Painting Iron.

The value of red lead as a preservative for iron has been generally accepted. Wrought iron requires a hard and elastic paint, which will hold itself together even if the scale beneath gives way. The following experiments, made under the auspices of the Dutch State railroads, may be instructive. Iron plates were prepared for painting as follows: Sixteen plates, pickled in acid (hydrochloric), then neutralized with lime (slaked), rinsed in hot water, and while warm rubbed with oil. The same number of plates were cleared of scale, so far as it could be removed by brushing and scraping. Four plates from each set were then painted alike—namely, four plates with coal tar and four plates with iron oxide A, another set with iron oxide B, and the remaining set with red lead. They were then exposed three years, and the results observed were as follows: The coal tar on the scrubbed plates was quite gone, that put on the pickled plates was inferior to the others. The iron oxide A on the scrubbed plates was inferior to the other two, while on the pickled plate it held well. The oxide B was found superior to that of A, but inferior to red lead, while the plates covered with red lead stood equally well on both prepared plates, and were superior to all others. From these results it is evident that pickling the iron removes all the black oxide, while scrubbing does not. It is also shown that the red lead unites with oil to form a hard, oxy-linseed oil acid soap, a harder soap than that given by any other combination. The red lead is shown by those experiments not to give way under the scaling; it is more adherent to the surface, more elastic and cohesive. On the Cincinnati Southern Railroad, experience extending over some years has shown that red lead has proved the most durable paint in the many miles of iron trestle and bridgework. It is found that the iron oxide is washed away by the rain and perishes in spots, although a valuable paint if frequently renewed. Red lead, on the other hand, is more expensive than iron oxide and is difficult to be obtained pure. It is adulterated with brickdust, colcothar, and other substances, and has lost its high repute.

Referring to white lead as a material for painting iron, one authority observes that "white lead should not, if possible, be used in priming iron, nor in any priming coat; moreover, it is a less desirable overcoat than iron oxide. The class of iron paints compounded of ores of natural iron rust, combined with clay or some other form of silica, are very useful, as they contain no water nor sulphuric acid. Magnetic oxide, or pure iron oxide, is an excellent protection for iron, says one writer; it is impossible to scrape it off. It is also of value in woodwork, and resists the action of salt water and sulphurous gases, so destructive to most paints. There is no doubt the great protective element in paint is the oil, and the conditions required for success are stated to be to prevent the drying part of the oil from becoming hard dry; the soft-keeping, non-drying acids must be kept from flying away in such a quantity as to reduce the oil to a brittle mass. In other words, the elastic qualities of the oil must be protected from the action of the oxygen.

Vegetable Wool, or Silk Cotton.

BY JAMES COLLINS.

Kapoc, or kapok, as it is more usually rendered, is a Malayan word, signifying cotton or a cotton-like substance, *i. e.*, silk cotton; real silk being known as *sutra*. *Kapas* is also used in Malay for cotton or silk cotton, the same vernacular name obtaining in Bengalee and other dialects; but in this latter case the term is restricted to true cotton plants (*Gossypium ops*).

Kapok silk cotton is furnished by the *Eriodendron anfractuosum*, DC., the *Bombax pentandrum* of Linnæus. The plant has been placed in various natural orders, some giving it a place in Bombaceæ, others in Sterculiaceæ or in Malvaceæ.

The tree is from 50 to 60 feet in height, the trunk being prickly at the base and the branches growing out horizontally. There are five to eight leaflets, lanceolate in shape, and either entire in their margins or serrated toward the apex. The capsule, or fruit, is five celled and five valved; the cells contain many seeds, covered with silky or cottony hairs, which form the kapok or vegetable silk. The gum furnished by the tree, when mixed with spices, is used in India in bowel complaints, and the seeds yield a dark colored oil. The tree is of rapid growth, and is lofty and imposing in appearance. It is found in India, the Malayan Archipelago, and in Africa and other countries. In the East generally, kapok is used for stuffing pillows, etc., and for tinder; but it has been found that the smoothness of the fiber prevents cohesion, or "felting," so necessary and important for spinning purposes. In Africa the tree is looked on with veneration, and is termed the "god tree," in some districts it being looked upon as a sacrilege to cut the tree down. Still the trunk is used for forming canoes, and although the wood is soft and liable to the attacks of insects, if soaked in limewater it becomes much more durable. The silk cotton, either alone or mixed with cotton, is largely utilized in Africa. The young leaves are used as food, and form not a bad substitute for "Ochro" (*Hibiscus esculentus*).

