

## A NEW CABLE RAILWAY SYSTEM.

(Continued from first page.)

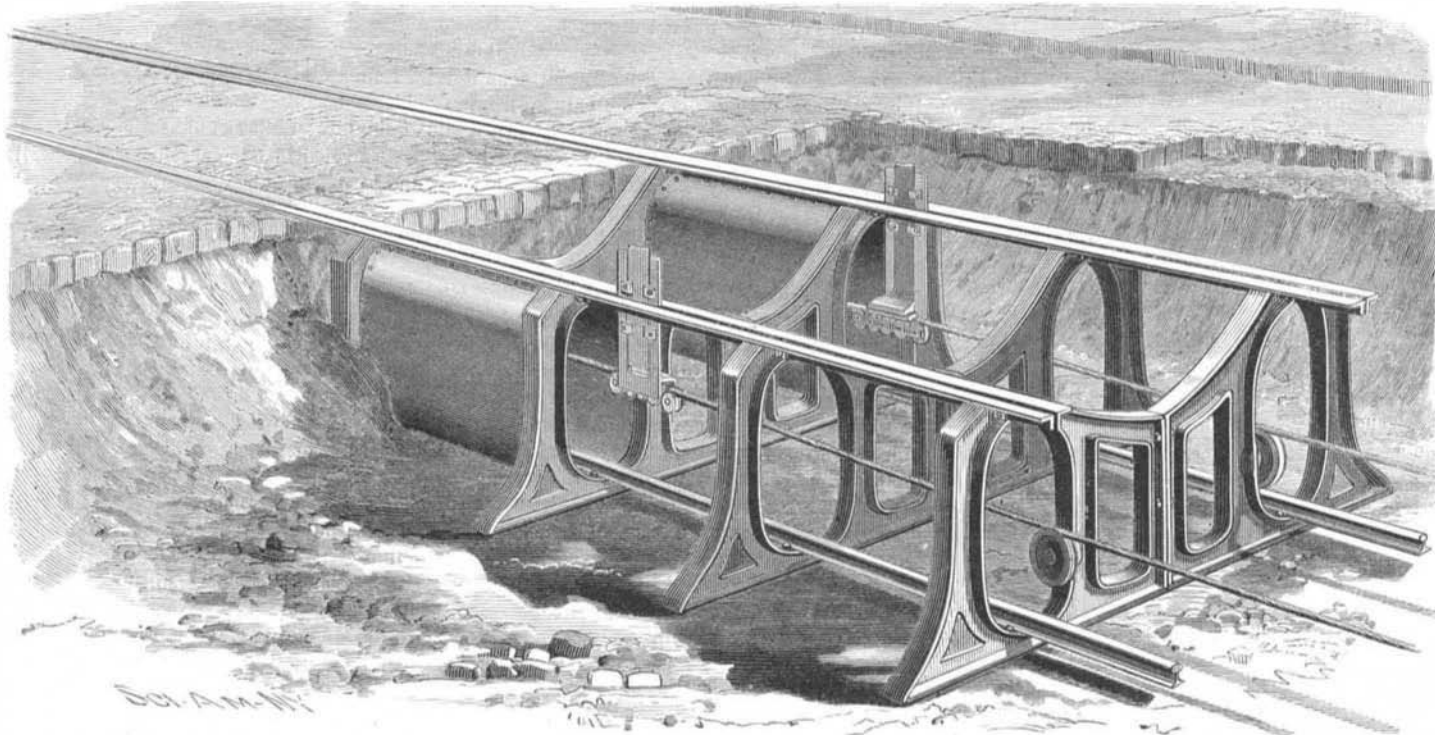
be propelled at a rate of 4 miles or 8 miles an hour at the will of the grip attendant. This feature is especially valuable for roads which run into the suburbs, where a high rate of speed is not objectionable, and it also affords a means of "making up lost time," when the road is accidentally blocked.

The cleaning of streets through which these roads run is greatly facilitated by attaching sweepers to the cables, and in winter the snow could be cleared for traffic as fast as it falls. From the nature of the system it will be seen that a

## THOMPSON'S BLEACHING PROCESS.

When any marked advance is made either in applied science or the industrial arts, it is by no means wholly unprofitable or devoid of interest to take a retrospective glance at the history of the matter at issue. On the contrary, it may prove very profitable, as showing the various landmarks in progress which have been reached and passed, and highly interesting as indicating the degree of proximity in which present development stands in relation to ultimate perfection. It is in this connection that we here revert to the early days of bleaching, in order to bring out to the full the important advances recently made in that useful art by

