

ELECTRIC LIGHTING ON THE ARIZONA.

The progress of electric lighting is well illustrated by the example we herewith illustrate, showing the electrical machinery now in use on board of the fast ocean steamer Arizona, plying between New York and Liverpool. Our engraving and particulars are from *Engineering*.

The Arizona is fitted with two of Siemens' compound shunt wound dynamos, each capable of maintaining 300 high-resistance Swan lamps, driven by a pair of Shanks' "Caledonian" engines, with cylinders $9\frac{1}{2}$ inches by 14 inches. Each dynamo is fixed upon an independent base plate, sliding upon round rods in a foundation plate. The side of the base that takes the strain of the driving rope is lengthened into a long slide, and the two machines are slightly displaced laterally, so that their bases interlock. By means of screws both dynamos may be drawn backward to tighten the belts. There are ten grooves in each fly-wheel, but there is only one rope to each machine, and consequently but one splice. This necessitates the use of a guide pulley to lead the rope from the last groove of the driven to the first groove of the driving pulley. Only one of the pulleys can be seen in the engraving, the other being hidden by the mast. The axis of one machine is elongated, and is provided with a pulley for driving a tachometer mounted upon the top of the frame. The commutator brushes are set on a bracket, which can be rotated by a worm to bring the points of contact into the most

chief purposes of the Mutual Fire, viz., the prevention of fires, it is appropriate to call the attention of our policy-holders to this hazard in its many headed forms, and to adopt such stringent rules and inspections as practically to abolish spontaneous combustion within the risks carried on our books.

Closer attention should be given to the spontaneous origin of fires, although it saves painstaking investigation to ascribe them to incendiarism, and the owner prefers to call the cause "unknown" than to admit his carelessness. In the official reports from the whole State of Massachusetts for 1881, as given by city and town authorities, in the summary of causes of fires, 365 are reported as "unknown," 310 are claimed to be "incendiary," and after "heating," and "lighting apparatus," "spontaneous combustion" leads the list, having created 56 fires. Intelligent observation will in coming years decrease the number of fires called "incendiary" and "unknown," and show that bad management and carelessness are the principal causes of such fires.

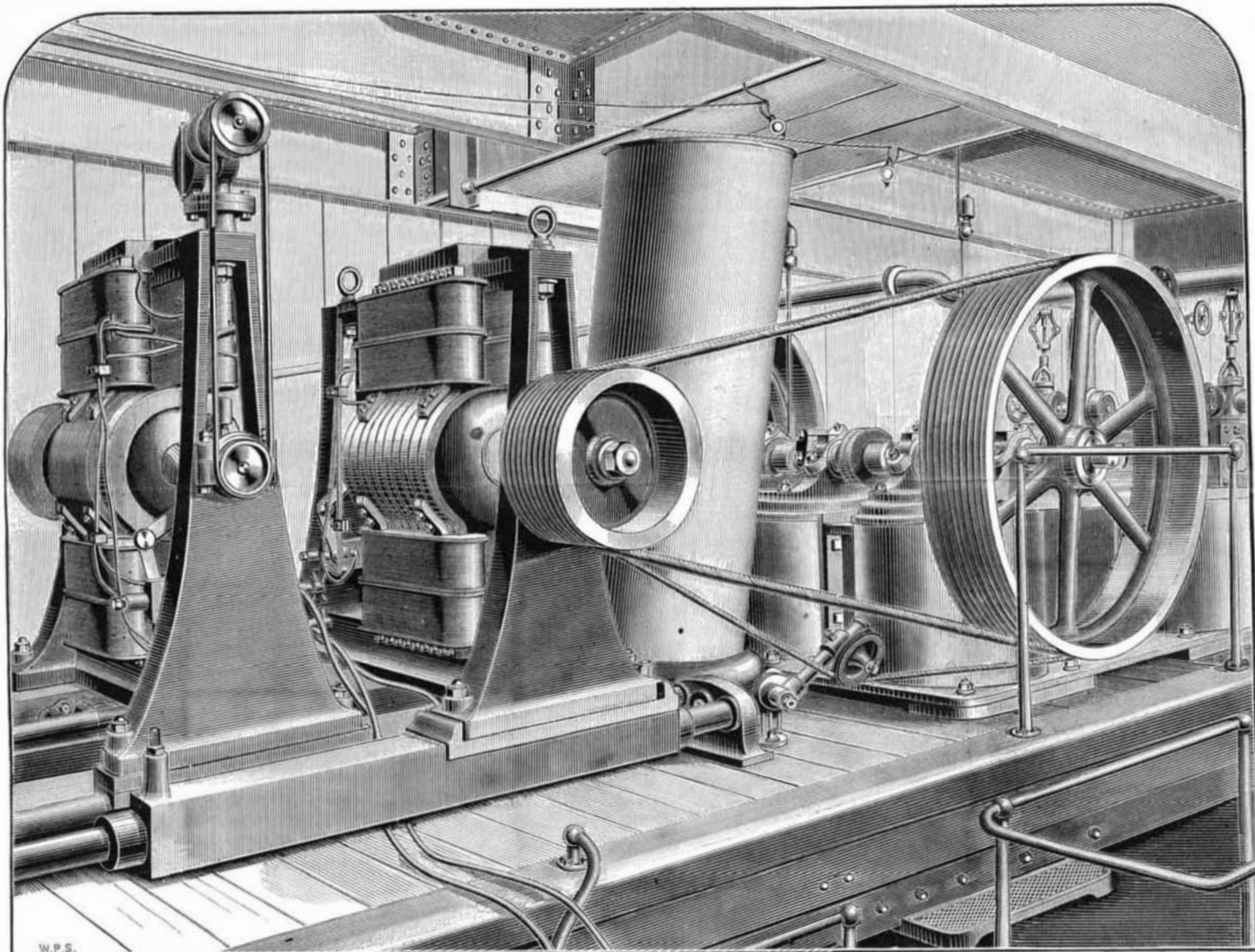
The great incendiary to be dreaded is *Oily Waste*, whether in cotton waste, animal fiber, as wool and silk, or vegetable fiber, such as raw cotton, jute, and "Excelsior." In some form it is found everywhere, in private houses and in stores; in shops and factories; at sea and on land; and the higher the mechanical skill and the more costly the product, the more frequent is its existence. Most men have

