

pearls, dry bleached linen, white paper, and even the stones extracted from the human bladder.

Grott has found that the same luminous rays—the blue and violet—which produce the photographic pictures, also produce this effect, and that the rays which have no photographic powers—red and orange—not only do not produce it, but extinguish the existing luminosity. However, this is not because it is easily extinguished, as handling and even immersion in water will have no effect upon it, neither plunging the body in different gases. Groszer found that the luminosity was not even in the least impaired in a perfect vacuum.

Some philosophers have already, and with apparent good grounds, mentioned their suspicion that in nature the same phosphorescence may take place on a larger scale, that we see in different minerals, fossils, and preparations on a small scale, and if so, planets and comets are luminous partly by light reflected from the sun, and partly by phosphorescence of their own. That comets possess such a light of their own has been proved by Arago's conclusive observations by means of polarized light; and perhaps the peculiar appearance of the moon during its eclipse is due, besides the refraction and absorption of light in our atmosphere, to such a phosphorescence; even ice shows luminosity in the dark for several hours, when suddenly withdrawn from sunlight exposure to a dark room. The periodical obscuration taking place during the moon's phases is so slow that no phosphorescence can show itself, but on the occasion of an eclipse the obscuration is so rapid that any phosphorescence on its surface persisting for an hour or half an hour must become visible.

Practical Researches in Sugar Refining.

M. Monnier, of France, has recently published his researches in sugar refining from which we publish some interesting facts:

If sulphurous acid gas is conducted into a chamber containing coarse sugar, the latter is promptly bleached, and about three-fourths of the coloring matter is entirely destroyed, while the sugar undergoes no change whatever in composition. After this treatment the sugar smells strongly of sulphurous acid, which presents no inconvenience in the process of refining. To bleach sugar in this manner; for 1000 parts by weight of sugar about four parts of sulphur must be burnt and the gas conducted into the chamber. When the operation is once set going, the proportion of sulphur may be notably diminished. The sulphur is converted into gas by combustion in a little furnace placed at the side of the chamber. When the action is complete, the sugar is dissolved in water and its sulphurous acid neutralized by a small quantity of lime. This lime may be previously converted into sucrate of lime by M. Peligot's method, that is, by crushing it with a little sirup; for 1000 pounds of sugar three or four pounds of lime are requisite to obtain this sucrate.

M. Monnier has been at great trouble to ascertain whether the sulphurous acid gas thus used modified the sugar so as to produce a certain amount of grape or non-crystallizable sugar, and he has convinced himself that sugar bleached in this manner undergoes no change whatever. The quantity of non-crystallizable sugar, found by analysis after the operation in question, was in each case exactly equal to the amount which the sugar contained before being bleached; namely, on the average, about 2-15 per cent. In all these experiments the sugar was exposed about forty-eight hours to the bleaching action.

The above process gives most striking results with exotic sugars, which are highly colored; with lighter-colored samples, the bleaching is not so marked, but in the former case, two thirds to three-fourths of the heterogeneous coloring matters are eliminated completely.

The author took the same opportunity of examining into the action of chlorine gas, and precisely in the same manner. But the result was very different. In destroying the coloring matters present in the sugar, chlorine is converted into hydrochloric acid, which at once renders a certain amount of sugar non-crystallizable even at the ordinary temperatures. A specimen was taken for experiment which contained two per cent of non-crystallizable sugar; it was submitted to the action of chlorine for twenty-four hours only, and then a fair specimen of the whole bulk was taken and analysed. It showed no less than nineteen per cent of uncrystallizable sugar. If it were not for this enormous loss, the action of chlorine as a bleaching agent would be preferable to that of sulphurous acid, for its action is more rapid and complete; but it does not appear possible to prevent its destructive action upon the sugar itself.

It was lately hinted in London that ozone was going to be used as a bleaching agent in sugar refining, and we believe one or more patents were taken out for this purpose. We should be glad to learn whether anything really practical has been done in that direction, and whether ozone will prove to be a more economical agent, or more complete in its action, than sulphurous acid gas, used as indicated above.

New Grain Warehouses of Liverpool.

The city of Liverpool is justly celebrated for its magnificent docks, which extend a distance of seven miles along the river Mersey. With a view to the proper handling and storage of the immense shipments of grain, the Harbor Board at Liverpool and Birkenhead have constructed some new warehouses, which we recently visited, the most perfect buildings of the kind in the world. On the Liverpool side the new warehouses, which are fire-proof, comprise three blocks, forming a quadrangle, within the margin of which is the dock. The total length of the building is 1,485 feet by 70 feet in width. Beside the quay floor there are five stories available for storage, and a sixth, which is appropriated as a machinery floor.

