serve to lift a series of small electric keys and pass successive currents through a series of wires which lead up to the chimes in the belfry.

Beneath the ten bells are placed ten powerful solenoid magnets, one to each bell. Each of these consists of an iron armature, which hangs, when the magnet is not charged, just within and above the solenoid coil. When the pins of the rotating barrel below strike a key, a current is passed through the solenoid coil in the tower and the armature is pulled violently down within the coil. The chain by which the armature is hung runs up over a pulley and attaches to the clapper of the bell, which is thus caused to make one stroke for every contact.

A similar mechanism to that above described serves to throw in a wooden cylinder, or barrel, at nine o'clock every evening, which plays what is known as the curfew hymn; and after the hymn is played the clock remains silent through the night, in order that the neighborhood may not be disturbed by the bells.

In addition to the automatic mechanism for striking the quarter chimes, the hour, and playing the curfew, a separate keyboard is provided in the small room at the base of the tower in which the clock mechanism is located. It is carried in a box-like structure, shaped something after the fashion of a reed organ, and it is used every morning at nine o'clock for playing a hymn tune by hand, and also at the regular Sunday services. This keyboard has electrical connection with the magnets in the tower and operates in the same manner as the apparatus already described. In case there should be any breakdown of the electrical connections or failure of the current, each of the connecting chains between the magnets and the bells is furnished with a wooden lever which is hinged to the frame of the magnet box. This arrangement is the same as is used in the ordinary tower chimes for tune playing.

The chime consists of ten Meneely bells, the largest of which weighs about 3,000 pounds and the smallest 250 pounds, and to strike a sufficiently powerful blow on a bell weighing a ton and a half requires a considerable amount of force. As a matter of fact a pull is exerted equivalent to between three and four horse power, and to secure this the main current from the dynamo is thrown on by means of the relay box, which will be noticed attached to the wall of the tower. The cost of the current for running the motor is estimated at $1\frac{6}{10}$ cents per day, and the clock has proved to be a reliable timekeeper.

For the above particulars we are indebted to Mr. George F. Atwood, the designer of the clock, and to Mr. McCullough, the engineer of the Grace Church Settlement plant.

The American Machinist.

The fame of the American machinist extends everywhere, says a contemporary. His ingenuity in planning and his skill in execution are known wherever man uses machines and tools. If there is any one branch of work in which he excels more than in another, it is in the building of special machinery, by which is meant machines not kept in stock or regularly manufactured, but specially devised and made for special uses.

For instance, man designs some article of use which he works up by hand or by the aid of machinery. To produce this article in quantities, at such a cost that it can be sold at a profit, special machinery is required. The designer or inventor takes the article to the builder of machines and says: "Can you make a machine that will make these things, and will you guarantee it to work?" It is altogether probable that the machine builder answers "Yes" to both questions, because there is practically nothing that he cannot do.

Special machinery is built for a wide variety of uses. As the knowledge of American skill in this direction, now long familiar, has spread, orders have come from all over the world, and special machinery is sent from here also for use in enterprises installed or conducted by Americans in foreign countries.

Such machinery, for various uses, is shipped from this country almost everywhere. One big machine shop in this city that is largely engaged in the production of special machinery sends probably a third of its work out of the country. It has sent machines to every land.

A Suspension Bridge of Fence Wire.

A curious suspension bridge of fence wire was recently constructed across the Waukarusa River, in Douglass County, Kan. This stream, like so many other Kansas rivers, swells to a torrent at every large rainfall, so that it was impossible for the children living across the stream to go to the school house. The county engineer was asked to provide a remedy. He bought quantities of fence wire, boards and timber. He used good sized oak logs as piers. Strips of boards three feet long were fastened together with wire and over these strips was run a plank walk two feet wide. Each end of the superstructure was then anchored to the piers; the sides consisting of a network of wire, were then put up. The bridge is two hundred feet long and is sixty feet above the water. It is certainly a daring feat of homemade bridge construction.

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For the Week Ending July 24, 1897.

