been used brings about a strong influx of air into the annular space, and the diffusion of the gases in the air takes place in the conduit before they make their exit into the open air.

On another hand, as the chimney is perfectly concealed behind the front side, it is impossible, at first sight, to recognize the mode of propulsion employed. The motor actuates the axle through the intermedium of two parallel chains, the ratio of the wheels of which is 1 (driving shaft) to 3 (axle).

The chains are so arranged that one of them alone shall be capable of assuring the service. The chain wheels are keyed in such a way that one of them alone shall operate, the other having to operate only in case of breakage of the other. The two axles are rendered interdependent through a third chain.

The transmission by chain makes the carriage roll very easily, while at the same time, on account of the multiplication of speed, it effects an almost constant stress and facilitates starting.

Owing to such arrangements as a whole, the gradients of Clichy Avenue, which reach nearly 5 to 100, are easily traversed at speeds that reach 16 kilometers per hour.

We find again in this new and interesting application of Mr. Serpollet's quick-vaporizing generator all the characteristic general advantages of his invention, and which have so often been brought to notice in connection with previous applications that it seems useless to revert to them. As for the special advantages, we may point out in particular the possibility of approaching and ascending any gradient whatever without loss of speed; the peculiar elasticity of the generator, proportioning at every instant the stress to be overcome; the absence of noise, smoke and odors that other systems of propulsion do not realize to the same degree; the facility of driving; and, finally, the saving in steam resulting from its being used in a superheated state.

These advantages are more than are necessary for assuring steam tramcars of the Serpollet system a certain number of applications, in presence of the opposition met with by the trolley system of electric propulsion on the part of the administrative authorities.—*La Nature.*

Artificial Glaciers.

Teachers who have found it difficult to make the movements of glaciers clear to their pupils may find it helpful to use one of these simple methods, which are given by a German writer. For ice, he substitutes *Yellow Pitch*, the surface layers of which, after exposure to the air, show about the same degree of plasticity and brittleness that ice has. Take a square tray which has a slanting gutter; this gutter must first be lined with a layer of very hot pitch, to prevent the mass from rolling down. Then pour in the rest of the pitch. As it moves downward, cracks are made from the edges toward the center at an angle of 45° to the edges, and join transverse fissures which are produced in the middle. Where the tray widens, longitudinal crevices are produced.

The other method differs from this only in coating the surface of the pitch with a layer of white paint, so that the cracks appear black on white, and are more easily seen. The writer says that particular forms of cracks can always be observed at the same parts of the tray, and that the motion, which has the same kinds of variation noticed in glaciers, can be studied with the microscope.

Limestone Made Into Marble.

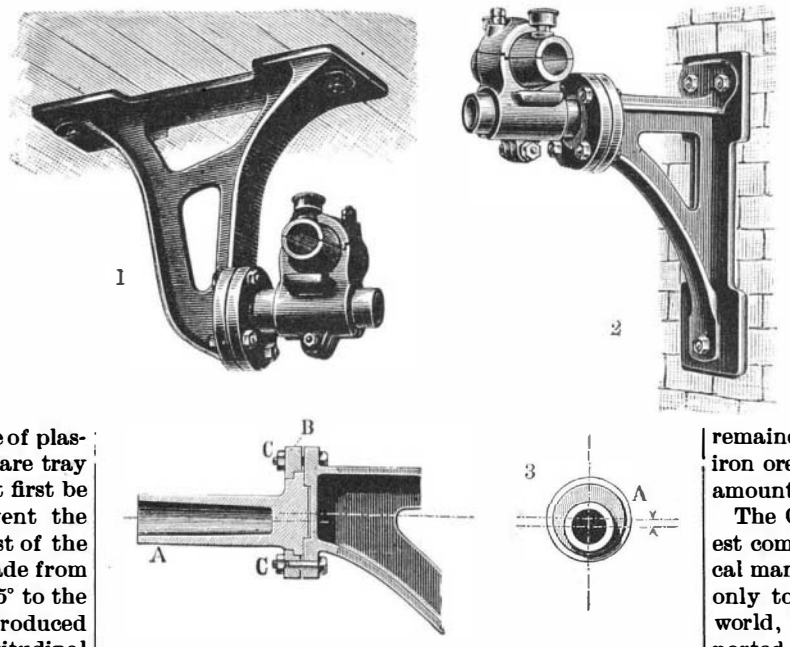
Various modes of coloring limestones have been developed, but the latest that has come under our notice is described in a recent number of *Engineering* as follows:

