

Correspondence.

Paper-Lined Tin Cans.

To the Editor of the SCIENTIFIC AMERICAN:

I notice in your issue of July 2 an English invention for lining tin food cans with paper parchment. I would suggest that instead of lining the finished cans, the sheets be covered before making up. There is also a great field for capital in making long strips or coils of tin, paper-coated, of suitable width for the body of the cans, thus saving cost both in the first manufacture of the tin and also in the better adaptation of long coils to the use of automatic machinery for making the cans. GEORGE D. CLARK.

Plainville, Conn., July 4, 1904.

Halter Embedded in Horse's Skull.

To the Editor of the SCIENTIFIC AMERICAN:

I am familiar with the photograph of horse's skull published in last week's issue.

The skull is of a three-year-old colt, and it was found in the bush at a place called Swan Hill, distant 214½ miles from Melbourne, or 114 from Bendigo. It was found in this condition some thirty years ago, and was given me three years since by the person who found it.

There appear no facts beyond what the skull itself and equine pathology teach us, i. e., when the periosteum of this species is injured, a deposition of bone is thrown out—Nature's endeavor to strengthen and assist the part—which becoming ossified, gives rise to many external blemishes.

This has assuredly taken place. The skull still growing, and the rope probably contracting at the same time, then the rotary movement of the jaws during mastication caused this irritation to the periosteum, and hence in time brought about the condition seen in the photograph. The animal probably died of starvation.

It is by no means a made-up specimen; and has been examined by many veterinary surgeons of this State, and all the medical men of this city, who one and all agree that it is the most wonderful specimen they have yet seen. ERNEST W. MITCHELL.

Bendigo, Australia.

Discovery of One Hundred and Fifty-two New Variable Stars in the Large Magellanic Cloud.

The two Magellanic Clouds have long been objects of careful study, on account of the extraordinary physical conditions which prevail in them. They have not, however, heretofore been known as regions in which variable stars are numerous. The discovery of a large number of variable stars in the Small Magellanic Cloud led to an examination by Miss Leavitt of the Large Cloud, although a detailed examination of the region immediately surrounding N. G. C. 2070, the Looped Nebula, had already been made, with negative results. Over one hundred variable stars have thus been found. Twenty-one plates, taken with the Bruce 24-inch telescope and having exposures of from one to five hours, were used. A series of six of these, taken within ten days of each other, has made it possible to derive some inferences as to the periods.

The variability of all of these stars has been confirmed either by Mrs. Fleming or by Miss Leland. It is probable that the range will be increased when a photometric scale is substituted for that here used. Many of the faint stars in the Large Magellanic Cloud show slight fluctuations in brightness. This renders it probable that many more variables may be discovered from an examination of later plates.

Preparations are being made for determining the precise positions, periods, and light curves of all of these variables.

The total number of variables found in nebulous regions by Miss Leavitt is at least 277. It is a remarkable illustration of the results to be expected from a systematic study of the Harvard Library of Astronomical Photographs. During 1903, a grant from the Carnegie Institution permitted a corps of eight or more observers to carry on such investigations. Since then this corps has been disbanded, and the means of the Observatory have permitted but one observer to be employed on similar work, with the results here shown. EDWARD C. PICKERING.

Harvard College Observatory.

The Current Supplement.

The current SUPPLEMENT, No. 1439, opens with an account of the giant 5,000-horse-power engine and dynamo furnishing the lighting current for the Louisiana Purchase Exposition. An excellent picture accompanies the text. The Paris correspondent of the SCIENTIFIC AMERICAN tells much that is interesting of the house of the Vetii, a Pompeian villa that has been the subject of considerable archeological discussion. Mr. H. G. Wells' article on the "Discovery of the Future" is concluded. Mr. Charles A. Stevenson describes the making of leather from alligator skins. Some excellent formulas for varnishes are given. An illustrated description of storage battery locomotives

for shop transportation is published. Dr. L. Brandt writes interestingly on the sensitiveness of chemical reactions.

