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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.


## THE AFTERMATH OF THE COAL STRIKE.

The effects of the great strike in the anthracite coal regions will make themselves felt in a very practical way long after the more dramatic incidents of the strike have passed from the public mind. That the immediate pecuniary losses both to capital and labor resulting from the strike will be enormous, goes without saying; but in addition to these the anthracite coal trade will unquestionably suffer a serious loss, because of the widespread public attention which had been directed to the great question of utilizing other domestic fuel supplies than that of anthracite coal.

After all is said and done, we are very much the creatures of habit, even in America. We have used anthracite coal so long, and so exclusively, that to the majority of workaday citizens it has never occurred that there might be substitutes which would be superior to anthracite in economy, and greatly superior to it in convenience and cleanliness of use and operation. There are thousands of homes, in which, previous to the strike, the use of gas and coal oil for heating and cooking purposes was unknown, that have been driven by necessity to the use of these fuels, and have formed such a good opinion of their qualities, that they are certain to continue their use, either in whole or in part, to the prejudice of the interests of the retail coal dealer. Just how far the consumption of coal will be affected, will only be known as the winter months advance; but it is certain that the vigorous campaign of instruction which has been carried on by the gas companies and the manufacturers of coal-oil stoves and ranges, will result throughout the anthracite-using districts in a great increase in the domestic consumption of oil and gas fuel.

Elsewhere in these columns will be found a discussion of the relative merits of fuels other than anthracite coal, and in the current issue of the SUPPLEMENT we publish an illustrated article describing a number of methods of lighting and heating by alcohol, which were shown in an exposition devoted to the subject that has recently taken place in the city of Paris. While it is true that the present strike has been settled, and the supply and price of coal are likely to resume gradually their normal conditions, it is certain that the lessons of the strike will be very lasting in the public mind; and the most important of these lessons, as far as they touch the comfort of the individual householder, is that by familiarizing himself with oil and gas fuels he should make provision against the serious contingency of a coal famine as it has recently presented itself with very alarming distinctness during the past few weeks.

## OUTPUT OF THE UNITED STATES STEEL CORPORATION.

In view of the vast extent of the plant and operations of the United States Steel Corporation, it will come as a surprise to many people to learn how large a proportion of the production of iron and steel of the United States is still turned out from mills and forges other than those included in the great steel trust. According to figures published by the American Iron and Steel Association, out of a total production in 1901 of 28,887,479 tons of iron ore, 43.9 per cent was produced by the United States Steel Corporation, and the balance by individual firms. From this ore there was produced 15,878,354 tons of pig iron, of which 42.9 per cent was the output of the corporation's furnaces. The total production of Bessemer and open-hearth steel ingots and castings in the same year was 13,369,611 tons, 66.3 per cent of which was produced by the United States Steel Corporation. They also produced 59.9 per cent of the steel rails, 62.2 per cent of structural shapes, 77.6 per cent of the wire rods and 50.1 per cent of a total of all rolled products of 12,349,327 tons.

It will thus be seen that the Steel Trust is far from having a monopoly of the steel trade in this country, and it is gratifying to know that this great corporation has made a wise use of its enormous influence in the steel trade, and prices have been maintained at a reasonable figure. There is no gainsaying the fact that the control of about 65 per cent of the total production of iron and steel in this country stands for a most powerful influence, should it come to the question of the control of the market, and it is sincerely to be hoped that the moderation which has marked the conduct of the affairs of the corporation will be a lasting characteristic; for herein lies the guarantee of the permanence of a prosperity in the steel and iron trade which has excited the interest and wonder of the world.

## ELECTRIC EQUIPMENT OF A GREAT RAILROAD.

One of the most notable movements yet recorded in the substitution of electric for steam traction on trunk railroads is now in progress on the North-Eastern Railway, one of the most important systems in Great Britain. Special interest attaches to this work from the fact that the change is being made on a stretch of road that is not in any sense suburban, since it runs largely through an agricultural district. The change involves the electrifying of 35 miles of double-track main line, 4 miles of single-track, and 2 miles of four-track road. With the exception of a road recently constructed in Italy, this will be by far the longest stretch of electrically-operated main line in the world.

A study of the call by the North-Eastern Railway Company for bids for the construction of this work shows that the company has had the wisdom to leave a great deal to the discretion of the contractors in the matter of the plant and equipment. Alternating current will be furnished by the Newcastle-upon-Tyne Electric Supply Company, at a pressure of 6,000 volts, and this will be stepped down to 650 volts for use at the motors. The important detail of the method of reduction of the current, and other details of less importance, are left to the discretion of the contractor, although the North-Eastern Company prefers that direct current be used.

