

### LARGE DYNAMO ARMATURE FOR DIRECT DRIVING.

Our engraving, for which we are indebted to *Industries*, represents a large Fritsche armature for direct driving, in which connectors are employed, and the armature strips proper are radial. The armature conductors are again connected up in series, and the method of coupling can be easily gathered from the illustration. We believe that Mr. Fritsche was the first to investigate the laws of the numbers of turns necessary to produce series winding in multipolar dynamos. The connectors in the radial armatures are of course copper, and as the iron conductors are naturally large in comparison, it is easy to fit the connectors in neatly. Messrs. Fritsch & Pischon, of Berlin, have now been manufacturing these machines for some time, and have made all sizes from 5,000 watts up to slow-speed direct-coupled dynamos giving 200 horse power each for central station work.

#### Veneering.

A very interesting process is the making of veneering. The logs are first steamed, then stripped of the bark and taken to the cutter. In the cutter, which resembles a large turning lathe, a long knife driven by machinery is made slowly to approach the revolving log, peeling off the veneer into long strips, the desired thickness varying from one-eighth to one-thirty-second of an inch. These strips are drawn out on a long table, cut and trimmed into the required sizes, and then are carried to the dryhouse. The veneer is dried in long racks, two strips being placed together, turned so that the frames are opposite, to allow a free circulation of air. After drying it is pressed and packed into bales.

#### THE JAFFA AND JERUSALEM RAILWAY.

The first railway line in Syria and Palestine, connecting Jaffa with Jerusalem, was opened on September 26, by the Governor of Jerusalem, Ibrahim Hakki Pasha, and by the Sultan's Special Envoy, Djelal Pasha, General and Aide-de-Camp of his Imperial Majesty, in presence of several distinguished officials of the Ministry of Public Works, who arrived purposely from Constantinople to witness the event, and to examine the works to see if the line were constructed in accordance with the plans and the terms of the concession. The president of the railway company and several other gentlemen and engineers arrived also from Paris for the occasion. All the inhabitants of Jerusalem and the neighboring districts gathered near the railway station; most of them were struck with amazement. A banquet was given by the railway company. The line is now open for traffic; two trains run every day from Jaffa to Jerusalem and the opposite way, passing by the towns of Ramleh and Lydda and several villages. Intending tourists may now be assured of finding comfortable accommodation on their journey to Jerusalem. Starting from Jaffa in the afternoon at two o'clock, they reach Jerusalem in

three hours and a half, arriving in the Holy City before six o'clock in the evening.

