and it is therefore not surprising that even the best of our rapid transit schemes should languish for want of funds. Some of our enterprising citizens, who know this but are determined that Rapid Transit shall no longer rest, have formed an association to promote the matter financially, by raising a fund of three millions of dollars, to be applied in carrying out whatever plan the subscribers to the fund may decide to be best, after the money is raised. They have ascertained by experience that, if plans are to be first discussed, there will be no end to the discussion, and no time left to obtain subscriptions. They have therefore decided to raise the money first, and talk afterwards, which is assuredly a very practical method of procedure.

At a recent meeting of the association, a board of directors was nominated, consisting of eminent and reliable citizens, in whom the public have great confidence. Progress of subscriptions was also reported, when it appeared that three hundred thousand dollars, or ten per cent of the whole amount, had been already pledged. This is certainly very encouraging.

The speakers reminded those present that a splendid line of rapid transit railway, half way through the city, was almost completed, and would be put in operation within a few days, namely, the Harlem Underground, and that it only needed the continuation of the same tracks down to the Battery to furnish New York with a better system of local communication than that of any other city in the world. It was suggested that, while it was out of place for the Association to discuss particular plans, still the members and others who were interested might do well to examine the works above mentioned, where all the various forms of railway that are being advocated, the Elevated, the Open Cut, and the Underground, may be examined and compared, and their effects upon the value of adjoining property, and their relative interference with the public uses of the streets, studied to the best advantage.

It was suggested that the great viaduct between 98th and 116th streets was perhaps as fine an example of the Elevated, or high level railway, as could be built, although it filled up the street, and the adjoining property would be found to be less in value than elsewhere on the line. The depressed or Open-Cut railway could be seen to the best advantage where it passes through the main street of Harlem, from 116th street to 133d street. It would be found that this plan, while it was less objectionable than the elevated, still occupied and absorbed the best portion of the avenue, and was disadvantageous to the adjacent property. The Underground railway could be studied between 56th street and 96th street, and here, above the railway, would be found a broad and magnificent avenue, beautifully paved and regulated, of park-like appearance, especially desirable whether for business or residence, and here the adjoining property would be found to be higher in value than at any other point along the ine.

The remarkable conjunction of all these different methods of city railway construction upon the same street, all the examples being of equal capacity for traffic, certainly affords to our citizens the best possible opportunity for correctly deciding which of the methods is the best for construction down through the business and crowded parts of the city.

The recent construction of these different styles of railway also places before our citizens positive evidence of the actual cost of building on either plan. In this respect the construction accounts will, we think, show that there is little to choose in the matter of economy between either of the forms. If there is any difference, the high level road will be found to cost probably more than the low level railway, capacity of traffic being equal.

We recently gave an engraving of the shaft of the Hudson river railway tunnel, which has been commenced on the Jersey City side of the Hudson, designed to lead the tracks of the great railways, which there center, directly into the southern part of New York by the underground method, the same as is now done at the northern part.

The city of New York will undoubtedly require ere long several independent lines of rapid transit railways, but what particular forms of construction should be employed, whether they should all be alike or different, it is perhaps too early now to determine. The general conclusion reached by the Rapid Transit (Elevated) Railway Committee of the Civil Engineers' Society is that each main line must have a traffic capacity at least equal to the London Underground Railways. In this conclusion everybody will agree. The standard for passenger accommodation is that afforded by the Underground. Nothing less will satisfy the public. The suggestion naturally follows: "Why not, for a first main line, complete the work so nobly begun, by carrying the Underground road down town at once?" The indications are that this will be done. We have only to add 4½ miles to the work already built, when we shall have in operation a safe, capacious, and fast railway underground from the Battery to Harlem river, a distance of nine miles.

Several excellent charters for fast railways in New York have been granted, and a bill is pending before the State legislature for a general law empowering the formation of other companies. So we are not likely to lack for franchises. But the tendency of this multiplication of charters is to hinder rather than to promote rapid transit. The immediate question for builders will be: Which, on the whole, is the best route for business? Which line will be the most sure to return a reasonable interest on the large expense which the work inevitably involves? The eminent British railway engineer, Mr. John Fowler, affirms that local or city railways, in order to ensure to themselves the largest amount of permanent traffic, must be located directly on the lines of greatest local travel, where they constantly command the public attention. In this view, the Broadway line would seem to have pre-eminent advantages. No other street in the world is so constantly crowded with travel. The gradual changes which are going on along this thoroughfare, by the erection of gigantic buildings, point to a day, not far distant, when its local population alone will suffice for a generous support of a railway placed under its pavement; and that if all the side avenues had their rapid transit rails, the Broadway line would never suffer for lack of business.

