No. 865,193. PATENTED SEPT. 3, 1907.

A. B. MACKLIN.

SHIP SALVAGE SYSTEM.

APPLICATION FILED DEC. 28, 1906.

2 SHEETS—SHEET 1.

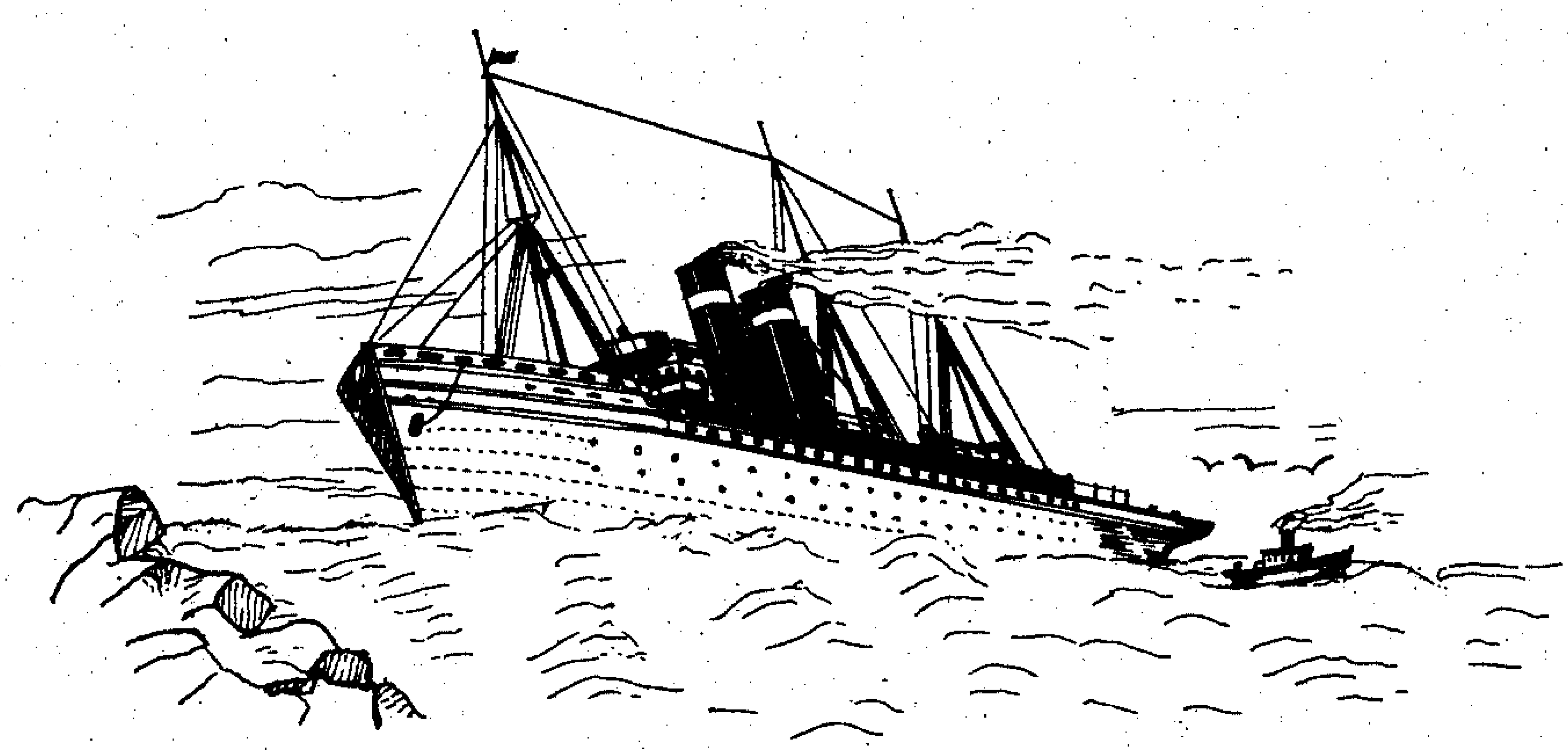

FIG. 1.

