GAS MOTOR CARS OF THE DESSAU TRAMWAY.

We give herewith a description of a system of tramway car propulsion by means of gas motors recently applied at Dessau, in Germany. The first section of the gas motor tramway of Dessau was inaugurated November 14, 1894, and the second on the 16th of December of the same year. The total length of these two sections is 2½ miles.

The track is of the normal gage of 4·75 feet between rails. The rails are the same as those used on electric tramways. The maximum gradients are two-thirds of an inch to the foot, and the sharpest curves are of 40 foot radius.

The rolling stock consists of nine automobile cars of the small type of the Lührig system. The weight of each car, ready for running, is six tons. The car has a capacity for twelve passengers standing upon the platforms and for fifteen seated, say, with the conductor, for twenty-eight persons.

The car has the aspect of an ordinary street horse car. The accompanying figure gives a view of one of the sides (that on which the motor is placed), with the doors that serve for the inspection of the motor removed. The cars, with the exception of the motors, were constructed at the Van der Zypen & Charlier works, of Cologne. The motors are from the Deutz works, of the same city. The motor, which is of the Otto type, is horizontal and has two cylinders in tandem, situated under one of the rows of seats of the car. It is of an effective 7 horse power, but is capable of developing ten per cent more. The transmission between the motor and the axles is so arranged as to communicate to the car a speed that may reach 7 or 9 miles an hour. The car easily ascends gradients in hauling another car full of passengers and not provided with a motor. Since the opening up of the line, the company has purchased freight cars and trailing cars.

GAS MOTOR CAR OF THE DESSAU TRAMWAY.

The car carries three gas reservoirs, two of which are placed under the platforms and one under the row of seats opposite that under which the motor is situated. Their total capacity is 28 cubic feet, which suffices for a round trip.

The peculiarity of construction of the first cars allowed them to be charged with compressed gas at the works of the builders. Upon reaching Dessau, after a travel of eight days upon the railway, they were placed upon the rails at the station, and were run to the tramway depot, at the other extremity of the city, through the utilization of the gas stored up at the works. This is a proof of the facility offered by illuminating gas for the transportation of power, and also of the perfect tightness of the reservoirs.

The charging of the gas reservoirs of the stations is effected through a threaded tubulure provided with a pressure gage placed upon the longitudinal wall opposite that of the motor. The taps for the injection and discharge of the water for cooling are situated above the mouth through which the gas enters. The charging is done in two minutes. The renewal of the water for cooling requires three or four minutes.

There are two compressing stations, each of which consists of a small 14·75 × 14·75 foot structure, provided on one side with a lean-to. In the interior of this structure there is a meter, an 8 horse power Otto gas motor, and a compressor. The illuminating gas is sucked from the pipe line of the city and forced into two reservoirs placed under the lean-to at a pressure of 20 atmospheres. From these reservoirs starts a small conduit that ends at a subterranean charging head placed in the vicinity of the tramway. In order to charge the car with gas, it suffices to screw the two threaded extremities of a flexible tube of the charging heads of the track and reservoirs and to open the cocks.

This installation might be still further reduced in area, and the reservoirs especially might be easily placed underground.

The capacity of the reservoirs of the charging station permits of filling two cars without actuating the motor. So the engines of the small works operate at Dessau only three hours a day. If they ran fourteen hours, they would suffice for the supply of forty cars. The two motors together of the compressing stations consume a tenth of the total quantity of the gas burned by the motors of the cars.

The population of Dessau is 42,500, and the establishment of the gas tramway has developed a taste for riding. So the success of the enterprise has exceeded all expectations. The existing lines have been lengthened by one and a quarter miles, and the number of cars raised from nine to thirteen. Of the four extra cars ordered, two are of 10 instead of 7 horse power. It is evident from these data that the tramway company is satisfied with its system of propulsion.

For the above details and the accompanying figure we are indebted to Le Genie Civil.

A Wire Flywheel.