Another tree yielding silk cotton in India is the *Cochlospermum gossypium*, DC., the *Bombax gossipinum* of Linnæus; a member of the tea order (Terustrœmiaceæ). It is a tree attaining a height of 50 feet, and the soft silky hairs surrounding the seeds are used for stuffing purposes. The tree has large, conspicuous, yellow flowers, and is not uncommon in Southern India, Travancore, and Coromandel. The *Calotropis gigantea*, or Mudah tree (nat. ord. Asclepiadaceæ), also yields a like substance.

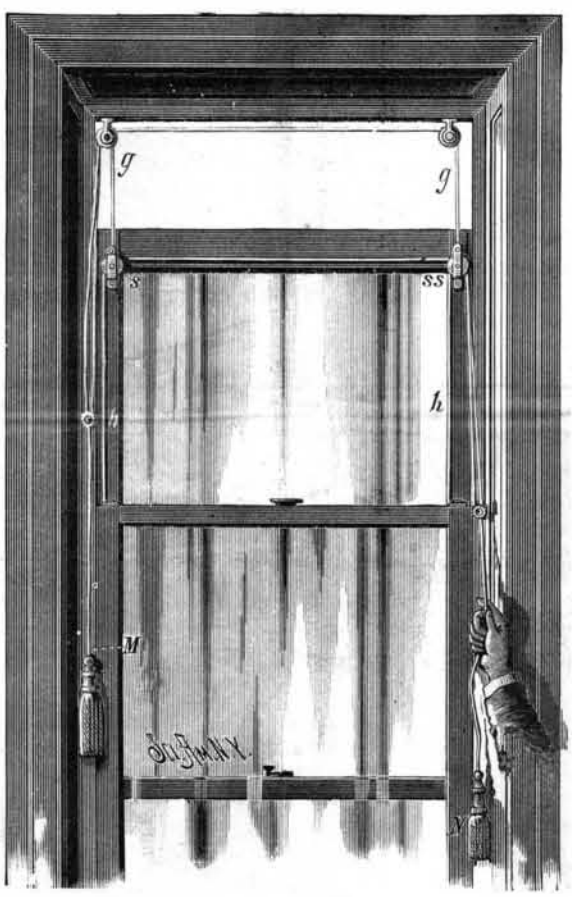
In America, both North and South, various so-called "milk-weeds," as *Asclepias verticillata*, and other plants, such as species of *Bombax*, etc., yield silk cottons, while the *Asclepias syriaca* obtained the attention of European agriculturists as early as 1785, and paper has been made from the cortical fibers of this plant. The young shoots of the plant, too, are said to equal asparagus in flavor.

These are only a few of the plants yielding silk, cotton which might be mentioned. Silk cotton has made its appearance in the markets from time to time, and in 1851 the jurors of the Great Exhibition recommended this substance for stuffing purposes and in mixed fabrics, and notices respecting it have occasionally appeared in this *Journal*. For the lining of quilts, quilted petticoats, etc., silk cotton seems to answer admirably, but its want of cohesion, or non-felting qualities, renders it of no use for spinning purposes, except as a mixture to impart a silky gloss to the fabric so mixed. The price is low, it is light in weight, elastic, and soft, and is said to resist the attacks of insects.—*Journal of the Society of Arts.*

WINDOW SASH ADJUSTER.

The lowering and raising of the upper sash of a window is usually an awkward matter, and in large plate glass windows one of considerable difficulty. Either a pole or a chair must be brought, or else the lower sash is lifted, and the upper one then drawn down or pushed up from the outside.

The accompanying engraving shows a simple and permanent attachment for adjusting the two sashes, which are balanced in the usual manner by weights in the box-frame.



