Obituary.

The Hon. Sir Charles Algernon Parsons, O.M., K.C.B., F.R.S.

By the death of Sir Charles Parsons on Jan. 12, while on a voyage to the West Indies, the world has lost the greatest engineer engaged in the production of power from steam since the time of Watt. It is due to his genius and perseverance that the steam turbine now produces practically all the electricity derived from steam power and every fast ship of large size, both naval and mercantile, is driven by steam turbines.

Sir Charles, who was in his seventy-seventh year, was the fourth and youngest son of the third Earl of Rosse, who built the great 6 ft. telescope at Birr, Ireland. He was educated privately and at Cambridge, where he was eleventh wrangler. He became a pupil at Elswick Works and in 1883 joined Clarke, Chapman and Co. of Gateshead, where he made his first steam turbine of 4 h.p., which ran at the unprecedented speed of 18,000 revs. per minute. The design of the dynamo to be coupled to it—and it must be remembered that the design of electrical machinery was in its infancy then—was quite as great a feat as the steam turbine itself. With increasing size, and improvements in design, the efficiency of the steam turbine increased until in 1888 a 32 kw. machine running at 8000 r.p.m. with 100 lb. per sq. in. saturated steam and non-condensing gave a consumption of 51 lb. per kw. hour, a figure that would be good even at this day.

In 1889 Parsons parted company from Clarke, Chapman and Co. and started the Heaton Works, Newcastle-on-Tyne, to manufacture steam turbines and other steam and electrical machinery. Here he met with the great setback that Clarke, Chapman and Co. retained his original patents for turbines with the steam flow parallel to the axis. He, however, designed a turbine clear of the original patents with the steam flowing radially, which, with the addition of condensing, culminated in a 100 kw. turbine running at 4800 r.p.m. giving the then record consumption of 27 lb. per kw. hour with 100 lb. per sq. in. steam pressure, 50° F. superheat, and 27 in. vacuum.

In 1894, however, as Clarke, Chapman and Co. had failed to make a success of the steam turbine, Parsons got back his original patents for a fraction of the sum originally asked for them, and the parallel flow turbine was reverted to, in a form, except for size and improvements in construction and design, essentially the same as the reaction turbine of to-day. In the forty-five years that have elapsed from the time he made his first turbine, the size has increased from the 4 kw. turbine of 1884, which is now in the Science Museum, South Kensington, to 50,000 kw. and even 200,000 kw.

In the same year Parsons resolved to apply the steam turbine to marine propulsion, and an experimental boat, the *Turbinia*, of 40 tons displacement, was built. At first it had one turbine, but, on account of what was then the little-known phenomenon of cavitation, not more than about 20 knots was attained. For one turbine, three in series were substituted, and on each of the three shafts there were three propellers, and thus, in 1897, the then record speed of 34 knots was attained. Two destroyers followed, one of which attained on trial 37 knots—which, it must be remembered, was obtained with coal and not oil fuel. Unfortunately, both these were lost at sea about 1901, due to causes which had no relation to the turbines. Soon afterwards two comparison ships, the *Amethyst* fitted with turbines and the *Topaz* with reciprocating engines, were built by the Admiralty, with the result that the performance of the turbine ship was much the better. As a result, in 1905 turbines were fitted into the battleship *Dreadnought*, and then became the standard for the Navy. On the mercantile side the growth was also very rapid, culminating in the *Mauretania* of 40,000 tons displacement and 68,000 s.h.p., which was designed in 1904 and finished in 1907, or just ten years after the *Turbinia* of 40 tons displacement. In 1912 the difficulty of a slow-speed turbine having to be coupled to a high-speed propeller was overcome by the introduction of gearing enabling each to run at the most suitable speed, and geared turbines have now become standard practice. In 1926 a further step was made in the *King George V.*, a Clyde passenger boat, where a steam pressure of 550 lb. per sq. in. was adopted.

Besides steam turbines, Parsons had many other interests: he made several experiments with very high pressures and temperatures, a 2000-ton press and large storage battery being installed for this purpose, chiefly in the hope of being able to make diamonds; but without success. He also experimented on still higher pressures by firing steel bullets into a block of steel having a hole the same diameter as the bore. Another experiment was to fire a large shot into a chamber containing a mixture of acetylene and oxygen, where it was estimated a temperature of some 16,000° C. was attained on the explosion of the gases. None of these gave any result. The reproduction of sound was another of his activities; he made a valve worked from a gramophone or violin which, when supplied with compressed air, gave a great augmentation of sound, combined in many cases with improved quality.

Parsons was always interested in optical work, largely inherited from his father, and so early as about 1887 devised greatly improved methods of producing search-light reflectors, resulting in Heaton Works constructing nearly all the parabolic searchlight reflectors made in Great Britain. He also made reflectors with one axis a parabola and the other a hyperbola or ellipse, so as to give a flat beam for use on the Suez Canal or other purposes. By taking over the Derby Crown Glass Works, where he was able to make many improvements in the manufacture, he to a large degree saved the production of optical glass in Great Britain; and he also had a controlling interest in Messrs. Ross, Ltd., makers of binoculars and other optical instruments. He also took over the telescope works of

Sir Howard Grubb, F.R.S., which are now carried on at Walker Gate, Newcastle-on-Tyne.

