The comet is situated near the boundaries of the four constellations, Hercules, Vulpes, Cygnus, and Lyra.

A CONVENIENT COMPARISON SPECTRUM.—For the study of both terrestrial and celestial spectra, it is useful for many purposes to photograph a comparison spectrum alongside the spectrum under investigation. The spectrum of iron is most generally used as the lines are well distributed along the spectrum, are sharp, and their wave-lengths are accurately determined. The iron, however, may not be pure, so several strange lines may appear in the spectrum, and these have to be investigated. Dr. Joseph Lunt, in searching for a convenient means of obtaining the spectrum of cyanogen has incidentally found that the spectrum of lead pencils gives an extremely fine set of lines, very sharp, well distributed along the spectrum, exhibits a remarkable constancy of spectroscopic composition, and consists of lines which are almost without exception present in the solar spectrum, the wave-lengths of which have been well determined. The account of this investigation on the spectra of graphites and lead pencils is given in vol. x. of the *Annals of the Cape Observatory*, part iv., and should be read by all those who work with the spectroscope. A plate reproduces the lead pencil spectrum from $\lambda 4071.91$ to $\lambda 4742.98$. The sharp metallic lines are for the most part due to iron, titanium, vanadium, chromium, and the alkaline earths, barium, strontium, and calcium, while the spectrum shows also the presence of the rarer elements, gallium, scandium, and yttrium, as well as silicon, magnesium, and manganese. The carrier of a lead pencil thus possesses a small portion of the very rare elements gallium and scandium.

REPORT OF HARVARD COLLEGE OBSERVATORY.—The report of the director of the Astronomical Observatory of Harvard College for the year ending September, 1913, gives one a good idea of the great field of work projected and of the large amount of work accomplished during the past months. It is hoped that means will be found to concede to the director's wishes stated in this report by increasing the income of the observatory, for the situation is not very satisfactory when, as Prof. Pickering states, "during the last twenty years the income of the University has more than doubled, while that of the observatory has diminished rather than increased." The report shows, in the first instance, the progress made in the Henry Draper memorial department, the revised Draper Catalogue being the principal work. More than half the sky has been covered, and 100,155 stellar spectra have already been classified. The 11-in. Draper telescope, in the hands of Prof. W. H. Pickering, has produced valuable results, among which may be mentioned the periodic changes in form of the discs of Jupiter's satellites. The work of the Boyden department at the Arequipa Station, of the Blue Hill Meteorological department (recently transferred to Harvard University), etc., are all briefly summarised, and indicate the wide range of activities.

THE SCHILOWSKY GYROSCOPIC TWO-WHEELED MOTOR-CAR.

A LARGE two-wheeled motor-car, constructed from the design of Dr. Schilowsky, a Russian Doctor of Laws, by the Wolseley Tool and Motor Company, Ltd., was given a trial run in London last week. The car is a six-seated car, and it carried six people as it slowly made a circuit of Regent's Park. The gyro-

scopic mechanism is placed in the cupboard under the middle four seats. This consists of a heavy gyrostator rotating at the moderate speed of 1100 revolutions a minute, and driven by an electric motor of $1\frac{1}{2}$ horse-power. The axis is vertical, and it is mounted in a ring supported on transverse trunnions, so that it may tilt in a fore and aft plane. As the car is necessarily unstable on its two wheels, the gyrostatic ring must also be carried unstably for it to have corrective influence. If, as a ship, the car could have been carried stably, then the gyrostatic ring would also have to be stably mounted. If one is stable and the other unstable then the gyrostator operates in the opposite sense to that intended.

The unstably mounted gyrostator will not maintain the car in its upright position for long, as the precessional oscillations increase in amplitude. Dr. Schilowsky counteracts this by an ingenious piece of mechanism. Driven by worm-gearing from the gyrostator axle are two spur wheels, each just out of gear with a segmental rack, but capable of being brought into gear by a heavy pendulum which feels any tilting of the car away from the dynamical vertical. This is only allowed to engage at such times as the gyrostator ring is approaching the neutral position. During this time the engagement causes a hurrying of the precession and a consequent steadying of the motion. At the moment the neutral position is reached the pinion and rack are disconnected by a snap mechanism reminding one of that used for closing the valves of a Corliss engine. One pendulum controls the engagement when the gyrostatic ring is approaching the neutral position from one side, while the other effects the control on the other side of the neutral position. Either alone might be used, but the two alternate with one another and maintain a more continuous control. It is a curious fact that the controlling mechanism is more easily adjusted so as to maintain the equilibrium of the car when it is turning in the opposite direction to the rotation of the wheel. For turning in the same direction more exact adjustment is necessary. A working model railway on this system has been presented by Dr. Schilowsky to the South Kensington Museum, where it may be seen by anyone interested.

The car weighed three tons, having been designed for running on a rail, while the engine was one of the maker's standard 16-h.p. engines. This was insufficient in power to drive the heavy car, as well as the motor of the flywheel, more than about four miles an hour. At this speed and at rest or moving backwards the car maintained its position with passengers jumping on or off. When a new load was applied to one side the car moved almost imperceptibly so as to raise it and maintain the centre of gravity over the line of support as has already been made familiar by Mr. Brennan with his monorail.

It will be interesting to see how the car behaves when a more powerful engine is fitted and higher speeds are possible. The inventor is, of course, aware of the very great couple, ordinarily resisted by the four-wheel support of the motor-car when ordinary curves and speeds are negotiated together, which he will have to contend with in like circumstances. The demonstration in the Regent's Park did not show that the gyrostatic control then existing would be sufficient for this, but it did show, and that perfectly, that the first step has been successfully accomplished. It may be worth while to add that the bicycle balance is not used, the gyrostatic control being independent of speed or direction of motion.

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