This decision of the company to leave the question of the type of current open will be commended by electric engineers in general, inasmuch as it takes cognizance of the important experimental work which is being done on the Continent in the direction of the use of alternating, high-pressure current direct at the motors. The indications are that for trunk line installations, such as this on the North-Eastern, the Ganz system or some modification of it will be found to be most efficient.

The advertisement for bids specifies that the work must be completed within twelve months from the date of signing of the contract; and if the scheme is pushed through with a vigor corresponding to the sweeping nature of the change proposed, it is likely that, before the New York Central Railroad commences the much-talked-of electrical equipping of its main lines into New York, it will have an opportunity to avail itself of the practical results achieved on this English road.

## BALLOON TRIP ACROSS THE SAHARA.

In the month of December Capt. Debureaux is to commence his project of crossing the Sahara by balloon. It is intended to explore the region by a balloon containing four aeronauts, probably including Count Castillon de Saint-Victor, Jacques Balsan and Lieutenant of Marine Hourts. Before making the attempt it has been decided to carry out a preliminary experiment with a balloon of 1,300 cubic yards' capacity which is to be furnished by the Minister of the Marine. This balloon, however, will not be mounted by aeronauts; it is provided with automatic apparatus for assuring the equilibrium and for throwing out ballast at the right time, and these will take the place of the aeronauts. The equilibrium is to be obtained by a steel guide-rope measuring 2,400 to 2,700 feet long and weighing 550 to 660 pounds. The ballast arrangement is a water reservoir, which is provided with a simple automatic device so that when the balloon comes within 150 feet of the ground a valve is opened and the proper quantity of water discharged. An air-bag inside the balloon is kept inflated by an automatic air fan, and thus keeps up the form of the balloon should the gas leak out or contract under the influence of a lowering of temperature. The start will take place from Gabes, on the Mediterranean coast, about 150 miles southeast of Tunis, taking advantage of the north northwest winds which prevail constantly in the Sahara region from the beginning of October to April. These winds should drive the balloon with its guide-rope at a mean speed of 12 miles an hour. The distance to be covered, from Gabes to the Niger, is about 1,400 miles, so that the balloon should traverse this part of the Sahara in about five days. The projectors have also provided for the case where the guide-rope becomes entangled in an obstacle along the route, and for this purpose the cable possesses four points of rupture, whose resistance increases with the length of the rope, going toward the balloon. The lower sections will thus be broken first and free the balloon. Automatic registering devices will be carried, as well as carrier pigeons, which will have their cages opened by an automatic release when the car touches ground. The experiment, which is to cost about $1,600, has been favored by the government, and the Minister of the Marine, besides furnishing the balloon, will no doubt bear the expenses of the inflation which will be carried out with pure hydrogen, as well as of the transport of the material. The Municipal Council of Paris and other bodies have also given financial aid to the project. If the first experiment succeeds it will no doubt be followed by an attempt to cross the Sahara in a balloon mounted by Capt. Debureaux and the three aeronauts mentioned above.

## RECENT IMPROVEMENTS IN WEAVING.

An interesting lecture was recently delivered in London before the Society of Arts by Prof. Beaumont upon the most important recent improvements in weaving. In the ordinary power loom for weaving plain simple fabrics, the difficulty for many years has been to initiate improvements which would result in greater productive power. Experiment and experience alike have demonstrated that beyond a certain speed it is undesirable to attempt economy by higher running power, which applies additional strain to the warp and augments the degree of vibration on the motive parts of the loom. If the maximum speed of a loom has been obtained on a given quality and fineness of thread, the problem arises, In what direction are further advances to be made in the construction of power looms for weaving simple types of fabrics? The builder of looms as well as the student of weaving has for some time past realized the loss of time necessitated in the recharging of the shuttle with weft yarn Other methods of conveying the weft into the warp than by the use of the flying shuttle have been attempted, but the difficulties of weft insertion have so far proved beyond solution by any more efficient means than the common shuttle.

Accepting the shuttle as the most practical weft conveyor yet devised, the modern loom builder has endeavored to provide a continuous supply of weft in two ways: First, by ejecting a spent bobbin from the shuttle and introducing a full one; and, secondly, by ejecting the shuttle containing the empty bobbin and replacing it by a shuttle with a full bobbin. The first system has been developed to such an extent by the Draper Company, of Massachusetts, that between 70,000 and 80,000 looms have been made on this principle. This invention has effected much economy in the weaving of plain fabrics. A weaver is able to mind 18 to 20 of these looms, where on the ordinary system 4 to 6 was considered the maximum. To change from one bobbin to another in a shuttle without removing from the shuttle box, and the loom running at full speed, making 190 to 200 shots per minute, is a mechanical triumph. To obtain a constant supply of weft English and Continental inventors have adopted the principle of changing the shuttle while the loom is running. Important motions for doing this are the Crossley, Hodgson and Hattersley; the two former change the shuttle while the loom is running, but in the latter the loom is for a brief period ingeniously made inoperative, and automatically re-started.

