ters in about 600 double determinations was only $\frac{1}{100}$° C., so that the temperature of the greatest ocean depths can now be determined with great accuracy.

Reversing mechanism.

A common form of reversing mechanism is a brass tube which can turn over within a frame. A pin retains the tube (into which the thermometer is placed) in an upright position; when the pin is withdrawn, the tube is tipped over by the aid of a steel spring. The pin is removed either by means of a propeller or by a messenger. The propeller is so adjusted that it does not move during the descent, but when the apparatus is pulled upwards it revolves, drawing out the pin along with it. Formerly this propeller-release was employed with many kinds of oceanographical apparatus, but it is not always reliable, especially in a rough sea, and the apparatus must be hauled up some distance before the propeller works. It is, therefore, gradually being superseded by the messenger, a small weight which is fixed on the line and let down after the apparatus has reached the desired depth. When the messenger reaches the reversing mechanism it knocks out the pin and the thermometer is turned upside down. One of the water-bottles used during the "Michael Sars" Expedition is reversed together with the thermometer; in other words, this water-bottle is a reversing mechanism for taking a temperature and a water-sample at the same time.

Pettersson-Nansen water-bottle.

The Pettersson-Nansen water-bottle has a very high insulating capacity, and the temperature of the water-sample is not affected by conduction even when hauled up from a depth of several hundred metres, though the apparatus may be drawn through water-layers having very different temperatures. Pettersson originally used an ordinary thermometer, which was inserted into the water-bottle after it came up. Then Nansen thought of fixing a thermometer inside the water-bottle, and in this way the temperature at any depth was determined more easily as well as more exactly. The Nansen thermometer is very delicate, and is protected by a strong glass tube against the great pressure.

Effect of great pressure.

In making temperature-observations, however, one special precaution must be taken. When a liquid is exposed to great pressure its volume is slightly diminished, and, some heat being liberated, the temperature of the liquid rises. Lord Kelvin studied this question carefully, and arrived at a formula by which such changes of temperature may be calculated. Conversely, the volume of a liquid released from great pressure