On Sea-going Torpedo Boats.

At a recent meeting of the Institution of Naval Architects, a paper was read by Mons. J. A. Normand, in which was advocated the extended use of sea-going torpedo boats, of from fifty to eighty tons displacement, having a maximum speed of eighteen to twenty knots, capable of steaming at least 1,000 nautical miles at ten or twelve knots, costing from £8,000 to £11,000, and manned by a crew of from ten to fifteen men. The importance of vessels of this class in future warfare was then referred to, and the consequences that would follow on their adoption. These were: (1.) No ironclad, no squadron or fleet, no cruisers (unless cruisers should attain the speed of torpedo boats), could navigate in a sea of moderate dimensions, such as the Channel or Black Sea, belonging simultaneously to powers at war, unless they should be escorted by sea-going torpedo boats equal in strength to those of the enemy. (2.) Military ports situated in those seas, or nearer than 200 or 300 miles to the enemy's shores, would be rendered useless as stations for ironclads or cruisers. For instance, supposing a war between England and France, this would be the case for Cherbourg, Plymouth, Portsmouth, and Sheerness. Cherbourg and Plymouth could then be assimilated to two military ports, whose entrances should be under the fire of each other, shot being here replaced by torpedo boats. (3.) Powers not having military ports sufficiently far from the enemy's shores would be actually deprived of the use of their navies, with the exception of those vessels stationed in foreign neutral waters, unless they could force the blockade of sea-going torpedo boats with a fleet of the same kind equal in strength. The above propositions are founded on the hypothesis that one squadron of sixty to eighty sea-going torpedo boats, equal in men and cost to one ironclad, are stronger than this ironclad by daylight, and *a fortiori* at night, even when reduced to half its number, the other half having left to coal and reprovision itself. Could sea-going torpedo boats be coaled at sea by means which are yet to be found, or could they, by such means as the use of liquid fuel, have their time of steaming doubled, their importance in warfare would be immensely increased. No second-class torpedo boats could replace boats of this kind, because they cannot stand a gale, nor can they then be lowered or shipped, so that the enemy can escape the attack of small torpedo boats by taking advantage of bad weather. The question now is, are torpedo boats of such small displacement as from fifty to eighty tons really sea-going? If they are not, can they be made so? Time and experience will show, but we already know that with their steel deck and hatchway coverings they can stand very bad weather. In an appendix was given the results of the official trials made last summer at Cherbourg of the sea-going torpedo boat No. 60, the first of a series built or building by the author for the French Government: Length of hull at load line, 108 ft. 2 in.; breadth, extreme, 10 ft. 10 in.; diameter high-pressure cylinder, 12·60 in.; diameter low-pressure cylinder, 20·48 in.; stroke, 14·96 in.; heating surface, fire-side, 816 square feet; grate surface, 19·3 square feet. Full speed three hours' trial. The boat was complete, with launching tubes, compressing engines, air reservoir, six 19 ft. Whitehead torpedoes, 2½ tons coal, two Berthon collapsible boats, no masts. Displacement, 43 tons; mean speed, 20·62 knots; consumption of coal during the three hours, 1·58 tons; consumption of coal per hour, 0·53 ton; indicated horse-power, about 500; revolutions per minute, 328·5; boiler pressure, 132 lb.; air, 3⅜ in.

In the discussion which followed, several speakers remarked on the extremely low rate of consumption of fuel, and desired that further information should be supplied in regard to the engines and boilers, but more especially the latter. Mr. Samuda thought that Mons. Normand was entirely wrong in his view that a naval contest at sea could ever be carried on with cruisers and torpedo boats of from fifty to eighty tons. Such boats might be useful as scouts, but for the actual work at least 1,200 or 1,400 tons displacement would be required, and he questioned whether a protection of armor would not be necessary, in which case 2,500 tons displacement would be nearer the mark. Admiral De Horsey confirmed Mr. Samuda's opinions, and thought that boats capable of steaming only six hours would be of no value at sea. What was wanted was a certain size of torpedo boat for harbor work, a larger size for the Channel, and larger again for the Mediterranean; but for the ocean he submitted that no torpedo boat was of any use whatever. Mr. White, however, pointed out that the boats mentioned in the paper, though only of 50 to 80 tons displacement, were practically unsinkable, while they were self-supporting under sail at sea, so that the fuel would not be used till the enemy was actually in sight, and operations about to commence. Reference was made to the recent bombardment of Alexandria, and to the fact that if the Egyptians had been provided with torpedo boats of the class mentioned in the paper, the bombardment would in all probability not have taken place, as our fleet would have found it very difficult to stay off Alexandria at all.

