Letters to the Editor (continued)

Mr. Bergen might well have mentioned the National Research Development Corporation, whose purpose is to commercialise promising inventions that have not been taken up by a manufacturer; the hovercraft is a well known example.

The patent system is founded on the principle that, in exchange for the disclosure of his invention to the public, the inventor is given a monopoly, so that he may derive profit from his invention. The Patents Act provides for extension of the term of a patent in cases of inadequate remuneration; the maximum period of extension, however, in exceptional cases is ten years, which makes the entire term of the patent 26 years from the date of filing the complete specification. Can this be justified in respect of the period of a patent copyright, which expires 50 years after the death of the author? The usual argument is that copyright covers a distinct and limited work, whereas a patent, in order to be effective, must cover a generalisation of the article, process or method of testing that the inventor has actually produced.

A solution might be to lengthen the normal term of a patent to something comparable with that of copyright and to provide that the patentee should grant licences, on reasonable terms, to anyone applying for them after a period similar to the present term of a patent. This would be an extension of the existing provisions for 'compulsory licences' and 'licences of right'.

In his article 'Patents and the engineer' in the September 1963 Journal, p. 384, Mr. Crawshaw said that the system was defective but it worked. In these days of international competition, can we really afford to carry on business on this basis? The Patent Offices in the Netherlands and the United States (which examine applications so strictly that Dutch and US patents are much more likely to be valid than British patents) have recently introduced cheapen the processing of applications. In the Netherlands, fundamental innovations have been made, designed to reduce the uncertainty about whether a patent application will result in effective protection and whether a proposed activity will infringe a patent for which application has been made. No doubt patent agents in Great Britain will be keenly watching the outcome of these changes. The important thing, however, is whether their clients are satisfied with the present system. It will be interesting to see whether any suggestions for improving it are put forward in Electronics and Power as a result of these articles.—Yours faithfully,

J. E. LANDER
The Ridge House, Woldingham, Surrey 30th November 1963

Electricity from waste

Dear Sir—I have noticed in the correspondence columns of the Journal several instances of electricity being generated from waste heat produced by the burning of refuse, and you may be interested to have information concerning yet another case.

In 1902, when the tramways generating station was built in Deepdale Road, Preston, Lancs., it was built back to back with the refuse destructor so that a considerable proportion of the steam required to run the trams could be generated from the burning of refuse. This system continued until the generating station was closed down in about 1928. By this time the Corporation had taken over the National Electric Supply Co., and had built a new generating plant. We are now providing a cheap and abundant supply of electricity for the trams, by which time these were being replaced by buses.—Yours faithfully,

J. SIMPSON
North Western Electricity Board, Cheetwood Road, Manchester 8 4th December 1963

Cosmic electrical discharges

13—Extremely strong cosmic radio sources

Dear Sir—Astrophysicists, like the ladies for Byron, would seem to an engineering physicist to be 'kettle cattle'. At an International Astronomical Union symposium, in reply to a question on whether the tilts in our galaxy, caused at some time by the Magellanic Clouds, could be a tidal effect, they were told that 'the distortion observed is too large by about two orders of magnitude to be explained by gravitational effects'. The speaker went on: 'But really I am not sure what they are providing distortions in many galaxies, and bridges between galaxies, and also more fancy things, which cannot possibly be explained by gravitation, neither in order of magnitude nor even qualitatively in shape.'

That reply was given in June 1957 and published in July 1958, and one would have thought it would have deterred astrophysicists from looking to gravitation to supply the explanation of internal galactic phenomena. However, there they were, on a BBC television programme the other night, at another international symposium called to celebrate a gravitational explanation for the recently discovered, extremely intense, short-lived radio sources.

The explanation of these sources was, however, published in 1958, five years before their discovery, in a paper presented to the second United States Air Force conference on atmospheric electricity. For they correspond on a galactic scale to the extremely bright phase of a new star or nova outburst on a stellar scale. Though it is only after 10 or 20 years that the normal nova returns to its pre-outburst magnitude, this bright initial phase, during which it sometimes becomes an outstanding naked-eye object, lasts for only a few days. The current waveform during this phase is roughly delineated by the effect of the discharge's magnetic field in broadening the spectrum lines, because, during this phase, the broadening is proportional to the square of the wavelength, as it is in the Zeeman effect, and not to the wavelength, as it is in the Doppler effect. Furthermore, it would be hard to see how a tremendous explosion could be followed by an equally tremendous implosion, as it would have to be for the last explanation.

This is the type of current wave one expects in all atmospheric electrical discharges, and one sees it in the lightning discharge and solar flares as well as in novae. One naturally expects a similar sequence when the corresponding phenomenon occurs on a galactic scale at the outset of the radio phase of a galaxy's evolution, i.e. on the breakdown of the electric field gradually built up over a period of the order of 10^9 years.

We can estimate roughly the duration of this phase from the duration of the corresponding phase, say 10 days, of a nova's total life of about ten years. It evidently occupies roughly one-five-hundredth part of the total duration of the outburst. Since the total life of a radio galaxy is 10^10 years, the initial intense phase may be expected to last for 10^9 years, which agrees with the estimate mentioned to me by Prof. Martin Ryle (~10^9 years), with that given by Prof. Kopel (~10^4 years), and with that quoted in a recent survey by J. L. Greenstein (10^6 years).

For those interested in determining the expected spectral distribution of the energy radiated during this phase of the galaxy's life, there is an interesting relationship between electron energy and magnetic field, since the latter will be small along the axis of the discharge, where the temperature is highest. The temperature will decrease somewhat radially outwards, and the magnetic field will increase from the axis outwards, being given approximately by 2/r, where r is the current flowing within the radius r.

The recognition of these extremely powerful cosmic radio sources thus adds yet another to the long list of successful predictions that the electric field and discharge theory of cosmic atmospheric phenomena has enabled me to make. The phenomenon is certainly not the result of an implosion, as has recently been claimed, but an electromagnetic and not a gravitational one. It is another example of the completely negligible part played by gravitation in determining galactic phenomena, once electrical breakdown of the atmospheric electric field has begun.—Yours faithfully,

C. E. R. BRUCE
Electrical Research Association Cleve Road, Leatherhead, Surrey 3rd January 1964

References

2 BRUCE, C. E. R.: (a) 'Recent advances in atmospheric electricity' (Pergamon Press, 1959); (b) Observators, 1949, 69, p. 195; (c) ibid., 1949, 69, p. 119; (d) ibid., 'acceleration and deceleration' in novae, ERA report Z/7 86; (e) 'Evolution of the Crab nebulae and the origin of metagalactic noise', ERA report Z/7 86; (f) ibid., 'novae', ERA report Z/7 84
3 BRUCE, C. E. R., and GOLDEN, R. H.: J. IEE, 1941, 88, p. 87

Electronics and Power February 1964