The aggregate clear internal area, including the quay floor, is 11½ acres. The height of the building from the quay to the top of the cornice is 82 feet. The stores, with the exception of the quay floor, which is 15 feet 3 inches high, are 9 feet three inches from the surface to the underside of girder above. Every attention has been paid to the relative strength of each part of the structure, the breaking strain of the beams and girders being three times the load they are intended to carry. An idea of the vast capacity of the warehouses may be gained from the fact that the total weight of grain upon the floors when fully loaded will amount to not less than 77,660 tons. The clear aggregate storage area of all the floors, exclusive of the quay and silo spaces, is 48,918 square yards, affording storage capacity for 196,000 quarters of grain. A quarter is equal to 8 bushels. Rails are laid within the warehouses, forming a communication with the main dock line.

Throughout the building the machinery for hoisting and distributing the grain is worked by hydraulic power. There are five self-acting, traversing, rocking cranes, for raising the grain in tubs from the hold of the ship. Each crane is capable of raising a tun of grain at a time at the rate of 50 tons per hour, through an extreme distance of 136 feet. Having brought the grain to the machinery floor at the top of the warehouses, the cranes discharge it into hoppers, from which, after being freed from dust, it is weighed by a single operation in one tun lots, and then transmitted by a most ingenious arrangement to any part of the warehouses. This work of transmission is effected by means of endless bands, of which there are two running the entire length of the three stacks of warehouses. The bands are of vulcanized india-rubber, 18 inches wide, and traverse at a speed of about 500 feet per minute. They are capable of transmitting grain from end to end of the warehouses at the rate of 50 tons per hour. There are chutes for passing grain from one floor to another, into the holds of vessels, or into wagons beneath. Beside the cranes there are eleven hoists for barrels and sacks, and twenty jiggers for lowering purposes.

The Birkenhead warehouses are in many respects similar to those on the Liverpool side of the water, and are fitted up in the same manner. Their storage capacity is 212,800 quarters of grain. They are not fire-proof. When completed, the warehouses on both sides of the Mersey will be handed over by the dock board under a ten years' lease to the Liverpool Grain Warehousing Company. We may here add that the imports of grain during the year 1867 into Liverpool were as follows: Wheat, 1,805,044 quarters; barley, 93,918 quarters; malt, 7,418 quarters; oats, 201,018 quarters; beans, 209,495 quarters; peas, 132,549 quarters; Indian corn, 913,855 quarters; oatmeal, 153,445 loads; flour, 382,572 sacks and 132,040 barrels—making a total of 3,363,293 quarters, 153,445 loads, 382,572 sacks, and 132,040 barrels; or about one-fourth of the entire grain imports of Great Britain.

A Royal Railway Train.

The Queen of England, with a numerous suite, recently left Windsor to pay her annual visit to Balmoral, in Scotland. It will interest our readers to know some of the particulars in regard to the style in which Her Majesty travels.

The directors of the Northwestern Railway Company were commanded to prepare a special train for the purpose, consisting of fourteen carriages. The Queen's carriage was fitted with a perfect system of electric communication with the guard—a thing which has bothered the English a good deal. This apparatus consisted of a small, square, gilt box, hollowed out in front, and furnished with a glass handle, by the pulling of which the Queen could at any moment bring the train to a dead stop. When once the handle was drawn out, it could not be replaced by persons occupying the car. An experimental trial proved that the plan operated very perfectly. This same system has been applied to a Birmingham train, and in two instances it has been called into use—once for a joke, by a young officer, and in the other case by a medical man, whose curiosity led him, when the express was approaching a station, to pull out the handle. To his great consternation and chagrin, the train was immediately pulled up, and he heard the bell in the guard's van ringing loudly. As the handle of the "communicator" remained out, the culprit was at once detected, and nearly lynched by the excited passengers, who were, of course, much surprised at the sudden stopping of the train, and annoyed at the loss of time occasioned by the foolish freak.

Her Majesty's saloon, in addition to the electric communication with the guard, was likewise fitted with an electric dial and index, for the purpose of calling the royal dressers and personal attendants, for whose accommodation a new saloon, expressly built by the directors, and was placed in a position in front of and directly adjoining the Queen's saloon. A time table was expressly arranged for running the train 591 miles, which was made in about nineteen hours.

The Pneumatic Dispatch.

We learn that the Governor has approved of the act to facilitate the transmission of letters and merchandise by means of the Pneumatic Dispatch, and that our citizens now have the promise of soon enjoying the most improved and rapid means of intercommunication. The act authorizes the laying down of the pneumatic tubes under the streets of New York and Brooklyn, and also under the waters of the North and East rivers.