Food Preservatives.

The action of very diluted nitromuriatic acid (aqua regia) on meat and other animal substances has been recently studied by Signor Pavesi, and he finds the substance an excellent preserving agent; meat in pieces of about 1 kg. kept in the liquid in wooden vessels remains unaltered and savory for years. The meat treated may also be dried at 15° to 20° without undergoing change, apart from a diminution of volume and the appearance of a brown color. Put for a few hours in water, the meat recovers its original softness and natural color. The proportions of the acids in the preserving liquid are not given. The method is also adapted to preservation of animal substances for scientific purposes.

A new set of experiments by Dr. J. Bersch on the preservatiou of must by means of salicylic acid are alluded to in a recent number of *Biedermann's Agricultural Journal*. The author of these observations has found that *fifteen* parts of salicylic acid in 200,000 parts of must is a sufficient quantity to entirely prevent the formation of mould or mildew. M. A. Dalpiaz not very long since made known the results of his experiments, which were begun as early as 1875, with the view of discovering some substance of not too expensive a nature which should enable us to preserve fruits and vegetables. He at last found what he desired in salicylic acid, and published a note on the subject in the eighth volume of the *Chemisches Centralblatt*, third series, p. 670, in which he treats specially of the preservation of fruits.

A solution is prepared with 2½ to 3 grammes of salicylic acid, and 100 to 500 grammes of sugar in one liter (about a quart) of water. The fruit to be preserved is simply placed in this fluid, and the vessel covered over tightly with a sheet of ordinary writing paper. No other precautions are necessary.

M. A. Dreher writes that he has taken 0·25 gramme (about 4 grains Engl.) of salicylic acid daily for the space of two months in beer, without experiencing the slightest inconvenience, and possibly with some benefit to his health, and as this is the largest quantity which should be used for the purpose of preserving beer from secondary fermentation and acidity, etc., he is glad to confirm Professor Kolbe's experiments in this direction.

M. R. Jacobi has lectured at Cologne, at the Union of Arts and Trades, on the advantages of salicylic acid in beer, and recommends that the quantity used should not exceed one part of salicylic acid in 5,000 parts by weight of beer for ordinary purposes. This is, he says, the largest quantity requisite for preserving beer under the most trying circumstances, and even for export in barrels. A person must drink 10 pints of beer daily in order to consume 15 grains of salicylic acid, and as most people drink far less than this, the introduction of salicylic acid, rigorously weighed, cannot prove in any way prejudicial to public health.

MICE-GIRDLED TREES.

At a recent meeting of the Elmira Farmers' Club, several members gave their views in answer to the inquiry of an orchardist who had a number of trees girdled by rabbits. In answer to the inquiry, and in allusion to the remedy of making a connection of the bark above and below the denuded part by inserting shoots, a member said it was next to impossible to have this mode succeed. Others spoke of the difficulty in making the trees live. As frequent inquiries are made on the subject, we repeat in substance the mode described in the *Country Gentleman* many years ago, which we have always found easy and certain, even for trees several inches in diameter. The process is exhibited in the accompanying cuts. Fig. 1 represents the trunk of a tree which has been girdled; Fig. 2, the twigs or shoots inserted to make the connection; and Fig. 3, a section showing the position of the inserted shoots. The twigs may be

Fig. 1.

Fig. 2.

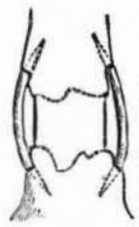


Fig. 3.

from a fourth to half an inch in diameter; the latter size will be best if the tree is large enough to hold them. They are sharpened to a wedge at each end, and the openings made with a narrow chisel to receive them. If the girdled part is low down, it will be necessary to dig away some of the earth, to make room for the chisel to enter the upper part. The twigs are first bent like a bow for entering, and then brought nearly straight when in place. It will be necessary to bind them to keep them firmly in their places. Then cover with grafting wax the two points of insertion. We have always done this work in spring before the buds opened, but if well performed, it would doubtless succeed later.