Among the most recent and novel applications of wire, attention is drawn in Hardware to the wire flywheel lately erected at the Mannesmann Tube Company's works, Germany, and especially notable, in view of the well-known fact that heavy flywheels, driven at high velocities, present such dangers of breaking asunder from the great centrifugal force developed. The wheel at the factory mentioned is described as a cast iron hub or boss, to which are attached two steel plate disks, or cheeks, about 20 feet in diameter. The peripheral space between the disks is filled in with some 70 tons of No. 5 steel wire, completely wound around the hub, the tensile resistance thus obtained being found to be far superior to that of any casting. This huge flywheel is driven at a speed of about 240 revolutions per minute, or a peripheral velocity of 2·8 miles per minute, or approximately, 250 feet per second, which is said to be nearly three times the average speed of any express train in the world. For such a constructed flywheel the length of wire is estimated at about 250 miles. The tensile strength of paper being enormous, it is quite possible that some of the new big wheels will be built up with a paper rim.

Acetylene Explosion and Fire.

In New Haven, Conn., January 21, an explosion and fire occurred by which three men were killed and a building destroyed on account of experiments with acetylene, the exact nature of which and the especial cause of the accident cannot be accurately determined, as the apparatus was wrecked, several of the participants badly burned, and one killed. On the third floor of a four story brick building was the shop of Frank P. Phlegar, a machine jobber, who was said to be experimenting upon a regulator to control the delivery of gas from steel cylinders, about six inches in diameter by four feet long, in which liquefied acetylene was kept, the pressure of which, at 65° to 70° Fah., according to Lewes and Shuckert, would be about 600 pounds per square inch. It was known that when the explosion occurred seven men were standing about the apparatus, of whom one was killed and all the others badly burned and injured. A second explosion soon followed the first, the surrounding structures being badly shaken up, and flames enveloping the building, which was so quickly destroyed by the fire that two other occupants were burned to death.

John Fritz.

John Fritz, who was recently elected the President of the American Society of Mechanical Engineers, was born in Chester County, Pennsylvania, in 1822, and the first sixteen years of his life was spent on the farm of his father. He then went to Parksburg, near by, and secured employment in a machine shop. During his apprenticeship he had a most varied experience, which ranged from the cleaning of castings up to the management of the lathe. Young Fritz went to Morristown, Pennsylvania, where there were larger shops and greater opportunity for improvement. From there he went to Safe Harbor, Pennsylvania, where he put up the machinery of a rolling mill. He then began to acquire an experience in the rolling mill industry, both as an inventor and a builder of iron and steel making machinery, upon which his reputation chiefly rests.

He is considered to be one of the foremost of American metallurgists and is now superintendent of the Bethlehem Iron Works. In 1854 Mr. Fritz remodeled and rebuilt the Cambria Iron Works, at Johnstown, Pennsylvania, which was one of the pioneer iron and steel plants of the country. In 1857 Mr. Fritz constructed his first three-high roll train and produced iron rails with an economy hitherto unknown. In 1860 a company was organized to build furnaces and rolling mills on the banks of the Lehigh River, below Bethlehem, and Mr. Fritz was selected to plan and build the new works. His company was one of the first to begin the manufacture of Bessemer steel, and their success was largely owing to the ability and energy of Mr. Fritz, who has the distinction of being one of the few Americans who has been honored with the Bessemer gold medal from the British Iron and Steel Institute.

All honor is due to the man who has passed through all the rudiments of a trade and has risen to the highest point in the profession, and it is a handsome and proper recognition of his worth to be elected to the presidency of an important body like the American Society of Mechanical Engineers.

ONE hundred and sixty plows started in a row in a recent plowing match at Dartford, England.

Glue Joints in Belts.