It would fulfill no useful purpose were we here to follow the various improvements which contributed to reduce the period required for bleaching from months to weeks and from weeks to days. We, therefore, pass on to describe briefly the process as we find it carried out in ordinary at the present time. Although great advances have been made, bleaching is still a comparatively slow process, and any recent attempts to hasten it have been carried out at the expense of damage to the fabric. In the ordinary process the goods to be bleached are first boiled with lime in a large circular boiler, or "keir," as it is termed. The boiling is continued for about seven hours, after which the goods are



A NEW CABLE RAILWAY.—ISOMETRICAL VIEW, SHOWING MANNER OF CONSTRUCTION

snow blockade is impossible, since, the wheels being below ground, the one-half inch standards would pass through the snow with very little resistance. The floor and platforms of the cars, as the engraving shows, are close to the surface of the street, the platform requiring no steps—a great convenience for all, especially ladies and children.

This proposed system contemplates the building of a large main tunnel in the center of the street and two smaller ones directly under the chairs. The former will be of ample size to take in all necessary pipes and electric light wires, while the latter may be used exclusively for telegraph and telephone purposes. All the tunnels will be constructed of concrete, so that when once built they will last indefinitely. The increasing number of overhead wires and subterranean conduits makes it highly important that some system be adopted which will do away with both evils at the same time, and this proposed railway system, devised by Messrs. Orvis and Nelson B. Adams, has this end in view.

The Orvis and Adams system, which presents many novel and interesting features, is controlled by the United States Cable Road and Subway Company, of No. 261 Broadway, New York, and those interested in city passenger traffic, as well as all city authorities and electric companies, are asked to examine into its merits.

## Idle Steamers.

Already about one-fifth of the total number of merchant steamers registered at northeastern ports has been laid up by the owners in consequence of their inability to obtain remunerative freights. The shipping trade is actually becoming worse instead of better, and the question of a remedy is beginning to strongly exercise the minds of the underwriters. Notices convening special meetings of the Mutual Insurance clubs in the Hartlepool, clubs which have an aggregate capital of over four millions sterling, have been issued, and it is the intention of the clubs to consider the advisability of increasing the return premiums for steamers detained in port by 50 per cent during the period from April to September. This is done with the intention of offering a premium to owners to lay up their ships, so as to produce a strengthening effect upon the freight market. The remedy seems a curious one, though at the same time it is no more out of place than the resolution of ironmasters to subsidize those who agree to put their furnaces out of blast in order to increase pig iron prices.—*The Engineer*.

A LINE of railway cars, to be drawn by camels, will shortly constitute one of the peculiar features of travel and transportation in Central Asia.

Mr. Jacob Baynes Thompson, the practical working of whose invention we have recently had the satisfaction of witnessing. The early days of bleaching stand a long way off from the present time, but we need go no further back than the second quarter of the last century to find the Scotch sending all their brown linen to Holland in the month of March to be bleached, and receiving it back in the following October. Then it used to be crofted, or spread out on the bleaching grounds for months, and sprinkled with water several times a day. Some advance was, however, made in 1749, when bleach works were established in the north of Scotland with tolerable success. The course of procedure consisted in first bucking the cloth or steeping it in alkalines for some days, and then washing it and crofting it for several weeks. After bucking and crofting the goods some half dozen times, they were steeped in sour milk for some days and then washed and crofted, these processes being repeated until the bleaching was complete. The process was an expensive one, not only from the time occupied in effecting it, but from the large area of grass land necessary to carry it out.

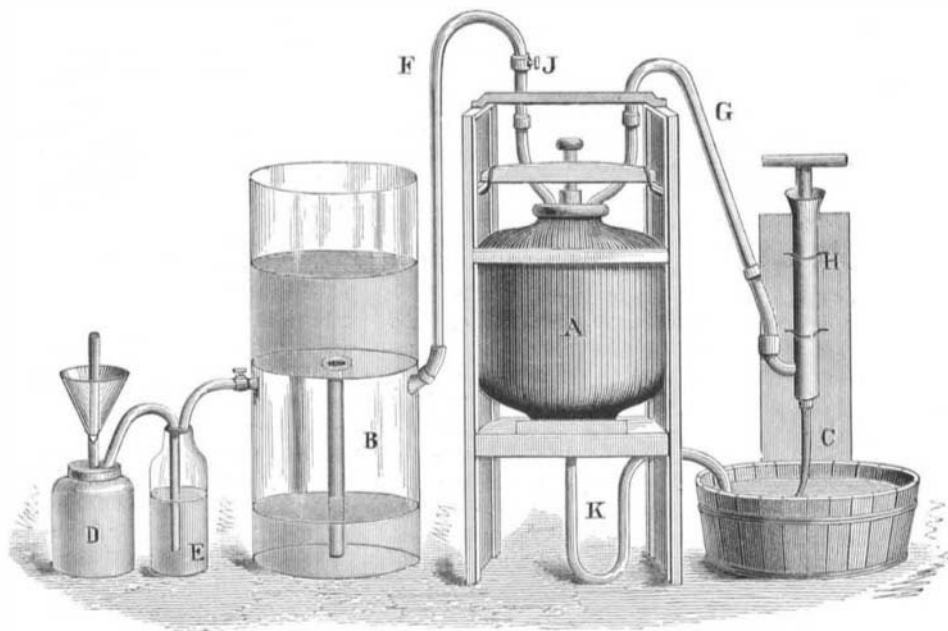
washed in clear water, and are then submitted to the souring process. This consists in steeping the goods for four or five hours in water made sour by means of hydrochloric acid. The goods are then washed again, boiled for nine hours in a soda lye, washed again, and then submitted to the "chemicking" process. This consists in steeping the material in a dilute solution of chloride of lime for about four hours. These processes, with the exception of the lime boiling, are repeated over and over again until the bleaching has been effected.