Some years ago a gentleman who had a large pear orchard of some thousands of trees a few years old called on us early in spring and said he had met with a great loss—the mice had girdled 1,200 trees in the course of two or three days under a March snow, where he had permitted weeds and grass to grow. They were, as he said, "hopelessly ruined," and the loss was at least $3,000. We assured him that he need not lose them, and explained to him the above described mode. "But I have no skilled grafter," said he. We told him that any man who was handy with tools could do the work—a common carpenter, for instance. He accordingly went to work and employed three men. They could each finish sixty or eighty trees in a day, with four shoots to each tree. Nearly all survived and grew, as well as the trees which remained uninjured, except some sixty out of the twelve hundred, and these were set by a careless bungler. Where the work was well done, they all lived. In a few instances only two shoots were inserted, but the want was supplied in a year or two by inserting the upper ends of suckers which sprang up below.

In the orchard alluded to at the Elmira Farmers' Club, the trees had been set out the previous year, were still quite small, and the rabbits had girdled them a foot or more up while running on crusted snow. The mode recommended by some of the members, of cutting down below the girdled portion, and rubbing off all but the largest shoot springing up from the grafted portion below, may be the easiest and best, and in some instances it would furnish a new and handsome tree almost as soon as if no injury had been done, but there need be no difficulty in making the described connection if small shoots are inserted, with a narrow chisel to make the incision, and with the whole well bound together and waxed.

The best treatment is prevention by keeping the orchard clear of weeds and grass, and, if necessary, embanking in autumn with smooth, solid mounds of earth.

Progress of the Telephone.

At the annual meeting of the Bell Telephone Company, held at Boston recently, the reports made showed the rapidity of the development of the business the past year. The total earnings for the year amounted to $1,576,031.57, against $1,001,924.91 the previous year. The expenses were $603,987.29, against $439,862.76 the year preceding; net earnings for the year, $972,044.28; balance of income from previous year, $126,034.58; total, $1,098,078.86. The total of the previous year was $606,555.01. Dividends paid, $595,000; carried to surplus account, $334,997.32; balance of income account, $168,081.54; total, $1,098,078.86. The increase of interchanges of telegraphic union doubled last year. The sales of instruments for export decreased and are likely still further to decrease, as foreign countries are making good instrumeuts of their own. The royalties from manufacturers now go to the manufacturing branch.

Local companies in New York, Chicago, San Francisco, and Boston are all paying dividends. All of the Dominion of Canada, exclusive of Newfonndland, is supplied by the American Bell Company, and dividends are to be expected from Canada. The legal expenses of the company have been heavy during the year. The report of the treasurer congratulates the company on the fact that the courts have decided that the Dolbear condenser telephone receiver, so called, infringes on the Bell patent, and an injunction has been issued; also upon the opinion of Justice Gray that the Bell patent has all the breadth that has been claimed for it, and covers microphones and instruments that employ electrical undulations. The People's Telephone Company, using a carbon transmitter, has set up lines in New Jersey, and the report says that an action on the case called forth the most careful examination that has ever been given to the principles of the various instruments, and gives additional proof that the microphone and other things claimed under the Bell patent are authorized. The case has since been decided in favor of the Bell Company. The underground wires in Boston have been found to transmit distinctly only for short distances, and it will be necessary to devise further improvements before they can be made available to any extent. It was voted that the capital stock of the company be increased from $7,300,000 to $9,800,000, and that new shares be allowed on the basis of one new share to each holder of the old ones.

Remarkable Meteor in Italy.

Advices from Rome state that on the 16th of February some peasants working in a field near Brescia were startled by hearing a loud report like thunder. Looking up they saw the clouds torn open, and a large body followed by a train of bluish smoke hurtling through the air over their heads with the noise of an express train. The aerolite buried itself in an adjoining field, the fall causing a shock like that of an earthquake. It was felt ten kilometers away, while the report was heard at Verona and Piacenza, many miles distant. When they had recovered from their fright, the peasants hurried to the spot, and found a clean hole about three feet deep, running in an oblique direction from north-northeast; and on digging down they came to a solid block, in the form of a truncated cone, weighing from 400 to 500 pounds. The surface, which was still hot, and emitted a sulphurous smell, was covered with a greenish-black crust, full of small holes, such as would be made by finger-tips in a soft paste, which may have given rise to the report that one of the fragments bore the impress of a hand. The proprietor of the clover field in which the aerolite fell flew into a rage at his crops being trampled down by people coming to see it, and broke it up, when it was carried away piecemeal. So he gained nothing but damage to his fields, while those who picked up the pieces found a ready sale for them, one man getting as much as 7,000 francs for a lump that weighed twenty-five pounds. On a subsequent search by Professor Bombicci, of Bologna, several pieces of scoriæ, apparently detached from the aerolite in its flight, were found in the neighborhood.

A Disinfective Laundry Blue.

