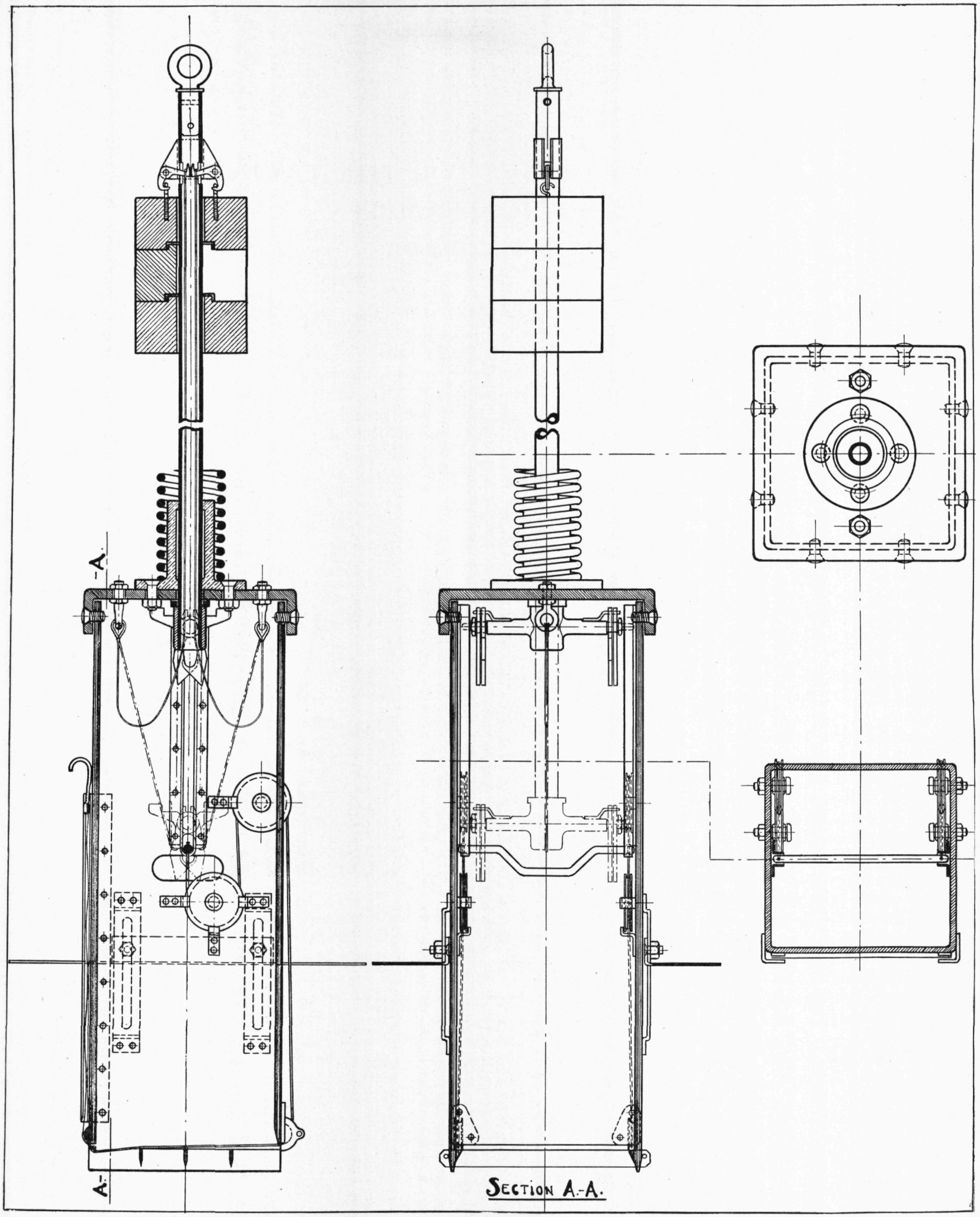
A NEW APPARATUS FOR THE TAKING OF BOTTOM-SAMPLES

BY O. PETTERSSON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SECTION A.-A.

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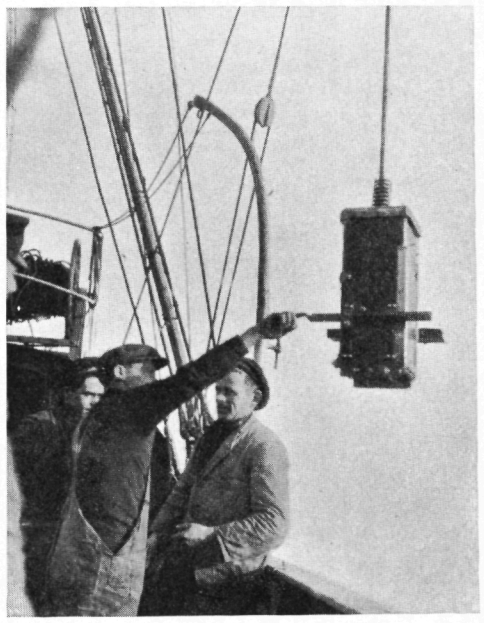
AT the request of Dr Molander here follows a short description of the bottom-sampling apparatus invented by me in order to facilitate his research of the vertical distribution of the fauna of the bottomdeposits of the Sea. Dr Molander wished to obtain samples consisting of a sharply defined column with a basal area of 400 cm² of the bottomdeposit *without disturbing the sequence of their stratification*. Dr Molander describes his experience with the Petersen bottomsampler thus:

»Whilst engaged upon the work of bottom-sampling in the Gullmar fjord with Petersen's bottom sampler I soon found occasion to interest myself in the question as to how the fauna vertically distributes itself through the bottom deposits of the various areas. As is well known, Petersen's apparatus is effective of good results when it is a case of observing the quantitative development of the fauna over a given area. But it does not supply any definite information as to how the fauna is distributed vertically. Information on this point is naturally a matter of interest as enabling one, *inter alia*, to form an estimate as to what proportion of the bottom fauna is assimilative by fishes as food. In the bottomsampling done by Petersen, it will be remembered that everything obtained — with certain exceptions — was looked upon as food for fishes (Petersen, 1918; Blegvad, 1914). But seeing that the bottom sampler, especially in soft ground, penetrates considerably below the surface layer proper, there would often by its means be brought up animals which cannot in any way be of importance as fish-food. Hence it would, theoretically as well as from a utilitarian point of view, prove of interest to make use of a bottom sampler capable of giving a more ample reply to the question of the vertical distribution of the fauna in the bottom deposits. Discussion of the conditions above referred to with Professor Pettersson, resulted in his undertaking to design a kind of bottom sampler with which a profile cut might be made through the bottom deposit, at the same time securing a sharply defined column (with a basal area of 400 sq. cm.) of the bottom deposits, without disturbing the sequence of their stratification. How Professor Pettersson solved this problem will be clear from his description of the apparatus in question.«

The apparatus consists of a quadrangular tube of iron (20×20 cm.) which is lowered by wire from the ship. The moment it touches the bottom it is driven into the soil by the impact of a heavy weight (20 to 40 K°) which slides along a shaft consisting of an iron tube 2½ meter in length, represented in the figure, and impinges upon the lid of the apparatus. The shock is elastic, a short steel spiral being interposed between "hammer and anvil", i. e. the weight and the lid of the apparatus, which thus becomes immerged into the soil to a certain depth determined by two plates of iron visible in the figure.



When the apparatus touches the bottom the weight is liberated automatically by the contrivance shown on p. 6. The impact of the weight upon the lid of the bottom sampler drives it vertically into the clay or gravel unto a certain depth which can be regulated by two iron screens outside the apparatus visible in the figures on p. 6 and 7. The shaft is also lowered by the impact when the line slackens and sinks so far that its hooks catch the end of a wire connected with the shutter which shuts the apparatus cutting off a column of bottomsediment when the line is tightened.

The apparatus then contains a *parallelopipedon of bottom-deposit with undisturbed stratification* which is brought up in its original state by the following device. The iron shaft which passes through a hole in the centre of the lid

of the apparatus is connected inside it by strings of wire with a screen or shutter of very thin copper sheet (20 cm. broad) with a sharp knife-like edge of steel. When the apparatus goes down the shutter is kept close to its outside by guides. When the shaft is lifted the shutter is drawn *horizontally* through the clay or gravel of the soil and thus closes the apparatus cutting off its content of deposit.

The details of the simple construction by which the shaft catches the strings combined with the shutter, which closes the apparatus when the shaft is lifted and the apparatus is hauled up, need no description. The Bohus Factory (Bohus Mekaniska Verkstad) in Göteborg makes the apparatus complete with weights, etc. at a price of Sw. Cr. 450 (round sum). The handling of the apparatus is the simplest possible since there is no running messenger etc. and it functions automatically. It can be used at any depth. Hitherto it has been tested at some of our sounding stations in the Skagerak at 500 to 600 M. In the future it will be found opportune to commence the routine work at a hydrographic station by taking a bottomsample with this gear which operation at the same time gives an exact account of the depth in situ.

When the apparatus is brought on board its undermost part is placed in a quadrangular box of wood open at the top, a little wider than itself. It then contains a column of bottom sediment longer or shorter according to the position of the screens at the outside of the iron sampler. The shutter is then drawn aside by means of a hook and the column of bottom mud slides out into the box when the apparatus is lifted.

The sides of the wooden box, which can be left down, are made to be turned up according to the mud column sliding out of the apparatus down into the box, thus finally enclosing the bottom sample without any displacement having taken place of its different strata. On the inside of the four walls of the box there are horizontal, parallel grooves 2½ cm. apart from each other. Then by letting down one of the sides of the box, and by pushing home into it a sharp-edged metal plate fitted into a suitable pair of grooves, the mud column can be divided into slices to be successively examined. In this way one gets as a rule slices 2½ cm. thick, except in the case when the mud column is of such small depth that it only measures 2½ cm. or slightly more. The intervals between these groves may of course be altered according to requirements. For many reasons I did not, however, find it suitable to work on slices thinner than 2½ cm. (A. Molander).