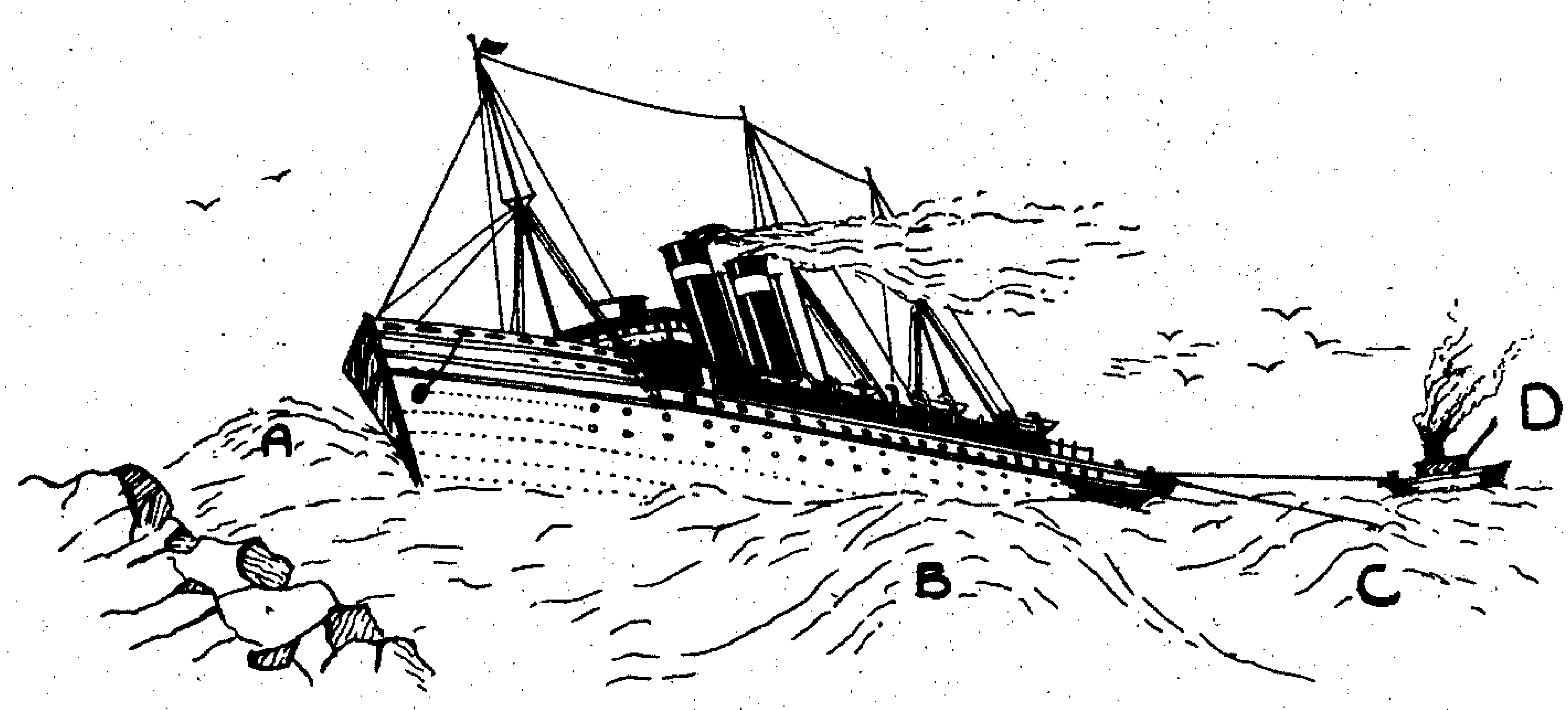

FIG. 2.