Mix together 16 parts of Prussian blue, 2 parts of carbolic acid, 1 part of borax, and 1 part of gum arabic into a stiff dough. Roll it out into balls as large as hazel nuts, and coat them with gelatine or gum, to prevent the carbolic acid from escaping.

American Competition in the Australian Colonies.

The following is an extract from a letter newly received by one of the leading colonial houses in Birmingham from their Melbourne correspondents, which we copy from the *Ironmonger* (London):

"We call your attention once more," says the writer, "to the enormous increase in the number of articles we are buying from America. A few years since some half dozen articles were about all we ordered of American make; now, as you will see by the indents we send you, the items specially ordered of American make are to be counted by hundreds. This increase is still maintained, and is, indeed, still growing. Your English manufacturers would do well to take a lesson from their American rivals. The American goods exactly suit the requirements of the market. The timber they have will always command a certain trade, but why should they excel English makers of shovels, axes, picks, and all classes of edge tools? It is annoying to those of us who have English sympathy to see so much trade go away from the old country. The general characteristics of American goods, as contrasted with home-made, are: quality more reliable, better finish, not an ounce of unnecessary material, better packing, and the articles themselves thoroughly adapted to the use to which they are to be put. Some of the things they make have been found unsuitable, and once ordered have never been repeated. Their cutlery will not bear comparison with the English make, and the same may be said of their plated ware. In wire-work as well as cast and wrought iron hollow ware England carries all before it. In all the cheaper kinds of cutlery Germany is becoming a very strong competitor, and also in steel toys and many other lines. Your English makers must bestir themselves, or they will certainly lose the larger part of their Australian and New Zealand trade."

[In addition to the reasons for the impetus given to trade in our products in the English colonies, we have an idea that one of the causes which has benefited our export traffic very much is the fact that our manufacturers and merchants advertise their wares in the export editions of newspapers which are circulated quite largely of late in the English colonies, South American countries, and Spanish islands.—ED.]

An Aged Inventor Gone.

The old fashioned pins used by our grandmothers were made by sharpening a bit of wire and twisting another bit as a head. They were valued more than the much finer ones made now. One of the first lessons of an honest childhood was in the words, "It is a sin to steal a pin." Economy was to be shown by carefully saving these little instruments, and they were commonly kept in service till they were actually worn out. Even among wedding presents, "a half a thousand of pins" was not a gift to be despised.

As recently as 1836 it occurred to Dr. J. J. Howe, that pins might be made cheaper and better by machinery than by hand. He interested a New York merchant, named Jarvis Brush, in his ideas to such an extent that the latter furnished the capital for proceeding with the experiments; and when, in 1840, the American Howe Pin Company, of Birmingham, Conn., was founded, Mr. Brush was at its head, and sent out the first solid headed pins the world ever saw. The new business increased so rapidly that in the next ten years it secured a monopoly of the pin trade, and manufactured nearly all sold in the United States, besides exporting large quantities to Europe.

Hundreds of tons of copper and steel were annually consumed in the manufacture, and numerous improvements were made until the modern silvered and polished pin is an elegant work of art compared with the far more costly but clumsy affair of fifty years ago. One of Mr. Brush's most useful inventions was for sticking the pins in paper, an operation that had been previously done tediously by hand; a few being inserted at a time, and six dozen papers being regarded as a full day's work. This he superseded by self-acting machinery, dispensing with numerous manual operations, and enabling one hand to stick one or two hundred dozen papers a day, and to do the work better than it had formerly been done.

In 1850 Mr. Brush retired from the active management of the pin company, but remained a director for life. Having accumulated a handsome fortune, he spent his declining years very happily with his only son, Prof. George J. Brush, the eminent mineralogist and executive officer of the Sheffield Scientific School, in New Haven. Mr. Jarvis Brush died April 10, after a brief illness of four days, with pneumonia, and his remains were interred in Greenwood Cemetery. His age was 86 years; but such were his active and companionable habits that he seemed much younger than was really the case. Like many other inventors, only perhaps in a higher degree, he was genial as well as useful, and courteous as well as clear headed; and this no doubt had its share in prolonging his days.

