valve, air being at the same time admitted at the top by the removal of a plug H, from a hole in the upper valve. The lower valve and stop-cock are protected from damage when striking against the ground by the casting extending about six inches below the valve. The arrangement and dimensions of the parts are sufficiently apparent from the wood-cut to make further description unnecessary. The slipping arrangement is in principle the same as that used on Brooke's sounding rod.

In order to adapt this water-bottle to collecting water at intermediate depths, it is fitted with a slipping plate (see fig. 40), furnished with a metal flap Q, which depresses it when the motion of the instrument is reversed. It is inserted into a slot S, immediately below the usual slipping plate to which the sounding line is attached, and differs from the latter in having a deeper notch R, and having a slot instead of a hole for the reception of the pin T, round which it turns. The object of this slot is, that after the string has been cast free, the flap may fall down close alongside the rod and afford as little resistance as possible in pulling up. In using the instrument, it must be let go before the flap enters the water, and not checked until the depth desired has been reached. On board the Challenger the slip water-bottle was only used to obtain specimens from the bottom.

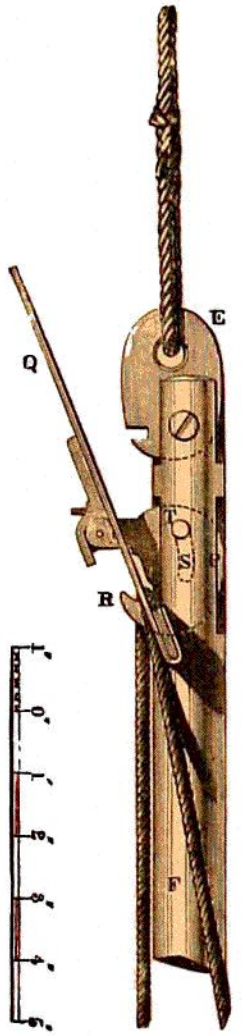

Fig. 40.—Instrument for slipping the Cylinder at intermediate depths.

The Stop-cock Water-Bottle.—Water from *intermediate* depths is obtained in an instrument represented in fig. 41. It is made entirely of brass, which, however, might advantageously be nickel-plated. It consists of a cylinder A, terminated at both ends by similar stop-cocks B, B, which are connected by the rod C. This rod carries, near its upper extremity, a piece of stout sheet brass E, 10 centimetres long by 15 broad, soldered to the casting F, which is movable about an axis. The function of this part of the apparatus will be more easily explained by describing the manipulations necessary when collecting water.

When intermediate water is to be obtained, the water-bottle is firmly attached to the sounding line, which carries at its end usually a 56 lb. or a 1 cwt. lead; the stop-cocks are then opened, giving them, with the rod C, the position represented in the left hand figure. The line is then lowered carefully by hand, until the water-bottle is close to the surface, when it is let go, and the line allowed to run out without a check. During its passage downwards, the water courses freely through it, being considerably assisted by the conical end pieces M, M. When the requisite depth has been reached, the line is checked, hauled in a few fathoms, then let go, checked again at the same mark, and finally hauled in altogether by the donkey-engine. When the