

La Navarre, New French Passenger Steamer.

La Navarre was launched from the yard at Penhoet St. Nazaire, and is built of steel. *Engineering* says she is divided into fifteen compartments by thirteen transverse bulkheads, and a longitudinal bulkhead in the engine room. There are four complete decks; the promenade deck extends half the length of the vessel. The vessel is 494 feet in length and 49 feet 3 inches beam, with a depth of about 37 feet. Her displacement is 8,922 tons at a loaded draught of 22 feet 8 inches. The vessel is, of course, propelled by twin screws, driven by triple expansion engines. Each set develops 3,750 horse power, showing a total power of 7,500, with 90 revolutions a minute. The cylinders are 31½ inches, 50¼ inches, and 82½ inches in diameter, with a stroke of 52½ inches. Each engine has its own condenser, 14 feet 1 inch long, 6 feet broad, and 10 feet 10 inches high. The total length of the tubes is upward of 27 miles. The boilers are double ended, four in number, and having a total of twenty-four furnaces of a diameter of 47 inches. There are four ventilating fans for forced draught. The propellers are of gun metal and their diameter is 15 feet 4 inches. The funnels, two in number, are elliptical, the greater diameter being 8 feet 10 inches, and the lesser 5 feet 3 inches. She is furnished with two masts, and these do not carry yards. Accommodation is afforded for 250 saloon, 54 second and 74 third class passengers. In addition to this, on the lower deck no less than 600 emigrants can be berthed. For the purpose of the proper separation of the sexes, these are carried in three separate divisions. The first class passengers are of course amidships. The dining saloon on the upper deck will seat 152 persons at one time. There are small tables at the sides for private parties, as well as the long tables in the middle of the room. This room is 66 feet long and 32 feet 9 inches broad. The *salon de conversation*, or, as the Americans will doubtless call it, "the social hall," is about 40 feet long, and is lighted by a dome as well as by the usual side port holes. The decoration of this room has been particularly attended to, and the walls are paneled with marqueterie. The usual smoke rooms, barber's shop, and bath rooms are not forgotten. On the main deck are the children's dining saloon forward, and the second class passengers' dining saloon aft. The cabins *de luxe* and family cabins are on the promenade deck. La Navarre is lighted throughout by electricity, there being 742 lights on board. There is also a refrigerating apparatus on the Fixary system for the manufacture of ice and for the preservation of the fresh provisions. This vessel is capable of being used as an auxiliary in time of war. La Navarre attained a speed of 18 knots on trial without being forced.

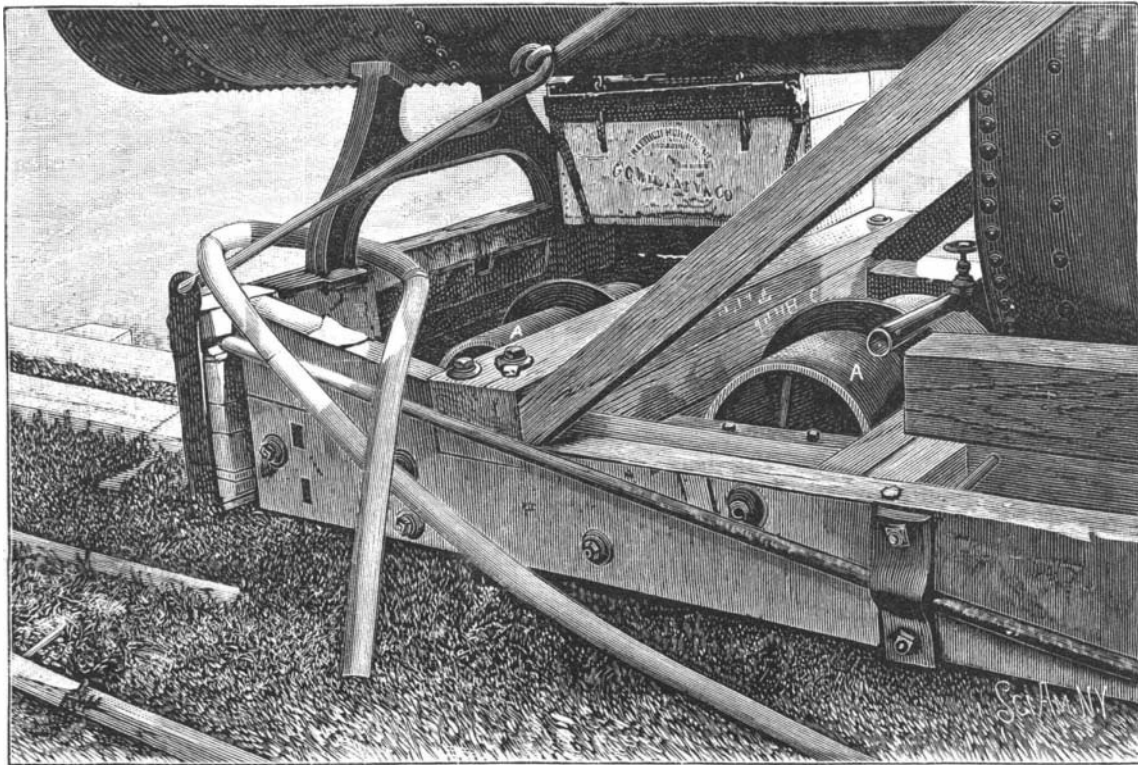
A Work on the Railway Exhibit at the World's Fair.