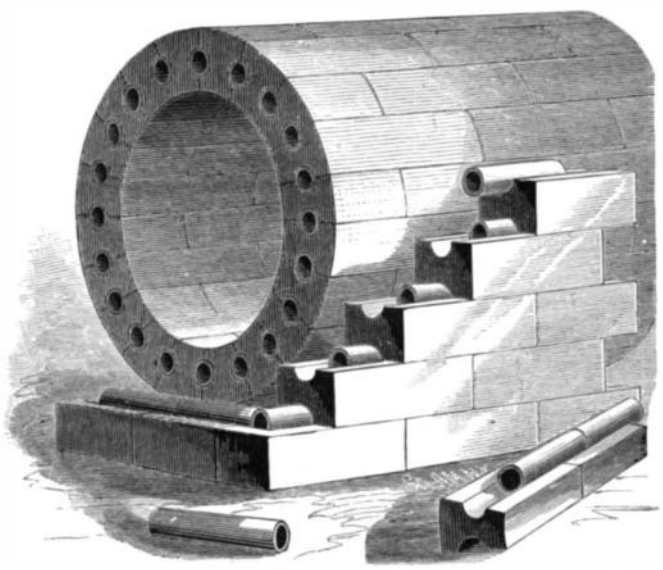
THE *Lancet* thinks that if children would wear woolen next the skin, and wear longer clothing, suspending it from the shoulders, we would hear more of boisterous health and less of back aches and pains.

IMPROVEMENT IN TUNNEL AND HOUSE BUILDING.

We give an engraving showing an improved method of building brick structures, applicable to general house building, culverts, tunnels, vaults, sidewalks, walls for tanks, cisterns, and wells, and many other purposes.

The device, as will be seen by reference to our engraving, consists of longitudinally grooved blocks of suitable material, preferably such as the first quality of strong brick is made of, and a tube of the same material laid in the groove and breaking joints with the blocks. This tube is strongly bound in the block by the cement, which tends to expand so as to compress the tube and hold it firmly in its place in the block.

This construction insures hollow walls of the most desirable form, which in the case of buildings may be used in summer for cooling and in winter for warming. An arch built in this way is as strong when completed as an old arch. It will be noticed that the tubes are supported on all sides, and at the same time serve as a perfect key to retain the blocks in position.



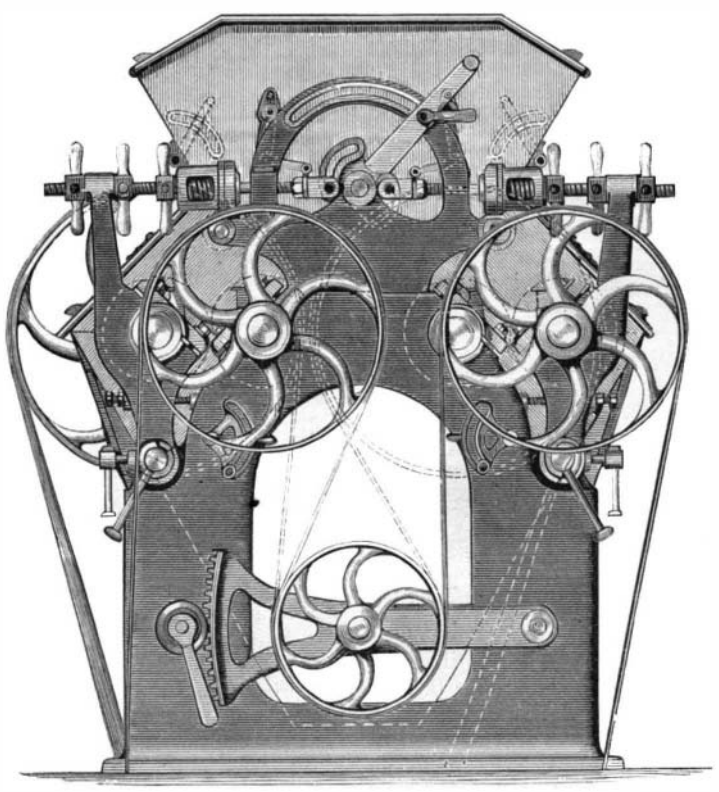
BRYANT & TOSTEVIN'S IMPROVEMENT IN TUNNEL AND HOUSE BUILDING.

The inventors of this system of building claim that they can put in a railroad tunnel of this material cheaper than a deep cut can be made, and at the same time land slides will be prevented.

Messrs. R. T. Bryant and David Tostevin, of Council Bluffs, Iowa, are the patentees of this invention.

AUTOMATIC FOUR-ROLLER MILL.

We are indebted to the London *Miller* for the following description and accompanying engraving of a new roller mill, which is being manufactured by Mr. F. Nell, of London, and represents the latest example of a machine of this class.



AUTOMATIC FOUR-ROLLER MILL.

