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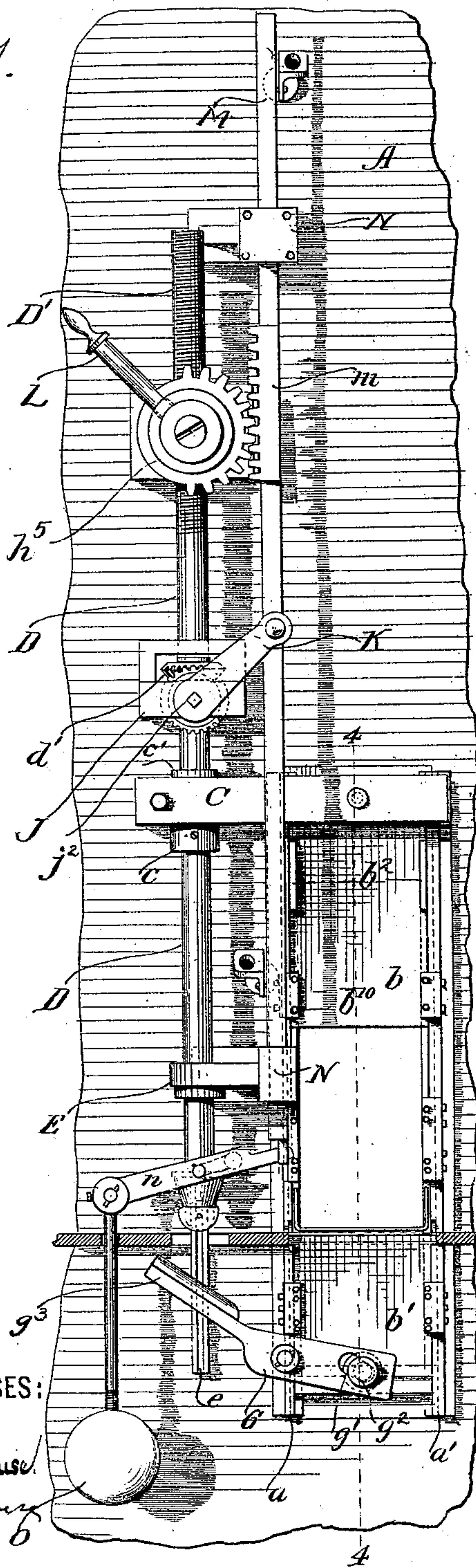
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L. KATZENSTEIN.
WATER TIGHT BULKHEAD DOOR.

No. 539,953.

Patented May 28, 1895.

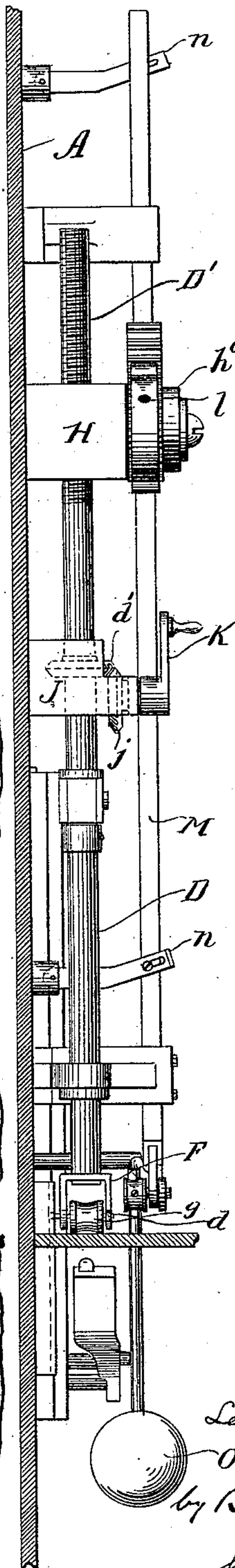
Fig. 1.



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Fig. 2.



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(No Model.)

