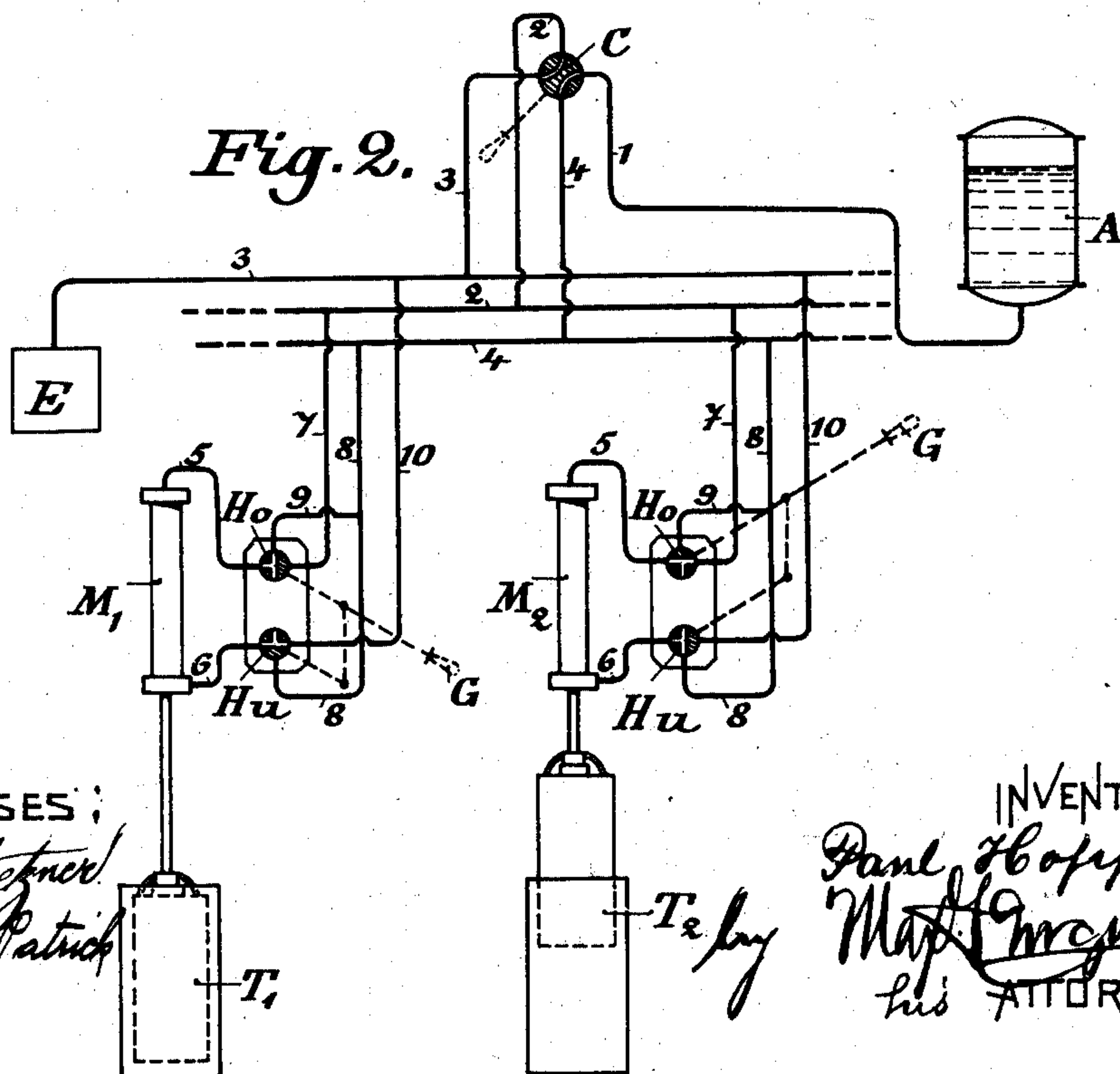
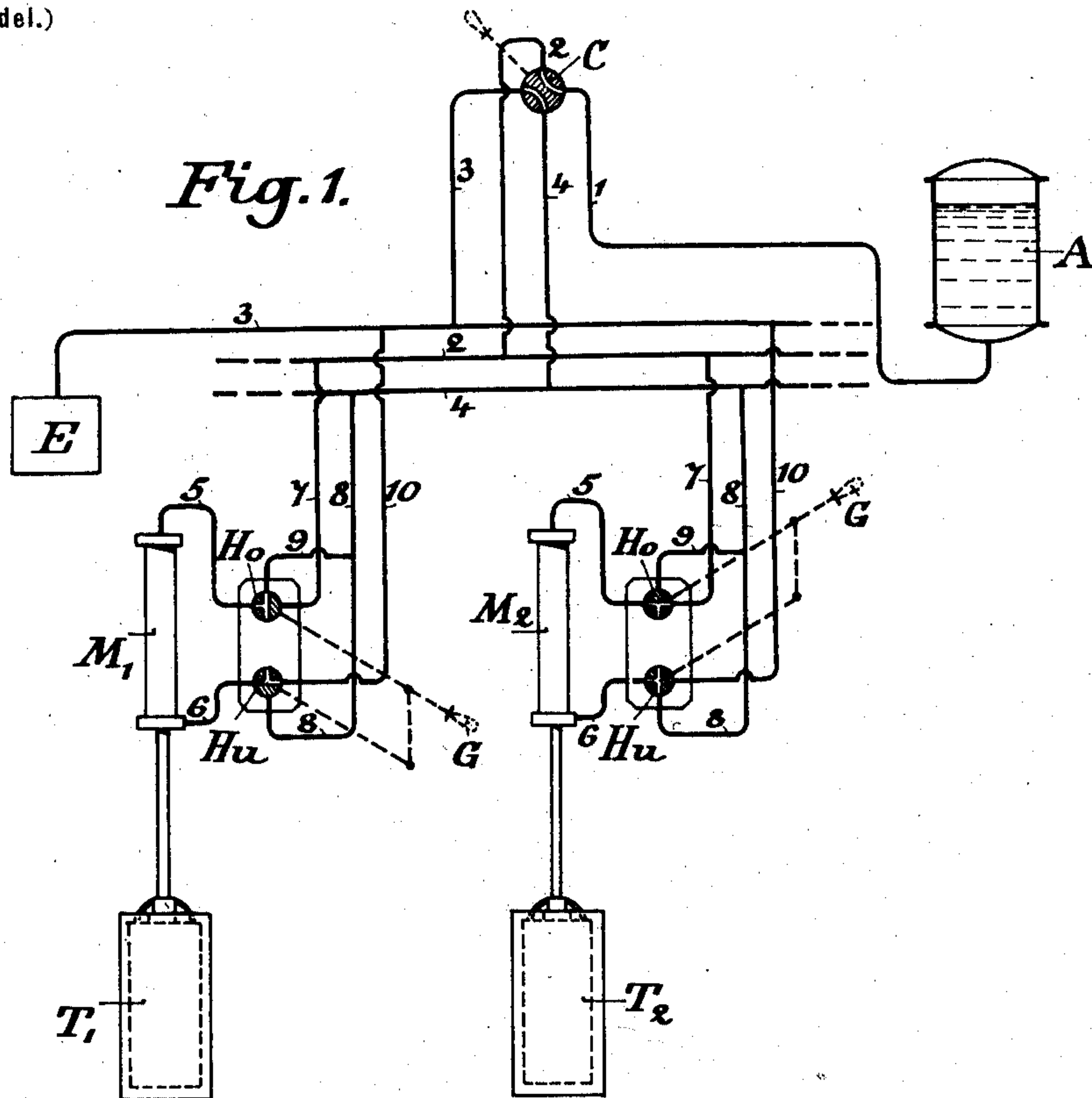


