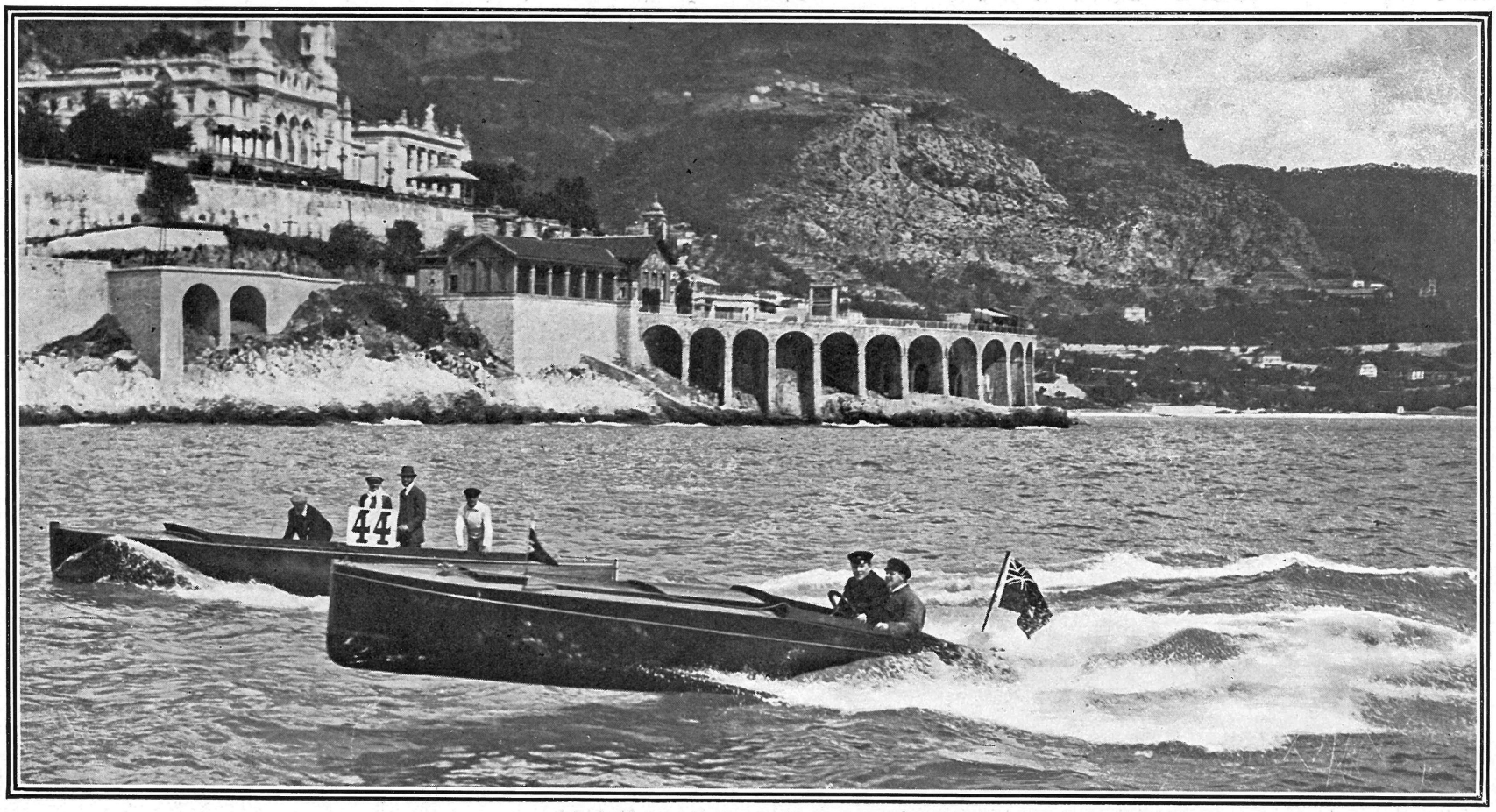


A hydroplane at the present Monaco meeting—the boat is rising well out of the water, thus lessening the resistance

What is a Hydroplane?