There are in all some sixteen distinct operations for ordinary cotton goods, the time occupied usually being from five to eight days. This condition of matters would now appear to be greatly changed by Mr. Thompson's ingenious process, which has now further reduced the time required for bleaching from days to hours. The main feature in this process consists in the peculiar and original methods of chemicking and souring, these two operations being performed at one and the same time. The bleaching liquid used is a very dilute solution of chloride of lime, of about specific gravity 1.0006, or less than a degree Twaddell. The decomposing or souring agent is carbonic anhydride, commonly known as carbonic acid gas.

There is another original feature in this process, viz., the use of a solution of triethylrosaniline and oxalic acid, through which the fabric is passed, the object being to remove the faint, natural yellow tinge of the cotton.

In carrying out the Thompson process, says *Iron*, to which we are indebted for our illustration, the goods are first boiled in an alkaline solution, and washed. They are then placed in an air-tight keir connected on the one hand with a vessel containing the bleaching solution, and on the other with a gas holder containing the carbonic acid gas.

In the annexed engraving we illustrate the apparatus by means of which the success of the process was practically demonstrated on a working scale, and which is capable of treating 100 yards of cloth. In our engraving, A represents the bleaching keir, B the



THOMPSON'S BLEACHING PROCESS.

In course of time an improvement upon this method of bleaching, which was known as the Dutch method, was effected by substituting dilute sulphuric acid for sour milk in the souring process. This was a grand step in advance, for it reduced the time required for bleaching from eight months to four. But the year 1785 saw a marked improvement introduced by Berthollet, who suggested the application of chlorine to bleaching. Watt took up the question in the following year, and in course of time the chlorine process was adopted in bleach works, and chlorine forms the basis of the process as now carried out.

gas holder, C the vessel containing the bleaching solution, D the carbonic acid gas generator, E the wash bottle containing water for the purpose of cleansing the carbonic acid gas as generated, F the gas pipe leading from the holder to the keir, G the pipe through which the chlorine solution is pumped into the keir, H the force pump, K the siphon pipe through which the chlorine solution is run from the keir back into its tank, and which prevents the escape of the carbonic acid gas with which the keir is filled after the chlorine solution has been drawn off. The mode of working the apparatus is as follows: After the material to be bleached

has been boiled or "bowked" in the ordinary way, and washed, it is piled in the bleaching keir precisely as it is piled in the chemicking vat in the ordinary process. The cover is then secured and the keir made air-tight, the valve on the pipe, F, being closed. An air tap in the cover is opened, and the bleaching solution is forced into the keir until it is quite full, thus expelling the air. The air tap is then closed, and the valve on the pipe, F, opened.

After the bleaching solution has remained long enough in the keir to enable the material to be thoroughly soaked, and which is about five minutes, the liquor is drawn off through the pipe, K, into the vessel, C, and the valve at J being open, the gas under pressure of the water in the upper part of the gas holder follows the retreating liquor. The gas remains in contact with the moistened material for forty-five minutes, by the end of which time it will have decomposed the whole of the chloride of lime in the bleaching solution on the fiber of the cloth. The bleaching liquor is again run in upon the material in the keir, thus forcing the carbonic acid gas back into the gas holder; but which again returns when the liquor is run out. This alternating of bleaching liquor and gas is repeated till the material is of sufficient whiteness. For a medium grade of cloth, provided it has been boiled three hours, it will take about eight hours to bleach, but if the cloth has not been boiled the bleaching will require a longer time. When the bleaching in the keir is finished, the material is thoroughly washed, after which it is slowly passed through the solution of triethylrosaniline and again washed, when the process is complete. The total time occupied ranges from eight to twelve hours, according to the nature of the fabric under treatment.