P. HOPPE.

MEANS FOR OPERATING BULKHEAD DOORS.

(Application filed May 19, 1902.)

(No Model.)



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

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## MEANS FOR OPERATING BULKHEAD-DOORS.

SPECIFICATION forming part of Letters Patent No. 706,471, dated August 5, 1902.

Application filed May 19, 1902. Serial No. 108,056. (No model.)

*To all whom it may concern:*

Be it known that I, PAUL HOPPE, manufacturer, a subject of the German Emperor, residing at 9/12 Gartenstrasse, Berlin, Germany, have invented certain new and useful Improvements in Means for Operating Bulkhead-Doors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to arrangements for hydraulically closing and opening several bulkhead-doors from a common controlling-station.

In the United States Patent No. 687,933 to Dr. Carl Theodor Dörr, of Ohligs, Rheinland, an arrangement for hydraulically closing bulkhead-doors is described which consists of a hydraulic cylinder the piston of which is connected to the door, an accumulator preferably filled with water and compressed air, pipes connecting both ends of said cylinder with the lower end of said accumulator, and valves disposed in such a way in said pipes that by turning a handle fitted to the valves water-pressure can be admitted to either end of the cylinder, at the same time switching the other end onto an exhaust-pipe. Thus accordingly as pressure is either admitted above or below the piston the door is either closed or opened.