THE DIFFERENCE BETWEEN A HYDROPLANE AND A HYDRO-AEROPLANE EXPLAINED FOR "SPHERE" READERS

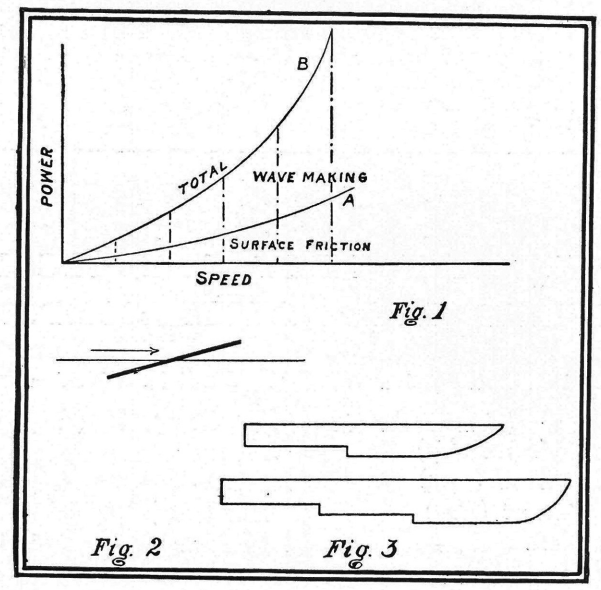
The terms, hydroplane and hydro-aeroplane, are not unnaturally liable to confusion in the public mind, and in fact the awkwardness of the term, hydro-aeroplane, leads to a cutting down of syllables in conversation among non-experts which is bound to produce misapprehension of the two means of progression.

A hydroplane is not a hydro-aeroplane and the terms are not interchangeable, similar as they are in appearance and sound. A hydro-aeroplane is *a flying machine* adapted for flight over water and land, with special apparatus for alighting and progressing over the surface of the water when required. The hydro-aeroplane can rise from the surface and continue to fly as an aeroplane pure and simple.

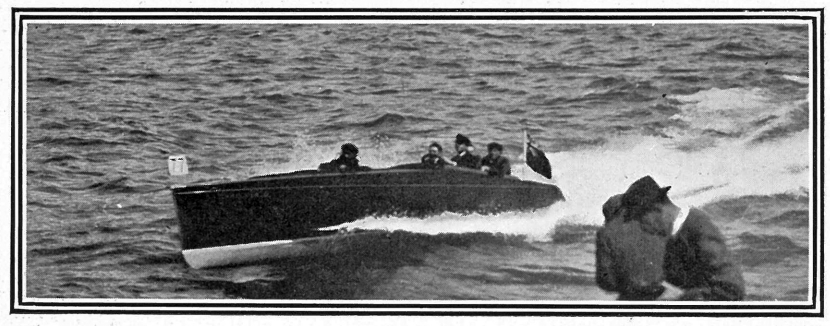
The hydroplane, on the other hand, is a *boat* which though it makes, as it were, an attempt to leave the water never actually does so. The hydroplane is the outcome of the motor-boat which set up a new standard in naval speed records by the use of a gasoline engine. The motor-boat could not, however, progress beyond a certain point in speed. Skin friction and wave-production held it back as they hold back all craft which are driven through water. As shown roughly in the annexed diagram (fig. 1), whereas the surface friction increases as the square of the speed, the power consumed in wave-making increases very much more rapidly, that is, at an increasingly rapid rate of increase. This wave-making resistance is due to the displacement of water by the moving boat.

But if one can avoid driving the craft through the water at all? If we can drive it over the water we can largely reduce the displacement resistance. Then we shall be utilising the principle which keeps a well-thrown skimming stone flying for a long distance over the water. A new type of boat was therefore devised with "steps," as shown in fig. 3, which would skim over the water and not move through it as all other boats had hitherto done.