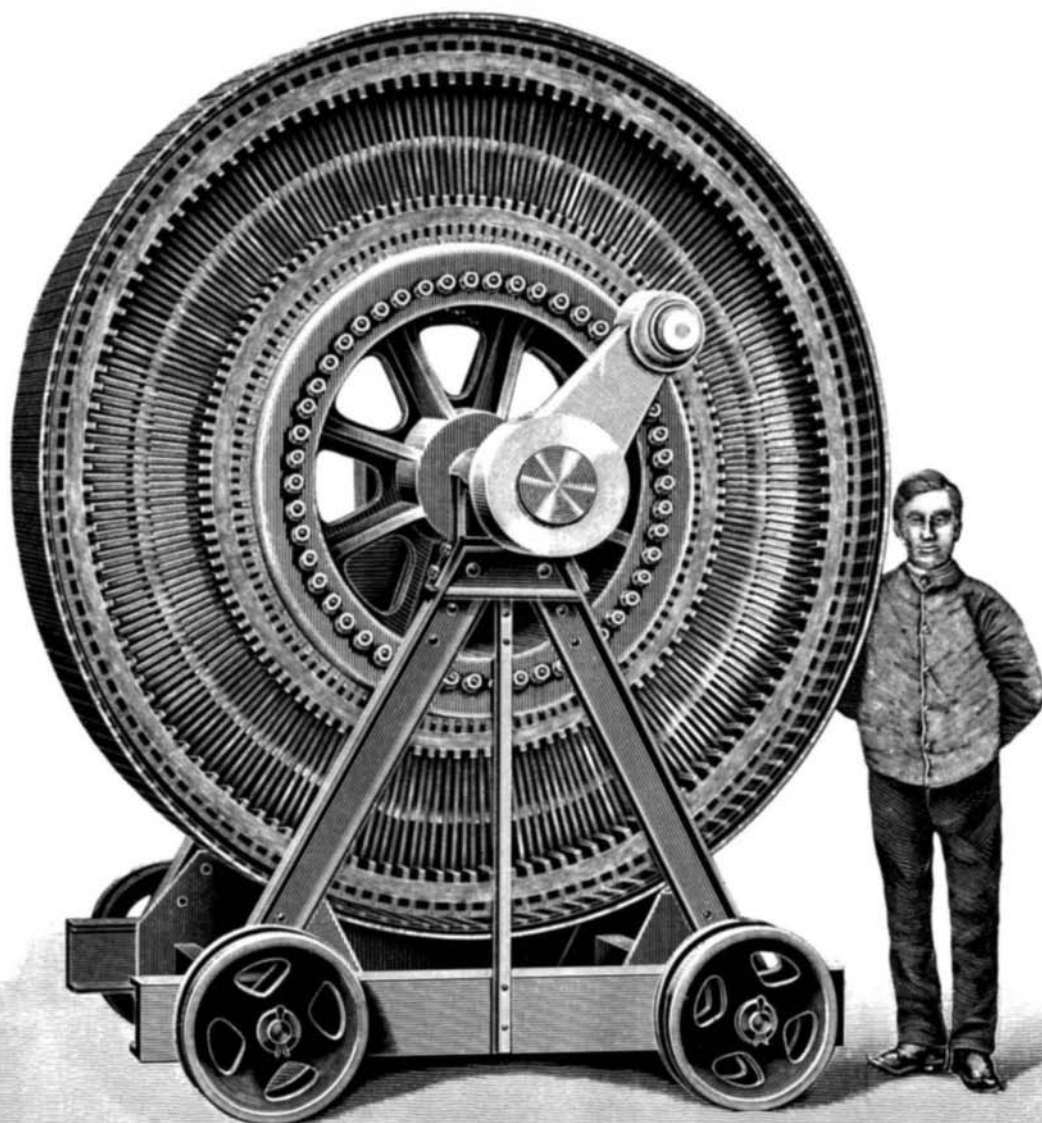
In these days we consult Baedeker, who informs us that Jaffa, pronounced Yafa, is a town with some export trade in wheat, sesame, grain, oranges, silk, and

trees. There is a Greek monastery on the quay, and a Latin hospice, founded in 1654, said to occupy the site of the house of "one Simon, a tanner"—but the Mohammedans claim this distinction for the site of a mosque near the Fanar, or lighthouse; an Armenian monastery, too, in which Napoleon, when it was a French military hospital, ordered the plague patients to be put to death by poison. At Jaffa, also, four thousand prisoners of war, by his order, were deliberately massacred. In the eighth century there was a Greek Church of St. Peter, on the supposed site of Tabitha's house. A German religious colony is settled at Saron, two miles from the town. Joppa was occupied in the twelfth century by the knights crusaders, and was the scene of conflicts between Saladin and Richard Cœur de Lion. The distance southeast to Jerusalem, by the ordinary road, is about thirty-six miles. Ramleh and Lydda were towns of much note in the times of the crusades and of the Arab rulers of Syria. The city of Jerusalem has been often described.—*Illustrated London News*.

