unlooked for. One of the chief difficulties encountered in depth sounding with the vessel under way, using transmitters of moderate power, is due to the loud disturbances caused by movements of the water and sounds within the ship. If all these noises are listened to in the telephones without the short-circuiting device the echo may be difficult to distinguish, because it is not loud enough to be heard distinctly through the

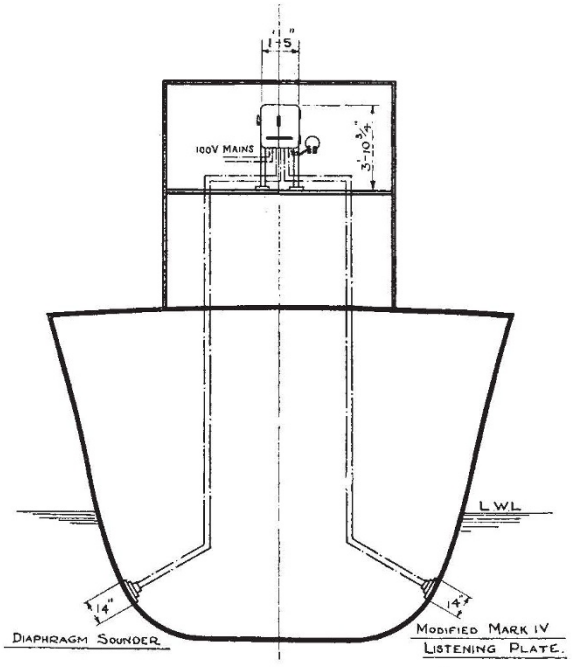

FIG. 3.—General arrangement of inboard apparatus.

other disturbances; but when the listening period is reduced to a small fraction of a second by the rotating switch, the echo is found to be clear and sharp.

In the specimen chart which is here reproduced (Fig. 2), Somerville wire and sonic soundings obtained on a trial run are compared. The apparatus was in this case handed over to the officers of an Admiralty survey vessel, who had had little or no prior experience of its use. The agreement is none the less good, and this may be taken as an indication of the simplicity and trustworthiness of the gear. In a report from the commanding officer of the vessel it is stated that the soundings were taken on a continuous run at a speed of six knots, under conditions which were by no means favourable — the send of the sea being sufficient to account for the four feet difference between the echo sounding and that obtained with the Somerville gear. From other trials the conclusion has been drawn that trustworthy indications can be obtained in all depths from almost the shallowest water in which a vessel will float, up to 35 fathoms. This does not, however, represent the greatest depth which the apparatus can be expected to measure.

In the trial run to which we have referred above the installation was exactly as described, except that the instrument was graduated to read fathoms directly, instead of time, while the transmitter, instead of being fixed in the hull, was hung overboard and submerged three feet. The receiver was placed in a ten-inch sluice valve, in order to shield it so far as possible from water currents and from the direct effect of the transmitter. In very shallow water a correction must be applied to allow for the distance apart of the transmitter and receiver, but this can be done very simply by an alteration in the scale of the fathom indicator. More powerful transmitters are being built so that the gear may be used in water of greater depth, and no difficulty is anticipated in obtaining indications over a range of 200 fathoms or more, with only minor modifications to the present apparatus. In equipment now in use both the transmitter and receiver are fitted directly on the hull on opposite sides of the vessel, as shown in Fig. 3, and the hull acts as a screen shielding the receiver from the transmitter. It is confidently anticipated that great depths may thus be sounded by a vessel proceeding at any ordinary speed. Special transmitters, which will be capable of dealing with oceanic depths, are under construction.

It is perhaps too soon to prophesy what will be the future of the sonic depth-sounding apparatus, and in what sphere it will find its most valuable application. There appears, however, to be good ground for anticipating that it may ultimately play an important part in the general practice of navigation.

The Physical Society of London.

JUBILEE CELEBRATIONS.