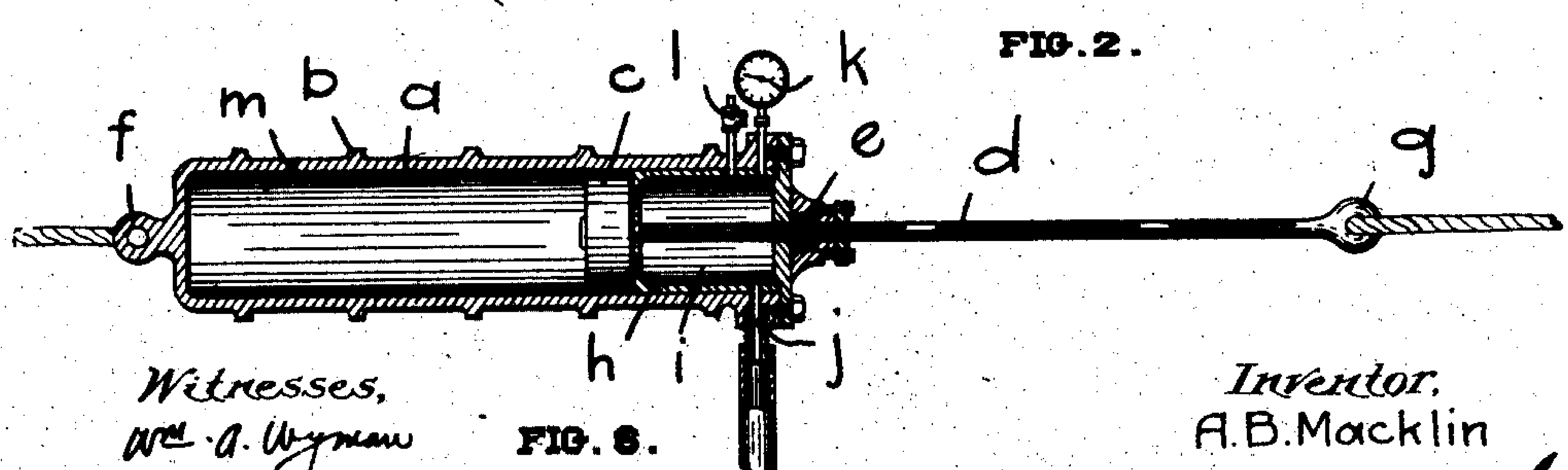

FIG. 3.

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2 SHEETS—SHEET 2.