RUSSELL'S WINDOW SASH FASTENER.

A double side-pulley, S S, and a single one, S, are screwed to the face of the upper sash, and through these pulleys is reeved a cord, *h*, whose ends are attached to the top rail of the lower sash. A similar cord, *g*, is reeved through a double and a single pulley screwed to the upper portion of the window frame, its ends being attached to the top rail of the upper sash as shown in the figure. The pulling cords, M and N, carrying thimbles at their upper ends hang from the loops of the cords, *g* and *h*.

By pulling down the cord, N, either the upper sash may be lowered or the bottom one raised, as desired. [On holding the *lower* sash by pressure of the hand or a clamp, the cord, N, draws down the upper sash; on holding the *upper* sash by its cord, M, the cord, N, will draw up the lower sash.]

The upper sash is raised and closed by pulling the cord, M; the lower sash is drawn down and closed by the hand, or by a cord not shown in the engraving fastened at one end to its top rail.

This invention has been patented by Mr. S. H. Russell, No. 10 Cedar Street, New York city, from whom further information may be obtained.

Coke for Foundry Purposes.

Coke is being successfully introduced for foundry purposes in New England and elsewhere in preference to anthracite. The advantages claimed for coke over anthracite are: 1. A duty 30 per cent higher than anthracite. 2. A rate of smelting from 30 to 50 per cent higher than that of anthracite. 3. A less powerful blast is needed. 4. The castings are softer.

Affairs at the Patent Office.

[SPECIAL CORRESPONDENCE.]

WASHINGTON, D. C., December 17.

As those applications for patents on which the final fees were paid on the 13th inst. will not be issued until January 1, 1884, all the patents which will be issued in the year 1883 have now been determined upon, and the total issues for the year may be obtained. A calculation shows that during the year 1883 there have been issued 21,196 patents, 167 reissues, 1,020 designs, 902 trade marks, and 906 labels. The total number issued since July, 1836, when the record was first started, is 289,793 patents, 10,418 reissues, 14,465 designs, 10,769 trade marks, and 3,743 labels.

These figures indicate in some degree the immense amount of labor performed by the Patent Office, and the record for the present year shows how rapidly the spirit of invention is increasing.

During the past week the speaking telephone interference cases were heard before the Examiners-in-Chief in Appeals from the decision of the Examiner of Interferences. The occasion was a notable one from the number of distinguished counsel who appeared for the different claimants, among them Mr. Roscoe Conkling.

These interferences were declared in 1878, and they involve not only the art or method broadly of transmitting articulative speech by throwing electrical undulations corresponding to the sonorous vibrations of the spoken words upon a wire, but the various forms of application that had been suggested up to that time for carrying this method into practical operation. Seven parties now lay claim to the merit of this striking invention, viz.: Alexander Graham Bell, J. W. McDonnough, Thos. A. Edison, Elisha Gray, A. E. Dolbear, Francis Blake, and J. H. Irwin. A vast amount of testimony was submitted, and the Examiner of Interferences, after a long delay, announced his opinion last June in a pamphlet of 350 printed pages.

This opinion is an epitome of the case. The first thirty pages are devoted to an examination of the state of the art as described in prior publications. An explanation and construction of the various issues involved occupies the next thirty-five pages, and in two hundred and seventy-one pages following the Examiner traces the history of the invention of each party as disclosed in the testimony. The conclusion is then drawn that Bell is entitled to judgment of priority for the fundamental invention of the telephone as a whole and for the greater part of the particular devices involved in the interference. Mr. McDonnough is, however, adjudged the first inventor of the telephone receiver, which is a constituent and necessary part of any speaking apparatus, and Mr. Edison is awarded a particular form of the water telephone, an instrument now out of use and of very little importance.

While the Examiner enters upon a minute investigation of the facts of the case, he declares that he is controlled to some extent by certain technical presumptions arising upon the face of the papers. These state that he is not entirely clear that Bell had any knowledge, at the time his application was filed, of any practical apparatus for speaking purposes, but that he must assume, as in other cases, that the invention was made at least as early as that time. The Examiner's rulings upon these points, as well as his findings of fact, were arraigned as errors upon the appeal. It was argued before the Board that the controversy should be determined upon its merits, and not upon strained constructions of the issue and technical presumptions at variance with the facts in the case. The hearing was concluded on December 15, and it will probably be some months before the Board will formulate its decision. FRANKLIN.

