STEAM BOILER NOTES.

The coroner's jury in the case of the Bullman & Brown boiler explosion in Jersey City, N. J., which occurred on the 13th of September, rendered, October 6, the following verdict:

"That the effective cause of the explosion, on the morning of September 13, 1881, of the boiler on the drydock of Bullman & Brown, located at the foot of Essex street, Jersey City, causing the death of Lionel D. Decker, was from an imperfect safety valve in the hands of a careless, incompetent engineer, in the person of George Everson; and we further censure Messrs. Bullman & Brown for leaving the boiler without an engineer from 7 to 8 o'clock in the morning; and we would recommend that the Legislature of this State enact some law requiring the licensing of engineers and the inspection of all boilers once a year."

Whatever else may be said of the phraseology of this document, it certainly cannot be called ambiguous or equivocal.

In pursuance of this verdict, Joel W. Brown and Adam Bullman, the drydock firm, were arrested and held in $2,000 bail each, to await the action of the Grand Jury in the matter of the killing of Lionel D. Decker, by the explosion of the boiler. Each defendant was compelled to furnish two bondsmen. George Everson, who was in charge of the boiler, was also arrested, and his late employers became his bondsmen in the sum of $2,000. Bullman & Brown, it is said, have paid Capt. Decker's widow $3,500 in settlement for the loss of her husband.

This explosion was fully reported, with illustrations, in the SCIENTIFIC AMERICAN of October 1. The case was so plain that no other conclusion could have been reached by practical men who took the trouble to look for themselves at the corroded safety valve.

The safety valve having been tested by direction of the coroner while in the corroded state in which it was picked up after the explosion, it was found that 2,000 pounds, equal to about 400 pounds to the square inch, did not move it from its seat. The iron stem of the brass valve was perfectly cemented in the hole in the iron bonnet, in which it was intended to slide freely, by corrosion. It was forced out partly by the application of about 4,000 pounds, and completely by driving with a hammer. It was then cleaned and adjusted for another test, which showed that the valve would have blown off when in order with the weight at the point on the lever where it was found firmly fixed by a set screw, at between 50 and 60 pounds per square inch, and with the weight at the extremity of the lever it would, when in order have blown off at 100 pounds per square inch. This boiler was used only at intervals, and with the appearance indicating that the valve had been leaky, the conditions could scarcely have been arranged better for the promotion of results.

On the morning of the explosion the young man who generally built the fire for the usual attendant, then absent, found the fire low, and thinking the engine would soon be wanted to pump the dry dock, put coal in the furnace, closed the furnace door, and went away to other duty. At the end of about three-quarters of an hour steam began to issue from the seams, all steam outlets being closed, and increased to such an extent that the boiler could not be approached by the terrified dock hands for the purpose of opening the furnace door, although pike poles were used for the purpose. It is said that it blew up while the temporary attendant was still at work with his pike pole at the furnace door. He was blown into the water and badly injured. The verdict appears to be severe on the owners, since they thought that their man had been long enough acting as engineer to know something about the duties required, while there was no means provided for testing his knowledge or the soundness of his judgment of the reliability of the most important safety device about a steam boiler. There is still another party, the one who put an iron stem through an iron valve bonnet, that ought, perhaps more than any other, to be indicted for manslaughter in this case. If the coroner had hunted up and brought him or them to taste Jersey justice he would have been entitled to the "cake" as a model coroner in boiler explosions. Notwithstanding the testimony of the valve itself, more than one human witness testified that this valve would blow off at seventy-five pounds, and had done so within a few days before the explosion. The valve was perhaps leaky at that pressure, but it is not at all probable that it would automatically relieve the boiler as it ought, or so that whatever the fire might be steam could not rise to a dangerous pressure.

The boiler in Landue & Plinney's car factory at Carrollton, Mich., exploded October 2. Two brothers, named John and James Picard, were killed, and damage was done to the extent of $7,000.

On October 4, one of the boilers at B. S. Nichol's machine shop in Burlington, Vt., exploded, demolishing the two story brick building in which it was placed. No one was injured, though the engineer and fireman were in the room at the time. The loss will be several thousand dollars. The cause of the explosion is not known.

Compound Steam Engines.

Hallauer's recent experiments have led him to the conclusion that the difference between engines of one and two cylinders, in point of economy, is very slight. In ranging from 80 to 8,000 horse power, with revolutions varying from 25 to 90 per minute, the expenditure of steam for a given amount of work remains the same for the same type of motor; the consumption for two cylinder motors are identical for Woolf and compound, whatever may be the volumes of the cylinders, provided the motors are regulated so as to give the maximum efficiency; the expenditures of steam in motors of one, two, and three cylinders, suitably regulated and constructed, are so nearly alike that the choice may be governed in each instance merely by the fitness of the type of the engine for the particular purpose desired.

MICA.

As in times past, when the search after the "philosopher's stone" resulted in the discovery of many unsought, but nevertheless valuable substances, it frequently happens that the treasure seeker of to-day brings to light some unthought of ore or mineral—not as valuable as the substance sought, but certainly well worth finding—if the discoverer is wise enough to understand this.