#### A New Color.

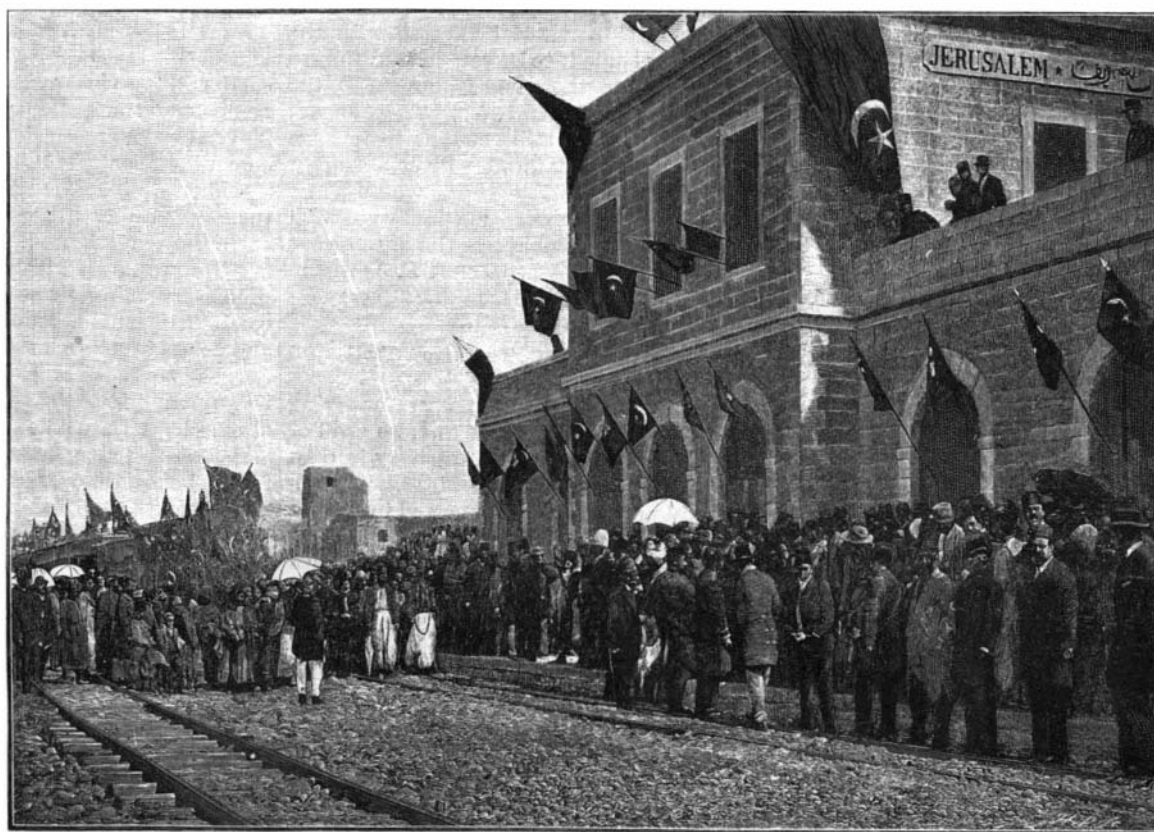
At a recent meeting of the chemical section of the Franklin Institute Mr. Palmer read a note on "A Lilac Color from Extract of Chestnut." In experimenting with a commercial extract of chestnut wood, with the idea of making galloflavine therefrom, an unlooked-for result was obtained. The extract was somewhat fermented; that is, a part of the tannin had been changed into gallic acid; and the design was to convert this gallic acid into galloflavine by the usual method. A solution of the 51° extract was made strongly alkaline with potash, and subjected to the action of a stream of air for about ten hours. The temperature, meantime, was kept below 50° F. At the end of the period of oxidation, the potash was neutralized with acetic acid. The solution so obtained was tested for galloflavine by working therein cotton and wool yarns with the addition of potash alum. While no yellow color was obtained, a clear, bright lilac was developed on both the animal and the vegetable fiber. The body giving this color has not yet been separated from the oxidized extract.

DR. GEORGE S. ALLEN, of New York, in the *International Dental Journal*, recommends the use of a one to one thousand solution of bichloride of mercury in rosewater, as an elegant and efficient disinfecting fluid for instruments. Contrary to the common opinion that steel instruments suffer from the use of any solution of the bichloride, he finds that they remain perfectly unaffected after being dipped in it hundreds of times. By the use of rosewater the bug poison taste of the simple solution is entirely supplanted by an agreeable rose-flavored one. As the plain bichloride decomposes, he advises the preparation of a one per cent solution from the tartaric sublimate tablets, and the addition of 9 parts of rosewater to 1 of solution when it is wanted for the disinfection of instruments or for use in the mouth.