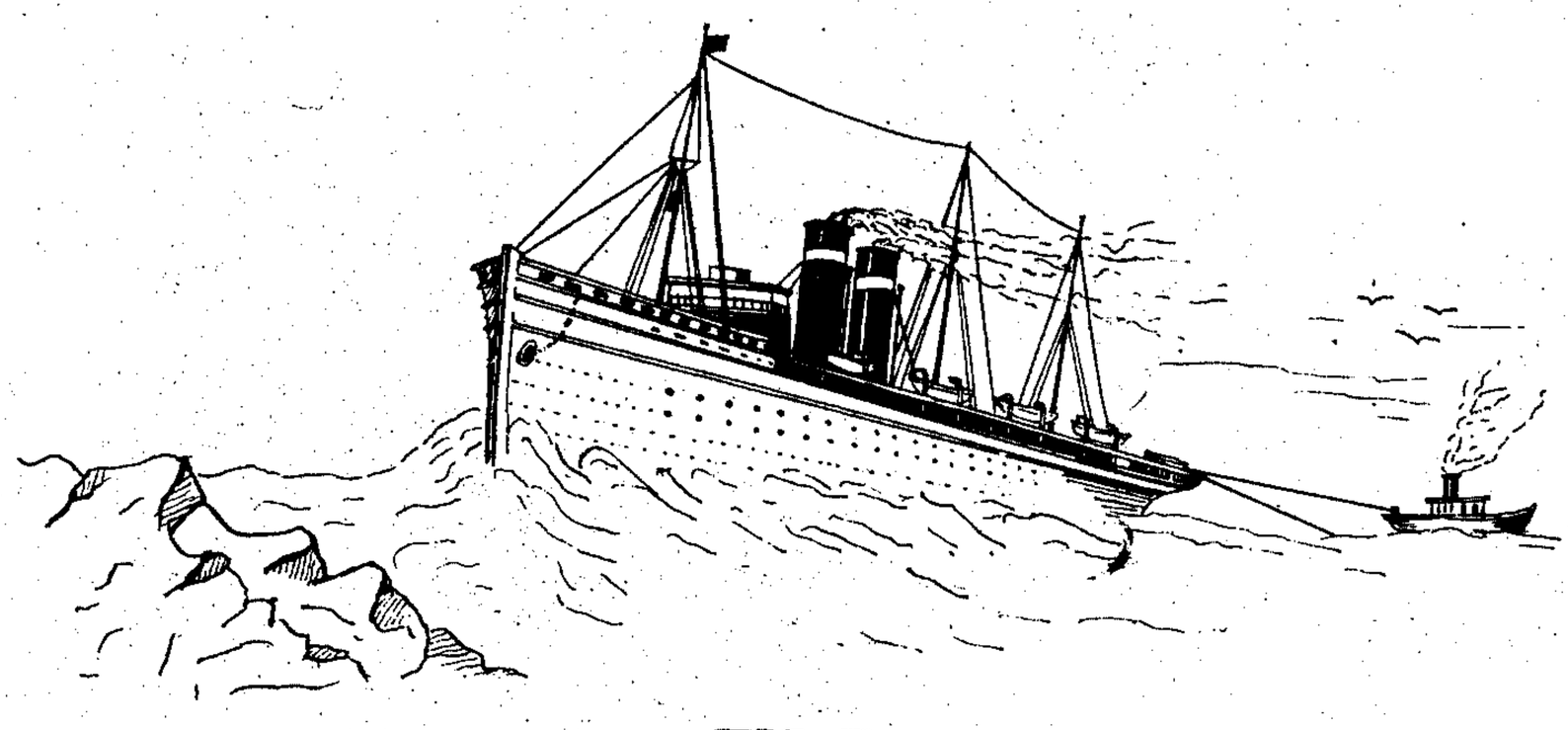

FIG. 3.

