

A. E. APEL.  
BOAT.

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928,579.

Patented July 20, 1909.

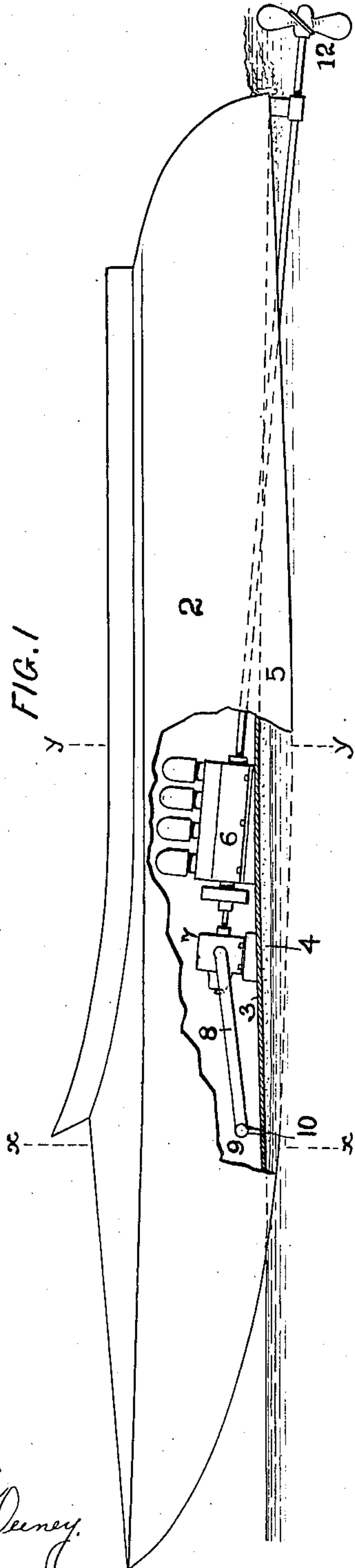