LARGE DYNAMO ARMATURE FOR DIRECT DRIVING.

soap; a landing place, of course, for thousands of Mussulmans, Jewish, and Christian pilgrims, the residence of a Turkish kaimakam subordinate to the Pasha of Jerusalem. The harbor, for small vessels only, is a basin formed by natural rocks under water and by the remains of ancient works of masonry; its northern entrance, by the mole or pier, is endangered by sandbanks, and that from the northwest is very narrow. Larger vessels and steamers anchor in the roads half a mile from the shore; passengers are landed by the boatmen. The town, built of tufa, with narrow, dusty streets, lies on a yellow beach, at the foot of a rock 116 feet high; to the north are orchards and palm



OPENING OF THE JAFFA AND JERUSALEM RAILWAY: THE NEW STATION AT JERUSALEM.

**Ordnance Notes.**

The following are from the recent report of the Chief of Ordnance, General Flagler :

The German smokeless powder has the advantage of giving as good velocity as the French with a somewhat less charge. The German powder has the further marked advantage that it is readily made up into cartridges, while a great deal of time is required for putting up the French powder. The type 10 inch B. L. rifle has been fired to date 158 rounds and the type 12 inch B. L. rifle 64 rounds.

The department will have completed by the end of the calendar year 1892, fifteen 8 inch guns, eight 10 inch guns, and three 12 inch guns, which will be available for issue to the service as soon as the necessary carriages for mounting them are provided.

The extreme accuracy of fire is better illustrated by the statement that with the 8 inch gun in a target of five shots at a range of one mile, four out of the five shots struck within an area 20 by 21 inches, and in a target of eight shots at a range of 3,000 yards (about 1 1/4 miles) six shots struck within an area 1 1/2 by 4 feet.

The test of the type 12 inch B. L. mortar, cast iron, hooped, has been completed by the board for testing rifled cannon, etc., and adjudged to be satisfactory for issue to the service.

**The Stone Cutters' Strike.**

A writer in *Stone* who is in a position to know, says that the granite cutters lost in wages and assessments during the recent long strike enough to buy and operate the leading quarries in New England. He estimates the loss to the strikers at \$2,800,000, and his estimate is probably nearly correct. This shows pretty clearly where the strike hits hardest. The quarries are still there. The owners may have lost a portion of this year's profits, but they have lived comfortably and the strikers have not.

The above is from the *Brickmaker*, and if the figures are true it might be a good idea for the cutters, the next time they contemplate a strike, to put their heads and money together and buy out the works. They can then regulate their own wages and hours, and arrange everything else exactly to suit themselves, besides enjoying the satisfaction of having no boss to watch and direct their work.

**How to Color Lantern Slides.**

Procure an assortment of Judson's liquid dyes of suitable tints, a small quantity of spirits of wine, not methylated, and some camel hair pencils, small paper stumps, and a piece of glass to do duty as a desk. I may here say it is of no use trying to mix the dyes like other color in order to make certain tints, for one color seems to destroy the other instead of forming a tint midway between the two. The dyes must therefore be used alone, diluted more or less with spirits of wine, and one tint allowed to dry before another is applied. The principal difficulty is in avoiding the thickening of color at the edges of the stroke, but with a little practice this is easily overcome. Begin with the most delicate tints first; in a landscape, the sky and water, finishing with the more pronounced colors. A drop or two of a suitably colored dye being put into a small saucer, add sufficient spirit to dilute it to the proper tint, having at hand a little plain spirit into which the brush can be dipped as occasion may require. Owing to the volatile nature of the medium, promptitude must be used to avoid waste, or the different tints may be kept diluted in small bottles.

Suppose we desire to tint a moonlight scene with good clouds, and bright reflections on the water, a cottage with the windows illuminated, or lanterns hanging to the rigging of ships. First take a small stump, dip it into a solution of wax in benzole, or suitable greasy matter, going over all parts carefully that have to remain colorless. The windows and lanterns having been tinted yellow or red, let these be waxed also. The slide then may be bodily immersed in weak greenish blue dye; blot off the edges and dry. This will be probably all that is required to complete the picture. With a daylight view, tint the sky pale blue, softening off the color toward the horizon with plain spirit. Then carefully go over the landscape with suitable tints, always putting on the lightest and most delicate first, and drying before the application of the darker greens, etc. It is best to use but little color, slightly tinted pictures having the best effect on the screen. Simple as this process is, excellent results may be obtained with little practice. Some colors are apt to dry duller than others. When this is the case a little gelatine solution poured over will restore the brilliance, care being taken to avoid dust in drying.—*E. Dunmore, Br. Jour.*

**PRINCE EDWARD ISLAND TUNNEL TEST.**

It sometimes happens that an engineer by a simple, bold expedient revolutionizes certain engineering processes, and not only greatly reduces the cost of construction, but renders possible either a new class of work or develops a new phase of work in well known lines, either of which could not have been successfully carried out by the old methods.