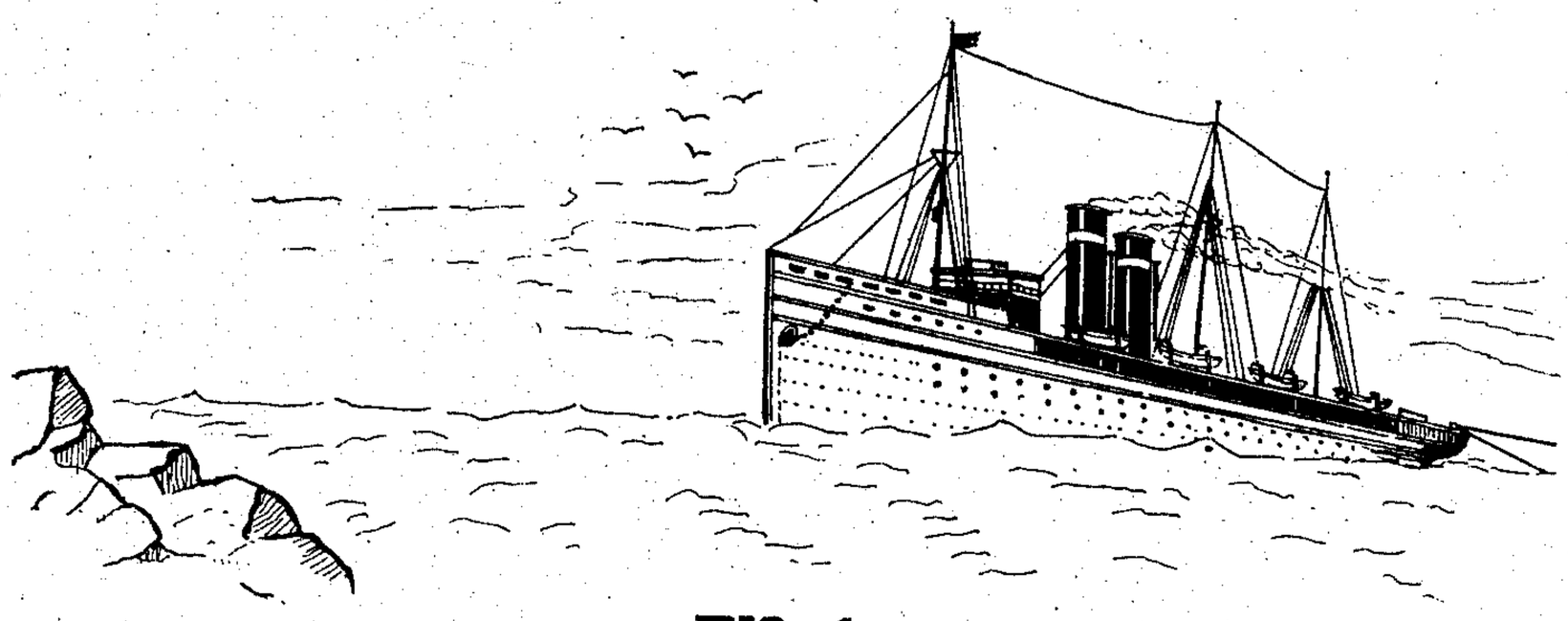

FIG. 4.

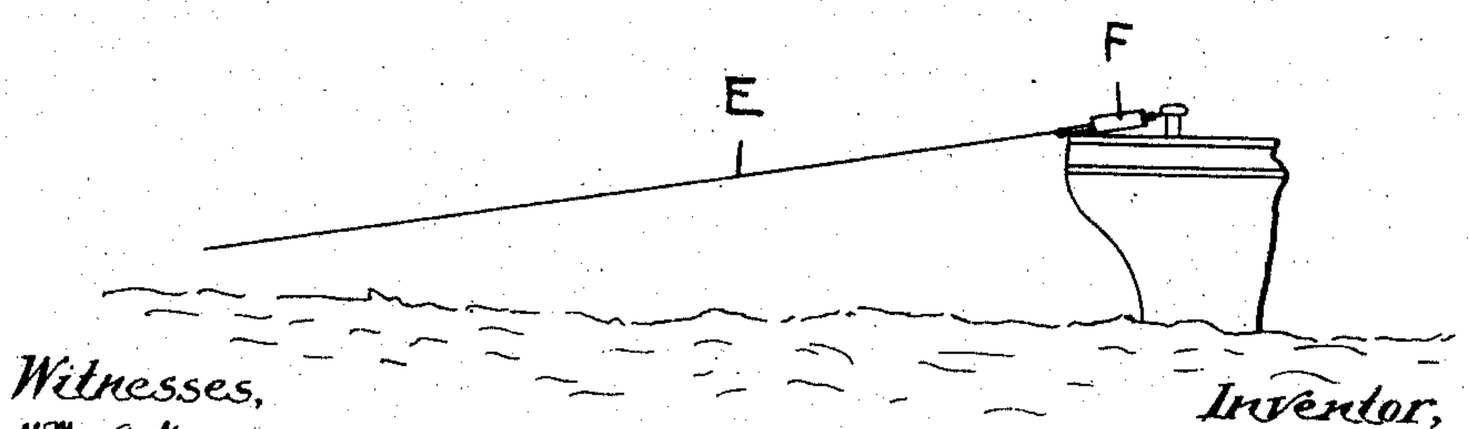

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FIG. 5.

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UNITED STATES PATENT OFFICE.

ATHOL BRANT MACKLIN, OF OTTAWA, ONTARIO, CANADA.

SHIP-SALVAGE SYSTEM.

No. 865,193. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed December 28, 1906. Serial No. 349,817.

To all whom it may concern:

Be it known that I, ATHOL BRANT MACKLIN, of the city of Ottawa, in the county of Carleton, Province of Ontario, Canada, civil engineer, have invented certain new and useful Improvements in Ship-Salvage Systems, of which the following is a specification.