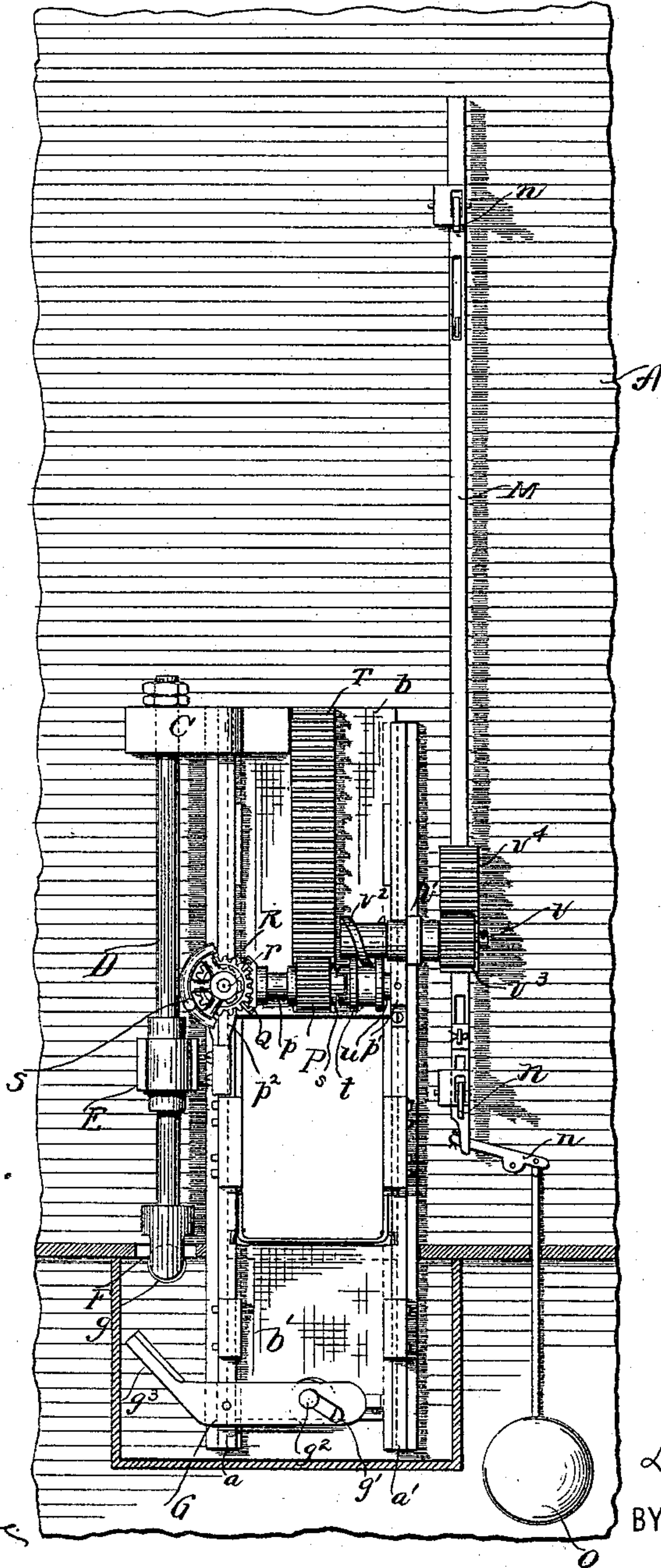
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Fig. 3.