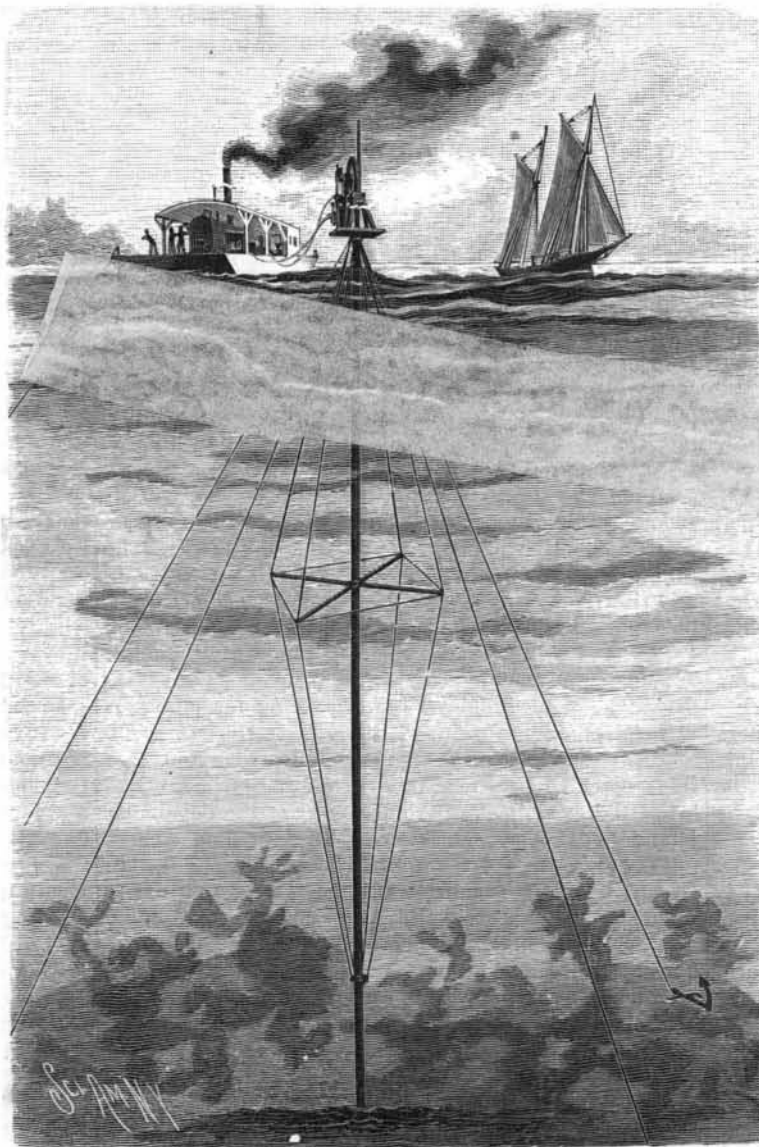
Examples of inventions of this class will occur to the



**ROUTE OF PRINCE EDWARD ISLAND TUNNEL.**

reader, and we now have to add to the list the record of an engineering feat which, in the boldness of its conception, the simplicity of the devices by which it was executed, the success attained, as well as the bearing of the work on associated interests, will compare favorably with any engineering work of like magnitude.

The work contemplated was the construction of a tunnel between Prince Edward Island and New Brunswick, as shown on the annexed map, the distance being eight miles. The problem presented was that of testing the nature of the earth between the proposed termini of the tunnel; but the Straits of Northumberland being perpetually stormy and the depth of the



**TESTING THE GEOLOGICAL FORMATION OF THE PROPOSED ROUTE OF THE PRINCE EDWARD ISLAND TUNNEL.**

water being more than one hundred feet, the problem was not so simple as it might appear.

