

The Floating Needle

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The writer believes that the water surface films in the case of a floating needle are of such small dimensions that they can not be directly likened to the films when the floating body is relatively large, as, for instance, what are found when a thin walled aluminum tube with plugged ends is floated. The shape of the water film next the needle is not necessarily the same as may be found next the aluminum tube. The surface is not perpendicular to the needle in any case the writer has observed. If it were perpendicular to the surface of any body floating with less than half its volume below the surface level, the film would pull downward and tend to sink the body, exactly what it does whenever the body is wetted.

In this abstract of a paper to be published later, the author says he does not claim, nor does he know of anyone who does claim, that a floating needle is supported fully by "a surface tension saddle". However, inasmuch as a steel needle is almost eight times as heavy as water at the temperature at which floating experiments are usually conducted, the water displaced by a floating needle is of much less importance than is the upward force of the surface film.

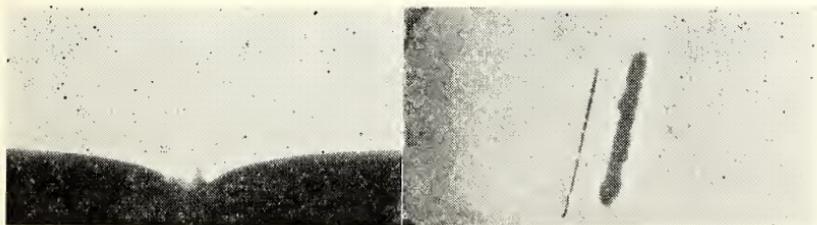
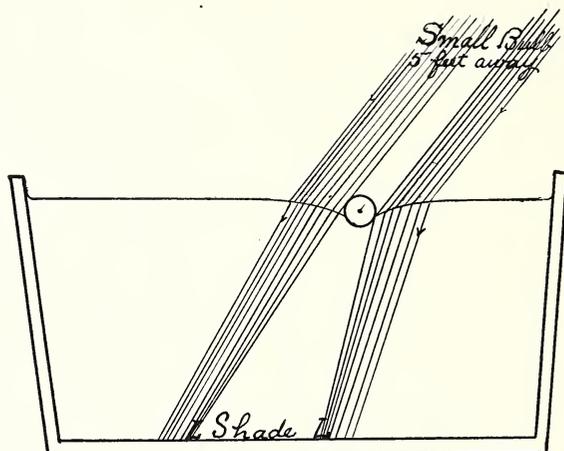


Figure 1 is a picture of the head end of a needle extending slightly beyond the surface of the water on which the needle was floating. The water was coaxed to stand a few millimeters above the horizontal ground edges of a glass tank, by greasing the edges. The picture was obtained by using a camera of 20 centimeters focus when equipped with a lens of 2 centimeters focal length. Nothing suggests a 90 degree angle between the film and the needle surface.

Figure 2 is a picture of a greased needle floating on water in a white bottomed glass tank about 2 centimeters deep. The picture was taken by a camera with a lens of one foot focus, arranged vertically above the needle. The needle was illuminated by a small electric bulb five feet from the tank, and roughly 20 degrees from the vertical. The breadth of the shadow on the white bottom of the tank shows clearly

that there was marked refraction of the light rays on the two sides of the needle, a condition that would not be expected if the contact surface between the film and the needle were 90 degrees, or even approximately 90 degrees.



White Glass Dish. Water 2 cm. deep.

Figure 3 is a rough drawing of what more nearly represents the writer's idea of what is shown experimentally in Figure 2.