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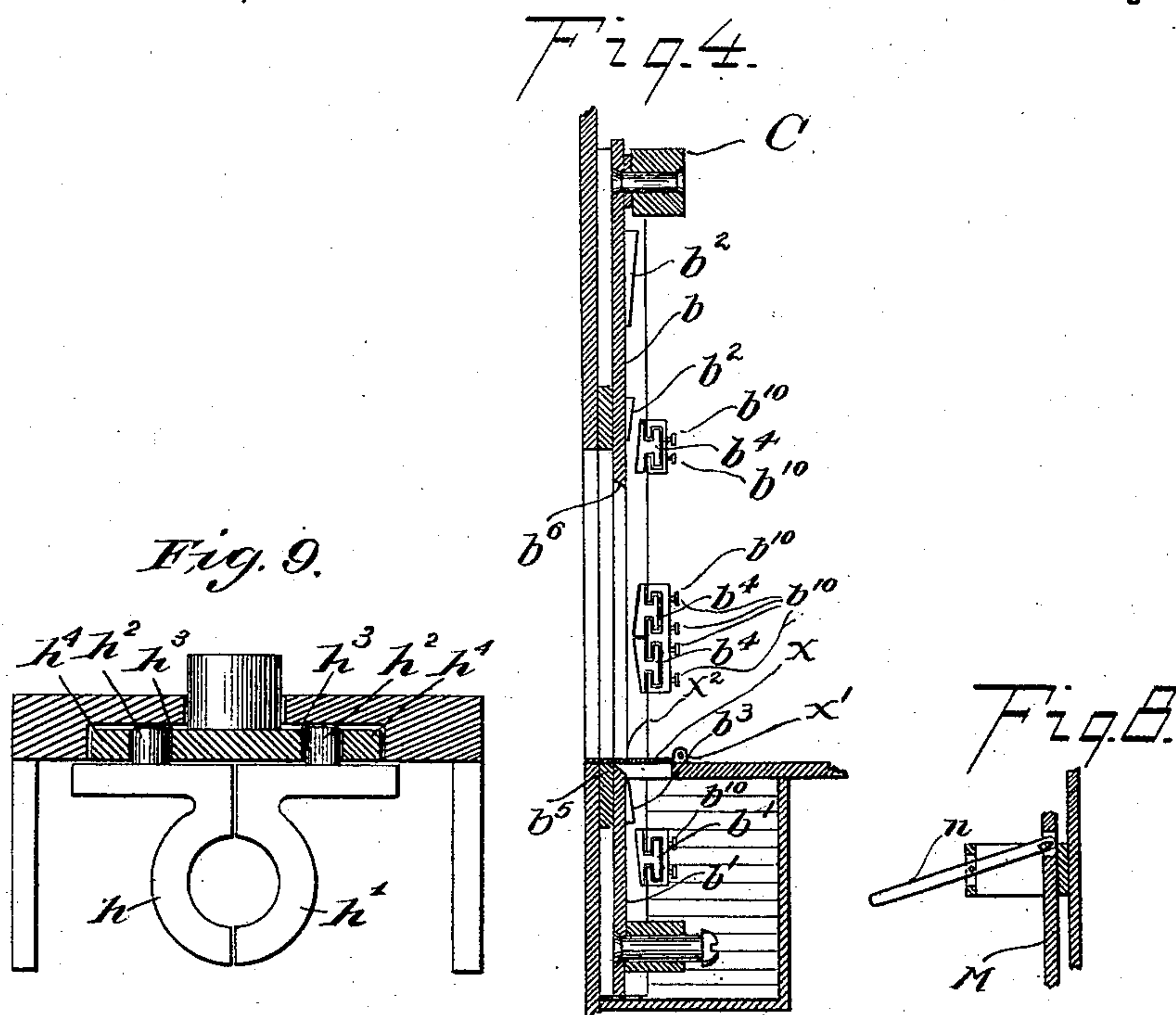
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3 Sheets—Sheet 3.

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WATER TIGHT BULKHEAD DOOR.

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UNITED STATES PATENT OFFICE.

LEOPOLD KATZENSTEIN, OF NEW YORK, N. Y.

WATER-TIGHT BULKHEAD-DOOR.

SPECIFICATION forming part of Letters Patent No. 539,953, dated May 28, 1895.

Application filed November 21, 1894. Serial No. 529,434. (No model.)

To all whom it may concern:

Be it known that I, LEOPOLD KATZENSTEIN, a resident of the city, county, and State of New York, have invented certain new and useful
5 Improvements in Water-Tight Bulkhead-Doors and Mechanism for Operating the Same, of which the following is a full, clear, and exact description.

My invention relates to water-tight bulk
10 head doors and mechanism for operating the same, and has for its object to produce a construction by which the water-tight bulk head doors in navigable vessels may be readily closed either from a point in proximity to the
15 door or from points more or less remote from the door; for instance, the upper deck of the vessel.

To this end my invention consists of a bulk head door combined with mechanism for open-
20 ing the same and holding the same open, and mechanism for disconnecting the bulk head door from the mechanism which operates directly to open it, in order that the doors may be automatically closed.