Our readers know how interesting a railway exhibit was presented at the World's Columbian Exposition. Mr. J. J. Pangborn, United States Honorary Commissioner, is preparing to issue an *edition de luxe* of a book devoted to this subject. In size it will be a large octavo, and is to be sumptuously printed and illustrated. The use of color in the cuts adds greatly to the appearance of the book, and it will meet with a warm reception at the hands of those who appreciate an interesting subject so carefully and expensively presented. It is to cover the en-

tire period of development of the locomotive and railway; it will have one hundred and fifty-three color plates, and the same number of single color plates. There will be 160 pages, printed on hand-made paper.

The Magnetization of Steel Rails.

Some interesting experiments have been carried out by M. Vinot, a French engineer, in regard to the magnetization of steel rails. A portion of the line between



FRONT END OF THE BURT LOCOMOTIVE, SHOWING FLANGED WHEELS.

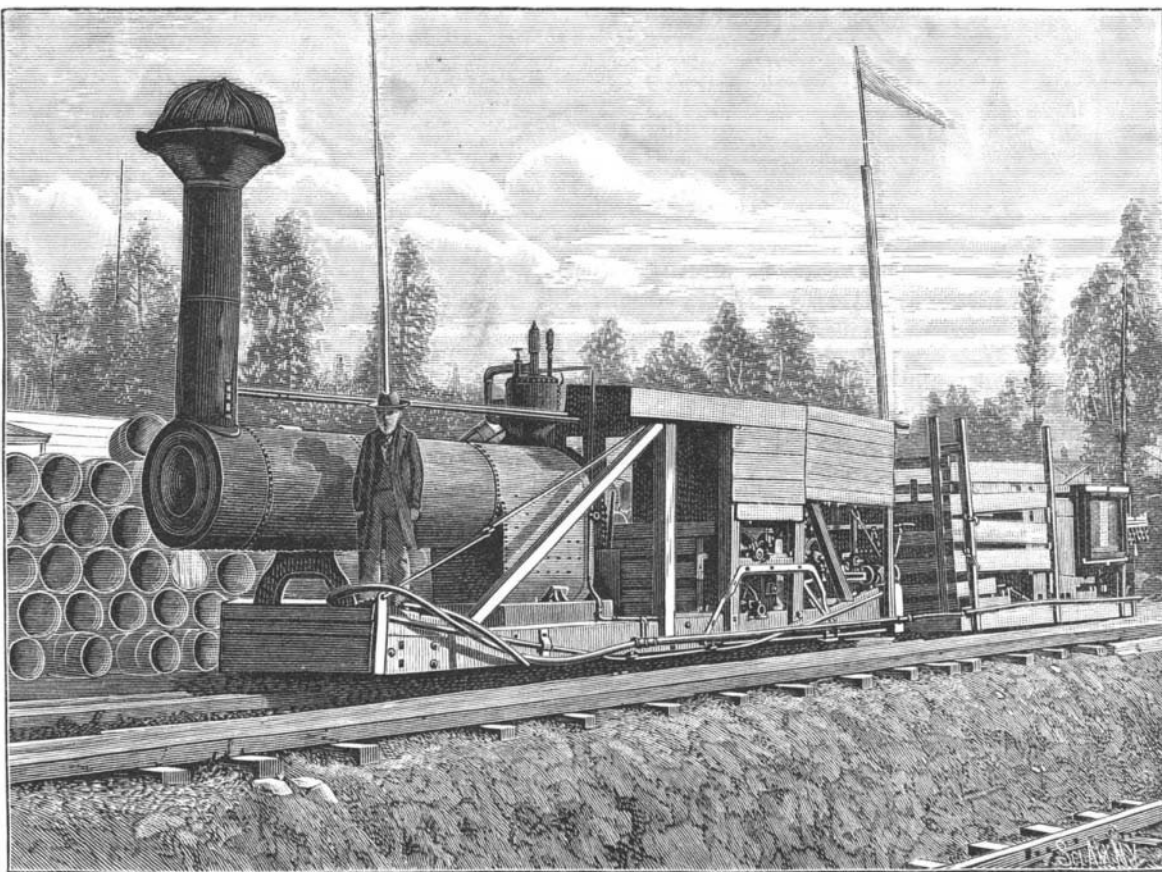
Bordeaux and Cette was utilized, the left hand track serving for the trains coming from the latter town, while on the right hand track the trains run in the opposite direction. On the experimental station chosen the rails were laid in a direction at right angles to the magnetic meridian, or in other words, from west to east, and it was found that when a pocket compass was placed on one of the joints in the left hand track, the needle pointed exactly in the direction of the line of rails, the north pole being turned toward the town of Cette. With the same compass similarly placed on the right hand track, the needle again pointed in the direction of the line of the rails, but the north pole this time was turned toward Bordeaux.

