AN OPEN LETTER TO THE MAYOR.

To the Honorable the Mayor of New York City:

In making the departure from the conservative policy of this journal, which is involved in our addressing the present open letter to the Chief Executive of this city, we believe that your Honor will credit us with being actuated solely by motives of concern for the interests of the great municipality over which you have always exercised such a faithful oversight.

We feel that sufficient justification is found for this letter in the fact that its subject matter is such as comes peculiarly within the province of a journal which, for the past sixty years, has devoted much of its space to the exploitation of the great engineering structures that have so largely contributed to the fame of the city of New York.

In the discharge of your multifarious duties, you must necessarily depend for information and guidance upon the representations made to you by the heads of your many departments; and in cases where the subject matter is of a purely technical character, as, for instance, in those coming within the province of the bridge department, the correctness of your final judgment must necessarily depend upon the completeness with which all sides of any subject of controversy are laid before you by your technical advisers.

The object of this letter is to present for your consideration certain facts regarding the present deplorable delay in the construction of the Manhattan Bridge. We believe we are justified in saying that among all the important public works now under construction, there is none so greatly needed as this; and none, therefore, in which more strenuous effort should be made to facilitate rapid construction. Yet, as matters now stand, we are confronted by the astonishing fact that, after two and a quarter years of incumbency of office, your Bridge Department has not only done nothing toward the actual erection of the steelwork of this bridge, but the specifications are not even yet in shape for the bridge companies to put in their bids. Considering the urgency of the work, this alone, it would seem to us, is a delay which approaches, if it has not already reached, the proportions of a public scandal.

The situation is greatly aggravated by the fact that, when the present department took office, it found on file a complete set of plans for this very bridge, which had been designed by engineers of acknowledged authority on suspension bridges, and approved by a non-partisan commission of some of the most eminent bridge engineers in the world. That the indorsement of this commission was in the highest degree authoritative, will be evident to your Honor when we mention that it included the late Mr. Morison, a past president of the American Society of Civil Engineers, and Mr. Theodore Cooper, whose Specifications for Bridges are standard throughout America. The plans which your department found on file had been drawn with a special view to economy of cost and rapidity of erection; features which were gained largely by the substitution of the eye-bar chain for the wire cable. The expert engineering commission referred to indorsed the plans in every particular. Had bids been called for and the work pushed forward, it is certain that the bridge would at this time have been three-fourths completed, with the prospects of its opening within the period of your present administration.

In spite of the city's urgent need of the bridge, the engineers of your Bridge Department, who must have been aware that the indorsement of engineers of the high professional ability of the members of the expert commission placed the practicability of the eye-bar plans beyond question, took the astounding course of ignoring these plans altogether, and committing the city to the delay and expense involved in preparing a new set of plans of their own.

This action has involved already an expenditure of $100,000 for new plans; a delay of two and a quarter years in the construction of the bridge; and a lawsuit, due to an illegally-drawn specification, which may easily cost the city $500,000 in damages. In justification of their action your Bridge Department has alleged that the eye-bar cable design would cost more and take longer to build than the wire-cable design. It has been suggested by this journal that in order to place the two sets of plans on an even basis, they both be submitted to an independent board of engineers for comparison. Your Bridge Department has always opposed, and very strongly opposed, this suggestion.

In order to ascertain from the bridge companies, who will be likely to bid on the Manhattan Bridge, their opinion as to the merits of the two designs, letters were recently sent by the Merchants' Association of this city to several of the leading firms asking for their opinion. They replied that they would be prepared to build eye-bar cables which would be up to the Bridge Department specifications; that the bridge would be cheaper to build; and that it could be built in less time than a bridge of the wire-cable type. They also stated that they would be prepared to bid upon the plans of the eye-bar cable bridge as they now stand on file in the Bridge Department.

Although some work has already been done upon the cable anchorages, we are in a position to assure your Honor that, by a piece of good fortune, they have been constructed of such a form and of such size and weight that they will serve their purpose equally well for either type of bridge.

Summing up, we beg your Honor to consider the following facts as between these two sets of plans:

That the eye-bar plans were drawn by engineers who, having in view the desirability of quick construction, adopted the eye-bar system because of its great facility of erection and smaller cost.

That these plans were submitted to an independent board of bridge engineers of high professional reputation, who gave them unqualified indorsement.

That several bridge-manufacturing companies have stated (1) that they are prepared to bid upon the plans; (2) that they can furnish eye-bars of the size and structural quality specified; and (3) that the bridge can be built more quickly and for considerably less money than one of the wire-cable type.

That the wire-cable plans, as completed by the Bridge Department, have never been submitted for the consideration of any outside board of experts.

That your Bridge Department officials have, on the contrary, thrown every obstacle in their power in the way of such discussion of these plans by an independent commission.

That the "strain sheets," or figures showing the calculations of strength of the various parts of the bridge, from which alone any comparison of the wire with the eye-bar design could be instituted, have never been made public, even to the contractors—an absolutely new procedure in the history of bridge building in America.

That this premeditated and carefully-guarded secrecy has raised an inevitable and very reasonable doubt in the minds of the technical world, in which we strongly share, as to the ability of the wire-cable plans to stand comparison with the plans for which they were substituted.

Finally, and in view of the above facts, we respectfully submit to your Honor, that in order to safeguard the interests of this city in this matter, it is advisable that you should instruct the engineers of your department to offer both sets of plans for bids, and thereby make sure that, whether the eye-bar or wire-cable type be selected, the city will secure the cheapest possible bridge in the least possible time. THE EDITOR.

THE MODERN PHILOSOPHER'S STONE.

