PRIZES FOR GAS ENGINEERS.

We notice that the Society of the gas industry in France has offered five prizes for 1878, which are as follows:

1. A prize of 2,000 francs ($400) to the author of the best paper upon economical heating of benches by either solid, liquid or gaseous fuel.

2. A prize of 1,000 francs ($200) to the author of the best paper upon arrangement of pipes, and the means of discovering leaks and repairing them.

3. A prize of 1,000 francs ($200) to the author of the best paper upon exhausting gas in general, and the apparatus employed for this purpose.

4. A prize of 1,200 francs ($240) to be divided between the authors of the two best papers presented to the Congress, upon any other subjects than the three preceding.

5. A prize of 200 francs ($40) to the foreman or workman having the longest and best service in one gas works.

The papers must be written in French, and must be sent to the president of the committee before the 1st of May, 1878.

Any one, whether French or foreigner, member of the Society or not, can compete.

The Sanitary Use of Trees.—A correspondent of the *American Architect* calls attention to a phenomenon which he has observed in the outflow of waste from his own house. He has a close-built brick cesspool eight feet in diameter and eight feet deep, with an overflow thence for liquids into a percolating stone cesspool 10x10 feet; both are domed over at the top, closed each with a flat stone, and covered with soil. Unlike his neighbors, whose cesspools are constructed in the same manner and in the same kind of soil, but who are subjected to the necessity of cleaning out both cesspools at frequent intervals, his own have been in use for four years without being opened, and have given him no inconvenience. A few months ago a deep excavation in the street near his percolating or overflow cesspool revealed the fact that the moisture from it was all absorbed by the roots of three large and very flourishing trees, a tulip and two maples, in its immediate neighborhood. "There could be no accumulation of water," he says, "where there were such channels to draw it up." This certainly is an important point to be considered in locating the area of absorption for household waste. We do not remember to have seen elsewhere noticed this very probable sanitary function of trees; but if the theory is correct, it goes far to solve the most serious difficulty in the problem of drainage without common sewers.

Intoxicating Grasses.—Dr. Hance gives in the *Journal of Botany* for September a supplementary note on intoxicating grasses. The plant treated of on this occasion is *Stipa Siberica*, Munro, which had been found to poison horses at Gulmuz, Kashmir. Prof. Dyer suggested that the *Stipas* may be only mechanically poisonous, like *Hordeum pratense*, but Dr. Hance thinks the symptoms opposed to such a supposition. In the recently published English translation of Przevalsky's travels, the Alaskan poisonous grass is stated to be a species of *Lolium*, but the native herds carefully avoid eating it, as the cattle of Kashmir refuse the *Stipa*. In part 22 of Messrs. Trimen & Bentley's "Medicinal Plants," recently published, there is given a figure of *Lolium temulentum*, Linn., and an account of its so-called poisonous properties. Mr. A. S. Wilson, of Aberdeen, ate large quantities of it daily for some time and found it quite harmless. It is suggested that in this case the poisonous property is due to ergot. It would indeed seem that grasses are poisonous only in two ways—mechanically (like *Hordeum pratense*), or when afflicted with ergot or some other disease. Farther experiments are much to be desired.

A Costly Railroad.—A costly railroad will be the extension of the Metropolitan District line in London—a section one mile and sixteen rods long, known as the "inner circle completion," as it will connect the Metropolitan and Metropolitan District roads (both underground lines) at their eastern ends, and make it possible to run trains entirely around the ellipse formed by the two roads, which at present are connected only at their western ends. This link is estimated to cost £2,100,000, or at the rate of about $10,000,000 per mile. The city will, however, allow $2,500,000 for a new street which has to be constructed in connection with the work, and which has to be done by August 7th, 1879. Costly as this work is, says the *Iron Age*, we have something quite comparable to it in expense in this country in the great St. Louis bridge, which, however, has but the merest fraction of the tariff which supports the London underground roads. This single mile of road will cost more than the entire system of elevated roads proposed for New York.

How our Manufactures Gain Entrance to England.—In a large carriage manufactory in England, a few months since, says an exchange, the directors wished to introduce an American machine for the manufacture of wheels. A number of workmen were inclined to use it, as they could earn higher wages and their work was less laborious, but they were ordered by their trades unions not to use it, and the machine was, consequently, set aside. Since then American machine-made wheels have been imported, and their importation increases every day.

Italian Railways.—Considering the state of its finances, the Italian government is courageous in its desire to buy off the three chief companies which now have railways in their hands—the Alta Italia, Romane and Meridionali—and either work them itself on behalf of the State, or farm them out like the tobacco monopoly. There is great merit in State purchase or State resumption of railways if done at the proper time, that is to say, before the dividends have become so large as to encourage unholy greed in shareholders. At present the Italian lines pay an average of a little more than two per cent., and their proprietors would probably prove tractable enough.

