

(No Model.)

2 Sheets—Sheet 1.

A. A. GRAHAM.  
PNEUMATIC PROPELLER.

No. 583,742.

Patented June 1, 1897.

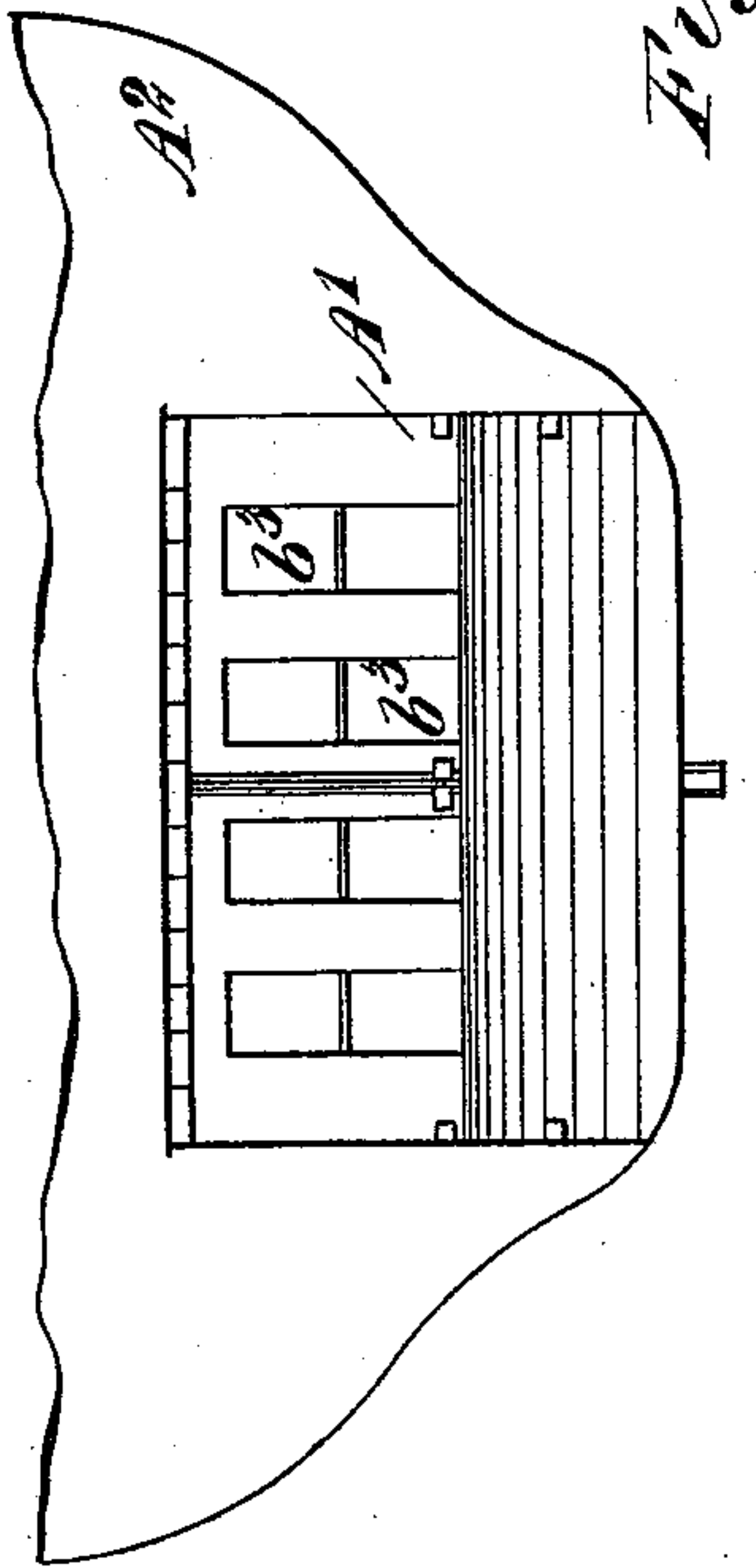
