illustrate this point. To them might be added his admiration for Jenner. It was Napoleon who placed a memorial in one of the wards of the Hôtel-Dieu to the memory of Dessault and Bichat.

Industrial progress and efficiency no less than scientific discovery appealed to Napoleon. Jacquard's loom of 1801 at first brought little but opposition and trouble to the inventor, the Industrial Council of Lyons even passing a formal condemnation of the loom. His ingenuity being remarked by Carnot and then by Napoleon, Jacquard was for a time employed in the Conservatoire des Arts et Métiers, and by a decree dated at Berlin, October 27, 1806, Napoleon gave him a pension of 6000 francs and a premium of 50 francs for each loom erected. In 1810 the Emperor offered a reward of a million francs to the inventor who should first bring into successful operation a method of spinning flax by machinery. The problem was solved by the distinguished mechanician and practical chemist Philippe de Girard, to whom France was indebted for successful work in various directions. Girard, however, died in 1845 without receiving the reward, though his descendants were recompensed.

The great public works initiated by Napoleon were as remarkable as his educational schemes. For the improvement of harbours and rivers, and for the construction of bridges, canals, and roads, he found in the Corps des Ponts et Chaussées, established in 1747, a body of technically trained public servants such as no other country in the world then possessed. The canals connected with the Rhine and Rhône, the Saône, the Seine, the Ourcq, and the Oise; the works at Dunkirk, Havre, Dieppe, Honfleur, and Brest; and the breakwater at Cherbourg, were all carried out by this famous corps, the records of which are enriched with the names of Perronet, Girard, Gauthey, Navier, and Prony. At Malmaison one day Napoleon said to Chaptal: "I intend to make Paris the most beautiful capital in the world. . . . What are your plans for giving water to Paris?" Chaptal gave the alternatives—artesian wells or bringing the water from the River Ourcq. "I adopt the latter plan; go home and order five hundred men to set to work to-morrow at La Villette to dig the canal." "Such," says Dr. Holland Rose, "was the inception of a great public work which cost more than half a million sterling."

The many men of science upon whom Napoleon bestowed honours were scarcely more numerous than those he employed in positions of trust. The story of Laplace as Minister of the Interior is well known. Given the post at his own request, six weeks later he was removed because he carried into the art of government the principles of the infinitesimal calculus. Sixteen years before this Laplace had been young Bonaparte's examiner at his entrance into the army. Guyton de Morveau, Cuvier, Fourcroy, Chaptal, and Lacépède were among those who held public offices. Lacépède was for some time President of the Senate. With Laplace he was not unlike the Vicar of Bray, and found no difficulty in agreeing with any Government—revolutionary, republican, monarchical, or imperial. It may be it was of him Napoleon was thinking when one day he bitterly remarked: "Men deserve the contempt with which they inspire me. I have only to put some gold lace on the coat of my virtuous republicans and they immediately become just what I wish them."

Of a different stamp were Cuvier and Chaptal. Cuvier, whose reputation as a naturalist and organising ability as secretary to the Institute could not fail to attract Napoleon's attention, was appointed one of the six inspectors to establish lycées in the principal towns. He afterwards did valuable work in the reorganisation of some of the European universities. Among all the public men Napoleon drew from the world of science, however, none stood higher in general esteem than Chaptal. Released from prison during the Revolution to superintend the manufacture of gunpowder, the rise of Napoleon opened for him a career of great public usefulness. Succeeding Lucien Bonaparte as Minister of the Interior, he founded trade schools, encouraged arts and manufactures, and assisted the Chambers of Commerce. Though his loyalty to Napoleon led to his being deprived of his peerage at the Restoration, he continued to devote his vast knowledge and great talents to the service of France, showing always that consistency, moderation, and desire for the common good for which he had been conspicuous under the *régime* of Napoleon.

"The true conquests, the only conquests which cost no regrets, are those achieved over ignorance," Napoleon once said. Such are the conquests of science, and no results of Napoleon's life's work are more enduring or beneficent than those due to his encouragement of scientific education and scientific discovery and to his promotion of great public works.

The Annular Eclipse of April 8.

By MAJOR W. J. S. LOCKYER.