Engineering Notes.

The project of digging under the English Channel has raised a storm of objection in Great Britain. Every time the scheme crops up, the same criticisms are leveled at it. Mathieu's proposal made in 1802, which received parliamentary sanction both in France and in England, came nearest to realization. The plan has again been proposed, and seems no nearer realization than before. M. Peltreanu in an elaborate report shows how commercially advantageous it would be to England and to France. Englishmen, however, have received the French advances with anything but cordiality. Admitting the economic advantages which would result, and the comparative ease with which modern engineers could build the tunnel, they deplore the moral effect on the British nation, whatever that moral effect may be. Fears are expressed that a powerful army would steal through the tunnel, and invade England with the utmost ease. The absurdity of the objection hardly deserves comment.

According to the Elektrotechnische Rundschau, a new process for utilizing exhaust steam to produce power in low pressure steam turbines has been developed in Germany. The device is especially intended for utilizing the exhaust from intermittently working mining engines. While an ordinary condensation in most of these engines will have but a very slight effect (the vacuum in the cylinders being negligible, and considerable condensation losses being caused by a high cooling of the steam cylinder during stoppages), the new outfit will permit the use of the exhaust from these machines so as to secure higher economy than can be obtained, for instance, in the case of a high-class triple-expansion engine. From the exhaust steam from a hauling engine 500, and from that from a reversing machine 1,000, electric horse-power may be generated. Moreover, the first cost is much lower than in a high-tension steam plant of the same output, while there are no expenses for operation worth mentioning. The principle of the process consists in storing the exhaust steam issuing in variable amounts from the intermittently working engines in an exhaust steam accumulator and of transmitting the stored steam in a uniform manner to a low-tension turbine. The latter, after receiving the steam as a rule at atmospheric tension, will give it off again at the condenser tension. In the accumulator the exhaust steam has a pressure by 0.15 to 0.3 atmospheres higher, the pressure varying within these low limits with the charging and discharging of the apparatus.

In the case of an amount of heat, Q , per hour traversing a wall, there must be, as is well known, a certain temperature gradient. Considering a portion of the boiler heating surface, the side of the sheet metal turned toward the water will take the temperature, t , and the side turned toward the fire the higher temperature, t_1 . In the case, however, of any portion of the water side of the plate being coated with boiler scale, there is an obstacle to the heat being drawn off, so that the fire side of the plate will have to assume a higher temperature, T , in order to be traversed by the same quantity of heat. The temperature gradient thus increases from t_1 — t to T — t , when a "stagnation of heat" takes place beneath the boiler scale coating. This phenomenon, the name of which does not seem to be well chosen, plays an important part in connection with boiler explosions. According to Austin's researches, a discontinuity in the behavior of the temperature will occur in similar cases, the water side of the sheet metal wall having a temperature superior by some degrees to the immediately adjoining water layer. The experiments carried out by the Physikalische Reichsanstalt have shown this sudden fall of temperature to be smaller in the case of the water being stirred up violently, as compared with the case of calm water. According to Volk, in a paper recently read before the Cologne section of the Verein Deutscher Ingenieure, this accounts for the so-called ebullition delay, which formerly was resorted to for explaining the occurrence of explosions produced on heating. In fact, as soon as the valve is opened, a violent evolution of steam would be produced, the water being stirred up and the fall in temperature becoming less, and as the wall thus is hotter than necessary, the surplus heat is set free suddenly. According to Mr. Ernst, about 2,000 heat units would traverse each hour a plate of boiler scale 1 millimeter (.039 inch) in thickness and 1 cubic millimeter in area with a temperature gradient of 1 deg., while an oil layer will lead 100 heat units under the same conditions, and a coating of ashes 65 heat units. When considering that in the same case 50,000 to 60,000 heat units will traverse the iron, it will be possible to ascertain the temperature limits in the passage of heat through the boiler heating surfaces. This local superheating of the walls results in the firebox being put

to higher strains, while the influence exerted on the walls themselves is still more important, an alteration in the shape and a diminution in their resistibility being produced. A similar superheating may be produced not only by deposits of scale, but as well by the effect of the flame; moreover, the walls of the boiler will be prevented from cooling by adjoining masonry or by ashes, thus remaining at a much higher temperature than the surroundings.