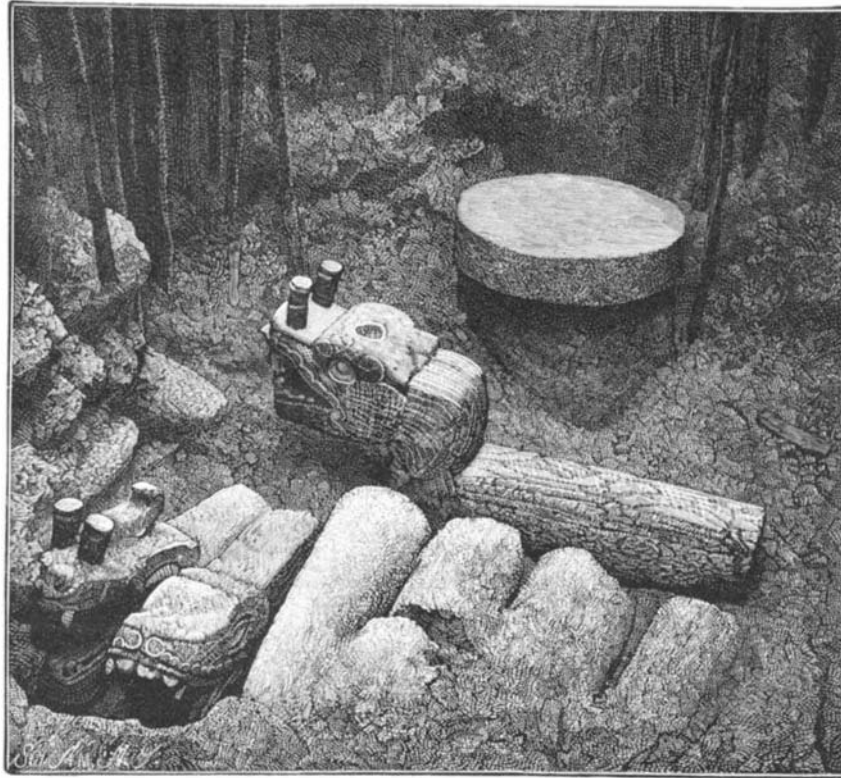
From what we have stated it will be clear to the practical mind that the great value of the process arises from the circumstance that the two operations of chemicking and souring, which have hitherto been carried on separately, are here performed simultaneously. The value and importance of the invention are, moreover, further enhanced by the fact that a great reduction in the wear and tear of the fabric under treatment is secured. Of the results of Mr. Thompson's invention we may write with confidence, for it has passed the experimental stage, and has entered the region of practice. It has been proved on a practical scale at the Halliwell Bleach Works of Messrs. R. Ainsworth, Son & Co., near Bolton, England. Respecting the theory upon which the process is based there never has been any question, namely, that by the reaction of carbonic acid on chloride of lime vegetable fiber is readily bleached. The point to be settled, however, was whether the carbonic acid gas could be made to penetrate to the center of a large body of cloth, that is, whether it would penetrate to the center of an ordinary keirful of cloth, say about 30 cwt., piled or laid in the usual manner. This Messrs. Ainsworth find is really done, even under disadvantageous circumstances in connection with the first apparatus erected at their works, and which proved slightly defective, but which defects are being remedied in the permanent plant now being laid down. Messrs. Ainsworth state that the carbonic acid gas does penetrate to the center of the goods in the keir, so that the entire contents are perfectly bleached. This point regarding penetration having been satisfactorily settled, we have now only to consider those respecting the saving of time and expense. The question of time we have already dealt with, while with that of cost we leave Messrs. Ainsworth to deal. They state from experience that the cost of bleaching one ton of cloth by the Thompson process is under 30s. for chemicals, labor, and coal. Although there is some little difficulty in arriving at a precise estimate of the cost of bleaching by the ordinary process, our practical readers will agree with us in placing it at from £4 to £6 per ton. The saving will, therefore, be seen to be at the worst very considerable, and at the best 75 per cent. If we place it at 50 per cent, we believe we shall be well within the mark. Without doubt Mr. Thompson deserves credit for so ingenious an invention, and Messrs. Ainsworth for the spirited manner in which they have given it its initial start in practice. They have shown it to be a thorough success, and there is every reason to believe that it will prove of incalculable benefit to the bleaching trade.

