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CANDLES FOR CARS---THE KEROSENE SCARE.

For the same reason, we presume, that "misfortunes never come singly," and a striking exemplification of that old adage, is the fact noticed by journalists and observing newspaper readers, that certain months of the year are particularly prolific of railroad casualties. The periodic return of this smash-up season, as it may be termed, is even predicted by enterprising journalists, and it must, so they affirm, like the dog days, run through a certain course before it finally dies out. If, for causes beyond our ken, certain months of the year are peculiarly favored in this respect, it is evident that such a season is now upon us, for the record of the past few months shows a long list of railway casualties of all kinds and of all degrees of horror. Many of these accidents have been the destruction of passenger cars by fire, and in some way the public have become possessed with the idea that kerosene oil lamps have in the majority of cases been the cause of these disasters. The papers have been instrumental in disseminating this belief, and behold, as the result, news reaches us from all points that the managers of the leading railroads of the land have caused the removal of the lamps from all their cars, the popular substitute therefore, being the more primitive source of illumination—candles. Even Legislative action has been taken in some States requiring, under a heavy penalty, all companies running roads through these States to do likewise. We know that several railway-supply establishments in this vicinity are overwhelmed with orders for car-candle burners. Now, if the oil lamps are really so dangerous as represented, and no better substitute can be found, then the sooner a return is made to the era of tallow dips—or any improvement thereof—the better.

In the first accounts received of the Angola tragedy, appeared a statement to the effect that the horrors of the disaster were much increased, if not mostly caused, by the oil from the broken lamps being ignited and scattered over the victims. When the actual facts in the case were made known, it appeared that no kerosene was used in the cars, but candles were employed in lighting them. Again: the lamp which lately exploded in a car on the Erie road, an exchange assures us, was not filled with kerosene, but with a mixed oil requiring a special construction of lamp for burning it. Last week we referred to the burning of the Pullman palace car, "City of Chicago," on the Chicago, Burlington and Quincy railroad. Since that brief account was written, additional particulars have been received, from which it appears that the affirmed cause of the fire was a merely suppositious one, the more probable explanation attributing its origin to the over-heating of a stovepipe near the roof. The officers of the road now feel confident that the latter was the true cause, yet they seem to have become affected by the anti-kerosene movement, and with a remarkable but uncalled for display of prudence, they have ordered all their passenger cars to be provided with candles. Although kerosene oil in this case was not the cause of the conflagration, yet, as it might have been, the remaining palace cars are to be refitted, and all new ones will hereafter be furnished with candles.

It cannot be denied that the light furnished by kerosene oil is superior in its illuminating power to any other equally convenient source of artificial illumination, and it is equally true that with the exercise of a little care, inexplosive oils can be procured. If the roads would confine their purchases to such oils as will stand the commercial fire test of 110°, not only the best, but, under ordinary circumstances, an entirely safe light for railroad cars would be obtainable. As far as our own experience extends, passenger cars are not sufficiently illuminated. The tediousness of a railroad journey is greatly relieved by a cheerfully lighted car, but while under the present arrangement this consolation is rarely afforded the weary traveler, the return to the use of sperm or whale oil, or even worse still, candles, is a retrograde step, which should not be taken until it can be shown that some superior means of illumination, equally safe, is not practicable.

OBITUARY.----SIR DAVID BREWSTER.

This distinguished *savant* was born at Jedburgh, Scotland, Dec. 11, 1781, and, at the time of his death, had reached the advanced age of eighty-seven years. He was educated for the Church of Scotland, of which he became a licentiate, and in 1800 received from the University of Edinburgh the degree of M.A. Eight years later he entered upon his literary career as editor of the *Edinburgh Encyclopædia*, a work that occupied him wholly or mainly until 1830. His attention was first directed to the study of optics in 1808, and a work on "New Philosophical Instruments," was published by him five years subsequently. In 1819 he was instrumental in establishing the *Edinburgh Philosophical Journal*, and sometime after, the *Edinburgh Journal of Science*. During the later years of his life he was one of the editors of the *London and Edinburgh Philosophical Magazine*, and a voluminous contributor to the reviews, and to the transactions of various scientific bodies. His special works, besides the one already mentioned, were a "Treatise on Optics," one on "The Kaleidoscope," the "Letters on Natural Magic," and "Life of Sir Isaac Newton."