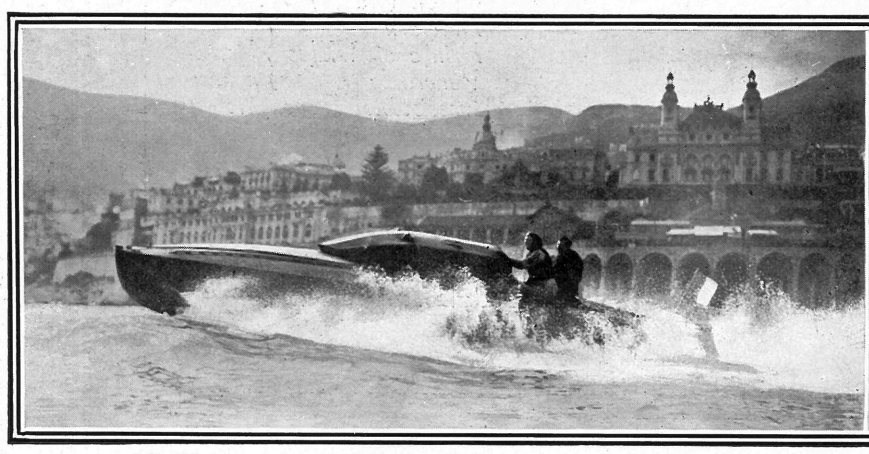
When the engine is started the bow rises, but ordinary buoyancy is still the ruling factor, and the stern sinks until the additional immersion of the after part displaces enough volume of water to support the boat (fig. 2). As the speed increases the further rising of the bow moves the centre of upward thrust back until it reaches almost to the centre of gravity of the craft. The boat is then ready to pivot vertically, so to speak, upon this point; and with further increase of speed the boat, powerfully upheld by the fluid pressure on its bottom, drops its bow but raises its stern till its bottom rests on the surface of the water at a small angle therewith and with very little displacement of water compared with that in the position of the boat when at rest. The main factor is no longer static buoyancy, but the new lifting force due to the speed of the boat. This is the true planing or skimming position; the power of the engine is translated into a speed which could never be attained in an ordinary boat with a displacement hull. If the speed is still further increased the bow may be sharply depressed, causing the craft to dive headlong.



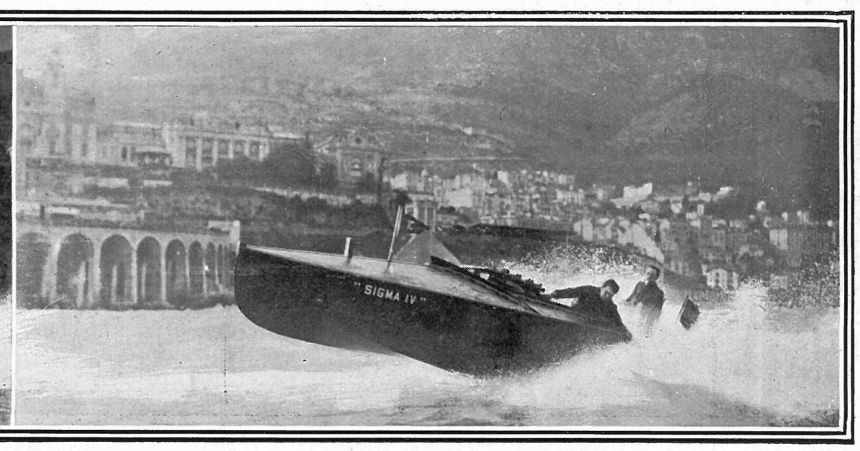
(Fig. 1) How the power required to drive a hydroplane increases with the speed and the loss by skin friction and wave-production. (Fig. 2) How the hydroplane moves over the water. (Fig. 3) One-step and two-step hydroplanes



Loss of Speed by Skin Friction on the Bow in this Position



All Wave-producing Means Loss of Speed Energy



Hydroplane in the Skimming Position—No Skin Friction on Bow

These two views were obtained last week during the Monaco meeting