Sir Charles was a firm believer in the importance of research in industry, and very large sums were set aside for this purpose. Also, accurate tests were invariably made of each machine as it was made, so as to give data for subsequent designs. He also firmly believed in the utilisation of what may be called highly educated labour, and had always on his staff university men and others with high education, but in all cases it had to be combined with good practical knowledge.

The Royal Society elected Sir Charles a fellow in 1898, and he served on the Council in 1907–9, being a vice-president in 1908–9 ; he was awarded the Copley and Rumford medals. He was made a K.C.B. in 1911 and received the Order of Merit in 1927. He was given many honorary degrees by various universities, and among other medals had the Grashof Commemoration medal of the Verein Deutscher Ingenieure, the Albert medal of the Royal Society of Arts, and the Faraday medal of the Institution of Electrical Engineers. He was an early member of the Advisory Council of the Department of Scientific and Industrial Research, and was on numerous other committees.

Sir Charles married in 1883 Katherine, daughter of W. B. Bethell, of Yorkshire, and had one son, who was killed in the War, and one daughter. He was a large benefactor to science, giving £5000 to the Royal Institution and £10,000 to the British Association, besides numerous gifts to various institutions.

GERALD STONEY.

IT is difficult to write of Charles Parsons, a great inventor, one to whom civilisation owes more than a friend's feeble pen can well express. Try to picture the world without his inventions, in the days when Atlantic travel took place in ships like the old *Scotia* of the Cunard Line, or the first *Oceanic*, which, when the White Star Line started some sixty years ago, created so much interest on Merseyside. Contrast these with the *Mauretania* and the *Lusitania*, the first great ships propelled by Parsons' turbine, or to come to our own days, with the Cunard *Aquitania* or the *Bremen* of the North German Lloyd Line. Maybe in 1931 we pay too much attention to speed, but time has a high value, and the minutes saved for useful work by the invention, which startled the world when the *Turbinia* first showed herself at the Jubilee Review in 1897, total many millions in number. These are due to Charles Parsons.

But for far more than speed and comfort in ocean travel are we indebted to the turbine and its inventor. Imagine modern life without electric power. This is neither the place nor the opportunity to collect statistics and estimate the percentage of that power generated through Parsons' work on the turbine; generated, too, in a manner so efficient that it is scarcely possible to hope for an improvement—unless, indeed, another Parsons shows us how to use atomic energy. For Parsons was never content to leave an invention until it was nearly perfect, nor was he stopped by difficulties which to many seemed insuperable. At first, the turbine was not a great success ; he knew how efficient it ought to be, and he reached his mark. Kelvin well described his invention as the greatest advance in steam practice since the days of Watt.

So, too, with other problems: Parsons tried to produce a diamond, and at the end of his life agreed, no doubt, as Prof. Henry E. Armstrong has told us, that there is no valid evidence to show that it can be obtained by any of the hitherto asserted means; but the work is there, of the highest value—a contribution to knowledge impossible for any but a great man, applying to the problem all the resources of the engineer, all the inventive power of a brilliant mind.

Nor were Parsons' powers less shown in his more recent work. Telescopes and optical glass had for him a hereditary interest: and so he applied his genius to replace English optical glass in the position it held before the days of Abbé and Zeiss, and he did it, while in quite recent years he was devoting himself to further Hale's plans for a giant reflecting telescope.

Parsons made no special mark at Cambridge, where he graduated as eleventh wrangler in 1877. After the usual training of an engineer, he set to work to develop the turbine, but it was not until the end of the century that he received any distinct recognition.

No one meeting Parsons casually would have recognised in the gentle, modest man, somewhat quiet and hesitating in speech and manner, one of the world's great benefactors. In public he said little; but interest him in a problem, ask his advice on some knotty point of scientific or engineering practice, give him, perhaps, a little time for quiet thought, and your problem was solved, or if solution was not at once to be found, you were set on a track promising to lead to the desired end. Moreover, if the attainment of that end seemed of importance, you secured for the rest of your journey the support and assistance of a most wise counsellor and, what is more, a most kind friend.

For Charles Parsons was that to all who earned his friendship; and we, who have enjoyed it for the last twenty-five or thirty years, are the poorer for his loss, happy though we are to have known such a man, and to have learned from him some of the elements of true greatness.

R. T. GLAZEBROOK.

I FIRST met Sir Charles Parsons when he was appointed by the Lord President to the Advisory Council for Scientific and Industrial Research, on the resignation of Prof. Bertram Hopkinson owing to pressure of War work. Thus he was not an original member of the Council as has been stated in some obituary notices, though he joined it in the course of its first year of work. His acceptance of the office was a proof of his willingness to subordinate his personal views to the common good, for it was no secret that he thought the national