From his laborious investigations of the subject of Optics, the name of Sir David Brewster will always be peculiarly identified with this interesting branch of physical science. Many of the most brilliant of modern discoveries in Optics were made by him, and particularly are we indebted to his researches for a great part of our knowledge respecting that most curious phenomena in science, the polarization of light. One of his earliest practical inventions was an illuminator for lighthouses, the peculiarity of which was a lens constructed out of successive segments of glass. The well-known toy, the Kaleidoscope, one of the most original optical instruments ever constructed, was of his own devising. It is said that the sensation it excited throughout the community, when first brought out, was astonishing; and people were everywhere seen, even at the street corners, looking at the pleasing wonders it revealed. During the space of three months over 200,000 of these instruments were sold in Paris and London. The invention of the Stereoscope is an honor which he divided with Prof. Wheatstone, but while the latter devised the reflecting stereoscope, the common or lenticular form was originated by Sir David himself.

To the labors of deceased we also owe numerous valuable facts in thermotics and meteorology, resulting from his researches on the mean temperature of the earth and the determination of the isothermal lines. The philosopher had certainly no reason to complain of the ingratitude of the world to its men of science. In 1807 he was made a Doctor of Laws by the University of Aberdeen; the next year obtained his Fellowship in the Royal Society of Edinburgh; received the Copley Medal of the Royal Society in 1815, and soon after became a Fellow of that august body; in 1816 received a grand prize from the French Institute, of which body he became a Foreign Associate in 1849; in 1819 received the Rumford Medals from the Royal Society; in 1831 he received a decoration from the King of Hanover, and the next year was knighted by William IV. At the time of his death he was a correspondent of the Royal Academies of Russia, Prussia, Sweden, and other countries, and a member of every scientific society of any importance in Great Britain.

Not only for his great scientific attainments, but also for his excellent qualities as a man was Sir David esteemed, and his death, while it removes one from the foremost rank in science, will be alike keenly felt in social circles.

Chemistry of Paint.

Hitherto but very little attention has ever been given to the above subject by our leading chemists, but a work has recently appeared, published by the celebrated Dutch chemist, Mulder, in which a vast amount of useful information on this point is imparted, and much of the mystery connected with the chemical action of the different paints is satisfactorily explained. The starting point of his investigations was an inquiry as to the best material to protect iron from rust. The result has been his rejection of all oil paints as unlikely to answer the purpose, and his conclusion that coal tar contains the best materials for a protecting coat. The author very completely investigated the nature of paint, and the chemical changes involved in the drying of oils. As regards linseed oil, we are told that the essential constituent is "linolein," a compound of glycerin and linoleic acid. The latter body the author could not obtain quite pure, but he decides that its formula is HO, $C_{32}H_{27}O_3$. When exposed to air linoleic acid rapidly oxidizes, first to "linoxic acid," a sticky body resembling turpentine. On longer exposure, "linoxyn" is produced. This is a tough leathery substance, sharing, we may say, many of the properties of caoutchouc. It is soluble in the same menstrua, and can be vulcanized like india-rubber. It is manufactured in considerable quantities in this country, and is the binding material used to consolidate emery wheels. It forms also the surface of linoleum cloth. According to Mulder, there are two linoxyns, the white and red; the white modifications become red on exposure to 80° Centigrade, and the red again turns white on exposure to sunlight. The browning of white paint in dark places the author ascribes to the gradual change of white linoxyn into red. Oxidation does not end with the production of linoxyn. It still proceeds to the complete decay of the material, as is seen in very old paint.

One useful result of Mulder's labor is a simple process for preparing a good colorless drying oil. For this purpose it is only necessary to boil linseed oil for two hours with three per cent of red lead, filter it, and then expose it to sunlight in large shallow vessels, frequently renewing the air above. Another result is a denial of the existence of albuminous and gummy matter in linseed oil, to which are ascribed the slowness of drying of unboiled oils. For these matters Mulder searched in vain, and at last came to the conclusion that they had no existence. Oxides and acetates of lead, he tells us, act as driers, not by precipitating albuminous matters, but by forming a little linoleate of lead, which rapidly oxidizes and communicates its activity to the oil.

Cast-steel Boilers.

