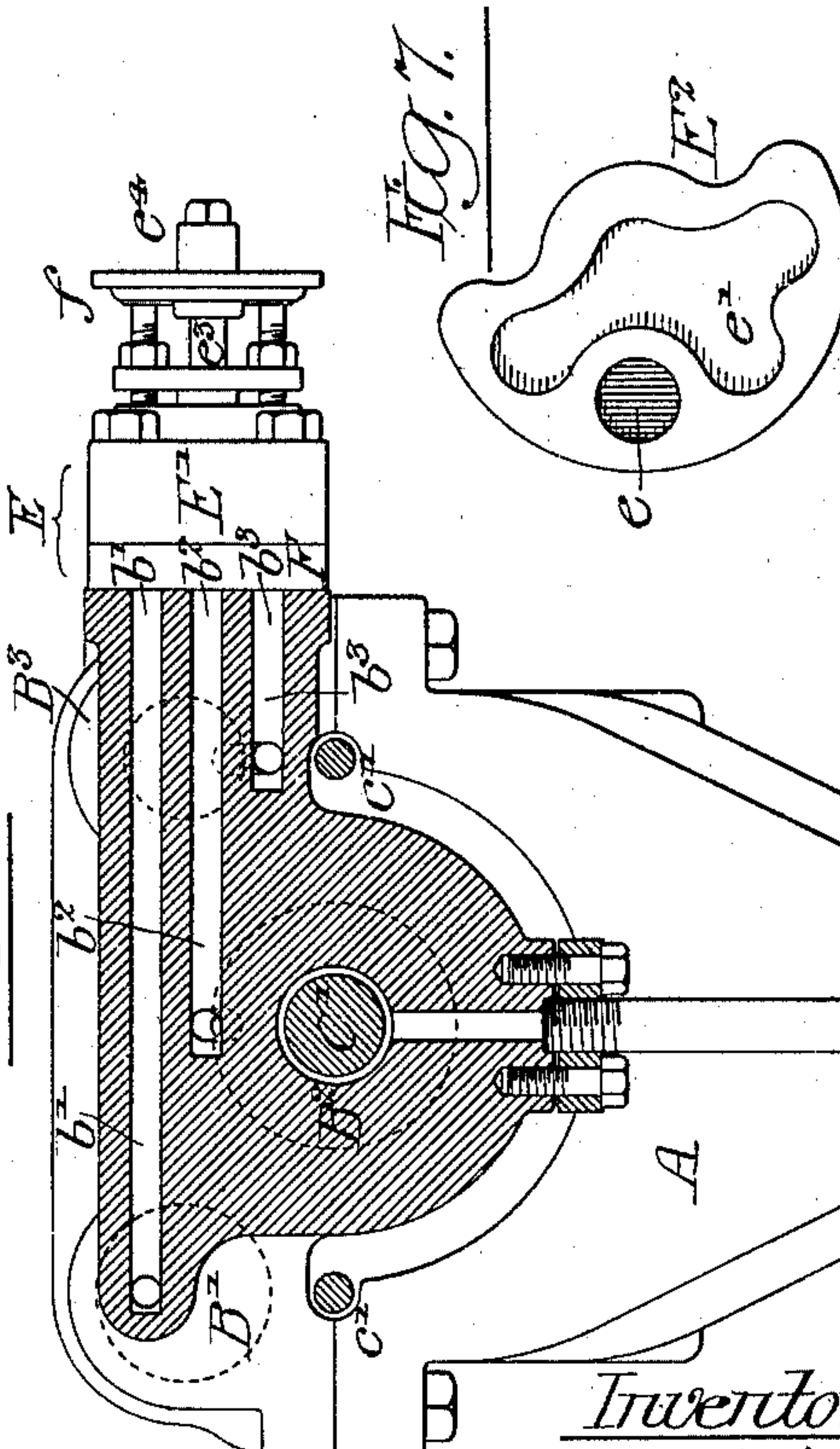


Fig. 9.

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4 SHEETS—SHEET 3.

Fig. 9.