AMALGAMS FOR FILLING THE TEETH.

An article under this heading, published in our paper of January 3, and referring to observations on the subject made by Dr. Clowes, of this city, before the Odontological Society, has called out a number of communications from members of the profession. We regret that our limited space prevents their publication. Dr. A. C. Castle, M.D., of this city, one of our oldest practitioners and a well known scientist, sends us an excellent article on the subject. Probably no one in the profession has had greater experience than he in the matter. He, by the way, calls our attention to a misnomer in our article, where we spoke of the use, by Dr. Clowes, of tin amalgam. We should have said dental amalgam, as every intelligent reader doubtless understood. It was the usual dental amalgam or compound, containing tin and silver, with sometimes other ingredients, that we referred to.

Dr. Castle tells us that he has been in the full practice of medico-dental surgery in this city for the last forty years, and during all that time has been constantly using amalgam fillings for badly decayed teeth. He gives us an interesting account of the early battles that took place a generation ago among the dentists. Dental amalgam was introduced in this city by his father, in 1829. In 1846, the late Dr. Eleazer Parmly, an eminent dental practitioner, began hostilities against the filling, on the score of injury to health, etc.; but when challenged to produce proofs, he utterly failed. On the other hand, Dr. Castle brought forward the most indisputable evidence, medical, metallurgical, and professional, fully sustaining the utility of the amalgam. From that time to the present, Dr. Castle tells us, its popularity and use, to apply a strong figure of speech, has advanced, almost, as it were, by a geometrical progression. To Dr. A. C. Castle, and primarily to his father, the profession is indebted for the introduction, improvement, and practical exemplification of this highly useful agent.

Dental amalgams, says Dr. Castle, can only be formed under certain conditions. Platina, unless melted with and combined with silver, will not form an amalgam. Tin will mix with mercury, but it will not crystalize or harden without a large addition of silver. So it is with gold and other metals. Silver is absolutely necessary to make hard amalgams for the teeth. But silver is affected by gastric acids and gases, which discolor dental amalgams, and, in many mouths, even the purest gold. In the shape of an amalgam, the quicksilver modifies the character of silver, rendering it less liable to the action of the gastric acids, and as durable in the teeth as the other metals or fillings used for this purpose.

TEST OF AMERICAN IRON AND STEEL.

The Sundry Civil Appropriation Bill, passed among the last acts of the late Congress, contained an appropriation of $75,000 for tests of iron and steel, to be made by a board of engineers, who were to serve without pay, with the exception of the secretary. The members of the board have recently been appointed by the Secretary of War, as follows: Colonel T. T. S. Laidley, Ordnance Department, U. S. A., resident; Professor R. H. Thurston, Secretary; Commander L. A. Beardslee, U. S. N.: General Q. A. Gillmore, Engineer Department, U. S. A.; Chief Engineer David Smith, U. S. N.; W. Lovy Smith, C. E.; A. L. Holley, C. E. A testing machine is to be built, and set up at the Watertown Arsenal, where the experiments are to be conducted. The board will receive instructions from, and report to, the Chief of the Ordnance Department of the Army.

The members of this board are all well known engineers, several of whom have already distinguished themselves by their investigations of the properties of materials used in construction. It would be difficult to over-estimate the value of their future experiments, if carefully conducted. To mention a single instance, it may be stated that the English formula deduced from Gordon's experiments is almost the only authority available to our engineers for computing the resistance of materials to compressive strains. Very few of our engineers could afford to make such experiments as they desired; and when such investigations were conducted by companies, the results were not usually available for general use. It seems probable, therefore, that the appropriation, made by Congress for these experiments, will be productive of more good than many other items for which ten times the amount was allotted

ANOTHER EARTHQUAKE INDICATOR.

In a late number of the SCIENTIFIC AMERICAN we gave an illustrated description of the earthquake indicator of Count Malvaria, of Bologna, Italy. A much simpler device has been for some time in use at the Cambridge Observatory, Mass. This was adopted by Professor Winlock, the distinguished astronomer, the Director of the American Nautical Almanac, and it is an excellent illustration, taken with the first described instrument, of the comparative simplicity of Yankee devices, and the directness with which American ingenuity attains its object.

