

NEW SCIENTIFIC APPARATUS FOR THE ARCTIC

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At the experimental workshops of the Arctic and Astronomic Institutes of Leningrad, several new apparatus have been constructed, and other appliances formerly used by Soviet polar explorers have been remodelled or perfected.

At the mechanical workshop of the Arctic Institute, two serial marine current-meters were overhauled and constructed. The new design of a mill current-meter of greatly increased sensitivity has been studied. Its propeller of plastic material renders possible the determination of extremely weak currents, the gauging of which has heretofore been impossible. These apparatus have passed the laboratory test in the calibration tank of the Institute of Scientific Research on Hydrotechnics and have yielded good results.

To meet the requirements of the expeditions of the Arctic Institute, a mill current-meter of the "Korobko" type, owned by the Institute, has been remodelled. Its construction has been considerably improved, a distinctive feature being its portability. Regarded externally, it reminds one of a howitzer shell. The apparatus has a folding vane which falls back to its normal position under the water, and thus orients the meter in the direction of the current. A compass unit inside the apparatus enables the set of the current to be determined at any depth. Thanks to its reduced size (diam. 12 cm. (5 ins.)), this current-meter greatly facilitates the work of the hydrologist when an opening has to be cut through the ice.

For lowering the apparatus to 5000 m. depth, a special light-weight winch, made almost exclusively of duraluminium, has been devised. It has automatic lubrication and is equipped with a continuously-acting cable-coiling device. A special brake arrests the functioning of the winch on the weight striking the bottom of the sea. During the unwinding of the cable, the drum rotates loosely on its axis, and the handles, thanks to a special disengaging gear, are liberated and remain motionless. When hauling in the cable, the amplitude of the crank-arm can be regulated by shifting the handles and clamping them with a special screw, which also makes the work much easier.

The brake on the winch is located above the drum, and the brake pressure may be regulated by means of a screw. The winch can be used both on the ice and from the ship's side.

Despite its light weight and small size, the lifting capacity of the winch ranges from 50 to 100 kg. (100 to 200 lbs), with a normal 5000 m. length of cable winding on the drum. The steel cable, 1.3 mm in diameter and composed of seven thin strands, is manufactured by the Works "Krasny Gvosdilshchik" at Leningrad.

The engineering office of the Arctic Institute has built a special portable generator for the preparation of hydrogen from activated aluminium.

The Astronomic Institute has brought out a new pendular apparatus (with two pendulums), which, as regards accuracy, is in no way inferior to the ordinary appliances of the foreign firm of Bamberg. It represents a new stride forward as compared with the outfit constructed for the drifting station "Severny Polius". The weight of the new apparatus is 16 kg., in contrast to the former.

The new model of pendular apparatus is distinguished by the use of pendulums with spherical bobs and an original head with an agate knife let into it, the edge of which serves as axis of oscillation of the pendulums.

The discarding of the rod-like minimum pendulums used in the appliance employed by E.K. FEDOROV on the drifting station "Severny Polius", considerably facilitates the taking of gravity observations. The new type of pendulums insures greater constancy in their lengths. The stop-and-start unit has been remodelled. The new form of the pendulums enabled the size of the apparatus to be reduced to 150 mm. (6 ins.), as a result of which it is more portable and lighter.

Several improvements preclude the possibility of derangement of the apparatus through hard usage.

The construction of the new pendulum apparatus is such that alongside the visual observations, it is possible to record the oscillations of the pendulums on a photographic film. The film expenditure is almost 100 times less than in the ordinary Vening Meinesz recording system.

All the component parts of the apparatus, by means of which the periods of the pendulums are determined to within a few ten millionths of a second, are mounted in the packing case for the pendulums; the weight of this case has been reduced to 8 kg. (against 10.5 kg. formerly).

The preliminary tests with the apparatus were carried out at the gravimetric laboratory of the Astronomic Institute. Lengthy observations, according to a special programme, were made in the big chamber of the Leningrad Institute of Cold at temperatures varying from $+ 7^{\circ}$ to $- 35^{\circ}$. These observations gave the possibility of determining the temperature coefficients of the apparatus.

In the barometric chamber of the Military Academy of Medicine in the S.M. KIROV Foundation, observations at pressures of 960 and 450 mm. of mercury were carried out for the computation of the barometric co-efficient of the apparatus. The apparatus was finally tested at the Pulkovo Observatory.