E

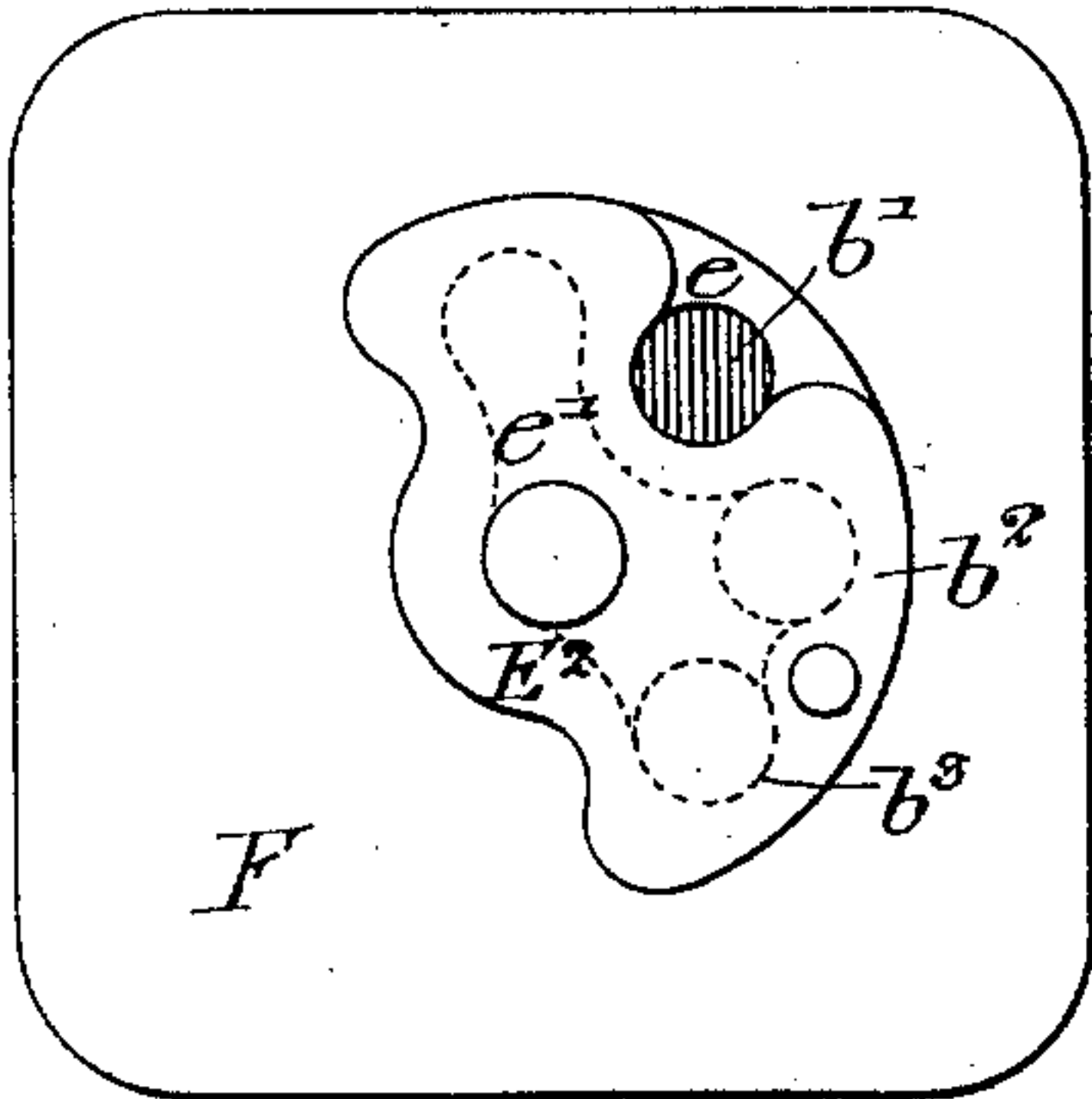


Fig. 8.