25 My invention further consists in the construction and arrangement of devices hereinafter set forth and claimed.

It will be understood that in this specification I will make reference merely to those
30 kinds of bulk head doors which are fitted in the bulk heads of navigable vessels and are adapted to slide in a plane parallel with and close to the bulk head and cover and uncover the aperture or doorway formed in said bulk
35 head, and being of such weight as to cause them to close with more or less violence when disconnected from their supporting mechanism; but I will have it particularly understood that I do not mean to limit myself to
40 this precise form of door, as doors which are otherwise operated may be adapted for use with the mechanism which forms this part of my invention. I would also have it under-
45 stood that the mechanism for opening the door and the mechanism for disconnecting the door from its opening mechanism may also be greatly varied without departing from the spirit of my invention, and indeed, I have shown several forms that these devices may
50 take, but, however, merely by way of general illustration without intending to be specifically limited to such forms.

My invention will be understood by reference to the accompanying drawings, showing several forms of my construction, wherein— 55

Figure 1 is an elevation of a bulkhead and its door and the operating mechanism there-
for, the same being one form of my invention. Fig. 2 is a side elevation of the construction
60 shown in Fig. 1. Fig. 3 is an elevation of a bulkhead-door embodying my invention, the same being the preferred form. Fig. 4 is a sectional detail view of the door taken on line 4 4 of Fig. 1. Figs. 5 and 6 are detail views
65 of the form of releasing mechanism which is illustrated in Figs. 2 and 3 and which will be hereinafter fully described. Fig. 7 is a broken-away detail view of another form of releasing
mechanism. Fig. 8 is a sectional detail view of the upper part of the releasing-rod shown
70 in Fig. 1; and Fig. 9 is a plan view partly in horizontal section and on an enlarged scale, the section being taken through the plate h^4 , hereinafter referred to.

Similar letters of reference indicate corre- 75 sponding parts in all the views.

Referring particularly to Figs. 1 and 2, A is a bulk head or dividing partition of a ves-
sel. This partition is pierced for a door-way, and on either side of the door-way are verti- 80 cal guides $a a'$ within which the bulk head door works. This bulk head door is composed of two sections $b b'$. These sections have mounted thereon wedges $b^2 b^3$ which co-operate with loose wedges $b^4 b^4$ mounted upon the
85 guides and adjusted by bolts b^{10} . These sections $b b'$ work in the guides $a a'$, and sliding toward each other abut one upon the other and close the opening, the meeting edges of the sections being beveled, as shown at $b^5 b^6$ 90
in Fig. 4, in order to make a secure water-tight joint, the wedges serving to hold the abutting edges firmly together.

Carried by the section b is an arm C, through which passes a rod D on which are collars c 95 c' , against which the arm bears. This rod D is free to rotate in the aperture in the arm C. The lower section of this rod D passes loosely through a guide or bracket E mounted on the bulk head, and terminates in a stirrup 100 F carrying a roller g . The axis of this roller g is prolonged and projects into a groove or guide e mounted upon the bulk head. Pivoted upon the bulk head in the path of the

roller g on the end of the rod is an operating mechanism therefor consisting of a lever G , one end of which is slotted, as with a slot g' , through which passes a stud g^2 carried by the door section b' . The free end g^3 of the lever G projects into the path of movement of the roller g . It will be observed that as the door-section b descends, the roller g , carried by the rod D connected to and moving with said door-section, will abut against the free end g^3 of the lever G , and the door-section b and its connected mechanism being of considerable weight, will rock the lever G on its pivot, thus raising the lower door-section in the grooves by the heft or weight of the upper section and its connected mechanism, and raising the door-section b' in the guides to meet the door-section b . It will be observed, however, that there is a certain amount of lost motion between the parts, that is to say, the door section b must have descended a short distance before the roller g contacts with the free end g^3 of the lever G . This distance may be variously spaced according to the room left aboard ship for the play of the lower door. In the drawings I show that the section b must have moved through one half its total movement before the lower door-section b' begins to move; but any other proportionate movement may be had, by regulating the distance between the rod D and lever G . I would have it understood, however, that while I have described vertically sliding doors and have set forth that the lower door-section is moved to close the door by the weight of the descending upper door-section, I do not mean to thereby limit myself to such a structure, as, for the purposes of this specification, doors sliding on horizontal or inclined lines and impelled by independent weights or other forces besides the inherent weight of the upper door, are the full equivalents of my vertically sliding doors.

The two door sections b and b' constitute the bulk head door, but it will be understood that the door may be made in a single section, if desired. It will also be observed that as the door section b is raised, the door-section b' will descend by its own weight and the two oppositely moving sections will uncover the aperture in the bulk head, the relative times of movements of the parts being the reverse of their relative movements when the sections are brought together, as before described.