DEPOSITION OF COPPER BY ELECTRICITY.

At the American Institute of Engineers' meeting lately, as reported by the *Iron Age*, Mr. N. S. Keith, of New York, read a very interesting paper on the above subject. The object sought to be accomplished was the obtaining of copper from the mother liquor of a copper sulphate manufactory, the liquors being the result of several solutions of commercial scrap copper containing impurities, the quantity of which in the liquors had increased by the operations until too large to allow the formation of pure, or even merchantable copper sulphate. There were silver, nickel, tin, zinc, antimony and iron sulphates in solution, besides enough copper sulphate to represent 4½% of the total weight of solution as metallic copper. The question was to obtain this copper in a cheap, practical and expeditious way by the agency of electricity. Experiments and computations showed that many of the different cells, such as Daniell's Brunsen's, Grove's and the gravity battery were too expensive in use. This was the same with dynamo-electric machines, though the cost was much less. Iron, when used in the well-known way, gives copper deposited in a powder, mixed with insoluble basic salts of iron. These considerations led to the abandonment of the idea of using these for the purpose designed.

By a plan which he put into use, iron was placed in less than a saturated solution of sulphate of iron (free from copper) contained in an ordinary porous cell such as is used in various galvanic batteries. The porous cell and contents were placed in a larger vessel containing some of the copper liquor and a sheet of metallic copper. The iron and copper were connected externally to the solution by means of a clamp. In 36 hours the liquor was completely freed from copper, which was deposited upon the copper sheet as a beautiful velvet-like coat, pure, reguline and coherent. Occasional displacements by water of the nearly saturated solution of sulphate of iron formed in the porous cell were made. No formation of basic salts of iron; no copper powder; none of the defects of the ordinary precipitation of copper by means of iron. By means of enlargements and modifications of this simple mode of treatment, any amount of copper solutions may be made to produce fine merchantable copper by inexpensive apparatus at, say, one cent per pound of copper more or less, as scrap iron (which may be placed loosely in the porous vessels) may be worth more or less than $20 per ton.

A PLEA FOR UNIVERSAL TIME.

The interest of those who own railroads and steamboats, as well as the interest of the people, requires that they all be run in unison with system and regularity. A writer for the *Railroad Gazette* says: One of the great inconveniences attending an arrangement of this kind is the want of a common, or, as we shall term it, universal time. It will not be necessary for us to refer to any particular place, where perhaps trains come and go by New York, Pittsburg, Cincinnati, Chicago and local time; the traveling community are well aware of these annoyances, as are also those whose duty it is to make up a time table that shall connect their roads advantageously with others.

And oftentimes when we see a cablegram in the papers, from some foreign country, after considering the dates and figuring on the time elapsed from time of sending to time of receiving, we are not sure but we may be out 24 hours one way or the other.

To obviate these difficulties we will offer the following suggestions: Establish a prime meridian to pass through Behring's strait, and let the day by local time commence at this line, and also the day universal, but 12 hours later, or when the sun is on this line, the hours of the day universal to number from 0 to 24; and also let longitude be reckoned from this line, numbering from 0 westerly around the globe to 360°, the universal time to be given daily by telegraph to the principal cities throughout the Union by the astronomer at Washington. All schedule time of railroads and steamboats and ocean steamers, as well as official documents and telegrams should be made out in universal time. The local publication of time tables for railroads and steamboats, however, should also be made out in local time.

Stimulating Progress among Young Mechanics.—Honorable competition in actual work is a great incitement to progress. This we think is well applied by an English society of turners. The subjects of competition were turning in ivory, pottery, stone and jet; and steel, brass and gold for horological purposes. The competition in ivory included vegetable ivory. The qualities considered in awarding the prizes were: Beauty of design, symmetry of shape, utility, and general excellence of workmanship; exact copying, so that two objects produced should be fac similes in every part, or exact measures of capacity; fitness of the work or design for the purpose proposed; ability to turn, whether circular or oval; and novelty in application of turning or in design. Carving was admissable, but it was to be subsidiary to the turning. The candidate was to make his own selection from the above conditions; but the one who best fulfilled the largest number, including the most important qualities, was preferred. The work to be all hand turning, produced in the lathe without special rest or tool apparatus, and the carving to be the work of the exhibitor.

Relation of Railroads to New Inventions.—A recent decision by a Judge of the Supreme Court of Illinois contains the following sentence: "While it is the duty of railroad companies to furnish good, well-constructed machinery, adapted to its due uses, and made of good materials, and of the kind found to be most safe when applied to use, they are not required to seek out and apply every new invention, although they must adopt such as are found by experience to combine the greatest safety with practical use."

AMERICAN AND BRITISH BRIDGE BUILDING.

