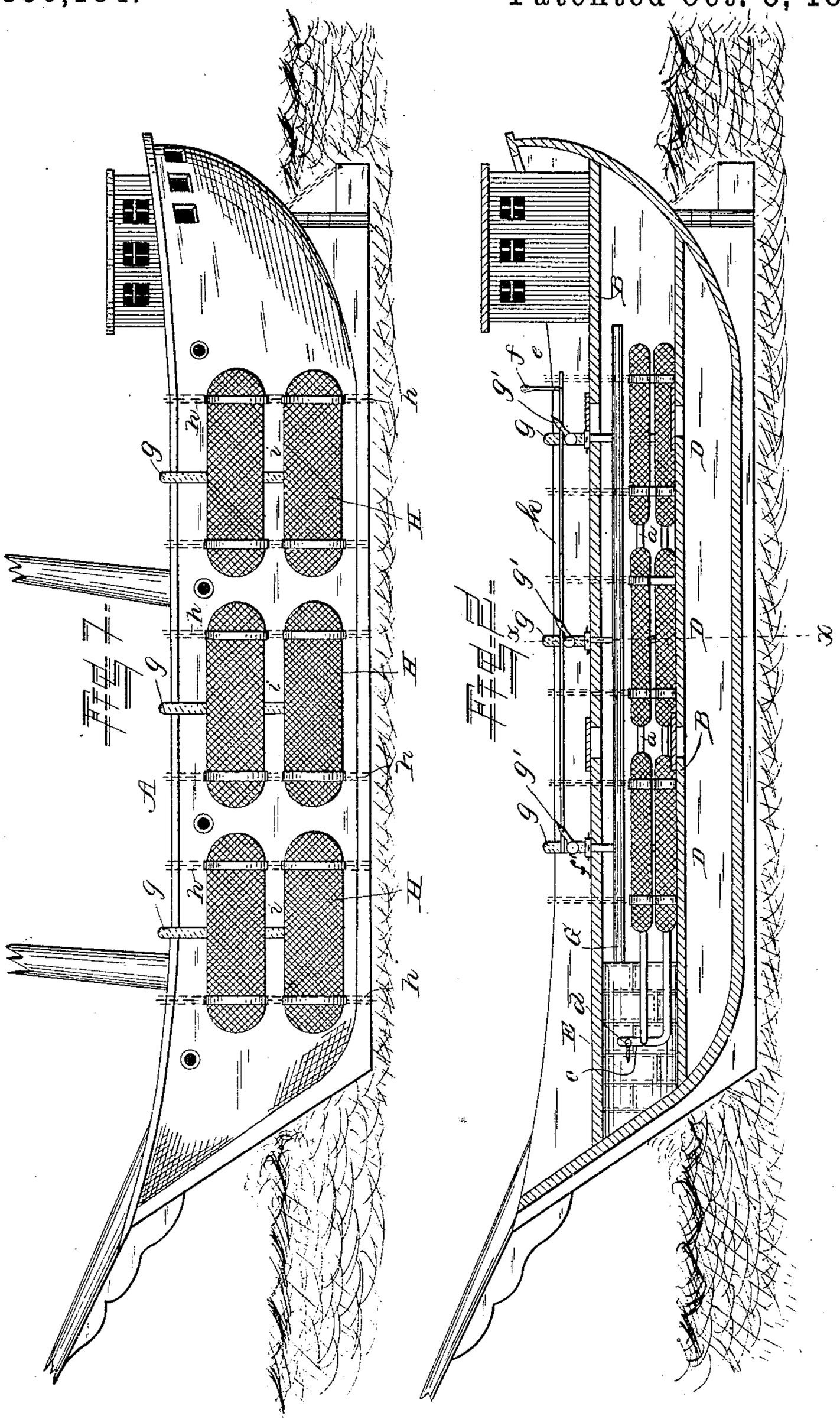
(No Model.) 2 Sheets—Sheet 1.