Marble is a natural product, so that this title is perhaps inadmissible, but works have just been started at Chelsea in which the natural process is so closely imitated by chemical means that there is produced so near an approximation to marble as almost to justify the name. Nature's process is hastened, and is more directly under control, so that although the veining may be varied as art demands, there can be a large production of a uniform tint of stone, if desired. The process known as the Moreau-Rae is simple, and by it all limestones or chalk may be converted into the semblance of marble of any tint or combination of shades, while the specific gravity is increased 25 per cent. With limestone, carving or turning is more easily done than with marble. The first process thereafter is to prepare for veining. On the surface of water there is sprinkled a varnish composed of sesquioxide of iron, gum thus and turpentine; and water being unstable, a freedom of design is obtained, especially when the turpentine is broken up by sprinkling of soap. The stone is dipped on the turpentine and subsequently immersed in baths of metallic solutions. These are of sulphates of iron, copper or zinc, separate or in combinations, the specific gravity varying from 1·2 to 1·5. They may be termed the primary colors, and variety of shade is got by different periods of immersion or in varying the order of tanks used. The varnish prevents the sulphates affecting the stone at those points, according to the density of the varnish.

In the case of some French stones where there is a good deal of shell or flint, this process of artificial veining is not necessary, as the same result is got from the existence of shell, and this Marseilles stone has been made into very effective balustrades, as well as fireplaces and table tops. Very dark colors, for instance, are got by using copper and iron sulphates. Zinc and iron alternately give light yellow, while the use of the three in turn gives dark yellow and brown in variegated tints. Black and gold, too, may be got by making the stone yellow before varnishing, after which the black bath is used, so that the veining takes the gold tint. Infinite variety is possible in the manner indicated. After this treatment in the sulphate baths, the stone is immersed in a water bath maintained at 50° Cent. to thoroughly fix the colors, all air meanwhile being expelled; and here it may be stated that the color permeates the full thickness of the stone, as is shown by blocks cut into several thicknesses. The process thus far takes only a few minutes, and the stone is then dried in an oven of a temperature of 90° to 100° Cent., remaining probably for twenty-four hours. It is then immersed for a corresponding period in an indurating bath—in a solution of sulphate of zinc—which does not affect the color, but effectually hardens the stone, closing up the pores, so that when removed it approximates the density and the specific gravity of marble, and has all its beauty and wealth of coloring. It is afterward polished in the usual way.

IMPROVED JOURNAL BOX SUPPORTS.

The construction shown in the accompanying illustration, for the support of journal boxes, is simple



HEY'S ADJUSTABLE JOURNAL BOX SUPPORTS.

and durable, and admits of convenient adjustment according to the position of the shaft. The improvement has been patented by Mr. Jean Hey, of Strasburg, Germany. Figs. 1 and 2 show the application of the improvement in connection with a hanger or bracket support, made to form a pivot to support the bearing, which is arranged to turn eccentrically, and be thus raised or lowered. The circular box, A, eccentric to the axis of support, as shown in longitudinal and cross section in Fig. 3, has an eccentric base flange or disk with a circular offset on its rear face engaging a circular recess on a disk of the hanger or bracket. The base flange or disk is rabbeted, and engaged by a correspondingly rabbeted ring, B, held in place by bolts, C. When the bolts are screwed up the ring clamps the base flange or disk, but when the bolts are loosened a complete revolution may be given to the base of the support, thus permitting a wide range of adjustment.

Long Distance Transmission of Steam.

At a recent meeting of the American Society of Mechanical Engineers, Mr. Eckley B. Coxe described a method he had used in carrying steam a long distance. At a colliery they wished to carry steam to a waterworks about 4,500 feet over a hill from the boiler plant. A trough was made by nailing the edges of two boards together, so that they formed a right angle. The trough was supported by two stakes driven in the ground, and crossing just beneath the trough. The pipe was laid in the trough resting n cast iron plates, the pipes surrounded by mineral wool, and a similar inverted trough placed over the top. To allow expansion, a bend was made to one side at the top of the hill, and then it was turned back to its original direction. A large receiver was introduced in the pipe at the pumps. This was made of three sheets of an old boiler, and was 34 inches in diameter. This also served as a separator. As the elevation was 1,800 feet above the sea, the cold was excessive in the winter time, but this arrangement has been in use since 1877, has cost nothing for maintenance, and has given no trouble. Mr. Coxe believed that the secret in carrying steam long distances to an engine without causing a drop in the steam pressure was in the use of a receiver or reservoir.