Wire Fence Telegraphing.

An experimental work has been going on for a short time along the Milwaukee and St. Paul Railroad Branch and the Brandon Branch, about 30 miles in length, the object being to determine whether or not the barbed wire of the fence on either side of the road can be utilized for telegraphic purposes. The fence wire was placed in proper condition for a sufficient distance to make a satisfactory test, the wire being run under the surface at road crossings. Superintendent of Telegraph Simpson decides that the plan is not practicable. Telegraph work can be done over the fence wire at this time, he says, but during the winter months, when huge snow banks completely cover the fence, the line would be made useless. There are thousands of miles of wire fence along the Western lines, and it has been contended that they should be utilized for this purpose.

A New Treatment for Neuralgia.

The latest agent introduced for the relief of neuralgia is a 1 per cent. solution of hyperosmic acid, administered by subcutaneous injection. It has been employed in Billroth's clinic in a few cases. One of the patients had been a martyr to sciatica for years, and had tried innumerable remedies, including the application of electricity no fewer than 200 times, while for a whole year he had adopted vegetarianism. Billroth injected the above remedy between the tuber ischii and trochanter, and within a day or two the pain was greatly relieved, and eventually quite disappeared. It would be rash to conclude too much from these results, in the face of the intractability of neuralgiæ to medication, but if it really prove to be as efficacious as considered, hyperosmic acid will be a therapeutic agent of no mean value.—*Lancet.*

Flour Mill Insurance.

We published a few weeks ago a list of flour mills burned in the United States during October, in which the loss reported upon each mill was $10,000 and upward. From this list we find that there were twelve mills burned, with a loss of $265,000 in all, not speaking of the lesser cases, which foot up probably $15,000, making in all a loss of about $280,000. If we multiply this by twelve for the entire year, it would make a grand total of $3,420,000; but October would not be the proper month to average from, for reasons which will be recognized by millers themselves. Not one of those fires originated from any cause other than might have occurred in any large business, and taking the number of mills in the country, and the large amount of capital invested, this loss is low compared with other businesses of like proportions.

