

the process of manufacturing it is explained. This gearing is of the straight-toothed type, and has been developed by the Maag Gear Co., of Zurich. Means have been found by which straight-tooth spur gears can be employed successfully under conditions demanding the highest possible peripheral speeds and loads per unit width of tooth. The methods of production ensure the requisite degree of accuracy, and at the same time provide a tooth form which is considered to give the most favourable conditions of sliding contact during engagement. A novel grinding process has also been devised whereby it is possible to generate a correct profile on a case-hardened tooth surface by means which are independent of the wear which must take place on the grinding disc. The compensating arrangements in the grinding machine are extremely interesting, and keep the grinding planes in their correct position to within $\pm 1/1000$ mm. The gear

has been applied to several ships and to a large number of electrical plants and electric-locomotive drives.

"A WINTER GUEST," the seasonable and striking Christmas card published by the Royal Society for the Protection of Birds (23 Queen Anne's Gate, S.W.), represents the redwing, sometimes called the "Norwegian Nightingale," though known in England only as a winter visitor. The picture is reproduced in colour from a painting by Mr. H. Gronvold, and gives very happily the character and the appealing expression of the little traveller. It can be had, with calendar, for 5d. by post.

ERRATUM.—The Poets' Corner of Westminster Abbey is in the south transept, and not the north, as stated in the article on "Science in Westminster Abbey" in last week's NATURE, p. 437.

Our Astronomical Column.

THE EFFECTIVE WAVE-LENGTH OF THE LIGHT OF GALACTIC STARS.—Prof. O. Bergstrand contributes a paper on this subject to the centenary number of *Astron. Nach.* The research is based on a series of plates of the star-cloud in Cygnus obtained with a 15-cm. triple objective prism. The spectral types of the brighter stars were taken from the Henry Draper catalogue, and the following table shows the correlation between type and effective wave-length λ .

Type	λ	Type	λ	Type	λ
O	411 $\mu\mu$	F	421	K	429
B	416	G	423	M	439
A	419	G5	425		

Only two M stars were available, both probably giants. From the evidence of the G5 and K stars, the author concludes that dwarfs have a smaller value of λ than giants of the same type.

An analysis is then given of the values of λ for the fainter stars down to magnitude 13.4. It is pointed out that the percentage of white stars is more than 60 for stars brighter than 11.4 m., and then drops suddenly to less than 50. He explains this by assuming that the white stars have the highest absolute brightness, and so are more distant than yellow or red stars of the same apparent magnitude. Hence we reach the limits of our local star system sooner in the white stars than in the yellow ones, causing a drop in the percentage for the fainter stars. Taking 0.0 as the absolute magnitude of an average giant white star, the radius of our local system is found to be 2500 parsecs.

THE DYNAMICAL EQUILIBRIUM OF THE STELLAR SYSTEM.—Prof. A. S. Eddington contributes an important paper to the centenary number of *Astron. Nach.*, in which he makes a further advance in the solution of this problem; his first approximation, in which he took the shape of the system as spherical, was published in Monthly Notices, R.A.S., vol. 75. He passes on in the present paper to consider the much more difficult problem of an oblate system, and succeeds in finding one exact solution as follows: A rotating system that has settled down to a steady state may be presumed to be oblate. If we divide it into two identically equal systems, and reverse the direction of rotation of one of them, we shall have a non-spherical system in equilibrium, with no rotation as a whole, but with preferential motion in a transverse direction. The solution is worked out in detail for a homogeneous spheroid, which is shown to be

strictly analogous to Maclaurin's hydrodynamical spheroid. It is inferred that non-homogeneous solutions exist. In conclusion, he points out that it is quite likely that the stellar system has not yet attained dynamical equilibrium, and may be collapsing somewhat rapidly towards a steadier condition. He has hopes that the advance of knowledge of stellar masses and velocities may enable the matter to be decided by using the principle that in dynamical equilibrium the total kinetic energy is half the exhaustion of potential energy.

OBSERVATIONS WITH THE COOKSON FLOATING TELESCOPE.—This instrument, which floats in a circular tank containing mercury, was designed by the late Mr. Bryan Cookson, and given after his death to the Syndics of the Cambridge University Observatory. It has been on loan at the Royal Observatory, Greenwich, since 1911, and a memoir just published discusses the observations of the first seven years. The primary object was the redetermination of the aberration constant, while the variation of latitude is a useful by-product. Pairs of stars are selected at about the same distance from the zenith and on opposite sides, and with right ascension difference of a few minutes of time; their magnitudes vary from 5 to 6.5. The trails of brighter or fainter stars are too broad or too faint for accurate measurement. Three solutions are given for the aberration constant and for the corresponding value of the solar parallax as follows:—

Ab. const.	Parallax	
20.442	8.815	General solution.
20.455	8.810	Discordant plates rejected.
20.460	8.808	Correction for wind direction applied.

The probable errors of aberration and parallax are 0.013" and 0.006" respectively. The third solution resulted from an examination of the "night errors," which led to the conclusion that they depend largely on the direction of the wind. This, combined with the dissymmetry of the ground-level to the north and south of the instrument, is presumed to produce inclination of the atmospheric strata and anomalous refraction. It will be seen that the values for the parallax do not differ too widely from Mr. Hinks's value 8.806". The period of observation is, however, not considered quite long enough to eliminate accidental error, and the observations are being continued for another seven years.