With regard to inventions applied to looms for special styles of fabrics such as velvet, swivel and lappet, two ingenious contrivances have been devised for this purpose by Mr. Hollingworth, of Dobcross, England, and Mr. Hutchins, of Worcester, Mass., respectively. In the Hollingworth device, which is for looms used in the weaving of fabrics in which wires are inserted into the warp to produce a pile effect as in carpet, velvet and plush, the reed and shuttle boxes are separated, thus providing more space for the wiring motion. The chief mechanical difficulty in such disconnection of parts—which in ordinary looms are combined—consists in securing a relative turning of the reed and shuttle boxes, so that they will be perfectly level with each other when the picking motion comes into action. Any failure of this results in the shuttle not traveling in a straight line and diverging out of its course. The Hollingworth invention is constructed in such a manner that there is little possibility of such defects arising.

The Hutchins invention relates to swivel weaving and its object is to substitute the ordinary shuttle by shuttles having a needle or pointed appearance, and in a line with, instead of at right angles to, the warp and forming one continuous series of shuttles from side to side. The chief advantage of this invention is the frequency with which the swivel shuttles may figure this fabric, there being 3 or 4 to the inch; and, secondly, in the indication of their entrance into the warp by the Jacquard, so that they be retained in or out of action for any period demanded.

In small ware looms the Poyser loom has accomplished what was, anterior to its inception, quite impossible. In this device there is a shuttle behind the reed, necessitating a division in the reed to allow the tongue or projection of the shuttle to place the thread of weft against the fell of the fabric. One advantage of this system is that the shuttle places the thread

almost in the exact position it is to occupy in the fabric, removing the friction upon the warp yarns produced in other looms, due to the backward and forward traverse of the reed to allow of the crossing of each pick of weft. The Poyser looms are capable of running at a speed of about 390 picks per minute.

## MAINE'S WOOD NOVELTY MILLS.

BY GEORGE E. WALSH.

Summer visitors to the woods find rare sights in the most unexpected places these days, and whether the trail leads along the watercourses or strikes directly across country into the very heart of the great spruce and hardwood forests, it is pretty apt to bring up to some mill where queer modern machinery is busy at work in cutting up the timber at one end and spouting out articles of commerce at the other. The great machinery chewing up forest trees of spruce to make paper for printing our books and periodicals can never quite lose its attraction to the uninitiated, and the scene of one of these modern mammoth paper mills is always a center of attraction.

But there are other mills in the Maine woods which we hear less about, and which in recent years have become remarkable institutions. We do not hear about them often, but every day of the year we use some of their products, utilizing them so often and commonly that our wonder about their manufacture ceases. These wooden novelty mills, as they might be called, are the outcome of Yankee genius in utilizing waste material by the invention of new machinery. It was found that the lumber mills of Maine were wasting enormous quantities of wood. The white pine trees furnished lumber in various sizes, but the trimmings were nearly all waste. Such immense piles of this waste wood accumulated at the various mills that it became a great inconvenience. It was difficult to burn it without setting fire to the mill, and to cart it away was both inconvenient and expensive.

Some enterprising pioneer then started in to utilize this waste lumber by manufacturing it into small commercial articles, and to-day this work has spread and multiplied so that the novelty mills are in great numbers and importance all through the Maine woods. One of the first mills established was to manufacture wooden toothpicks. A small machine was invented which would cut out of the soft pine wood hundreds of these toothpicks at one stroke. So important has the manufacture of these become that the annual output of the Maine woods to-day is over 500,000,000 toothpicks. The smallest pieces of waste wood can be used for this purpose, and the cost in raw material is practically nothing. Following these, other common articles were made at the same mill. There are a score or two of the novelty mills in Maine to-day, and their total output is enormous, including nearly all of the common articles of use. The long wooden skewers which butchers use to hold their meat together are manufactured in the mills at the rate of half a million a week. One mill alone will turn out in the summer season 5,000,000 skewers, and 50,000,000 toothpicks, besides a great number of other articles.