J. A. BENNINGER.

SYSTEM FOR PREVENTING VESSELS FROM SINKING.

No. 350,184. Patented Oct. 5, 1886.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

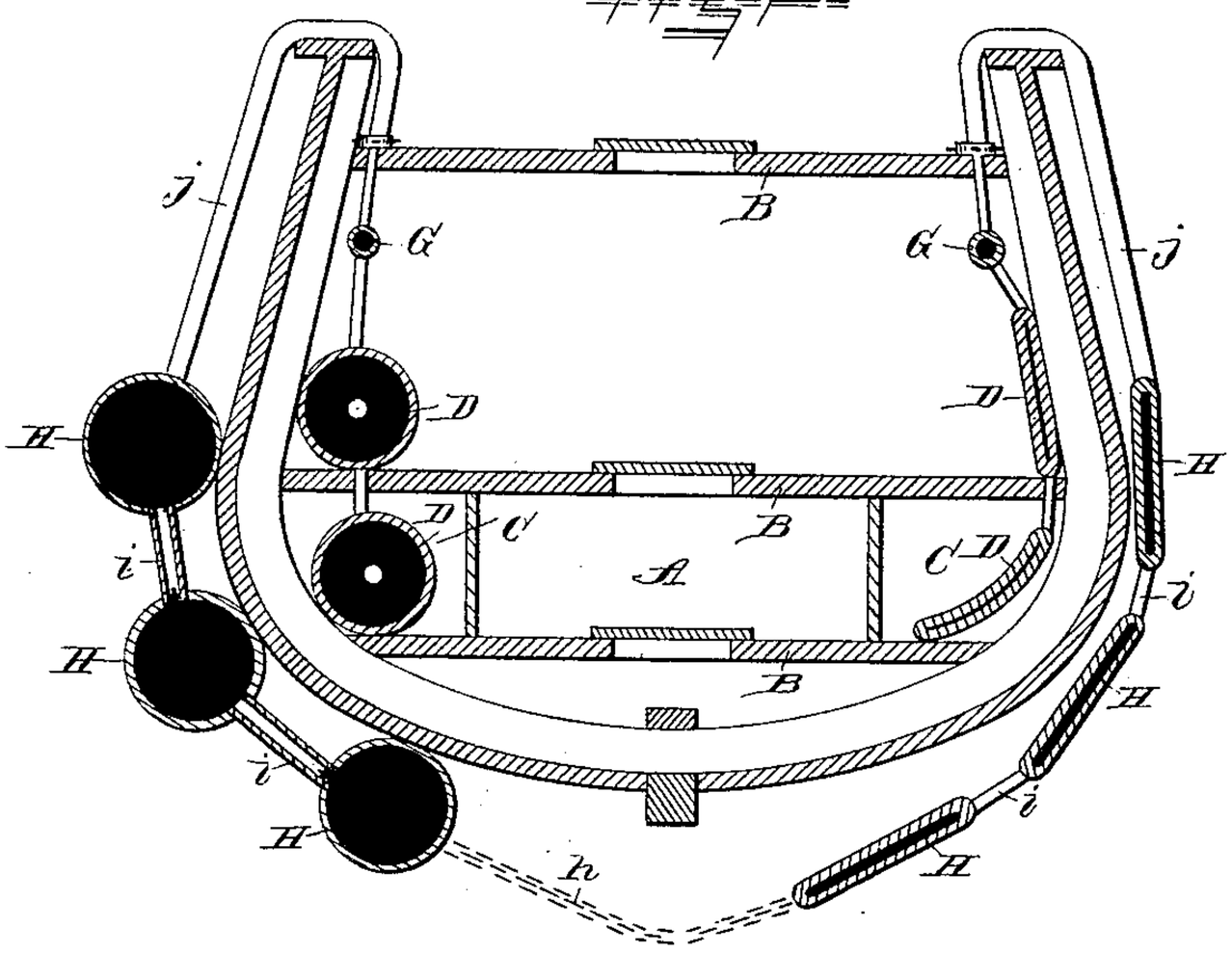
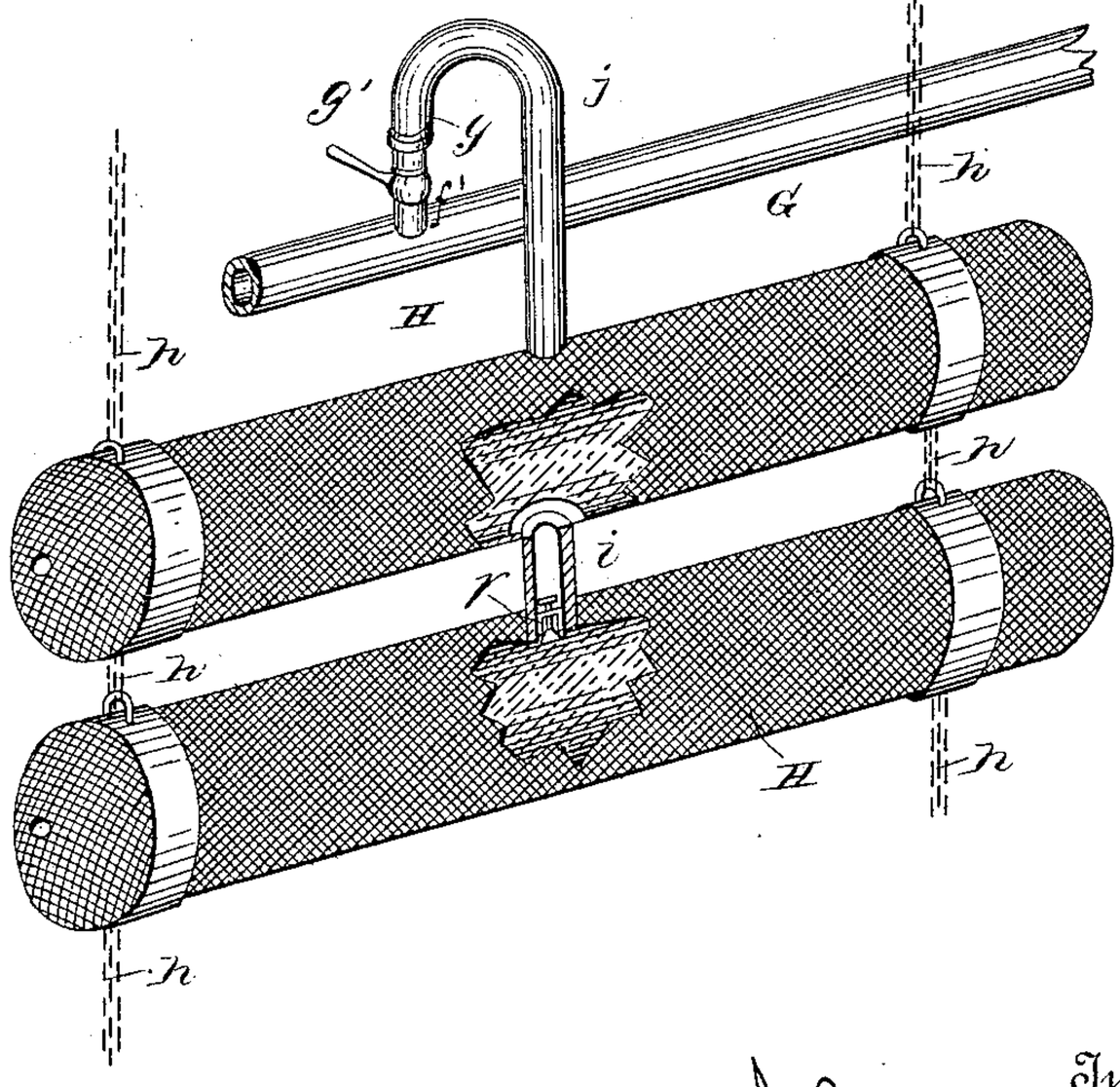


Fig. 4.