Our Exports of Ferro-Manganese.*

A short time ago the *Engineering and Mining Journal* called attention to the wonderfully low cost at which pig iron is being produced at well located furnaces in Alabama, the figure given, viz., $6.37 per ton, being, we believe, lower than anywhere else in the world. We can now claim also that ferro-manganese is being produced in this country at a lower cost than anywhere abroad, and the credit for this is due to the Carnegie Works, which have always been in the van of industrial improvements, and which have been one of the chief producers of ferro-manganese for many years past. So successful have they been in reducing the cost of production that they are now able to ship ferro-manganese from Baltimore to Glasgow, Antwerp, Hamburg, and Rotterdam, sending more than one thousand tons in October, November, and December, 1893, and a certain amount also from New York, while more than 1,200 tons have been shipped in the first two months of the present year. We are not advised as to whether any was shipped from Philadelphia also.

A part of this ferro-manganese has been exported under the name "manganese ore," but there is no mystery as to what the material actually was. The invoiced value was a little less than two cents per pound, or about $44 per gross ton. At present the market quotations of ferro-manganese are $52 to $53 per ton in Pittsburg, the present import duty being three-tenths of one cent per pound, or $6.72 per gross ton. Ferro-manganese and spiegeleisen are very important products used in steel making, and our consumption of them may be appreciated from the fact that the production of spiegeleisen and ferro-manganese in 1892 amounted to 179,131 gross tons, though in 1893 it declined to 81,118 tons. The high price of the product has caused earnest search to be made in this country for an ore well suited for its production, and numerous mines have been opened, but for one reason and another they have not succeeded in supplying the demand. The production of manganese ore in 1892 was 19,117 gross tons, and in 1893 it reached only 9,150 tons, a decline almost proportionate with the falling off in the output of spiegel and ferro. The remainder of the ore used comes from the imports of iron ore (including manganiferous ores) which, in 1892, amounted to 806,585 tons and in 1893 to 526,951 tons.

The Carnegie Company certainly deserves the highest commendation for the skill shown in the economical management of its plant, which has enabled it not only to produce steel rails in competition with the world, but to make ferro-manganese in part from imported ores, and actually export it to the home of ferro production, Belgium.

Origin of the Dollar Mark—Five Theories.

Below I give five theories of the origin of the dollar mark ($), they being selected from about twenty seemingly plausible solutions:

1. That it is a combination of "U. S.," the initials of the United States.

2. That it is a modification of the figure 8, the dollar being formerly called a "piece of eight."

3. That it is derived from a representation of the pillars of Hercules, consisting of two needle-like towers or pillars connected with a scroll. The old Spanish coins marked with the pillar device were frequently referred to as "pillar dollars."

4. That it is a combination of "H. S.," the ancient Roman mark of money unit.

5. That it is a combination of P and S, from peso duro, signifying "hard dollar." In Spanish accounts peso is contracted by writing the S over the P, and placing it after the sum.

According to one writer the symbol of the dollar is a monogram of the letters "V," "S," and "J," the dollar being originally a "thaler," coined in the valley of Sankt Joachim, Bohemia, and known as a "Joachims thaler," and the monogram the initials of the words, "Valley Sankt Joachm." A writer in giving his opinion of "Reason No. 3," as given above, says:

"The American symbol for dollar is taken from the Spanish dollar, and the origin of the sign, of course, must be looked for in associations of Spanish coins. On the reverse of the Spanish dollar is a representation of the pillars of Hercules, and around each pillar is a scroll with the inscription 'plus ultra.' This device in course of time has degenerated into the sign which at present stands for American as well as Spanish dollars, '$.' The scroll around the pillars represents the two serpents sent by Juno to destroy Hercules in his cradle in mythologic lore."—*St. Louis Republic.*

* From the *Engineering and Mining Journal.*