A common article made at these mills is the spool for cotton and thread. The spool factories number nearly a score, and they turn out something like 250,000,000 spools a year. One can hardly realize what this amount means. On them some fifty billion yards of cotton or thread can be wound. Laid in a row they would stretch across the whole State of Maine, and piled up one on another they would make a slender tower that would reach up in the air ten times higher than the tallest mountain peak. Only white birch is used by the spool factories, and they consume immense quantities of this timber. To make the annual output of spools over 15,000,000 feet of white birch timber are needed. In addition to this immense quantities of the white birch timber suitable for spool manufacturing are shipped to factories in England and Scotland.

There is a common saying that the spool factories and hoop pole hunters saved Maine's woods from being overrun by white birch saplings. At one time countless millions of deer and rabbits roamed through the Maine woods, and they subsisted largely in the spring and winter on the sprouts of the white and gray birch saplings. There is no more prolific growth than the birch, and in Maine if left unrestricted the trees will soon spread everywhere and crowd all else out of existence. The destruction of the rabbits and deer destroyed nature's nice balance, and the birch trees threatened to rule everywhere. When the trees were about to monopolize all the Maine woodlands, the hoop pole hunters and the spool manufacturers discovered that the birch was the best wood for their purposes. The result has been that an enormous industry has been built up with an inexhaustible supply of raw material, and the birch saplings have been kept within certain restricted areas.

The barrel hoops made out of the birch saplings and brown ash in Maine each year number some 35,000,000, and the demand is constantly increasing. Their manufacture cannot be said to belong to the so-called novelty mills exactly. They are made and gathered by hoop pole hunters, who go through the woods, and cut and shave them for market. The price they receive for these hoops averages $1 per thousand for the smallest size to $1.25 for the largest. A good man can cut and haul two thousand poles per day. When these are split, shaved down, and cut the right length, they will make about four thousand hoops. A man must, then, work pretty lively to make from $3 to $5 per day at this work. Some of the old hunters, however realize the latter amount during the dull season of the year when there are no summer visitors to guide or board. In the summer the hoop pole business is quiet, and few men attempt to gather the birch and ash saplings when they can make several dollars a day simply guiding people through the woods. Some two thousand men are engaged in hunting barrel hoops in the Maine woods, and the total gross income from this source is estimated between $40,000 and $50,000.

The novelty mills proper make their income from manufacturing very small things on a large scale. A bunch of wooden toothpicks, which sells in the city for a fraction of a cent must net to the manufacturers a ridiculously small sum, but when they are made and sold by the millions and billions there is money in them. Likewise the cheap wooden checkers are inexpensive articles of commerce, but in the novelty mills they pay a good profit, for one factory alone will receive an order for five million checkers. On such a scale it is possible to figure out a profit, but not unless the raw material is cheap, and the machinery invented for the work so thorough and quick that the little round pieces of wood can be made at a marvelously rapid rate. Indeed the checker pieces spout out of a funnel so fast that they quickly form a huge heap. The piece of timber is first shaved off the right size, and then as it is forced through a funnel knives cut it into small pieces just the size of the checkers.

Another product of some of the mills are small dice boxes, which are manufactured for the trade out of small pieces of timber that are discarded for building purposes. One might gather some faint idea of the gambling business in this country from the statement that some half a million of these dice boxes annually come from Maine's mills. They are shipped to all parts of the country. Backgammon, checker boards, domino boxes, and all conceivable kinds of games and boxes are made in great quantities. The same mill will have machinery for making half a dozen different kinds of novelties. There is one novelty mill in Oxford county which manufactures fifty different varieties of novelties. It is by such combinations that large profits are made. The wood which is nothing but waste after the large boxes are made is utilized for toothpicks, skewers and similar articles. In this way all the trimmings find some use.

Wooden bicycle rims are important articles of the novelty mills, and tables, desks, sleds, swings, and toys by the million swell the total output each year. Christmas toys have in recent years been made great features of the mills. This trade promises to become one of the most important. The millions of wooden toys which are sold at Christmas time can be made at the novelty mills far cheaper than in almost any other part of the world. Machinery is being made and perfected every year for cutting out toys for children, and instead of being "made in Germany," we may soon see "from the Maine woods" stamped on all our wooden toys and Noah's Arks. Recently efforts have been successfully made to paint these toys by machinery so that the cheap hand labor of Germany and Switzerland can be offset. The possibilities in this direction are very promising, and mill owners are carefully studying new methods of manufacture by machinery which will bring the cost down to the lowest figures. The supply of waste timber is almost inexhaustible, and it remains for the inventors and manufacturers to find means of utilizing it in commercial ways. So far Yankee genius has been very successful, and within a decade the output of the novelty mills may be doubled several times over.