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UNITED STATES PATENT OFFICE.

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SYSTEM FOR PREVENTING VESSELS FROM SINKING.

SPECIFICATION forming part of Letters Patent No. 350,184, dated October 5, 1886.

Application filed May 18, 1886. Serial No. 202,530. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. BENNINGER, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Systems for Preventing Vessels from Sinking; 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to means for preventing vessels from sinking should they spring a leak from any cause; and it consists in the employment, both inside and outside of a vessel's hull, of a system of bags or buoys all communicating by means of pipes with a common reservoir containing a gaseous element in a highly condensed or compressed state, said pipes being provided with suitable valves for regulating the flow of gas to the bags, floats, or buoys, and said bags being provided with flexible connections, all of which constitute a new and improved system, whereby even under most adverse and extraordinary circumstances a leaking vessel and its cargo can be kept afloat and conveyed safely into port, as will be fully understood from the following description, when taken in connection with the annexed drawings, in which—

Figure 1 is a side view of a two-masted vessel, showing the flexible bags, sacks, or buoys which are applied on the outside of the hull. Fig. 2 is a longitudinal central section of the vessel, showing the bags or sacks which are applied on the outside of the hull between decks, and also the system of pipes which form communication between them and a gas or air holder. Fig. 3 is a cross-section through the hull, taken in the vertical plane indicated by dotted lines *x x* on Fig. 2, showing some of the exterior and interior bags or sacks inflated and others collapsed. Fig. 4 is an enlarged sectional detail in perspective, showing two of the exterior sacks or buoys and their chain and tube connections.

Before describing my improved system and its details I will state that I am aware that bags, buoys, bulk-heads, and other like vessels have long been employed for raising sunken vessels, and also for keeping ships afloat in case of their springing a leak, said bags or buoys being filled with atmospheric air by pumping the same into them after they are sunk, and then displacing the water which they contained. This slow method of rendering the submerged bags buoyant is not always practicable, and is not herein claimed. I am also aware that vessels have been provided interiorly with flexible bags permanently attached and provided with an air-forcing engine for filling them, and thus preventing a vessel from sinking for want of tenable space for water, and this feature I broadly disclaim.

The drawings represent my improved buoying system applied to the hull of a two-masted schooner; but it will be obvious from the following description that it may be applied to larger or smaller sailing vessels, or to vessels provided with steam propelling-power.

A designates the hull of the vessel; B, the decks, and C C bulk-head compartments, if the latter be used. Between the decks, and preferably in close relation to the inner sides of the hull, I suitably attach a series of flexible bags or sacks, D, which may be made of canvas, saturated or otherwise treated to render them gas-tight and fire-proof. These bags may also be strengthened by flexible bands or flexible netting, so that when they are collapsed they occupy very little space, and when dilated they will resist considerable internal pressure. I prefer to make the bags tubular with bulging ends, as shown in the drawings; but their size and shape will depend upon the position they are required to occupy in the hold of a vessel. I have above stated that these bags or sacks D are suitably attached to the hull; but in some cases they may be removable and arranged in spaces which may be necessarily left between boxes, bales, or other pieces of cargo. The said bags or sacks on each side of the longitudinal center of the vessel are connected together by short tubes *a*, provided with suitable trap-valves, all opening in one direction and at the bow or stern, as the case may be. The bags or sacks communicate by a pipe, C, with an air or gas holder, E, adapted for containing air or gas under great pressure, or a liquid—such, for instance, as liquid carbonic acid—which, when set free, will instantly expand

into the bags or sacks, thus rendering them highly buoyant and dispensing with pumping-engines. The pipe-connection *c* should be provided with a gas-tight cock, *d*, by means of which an attendant can regulate the flow of gas to the bags and cut off the flow at will. When these internal bags or sacks, D, are charged with air or gas, they fill up and render air-tight the spaces between or about the objects that surround them and form the cargo.