E

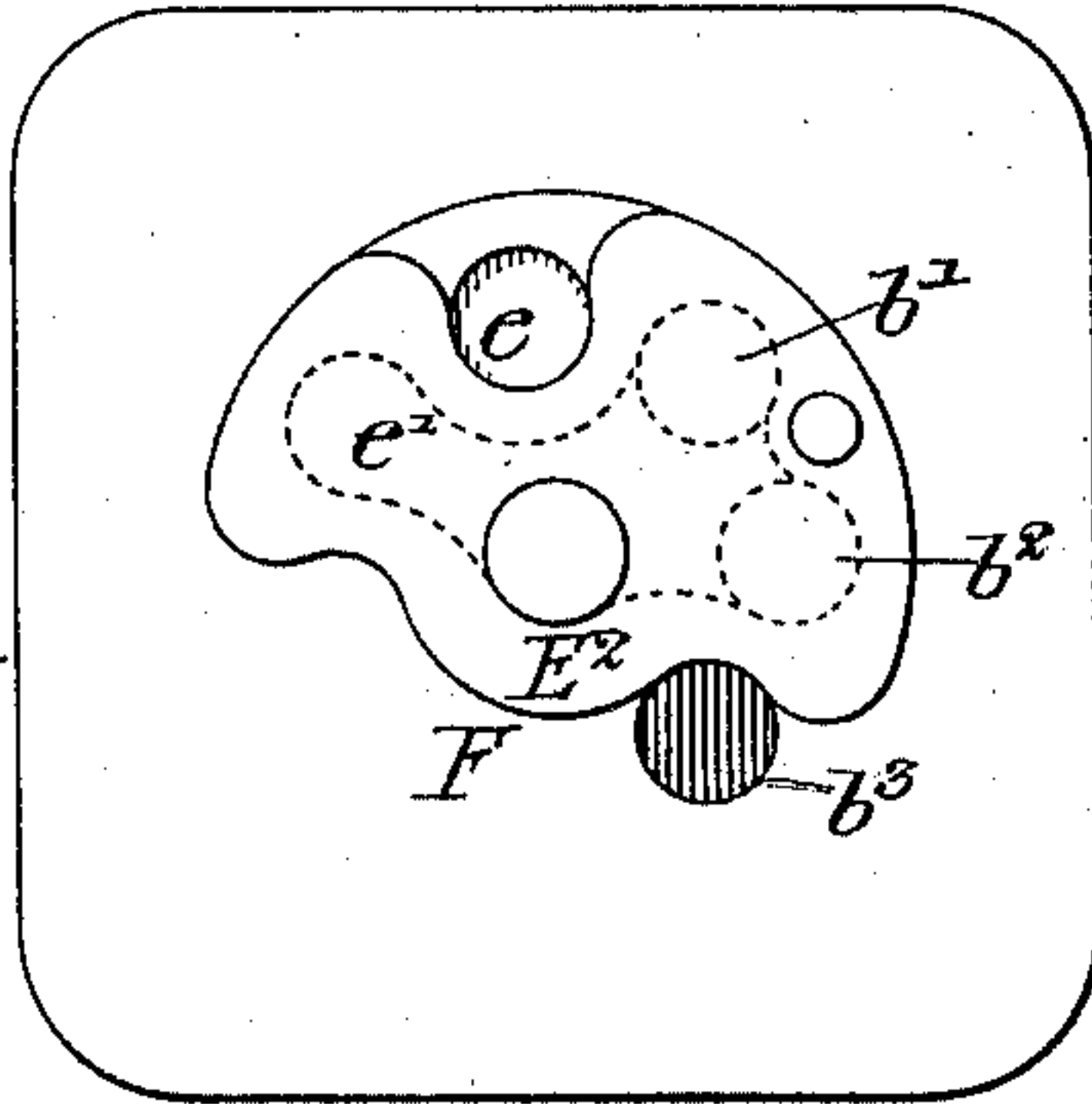


Fig. 10.

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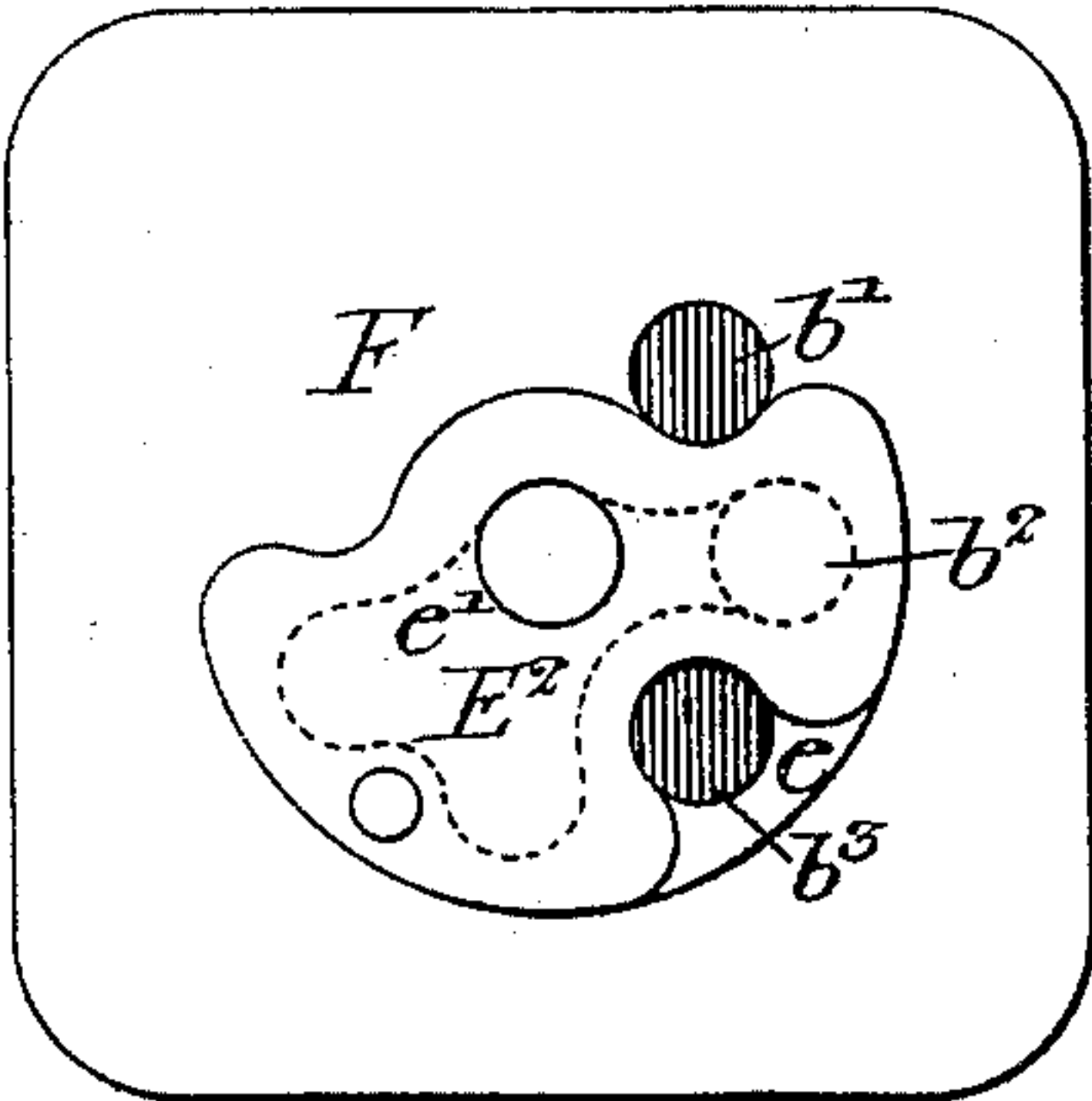


Fig. 11.