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THE EXPANSION OF OUR FOREIGN TRADE.

If there is one fact more than another that is made evident by the events of the past few years of industrial depression, it is that a large extension of our foreign trade is a necessity if we are to have a return of our old-time prosperity. In spite of the rapidity with which the country has grown in population and wealth, and the ever lengthening list of what the average citizen considers to be for him the necessities and conveniences of daily life, the increase in our manufactured products is so rapid that there is always a surplus on hand. The national instinct—it is nothing less—for cheapening the cost of labor, and the ingenuity which has enabled us to lead the world in the production of labor-saving machinery, have enabled us to turn out our manufactured products with a speed and at a price which our old world competitors frankly admit to be entirely beyond their capacity.

The necessary consequence—an overloaded domestic market—was merely a question of time, and there is no doubt that the present so-called depression is largely an evidence of the fact that we have improved, and are continually improving, on our former methods of manufacture. It is not that we consume so much less as that we produce more speedily, more cheaply, and therefore in greater abundance.

The country has reached a point at which it has to choose between two alternatives: it must either curtail its production or find new markets in foreign countries. The day has passed when America can boast, or wishes to boast, of its absolute independence of the outside world, and in regard of our foreign trade it must be admitted that it is destined soon to become one of the supreme questions of the hour.

Why is it that one great section of the English speaking race has such a preponderating share of the foreign trade of the world, while the other has comparatively so little? It is not a sufficient answer to say that Great Britain's widely extended trade is altogether the outcome of her vast navy and mercantile marine, for this would be to mistake cause for effect. Her fleet of ships is as much the outcome of her commercial operations as her markets are the outcome of her omnipresent fleets. Each has served to build up the other, and both have poured wealth into the private purse and the public treasury of the people. The United States, on the other hand, have been so entirely occupied in developing the vast internal resources of the country that they have thought little and cared less for the foreign fields of commerce which were being occupied by British, French and German interests. While Great Britain has been shaping steel and iron into ships and engines, we have been turning them into rails and locomotives; and against the vast ocean fleets of the old world we have to show the 180,000 miles of track with which, mainly in the brief thirty years since the war, we have covered the land. If our ocean carrying trade had not been destroyed by the Confederate cruisers during the civil war, and if at the close of that war there had been no great area of undeveloped country to be exploited, this nation would doubtless have turned its attention to the upbuilding of its merchant marine and the extension of its foreign trade.

The time has come, however, when, if we are to hold our reputation as the most progressive race of the day, we shall be obliged to compete for a proportionate share of the foreign trade of the world. If we are to be successful in the competition, it must be carried out on scientific lines and on a liberal scale. No half measures will suffice; and it may as well be written down at once, that if we are ever to create and control markets on the vast scale that marks the operations of Great Britain, we shall have to adopt her methods, at least to the extent of carrying our goods in American ships. Any scheme for the extension of American foreign trade that contemplates the carrying of that trade in English or German ships may as well be pigeonholed at once. To do this is to pay toll both ways, divert a big share of the profits to an alien people, and carry a foreign yoke which is not the less shameful because it is self-imposed. The advantage of a nation's trade being carried in its own ships is shown by the figures of British trade and shipping. The latter, according to the latest figures, is credited with carrying seven-tenths of the world's ocean-borne commerce, and this includes not only the traffic between England and other foreign countries, but the traffic between these countries themselves. Apart from the great advantage which she thus secures in the matter of her own freights, there is a total annual tribute of about $800,000,000 paid by other nations to the British shipholder.

It is not within our province to discuss the share which the government, in its endeavor to promote foreign trade, should take in the upbuilding of our merchant marine; but we think it would be a wise and far-sighted policy to encourage this moribund industry by every legitimate means that can be devised and carried out. Coupled with this there should be a reform of our consular service, at least as far as the method of selection of our consuls is concerned. These should be chosen rather for their fitness to fill the highly important positions to which they are sent than for any

political services they may have rendered to a particular party. The excellence of the reports which are continually sent in by many of our consuls shows what a valuable aid to the extension of our foreign trade this particular service may be made, and if it were entirely divorced from all political influences and its members retained and promoted entirely on their individual merits, the efficiency of the consular service could be largely increased.

