# Correspondence.

### Lessons from a Railroad Wreck.

To the Editor of the SCIENTIFIC AMERICAN:

In the SCIENTIFIC AMERICAN for July 4, 1903, there are four unusually instructive views of a railroad wreck. These engravings, reproduced from photographs, show the positions of three cars after having rolled down an embankment at a speed of thirty-five miles per hour. In one respect, it was an easy wreck, because the cars were not dragged along the ties in such a way as to strip the trucks from the body. In fact, steps, air and gas cylinders and even brake rods are left intact. The strength of any good car body is such that it ought, having a fair opportunity, to roll over and over down an embankment like that shown for fifty or sixty feet without serious damage.

In general, destruction in such wrecks is found inside the coach, as may be seen from the interior view, where the wreck of the chairs is astonishing. They not only parted company with the seats, but were torn bodily from the floor.

The interior fitting of a car is often objectionable because of the return to an old fashion of elaborate brasswork, abounding with sharp angles and points. It has often happened that passengers have been seriously injured, where a car has rolled over and over, through coming in contact with the interior bronze or brass work. In a wreck like the one mentioned, bruises would be probable, but, had the seats remained intact and the brass work been suitably designed with rounded corners and smooth curves, there should have been no one seriously injured. With a properly designed coach of modern construction, telescoping is practically impossible. The end frame of the car is so strengthened from floor to roof by heavy bars, that the car would yield bodily before it could be penetrated. The real danger to the passenger is found in the lamps, baggage racks, seat arms, etc., against which he is liable to be thrown. W. E. P.

### Uses of Superheated Steam.

To the Editor of the SCIENTIFIC AMERICAN:

In your number of December 27, 1902, I found an interesting article by Mr. Foster on superheating of steam; but his conclusion is wrong where he gives other uses for superheated steam, such as for boiling and distilling apparatus.

A short time ago I had the same opinion until I read that in Germany was made the same proposition and on that occasion Dr. Claassen published a report of tests made in this direction with negative results. With the purpose of enlarging our own evaporating plant on this principle and to convince myself I made a series of tests with a little evaporating apparatus to find what results I could obtain by using superheated exhaust steam, such as is always used in Java in sugar factories for boiling and evaporating cane juice.

After a great deal of trouble I found that superheated steam never will be introduced successfully on this line of evaporating.

I fear very few people interested in evaporation will believe on first sight that *wet or saturated exhaust* steam of, for example, 7½ pounds pressure and ± 110 deg. C. temperature, *and superheated* steam of 7½ pounds pressure but with temperature of 140 deg. to 160 deg. or even 180 deg. C. will do nearly the same amount of evaporation. Don't forget, however, that if superheated exhaust steam has 7½ pounds pressure, the initial pressure is far less.

In the tests I made there was a difference of about 2 pounds in back pressure on the engine in superheating to absolute dryness, which I reached at about 140 deg. C. By the use of this absolute dry steam there was a remarkably quicker evaporation, but comparison of the results obtained with saturated steam of 2 pounds more pressure (this means the same back pressure on the engines for both cases) showed no gain, and therefore I believe you could obtain the same results without a costly superheating apparatus by simply augmenting the back pressure on your engines to the same pressure as the absolute dry superheated exhaust steam would have. A low superheating on low pressures, such as 2, 3, or 5 deg. C. and 1 to 5 pounds pressure showed particularly badly and the results are only one-third to one-half in evaporating quality of that with wet or saturated exhaust steam.

The amount of work done in evaporating or boiling plants of our kind is proportional to the heat corresponding with the pressure of the steam.

DEKKER,
Engineer Sugar Estate.

Peterongan, Java.

### The New Australian Patent Bill.

To the Editor of the SCIENTIFIC AMERICAN:

Among the first beneficial fruits of the Australian Commonwealth, patent legislation must take high rank, and I am pleased to be able to inform you that a bill containing many excellent features was on June 26 last introduced into the Senate and read the first time, dealing with this important subject, a copy of which I have the honor to forward you as soon as received by me from the government printer.