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One of the most important steps to establish aerial telegraphy stations at a distance from the coast and thus communicate with approaching ships is to be shortly carried out. The floating station will be placed in the open sea at the point 49 deg. 40 min. north latitude and 8 deg. west longitude by an English company which has been recently formed at Liverpool. This point is 110 miles west of Cape Lizard, and the station will be in constant communication with the latter point. As the distance is within the limits of good operation there is no doubt that the messages will be regularly and accurately received. The vessel which is to be anchored here will serve different purposes. It will be equipped as an electric fireship, a telegraph and postal station, a life-saving post and also as a supply station which will furnish food, coal, etc., to ships which are in need. The vessel will also be of value as representing an advance maritime post for England. There may be some difficulty in the way of anchoring such a vessel, as the ocean depth in this locality reaches 400 feet. The ship will need to be of a considerable tonnage in order to carry out the requirements, as well as to resist the force of the Atlantic during the winter season. In this exposed situation the vessel will certainly be subject to some rough treatment.

## A TEXTILE NOVELTY.

BY WILLIAM VON BRENNERBERG.

The great forward strides which Germany is making, not only in the chemical and electrical industries, but in almost all technical branches, deserve the carefulest attention of American manufacturers.

The object of the following lines is to call the attention of American textile manufacturers to a new industry which has recently been started in Germany and which offers considerable prospects and possibilities, i. e., the wood-pulp or cellulose tissues made by the Patentspinnerei Actiengesellschaft at Altdamm near Stettin.

The spinning of wood-pulp or cellulose is the patented invention of Mr. Gustav Türk, manager of the cellulose works at Walsun on the Rhine, and the well-known inventor Dr. Carl Kellner, of Vienna.

The spinning process is a comparatively simple one. The fibrous materials are first treated in the usual manner, for instance in the rag engine, i. e., they are first macerated or decomposed and thereupon passed through a specially constructed machine, resembling the sieve-cylinder machine used for paper making.

The novel feature of this machine, however, is that the fibrous material suspended in water is not worked on the whole breadth of the sieve-roll so as to form a broad gauze, as is usual in paper making, but is immediately separated in strips of suitable breadth, which form a thread of rowing after being rolled up. Thus the gauze divider which was necessary hitherto is entirely avoided.

The sieve-roll of this apparatus is such that narrow strips of material acting as a sieve, such as wire gauze, alternate with strips of solid material.

In consequence of this construction of the sieve-roll, the fibrous or pulpy material adheres only to the strips of wire gauze. The continuous movement of the water in the vat contributes to remove all fibers extending beyond the edges of the wire-gauze strips, the thickness of the strips of fibrous material adhering thereto is thereby increased toward the edge, while the revolving movement of the sieve-roll tends to lay the fibers of the fibrous material in a longitudinal direction parallel to one another.

The strips formed in this manner are then taken off the sieve-roll in the usual manner by means of a band of felt and brought between pressure-rollers, where the water is squeezed out of the same. The strips of paper or fibrous material adhere to the smooth upper roller. They are then taken off this roller and passed between two sets of rubbers moving to and fro, where they are rolled up in their length.

These rowings are then passed to the fliers, where they are treated in the usual manner.

As will be seen, the process is a continuous and very simple one. In this manner fiber of only 2 to 8 millimeters length can easily be spun into yarns of considerable strength.

Another advantage of this process is the simplicity with which the dyeing can be effected.

For this purpose it is only necessary to put the dye into the vat containing the water in which the fibrous material is suspended; in this way every single fiber will be dyed before the rowing is made therefrom, and therefore the whole complicated and costly dyeing and drying process is considerably simplified.

If it is taken into consideration that the process itself is considerably cheaper than the usual method of making yarn, that even the shortest animal or vegetable fibers can thereby be easily spun into yarn, and that the price of best quality of wood-pulp is only about one-third of that of ordinary cotton, the advantages and possibilities of this process are evident.

The objection might be raised that yarn of fibrous materials of only 2 to 8 millimeters length cannot be strong or fine enough; however, this objection is futile, as there are quite a considerable number of textile fabrics where the strength and thinness of the single threads are of not so much importance as the handsome color, pliability, comparative strength and cheap price, such as carpets, draperies, furniture covers, etc. Besides, in the case of wood-pulp, the strength of the yarns can easily be increased by submitting them to a chemical treatment, and finally, if such short-fibered yarns are used as wefts in combination with cotton or linen threads as warp, every single fiber will be tied down at least three times by the warp, and therefore such tissues will be almost as strong and durable as pure cotton and linen fabrics.

Doubtless yarn made according to this process will in the future replace to a considerable extent woolen, linen, cotton and especially jute yarns, especially in the cheaper grades of tissues and for such tissues where pliability and handsome color are of main importance.