FIG. 4

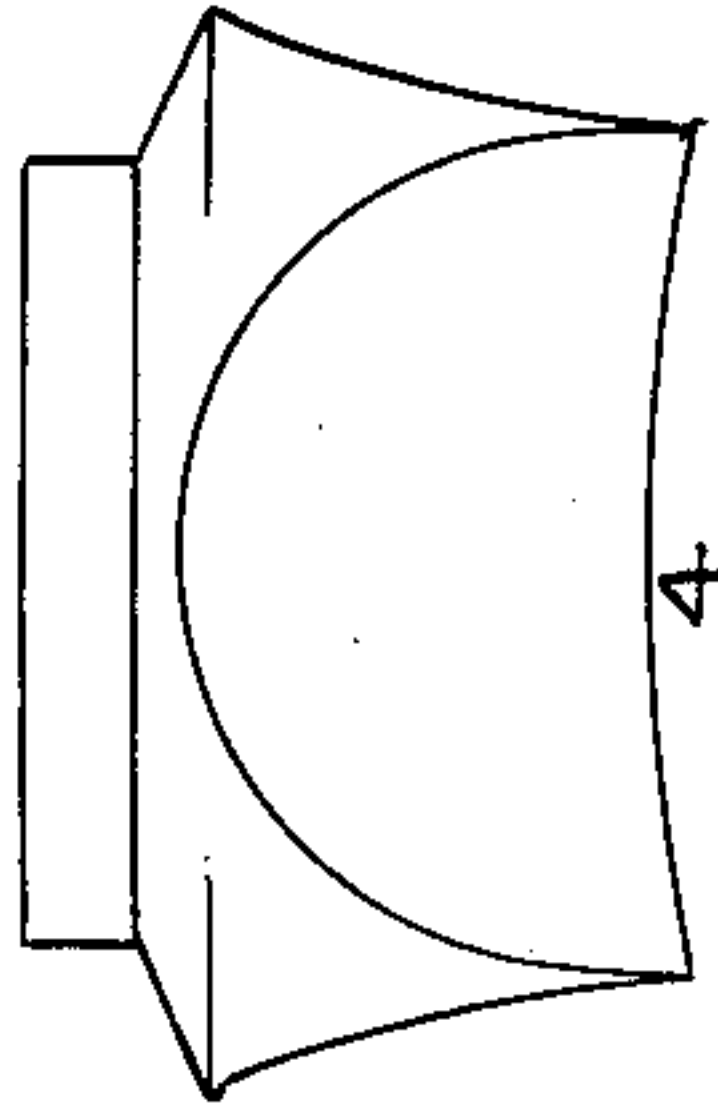


FIG. 3

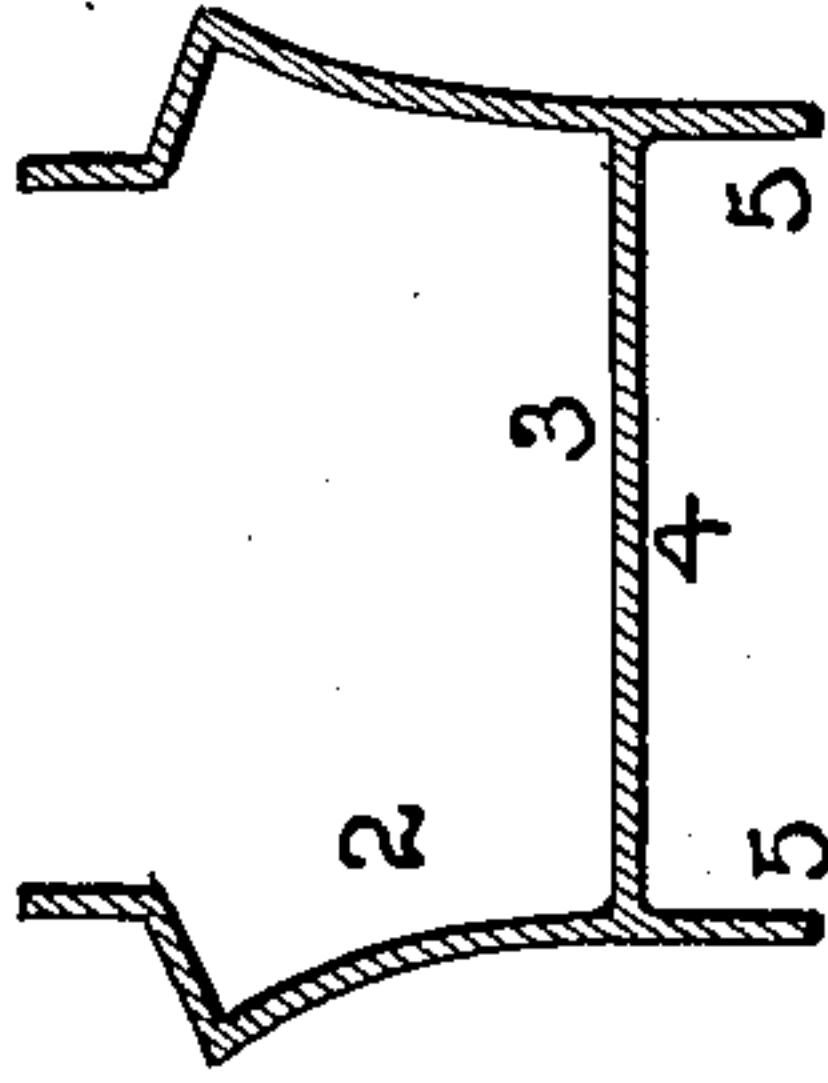


FIG. 2

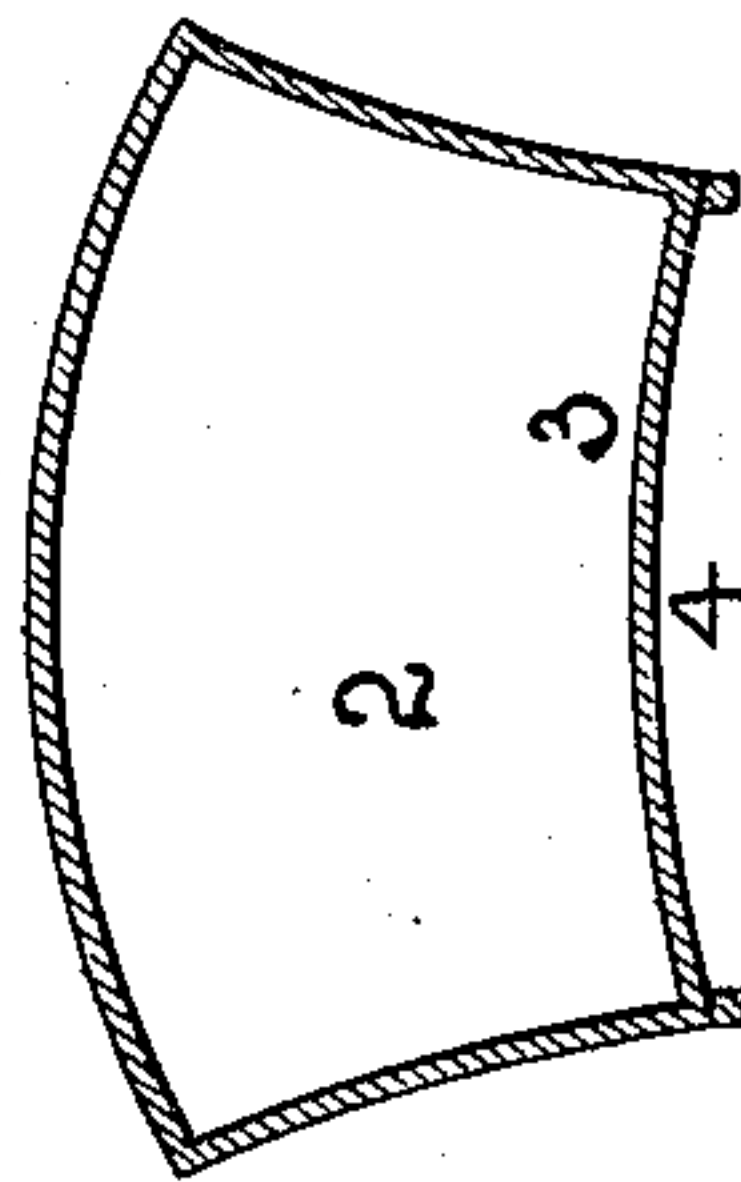