each other. This is to secure ease in turning curves. The road is a private one, its rights being granted by the county supervisor. Considerable grades exist on the road, which are readily overcome. One of our views shows the engine with one of the freight cars, Mr. Burt standing on the forward end. Another engraving (see next page) shows the lines of rail passing over a trestle and extending back into the country. The arrangement of the wheels with their central flanges is shown in the view of the front end of the boiler. The system is a novel one and has features which might make it of very great utility in some regions of the country. It may be accepted by our readers as a further contribution to the history of rails

which formed the subject of an article in a recent *SCIENTIFIC AMERICAN*.

The marble quarry of J. J. Burt, Esq., is situated in the hills at Cienega, about twelve miles from Tres Pinos, and is known as the Cienega Lime and Marble Quarry. It is one of the largest deposits of marble in the State, while none of finer quality can be found anywhere. The locality where this marble is found was purchased by Mr. Burt some years ago. He has been supplying all parts of the State with lime for some six years, and it is of such superior quality that it brings 25 cents more per barrel than any other on the market.

The mountains containing this valuable marble are 1,500 feet high and run some six miles back. This marble can be seen cropping out in every direction. In fact, there is no end to it. A remarkable fact in this connection is that the present workings are in a canyon, on the opposite side of which from the marble ledges is a vast de-



THE BURT LOCOMOTIVE ENGINE AND FREIGHT CAR

The secret of this singular phenomenon was conclusively demonstrated. The distances allowed for expansion between rail ends varied from about one-tenth to one-half inch, producing a very perceptible shock on the passage of trains, from the respective depressions and elevations of the ends of the rails and their influence on the car wheels, and these shocks, it was found, developed a south polarity in those rail ends in which the concussion took place.

posit of granite of good quality. Thus the two valuable building stones may be quarried out at one and the same time. There is a very large area of both marble and granite, comprising several hundred acres. To say there are a thousand fortunes in this property is putting it mildly.

Mr. Burt, up to the time of his purchasing this valuable property, was a leading lawyer in San Jose, but finding his health giving out, he decided to make

a change and find some way to busy himself; he has given up all other engagements and located at the quarry for the purpose of introducing it into the market in the way of monuments, statuary and contracting with builders to furnish it for ornamental purposes.