There can be little doubt that the bill will be carried in such form as to open up a new industrial era on this continent, and attract capital, and men of great enterprise and extensive experience in manufacturing pursuits, so that there will be born a period of prosperity in marked contrast to the stagnation which has affected the various Australian states for years past during their term of individual and sadly defective patent laws.

By the expert eye it will be seen that the bill in many respects is studiously moderate, while recognizing the principle which is so successful in Canada and over most of the European countries, that those foreigners who look for the large rewards which patents on successful inventions give, must not forget the claims of the people from whom those rewards are obtained to the manufacture of the patented article in the commonwealth within a reasonable period and under reasonable circumstances.

In these directions the Australian provisions are immensely more lenient to foreigners than those of Canada, France, Germany, Italy, Austria, Hungary, and many other foreign countries. There are defects in the bill, obviously enough, and I have no doubt some of these will be removed.

The idea has been mooted in the press that the government is of opinion that either from America or England a gentleman having those high attainments which would fit him to take the position of commissioner of patents in Australia, should be secured. I sincerely hope applications will be made at once by eligible persons who might, if in England, get some hints from the agent-general as to procedure, or in America by putting the consular service in motion.

It cannot be doubted that color exists for the notion that much of the stagnation and inefficiency of our patent offices has been directly due to the extraordinarily weak and often incapable management by former heads of the various patent offices here, vividly contrasting with the skill, energy, and patriotism exhibited by the commissioners of patents in the United States and elsewhere. Of the present heads I do not speak.

If an Australian gentleman is appointed, the administration of the act may not be nearly so successful as it might otherwise be, judging from the past.

The post is one which one (in many respects very worthy) aspirant for the position states to me he would not accept under from $6,000 to $7,500 per annum, and there can be no doubt whatever that in accordance with the practice of Australia of paying high salaries, whatever the salary may begin with it will certainly become a decidedly high one if the office is only filled by an energetic and capable administrator, such as the various patent office commissioners of the United States and the comptrollers of Great Britain have proved themselves to be. Of course no lawyer or engineer in Australia, however willing to do his best, can have had the enormously valuable experience of organization and routine those countries provide; and though those here seeking the position include several personal friends, and will receive every assistance from me if appointed, yet I sincerely hope the post will, in the industrial interests of Australia as a whole, fall to some one having those greater advantages, which obviously can only be obtained from abroad.

I hope to be able to devote a large amount of time hereafter, even at a sacrifice of private engagements, to promoting improvements in the patent bill, and to be as unremitting as I have been in the past in seeking to raise administration to a high level, and if you would be interested in further communications from me on the subject I should have pleasure in making a note of it.

Some petitions to Parliament for patent law improvements, which I some time ago originated, received over 1,000 signatures, including all the leading manufacturers and importers to whom they were submitted, and it is gratifying to note that the new bill recognizes some of the most important of the desires the petitioners expressed, so curing evils in existing legislation.

G. G. TURRI.

Melbourne, Australia.

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William E. Parker, who has been connected with the Texas and Pacific Railroad for many years, has recently invented and patented a cattle guard which has some novel features. It has been tried on that line and found to be very effective. The guard is a simple system of small wheels about four inches in diameter and a half an inch thick mounted on many axles and bound together by straps of iron. Cattle attempting to cross this arrangement find that they are unable to obtain a footing, and turn back. In a recent trial it was found that after an attempt had once been made by an animal to cross it, it was impossible to drive the animal over the guard by any means.