THE best positions to observe the annular eclipse of the sun on April 8 were to the extreme north-west of Scotland, and it was the intention of Lt.-Col. F. K. McClean and myself to take up a station somewhere in that part. Owing to the miners' stoppage Col. McClean was unable to take the journey, but in London I succeeded in finding two volunteers in Mr. Patrick Alexander and Mr. Allan Young, and we started off for Durness (Sutherland), near the entrance to Loch Eriboll, on the evening of April 5. Reaching Lairg the following afternoon,

we heard that the inn at Durness had been burnt down several years previously, so we proceeded by motor-car along the beautiful side of Loch Shin, and arrived at a place called Rhiconich, at the southernmost end of Loch Inchard. Finding that the hills around were not sufficiently high to obstruct the view of the annular eclipse, we decided to stay at the excellent hotel there for the event.

We took with us two instruments—one a whole-plate camera fitted with a telephoto lens, and the other a small Thorpe grating slit spectroscope fitted up for taking photographs of the spectra of the limbs where they grazed each other. The spectroscopic part consisted of a box to act as a collimator tube, fitted with a 1-in. slit at one end, and a Dallmeyer rapid rectilinear lens at the other. The camera part was also a box arranged to take plate-holders 5 in. by 4 in. at one end, and a Dallmeyer rapid rectilinear lens fitted with a Thorpe grating in front of it. The latter box was placed obliquely with regard to the collimator box, and so adjusted that both the first- and second-order spectra fell on the photographic plate. This spectroscopic arrangement was fitted on a long, stiff plank, made in two sections for the sake of portability, and at the other end were fitted two guides to which was screwed the small framework for carrying a $3\frac{3}{4}$-in. objective.

FIG. 1.—Our instruments in the ground adjoining the Rhiconich Hotel. Photograph taken during the first partial phase.

Arrangements were made for propping up this plank in the direction of the sun so that the solar image fell on the slit of the collimator. A screw adjustment was adapted for raising the plank as the sun increased its altitude. The whole of this outfit can be seen in Fig. 1, as it was in position on the ground outside the Rhiconich Hotel during the first phases of the eclipse. The whole-plate camera can also be seen a little further away.

I had to work the instrument completely by myself; but if I had had some skilled assistance I should have obtained more spectra of the chromosphere. The difficulty was to get the right portions of the crescent exactly on the slit, and then to draw the dark slide and make the exposure, the sun moving all the time across the slit.

The only photograph of the chromosphere is that shown in Fig. 2. This is an enlargement from the first order of one of the spectra, and shows amongst others the bright hydrogen and calcium lines. Each plate exposed gave four spectra—two in each order and two at each limb (upper and lower) of the sun.

Fig. 3 shows one of the numerous photographs taken with the whole-plate camera by Mr. Allan Young. It was exposed a little before the time of mid-annularity. The eclipse took place under nearly perfect conditions, but there must have been some very high cirrus haze, because during the first partial phases a halo became visible round the sun. This became brighter as the eclipse progressed, and showed the spectrum colours distinctly. At two points of this halo, about east and west, mock suns were seen, and these extended right and left and formed practically two spectra lying horizontally, the colours being very distinct. These phenomena were observed by all those who gathered round our camp.

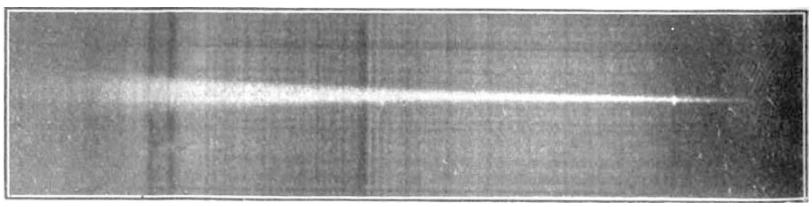

FIG. 2.—The spectrum of the chromosphere, showing, amongst other bright lines, the lines of hydrogen and calcium.