CITY LIGHT FROM CITY REFUSE.

The costly experiment which the municipal authorities of Shoreditch, London, are carrying out in their new electric light station should be watched with close attention by the city authorities in all parts of the world. Up to the time of the opening of the new plant by Lord Kelvin, the inhabitants of this populous district had been entirely without electric light of any kind. This was due to the reluctance of the authorities to grant a monopoly to any private company, and also to their intention, ultimately, to put in a plant of their own. At the time when the question of lighting was finally settled, the question of the disposal of city refuse was also before the vestry, and with an enterprise that is strangely in contrast with their dilatory handling of the electric lighting problem, they determined to combine at once the destruction of refuse and the production of light in one plant.

The scheme, as finally carried out, is a very ambitious one, for in addition to the destructor and lighting plant, it includes on one site public baths and workhouses, a museum, a library and a technical institute, the total cost of the undertaking being about one million dollars. The works consist of an engine house, measuring about fifty by seventy feet, and a destructor house eighty feet square. The latter contains twelve destructor cells and six water tube boilers with 1,300 square feet of heating surface each. The refuse is carted to the yard and dumped into trucks, which are carried by an electric hoist to the top floor. Here the loaded truck is run along tracks to the top of the cell that is to be charged, and its load is dumped into a charging truck below, and thence it passes to the drying hearth and onto the grates of the furnace. Some 20,000 tons of refuse will be handled in a year, this being the amount gathered from this district, which is about a square mile in area and contains 124,000 inhabitants. It formerly cost about 76 cents per ton to carry this refuse away in barges, whereas now it will cost about 28 cents per ton to burn it in the destructor—a clear saving of 48 cents per ton at the outset.

The boilers are supplemented by a thermal storage vessel, and they are both designed to work at a pressure of 200 pounds to the square inch. During the daytime the steam from the boilers passes into the storage cylinder, where it is mixed with sufficient cold water to insure that by night time it will be full of water at the temperature and pressure of the steam used by the engines. The chimney is provided with a centrifugal dust separating chamber, in which all the particles which, passing through the chimney, would be a nuisance in the surrounding neighborhood, are retained.

The district for whose benefit this fine plant has been built is one of the most squalid in all London: ignorance, indifference, and poverty have combined to sink the inhabitants to the lowest levels of tenement life. The costly experiment—for it is yet in the experimental stage—will be watched both for its results as an engineering problem and as an attempted amelioration of the condition of its poor by the municipal authorities of a great city.

WEATHER PROGNOSTICATIONS.

The study of the weather and of conditions which produce heat and cold, dry or wet weather, grows more interesting each year as progress is made in a scientific way to foretell in advance what is likely to take place. The record of the movement of storm centers by means of the telegraph is pretty well understood, and the service of the United States Weather Bureau in promulgating news of their advance has been of inestimable value to commerce and to farming industries.

That many peculiar weather phenomena may be accounted for by certain astronomical conditions there can be no doubt, but whether there is any absolute law by which the phenomena are originated is still a matter of conjecture.

Mr. A. J. Devoe, of New Jersey, has made many observations, more especially as regards the relation of astronomical conditions to the production of weather peculiarities, and has undertaken to predict a month or so in advance what the weather is to be. Among other things, he predicted very cold weather for the first part of July, while it turned out to be very hot, but he also claimed there would be very heavy rains and floods about the middle of July in the New England States of the United States and in France, which, in a measure, truly followed. He also thinks another very destructive and violent storm is yet to come along the Atlantic coast about the last of July. Observers on the Atlantic coast will have a chance to note the verification of this prediction; meanwhile we imagine many will note that the direction of the wind and the barometrical pressure is also a pretty certain guide as to weather probabilities. The study of meteorology should be extended and be taken up more universally in the educational institutions of the country than it is. By systematic observations, duly recorded, working in harmony with the United States Weather Bureau, much valuable information could be gained.