The great equatorial at the Observatory of Harvard College is mounted upon a massive granite pier, whose foundations extend far below the surface of the ground. The floors of the building are carefully kept out of contact with this pier, in order that no tremor may be communicated to the telescope by the structure. This pier can therefore only be moved by actual motion of the earth. Four little pins, slightly conical in form, are balanced, small end down and large end up, on the upper face of the pier. They are so nicely pointed that it requires some skill and care to set them up. Once set up, only movements of the earth will throw them down. When thrown down, the direction in which they lie indicates the direction of the earthquake wave. At the time of the shake which so seriously disturbed our neighbors of Westchester county, one of these pins was found overthrown, indicating that the shake probably affected slightly the Hub of the Universe.

We presume that many of our readers will adopt the Cambridge earthquake indicator, and that we shall learn from them the direction of movement and the extent of the next earthquake. This little device is far simpler and, we think, more accurate and reliable than that of the Italian Count.

KAOLIN IN THE UNITED STATES.

A letter appears in our correspondence columns, signed by Mr. S. D. Morgan, of Nashville, Tenn., in which the writer takes the ground that we labor under a mistake in stating that kaolin suitable for fine porcelain is not produced within the United States. Our statement was based on the assertion of one of the oldest, as well as one of the largest, consumers of the clay in the country, and that gentleman assures us that, though he would be highly gratified if he could substitute an American for a foreign raw material in his manufactures, and that he had endeavored to awaken interest in the discovery of suitable kaolin beds, as yet his wishes and efforts have been entirely futile. We are well aware that there is an abundance of kaolin deposits open; but we have yet to learn of one in which the material is sufficiently free from iron and other impurities to serve the purpose of manufacturing the fine grade of porcelain, to the description of which our recent article was devoted.

SCIENTIFIC AND PRACTICAL INFORMATION.

NEW POISONOUS SNAKE.

A wonderful poisonous snake has just found a home in the London Zoological Gardens. This is a snake-eating snake, hence called *ophiophagus*. Dr. Fayrer has ably described this creature. We learn from him that this most formidable of poisonous snakes is found, but not commonly, in India, the Andaman and Philippine Islands, etc. It is the largest and most formidable of known venomous snakes. Shortly after his arrival he was fed by the keeper, who put an ordinary English snake into his cage; the *ophiophagus* quickly devoured the English snake by bolting him head first. In general appearance this new snake is very like a common cobra, except that, when he spreads his hood, he is seen to be marked in very pretty bands, not unlike the patterns on oil cloth. The head is somewhat almond-shaped, exceedingly lizard-like, not flat and triangular like that of the rattlesnake. When sitting up with his hood expanded, the snake is continually jerking his head in a restless manner, reminding us of the quick, darting action of the common green lizard; the eye is exceedingly clear and bright. When disturbed he hisses loudly, and shows his temper by extruding his long, black, forked tongue, which he vibrates with marvelous celerity. The lower part of the glass of the cage now inhabited by this snake has been painted white, in order that his naturally hasty temper shall be disturbed as little as possible by the morning calls of visitors.

PRAIRIE CHICKENS AND GRASSHOPPERS.

While naturalists and entomologists are puzzling over the discovery of some plan to prevent the recurrence of the grasshopper plague in the Western States during next fall, it would be well for them to take the immense yearly slaughter of the prairie chickens into consideration. The numbers of these birds which are slaughtered each winter by trapping after heavy snow storms, and find their way to the markets, are something enormous; and as the grasshoppers constitute a great part of their natural food, it seems not improbable that the disappearance of the former might exercise a very appreciable effect in the increase of the devastating insects.

ANILINE INKS.

The majority of aniline colors soluble in water furnish inks of excellent quality. Dingler's *Polytechnische Journal* of recent date gives the following practical recipes for their preparation, by which any one can make the fluids very easily: Violet ink is obtained by dissolving one part of aniline violet blue in 300 parts of water. This ink is quite limpid, dries quickly, and gives a remarkably dark color. It is necessary that new pens should be employed in using it, as the smallest quantity of ordinary ink mixed with it causes its alteration. Blue ink is made by dissolving one part of soluble Paris blue in 250 parts of boiling water; red ink, by dissolving one part of soluble fuchsin in 200 parts of boiling water. While ordinary inks are decomposed by numerous substances, and notably by hydrochloric acid, aniline inks are completely ineffaceable from the paper on which they are used. They resist the action of acids and even of chlorine.

EBULLITION OF SULPHURIC ACID.

According to M. Bobierre, sulphuric acid may be caused to undergo regular ebullition by the addition of thin plates of platinum in the proportion of 180 grains of metal to 32 quarts of acid. The whole is to be treated in a vessel of 55 quarts capacity.