With regard to the visibility of the planets and

stars, though I showed everyone a map of the positions of possible visible objects, no one recorded the appearance of any. At Sidmouth I have been able to see Venus easily in the daytime by looking along a telescope which was pointing to its position in the sky, but I could not pick it up without such help. During the eclipse I looked specially for it, but failed to see it; this may have been due to the haze referred to above. While we had no thermometer to record the temperature, the chilliness was so pronounced that everyone noticed it; further, there was no wind during the first phases, but before annularity was reached there was a distinct breeze blowing, which died away before the later phases ended.

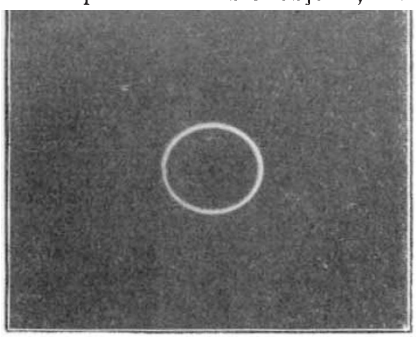

FIG. 3.—The eclipse just before the mid-phase of annularity.

It may be added in conclusion that this annular eclipse was not nearly so striking as that which I observed from the outskirts of Paris in April, 1912, when the moon at the greatest phase of annularity almost, but not completely, covered the sun, making the bright ring appear like a circle of irregularly placed pearls.

The Royal Academy.

SCIENCE and engineering have become closely allied, and it is therefore of interest to note the prominence given in this year's Academy to engineering subjects; in many cases, not merely engineering features as an incident in a landscape or in a pictorial setting, but the work of the engineer shown for its own sake. Thus amongst unexpected subjects we find the interior of a garage with parts of a dissected motor-car in the foreground (262), and a bridge under construction (84). Of the same type is 654, showing railway sidings and factory chimneys with, it is true, cathedral towers in the background scarcely discernible through the smoke. The scientific basis of engineering is not far from the surface in "The Ages Meet" (156), where Mr. Stanhope Forbes shows the welding together of tramway rails by the oxy-acetylene process. The setting of the picture is the Embankment at the foot of Cleopatra's Needle. It was a happy idea of the artist to bring into juxtaposition the two human achievements—the modern welding of the steel rails in the tramway track, and the great stone column of antiquity. The task of raising this to a vertical position with the primitive devices available in those days must have been a feat in comparison with which our modern building operations, with their electric cranes and other labour-saving devices, appear but child's-play. As industrial engineering is given such prominence in this year's exhibition, it will be but one further step forward, one is tempted to think, for the laboratories of scientific workers and their cherished apparatus to be accepted as fit subjects for the work of future exhibitors at Burlington House.

This day has not yet come, and the scientific critic has for the present to confine his attention to the many aspects of Nature which are set forth from year to year in such countless profusion. The proportion of landscape scenes and Nature-studies which are really true to life seems ever to remain a small one, and leads to speculation as to whether the cause lies in a lack of desire or a lack of power on the part of artists to give expression to the truth. There is, and probably always will be, a school which frankly cares not for the accurate representation of Nature; but there are other artists who seem to aim at reality without achieving their object, and the failure is more marked in some directions than in others. Thus the post-impressionist dog and the post-impressionist cloud may be equally obviously unreal; but in the other school the artist who sets out to paint a dog is apparently more likely to succeed than the artist who takes clouds for his theme. Such is the conclusion reached from an inspection of the exhibits at the Academy. Miss Hordern's miniature of a terrier (Bailey, 741) is excellent; so is the more ambitious painting by Edmond Brock (259); but "Rolling Clouds" (616) as an attempt at a cloud study is a failure, both in the colouring and in the form of the clouds. J. Farquharson, who is always at home in snow scenes, gives in 93 a delightful picture with snow on the ground and slanting sunshine among the pines which leaves open only one point for criticism. The moon, though apparently full, is above the horizon at the same time as the sun. The eye is not very sensitive to determining the fullness of the moon, and perhaps this would be the author's explanation, though it seems unnecessary so carefully to direct attention to the point by means of the title, "The Moon is up and yet it is not Night."

If Julius Olsson could refrain from such a free use of brilliant colours in strong contrast with one another his seascapes would be immensely improved. Several examples of these glaring colours are shown this year. There is one exception, "Silver Glitter" (458), where the artist has used more restraint with a marked improvement in effect. Mr. Mark Fisher, in his