In an address delivered at a late meeting of the Liverpool Engineering Society, by the President, C. Graham Smith, we find the following contrast: Bridges on the American system have a decided advantage in new countries on account of the small weight of the various portions and the speed with which they can be put together. It is no uncommon circumstance to find American engineers speaking and writing of putting up spans of 150 feet to 250 feet in from two to four days. According to Mr. Lovett, chief engineer to the Ohio and Mississippi railway, the last span of the Medora bridge built for that company over White river, and measuring 147 feet 6 inches between center and center of end pins, was erected by four foremen and 37 men in one day. In England a few weeks more or less for the erection of a bridge in not generally a matter of great moment, but for foreign work speed is often of paramount importance, as the streams which can be walked across dry-shod one day are in the space of 24 hours converted into roaring torrents capable of washing away both the temporary staging and the girders in course of erection upon it. Another advantage of speed in construction in foreign countries is the fact that the new road is often the only means of communication with its own more advanced portions, and until a certain bridge can be constructed it may be difficult to convey materials for the advancement of distant works. There is a further consideration which may even make it desirable to introduce this class of bridge into England, namely, that nearly the whole of the work in the construction is performed by machines, and the erection may be carried on by unskilled labor directed by competent foremen. These are matters worthy of some attention in these days of strikes and inconsiderate and arbitrary restrictions imposed upon labor by various unions. For instance the day's work of a boilermaker allowed by the boilermaker's club can be put in by 12 or one o'clock by a good average man working piecework. This, of course, enhances the value of riveted work, and it therefore behooves engineers to reduce as much as they consistently can the number of rivets in their bridge designs.

THE MANUFACTURE OF MOSAICS.

The modern process of making mosaics now commonly followed in Rome is this: A plate, generally of metal, of the required size is first surrounded by a margin rising about three-quarters of an inch from the surface. A mastic cement, composed of powdered stone, lime and linseed oil, is then spread over as a coating, perhaps a quarter of an inch in thickness. When set, this is again covered with plaster of Paris rising to a level with the margin, upon which is traced a very careful outline of the picture to be copied, and just so much as will admit of the insertion of the small pieces of smalto or glass is removed from time to time with a fine chisel. The workman then selects from the trays, in which are kept thousands of varieties of color, a piece of the tint which he wants, and carefully brings it to the necessary shape. The piece is then moistened with a little cement and bedded in its proper situation, the process being repeated until the picture is finished, when the whole, being ground down to an even face and polished, becomes an imperishable work of art. The process is the same for making the small mosaics so much employed at the present day for boxes, covers or articles of jewelry, and this work is sometimes upon almost a microscopic scale.

The Florentine mosaic which is chiefly used for the decoration of altars and tombs, or for cabinets, tops of tables, coffers and the like, is composed of precious materials in small slices or veneers, and by taking advantage of the natural tints and shades which characterize the marble, the agate or the jasper, very admirable effects may be produced in imitation of fruit, flowers or ornaments. The use of this kind of mosaic is extremely restricted, on account of the great value and expense not only of the materials but of the labor which is spent upon them. None but the hardest stones are used; every separate piece must be backed by thicker slices of slate or marble to obtain additional strength, and every minute portion must be ground until it exactly corresponds with the pattern previously cut.

The Tunnel Beneath the British Channel.—The London *Daily News* says: Operations connected with the submarine tunnel have already been commenced; on the other side of the channel, several pits having been sunk to the depth of 110 yards. At the same time the French and English committees have definitely drawn up the conditions of working for the route. The property of the tunnel is to be divided in half by the length—that is to say, each company will possess half of the line, reckoning the distance from coast to coast at low tide. Each company will cover the expense of its portion. The general work of excavation will be done, on the one hand by the Great Northern of France, and on the other by the Chatham and Southeastern Companies, the two latter having each a direct route from London to Dover. All the materials of the French and English lines will pass through the tunnel in order to prevent unnecessary expense and delay of transhipment, as in England and in France railway companies use each other's lines, and goods can pass from one line to another without changing vans. It is understood that an arrangement will be established for a similar exchange of lines between all the English and continental railway companies when the tunnel is completed. The tunnel will belong to its founders. At the expiration of 30 years the two governments will be able to take possession of the tunnel upon certain conditions.

Magnetism of Nickel and Copper.—Mr. Hall affirms in the *Moniteur Scientifique* that with feeble currents the magnetic power of nickel is equal to that of soft iron, but with stronger contents it is comparatively futile. Under any circumstances, however, the magnetic power of cobalt is much inferior to that of the other two metals.

TRANSMITTING POWER.