In regard to joining leather belts, a correspondent writes to the Woodworker and says: I have always had the best results by using common carpenter's glue, such as we use in the shop. I mended an old belt that drives a pony planer. The driver is 32 inch, the driven 10 inch, centers about 11 feet, and the belt has to be crossed. There are eight splices in this belt, all glued, and not a rivet in any one, as I consider rivets in a belt a perfect nuisance, and of no use whatever, except to weaken the belt where the rivets are put through. I also used a glued belt on the under head of a moulding machine and on the side spindles.

I have used glued belts on matcherhead spindles and always with the best results. The reason so many fail in their efforts to produce the best results is because they do not give enough attention to the details. My modus operandi is this: Scarf the ends with a plane and make a good length of splice. Have all nice and equal, so it will be same thickness as the rest of the belt when glued. Here is where the secret lies to make it hold: Before gluing, give all the ends a sizing of thin glue, in order to thoroughly fill up the pores in the leather. Let this get perfectly dry, then glue in the ordinary way, and let the glue get good and dry before using. I always give such a joint a good dose of neat's foot oil to limber it up. The belt referred to has been in use now two years, and only repaired once with a new lace. Experience has taught me it is money in pocket to make all repairs as thoroughly as possible.

Value of Wood Pulp.

It is stated that the paper required in the printing of the Petit Journal, of Paris, is equivalent to the consumption of 120,000 trees annually, converted into wood pulp. This requires an annual thinning of 25,000 acres of timber land. If a single newspaper induces such a slaughter of trees in one year, what must be the destruction of trees on paper account in all Europe? In Sweden, Austria and Germany, the regions of greatest supply of wood pulp, it is a question as to how to continue annual cuttings without exhausting the timber. In this country a like process is going on. There seems to be a possibility that pulp timber within a few years will become as important as that for lumber, particularly in localities where there is a large growth of spruce, aspen leaf poplar, or any other wood adapted to pulp making. Such timber will soon become in such request that extensive holdings of it will be sought as eagerly as the lumber woods hitherto have been, and a value will be placed on it undreamed of a few years ago. Then the newspapers will begin to prate of pulp barons and kings, as they now refer to pine barons and kings. Wild stories of pulp wood trusts and combines will be as rife as are such fairy tales about pine trusts and combines, which are evolved and sent broadcast to delude an easily prejudiced public.—Paper World.

Cleaning Castings with Sand Blasts.

The Iron and Coal Trades Review quotes a record made by Howard A. Pedrick of an experiment tried to determine the practicability of cleaning large castings by blowing sand against them under steam at a pressure of 60 pounds per square inch. It was found that the steam wet the sand, causing frequent clogging of the pipes, and made it next to impossible for a man to stand the severe rebounding of the sand from the casting. After a time, compressed air was substituted for steam, and the process was improved until at present ornamental and fancy castings can be thoroughly and cheaply treated in this way, producing an article which would otherwise require considerable labor to finish. In ordinary classes of work it is practicable to clean thoroughly six square feet per minute, no matter how much ornamentation covers the casting. Steel is very hard to clean in the usual manner, but yields readily to the sand blast. The outside appearance of the sand box is like that of a vertical boiler. It is fitted with feed valves and sand chambers, so arranged that an air pressure of about 10 pounds per square inch forces the sand through a rubber hose, which must be kept free from kinks, or the sand will destroy it.

Smithsonian Institution Jubilee.

In September of this year, the Smithsonian Institution, which has exerted an immense influence upon the development of science in America, and which has done more than any institution to make the results of scientific work known unto the ends of the world, will celebrate its jubilee. It is stated by Dr. Brown Goode, in a historical account of the Institution, that a special volume will be published to commemorate the event, and two memorial tablets will be erected in honor of the founder in the city of Genoa, where he died June 26, 1829: one in the English church, and one upon his tomb in the beautiful little English cemetery on the heights of San Benigno.—Nature.

SIR HENRY ACLAND has been presented with a testimonial by the University of Oxford, in recognition of his services to medical science and hygiene. The memorial takes the form of a bust and of a fund of $15,000.

Colors According to Latitudes.