One interesting deduction can be made as a result of the disintegration of radium into helium—a deduction which has a great bearing on the ancient problem of the transmutation of baser metals into gold, and which has been admirably set forth in a recent paper by Prof. Frederick Soddy. Although we cannot yet transmute one metal into another, we know very well why that has never been accomplished. Radium evolves for every gramme weight 100 calories of heat per hour, and since in a year only one-thousandth part changes, it follows that the total energy in the complete disintegration of a gramme of radium must be enormous. It is roughly about a million times that given out by a similar weight of coal burning. If 30 milligrammes of radium were all to disintegrate suddenly, the effect produced would equal the explosion of about a hundredweight of dynamite. Uranium in its complete disintegration produces radium, and hence the amount of energy evolved must be as much greater than in the case of radium, as the whole is greater than the part. If we could artificially accelerate the rate at which radium or uranium disintegrates, we should, on the one hand, have achieved transmutation of a heavier element into lighter ones, and, on the other, have rendered available for use a new supply of energy a million times more powerful than any source at present known. If we succeeded in artificially transmuting uranium there is little doubt that the same means would be applicable to the other elements. Hence the supply of energy would be inexhaustible. But let us see what the old attempt of the alchemist involved. When he was concerned with building up a heavy element like gold from a lighter like silver, he was attempting a most profitless task. The energy absorbed would cost far more than the value of the gold produced. The energy of some hundreds of tons of coal would have to be put into the silver to turn it into gold. But where he was attempting to produce gold out of a heavier element like lead, not only would he have got the gold from the lead, but also a store of energy would have been released in the change of far more intrinsic and commercial value than the gold.

Is radium ever likely to be of any practical use? It may, or it may not, light our lamps or drive our motors. The assured certainty is that if it is ever made to do either of these things, man as we know him will quickly follow his steam engine and dynamo into the museum. At present we have not found how to control the gigantic forces, or to affect the tremendous processes we have so lately discovered, and we never may. The important point is that by these discoveries the relations of mankind to Nature have undergone a certain change, and he has caught a glimpse of some latent possibilities within his legitimate destiny which cannot be effaced. Energy is the life of the physical universe. You cannot multiply the existing store by a million and leave things as they were. But the recognition of the internal energy of matter has done this within the progress of the century which has just begun. A journey to the moon to-morrow *may* rank with the half-penny car ride of to-day, or the warming of a house with the thawing of an Arctic continent. To-day, so far as any use of the new knowledge is concerned, the one is as impossible as the other, but none would venture to deny to the future the possibility.

A NEW ARMY SIGNALING APPARATUS.

Signaling from station to station is not the easy matter it seems. In order that an object on shore used as a signal may be seen by the observer on a tug, 9,000 yards away, there must be a strong contrast of color between the signal form and its background; else the form cannot be distinguished from the background. First of all, then, this contrast of color must be secured. How the obstacle may be overcome is pointed out by Capt. Thomas E. Merrill, of the Artillery Corps, in an article published in the Journal of the Military Service Institution. Broadly speaking, his apparatus is constructed very much like a huge window-shutter, inasmuch as it depends for its effect on the simultaneous movement of a number of hinged boards.

Capt. Merrill finds that the objects used to represent signals must be all either white or black and their background of the opposite color. The easiest background to provide is a dark one. A grass or earth slope, while of course not black, will generally answer the purpose. Then the signal forms must be white. A white surface in shadow shows dark at long distances. Therefore, in the general case it is necessary to use a surface whose face toward the observer is so inclined as to not be in shadow.

At Fort Heath a plane surface 15 by 40 feet with a fall of fifteen feet in the forty has been found to work very well when not in shadow, and on account of its inclination, fairly well even when in shadow.

The plane surface consists of inch boards each a foot broad and fifteen feet long extending across stringers that run parallel with the long direction, there being forty of these boards. Every fourth board from the top is hinged to the preceding board, and all the hinged boards are so arranged by a system of levers and counterweights that all can be simultaneously raised to a vertical position or lowered to a position where they form part of the plane surface.

The plane surface is painted white. The underside of the hinged boards and the stringers under the hinged boards are painted black. When the hinged boards are vertical the apparatus looks black from the front because each hinged board covers the preceding white boards to such an extent that they are invisible to an observer situated to the front and on a slightly lower plane.

The operation of the apparatus resembles that of the heliograph. Normally the white surface is in view. The observer on the tug watches the white surface. When a signal is to be sent the white surface disappears, due to the raising of the hinged boards. The apparatus has been found to work almost as rapidly as the heliograph and (an important advantage) is easily operated by one man.

The appearance presented to a distant observer when a message is being sent is as though a vertical square 15 feet on a side changed uniformly throughout its entire surface from black through all the intermediate shades to white and *vice versa*. At a distance one does not see, as the square changes from black to white, a succession of bands of white increasing in width until the entire surface is white, as one might at first thought expect, but just a uniform change in color over the entire square. For artillery target practice a single letter would indicate a prearranged command.

The signal apparatus described was used with complete success for the entire subcaliber and service practice of Forts Banks and Heath during the fall of 1905. During the service practice the range of the tug varied between 4,000 and 7,000 yards. The practice lasted from about 8:30 A. M. until about 4 P. M. the same day. It is safe to say that at least one hundred signals, each a single letter, were sent during the day. Not one was repeated and not one was misunderstood.

A Swiss company has received the order for equipping the Valle-Maggia Railway from Locarno to Bignasco on the single-phase system. The line is 17 miles long, with a maximum gradient of 3.3 per cent, and the gage is 3 feet 3 1-3 inches. A trolley voltage of 5,000 volts is to be employed. It is intended to obtain the necessary power for working the railway from a waterfall.