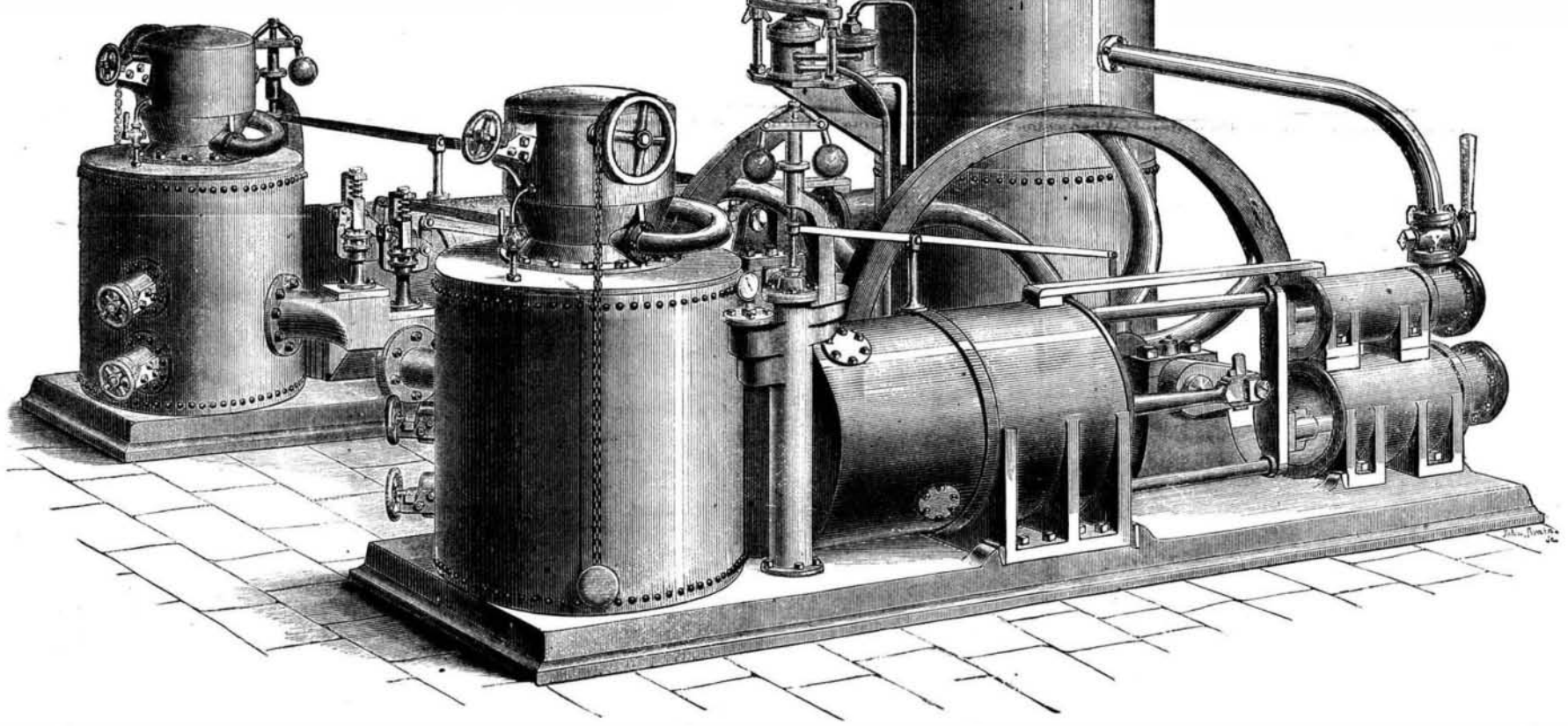
These fires may be divided into two groups, namely, those which originate by reason of defects in arrangement and construction, and those caused by the manner in which the mills are worked. Out of the entire number burned during the year so far, not one was caused from what the insurance actuaries would call the explosive property of the flour, and none would point to the fact that flour mill risks are any greater than those of other factories where machinery is largely used. The question then that naturally rises is this: Are new process mills, or those in which improved machinery is used, less liable to dust explosions than the number still pursuing the even tenor of their way with the old method?

We incline to the opinion that the roller process, with all its concomitant machinery, notable among which stands the improved dust catcher, is not so liable to explosion from flour dust, for the following reasons: In July, 1879, a report was made to the Society for the Encouragement of Manufactories in Prussia, in which it was announced that the Industrial Association of Lower Austria had investigated the causes which would produce explosions in flour mills. In this report it was stated that in the course of their investigation attention was called to the well known phenomenon, the artificial lightning in the theaters produced by lycopodium, which contains considerable oily matter. A similar blaze, or explosion, could not be produced with ordinary meal, but with meal which had been previously heated up to 30° C. the phenomenon would result precisely as with lycopodium.

It was probable that in the mills the meal was heated, and in consequence much more easily ignited. The report gives as a reason why explosions were so few in former times, that the millers used to wet the grain, whereas it was not the case in these times. If the chemical constituents of meal are considered, the question assumes an entirely different aspect. All cereals, with the exception of buckwheat, contain a certain quantity of oily matter; for example, of a thousand parts of flour 18·50 are oleaginous; of rye, 21·09; barley, 26·31; oats, 39·00, and of corn as much as 48·37. These figures are taken from the work of Moleschoot on "Chemistry of Food." The presence of this oleaginous ingredient accounts for the explosive property of flour and meal. The grain having been crushed between the burrs under heavy pressure and a great amount of friction, a great deal of heat must necessarily be engendered by the operation, and a large quantity of moisture containing this oil is set free, and a spark from a stone or the flame of a lamp is sufficient to ignite at once the oil distributed among the fine particles of dust and flour, and an explosion takes place. At present time, by the roller system, no oil is lost from overheating, very little dust is made, and that which is made is taken charge of by the dust collector, and kept "out of harm's way." There is a great deal of difference in the fire risk on flour mills now, compared with a few years ago, and a careful investigation will show, we believe, the possibility of materially reducing rates, except perhaps in cases where these establishments are grouped together in considerable numbers.—*Milling World.*

FOG SIGNAL APPARATUS.