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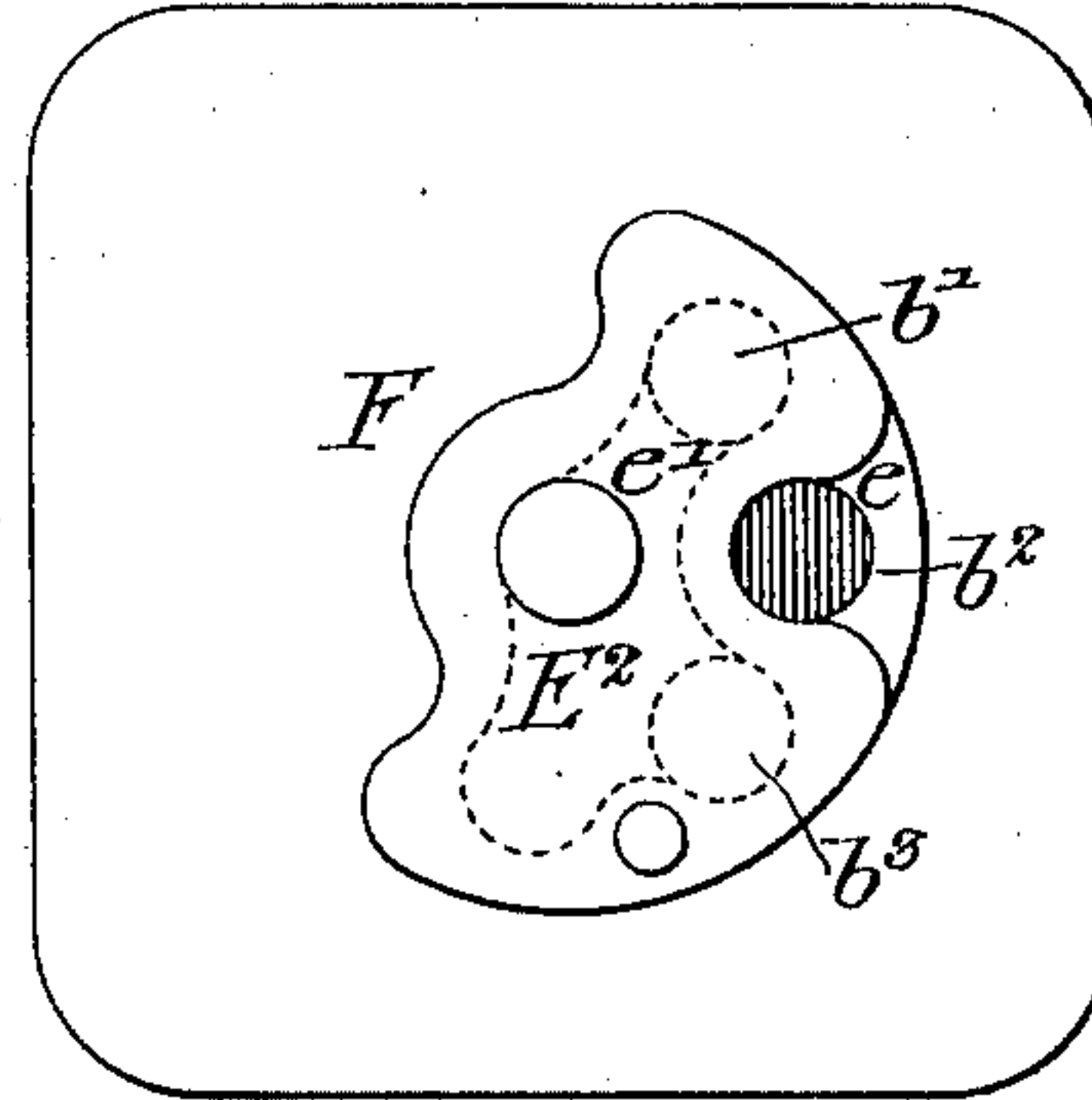


Fig. 13.