An endeavor to find a cause for the predilection of certain peoples for a certain color, while such color is put under the ban in another latitude, must, we think, says La Science en Famille, prove futile. Why is yellow, as a general thing, displeasing to us, while in Guiana and the Antilles it is the color preferred par excellence? Why do we like blue, and why do the Japanese detest red? This is a matter of surroundings and habits and also of fashion for certain countries.

But if the cause is of slight consequence, the fact is, nevertheless, of interest to note, and we have evidently here ideas of extreme importance to the exporting manufacturer whose products are designed for remote peoples having customs different from ours. At the epoch at which Japan opened its ports to European commerce, a certain manufacturer of Havre hastened to ship thither fabrics of the most beautiful red. This detail, of trifling appearance, had escaped him. It proved a disaster and the goods remained on his hands.

Dr. Felix Regnault has endeavored to put a little order into the nomenclature of such preferences, and finds, along with all anthropologists who have studied the question, that savages are especially fond of luminous and dazzling colors. If we turn to the negro, the North American Indian, or the Polynesian, we find that he always has a predilection for red.

According to Cook, the New Caledonian admires everything that is red and is prodigal of this color for the embellishing of the poles of his huts, his carvings, and his images.

In New Zealand it would only be necessary to paint an object red in order to have it become a taboo.

The only colors known to the natives of Gaboon, before the arrival of the whites, were, according to Dolhac, red, white and black. To-day, they use blue as a color of mourning.

Capus remarks that the color preferred by the Siapoch Kafirs, a people of Afghanistan, is red, which is especially the color of certain ornaments of the chiefs.

Among the ancients the chosen color was purple.

On the contrary, the peoples of the north have a particular liking for somber colors.

We are especially partial to blue, and regard yellow as ridiculous.

In Japan, light Prussian blue and greenish blues prevail in clothing.

The savage Ainos of the island of Jesso, according to Dybowski, prefer blue, and tattoo themselves with this color alone.

Let us now pass to the French colonies. In Congo, De Brazza always carried bright red cotton cloth for his exchanges. On the contrary, in the Soudan, we have to do with the Mussulmans, who are more civilized. The medium of exchange is here blue or long cotton cloth. The latter is dyed indigo blue in the Indies, and any other shade of blue would be rejected.

The Mussulman negro is distinguished from the fetichist negro by his love for blue, while the fetichist prefers red. The former tattoos himself with blue, while the latter smears his body with ocher.

In the French Indies, the clothing worn is especially red and yellow, while blue finds little favor. One of the main affectations of the women is to color their skin with saffron.

In Cochin-China the colors most used are yellow and red, and then comes green. The gods are gilded.

The negroes and the natives of Guiana and the Antilles have an especial fondness for fabrics of a yellow ground. Fashion does not lose its rights and the ground always persists, but the designs upon it may be modified.

In Tahiti the aborigines adopt a pale rose color for their clothing.

The Germans make a singular deduction from the passion of savages for gaudy colors, and have concluded therefrom that they do not perceive violet, blue, or green. These colors, in fact, have no name in the language of some of these peoples. Without going farther, moreover, the ancients had no special names to designate all colors. The Israelites knew only white, black, green and red, and in Homer, according to Gladstone, we find special names only for green, blue, and violet. But why not simply admit that savages, having a language poor in precise terms, denominate only that which strikes them, and that somber colors being indifferent to them, they do not think to mention them by a specific name.

Thus, the Battas of Sumatra, in contact with the Dutch, have taken the term blue from the language of the latter to designate that color, which they distinguish perfectly. So, too, certain African peoples have borrowed the word blue from the English. They, therefore, distinguished the color previously, but did not concern themselves about giving it a name. The Cree Indians of British America call blue by a name signifying "dead man's country color," i. e., "sky color," the spirits of the dead being supposed to ascend to the sky.

The ancients had no special terms to designate certain colors, and yet they used them in profusion upon their monuments.