This invention has reference to the salvage of steamships, or sailing vessels in cases where they have been stranded on a reef or run ashore, and where by reasons of insufficient power of their own, release is impossible, and the objects of the invention are to provide a simple and effective means by which the ship may be refloated without removing the cargo therefrom.

The application of the invention is carried out, by exerting a continuous lateral pull on the vessel, and then artificially creating a number of separate waves at some distance from the ship, which unite into one large lifting wave, on their approach to the ship. The artificial wave is created, preferably by a number of mines sunk in suitable positions on each side and, if desired, off the bow of the vessel, which are simultaneously exploded.

To insure a continuous lateral pull on the vessel, cables are attached to suitable kedge-anchors, and are tensioned by pneumatic means, comprising essentially an air-pressure cylinder and piston therein, which operate to exert a continuous pull on the cable, and when free to move, continue to maintain the tension. The details of this and other features of the system, are more fully described in the accompanying specification and drawings, and specifically set forth in the claims.

Referring to the drawings, Figure 1 is a perspective view, indicating a steamship aground. Fig. 2 is a perspective view, indicating the wave action at the first explosion of the charges. Fig. 3 is a perspective view, illustrating the final lifting of the vessel. Fig. 4 is a perspective view, showing the vessel as it floats clear of the ground. Fig. 5 is an elevation, indicating the cable with the straining means therein connected. Fig. 6 is an enlarged sectional view through the pneumatically operating and automatic straining cylinder and piston.

In the drawings like letters of reference indicate corresponding parts in each figure.

In applying the system to float a stranded vessel, a number of mines are sunk around the same at suitable points such as A, B and C, shown in Fig. 2, each mine consisting of a charge of explosive, which may be blasting powder, dynamite, gun cotton or an explosive mixture of vapor-gas and air contained in a suitable reservoir. The position of these charges will depend on the part of the vessel which is aground, and as well as being placed along the sides of the ship, as shown, they may also be placed between the bow and the shore. The mines are connected together in such a manner that they may be exploded simultaneously, which result may be most advantageously obtained, by electrical means. Prior to the explosion of the mines, arrangements are made whereby when the explosion occurs, the ship's own engines will be exerted in the effort to release her, combined with the towing energy of tugs D, if the same are available. As it is difficult under ordinary conditions and with the appliances at hand, to gather sufficient momentum to move so large a body as a vessel, the following additional means have been devised to effect this result.

A number of kedge-anchors are secured in the most desirable positions, seaward of the stranded ship. These are connected by steel cables E, to the stern capstan or towing-post of the ship. Intermediate of the length of these cables and preferably aboard ship, an air-pressure cylinder F is inserted. This cylinder may be of any suitable construction, a practical form being shown in Fig. 6, and consisting of the cylinder proper *a*, provided with strengthening ribs *b*, on its periphery, to impart resistance to pressure. The piston *c* to which is secured the piston-rod *d*, extending through an air-tight gland *e*, has a free movement within the cylinder, but is limited in its outward movement by a ring *h*, which acts as a stop whereby a space *i*, is provided at the end of the cylinder, acting as a reservoir for compressed air, introduced through the opening *j*. A gage *k*, may be connected to the cylinder, and by this means, the pressure shown. A relief valve *i*, may also be provided. The cylinder, as described, is connected by a ring *f*, at one of its extremities, to one section of the steel cable, and a ring *g* on the terminal of the piston-rod, is connected to the other section. If desired, the cylinder *a* might be connected directly to the towing-post of the ship by the ring *f*, but as the cable, of which the cylinder in reality, forms part, should be stretched taut, it is preferable and more practical, to have a short length of cable attached to the cylinder, and which may be connected to the capstan or steam-winch.

To prevent accidents in case of a rupture of the cable, a vent *m* is provided near the end of the cylinder. A release of the plunger or piston *c*, while under pressure, is prevented from doing damage, by coming in contact with the air-cushion which will be automatically formed when the piston passes the vent.