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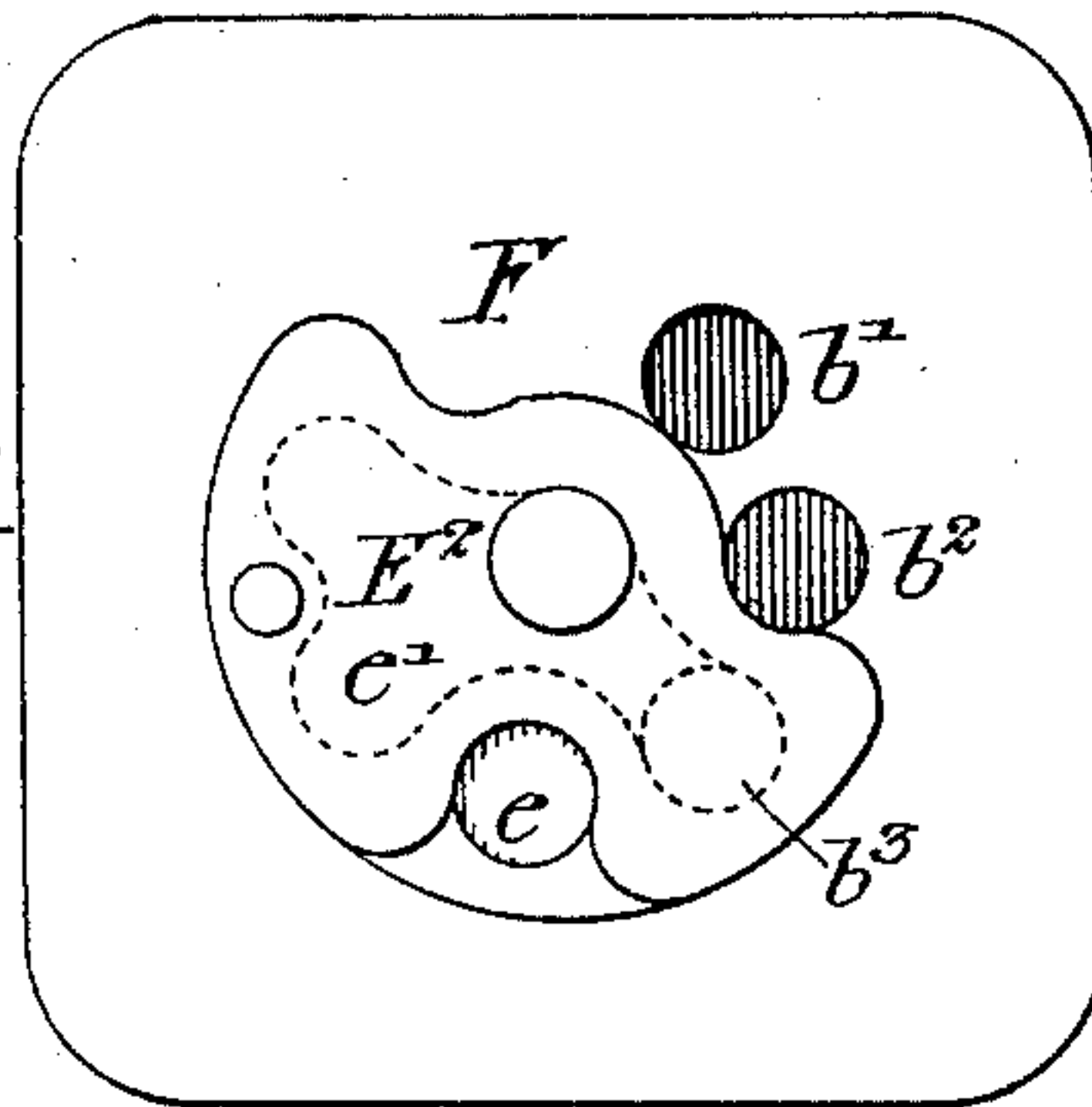


Fig. 12.