The Egyptians used yellow, red, blue, green, brown, white, and black, and had a correct perception of the harmony of colors.

The two colors that occupy most space in the decorations of the enameled bricks of the Assyrians are blue and yellow. Blue almost always furnishes the ground, while the majority of the figures thereupon are yellow.

The Persians made much use of these two colors, but they likewise employed green and red. Moreover, they set off their palaces with plates of gold, silver, bronze, ivory, and choice woods.

Finally, the Greeks were fond of color. We know that they had the habit of painting the frieze of their structures blue. In the Parthenon, the front of the metopes was red, and blue and yellow were distributed throughout the rest of the edifice.

In our epoch, it seems that we are timidly returning to ancient practices. At the Universal Exposition of 1889, polychromy was tried, but blue always predominated.

Efficiency of Building Materials Against Fire.

Experiments have lately been made in Vienna for the purpose of testing the efficiency of various building materials against fire, and also to ascertain what protection they were capable of affording to iron work. To make these tests a brick chamber some 12 ft. by 8 ft. in plan and 11½ ft. high was built, and in the center an iron column was constructed consisting of two channel bars, 5½ in. by 2¾ in. These channels were placed 2½ in. apart, back to back, and were braced together with light lattice bars. Within the space between the channels test bars composed of various alloys melting at temperatures between 150° F. and 1650° F. were placed, the column afterward being surrounded with brick work in mortar, thus forming a pier some 18 in. square. In order that the test should as nearly as possible resemble the conditions met with in actual practice, the column was loaded with a sufficient weight to cause a stress of 3½ tons per square in. on the iron work. Fuel was then strewn over the floor of the chamber to a depth of some 3 ft. and the firing was fully maintained for a space of 2½ hours, and was subsequently extinguished by the fire brigade. The heat had, however, been so great that it was not until the next day that a thorough examination of its effects could be made, but it was then discovered that, although the edges of the brick work pier were crumbled to an extent of 1½ in., the iron column was quite uninjured, and only the test bar, capable of fusing at 150° F., showed any indication of melting. It would thus appear that the brick work was of ample thickness to protect the iron work, and that when such construction is adopted in actual practice a building is probably as fireproof as it is possible to make it.—Construction News.

Palace Cars on Trolley Lines.

The recent growth and development of Brooklyn is largely due to the extension of the surface railway companies' system, whose lines now extend for miles into the country. Last summer the Brooklyn Heights Railroad Company placed several excursion cars in service. These cars were profusely decorated and were furnished with incandescent lamps of all colors. They could be chartered for trips of all kinds, and it was not an unusual sight to see a procession of five of these cars, the first having a band, passing through some of the principal streets. The same company has just built and equipped two handsome parlor cars for winter use. The cars are intended for theater or skating parties and for the use of any persons who may be inclined to visit outlying sections of Brooklyn, either for business or pleasure.

The cars are 25 feet long inside and have platforms 5 feet in width, upon which can be placed four seats, for purposes of observation or for those who care to smoke. The cars are equipped with standard air brakes and ride on easy half elliptic and spiral springs. The exterior of each car is painted a royal blue, with gold letters; the platforms are inclosed with brass open grill work, railings and ornamentation. The interiors of the cars are finished in mahogany and are decorated in old gold and light umber. In each corner is a small buffet with a plate glass mirror door and a small cabinet or sideboard where lunch may be served. The floors are carpeted and have luxurious cane chairs upholstered in plush, every effort being made to provide the greatest possible comfort. The plate glass windows are hung with old gold and blue curtains. The cars are lighted and heated by electricity and the electric call bells provide a ready communication with the waiters, who are in attendance whenever luncheons or suppers are given on the car. The cars can be chartered for the evening or for any period.

IT is said that the exports from Great Britain into the United States only amount to some $90,000,000 annually, while the imports into Great Britain from the United States amount to some $445,000,000 per annum, the balance of trade being about $355,000,000 in our favor.