DEATH OF PROFESSOR MAYER.

Dr. Alfred Marshall Mayer, one of the leading physicists of the United States and for the last twenty-six years professor of physics at the Stevens Institute of Technology, Hoboken, died July 13, at his summer residence at Maplewood, N. J. Professor Mayer was born in Baltimore, Md., 1836. He was educated at St. Mary's College, Baltimore, but left when only sixteen years old to enter the workshop and draughting office of a mechanical engineer, where he remained for two years. He then devoted two years to the study of analytical chemistry. At the remarkably early age of twenty years he was called to the chair of physics and chemistry in the University of Maryland. Three years later he accepted a similar position in Westminster College, Missouri. In 1863 he went to Paris, where he studied physics, mathematics and physiology at the university. On his return he was professor in the Pennsylvania College, Gettysburg, and Lehigh University, Bethlehem, Pa. In 1871 Professor Mayer accepted the professorship of physics in the Stevens Institute of Technology. He held this chair until last February, when he was taken sick. Professor Mayer received the degree of Ph.D. at Pennsylvania College, in 1866, and in 1872 was elected a member of the National Academy of Sciences. He was one of the associate editors of the American Journal of Science, and was until the latter part of his life a frequent contributor to the columns of the SCIENTIFIC AMERICAN, the most important of his contributions to the SCIENTIFIC AMERICAN being the "Minute Measurements of Modern Science," which was published in the SCIENTIFIC AMERICAN SUPPLEMENT, running through many numbers. His scientific researches have been principally published in the American Journal of Science, under the title "Researches in Acoustics." In all he was the author of a hundred articles and pamphlets, dealing with the several branches of science to which he devoted nearly all his life. He was also an enthusiastic sportsman and was the editor of one of the finest books on sports that has ever been produced, called "Sport with the Rod and Gun."

BRITISH TRADE MARK DECISION.

IN THE MATTER OF THE TRADE MARKS OF THE MAGNOLIA METAL COMPANY.

In February last, a motion was made in the High Court of Justice, Chancery Division, before Mr. Justice Kekewich, to expunge the trade marks of this company from the Register.

The marks were three in number, to wit: (1) The representation of a magnolia blossom or flower; (2) the same device, with the addition of the words, "Magnolia Anti-Friction Metal;" (3) the word "Magnolia" alone. Marks Nos. 1 and 2 were registered for anti-friction metal bearings, being parts of machinery other than horticultural and agricultural machinery in class 6. Mark No. 3 was registered for unwrought and partly wrought metal in class 5.

The alleged grounds of objection to the marks were that the word "Magnolia," as an essential part of mark 2, and standing alone in 3, had been used to designate the article, and not the manufacturer; second, because the word had reference to the character or quality of the goods; and third, because it was a geographical name. Objection was taken to the registration of marks Nos. 1 and 2 on the further ground that, at the time of registration, the assignors had no good will in anti-friction bearings, their trade being confined to the sale of the metal itself in ingots.

It appeared that the manufacture of this anti-friction metal was commenced in 1886, by Charles B. Miller, the predecessor of the Magnolia Metal Company, and that the term "Magnolia Anti-Friction Metal" was given to the compound, which differed in its composition from the many other anti-friction metals then on the market, to distinguish it from these products of other manufacturers.

The words "Magnolia Anti-Friction Metal" were always cast on each ingot, and, in addition to that, the representation of the magnolia flower was also impressed thereon.

The metal has been widely advertised and has gone into very general use, and by a process of abbreviation the words "Anti-Friction" have been gradually dropped by the public and consumers, and the metal is now popularly known and referred to as "Magnolia Metal." The metal was patented in England in 1890, and the patent is still in force. On the argument further objection was made to the use of the word "Magnolia," on the ground that it had become the name of a patented article.

In deciding the motion, Justice Kekewich held that the word "Magnolia" was not geographical, and decided in favor of the marks as to that point; but he held that the name "Magnolia" was descriptive of the alloy, and should therefore be expunged, and also that as to the flower the registrants had no good will at the time of the registration as to the class of goods for which it was registered. The marks were thereupon ordered expunged.