Prof. Osborne Reynolds delivered a long and valuable address before the Manchester Scientific and Mechanical Society, on the transmission of power long distances. He analyzed all the means proposed carefully and arrived at the following conclusions: Twenty miles appears to be the outside limit to which power may be economically transmitted, even when the power can be had for nothing, and the most economical means of doing this is probably the wire rope. This review, therefore, shows the hopelessness of our ever utilizing the natural sources of power, such as tidal rivers for mechanical purposes, unless we conduct them on the banks of those rivers. But as regards the substitution of a general source of power for the small steam engines now in use in our towns, the case appears more hopeful; and, what is more, this has already been done in some instances. In the most notable instance, that of Schaffhausen, the power is obtained from the Rhine at a point close to the town and is conveyed along the banks of the river, which crosses the ends of the streets of the town by wire rope, which, as it passes the ends of the streets, gives motion to shafts which are laid in a channel under the pavement, and from which the power can at once be introduced into the various manufactories. In our own country, also, in the town of Hull, I believe that pipes have been laid down to convey the power derived from steam in the form of water, under a pressure of 600 pounds, over some part of the town. It does not appear unreasonable, therefore, to suppose that something of the same sort might be done in our own city. Considering that a very large proportion of the power required in our warehouses is for hydraulic presses, it would appear desirable that, in part at least, the power should be communicated to water pressure. Where rotatory motion is required, the machinery might be driven by pressure engines, but as this would entail considerable waste, and as power may be more cheaply conveyed by compressed air, it might be better to supply both water and air; as regards the mechanical means, ropes and shafts. Although the former appears on the whole to be the most economical means of communicating work, and to a certain extent, their superiority is supported by the instance of Schaffhausen, considering their inconvenience in a town I think that the pipes would be preferable. With the ability to have either water or air at the most convenient pressure, and at a reasonable cost, I think that but few users of power on any but the largest scale would care for the trouble, danger, dirt and expense of having steam engines of their own; and if this be so, there would then be a chance of reducing the impurities in the air. Looking at these facts, I cannot help thinking that there is open to the engineer a field of enterprise, in which he may not only find remunerative employment for his talents, but in so doing confer a great benefit on his fellow creatures. This may not be so. The scheme, when closely considered, may be found wanting, but it will have served my principal purpose if it has helped to illustrate and render interesting what would have been otherwise desultory remarks about the transmission of work.

LABOR SAVING MACHINERY.

A feature of the Massachusetts census of manufactures for 1875, says the *Iron Age*, deserving especial notice, is the showing made in regard to the effect of labor-saving machinery on the production of some of the leading staples. We find that, with 24,151 hands employed in 1865, there was produced 175,875,000 yards of goods, a ratio of 7,355 yards to each employee. In 1875 there was produced 874,780,000 yards by 60,176 employees, or about 11,213 yards to each hand. This shows that with an increase of a little over 140% during the 10 years, in the number of hands employed, the quantity of cloth produced was increased nearly 392%. Woolen goods also make a very striking exhibit. For 1865, the production is placed at 46,008,141 yards, and the number of employees 18,753. For 1875, the production is 90,208,280 yards, and 19,036 employees, showing an increase of 96½% in production to 1½% in the number of employees. The number of pairs of boots and shoes made in 1865 was 31,870,581, and number of employees 58,281; and in 1875, 59,762,866 pairs, with 48,090 employees. This is probably the most important showing made, the production during the 10 years having been increased nearly 88%, while the force employed was less by 4,731. The product of carpetings in 1875 increased fourfold as compared with 1865, while the increase of force employed was less than half that amount. The average value of the boots and shoes produced in 1845 was 70 cents a pair; in 1855, 80 cents; in 1865, $1.80; and in 1875, $1.50. The value of carpetings was $2 per yard in 1865, and less than 73 cents per yard in 1875—which shows the source of the immense supply of dollar carpetings. The great reduction in the number of employees in the clothing business shows to what an extent the sewing machine, the machine shear and more careful gradations of "ready-made" have superseded the need of the tailor and the needle-woman.

Asiatic Railroads.—According to the journal of the Imperial Society of Geography of Vienna, M. Hochstan, President of the society, has recently published a pamphlet on the different projects studied for the establishment of a railroad through Central Asia and China. The following are the four principal routes: 1. The Baranowski project. Saratoff is the proposed point of departure. From here through the country of the Kirghises and over the Hindoo-Koosh mountains. This is the road of greatest travel to Moscou and Peshawur, the principal fortresses of the valley of the Indus. 2. The Lessep-Cotard project. From Orenbourg to Peshawur by Oursk, Taschkend, Samarkand and Balk. 3. The Bogdanowitch project, the principal points of stoppage being Moscou, Kanzan, Ekatherinobourg, Oursk, Tomsk, Irkutsk and Pekin. 4. The Ruthhofen project. This would be along the Siberian route to Oursk, passing Taschkend, Samarkand and Balk. At this point the road leads toward the west, and passes Teheran, and rejoins at Tiflis the Russian roads of the Caucasus, now in process of construction.