The present enterprise contemplates the connection of the Brooklyn, Jersey City, and all our sub-post offices, with the general post office, and also the erection of pneumatic letter-boxes in place of the present lamp-post boxes, so that letters and parcels will be both collected and delivered by air pressure acting on cars, which will fly along at the rate of thirty miles

an hour. The mails will go back and forth between the New York and Brooklyn and Jersey City post offices in from three to five minutes. Letters deposited in any of the street letter-boxes on the pneumatic line below Forty-second street will be carried to the general post office, or to any intermediate station, in from three to six minutes. Our citizens can easily understand the great benefit that will accrue to business transactions from this arrangement.

The introduction of the Pneumatic Dispatch is due to the efforts of our enterprising neighbor, Mr. Alfred E. Beach, of the SCIENTIFIC AMERICAN, and we congratulate him upon his success before the Legislature. The Pneumatic Dispatch was first put into practical operation last October, at the American Institute Fair, and a full account of its construction and operations was then given in our columns. We understand that it is the intention of the grantees to put a short line of the Pneumatic Dispatch into operation within the next ninety days. The exact route has not yet been determined, but it will probably extend from the post office, corner of Nassau and Liberty streets, to the City Hall Park. If this short line is found to operate as well as is expected, the pneumatic tubes will then be laid down extensively in many different directions.—*New York Sun.*

THE SALE OF PATENTS IN OHIO.

The General Assembly of Ohio, at its last session, enacted a law regulating the sale of patent rights in that State. The law renders it necessary for the patentee, or his authorized agent, to produce his documents to be examined by the Judge of Probate of the county, who issues a certificate authorizing the sale of rights, providing he is satisfied of the good faith of the parties. It is questionable whether any State has the constitutional right to impose restrictions upon the sale of patents granted by the United States government, but as the law was enacted for the purpose of preventing swindling, it cannot affect unfavorably legitimate and honorable enterprises.

Commissioner of Patents.

A recent telegram states that a movement is going on at Washington to secure the appointment of Hon. Elisha Foot—now of the Appeal Board—to the office of Commissioner of Patents. Judge Foot has a thorough knowledge of the patent law, and is well versed in mechanical science. The selection would be an excellent one.

Editorial Summary.

BREECH-LOADERS IN ITALY.—The Commission appointed by the Italian Government for examining into the comparative merits of the different breech-loading rifles known, have decided in favor of the Prussian needle gun. This is the only instance of its having been approved by a non-German state, all other countries having endeavored to construct an even more perfect weapon. More general recognition has been bestowed upon the Prussian breech-loading cannon. Having some time ago been adopted by Russia, Belgium, and for fortress and naval artillery, by Austria also, it is now about to be introduced into the Italian service.

THE SPECTRUM RECONSTRUCTED.—Prof. Listing, of Göttingen, considers the solar spectrum as made up of nine colors, in the following order: brown, red, orange, yellow, green, blue, indigo, violet, and lavender. He has also calculated the number of vibrations of each, and has found that their numbers constitute an arithmetical progression; the interval between one color and the next always being 48,524 billions of vibrations per second. The number of vibrations constituting the two extreme colors are represented by 364 trillions for the brown, and 801 trillions for the lavender.

THE London local post office is one of the best conducted institutions in the world. It employs 1,152 letter carriers, who distributed 76,000,000 letters in 1863, and in 1868 it is estimated will deliver 90,000,000; that is, 1,730,000 letters per week, and 288,000 per day. Carriers are paid about twenty-five shillings per week—nearly \$8 75—and the expense of the department is estimated at £120,000. The net profit amounts to nearly £300,000, or two millions of our money.

At a meeting of the Société de Photographie, Paris, M. Civiale made some observations upon the employment of sulpho-cyanides in toning and fixing. He stated that in the summer of 1867 he fixed about 700 positive proofs by means of potassium and ammonium sulphocyanides. A print, one half of which had been protected from the light, the other unprotected, and which had been exposed for three months, showed only a uniform tint.

REMEDY FOR CHAFING.—Obese persons suffer greatly, especially in warm weather, from chafing. We know of nothing better than a wash of alum dissolved in water, and applied with a linen or cotton rag.

SOUNDINGS have been made in the sea to a depth of six thousand feet, without finding bottom, within 1½ miles of the shore of the island of Santa Cruz, W. I. This island is the apex of an immense submarine mountain.

THE grasshoppers, having survived rain, fire, snow, and frost, during last fall and winter, have hatched out thicker than ever on the prairies of Iowa and many other western States.

NEVER leave file marks on a turning tool. It greatly weakens the material. The grindstone, in this case, is a better finisher than the file.