We are indebted to Mr. J. M. Pickett, of Hollister, Cal., for a set of admirable photographs of the Burt railway. From these our engravings were prepared.

To Trade Mark Appeals.

It has been settled by a decision of the Court of Appeals of the District of Columbia that appeal does not lie to it from the Commissioner of Patents in trade mark disputes. This is an important decision. Disputes between trade mark claimants are commonly referred to as "interferences" in trade marks. Under the law establishing the Court of Appeals of the District of Columbia it is provided that any party aggrieved by a decision of the Commissioner of Patents in any interference case may appeal therefrom to the said court. In dismissing the appeal the court held that the word "interference," as used in the act establishing the court, applied only to patent cases or applications therefor and not to trade mark disputes.

Source of the Mackenzie River.

The great Mackenzie River, the mightiest stream on the American continent, excepting only the Mississippi, has never been traced to its head, and up to the present time the source from which it issues has only been known from Indian report. The mystery has, however, now been solved by R. G. McConnell, of the Dominion Geological Survey, who has just returned from a four months' exploration trip in those regions.

Mr. McConnell arrived in British Columbia from Ottawa in June and started out on his trip from Quesnelle on the 9th of that month. That at least may be said to be the commencement of his trip, as on that day he left civilization behind. The party numbered six in all, and consisted of himself, his assistant, Mr. Russell, who, by the way, is one of the leading hockey players of Canada, two whites he got at Quesnelle and two Indians. From Quesnelle the party proceeded in canoes up the Fraser to Giscome Portage. This is seven and a half miles long, and after crossing it they proceeded down Crooked River to Fort McLeod. Their route then lay down Parsnip River to the forks, where Findlay River meets the Parsnip and gives birth to Peace River.

On reaching Findlay River Mr. McConnell really commenced his summer's work, as the chief object of his trip was to explore that river and, if possible, the Omineca also. Mr. McConnell accordingly went up Findlay River to its junction with the Omineca, and followed the latter river to its head, returning down it again to the same spot. This river is easily navigable on the upper portion, but in the first thirty miles it falls over 500 feet, and is consequently extremely rapid and difficult to ascend. Mr. McConnell then proceeded up the Findlay River.

Whites had been up to the Omineca River previous to him, as at one time that was a famous gold country, but Mr. McConnell and his party were the first whites to ever ascend the Findlay River to its head. The river is about 250 miles long and is navigable for the greater portion of the way in canoes, though owing to the rapids the party had to proceed the last fifty miles on foot, an arduous task, owing to the roughness of the country. The country is very mountainous, and though at the lower part of the river the valley is six miles wide, the mountains come right down to the water's edge in the upper portion.

At its mouth the Findlay is about as wide as the Fraser at Quesnelle. It is not very deep, except in the canons, where the current is very strong, and, owing to the numerous rapids and eddies, progress is very slow. At the head of Findlay River is a lake known in the Indian tongue as Lake Fehutade, which, being interpreted, means "narrow waters between mountains." This lake is the real source of the Mackenzie River. It is between twenty-five and thirty miles long and not

more than a quarter of a mile wide, and is inclosed by high mountains.

Around the edge of the lake are glaciers, and the scene is a very pretty one. The mountains rise 5,000 to 6,000 feet above the lake, while they are some 9,000 feet above the level of the sea. After exploring the lake Mr. McConnell started on his homeward journey about the end of August, and it was none too soon, as ice began to form on the river, and while on the Parsnip the party experienced a snowstorm.—*Vancouver News-Advertiser.*

Solidified Petroleum.

The method of making fuel bricks of crude petroleum adopted by Engineer Maestracci, of the Italian navy, is given as follows by the *Revue Scientifique*: The bricks are of similar form and size to the coal briquettes extensively used in France and Germany. The mixture is made in the proportion of 1 liter of petroleum, 10 per cent of resin, 150 grammes of powdered soap and 333 grammes of caustic soda. The mixture is heated and stirred at the same time; solidification begins in about 10 minutes, and the operation must then be carefully watched. If there is a tendency to remain liquid, a little more soda is added. The mixture is stirred until the mass becomes nearly solid. The thick paste is then poured into the moulds, which are placed for 10 or 15 minutes in a drying stove. The briquettes are then cooled and are ready for use in a few hours.