It will be seen from the illustration that the mill is driven by belts, but gear is provided if preferred. The outside rolls are the slow, and the inside rolls the fast, both sets being operated by belts, which run over a tightening pulley, shown in the center of the lower part of the engraving, regulated by a lever, shown on the left of the engraving, in connection with a ratchet. The following are some of the improvements comprised in this machine:

On each side there is a swing arm, worked by a lever and cam, shown in the center of the upper part of the engraving. This lever has a double object: it throws out the two outer rolls and shuts off the feed simultaneously, and by reversing the lever it brings back the two rolls again and also the feed. At the bottom of the swing arms is placed a set screw, which prevents these arms being brought so close as to allow the rolls to touch, the set screw being adjustable at will. Underneath the driving pulleys will be observed another lever, which is only used, should the brasses at all wear, for the purpose of setting up the journals.

On either side of this lever is a quadrant which regulates the brushes under the rolls, used to keep the latter clean. While the lever acting upon the arms opens and shuts, there is still a further adjustment of the feed made by the two quadrants on the hopper shown on each side of the lever, and which adjust the feed to whatever nicety is required. When the feed adjustment is once set it requires, it is stated, no further interference with from one week's end to the other, the lock nuts preventing any alteration in the position of the rolls. A box hopper is provided to prevent the products from the rolls coming in contact with the iron work of the machine. The rolls may be smooth or corrugated, as may be required for the purpose for which they are to be used, and when they are corrugated, scrapers are used instead of brushes for keeping them clean.

Genesis of a New World.

On a beautiful summer's night, August 22, 1794, Jerome and Lefrançais de Lalande noticed a star in Aquarius, which they estimated of the 7½ magnitude. Six years later they thought it of the 8 magnitude. In appearance it resembles a star which is not exactly in the focus of the telescope. Herschel had observed it in September, 1782, and recorded it as an admirable planetary nebula, very brilliant, small, and elliptical. Lord Rosse and Lassell perceived that it was surrounded by a ring, which gives it somewhat the appearance of Saturn. The spectroscopic observation of Huggins indicate that it is a gaseous mass, in which nitrogen and hydrogen predominate. Most of the other planetary and annular nebulæ give similar results. In 1871 and 1872 Brunnow, the Irish Astronomer Royal, measured its parallax and concluded that its distance is more than 404,000 times as great as that of the sun, and its diameter is probably greater than that of the entire solar system. This would make its volume more than 338,896,800,000,000,000 times as great as that of the earth. We have thus before our eyes a new system, which is probably undergoing the process of condensation through which our sun and its attendant planets passed hundreds of millions of years ago.—*L'Astronomie.*

The Electrical Transmission of Power.

In view of the claims of electricians to be able to distribute power as well as light, by means of wires charged with electromotive force, it is right, says the *Journal of Gas Lighting*, to take account of the results of a recent course of experiments made in Paris upon the electrical transmission of power. So long ago as October, 1881, M. Marcel Deprez declared at the International Congress of Electricians that the economic duty of two dynamo machines connected for the transmission of power was 65 per cent. That is to say, that if 100 horse power were absorbed by one machine, 65 horse power would be given out by a machine receiving the current from the first.

This assertion, like so many others emanating from electricians before and since that time, was accepted with enthusiasm, and has formed the basis of all the wild projects since mooted for the utilization of so-called natural forces for industrial purposes. A French syndicate has, however, put the system of M. Deprez to a practical test in the workshops of the Northern Railway Company in Paris, under the direction of M. Tresca. The result is disastrous to the assumption held since 1881; for M. Tresca has been unable to obtain a useful duty of more than 33 per cent.

In these experiments it appears that 6·21 horse power was put into one machine revolving at the rate of 590 turns per minute, and connected by wires (corresponding in length to 8·5 kilometers) to another machine making 365 revolutions per minute, and giving out 2·03 horse power upon the brake. This amounts to a useful duty, for the transmitting medium, of 32·7 per cent; the rest being lost by the way. It evidently lies with M. Deprez to make good his assertion of 1881, or to confess to something more than an error of judgment. It is even doubted by the *Revue Industrielle* whether M. Tresca's results, small as they are, could be relied upon in the case of a system of distribution established out of doors in the ordinary way, and with the usual liabilities to waste through bad insulation and insufficient connections. At any rate, the claim of electricians to the present possession of means for the economical distribution of power is seriously prejudiced by these statements.

FROM a study of the maximum temperatures naturally occurring, Mr. L. Liebermann says that a mineral oil, the flashing point of which exceeds 60°, may be safely used in all parts of Europe.