AN event of the first importance in the scientific world, the jubilee of the Physical Society, was marked by a series of celebration meetings held on March 20-21 at the Institution of Electrical Engineers, an exhibition of apparatus and demonstrations of great historical interest, and a banquet held at the Connaught Rooms on March 22. The labours of Prof. A. O. Rankine and those who helped him to organise the celebrations were rewarded by the spontaneous vigour which characterised the proceedings throughout their course. At the banquet Mr. F. E. Smith made the important suggestion that kindred societies which, like the Physical Society, do not possess a building of their own should unite in providing a common home in some central position.

On March 20, delegates were received from numerous learned societies of Great Britain and other countries (the foreign delegates including Profs. Fabry, Wien, S. J. M. Allen, Zeeman, and others whose names are well known), and addresses in a variety of languages were presented. The president of the Physical Society, in welcoming the delegates, commented on the contrast between the laboratory equipment which existed at the date of the Society's origin and that of the present day, and on the importance which the Society had always attached to demonstrations and apparatus. The number of fellows had grown from 99 to 600, and was rapidly increasing: amongst the younger fellows must be some of the intellectual giants of the future. Later in the afternoon the Guthrie lecture was

delivered by M. le Duc de Broglie, who discussed some effects of high-frequency radiation. After outlining the recent work on (1) the photo-electric effect and (2) the fluorescent excitation of K, L, M, N lines, the lecturer dealt with (3) the difference in wave-length which has been asserted to exist between scattered X-rays and the incident beam which excites them. By allowing X-rays from a tungsten target to be scattered by a re-radiator compounded of carbon and tungsten the lecturer has succeeded in obtaining on the same plate tungsten lines due to (*a*) scattering from the carbon and (*b*) fluorescent excitation in the tungsten re-radiator. He claims to have confirmed Compton's finding of an increment in wave-length in case (*a*). In the evening, under the auspices of the Institution of Electrical Engineers, a lecture on the nature of speech was given by Sir Richard Paget, assisted by Miss Sylvia Paget. In addition to demonstrations similar to those already described in NATURE, the lecturer showed the transmutation of certain vowels by alteration of the speed of a dictaphone record, and demonstrated Eccles' electrical vowel apparatus. The "cheirophone" added to its repertoire, in honour of the occasion, excellent reproductions of "Oliver Lodge" and "Vernon Boys."

Friday, March 21, the fiftieth anniversary day, was devoted to reminiscences by original fellows and other fellows of long standing, and numerous interesting particulars were given of Prof. Guthrie and the early days of the Society. Sir William Barrett exhibited the original lists, in his own and Prof. Guthrie's handwriting, of those who were first invited to form the Society, and Prof. Guthrie's draft of the circular by which they were invited. The Society grew originally out of the courses for science teachers held at South Kensington, and Guthrie chose for himself the minor post of demonstrator. Prof. J. A. Fleming, who had read the first paper to the Society fifty years earlier almost to an hour, said that the Society was founded in the belief that incomplete researches might give and receive stimulus if submitted to discussion. Some discountenance was met with, from Clerk Maxwell amongst others, and the attitude of the Royal Society was at first unsympathetic, but the above aim has been vindicated by the publication of progressive series of papers in the Proceedings. Guthrie himself showed in 1874 that red-hot iron loses negative more quickly than a positive charge, and was therefore the first to notice thermionic phenomena. Prof. C. V. Boys, who was unfortunately absent through illness, contributed a paper describing some early proceedings of the Society; and Sir Richard Glazebrook gave a discourse on the history of international electrical standards, in which British physicists (including the president of the Society) have played a leading part. Prof. Wien, in moving a vote of thanks, said that while the quantum theory had been "made in Germany," it required international co-operation to rescue it from the inconsistencies from which it at present suffers.

