Correspondence.

A Free Electric Current.

To the Editor of the SCIENTIFIC AMERICAN:

Thinking it would interest some of the readers of your paper, I wish to mention a little experience I had on some electric work.

I was working on bell work in Tremont, N. Y., in a new building and was to find out where the trouble was which had given the men so much annoyance. Testing out, I got in circuit a Croton water lead pipe and also a New York Telephone lead cable and to my surprise I received a current of 6 volts and about 10 amperes.

The current I found strong enough at times to run an Edison dental battery motor. Now I believe this lost current is coming from a trolley line in its return circuit, or it may be the discovery of tapping the earth for current. I notice the current becomes stronger when a trolley car is coming near, also that it is a steady current night and day, as I have the motor running all the time now. JOHN J. KEHOE.

Fordham, N. Y.

Suburban Side-Door Cars.

To the Editor of the SCIENTIFIC AMERICAN:

In the last issue of the SCIENTIFIC AMERICAN your editorial is enthusiastic over the advent of side-opening street cars. Now, while these are undoubtedly ideal in theory, in practice they have not proved an unmixed blessing. For several seasons they have been used regularly in Cleveland, and although they possess the merits which you ascribe to them, the great and almost insuperable difficulty of keeping the car warm has made them lose in popular favor. The constant opening and shutting of the doors, the forgetfulness of passengers, who fail to close the doors when the conductor is inside the car and unable to close them, subjects the passengers not only to the chilling blasts, but causes numerous draughts which are extremely unhealthy.

The Cleveland cars are provided with only two doors, and you will always find the seats opposite the doors vacant, as few people are hardy enough to withstand the direct force of the wind. Imagine what the conditions will be in the midst of winter in Chicago with twelve openings. It will be worse than riding in open cars, for there at least you have no draughts. Moreover, the necessity of running boards adds an element of danger, owing to their becoming slippery. So that in spite of the superior unloading ability of this style of car, the bodily discomfort ensuing prevents it from being as desirable as supposed. None of the new cars in Cleveland are being made in this style. MORTIMER T. STRAUSS.

Cleveland, O., October 5, 1903.

Optical Atmospheric Phenomena.

To the Editor of the SCIENTIFIC AMERICAN:

At page 317 of the last monthly Bulletin de la Société d'Astronomie de France, under the heading, "Optical Atmospheric Phenomena," is a communication from Mr. C. Jassenne, of Pervyse (Belgium) to the effect that on September 2, 1902, from the point where the sun had just disappeared below the horizen, he had observed immense divergent rays ("d'immenses rayons divergents").

This communication seems to have been made with the view of an explanation of the phenomenon; but no such explanation is given. I have written Secretary Flammarion, editor of the Bulletin, explaining the phenomenon, and it may be interesting to your readers to know how these divergent rays occur and are made visible to us.

Instead of the phenomenon being exceptional, as Mr. Jassenne's letter would lead me to suppose, it is, on the contrary, a thing of frequent occurrence, or on any fine day when the sky in the vicinity of the sun is covered with light, fleecy, cumuli clouds; and yet, strange to say, not one person in a thousand probably has ever given the phenomenon any attention, or if so, has never inquired into the why or wherefore of the occurrence.

Now, let any cloud stand between us and the sun's light, and let this cloud extend upward; there will be formed on the opposite side of such cloud a focus of light. Then, if there be below the sun other clouds, further away or more remote from us than that upon which impinge the sun's rays, intercepted or cut off from our sight by the cloud, the focus of light alluded to, or an imaginary or reflected sun situated at that distance from us, will send forth rays in all directions around it, those extending upward being hidden by the upper cloud or clouds, while those extending downward will be reflected to our eye from the lower cloud or clouds on which they fall.

If the sun be near the horizon, and its direct rays hidden from us by a stratus cloud in that vicinity, while there are above it other clouds more remote from us than that intercepting the solar rays, we will have divergent ascending rays.

