

work, the trammels were by far the most useful. They are the best appliances for collecting shore fish for scientific purposes, since they secure all sorts and sizes which may be swimming in the waters where they are put down. As they are very liable to be torn and injured, there should be a good supply. These nets, as well as the trawls, were supplied by Mr. Jonathan Hearder, Plymouth. Lobster pots, drum nets, and shrimp nets were very little used during the Expedition, but mainly because the stay at the places visited was usually short. They would probably be found very useful on any scientific voyage not so exclusively devoted to deep-sea research as that of the Challenger. It is most important that on any future scientific expedition it should be arranged, if possible, that some of the seamen composing the crew should have been trained as fishermen. It might be expected that plenty of fishermen would be met with in any ship's company, but such is not the case; the men in the navy are mostly such as have been trained for special naval duties.

*Chartroom.*—The chartroom was fitted with two drawing tables, each 6 feet by 5, with nests of drawers underneath, in which the smaller instruments and stationery were stowed. At the after end cupboards were built for a complete set of charts of the world, and were so arranged that any particular chart could be got at without difficulty. In these cupboards also the larger instruments such as theodolites, declinometers, &c., were stowed. At the foremost end a bookcase was placed, which contained the sailing directions and such of the narratives of former circumnavigators as might prove useful on the voyage.

Before the zoological laboratory and chartroom on each side were cabins for the use of the commander and navigating officer. Farther forward, again, were two reels containing spare sounding and temperature lines, and here also was a hydraulic press (fig. 4). The pump A is of the ordinary construction, but with a very narrow cylinder, the diameter of the cylinder and piston being  $\frac{1}{4}$  inch. The water is pumped into the reservoir B, a cast-iron tube of 3 inches internal, and 9 inches external, diameter, closed above by the plug C, which is held in its place by the bolt D. The instruments to be tested are placed in B; the plug C is inserted and made fast by the bolt, and water is pumped in until the desired pressure has been obtained. This is indicated by water issuing from the safety-valve E, which is of the ordinary construction. The machine, which was made by Messrs. James Milne & Sons, Edinburgh, works up to a pressure of 4 tons on the square inch. (See p. 100.)

In the central part of the main deck, abreast the mainmast, other cabins were built for a chemical laboratory and photographic room, each of which was specially fitted for the purpose for which it was intended, under the immediate superintendence of those members of the Civilian Staff who were to use them. Between the funnel and the foremast two large tiers were built, one on each side, in which a portion of the spare dredging rope was coiled, 6000 fathoms in each tier.