Electrical Notes.

The Schuckert & Co. Electric Company, of Nuremberg, made some time ago comparative tests of incandescent gas and electric arc lights, the results of which have just come to hand. These experiments, carried out by Dr. Lehmann Richter, gave the following results: The surface luminous intensity at the level of the eye proved fully satisfactory for both light sources, the arc light affording also a uniform distribution of light. In the case of the electric arc light, no noxious alteration of the air was noted, the temperature would not rise to any appreciable extent, nor would the percentage of carbonic acid be augmented. With incandescent gas light, on the other hand, the temperature at the level of the eye was found to rise by about 6 deg. C. in the course of three hours, while the percentage of carbonic acid was found to increase to more than five times the initial figure. As regards the cost of operation of both classes of light, this proved somewhat smaller in the beginning with the Auer light, whereas, after a short time, the figure corresponding to the cost of operation of the arc light was reached, even without taking the lighting flame into account. When accounting for the lighting flame, on the other hand, the cost of the Auer light would be much higher than that of the electric arc light.

In a recent issue of La Energía Eléctrica, Madrid, Mr. G. J. de Guillén García records some interesting experiments made by him in conjunction with his son. In connection with some wireless telegraphic researches, the younger García happened to note that in the telephone of the Tommasi coherer located at the receiving station, there was a difference in sound varying according to the air gap in the interrupter of the Ruhmkorff apparatus. This suggested the idea that a similar apparatus would be susceptible of transmitting the human voice to a distance without wires. The author was eventually enabled through the courtesy of Prof. Marcel, of the Barcelona Seminary, to carry out his idea. The experimental apparatus is rather simple. At the transmitting station there is a Ruhmkorff apparatus 3 centimeters in spark length, as well as the necessary oscillator, a small antenna, and a grounded conductor. Between the transformer (i. e., the Ruhmkorff coil) and a small battery of Grenet cells, is a special microphone, acting both as manipulator and as interrupter. The automatic interrupter of the induction coil is stopped, while the condenser is used for enforcing the oscillator spark. At the receiving station is a Tommasi coherer, connected with the receiving antenna and the grounded conductor. In a telephone receiver, the noise produced by the Hertzian waves on traversing the coherer is noted. On bringing the mouth to the microphone and singing or speaking, every sound vibration will be attended by an interruption in the passage of the electric current through the primary circuit of the transformer, the number of sparks in the oscillator thus being varied. The underlying principle shows therefore some analogy with the mechanism of an ordinary telephone. Any results so far obtained in the reproduction of singing are said to be quite satisfactory, whereas the rendering of language leaves much to be desired. The defect seems to be the difficulty of designing a microphone of sufficient intensity; Mr. García, it is true, has remedied the imperfections of his apparatus to a certain extent, by using a condenser and augmenting the potential difference; this, however, could not be driven because electric arcs were easily formed.

An interesting lecture was recently delivered in London by J. M. Bacon, the aeronaut, upon the subject of photographing from a balloon. There is great uncertainty about obtaining good photographs from a balloon, on account of the atmospheric influences. Even on a clear day, when the sun during the ascent is shining, definition gradually becomes blurred, until at a height of 4,000 feet photography becomes impossible, owing to the dust motes that reflect the sunlight. Warm and cold air currents coming in contact with one another give rise to conditions that prevent photography, but over water sharp definition is generally possible, owing to the moisture in the air. Some of the most striking results have been obtained on a dismal rainy day, when leaving the earth and passing through the clouds into genial weather above, while the cloud masses below were brilliantly illuminated by the sun. An ascent from Clifton on the occasion of the meeting of the British Association produced some exceptionally beautiful photographs, that were obtained toward sunset.