Signor Maestracci recommends the addition of 20 per cent of wood sawdust and 20 per cent of clay or

and slimy substances which are, perhaps, derived from the shell or joints of the cane. These impurities can be removed to a surprising extent by simply allowing them to subside in the cold, limed juice. If the raw juice is heated, these impurities dissolve in the juice and cannot then be removed.

There are also impurities in sorghum juice which are soluble in the raw juice, but which become insoluble when the juice is heated. These form scums and sediment, and can be removed best by hot clarification.

It appears that a much better clarification of sorghum juice can be had by performing a double clarification, by liming cold juice, settling the impurities and decanting the juice, by heating the partially clarified juice, adding phosphoric acid, again settling the impurities and again decanting the juice.

This method has been used in Kansas for two seasons. With unstripped cane, that is leaves and cane milled together, and with open steam evaporators or with fire pans, it has given brighter and better sirup, with higher purity, than has yet been had in sorghum diffusion sugar houses.

In these days, when the tendency is distinctly toward larger and yet larger sugar houses, it may seem absurd to mention small mills, but the sorghum industry is obviously compelled to study all means for advance. The conditions in Kansas are not altogether the same as those in other sugar-producing countries. That State has a scattered population, too distant from sugar factories to be benefited by them, the greater number engaged in agriculture, owning land and stock, preferring to labor at home, willing to work harder, more hours, and more cheaply for themselves than for others. It is quite possible that they can grow cane cheaply and utilize the seed, and manufacture the cane in small mills and make considerable quantities of crude sugar and molasses for their own use, and it is not impossible that sirup produced in many little mills may increase the outturn of sugar from complete sugar houses.—*The Louisiana Planter.*

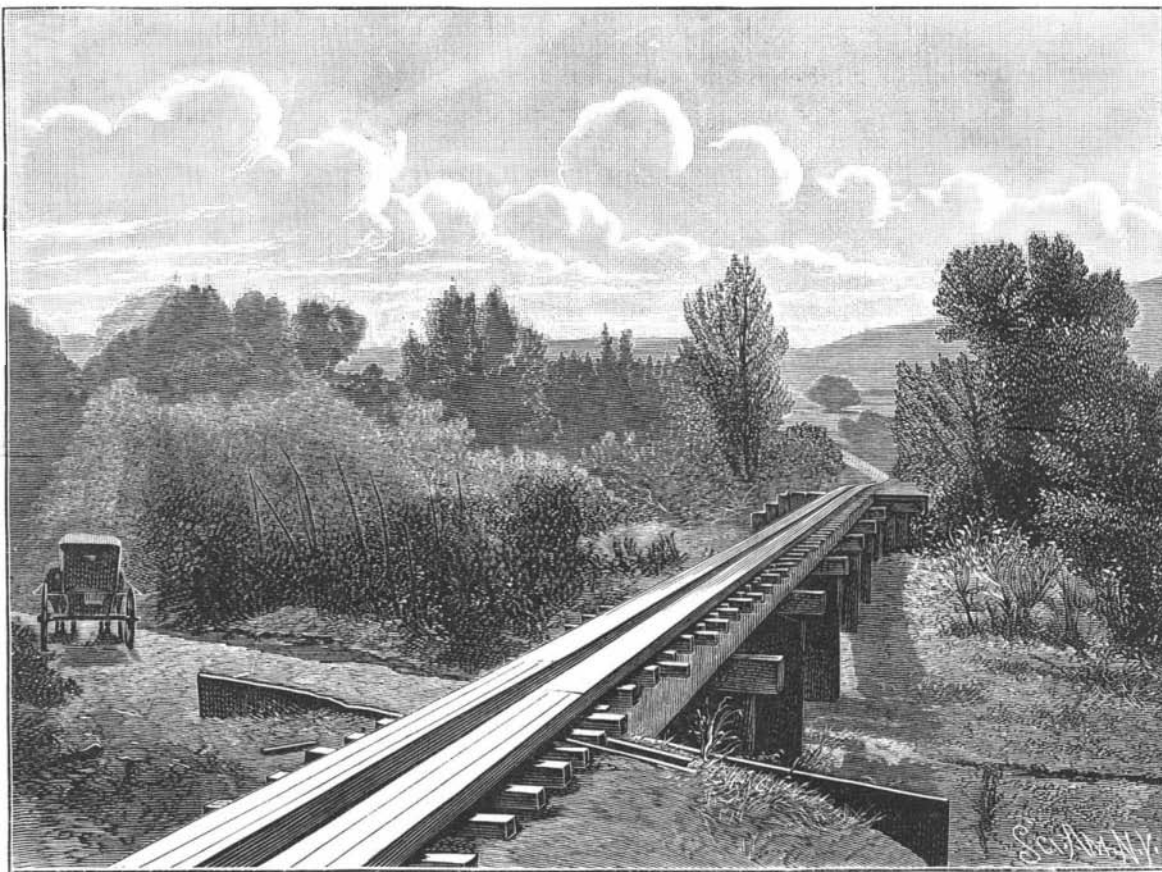
The New Railway Tunnel Opposite New York.