After the cylinder has been connected in position in the cable with the piston at the innermost point of its travel, ordinary means are adopted to take up all slack, and the cable is then strained taut, which withdraws the piston *c*, thus compressing the air in the limited space *i*. Additional pressure is added by forcing air into the reservoir *i*, by means of a suitable pump, which may be hand-operated, until the pressure is raised to, say: 1,000 pounds to the square inch. Under these conditions, if the cylinder is 12 inches in diame-

ter, the pressure on the piston or plunger c, will represent a tension of about fifty tons between the ship and the anchor; and, if two such cylinders are in operation there will be a tension of 100 tons tending to draw the ship off the beach, the moment she lifts from the bar.

The pulling strain of one hundred tons referred to, is equivalent to a dead-weight pull continuing a distance equal to the travel of the piston or plunger in the cylinder, say: four feet, and is sufficient to impart the necessary momentum to get the vessel under way in the direction of deep water. Of course, the compressed air gradually expands as the piston moves outwardly, resulting in a reduction of pressure but before this has occurred to any appreciable extent, the desired movement of the vessel will have been accomplished.

When the preparations described, have been made, the mines are simultaneously exploded by electrical or other suitable means. The displacement of water thus effected, results in the creation of a number of separate waves, as shown in Fig. 2. These waves, on their approach to the vessel, combine into a single wave of considerable volume and height, as shown in Fig. 3 which irresistably lifts the vessel by the power of flotation. At this critical moment, the action of the ship's own engines, combined with the pulling tugs and with the tension or pull exerted by the pneumatically operated cylinders, will be sufficient to impart momentum, moving the ship from her dangerous bed and into a position of safety, as shown in Fig. 4. If unsuccessful in the first attempt, the process may be repeated until the vessel floats freely.

The use of the pneumatic apparatus, as described, inserted in the cables, insures a continuous and steady pull; its action being automatic, the effect is applied the instant it is available, due to the lift of the vessel. Such an end could be attained in no other manner. Tugs are helpful but not dependable; their pulling power is relatively small, and through contrary wave-action, their efforts might prove to be absolutely ineffective at the critical moment.

The apparatus described is inexpensive; the system avoids the necessity of the removal of the cargo, except in rare instances, and the means utilized to lift the ship bodily from her anchorage in the sand or on the rock are exceedingly simple, easy to apply and may be carried out with no danger to the vessel or to the men.

The great advantage of such a system as this, cannot fail to be recognized in the maritime world. Many ships are yearly abandoned, and a large percentage, if not all, of their valuable cargoes lost, which could otherwise be saved by the method of salvage herein described.

While the details of the system are herein described with great particularity, yet it will be readily understood that considerable change might be made therein within the scope of the appended claims, without departing from the spirit of the invention.

What I claim as my invention is:—

1. In a ship salvage system, the herein described means for raising the ship consisting of means for artificially creating a number of separate waves at a distance removed from the ship, the said waves being adapted, on approach to the ship, to unite in one large lifting wave, and raise the ship, by the power of flotation, in combination with a cable extending from the ship to a suitable support, and pneumatically operated means intermediate of the length of the cable, for creating a stress therein, and contracting the same as soon as the ship is free to move, as and for the purpose specified.

2. In a ship salvage system the combination with the means for raising the ship, of a cable secured to the ship and to a fixed support, a co-acting cylinder, and its piston inserted intermediate of the length of the cable, means for storing compressed air in one end of the cylinder, whereby when the vessel is raised, the said compressed air may expand and shorten the cable, as and for the purpose specified.

3. In a ship salvage system, the combination with the means for raising the ship, of a cable exerting a lateral pull thereon, a cylinder, a piston operating therein, means for limiting the outward movement of the piston to leave a dead space at the end of the cylinder, and means for introducing compressed air into said dead space, as and for the purpose specified.

Signed at the city of Ottawa, in the Province of Ontario, this 22nd day of December, 1906.

ATHOL BRANT MACKLIN.

Witnesses:
RUSSEL S. SMART,
T. H. GEAR.