At the evening session Sir Arthur Schuster gave some amusing reminiscences of Joule (whose paper on the C^2R law the Royal Society refused to publish except in abstract), of Balfour Stewart, Stokes, and Boltzmann. Prof. H. E. Armstrong pleaded for closer co-operation between chemists and physicists, and indulged in some friendly gibes at the "clerical" tendencies of physics. He regretted the passing of the popular science of Tyndall, and mentioned that Guthrie was the inventor of what is now known as mustard gas. Dr. C. Chree emphasised the fact that skill in the use of apparatus is of even more importance than the construction of the apparatus itself. He suggested that the Society should publish a larger proportion of papers on *results* as compared with papers on *instruments*, and should give more attention to geophysics. Sir Oliver Lodge in a discourse claimed that the relativity postulate of an absolute velocity implies an ether, and hinted at a psychic function for the latter. He quoted some "queries" of Newton, one of which foreshadowed the modern identification of mass with energy. A vote of thanks to the speakers was moved by Prof. S. J. M. Allen, of the American Physical Society.

Throughout the celebrations there was on view an exhibition of great historical interest, organised by Messrs. J. H. Brinkworth and R. W. Paul. The exhibits principally illustrated apparatus first shown or described before the Society, together with corresponding modern developments. Special interest was shown in a series ranging from the earliest forms of Fleming valve to the latest commercial valves. Another series showed the laborious method by which Prof. Boys first obtained fuzed quartz products; and in his absence the shooting of quartz fibres was demonstrated by Mr. W. Colebrooke. Other series showed the development of the oscillograph, of the induction motor (the earliest demonstration of a rotating field having been given to the Society in 1879), of vacuum apparatus (the original McLeod gauge being shown), of resistance thermometry, the photo-electric cell, the moving coil galvanometer, etc.

Faraday's own lodestone, Wheatstone's original bridge, Hughes' induction balance and microphones, and Guthrie's diffusion apparatus were amongst the 183 exhibits. Some beautiful demonstrations were repeated, the most spectacular being those of Prof. C. R. Darling on drops and of Major C. E. S. Phillips on fluorescence with ultra-violet light.

A banquet, organised by Mr. R. S. Whipple and Major C. E. S. Phillips, brought the celebrations to a conclusion. H.R.H. the Duke of York, in replying to the loyal toast, expressed his interest in the international character of physics, and the social value of its application to industry. He noted that 25 per cent. of the Society's fellows have been elected since the War, a sign of vitality. The Prime Minister, whose late wife was a daughter of Dr. J. H. Gladstone, first president of the Society, referred to the latter's personality as illustrating the fact that reverence should be characteristic of every seeker after truth, whether he be theologian, explorer, or man of science. He regretted that physics had now become too complicated for the comprehension of the layman, who had felt the greatest enthusiasm for the popular science of Tyndall and Huxley, and he expressed the hope that the future might bring some broad simplification acceptable to the lay mind. He mentioned, with a slyness which was immensely enjoyed, that he had been present at the Bristol meeting of the British Association when De Rougemont was acclaimed by many of the members, but he did not

mention that it was at the same meeting that De Rougemont's travel-tales were exposed. Finally, he drew a parallel between the work of a government department in collecting and co-ordinating facts and applying them to policy, and the work of the scientific investigator and inventor, and suggested that a similar mentality was required for the due performance of each of these functions.

Mr. F. E. Smith, president, pointed out that the Faraday, Optical, Röntgen, and other Societies resemble the Physical Society in having no permanent accommodation of their own. He suggested a joint effort to obtain a central building with theatre, laboratory, refectory, and library. The suggestion was received with great enthusiasm. Lord Haldane referred to the unity of mind prevailing amongst scientific workers of different nationalities, and suggested that the introduction of scientific method into the study of national and international affairs might lead to a similar harmony there. Sir Richard Glazebrook, in the absence through illness of the president of the Royal Society, spoke of physics as the key science on which all the other sciences depend; Prof. Fabry directed attention to the necessity for international co-operation in science; and Sir Oliver Lodge expressed the belief that there are giant stars in the rising constellation of the Physical Society. Sir Joseph Thomson, proposing "The Visitors" in a witty speech, said that, although not a student of physics while at Cambridge, H.R.H. the Duke of York had excelled in the technique of that branch of applied physics which relates to the effect of rotation on the track of a sphere moving through an elastic fluid. He assured the Prime Minister that statesmen would never appeal in vain to the scientific world for help in the difficult tasks which confront them. The High Commissioner for Australia and Mr. J. H. Jeans replied, and the toast of the chairman (Mr. F. E. Smith) was proposed by Sir Ernest Rutherford.