The fog signal apparatus shown in the annexed engraving consists of one pair of "Buckett" caloric engines working pumps for compressing the air, a reservoir for the compressed air, automatic gearing for opening the valves at given times and sounding the signal, and Prof. F. H. Holmes' patent double note "Siren" fog horn. The apparatus herewith illustrated is for light ship or signal station use when it can be placed near the engines, but when it is necessary to separate them, other means are adopted for operating the horn automatically.



FOG SIGNAL APPARATUS

The siren produces its powerful sound, which in calm weather may be heard twenty miles, by means of two slotted cylinders, one fixed and the other revolving within it. The slots, as they pass one another, stop, or cut off, the passage of compressed air or steam, and thus cause a series of vibrations and, consequently, a musical note, the pitch of which depends upon the speed of the revolving cylinder. In order to vary the note it is only necessary to control this velocity.

The double note horn is formed with a casing within which is a fixed slotted cylinder and a revolving cylinder moving upon a spindle. The slots are formed in each cylinder at opposite inclined angles, so that the motive fluid impinging against a number of inclined planes causes the inner cylinder to revolve with great rapidity. As this cylinder revolves it carries with it two disks, attached to the common spindle, and upon their peripheries are pressed levers under the action of small pistons operated by diaphragms to the outer surface of which compressed air is admitted. When the high note is required only one brake is put on, but for the low note both brakes are on, thereby reducing the speed of the revolving cylinder. While the notes are being sounded the pressure of air in the reservoir diminishes; but as the air for operating the diaphragms comes from the same source, the force on the brakes decreases in the same ratio, and the friction on the disks being reduced, the cylinder continues to revolve at a uniform speed, and the pitch of the note is constant.

The end of the crank shaft of the engine is formed with a screw that engages with a worm wheel upon which is bolted a cam having long and short projections. The short projection opens a small valve, and the long one opens the same valve and also a second one. The first valve is connected by a copper tube with the starting valve box of the horn, which, in turn, is connected by a pipe with the diaphragm of the first brake. When the cam opens the small valve, air from the reservoir passes to a diaphragm on top of the starting valve box, and the area being greater than that of the starting valve, the pressure at once opens the latter and a volume of compressed air is admitted to the horn, and at the same time a small quantity of air passes to the brake. The cylinder having only the resistance of one brake to overcome, revolves at the speed requisite to produce the high note. When the long projection of the cam strikes the second valve, air is admitted to the second brake, and the extra friction causes a reduction in the speed of the cylinder and the low note is produced. By adjusting these parts the notes and intervals of silence can be changed as desired.

The wrought iron generator of the engine is lined with fire brick, between the outer sides of which and the inner sides of the generator is an annular space. Air is forced into the generator by the lower small pump operated by the main piston, and this air is divided into two currents, one passing into the annular space referred to, whence it descends beneath the fire bars and so through the fire; the other passing into the upper part of the generator, above the fire, where its oxygen enters into instantaneous combustion with the carbonic oxide formed by the air which has passed through the fire. The intense heat causes expansion, and a valve allows a portion of the gas to enter the cylinder and actuate the piston, giving motion to the engine, as shown in the engraving. The upper small pump supplies air to the reservoir for operating the siren. For the engraving and for the description from which the above notes were taken we are indebted to *The Engineer*, of London.

Greenport Harbor.

A correspondent writing from Greenport, N. Y., dissents from our statement, in the SCIENTIFIC AMERICAN of December 8, that there were no good harbors in Long Island Sound west of New London, and adds that the harbor of Greenport is of sufficient depth to accommodate the Great Eastern. He also says an effort is being made to obtain a Congressional appropriation for building a breakwater there, which would render the harbor a spacious and convenient harbor of refuge for all vessels passing through Long Island Sound.