The present invention consists in a special arrangement of the pipes and valves in this system by which all the doors connected with the system can be closed by the action of a single centrally-disposed valve independently of the position of the local valves. Thus though it is possible to close any single door by the use of the local valves when the central valve is set to "Open" it is not possible to open any single door by the use of the local valves when the central valve has been set to "Close."

The arrangement is illustrated in the accompanying drawings, in which—

Figure 1 is a diagram showing the action when the central or controlling valve is set to "Close," and Fig. 2 is a diagram showing the action of the arrangement when the central or controlling valve is set to "Open."

The same characters of reference are used to designate the same parts in both figures.

In the diagrams T' and T<sup>2</sup> are two bulkhead-doors. I wish it to be understood that, though in each diagram only two doors are shown connected with the system, as a matter of fact any desired number may be provided, the invention being designed for the operation of any plurality of doors.

To each door is fitted a hydraulic cylinder, the one belonging to door T' being designated by the reference-letter M' and the one belonging to door T<sup>2</sup> being designated by the reference-letter M<sup>2</sup>. From the lower end of each cylinder a pipe 6 leads to a three-way cock H<sup>u</sup> and from the upper end a pipe 5 to a similar three-way cock H<sup>o</sup>. The levers controlling both cocks or valves are positively coupled and are provided with a handle G, by means of which both valves can be operated simultaneously. Both three-way cocks H<sup>o</sup> and H<sup>u</sup> are connected by suitably-disposed piping with an accumulator A and with an exhaust-pipe 3.

Thus far the arrangement is identical with that described in the above-mentioned United States Patent No. 687,933.

The pressure from the accumulator is transmitted through a pipe 1 to a four-way cock or valve C, which is supposed to be disposed on the bridge of the ship or in any other suitable place from which the closing and opening of the bulkhead-doors is to be controlled. Three other pipes 2, 3, and 4 issue from the central or controlling valve C, of which the pipe 3 leads to an exhaust-tank E. Each local valve H<sup>u</sup> is connected to the exhaust-pipe 3 by a pipe 10 and to the pipe 4 by a pipe 8, and each local valve H<sup>o</sup> is connected to the pipe 8, and thereby to the pipe 4, by means of a pipe 9 and to the pipe 2 by means of a pipe 7. The operation of this arrangement may be varied in four ways, giving rise to the following four cases:

First. Central valve C set to "Open" and local valves likewise set to "Open" door T<sup>2</sup> of Fig. 2.

Second. Central valve C set to "Open" and local valves set to "Close" door T' of Fig. 2.

Third. Central valve set to "Close" and local valves set to "Open" door T<sup>2</sup> of Fig. 1.



Fourth. Central valve C set to "Close" and local valves likewise set to "Close" door T' of Fig. 1.

In the first case the water-pressure is transmitted from pipe 1 through controlling-valve C to pipe 4, thence through pipes 8 and 9 to local valves H<sup>o</sup> and H<sup>u</sup>. The water finds the valve H<sup>o</sup> closed and passes through the valve H<sup>u</sup> into pipe 6 and thence below the piston into the cylinder M<sup>2</sup>. It raises the piston, carrying the door T<sup>2</sup> with it, and the water above the piston issues through pipe 5, three-way cock H<sup>o</sup>, into pipe 7, thence into pipe 2, central four-way cock C, into pipe 3, and thus into the exhaust-tank E.

In the second case the water coming down pipe 8 finds three-way cock H<sup>u</sup> closed and three-way cock H<sup>o</sup> open, and therefore passes through pipe 5 into the upper end of the cylinder M', depressing the piston, and thereby closing the door T'. The exhaust-water passes through pipe 6, three-way cock H<sup>u</sup>, pipe 10, and pipe 3 into the exhaust-tank E.

In the third case, Fig. 1, door T<sup>2</sup>, the pressure is transmitted from pipe 1 to pipe 2, thence through pipe 7 to three-way cock H<sup>o</sup>, pipe 5, and the upper end of cylinder M<sup>2</sup>. The exhaust-water issues through pipe 6, local valve H<sup>u</sup>, into pipe 4, thence through the central valve C into pipe 3 and the exhaust-tank. Thus, though in this case the local valves were set to "Open" when the operation commenced, the door T<sup>2</sup> is closed, nevertheless, by the action of the central controlling-valve C.