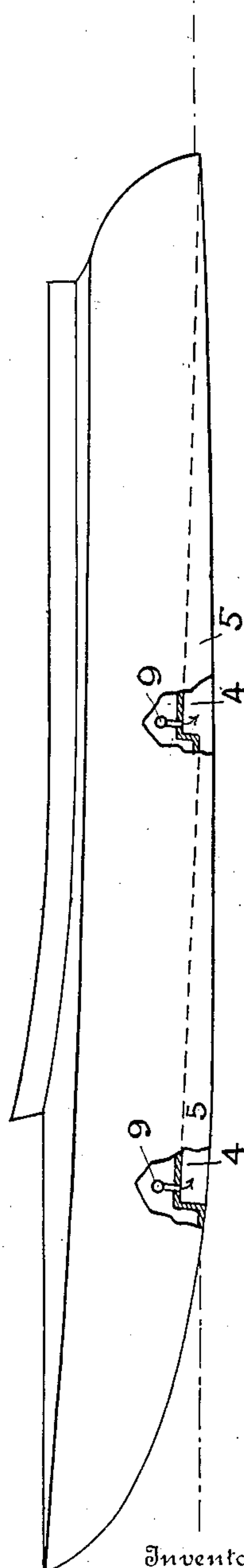


FIG. 5



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# UNITED STATES PATENT OFFICE.