### Electrical Notes.

An efficient type of electric battery designed especially for cars propelled by electric energy, is the Elieson-Bobinsky battery. In this type the cells contain five Planté plates, the negative and positive plates differing simply in thickness from other batteries. The distinctive feature of the plate is that the current enters through a central conducting lead tube from which thin laminæ extend to both sides, the outer ends being left free. By this arrangement there is no impediment to expansion, and consequently no buckling. Owing to the high degree of porosity and free circulation of the electrolyte, high capacities are obtainable—100 ampere-hours at a discharging rate of 20 amperes, 90 ampere-hours at 50 amperes discharge, and 73 ampere-hours at a discharge rate of 100 amperes. Another feature and advantage of this cell over the pasted plate type is the quickness of charging, since whereas the latter require several hours, the former can be charged in about three-quarters of an hour. The battery has been subjected to prolonged exacting tests by Messrs. Preece and Cardew, two well-known electrical scientists, and it was found that two-thirds of the full charge could be put in, within a quarter of an hour, while the battery withstood short-circuiting and reversing with commendable ease. From this it will be seen that this battery possesses several conspicuous features over the ordinary pasted plate cells, the most important being lightness in weight, high discharge rates, quick charging, and what is equally important, low cost of renewing the plates.

The phenomena of electric discharges in vacuum tubes give the nearest approach to seeing electricity that are likely to be made. The streams of corpuscles propelled along the tubes suggested to Crookes in 1870 the idea of a fourth state of matter, and these corpuscles—smaller than atoms and the same in all kinds of gases—were named electrons by Stoney, and have come to be regarded as the electric parts of all atoms, or even as making up matter itself. When torn from its groups or from matter, the electron travels with a speed comparable to that of light. A body charged with electricity, if at rest, presents the phenomena of electrostatics; if in motion, those of electricity and magnetism; if in acceleration or change of motion, those of light and radiation generally. Some substances—such as uranium, polonium and radium—throw off electrons without stimulus, giving intense and penetrating rays, with a kind of "electrical evaporation." This property of radio-activity is found in many bodies, even in leaves and newly fallen raindrops, and it will soon be difficult to find any substance without it in some degree. On the hypothesis that matter is composed of electrons, their size is known to be about the hundred-thousandth part of the diameter of the atom. In an atom of hydrogen there are about 1,000 electrons, in an atom of mercury there are 100,000; but even in the latter they are shown by calculation to be about as far apart in proportion to their size, comparatively, as the planets in the solar system. By their force the atoms come to be impenetrable. Of the fundamental properties of matter, inertia is considered to be electrical, cohesion is being shown to be so; gravitation is still a mystery.—Mining and Scientific Press.

There are few inventions in the electrical field which have benefited the chemist and metallurgist more than that comprised under the general title of "electric furnace." Up to, comparatively speaking, a few years ago, the highest attainable temperature by any known artificial means was 1,800 degrees Centigrade, or, possibly, with exceptional facilities and the exercise of great care, as high a temperature as 2,000 degrees Centigrade may, in some cases, have been attained, though the exact limit is questionable; certainly it does not rise much above the latter figure. Thanks, however, to the indefatigable researches of Moissan, Siemens, Borchers, Cowles, and some other investigators, we now possess a means for the artificial production of temperatures far above this limit, which enable us to fuse and otherwise treat commercially such hitherto refractory substances as chromium, platinum, carbon, and it is even possible to fuse the once indestructible crystalline form of that element, the diamond. Generally speaking, electric furnaces may be divided under two main headings, namely, those in which the heating effect is produced by the electric arc established between two carbon or other electrodes connected with the source of current, commonly known as arc furnaces; and those in which the heating effect is produced by the passage of the current through a resistance, which either forms part and parcel of the furnace proper, or is constituted, by a suitable conducting train, of the material to be treated in the furnace. The principle of this latter type is analogous to that involved in the heating to incandescence of the ordinary electric lamp filament, and such furnaces are, as a class, designated by the term resistance furnaces. The experience of late years in the construction and use of electric furnaces tends toward the establishment of the resistance furnace as a type more readily capable of efficient regulation.—J. Wright, in Cassier's Magazine.