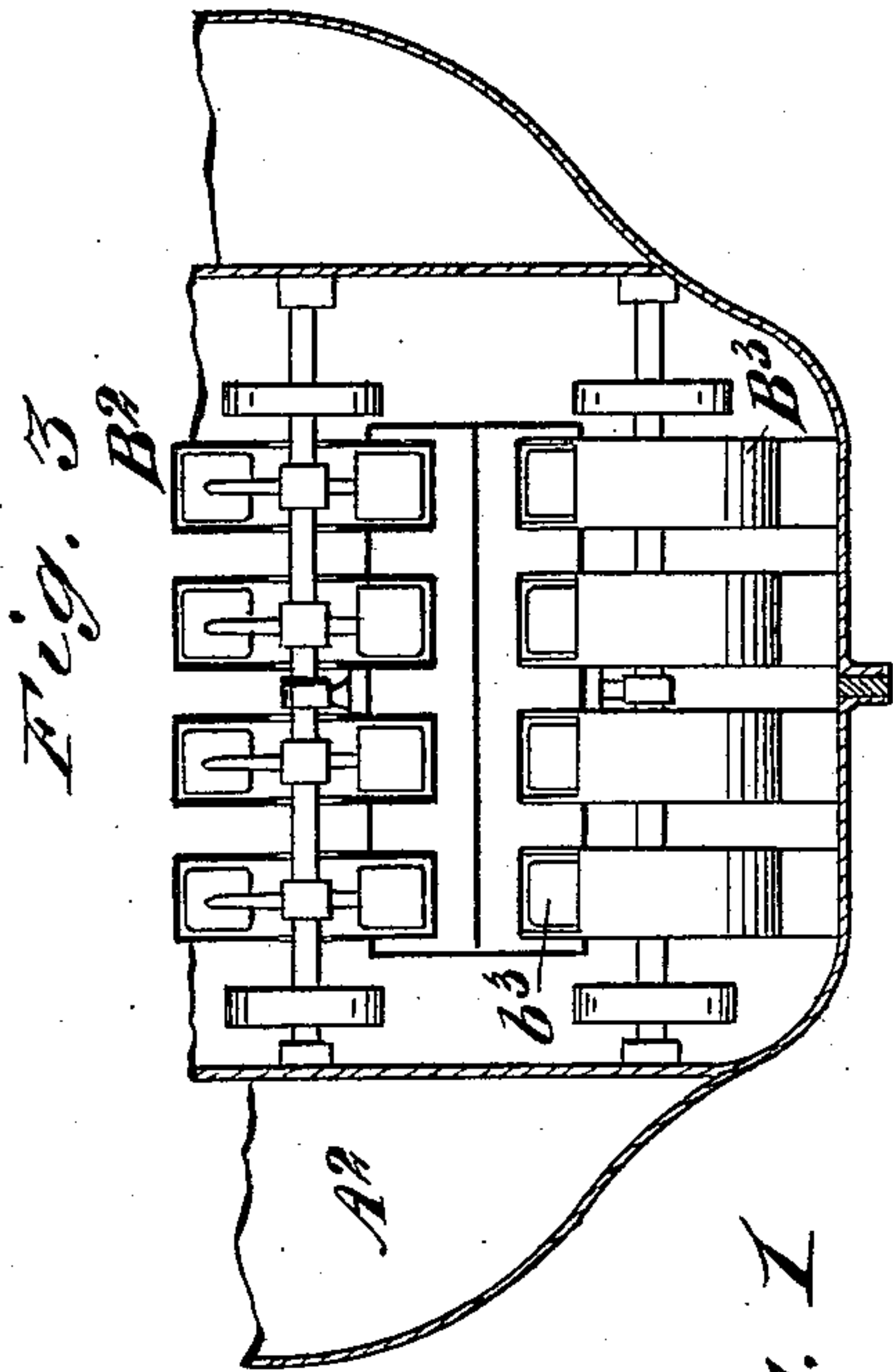
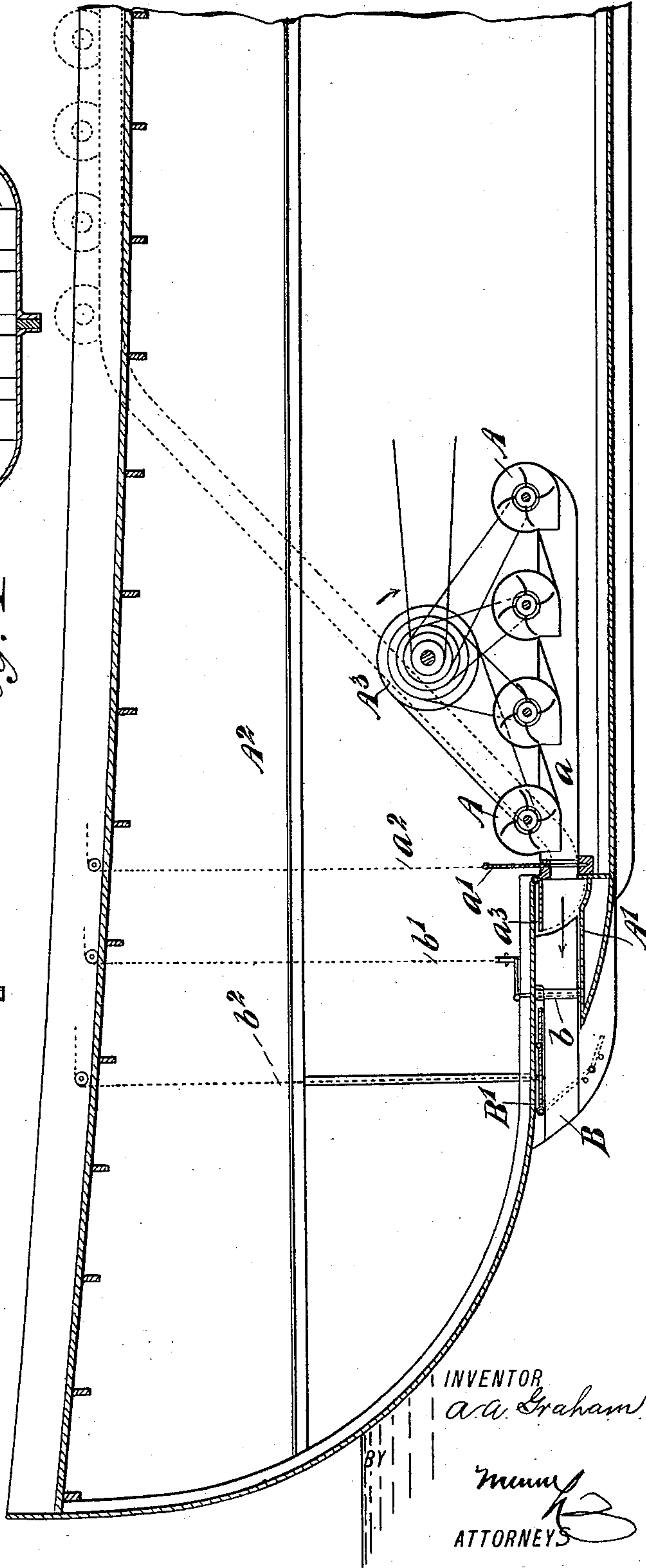