ADOLPH E. APEL, OF ATLANTIC CITY, NEW JERSEY.

## BOAT.

No. 928,579.

Specification of Letters Patent.

Patented July 20, 1909.

Application filed November 18, 1908. Serial No. 463,144.

*To all whom it may concern:*

Be it known that I, ADOLPH E. APEL, resident of Avenues Fifth and C, Ventnor, Atlantic City, county of Atlantic, State of New Jersey, have invented an Improvement in Boats, of which the following is a specification.

My invention has reference to boats and consists of certain improvements, which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

The object of my invention is to provide a construction of motor-boat which shall have a minimum resistance to being propelled through or over the water, whereby great speed may be secured with a minimum expenditure of power and with the least possible strain upon the boat proper.

My invention is especially useful in comparatively smooth sea or inland water, and while its advantages are more fully secured under such conditions, the boat may be employed in rough water with an embodiment of the advantages, though in a lesser degree.

In high-speed motor-boats, as at present constructed, there is a great tendency, when traveling under speed, to produce waves and a great deal of spray, which not only reduces the possible speed with a given expenditure of power, but also renders the sport of motor boat racing more or less unpleasant.

The object of my invention is to provide a construction whereby the above objectionable features are entirely eliminated, or so far eliminated, as to be unobjectionable.

My invention consists in providing the motor-boat with a bottom, which is flat or slightly recessed so as to present an extended surface both longitudinally and laterally to the water, and combining therewith, means for introducing air between the boat bottom and the water, whereby the resistance between the bottom of the boat and water is very materially reduced.

My invention further consists in providing the above specified boat with side keels, bounding the flattened or slightly recessed bottom of the boat, to prevent the escape of the air laterally and provide a continuous volume of air upon which the boat rides in passing over the water, the side keels extending down into the water act as guides and sealing strips for the air chamber thus formed below the boat.

My invention further comprehends details

of construction which, together with the features above specified, will be better understood by reference to the drawings, in which:—

Figure 1 is a side elevation of a motor-boat embodying my invention with part in section; Fig. 2 is a cross section of the same on the line  $x-x$ ; Fig. 3 is a cross section of the same on the line  $y-y$ ; Fig. 4 is an elevation of the stern of the boat; and Fig. 5 is a side elevation with part in section of a modification of my invention.

2 is the body of the boat and may be made in any suitable manner.

3 is the bottom of the boat and, transversely considered, may be made slightly hollow at the forward and rear parts, as indicated in Figs. 2 and 4, and more or less horizontal or flat in the middle as indicated in Fig. 3. The sides of the boat may be extended downward to form keels 5, and these keels are preferably deeper in the middle of the boat than at the bow and stern ends. This construction of bottom provides a longitudinal channel or compartment 4 which, when the boat is in position upon the water, constitutes a longitudinal chamber bounded on the sides by the side keels 5. The bottom 3 of the boat is preferably swelled upward slightly between the bow and stern, as indicated in Fig. 1, but this is not essential.

6 represents an engine of the explosive or other type for operating the propeller 12. The engine may also operate the air compressor 7 for forcing air, under pressure, through a pipe 8 into a header 9 from which nozzles 10 extend through the bottom of the boat adjacent to the bow portion, for the purpose of delivering compressed air between the bottom of the boat and the surface of the water and into the part which I have designated as a compartment 4. As the air is delivered below the bottom of the boat near the bow and is prevented from escaping laterally by the shape of the boat and from escaping forward by the resistance of the water, the said air will fill the compartment 4 throughout the length of the water line of the boat in such a manner as to present a more or less thin air film upon which the boat largely rides, with the result that the friction between the bottom of the boat and the surface of the water is greatly reduced. It is evident that, with this method of reducing the resistance between the boat and the water, materially less power will be required to propel the boat at a given speed; or with



the same power, the boat may be driven at a far greater speed than is possible in the case of a similar boat in which contact with the water throughout its length is had.

