

by the ring they remain in that position; directly, however, the rod is placed upright on the ground, and the power which suspended it is relaxed, the weight inside the tube falls down until the stud fastened to it is at the bottom of the slit, and the shoulders on the flat bar are concealed in their sheath.

The method of using this apparatus was to pass the iron cylinder through the hole in the centre of the sinkers, in a similar way to that in which the Hydra rod was rove, to suspend the rod by the ring, and then place the bight of the wire attached to the disc under the sinkers, over one of the shoulders of the flat iron bar. The apparatus was then ready for lifting over the side, the sinkers being suspended from the shoulders of the iron bar, which remained outside its sheath as long as the whole apparatus was hung by the ring. When the rod reached the bottom, the lower end of the cylinder touching the ground, and the sounding line above being relaxed, the weight in the brass tube fell down and the shoulder disappeared in its sheath, so that the wire which suspended the sinkers was pushed off and the rod thus became freed from the weights. The shoulder over which the suspending wire was placed was slightly hollowed to prevent the wire being knocked off as the apparatus was hoisted over the side. Care was requisite in making this hollow, for, if too deep, the wire was apt to jam between the outer part of the shoulder and the brass tubing. The Baillie rod, which weighed 35 lbs., only failed once in the Challenger, and then not from any fault of construction, but from the wire being caught by the spout of the slip water bottle which descended on the rod. To facilitate collecting the mud brought up by the tubes their lower ends were made to unscrew. The tube of the Baillie rod was  $2\frac{1}{2}$  inches in diameter, and was usually made to project 15 inches beneath the weights. A substantial valve of some sort is necessary to prevent the bottom samples falling out when the tube is being brought on board. When, however, the bottom is a tenacious clay, no valve is required, as the rod, without a valve, frequently brought up a section of the bottom 2 feet in depth. A valve is always a great impediment to the entrance of the mud into the tube.

It would be a great improvement so to arrange the Baillie tube that the weight should be more effectually utilised in pushing it into the ground, as it is of importance to procure samples of the deposits below the superficial layer (see page 118).

*The Accumulators.*—The accumulators are india-rubber bands  $\frac{3}{4}$  of an inch in diameter and 3 feet in length, having at each end a thimble “seized in” (fig. 15 A). They are used to prevent any sudden jerks arising from the pitching or rolling of the ship, bringing an undue strain on the sounding line. They are capable of stretching 17 feet, when they each exert a force of 70 lbs.; beyond this they should not be stretched, as they are then liable to “carry away.” When stretched 13 feet they each exert a force of 56 lbs.