The owners of the marks appealed from this decision to the Court of Appeal, and the appeal was heard on May 12, before Lords Justices Lindley, Lopes and Rigby.

The judgment of the court, which was read by Lord Justice Rigby, affirmed the decision of Justice Kekewich as to the fact that the word "Magnolia" was not geographical, and as to his conclusion that the word "Magnolia" was descriptive of the article; but reversed his decision that the company had no good will in the class of merchandise for which the representation of the magnolia flower had been registered.

By this decision, the Magnolia Metal Company's exclusive right to the use of the flower as a trade mark was sustained, but the word "Magnolia" was declared to be impossible of exclusive appropriation.

The court evidently wholly disregarded the objection based on the fact that the metal had been patented, for the Lord Justice said: "In this case, however, it is not really necessary to rely upon the patents taken out. For years before these patents were taken out, and before the trade marks were registered, the word 'Magnolia' had been treated with and without additions thereto as the name of an article manufactured by a secret process and therefore presumably incapable of appropriation by being registered as a trade mark." The case most strongly relied upon by the petitioner's counsel was the well-known "Linoleum" case.

This mark has been rendered immensely valuable by the extensive advertising and the high reputation of the Magnolia Metal Company, and this decision, which apparently throws its use open to the British public, to those familiar with the attitude of our courts toward the owners of trade marks seems inexplicable, unless indeed an explanation can be found in the statement of Lord Justice Rigby that "Magnolia" had been treated with and without additions as the name of the article. If from this statement it is to be understood that the evidence showed that the metal was known simply as "Magnolia," as linoleum is known as "Linoleum," then the decision is in harmony with the "Linoleum" case; but it seems hardly possible that the evidence could have warranted this conclusion. Certainly the facts do not, to the minds of those familiar with the subject. The metal is invariably referred to as "Magnolia Metal" or "Magnolia Anti-Friction Metal," and the difference between this and the "Linoleum" case is therefore radical. "Linoleum," for instance, is the name of the product, by which it is designated absolutely, without addition. The desire of a customer asking for "linoleum" would be understood by a merchant at once, whether he dealt in the article or not; but if the merchant received an inquiry for "Magnolia," he would be wholly ignorant as to his customer's wishes. If he were a liquor dealer, he would expect to supply "Magnolia" whisky or "Magnolia" gin; if a tobacconist, he would certainly furnish "Magnolia" tobacco; and if a hardware merchant, he would probably be unable to decide between Magnolia Boiler Compound and the Magnolia Anti-Friction Metal.

We understand that the Magnolia Metal Company has appealed from this decision to the House of Lords, and, in view of the magnitude of the interests which are affected by this decision, it is to be hoped that the judgment expunging the mark will be reversed. If followed to its logical conclusion, the judgment will in England absolutely prevent any one from acquiring a trade-mark on any new product or even on an old product produced by a new or improved method.

It is safe to predict that this English decision will receive scant consideration as a precedent in our courts.

ANDREE STARTS NORTH.

A dispatch from Tromsöe says that on July 11, the winds being favorable, Prof. Andree, who hopes to reach the north pole by balloon, ordered that a start be made as quickly as possible from Dane's Island. Preparations for getting the balloon away occupied three and one-half hours. The wind was light and the balloon quickly rose to a height of 600 feet; it then dropped nearly to the surface of the sea, whereupon sand bags were thrown out, after which it ascended. At this time the breeze had freshened, carrying the balloon, which has been named the Eagle, north-northwest at the rate of twenty-two miles an hour. The weather was clear and the balloon was visible for an hour. With Andree are Dr. Ekholm, the eminent meteorologist, and Nils Stringberg, a Stockholm scientific man. We have already described the balloon in detail.

Immediately before his departure Prof. Andree wrote a telegram expressing the hope that he would gradually get into a region where the wind would be more favorable. The dispatch ended with greetings to his friends and his country.