Fig. 1



WITNESSES:

*C. Neveu*  
*C. R. Ferguson*

INVENTOR

*A. A. Graham*

*Munn*  
ATTORNEYS

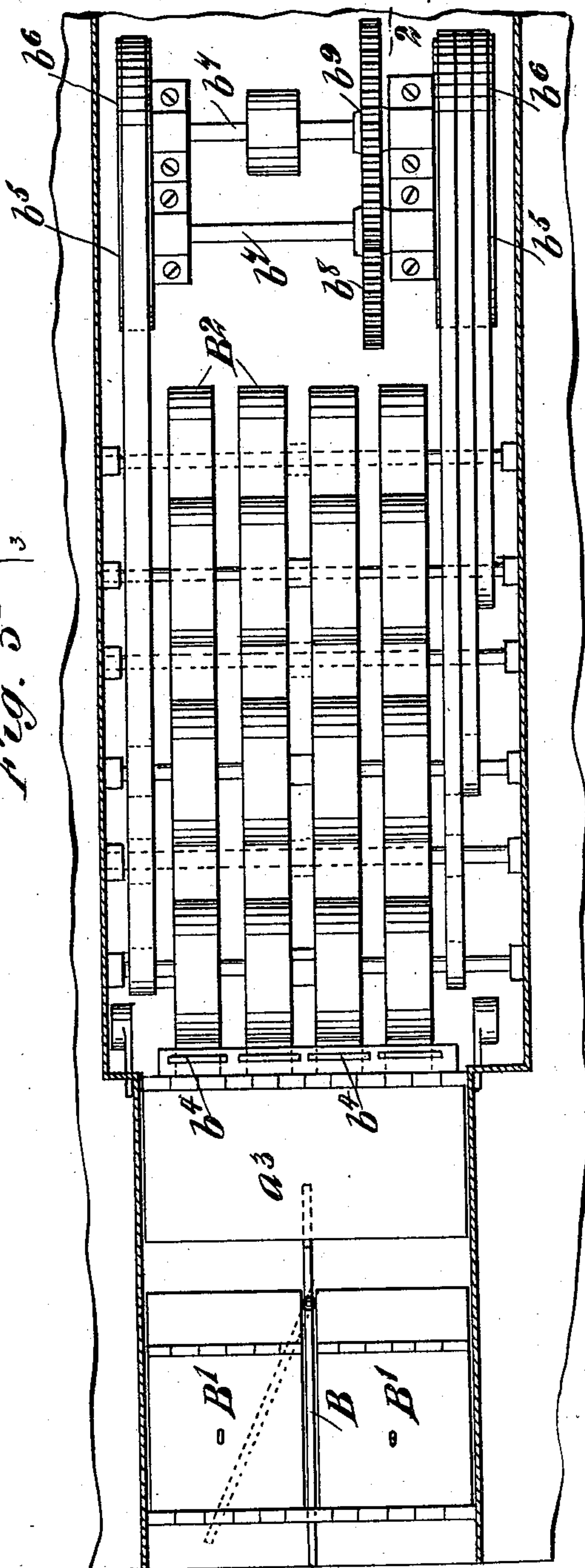
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2 Sheets—Sheet 2.

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**WITNESSES:**

C. Neveu  
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A. A. Graham

BY

ATTORNEYS



# UNITED STATES PATENT OFFICE.

ALBERT ALEXANDER GRAHAM, OF TOPEKA, KANSAS.

## PNEUMATIC PROPELLER.

SPECIFICATION forming part of Letters Patent No. 583,742, dated June 1, 1897.

Application filed January 9, 1896. Serial No. 574,811. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT ALEXANDER GRAHAM, of Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Methods of and Means for Marine Propulsion, of which the following is a full, clear, and exact description.

This invention relates to a method of and means for the propulsion of vessels, and a main object is to provide means for such propulsion in which the engine-power required is comparatively small, thus saving in fuel, and in which the propelling power may be employed for steering the vessel.

The invention consists in the employment of an air-blast for propelling the vessel and in means for causing such blast, as will be hereinafter specified, and particularly pointed out in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a vertical section of the stern of a vessel, showing my invention as applied thereto. Fig. 2 is a vertical section showing a modification. Fig. 3 is a section through the line 3 3 of Fig. 2. Fig. 4 is a rear elevation, and Fig. 5 is a horizontal section.

