sliding weight ("messenger") or by a propeller-release—to turn upside down at the depth where the temperature is to be deter-mined. The temperature is thereby regis-tered, and can be read off at any time after the instrument has been hauled up. Aimé's instru-ment was, however, rather intricate. In 1878 Negretti and Zambra of London constructed a reversing thermometer, which has played a prominent part in physical oceanography. In this form there is a narrowing of the tube just above the bulb; the mercury fills the tube above the narrowing to a greater or lesser extent according to the temperature, and when the thermometer is tipped over, the mercury breaks off at the narrowing, the portion which was above that point sinking down to the end of the tube (Fig. 155); the scale on the tube indicates the temperature at the moment of inversion. The thermometer must be able to withstand the pressure of the ocean depths, and is therefore placed inside a strong glass tube, with some mercury round the bulb of the thermometer in order to secure a rapid conduc-tion of heat.

The Negretti and Zambra reversing thermo-meter has latterly been widely used, but it has been found that occasionally the mercury broke off not exactly at the narrowing, but at some other place in the tube, while sometimes addi-tional mercury might overflow during the pro-cess of hauling up. Certain improvements have therefore been introduced to remedy these defects, like the recent modifications by C. Richter of Berlin, who altered the breaking-off arrangement so as to render it quite trust-worthy, and formed the tube in such a way that no superfluous mercury could enter it during the ascent (see Fig. 156). The severed column naturally lengthens or shortens some-what according to the temperature changes to which it is subjected: suppose, for instance, the thermometer to be reversed in water of 2.00° C., and then hauled up through warmer water and read off in the air at a

Aimé.

Negretti and Zambra.

Richter.

FIG. 155.
NEGRETTI-ZAMBRA
THERMOMETER,
AFTER REVERSING.