I will now proceed to describe the mechanism for opening the doors, having, as before, particular reference to Figs. 1 and 2. This mechanism consists of the threaded rod D provided with a gear d' through which the rod freely slides longitudinally but which is splined or feathered on the rod to cause the rod to turn therewith. The threaded portion D' of the rod passes through a split-nut contained within the box H . This split-nut is made in two sections $h h'$ which embrace the rod and may be engaged therewith and

disengaged therefrom. Hung in a stirrup or bracket J , mounted on the bulk head, is a gear j which meshes with the gear d' , and whose shaft j^2 is adapted to co-operate with a handle K for turning the same.

The operation of the door opening mechanism just described is as follows: Supposing the nut-sections $h h'$ to be engaged with the rod D , the handle K is turned, turning also the gear j and its meshed gear d' which also rotates the rod D . The rod D , turning and being as aforesaid threaded and embraced and engaged by the nut contained within the box H , screws upward in the nut and is elevated bodily, carrying also with it the door section b and allowing the door section b' to descend by its own weight. This is the position of the sections as shown in Fig. 1.

Referring particularly to Figs. 5 and 6, h and h' are the sections of the nut contained within the box H and which embrace the threaded section D' of the rod D . These sections $h h'$ are provided with pins or studs $h^2 h^2$ which are entered into cam slots $h^3 h^3$ of a disk h^4 , to which is connected a gear h^5 , which is held in position by the hub h^6 . The gear h^5 and disk h^4 are capable of rotation, which rotary movement serves the purpose of separating the sections $h h'$ of the split-nut, thereby releasing the rod D and door-section b , which thereupon descends and by the interaction of the rod D and lever C cause the section b' to be elevated. The rotation of the disk and gear may be effected in various ways, the most direct being by means of a lever L which can be inserted in the aperture l in the gear h^5 . For this same purpose I also provide an operating rod M freely movable in guides $N N$, and to which is connected at intervals pivoted operating levers $n n$, to the lowermost of which is connected a float O . Carried upon the operating rod M is a rack m which meshes with the gear h^5 . It will be quite obvious that a longitudinal movement of the operating rod M will cause the gear h^5 to be rotated, thereby separating the sections of the split-nut and allowing the rod D and door-section b to descend, as before stated. The longitudinal movement of the operating rod N may be effected by the movement of any one of the pivoted operating levers n , which operating levers may be located upon different decks so that the door may be closed from numerous points more or less remote from the door. It will also be observed that the closing will be done automatically should the water rise beyond a predetermined height for, if the water should rise beyond a predetermined height, the float will be lifted, thereby rocking the pivoted operating lever n , to which it is attached, and moving the rod longitudinally.

It will, of course, be understood that the mechanism for opening the split-nut and releasing rod D may be variously constructed, and that the split-nut itself may be replaced by any other suitable two-part releasing mech-

anism. In the preferred form of my invention, shown in Fig. 3, the door section b , which moves in vertical guides $a a'$, is provided with the usual bracket C and rod D, which rod works in a guide E, as before described, and terminates in the usual stirrup F and roller g . The door-section b' which, as before, slides in the guides $a a'$, is provided with the usual stud g^2 which works in a slot g' of the usual pivoted lever G, the free end g^3 projecting into the path of movement of the roller g , the mutual operations of the door-sections and their respective times of movement being the same previously described. Now, in the present case the door opening mechanism consists of a gear P mounted upon a shaft p which is carried in brackets $p' p^2$ on the guides $a' a$. Mounted also upon the shaft p is a bevel gear Q which meshes with a bevel gear R carried upon a shaft r mounted in the bracket p^2 . Mounted also upon the shaft r is a wheel or crank S. Mounted upon the door-section b is a rack T which meshes with the gear P on the shaft p . The operation of this form of my door opening apparatus is as follows: The wheel or crank S is rotated, thereby rotating the gear R and its meshed gear Q, thereby rotating the gear P and raising the door section b with its rod D, the door-section b' sliding down by its own weight as soon as the pressure is taken off the free end g^3 of the pivoted operating lever G. The door-section b is held in its elevated position by a two-part releasing mechanism, which, in this instance, is a clutch consisting of a member s mounted rigidly upon the shaft p and the member t held firmly from rotation but slidable laterally upon the sleeve u upon which it is carried. v is a shaft carried in a bracket v' , and has mounted thereon a cam-wheel v^2 co-operating with the movable clutch member t , and a gear v^3 which co-operates with a rack v^4 carried upon the usual operating rod M which is movable longitudinally and operated by means of pivoted operating levers n (see Figs. 3 and 8), one of which levers is operated by means of a float o , as in the preceding example. The operation of this form of my construction is as follows: I will suppose the parts to be in the position shown in Fig. 3, that is to say, the door-way to be uncovered. When, now, it is desired to close the door, the operating rod M is reciprocated longitudinally through the medium of any of the levers n , thereby rotating the gear v^3 and its shaft, and causing the cam-wheel v^2 to slide the movable section t of the clutch out of engagement with the section s , which, being thereupon released, will permit the shaft p to rotate freely, thus allowing the door-section b to descend and raise the door-section b' , thereby closing the opening in the bulk head. When, now, it is desired to open the door, the wheel S is rotated, thereby separating the sections, and the clutch member t is moved to the left to cause it to engage with the clutch member s