The use of steel in the manufacture of steam boilers is of comparatively recent date, and the relative advantages, if any, over ordinary iron boilers, except on the score of their less weight, has hardly yet been satisfactorily determined. We have before us perhaps the latest information bearing on this subject, being the results of an important series of experiments made recently at the rolling mills of Messrs. Funk & Elbers, of Hagan, Prussia, for the purpose of ascertaining the respective evaporating power of the new compared with the old style of boiler.

The two boilers experimented with were each five feet in diameter, and thirty-four feet long, constructed to stand five atmospheres "over" pressure. One was made of wrought iron, and the other of soft cast steel. The thickness of the sides in the cylindrical portions of the iron boiler was 0·50 of an inch, and of the cast-steel boiler 0·33 of an inch. Each boiler had a heating surface of 293 square feet, and twelve square feet of surface. Both were new, and had never been before heated. They were set alike in brickwork, one above the other, but entirely separated by masonry; the gaseous products of combustion passed through a single flue underneath each boiler, and passed directly into the same chimney. At first both boilers were filled, and fires were kept under them for several days in order to dry the brickwork, after which the fires were extinguished and the boilers emptied and cleaned. Each boiler then received exactly 712 cubic feet of water at 95° Fah. temperature; the man-holes were closed, and the water was heated to the boiling point; again the fires were put out, and all the ashes and coals taken away. From this point the boilers were fired afresh, and fed with weighed fuel; the man-holes, hitherto kept closed, were now opened to let the steam escape; and the firing was so well regulated, by means of dampers, that the velocity of the escaping steam—measured by List's Velocimeter—was the same in each boiler. The temperature of the gases from the fire was measured, at a point six feet from the rear end of each boiler, by Gauntlett's Pyrometer, and found to vary from 644° to 734° Fah.

After consuming on each grate 3,150 pounds of coal of the same quality, the cinders of which were burned over and over again, the fires were put out, and the man-holes closed. On the following day the remaining water of the boilers, showing a temperature of 95°, was let out through the emptying tube, situated at the lowest part of the boiler, and measured by means of a hydrometer adapted to the tube. The iron boiler showed 387 cubic feet, and the steel boiler 331 cubic feet of the remaining feed water. Therefore the water evaporated in the iron boiler was 712—387—325 cubic feet, or 20,065 pounds; and that evaporated in the steel boiler was 712—331—381 cubic feet, or 23,523 pounds. Hence the evaporating capacity was proved to be 17·20 per cent in favor of the steel boiler. One pound of coal evaporated in the iron boiler 6,350 pounds of water, and the steel boiler 7,467 pounds of water at 212° Fah.

At the next trial the whole operation was performed in the same manner, only the velocity of the escaping steam was less. It resulted in showing 19·62 per cent in favor of the steel boiler. One pound of coal evaporated in the iron boiler 5,809 pounds, and in the steel boiler 7,008 pounds of water.

These two experiments were verified in the following manner: To an equal quantity of feed water in each boiler an equal volume of a strong solution of salt was added. After stirring the water for some time, by means of long poles, and boiling it with closed man-holes, samples were taken out for future analysis. In completing this experiment in which equal quantities of fuel and water were used, further samples were taken out. The analysis of the samples by Dr. List, of Hagan, showed that in the iron boiler one quart of water contained before evaporation 4,629 grammes of chloride of sodium, and after, 5,985; in the steel boiler one quart contained 4,371 grammes before, and 7,385 grammes of salt after evaporation; the iron boiler lost 33·76 quarts, and the steel boiler 40·81 quarts of water, showing 20·85 per cent in favor of the latter. The average percentage of these three experiments is 19·24 per cent in favor of the steel boiler, which it will be noted had a shell 33 per cent thinner than that of the wrought-iron boiler.

COLOR OF THE CLOUDS.—The varied colors which the clouds assume at various times especially at sunrise and sunset, are explained by Mr. Sorley on the principle that the clear transparent vapor of water absorbs more of the red rays of light than of any other, while the lower strata of the atmosphere offer more resistance to the passage of the blue rays. At sunrise and sunset the light of the sun has to pass through about 200 miles of atmosphere within a mile of the surface of the earth in order to illuminate a cloud a mile from the ground. In passing through this great thickness the blue rays are absorbed to a far greater extent than the red, and much of the yellow is also removed. Hence clouds thus illuminated are red. When the sun is higher above the horizon, the yellow light passes more readily and the clouds become orange, then yellow, and finally white. Clouds in different parts of the sky or at different elevations often show these various colors at the same time.