Remarkably good work in hard rock tunnel driving is now being done on the Palisades tunnel of the New York, Susquehanna & Western Railroad, near New York. This work has been under way about a year, and it is expected that the tunnel will be completed early in 1894. During the past month the contractors, Messrs. Broadhead & Hickey, drove on the east end of

the tunnel, which is in charge of Mr. P. F. McLaughlin, 161 feet of heading; and 186 feet of bench, all double track tunnel, dimensions 27 feet by 21 feet. The record in the heading is especially remarkable, owing to the fact that the work was done by night shift only, that is only one shift in twenty-four hours. This plan was first introduced by Mr. McLaughlin, and has proved so successful that it has since been adopted elsewhere. One of the main advantages of the single shift is that, after the drilling and firing, which takes place early in the morning, common muckers are put to work in the heading to get rid of the broken stone, and the man in charge of these muckers sees that the columns are put up and the drills in place for the runners to begin drill work again on the following night. The rock encountered is the well known Jersey trap, known to be one of the hardest rocks in existence. This good work has been done with four Ingersoll-Sergeant F-2 drills in the heading and six on the bench.

Election of a New President in Switzerland.

The new president of Switzerland, recently elected, is Emil Frey, who emigrated to this country, and in 1861 was a farm hand in Illinois. When the war broke out he enlisted as a private in the Union army, and faithfully served until the close of hostilities, having participated in several of the principal battles, and endured imprisonment in Libby and other Southern prisons. After the war he returned to Switzerland, where his excellent education, vigorous and useful career as a journalist, soon brought him to the front among the public men of his country, and now he has received the high honor of election to the presidency.



THE BURT WOODEN RAILWAY, CALIFORNIA.

sand, which will make the briquettes cheaper and more solid. In trials made at Marseilles on several tugboats the petroleum briquettes furnished about three times as much heat as coal briquettes of the same size. They were burned in the ordinary boiler furnace without any special preparation, and gave out very little smoke, leaving also little or no ash. The advantages claimed for the petroleum briquettes for marine use are the absence of smoke and a large reduction in bulk of fuel which must be carried as compared with coal, while the risks attending the carrying of liquid fuel are avoided.

Clarification of Sorghum Juice.

Analysis shows that the difficulty in securing a good yield of sorghum sugar is not caused by a deficiency of sugar in the juice, for it is now easy to produce sorghum cane which has, as a general average, 12 to 14 per cent. of crystallizable sugar in the juice. Sugar canes and sugar beets whose juice contains no more sugar give satisfactory yields.

The difficulty in sorghum manufacture is not in the excessive cost of cane which contains 12 to 14 per cent of sugar, for such cane is produced with much less labor in planting, cultivation or harvesting than sugar cane or beets having the same percentage of sugar.

The difficulty is caused by imperfect separation of impurities which are peculiar to sorghum juice, and it follows that when a good clarification can be had the difficulty will vanish.

There are impurities in sorghum juice which can be removed best by cold clarification. Starch is found in considerable quantity in sorghum juice, and gummy