thinkingly, men say iron will not burn, and the proprietor of works which have turned out immense quantities of valuable product for the U. S. Government seemed surprised at the hazard in a pile of damp iron filings, into which had fallen drops of oil and a little cotton waste. In that case only the low temperature of the room or the excess of water had prevented a spontaneous fire.

Common Causes.—The more usual cause of these fires are "oily waste," "rubbing rags," "Excelsior" used for rubbing and finishing, "oiled rags" for cleaning sewing machines, oiled paper used for lining packing cases, iron grindings, piles of coal, etc. The present object is to suggest practical methods for overcoming the danger of spontaneous fires from those principal causes with which we come in daily contact.

Oily waste is the most common cause of spontaneous combustion, since it is found in every factory, store, hotel, office building, etc., having even an elevator in it. The usual custom prevails among the better houses to remove the "oily waste" daily, yet it is quite common to find it lying upon the floors, upon and under workbenches, and often with the clean waste.

"Oily waste" which is permitted to lie around during the day is not likely to be cleaned up carefully at night, and even in the best establishments fragments will fall under machinery, benches, tables, and heating apparatus, besides the surplus carried into rat holes. Then again it is fre-



ELECTRIC LIGHT MACHINERY OF STEAMER ARIZONA.

favorable line, and the conductor, which is of large cross section, is jointed, so as not to impede the motion.

By this machinery all parts of the great ship are brilliantly lighted with electric lamps. Looking back for only twelve months, immense advances are to be seen in this department of electric lighting. It is no longer a question with the Liverpool companies in what parts of the ship the light shall be used, for it is now applied everywhere, and both cabin passengers and emigrants share in its benefits. At the present time there are more than a dozen American liners fitted with Siemens generators and Swan lamps, and the number is increasing every month. Besides these there are vessels of the Orient, the Castle, the British India, and other lines, which probably bring the total up to three times that number.

Spontaneous Combustion.

Secretary P. B. Armstrong, of the Mutual Fire, of New York, has sent the following circular to the members of his company, which merits consideration by all who are interested in reducing the number of fires:

Oily Waste.—The frequency of fires from spontaneous combustion is constantly increasing. Only a few years ago this was a debated point between underwriters and business men, but, especially since the introduction of novel products of petroleum and the formation of new chemical compounds, now all observing men admit the power of spontaneity. Chemistry and science are only seemingly arrayed against good underwriting in introducing new agencies of combustion. Pursuant to one of the

ready excuse that only a small quantity is used, and therefore it is not dangerous. A handful of cotton waste immersed in a pan of linseed oil is harmless; the same waste with a few drops of oil makes the effort to carry the tiny globules along its fibers by capillary attraction, until it is arrested by the microscopic kinky structures, and especially when under the joint mechanical and chemical action of the sun, combustion spontaneously arises, and another fire is reported as "incendiary."

Rats and mice have great affection for the soft, slightly oily fragments, which they incorporate in their nests, as heedless of the danger of spontaneous combustion as are the more intellectual tenants of the same premises; and in their august assemblies and nightly clubs, they doubtless declaim against incendiarism and the mysterious origin of fires.

In this brief paper it is impracticable to enumerate the particular cases of spontaneous combustion which occur in almost every branch of trade from numerous causes. Two years ago "cordonnet silk" attracted particular attention here, though in England it had been recognized as a special hazard for fifteen years. Phosphorus has recently educated some men concerning its well known powers, and the danger from leaking acids, as used in the electrical batteries stowed away in dusty corners, has been often emphasized by fire-loss.

As even water can be changed into its constituent elements, and transmuted into combustible gases, nothing seems to escape this insidious power of combustion. Un-

requently swept up with other rubbish, placed in barrels, and kept over night, to the hazard of property valued at hundreds of thousands of dollars.

Rags used in cleaning sewing machines are commonly placed with the "cuttings," or with the floor sweepings, and repeatedly our inspectors have urged discontinuance of such conduct. Hereafter where such carelessness is discovered and not immediately remedied, our policies will be discontinued without delay.

Novel Railway Propulsion.

A railroad is being constructed from Territet to Glyon, in Switzerland, to be completed next September. The steep mountain side is climbed in a manner similar to the railway up the Riga. The motive power of the Territet and Glyon road is to be water, derived from a reservoir in the hills above Glyon. The use of water in place of coal will not only be a great saving of cost for fuel, but the carriage of fuel up the mountain will be another saving in the running expenses.

Imitation Walnut.

We have it on good authority that an excellent stain for giving light-colored wood the appearance of black walnut may be made and applied as follows: Take Brunswick black, thin it down with turpentine until it is about the right tone and color, and then add about one-twentieth its bulk of varnish. This mixture, it is said, will dry hard and take varnish well.