5 By making the bottom 3 of the boat higher in the middle than at the bow and stern, it is evident that there is provided a chamber which may be in contact with the water throughout its perimeter, but which may  
10 seal a given quantity of air when the boat is at rest, so that even at the starting the resistance is reduced to a minimum and the boat may obtain great speed in a limited period of time.

15 From the foregoing it will be seen that my improved motor boat consists of a body having the under part of its bottom formed with a hollow compartment tapering in depth at the bow and also at the stern and of greatest  
20 depth at the middle portion and in which the bow is curved under and blended gradually into the hollow bottom, the said bottom being slightly curved upward at the middle in a transverse direction near the bow and stern  
25 portions and substantially straight in transverse cross section at the middle portion, combined with means to admit air to the hollow bottom immediately back of the bow, whereby a thin film of air is provided under  
30 the boat and between it and the water and said air is guided to the central portion of the bottom at the bow and stern portions where the compartment is very shallow and allowed to spread at the middle portion where  
35 the compartment is deep.

During the running of the boat, the water will be continually displaced from contact with the bottom thereof by the introduction of the compressed air, and this will remove  
40 the frictional contact between the water and the boat while still maintaining the buoyancy when under head motion. By this introduction of the air, the wetted surface of the boat is reduced and the reduction of the friction  
45 between the water and the boat is largely proportional to this reduction in the wetted surface. In view of this reduction in the friction, there is less resistance against driving the boat forward and consequently,  
50 the speed capacity of the boat under given power is greater than in boats as ordinarily constructed. Moreover, in a boat embodying my improvements, there will be very little tendency to produce waves and conse-  
55 quent spray and the resistances and discomfort arising therefrom. While my boat is more especially designed for comparatively smooth water and for very high speeds, it is evident that the merits of the invention may  
60 be effective in rougher water, though the advantages will not be secured to the same degree.

If desired, the bottom of the boat may be made with notches instead of one continuous

bottom, said notches being indicated in Fig. 65 5. In this construction, the compressed air may be delivered only to the front notch alone or to each notch as indicated.

The essential feature of my invention resides in the provision of means for introduc- 70 ing a layer of compressed air between the bottom of the boat and the surface of the water in a motor-boat, in which the compressed air operates to reduce the wetted surface of the boat in contact with the solid 75 body of the water; and while I have shown my invention in the form in which I prefer to apply it, I do not restrict myself to the details, as these may be modified in various ways without departing from the spirit of the 80 invention.

Having now described my invention what I claim as new and desire to secure by Letters Patent, is:

1. A motor boat consisting of a body hav- 85 ing the under part of its bottom formed with a hollow compartment tapering in depth at the bow and also at the stern and of greatest depth at the middle portion and in which the bow is curved under and blended gradually 90 into the hollow bottom, the said bottom being slightly curved upward at the middle in a transverse direction near the bow and stern portions and substantially straight in transverse cross section at the middle portion, 95 combined with means to admit air to the hollow bottom immediately back of the bow, whereby a thin film of air is provided under the boat and between it and the water and said air is guided to the central portion of the 100 bottom at the bow and stern portions where the compartment is very shallow and allowed to spread at the middle portion where the compartment is deep.

2. A motor boat consisting of a hull having 105 a bow curved under and provided with a bottom compartment having side keels tapering in depth to nothing at the stern and the bottom of the boat between the side keels being made substantially flat trans- 110 versely where the keels are deep and gradually curved upward in a transverse or athwartship direction adjacent to and at the stern and the highest point of such transverse curvature being at the transverse center 115 of the boat, combined with means for delivering air into the compartment near the bow and forming a film of air between the bottom of the boat and the water, and whereby it leaves the bottom centrally of the 120 boat at the stern.

In testimony of which invention, I hereunto set my hand.

ADOLPH E. APEL.

Witnesses:

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BERTHA CLARK.