In the fourth case it is assumed that before commencing operating the position of the parts was that already described with reference to door T' of Fig. 2, and therefore the door being already closed, it is not necessary to move it. It will be seen by reference to Fig. 1, door T' of Fig. 1, that both ends of the cylinder M' are connected to the exhaust—namely, the upper end—through pipe 5, local valve H<sup>o</sup>, branch pipe 9, pipe 8, pipe 4, central valve C, and pipe 3, and the lower end through pipe 6, local valve H<sup>u</sup>, pipe 10, and pipe 3.

It will be observed that in the first two cases—that is, when the central valve is set to "Open"—pipe 4 acts as a pressure-pipe and pipe 2 as an exhaust-pipe and that in the two latter cases—that is, when the central valve is set to "Close"—the parts are exchanged—i. e., the pipe 4 acts as an exhaust-pipe and the pipe 2 as a pressure-pipe. This is the leading feature of my present invention. Since one end only of the cylinder is connected directly with the permanent exhaust-pipe 3 and the other end is always exhausted through the pipe 2, it is always possible by changing the parts of pipes 2 and 4 to close the doors, or, in other words, the operation of the central controlling-valve C in closing the door is altogether independent of the position of the local valves.

Having now particularly described and as-

certained the nature of my said invention and the manner in which the same is to be performed, I declare that what I claim is—

1. In an arrangement for closing and opening bulkhead-doors from a central controlling-station, the combination with hydraulic cylinders fitted to the doors, means for operating the doors according as pressure is admitted to either end of said cylinders and a pressure-accumulator, of a pair of pipes connecting the accumulator with the cylinders, a third pipe connecting the cylinders with an exhaust-tank, independent pipes connecting said cylinders with said third pipe and controlled by local valves, and means for switching the pressure stored in the accumulator to either of the pair of pipes and connecting the other with the exhaust-pipe.

2. In an arrangement for closing and opening several bulkhead-doors from a common controlling-station which arrangement consists of a hydraulic cylinder fitted to each of said doors, means for operating the doors when pressure is admitted to either end of the cylinders and a pressure-accumulator the combination with means for switching the pressure stored in said accumulator onto either of a pair of pipes leading from the controlling-station to said cylinders and simultaneously connecting the other to an exhaust-pipe such means being located at the controlling-station of means for connecting the one end of said cylinders either with one of the said pair of pipes or with the said exhaust-pipe and for simultaneously connecting the other end of said cylinders with either of the said pair of pipes substantially as and for the purpose set forth.

3. In an arrangement for closing and opening several bulkhead-doors from a common controlling-station which arrangement consists of a pressure-accumulator, a hydraulic cylinder fitted to each of said doors and means for operating said doors when pressure is admitted to either end of said cylinders, the combination with a four-way valve located at the controlling-station of a pipe connecting said central valve to said accumulator, a second pipe connecting said central valve to each of the cylinders and leading to an exhaust-tank and of two more pipes connecting the central valve with the cylinders, the central valve being arranged so as to connect either of the two latter pipes to the pressure-pipe and the other to the exhaust-pipe or vice versa and of means for connecting one end of said cylinders with either of the said latter pipes and the other end with either one of said latter pipes or with the exhaust-pipe, substantially as and for the purpose set forth.

4. In an arrangement for closing and opening several bulkhead-doors from a common controlling-station the combination with hydraulic cylinders fitted to each of said doors, means for closing and opening said doors when pressure is admitted to either end of said cylinders, a pair of three-way cocks fitted to each



of said cylinders each of which cocks is connected by a pipe or channel to one end of the cylinder, means for simultaneously operating both three-way cocks, such three-way cocks  
5 being arranged and connected so as to switch the one end of said cylinders onto either of a pair of pipes connecting all cylinders with the controlling-station and the opposite end of the cylinders either onto one of said pair of pipes  
10 or onto an exhaust-pipe likewise connecting all doors with the controlling-station, of a pressure-accumulator, a pipe connecting same with the controlling-station and of a four-way

cock fitted at the controlling - station and adapted and connected so as to switch the 15 pressure stored in said accumulator onto either of the above said pair of pipes and simultaneously to connect the other to the exhaust-pipe, substantially as and for the purpose set forth. 20

In testimony whereof I have affixed my signature in presence of two witnesses.

PAUL HOPPE.

Witnesses:

HENRY HASPER,  
WOLDEMAR HAUPT.