G G designate what I denominate "main pipes," which are suitably secured to the sides of the hull inside and preferably located below the upper deck. These pipes communicate with the gas-holder E. At suitable intervals along the said mains G are unions *g*, provided with cocks *f'*, the handles *g'* of which are preferably connected by a rod or chain, *k*, to the handles of the cocks *f'*, so that when the rod or chain *k* is moved endwise to discharge gas into the mains or to cut off all of the cocks in the unions or branch pipes of the mains will be simultaneously moved, and the bags H will be quickly filled with gas or air.

H H designate several series of flexible bags or buoys, which are preferably made and strengthened like the bags or sacks used inside of the hull. These bags or buoys H may be of any desired shape and size; but I prefer to make them of the shape represented in Figs. 1 and 4, and to connect each series together by chains *h*, and to establish communication between the buoys by means of flexible pipes *i*, preferably provided with trap-valves *v*, like the valves of the pipes connecting the bags or sacks D. The pipes *j* of each series of buoys H are provided with screw-couplings adapted for connecting them gas-tight to the unions *g* or branch pipes of the mains G G.

It will be observed from the above description that when the bags or buoys D and H are arranged as shown in the annexed drawings, they all communicate with one common gas-holder, E, so that in the event of the hull being stove in said bags and buoys inside and outside of the hull can be filled with a buoyant gas almost instantly and by one person, who can regulate the charge of the bags or buoys according to the necessity of the case. The external buoys, when not in immediate use, can be hauled inboard and compactly stowed away. When an accident requires their use, a rope is thrown over the side of the vessel, either at the stem or stern, both ends being held inboard, and this rope is drawn beneath the keel. The coupling-pipe *j* of one end of a series of buoys H is attached to a union of one main G, and by means of said rope the other end is drawn under the hull and attached by the pipe *j* to a union of the other main G. It will thus be seen that each series of buoys H communicates with the mains G G and gas-holder, thereby allowing the several external series of buoys to be quickly charged with gas.

If desired, the bags, sacks, or floats D used inside of the vessel's hull may be, and for some vessels will be, connected together in transverse series, like the external buoys, H, and provided with means for coupling them to the mains, each coupling device being provided with an independent cock. By this means any one or more of the series can be charged with gas or compressed atmospheric air from the gas-holder, according to the emergency. A single two-way cock applied to a pipe which communicates with the compressed gas or air holder E, and also with the internal and external series of bags, floats, or buoys, will suffice to charge them simultaneously with the buoyant element.

In practice I shall employ well-known pressure-gages applied to the holder E, and also to the bags, to prevent undue strain.

It is essential in carrying out my invention that means, such as I have described, should be employed for filling the buoys on the outside of the vessel from the reservoir E independently of the means for filling the buoys used inside of the vessel; also, that the cocks which are applied to the branch pipes of each main pipe G should be connected, as described, so that all of the cocks can be simultaneously opened.

Having described this invention, what I claim is—

1. The combination, with a vessel's hull, of collapsible bags connected together in a series by means of pipes provided with valves and located at the middle of the length of the bags, also connected together by means of chains near their ends, the supply-pipes *j*, coupled to branch pipes of main pipes located along the sides of the vessel inside thereof and communicating with a reservoir adapted to contain compressed air, and the cocks applied to said branch pipes and connected by their handles to an endwise-movable rod, by which all of the cocks can be opened simultaneously, substantially as and for the purposes described.

2. A vessel's hull provided with collapsible bags or floats connected together by means of vertical pipes and chains in several series and communicating with mains inside of the vessel by means of pipes provided with valves adapted to be moved by a single rod, the reservoir with which said mains communicate, and the collapsible bags located inside of the vessel, communicating with each other and also with said reservoir by means of pipes provided with a cock, substantially as described.

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

JNO. A. BENNINGER.

Witnesses:
GEORGE MARKER,
FRANK SENN.