In carrying out my invention I employ a series of fans for generating an air-blast, the fans being rotated at different speeds, as a blast thus generated will be of great force and pressure—that is, the air will become more and more compressed as it travels outward, thus causing a more solid impact with the water. In the example of my improvement shown in Fig. 1 there are four fans A, arranged in a row, one rearward of another, and all discharging into an air-duct  $a$ , which communicates with a passage-way  $A'$ , leading through the stern of the vessel  $A^2$ . The stern of the vessel is shown as curved rearward and upward, and the passage-way  $A'$  is located just above the keel, so that the air-blast will strike the water near the bottom of the vessel and by its expansion and pressure against the stern of the vessel will force the vessel along. I have shown the fans as arranged in the lower portion of the vessel's hull, but it

is obvious that, if desired, they may be placed on deck, as indicated in dotted lines in Fig. 1.

The several fans are rotated at different speeds by band connections with a cone or step pulley  $A^3$ , which is driven, preferably, from an electric motor.

In the outer end of the duct  $a$  is arranged a vertically-sliding gate  $a'$ , that may be operated from the deck or pilot-house of a vessel by means of a chain  $a^2$ . This gate  $a'$  is designed to be closed when the vessel is in port or at anchor to prevent the entrance of water. I also provide a vertically-swinging gate  $a^3$  for the end of the duct  $a$ . This gate  $a^3$  is counterbalanced or poised, so as to swing open easily under the air-blast pressure when the fans are in operation and to automatically close should the air-blast cease through some accidental or other cause and thus prevent the entrance of water to the duct.

The passage-way  $A'$  is divided longitudinally by a vertically-arranged swinging partition B. This partition B is pivoted on a post  $b$ , so that it may be swung transversely of the passage-way in order to direct a greater amount of air-blast to one side or the other to steer the vessel. This partition therefore serves as a rudder, and as it is wholly within the passage  $A$  there is no danger of its being broken by coming in contact with floating objects, and, further, as it does not drag in the water it does not offer any resistance to the movement of the vessel. The partition may be deflected from the pilot-house by means of chains or connections  $b'$ , engaging with arms extended from the pintle of the partition.

Hinged to the upper wall of the passage  $A'$  at opposite sides of the partition B are deflector-plates  $B'$ , each comprising two hinged sections. Connections  $b^2$  extend from these plates  $B'$  to the pilot-house, and when these plates are in their upper position the air from the fans will force the vessel forward, but when said plates are lowered, as indicated in dotted lines, the air will be deflected forward beneath the vessel and thus move the vessel backward.

In the example of my improvement shown in Figs. 2 to 5 I have shown two tiers of fans, each tier comprising a number of rows of fans, and each row discharges into a duct



$b^3$  independent of all the other ducts. All of these ducts  $b^3$  discharge into the passage-way  $A'$ , and each duct has an end closure  $b^4$ , that may be operated from the pilot-house. The  
5 several fans  $B^2 B^3$  are operated by band connection with pulleys  $b^5 b^6$  on the shafts  $b^7$ , which have gear connections  $b^8 b^9$ .

It will be seen that the operation of a vessel equipped with my invention is under complete control of the pilot and that a considerable power may be obtained with a comparatively small amount of fuel.

Having thus fully described my invention, I claim as new and desire to secure by Letters  
15 Patent—

1. The combination with a vessel having an air-passage leading through its stern, means for forcing air outward through said passage, a vertical partition in the outer portion of  
20 said passage and mounted to swing, means

for swinging said partition, a vertically-sliding gate in said passage forward of said partition and means for operating said gate, substantially as specified.

2. The combination, with a vessel having an  
25 air-passage leading through its stern, of a series of fans for forcing air through said passage, means for operating the fans, a vertical partition at the outer portion of the passage and mounted to swing laterally, a vertically-  
30 sliding gate for said passage rearward of the fans, means for operating the same, and a swinging gate for said passage designed to be moved to an open position by the air-pressure from the fans, substantially as specified. 35

ALBERT ALEXANDER GRAHAM.

Witnesses:

ROBERT STONE,  
C. H. NETTELS.