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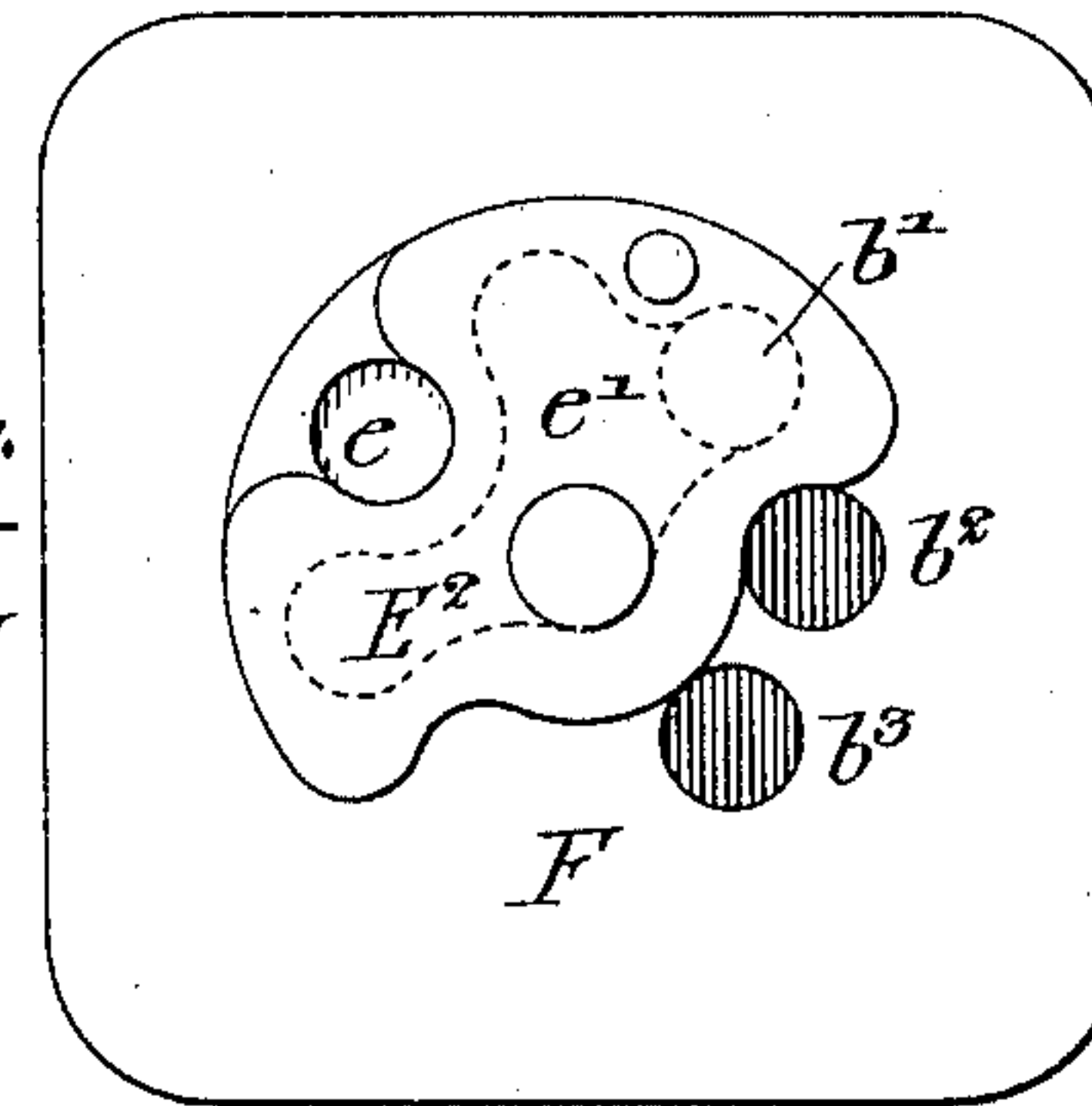
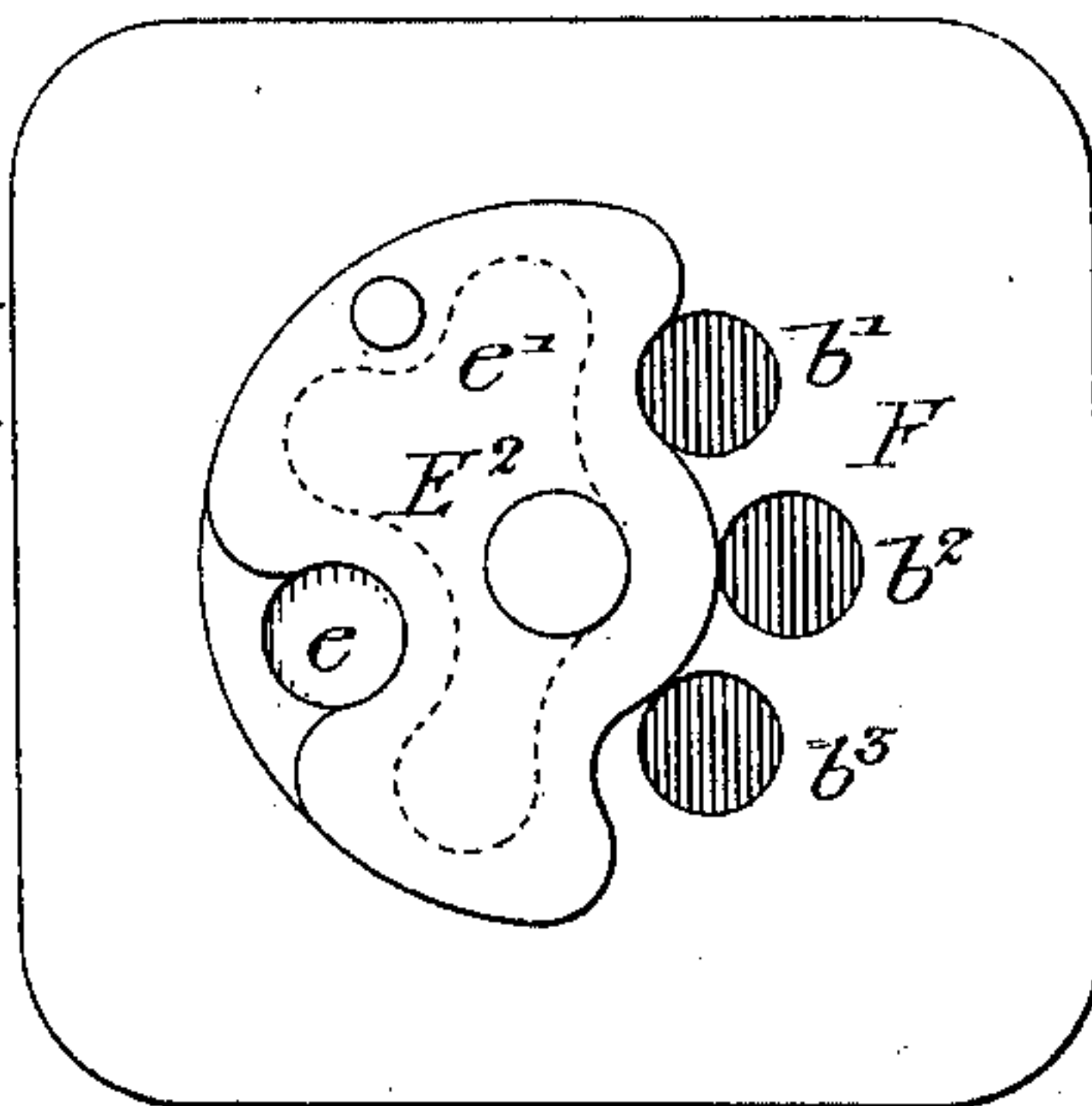


Fig. 14.

E



Witnesses

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No. 756,595.

PATENTED APR. 5, 1904.