in order to hold the door-section b in its elevated position.

In the construction shown in Fig. 7, the clutch member t is operated by means of pivoted levers $t' t^2$ and stirrup t^3 which engages therewith. I may also operate this form of mechanism by a longitudinally moving operating rod M and pivoted lever n and float O.

It may sometimes happen that the aperture in the bulk head will become obstructed by some large body, and the door-sections will not close together tightly. In order to prevent this, I provide a shield consisting of a plate x lying across the threshold of the door and pivoted at x' . This plate may also be provided with shields x^2 which serve the purpose of keeping coal and other small obstructions out of the guides $a a'$. It will be observed that as the door-sections close together, the lower section b' will as it rises abut against the shield x and will swing the same on its pivot, thus removing from the path of the door-sections any ordinary obstacle, such, for instance, as a man standing in the door-way.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of a water-tight bulk head door consisting of two sections movable one toward the other and one of the said door sections being actuated by the movement of the other, mechanism for separating the sections and holding the same separated, and a two-part releasing mechanism for releasing the sections to permit them to automatically come together to cover the opening in the bulk head, substantially as described.

2. The combination of a door-section, a rack carried thereby, a gear meshing with the rack, mechanism for rotating the gear to raise the door-section, and a clutch for releasing the gear to permit the door section to descend automatically, substantially as described.

3. The combination of a sliding door, mechanism for opening the said door, two-part releasing mechanism for releasing the door to allow the same to close, and a longitudinally movable operating rod for operating the releasing mechanism, substantially as described.

4. The combination of a door, mechanism for opening the same, and releasing mechanism therefor, the same consisting of a clutch, together with mechanism for actuating the releasing mechanism consisting of a float, and means for actuating the releasing mechanism by the float, substantially as described.

5. The water-tight bulk-head door herein described, that is to say, a door consisting of two gravity actuated sections movable toward and away from each other, operating mechanism for operating one of the sections, the said last named section operating the other section by its movement, mechanism for holding the sections separated and releasing mechanism therefor, whereby upon operation

of the releasing mechanism the door sections will come together automatically by gravity and cover the opening in the bulk-head, substantially as described.

5 6. In a water-tight bulk-head door, the combination of a sliding section *b*, a sliding section *b'*, and a rod *D* connected to the section *b*, and a pivoted lever *G* connected to the section *b'* and extending into the path of movement of the rod *D*, whereby when the section
15 *b* falls the rod *D* will co-operate with the lever *G* to raise the door section *b'*, substantially as described.

7. In a water-tight bulk-head door, the combination of a section *b*, a section *b'*, the said
15 sections sliding toward one another to cover the opening in a bulk-head, operating mechanism for the door section *b'*, a rod *D* co-op-

erating with the operating mechanism for the door section *b*, and a connection between the 20 door sections, all arranged so that the door section *b* shall have a greater degree of movement than the door section *b'*, substantially as described.

8. The combination of the bulk head door 25 consisting of two sections movable toward one another, a pivoted shield extending across the threshold of the door and into the path of one of the door-sections, whereby one of the door sections will co-operate with the shield 30 to swing the same out of the path of the door-sections, substantially as described.

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