Antidotes against Sleeping-Sickness.

TOWARDS the latter part of 1920, German investigators announced the discovery of a new drug, "Bayer 205," which had a remarkable action on experimental trypanosomiasis in laboratory animals. It was far more efficacious than any other known remedy, and in addition possessed the great advantage of being therapeutically active in doses which were at least one-sixtieth of the maximum dose tolerated by these animals. It was later proved that horses suffering from dourine could be cured by injections of the drug. Such an active trypanosomicide naturally demanded attention from the point of view of human sleeping sickness. An opportunity offered itself in 1921. An Englishman who had contracted the disease in Africa was treated at the Liverpool School of Tropical Medicine with almost every known remedy without success. He was seriously ill and was rapidly failing. As a last resort he travelled to Hamburg, where he was given a few injections of the new remedy. The result was immediate improvement and restoration to normal health. This has been maintained to the present time, and there seems every reason to suppose that the cure is a permanent one. Since this first case was treated, numbers of others have received the drug, and in the majority of these it would seem that a permanent cure has probably been attained.

Whatever may be the final verdict, it seems clear that in "Bayer 205" we have the best-known antidote against sleeping sickness. The opportunity for testing the drug and treating cases of the disease has been afforded by the Bayer Dye Company, which has issued limited supplies to selected individuals under certain restrictions. The secret of its manufacture and composition has been carefully guarded, and though various suggestions have been made, no definite information as to its nature has been forthcoming.

Quite recently, however, the French chemist, Fourneau, and his assistants announced to the Paris Academy of Sciences that they believed they had discovered the secret. In a detailed account of their investigations which has just appeared in the *Annales de l'Institut Pasteur*, they trace the various steps which led them to the discovery. They were guided to some extent by the succession of patents taken out by the Bayer Company. Finally a lucky chance led them to produce a compound which, so far as their experiments go and the limited supply of "Bayer 205" at their disposal permits of a comparison, appears to be identical with it. The substance prepared by the French investigators is the urea of meta-aminobenzoyl-para-methyl meta-aminobenzoyl-1-aminonaphthalene-trisulphonate of sodium-4-6-8, and they designate it "309" as absolute proof of its identity with "Bayer 205" has not yet been obtained. In one respect "309" appears superior to "Bayer 205." The dose required to cure mice of experimental trypanosome infection is 1/160 of the maximum dose tolerated. Like "Bayer 205," it possesses the disadvantage of irritating the kidneys, with the consequent danger of producing nephritis.

A series of other ureas has been prepared, and some of them, though less active than "309," are not so costly to produce, and it is suggested that they may prove of service in the treatment of trypanosomiasis of domestic animals, which require much larger doses than those given to human beings. It is evident that the discovery of the nature of "Bayer 205" will lead to an increased supply of the drug and its extended use in the treatment of sleeping sickness and other allied diseases.

Whatever may have been the reason for secrecy, the action of the Bayer Company in issuing supplies only to carefully selected and competent physicians has had the advantage of preventing the flood of extravagant statements which would have resulted inevitably from an unrestricted distribution. The value of the drug is undoubted, the best method of its administration is known, its dangers are fully realised, and there is reasonable ground for hope, though this cannot be stated with absolute certainty even yet, that a large percentage of those who have been treated will be found to have been permanently cured.