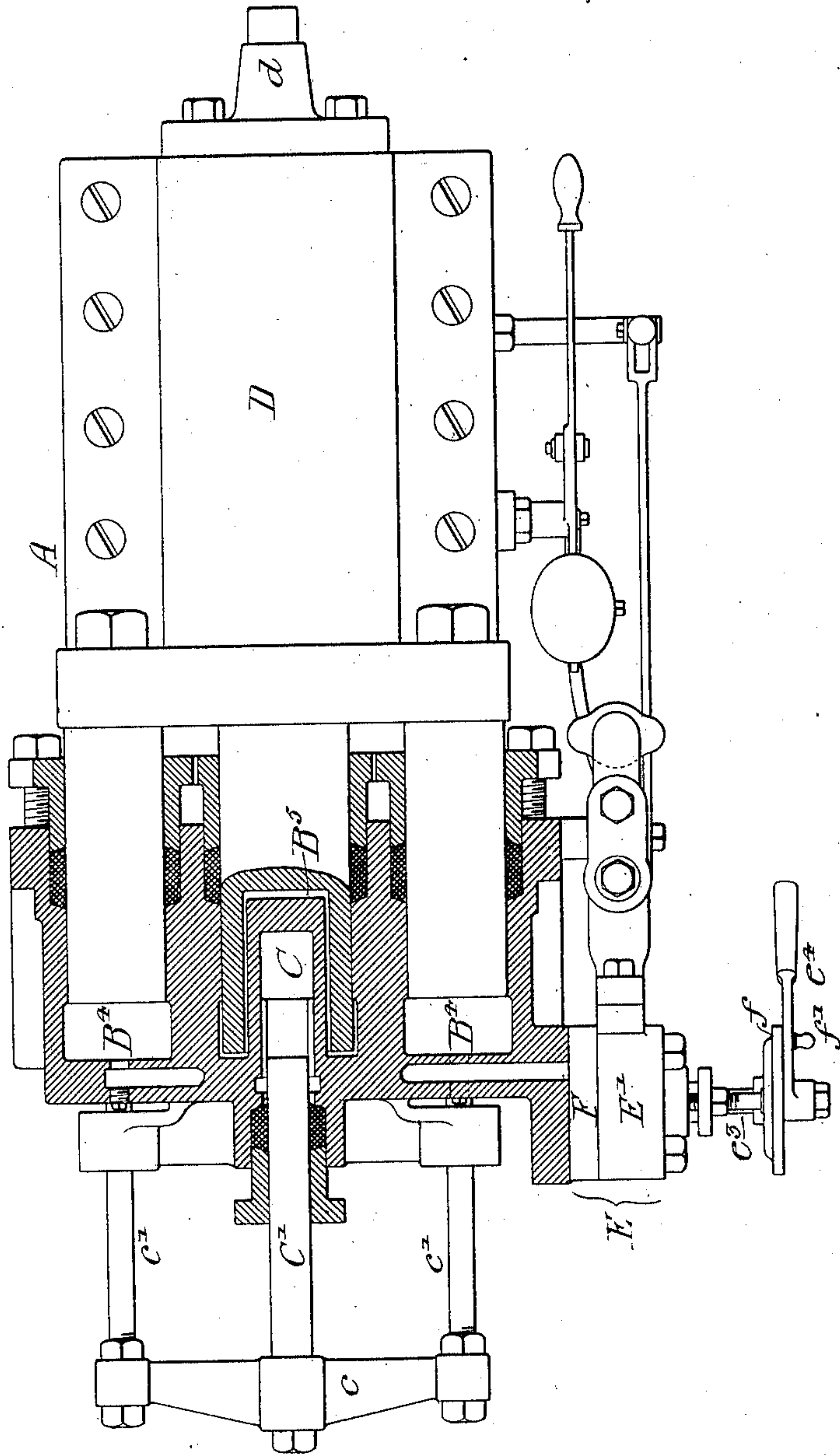
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APPLICATION FILED NOV. 23, 1901.

NO MODEL.

4 SHEETS—SHEET 4.

Fig. 13.



Witnesses:-

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Wm. A. Baw.

Inventor:-

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J. W. & J. W.

UNITED STATES PATENT OFFICE.

WILLIAM H. DERBYSHIRE, OF CHAMBERSBURG, PENNSYLVANIA.

HYDRAULIC MACHINE AND VALVE THEREFOR.

SPECIFICATION forming part of Letters Patent No. 756,595, dated April 5, 1904.

Application filed November 23, 1901. Serial No. 83,459. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. DERBYSHIRE, a citizen of the United States, and a resident of Chambersburg, Pennsylvania, have invented certain Improvements in Hydraulic Machines and Valves Therefor, of which the following is a specification.

My invention relates to certain improvements in hydraulic riveting and other machines having valves for controlling the fluid.

The object of my invention is to provide a machine by which seven or five distinct and positive pressures are obtained by the use of three pistons. This object I attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1 is a side view of my improved hydraulic riveting-machine. Fig. 2 is a plan view partly in section. Fig. 3 is a transverse sectional view. Fig. 4 is a sectional view of the controlling-valve. Fig. 5 is a sectional view on the line 5 5, Fig. 4. Fig. 6 is a sectional view on the line 6 6, Fig. 4. Fig. 7 is an inverted view of the valve. Figs. 8, 9, 10, 11, 12, 13, and 14 are diagram views illustrating the operation of the valve; and Fig. 15 is a view showing a machine in which five pressures are obtainable with three cylinders.

The machine illustrated in the accompanying drawings is of the type set forth and claimed in the patent granted to me on November 19, 1901, No. 687,134; but it will be understood that the arrangement of the cylinders and pistons and the general construction of the machine may be modified considerably without departing from the main feature of my invention.

A is sufficient of the frame of a riveting-machine to illustrate my invention. On this frame is mounted the cylinder-casting B, having three cylinders B' B^2 B^3 in the present instance, arranged as shown. The largest cylinder B^2 is four times the area of the smallest cylinder B^3 and twice the area of the intermediate cylinder B' in the present instance.

D is the slide, carrying the riveting-head d , and projecting rearwardly from this slide are

the plungers D' D^2 D^3 , fitting their respective cylinders, as shown.