Our engraving illustrates the way in which the feat was accomplished. The method and apparatus are the invention of Mr. Alfred Palmer, C.E., of the

Mills Building, in this city. A four-inch wrought iron pipe made up of 20 foot lengths rests upon the bottom of the sea, and upon the upper end of this pipe, which reaches above the surface of the water, is arranged a platform on which is mounted an engine running at a high rate of speed. The pipe is trussed to make it rigid and it is supported in an upright position by means of four wire ropes set out at right angles to heavy anchors. The engine drives a diamond drill at the rate of 1,000 revolutions per minute. A scow anchored near the pipe carries a 10 horse power boiler and other necessary machinery, the boiler being connected with the drill engine on the upper end of the pipe by means of flexible tubing. Another flexible tube supplies water to the drill for lubricating purposes. By means of this arrangement the drill is always held in a vertical position, and is not subject to any vertical or lateral movement, although the scow carrying the boiler and pump may be tossing about in a heavy sea. The current in the channel offers a resistance to the pipe of 36 pounds to the square foot, but it is so thoroughly braced and stayed that it easily resists this pressure.

The tests made indicate that the formation is highly favorable to tunnel construction. The contract for the tunnel is being carried out under the direction of the Dominion government, represented by Hon. George E. Foster, Minister of Finance, Mr. Collingwood Schrieber, Chief Engineer, and Sir Douglas Fox, Consulting Engineer, of London. Mr. Alfred Palmer is reporting engineer for Sir Douglas Fox.

**An Historian's Brain.**

The late Mr. George Grote, the historian of Greece, expressed in writing, eight years before his death, a desire that after his decease his cranium should be opened and his brain weighed and examined. The task was undertaken by the late Prof. John Marshall, and the results of his observations are set forth in a full report printed in the current number of the *Journal of Anatomy and Physiology*. The entire encephalon, says *Nature*, was somewhat above the average in size, if compared with the adult male brain at all ages. If allowance be made for the effects of senile wasting, it must be regarded as a rather large brain, but not as an actually or especially large one. There can be no doubt, however, that it was, at death, further diminished in size and weight through the effects of disease, as shown by its marked deviation from the ordinary ratio as compared with the body weight. As tested by the standard of macrocephaly adopted by Welcker, its utmost allowable weight was below that standard; and as contrasted with the encephala of certain other eminent men, it would find its place about one-third up from the lower end of the list. The general form of the cranium was rather or nearly brachycephalic, but it was decidedly higher than usual. The cerebrum itself was, in accordance with the shape of the cranium, short, broad, and deep. The cerebral convolutions were very massive, being not only broad and deep, but well folded, and marked with secondary sulci. This condition was observable all over the cerebrum, but chiefly remarkable in the frontal and parietal regions. Studied in reference to Dr. Ferrier's researches into the localization of function in the brain, the relative size of certain convolutions, and the relative size of groups of convolutions suggested some reflections as to individual peculiarities, but these reflections did not seem to Prof. Marshall to be quite trustworthy. From the size and richness of the convolutions, the sufficiency of gray matter, both on the surface and in the interior of the hemispheres, and from the remarkable number of the white fibers, especially of the transverse commissural ones, the brain of Mr. Grote is pronounced to have been of very perfect and high organization.

**Mirage.**

A beautiful and instructive lecture experiment, illustrative of the conditions of the heated atmosphere which give rise to the mirage, says *Nature*, is described by MM. J. Mace de Lepinay and A. Perot, in their "Etude du Mirage," which appears in the *Annales de Chimie et de Physique*. Water is poured into a long rectangular trough, with glass sides, and covered with a layer of alcohol about two centimeters thick, containing a trace of fluorescence. After a few hours, during which the alcohol diffuses slowly through the water, a flat beam of light is sent through the mixture at a very slight inclination to the horizon. Under these conditions a kind of garland of light is seen to traverse the liquid, due to a series of curvilinear deflections or "mirages" in the less highly refractive water below and total reflections at the upper surface of the alcohol.