**DR. LE PLONGEON'S LATEST AND MOST IMPORTANT DISCOVERIES AMONG THE RUINED CITIES OF YUCATAN.**  
(Continued from page 311.)

The stones and mortar having been cleared away, it was found that the statue had rested on conoidal stone pillars,

from eighty centimeters to 1 meter 25 centimeters. On a level with the pillars were twelve serpent heads, with feathers and many designs exquisitely sculptured all over them. Two large ones, and two small, looked toward the east, northeast, and southeast. Three on the west side of the excavation looked west, and three on the south looked south, and two others southeast. From the top of each head rises a kind of plume or perhaps flame; and on each side of the front of the head perpendicular ornaments, like horns, that we have discovered represent the opening pod of the *Ceiba* tree, sacred to the Mayas. Their ideal heaven was to rest beneath the shade of the *Yacche* (*Ceiba*), eating sweet things, and enjoying the happy do-nothing. The opening pod of that tree, with the silky filament coming forth, served as models for the scepters and badges of authority seen in the hands of the chiefs whose stone likenesses adorn the buildings.

The feathers carved all over the upper part of the body of the stone serpents are painted green; the scales of the belly, well defined, are yellow, as also the edge of the jaws. The inside of the mouth and forked, projecting tongue are red, like the gums, though the teeth and fangs are white. Blue paint is round the eyes and over the brow. The whites of the eyes were made of shell, that had a round hole where the pupil should be. Perhaps the pupils were made of some brilliant stones that were removed when the stones were interred, for nothing that might have served such purpose has come to light. The horn-like ornaments on the front of the head are painted green and tipped with red, which is the color of the feather on the top. The largest head measures fifty centimeters in



**DISCOVERY OF TWELVE SERPENTS' HEADS.**

length, thirty-five from top to lower jaw, and twenty-five across the top. Unhappily, we found nearly all of them more or less broken; they are of soft limestone, but we also found the pieces, so they could be mended; they were undoubtedly broken at the time of making the mausoleum.

On the south side of the excavation, at the feet of the statue, but lower down, was a round, white stone urn that measures outside 80 centimeters in diameter and 70 in depth, with the lid that is 17 centimeters thick. The diameter of the interior is 55 centimeters, and the depth 28. With difficulty four men were able to slide off the lid. Then, at first sight, the urn seemed empty, except a little red earth in the bottom, but feeling among it, we found a trapezoidal piece of green jade, 6 centimeters long, 4 wide, and 1 centimeter thick. The jade stone was held in great esteem by the Mayas, as it is to-day by the Japanese. On one side of the piece found in the urn there is a human face—full face—and letters round it; it is well carved and highly polished. Besides this, we found in the urn a tube-shaped jade ornament, nearly 3 inches long, one end of which broke to pieces when we touched it. Also two pieces of the same stone, that look like halves of pierced ornaments, and a ball of white glass nearly an inch in diameter. We took all the dust that was in the urn, and with some trouble separated from it many small pieces of shell or bone, and some seem to be enamel, painted red and green, and cut in various shapes, having served to form mosaic work. The ball of white glass is very interesting, proving that those people were acquainted with glass, and probably knew how to make it. At the time of the Spanish conquest looking glasses were in use among the Mayas, for the historians inform us that *only the men used them*. When the glass ball was taken from the urn, the Indian workmen said: "Holo! zuzteen!" ("Here, the transparent stone.")



**PIECE OF JADE.**

Effectively, even to-day, there are people among the Indians of Yucatan who call themselves *H-men* (*m*) and *X-men* (*f*). The letter *H* before the word *men* is a contraction of the masculine article *Ah*, and the *X* a contraction of the feminine article *Ix*, which is pronounced ish; and as the *i* in Maya is like the English *e*, it is the feminine article *she* reversed. The *H-men* and *X-men* (wise men and women) use stones like the glass ball found, and in them pretend to see hidden things and coming events; so we may presume that clairvoyance was known among the Mayas; and Bishop Landa, in his work on Yucatan, tells us that soothsayers, who pretended to read futurity, formed part of the priesthood. After the serpent heads and urn were removed from the

placed horizontally side by side. Some were painted blue, others red, one meter high, and thirty centimeters in their thickest diameter; blue, by the bye, was the color of mourning among the Mayas, and was also a color much used at Egyptian funerals in ancient times, according to Sir Gardner Wilkinson.



**THE SERPENTS' HEADS AND ROUND URN.**

The pillars on which the statue rested were not the only ones; they extended over a space of about eight square meters, and in some places were three and four deep, the total number being 182, half the number of the days in our year, less half a day. Two-thirds of the pillars are painted blue, and one-third red; they vary in height

After the serpent heads and urn were removed from the