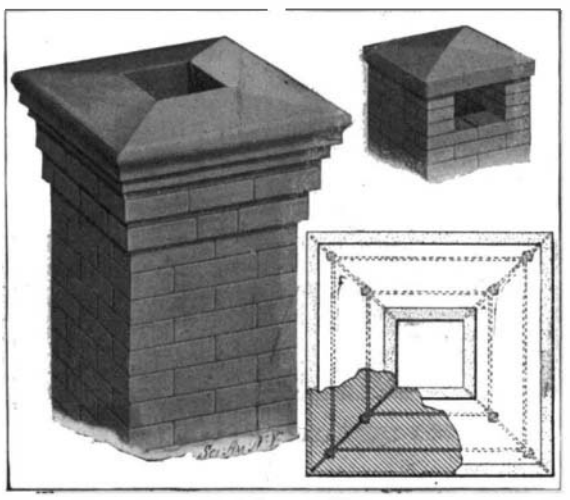
If again the cloud intercepting the sun's light happened to be forward, or nearer to us than all those surrounding it, we should see the secondary rays diverging and extending from in rear of the nearer cloud, both upward and downward or all around the line of sight from the eye to the sun, a phenomenon of rarer occurrence.

I believe there appeared in your journal, some years ago, a different explanation of this phenomenon, and it now remains for you, sir, or some of your readers, to say which of the two you consider the true explanation of the phenomenon. CHARLES BAILLARGÉ.

Quebec, September 15, 1903.

CHIMNEY CAP.

The accompanying illustrations show a shapely, inexpensive, and durable cap-piece for stone or brick chimneys. The cap-piece is formed of cement, being molded in any ornamental shape desired by means of a suitable matrix. An essential feature of the construction lies in the provision of a reinforcing frame preferably formed of metal strips imbedded in the cement. In order to prevent the metal from oxidizing the strips are galvanized or coated with some suitable paint. The frames may be made in the form of several rectangles suitably spaced apart by corner strips. It will be seen that the cement cap-block thus reinforced will be adapted to sustain considerable breaking strain without permanent injury, as the block if cracked by rough usage will not fall to pieces, being held by the metal frame from fragmentary separation, so that the crevices may be filled and the block be rendered solid by the introduction of liquid cement into the cracks which when set will reunite all the parts of the cap-blocks. The cap-block is formed with a recess or seat in its lower surface adapted to fit on to the top of the chimney. In mounting the cap upon the chimney a thin coating of cement mortar is first applied to the top surface of the chimney, so



CHIMNEY CAP REINFORCED BY METALLIC BAND.

that when the cap is seated it will practically unite the cap-block with the chimney. In this way the chimney top is greatly strengthened. The chimney cap may be formed of any required shape to fit different styles of chimneys, as shown in our illustration. A patent on this invention has been granted to Mr. George R. Cross, of 116 Holland Street, Lewiston, Maine.

The Current Supplement.

The transmission of electrical energy from Hochfelden and Glattfelden to Oerlikon (a distance of about eleven miles) possesses the rare peculiarity of being the only installation in Europe in which a triple-phase current is transmitted at a pressure of 30,000 volts. The line is fully described by Mr. Emile Guarini in the current SUPPLEMENT, No. 1450. The text is well illustrated by many engravings. Mr. Marcus Ruthenburg's paper on the electro-metallurgy of iron, read at Niagara Falls, is also published. Mr. James Alexander Smith, who is well known to readers of the SUPPLEMENT as a contributor, writes on testing the specula of reflecting telescopes, and takes occasion to correct Draper's method of parabolization by measure. John W. Alvord discusses sewage purification plants for summer cottages. The engineering subjects at the British Association are reviewed in a careful retrospect. Dr. Joseph Frank Payne tells much that is interesting of Anglo-Saxon medicine. The Paris correspondent of the SCIENTIFIC AMERICAN describes in a well-illustrated article a system of compressed-air locomotives used on Parisian suburban lines. Mr. D. G. Purse, president of the Savannah Board of Trade, read an interesting paper before the Farmers' National Congress on the sugar supply of the United States. The paper is published in full. "Producing Helium from Radium" is the title of an article which narrates the work of Messrs. Ramsay and Soddy. The usual electrical notes, engineering notes, and consular matter will be found in their accustomed places.