C is a cylinder within the cylinder-casting B, and in this cylinder is a return-plunger C' , connected to a cross-head c , which in turn is connected by rods c' to the slide D. The arrangement of this return-plunger may be modified and the return-plunger may be placed upon other parts of the machine without departing from my invention.

E is a controlling-valve. This valve has a casing E' fitting over the valve-seat F on one side of the cylinder-casting B. In this valve-seat are three ports b' b^2 b^3 , communicating, respectively, with the cylinders B' B^2 B^3 of the cylinder-casting B. In the valve-casing is a valve E^2 , provided with a single port e and having its face recessed at e' , as shown in Fig. 7, so that the ports not in communication with the space containing the motive fluid will be open to the drip e^5 through the said recess in the valve, thereby preventing the liquid under pressure from entering the cylinders not in use. The valve E^2 is connected to an arm e^2 on the shaft e^3 , provided with a handle e^4 . This handle travels over a segment f , in which there are a number of holes, (seven in the present instance,) and a pin f' , carried by the handle, can enter any one of the holes, according to the location of the handle, so as to lock the handle in the particular point to which it is adjusted. The valve E^2 is so shaped and the ports so arranged that said ports can be opened to pressure, either singly or in multiple. Consequently by the use of the three cylinders and the arrangement of the valve I am enabled to obtain seven distinct pressures.

In explaining my invention I will refer to the diagrams, Figs. 8 to 14, and while I do not limit myself to the pressures herein given or the size of the cylinders I will refer to a sample case—say one-hundred-and-twenty-six-ton riveter—in which seven distinct pressures are desired—namely, eighteen, thirty-six, fifty-four, seventy-two, ninety, one hundred and eight, and one hundred and twenty-six tons. These pressures are desirable in most shops in which a riveter must be used.

Referring now to the diagrams, Fig. 8 shows the valve set so as to open to pressure the port b^3 leading to the cylinder B^3 , the other two ports being closed against pressure and communicating with the drip. Thus in a one-hundred-and-twenty-six-ton machine only eighteen-tons pressure would be used when the valve is in this position.

If the valve is turned as shown in Fig. 9, then the ports b^2 b^3 are closed to pressure and open to drip and the port b' open to pressure. As this port communicates with the cylinder B' , thirty-six-tons pressure would be used.

When the valve is turned as shown in Fig. 10, the port b^2 is closed against pressure and open to drip and the ports b' b^3 open to pressure, and as these ports communicate, respectively, with the cylinders B' B^3 (one of eighteen and one of thirty-six tons) fifty-four tons would be the pressure.

If the valve is turned to the position shown in Fig. 11, then the ports b' and b^3 would be closed against pressure and open to drip and the port b^2 open to pressure, and as this port communicates with the cylinder B^2 seventy-two-tons pressure would be the result.

If the valve is turned as shown in Fig. 12, then port b' is closed to pressure and ports b^2 b^3 are open, giving eighteen and seventy-two tons pressure, respectively, or a total of ninety tons.

If the valve is turned as shown in Fig. 13, the port b^3 is closed to pressure and ports b' and b^2 are open, giving seventy-two and thirty-six tons pressure, respectively, or a total of one-hundred-and-eight-tons pressure.

If the valve is turned to the position shown in Fig. 14, then all three ports would be open to pressure and the combined pressure would be one hundred and twenty-six tons.

It will be understood that this is only one instance, and the pressures may be varied according to the size of the machine and to the initial pressure, the above being only given as an example. It will be seen, therefore, that a three-cylinder machine is designed so that seven distinct pressures are obtained with the use of a single valve.

By making the two smaller cylinders B^4 B^4 the same size and making the largest cylinder B^5 three times the area of one of said smaller cylinders I may obtain five distinct pressures, as shown in Fig. 15—for example, in a one-hundred-and-twenty-five-ton machine using

three cylinders, two of the same size and one three times the area of one of the other two, five pressures may be obtained—namely, twenty-five, fifty, seventy-five, one hundred, and one hundred and twenty-five tons—by the use of the valve described above.

While I have shown a rotary valve, it will be understood that I may use a slide-valve or cylindrical valve without departing from my invention.

While I have illustrated my invention in connection with a hydraulic riveting-machine, it will be understood that it can be used in connection with any liquid-pressure machine in which a number of distinct pressures are desirable—such, for instance, as punching and bending machines—and while I have shown the plungers movable and the cylinder stationary I may build a machine such as that described in an application filed on the 2d day of July, 1902, Serial No. 114,040, in which the plungers are stationary and the cylinders movable.

I claim as my invention—

1. The combination in a hydraulic machine, of three cylinders, plungers therefor, a valve-chest having independent passages leading from it to each cylinder and also being provided with a drip-passage, a valve having a single port and a contour shaped to open any one, two or three of the ports to pressure, said valve being provided with a recess communicating with the drip and with the passage or passages cut off from pressure, substantially as described.

2. The combination in a hydraulic machine, of the three cylinders, plungers therein, a valve-chest, an independent passage leading from each cylinder to the valve-chest, a central drip-passage in the valve-chest, a valve in the form of a segment and having a single port, the valve being so shaped as to open any one, two or three of the ports to pressure, and a recess in the face of the valve communicating with the drip and with the passage cut off from pressure, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. DERBYSHIRE.

Witnesses:

WILL. A. BARR,
JOS. H. KLEIN.