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Price 10 cents. For sale by all newsdealers.

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A LETTER ENVELOPE GUM GREATLY NEEDED.

In consequence of the decline in the supply of gum arabic, the Post Office department has been obliged to abandon its use of this excellent material as a sealer for letter envelopes. In lieu of gum arabic a filthy and foul-tasting compound has been substituted, which is a disgrace to the department and a nuisance to all who have occasion to seal a government envelope.

It is to be hoped the ingenuity of chemists will be able to purify the substances now used, or produce a new gum that shall be free from the objections mentioned. Such an invention or discovery ought to prove highly profitable to its author, for it is greatly needed by the public.

A PROPOSED ELECTRO-MOTOR TRIAL.

The project of a large sleeping car company to have built for them a four-mile electrical railroad, for illustrating the advantages of each type of motor, will be the first really practical attempt to compare the various systems on the same line and under similar conditions. If the avowed purpose of the company may be accepted in good faith, and the projectors of the various systems will really assent to such comparative trials, we are likely to get at more cold facts concerning electro-motors than we have had for many a day.

The projectors of the third-rail system say that the trolley system is uncertain; the trolleys snap from their propelling wires or fly off at slight impediments, relying on the climbing capacity of the passengers in the car below to keep them in their places. On the other hand, the overhead people—we do not refer to celestial folk, who would not, of course, prevaricate about such small things as electro-motors—we say these overhead people declare the trolley system to be the only reliable one; the transmission of the electrical energy being wholly removed from contact with the ground, which, as is well known, is the worst of insulation, and carried through the air, which is the best.

THE NEW PHILADELPHIA SUBWAYS.

The plan adopted for burying all the telegraph and telephone wires of Philadelphia has about it that air of cool consideration and substantiality that mark the Quaker mind. After long investigation of the hundred and one good, bad, indifferent, but always cheap plans for burying the wires, the managers of these companies have thrust all aside and hit upon an expensive system of their own in the belief—a reasonable one, be it said—that it will prove cheapest and most satisfactory in the long run.

As will be seen, it is not necessary, in such a system to tunnel every main street and avenue, but, at most, only every second or alternate one, for from one line the wires may be run to the blocks on either side. Indeed, the number of main lines could, it is obvious, be still further reduced by branching, and, doubtless, it was only the fear of possible trouble from complication that induced the Philadelphia managers to forego the temptation to so lessen their construction account.

Curiously enough, the tunnel system has been looked upon, from the very first, as impracticable, because of its cost. Nor is this surprising when we remember that most of the estimates for construction were for lengths of lines greatly in excess of what is now found to be required, while some seemed to be based upon such elaborate construction as that of the Paris sewage system.

THE DIRECT PRODUCTION OF LIGHT.

In his paper entitled The History of a Doctrine, read before the American Association at their last meeting, in Cleveland, Prof. Langley gave a graphic account of the development of the undulatory theory of light. He held that much yet remained to be done in that field of research, and he formulated a definite object for investigation—the relations between radiation and heat.

We have every reason to believe that it is very low. There is little doubt that could we estimate the equivalent in energy of the light-giving radiations of a source of light, it would be surprisingly small. Acting on this idea, and assuming and probably believing that the hypothetical luminiferous ether is an actual entity, Prof. Lodge, in England, and Prof. Hertz, in Germany, have been making very interesting experiments in the direction of the production of light.

Nothing is truer than that the contrast between the small amount of energy absolutely needed to produce light and the large amount that practically has to be expended gives a disparaging view of man's progress. In the flame of a candle, a lamp, or a gas burner the light is probably derived from ignited carbon. Yet in the case of gas, for raising this carbon to the light-giving temperature, not over one or two per cent of the heat of the flame is theoretically required.

Prof. Lodge's way of putting the case is so very striking that we refer our readers to it, as given in the last issue of the SCIENTIFIC AMERICAN. He states his case as a whole with great clearness. Where he refers to "atom" he probably employs the word in the physicist's sense, and as a concession to accuracy might have done better in using the word "molecule."

The ether is still hypothetical; an a priori attempt to produce light by throwing it into oscillation by direct electric action seems based on an insecure foundation. A few years ago the world was startled by the announcement that the astronomer Lockyer had discovered the identity of all the elements and the unity of matter.

So it will be with the experiments we speak of. Should they lead to the production of light unaccompanied by obscure heat radiations, the world will be incalculably benefited. The energy corresponding to the maintenance of a single horse power will give the light of five thousand candles.