Engineering Notes.

The American company which is building the railway from Guayaquil, Ecuador, to Quito has opened the station at Guamote, at an elevation of 10,000 feet, and 126 miles from Guayaquil. The most difficult part of the work on the railroad has now been accomplished. With the exception of Lhassa in Thibet, Quito, in Ecuador, is the only capital in the world that to this day can only be reached for a considerable part of the journey from the sea on muleback.

A recent investigation into the question of the relative cost of running trains at high speeds, as compared with low speeds, has developed the fact that an increase in speed from 32 to 48 miles per hour, or 50 per cent, accompanied by a decrease in the number of cars per train from seven to four, has resulted in an increase in absolute coal consumption of 12 per cent, or about 90 per cent when figured on the basis of the number of cars, which, of course, represents the earning capacity.

Severe tests have been carried out in England with a ferro-concrete floor built on the Hennebique system. The section tested was of 25 feet 7 inches clear span between walls, and was composed of a 5-inch thickness, with a layer of cement paving 1½ inches thick. The main ferro-concrete beams which were to support this floor were 22 inches deep by 14 inches wide, and spaced at 11 feet 3 inches centers. Between these main beams were placed ferro-concrete joists 5 inches wide by 9 inches deep at 5 feet centers. A load of 6 hundredweight per square foot was placed upon this section over an area of 25 feet 7 inches by 11 feet 3 inches, and records of the deflection caused by this load were accurately taken by means of instruments capable of recording a deflection of 1,500 inch. The load was slowly increased and records taken. The deflection under the maximum load was only 0.149 inch, but with the load for which it was designed—4 hundredweight—the deflection was 0.079 inch. When the load was removed the flooring returned to its original level, thereby showing that the weight caused no permanent sag.

The relative advantages of milling and planing machines is a subject that frequently comes to the front. Both machines occupy an important place in the machine shop, and neither of them could very well be dispensed with profitably. One, however, cannot help but notice that many of the jobs that have until recently been undertaken on the planer are now being relegated to the milling machine, and that the latter is gradually coming more into favor. As regards cost of production by the two methods, we think the advantage is on the side of the milling machine. While the cost of milling cutters is certainly more expensive than planer tools, in making a comparison it should be noted that the milling cutter will do much more work as a rule per tooth, without sharpening, than the planer tool. The time each cutting point or tooth of a milling cutter is actually in the work is usually very short; using a planer tool it is long. Therefore, the cutting tooth has an opportunity to cool while the planer tool point has not. Thus, while the first cost of the milling cutter is much greater than the planer tool, taking results into consideration it works out the cheapest.

In connection with the experiments of the British Admiralty in the storage of coal under water for the purpose of retaining the calorific value of the fuel, some interesting information upon this subject has been vouchsafed by Mr. J. Macaulay, the general manager of the Alexandra Docks and Railroad of Newport, Mon. (Eng.). He recovered a quantity of coal that was known to have been submerged in the docks under his control for periods varying from three to ten years, and also further quantities from the estuary of the River Usk, whither the fuel had been carried by currents and tides from wrecks in the Bristol Channel. The latter coal was considered to have been for more than two years under water. This coal was experimented with upon the locomotives employed at the docks in competition with the best freshly mined coal obtainable. The trials were carried out under similar conditions so that absolutely comparative data might be obtained. The results showed that the first place was taken by the river-submerged coal, followed by that which had lain submerged in the docks for ten years, with the newly mined coal third. According to this expert, coal loses about 10 per cent of its steam-generating power when stored in the open air for any great length of time, the greater part of this deterioration taking place during the first year. From these tests it is apparent that the best method of storing coal with a high calorific value is under water, if it is to be stored for any great period. Subaqueous storage is cheap, and has the further two important advantages of immunity from hostile attack, and ready access when required, and permits the utilization of a great space for other purposes that would otherwise be occupied by the bunkers of coal on land.