The discovery of good merchantable mica in some of our Western gold mining regions is illustrative of this We have recently received many samples of this peculiar mineral—chiefly from Dakota, Colorado, and California—and some of these compare very favorably with the best products of the celebrated Carolina mines. We are glad to note this, for mica is peculiarly well suited for hundreds of useful applications in the arts for which it is not now available on account of its cost.

Mica is a very common mineral in some localities, but the merchantable article is by no means common, and a large body of "mica rock," capable of affording large, clear, and colorless sheets of the mineral, free from flaws and of uniform structure, is worth developing almost anywhere.

Muscovite or oblique mica—the clear variety—is essentially a silicate of aluminum and potassium. When the crystallization is uniform it can be easily separated with a knife blade into very regular flexible and elastic sheets of almost any required thickness. It is not affected by water or strong acids (with the exception of hydrofluoric acid), and may be heated quickly to redness without danger of melting or cracking it. In thin plates or sheets it resembles glass, but it is not brittle, and this, in connection with the other peculiar properties alluded to, make it available and serviceable as a substitute for glass under conditions which preclude the use of the latter. Mica is never quite colorless, although in good samples the color is barely perceptible in the thin sheets. That having a faint wine or brandy tint commands the best prices.

In the New York market the mineral is usually sold by the pound, in sheets cut to sizes varying from two inches to fifteen inches square, the price varying with the size and number of sheets to the pound, color, and quality. When the sheets are properly split, trimmed, and cut to size the prices for good clear mica vary from twenty cents to eight dollars per pound.

Of the numberless uses to which this mineral glass has been put it is chiefly in demand for the glazing of stone and furnace or heater doors, and as a substitute for glass in some kinds of lanterns, as it is much lighter and tougher than glass, and is not easily ruptured by jar or concussion. The latter consideration has caused its substitution for glass lights on gunboats and naval vessels.

Mica is peculiarly well suited to the construction of light roofs and walls for galleries, conservatories, greenhouses, or hotbeds, etc., as it can be easily shaped and bent, and secured with tacks after the manner of shingles; is not easily fractured, and requires very light supports. We have seen structures of this kind, and they would seem to leave little to desire in this line, except, perhaps, larger sheets of the mineral and a reduction in its cost. The sheets may be tinted or colored by dipping them momentarily in a very dilute alcoholic solution of pale shellac suitably colored with any of the soluble coal tar or aniline dyes, and exposing them for a few minutes to warm air to dry. Very pretty color effects can thus be produced. A simple way of producing a frosted or ground appearance on the sheets of mica is to coat them with a thin milky varnish prepared by mixing together solutions of one ounce of pale shellac in three pints of wine spirit and one ounce of pale resin in a pint of good benzine. A rather thin sirupy solution of water glass, with which has been mixed a trace of zinc sulphate dissolved in water, can be used in a similar manner to effect this object.

A colorless cement for joining sheets of mica is prepared as follows: Clear gelatine is softened by soaking it in a little cold water, and the excess of water is pressed out by gently squeezing it in a cloth. It is then heated over a water bath until it begins to melt, and just enough hot proof spirit (not an excess) stirred in to make it fluid. To each pint of this solution is gradually added, while stirring, one-quarter ounce of gum ammoniac and one and one-third ounces of gum mastic previously dissolved in four ounces of rectified spirit. It must be warmed to liquefy it for use and kept in stoppered bottles when not required. This cement, when properly prepared, resists cold water.

Flexible mirrors are made from sheet mica, the silver being deposited from a solution of the nitrate by one of the processes described in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 105. Small mirrors of this description are used in some kinds of inlaid work and for various decorative purposes. As their flexibility admits of their application to irregular surfaces they can be used where glass mirrors cannot. With the aid of a little gold leaf, bronze powders, size, and variously colored thin transparent varnishes or collodion mica has been worked into hundreds of beautiful articles for decorative purposes, toys, etc.

When mica is heated to redness for some time in a muffle and then allowed to cool rather quickly the laminæ become distorted and the sheets present a silvery-white appearance by reflected light, the mineral losing much of its flexibility The dust of this whitened mica is used to some extent by the French as a silver bronze powder. Mixed with a weak solution of gum arabic it makes a good silver ink. The powder is sometimes variously tinted by washes of very dilute colored solutions of gums or varnishes. To prepare the glistening powder the sheets of whitened mica are simply crushed (not ground), boiled in hydrochloric acid, rinsed, dried, and assorted to size of laminæ. The finer filaments have a pearly luster and are made to adhere to semi-softened gelatine and wax to imitate pearl. The silvery powder is used on metals, glass, wood, paper, plaster, tapestry and furniture. It has also been used in calico printing in place of the heavy bronze and glass dust of Lyons fabrics, and for the decoration of china and glassware.

Mica is used by electricians for certain insulating purposes and also to some extent by makers of philosophical and optical instruments. Good mica, because of its lightness, is often employed as a substitute for glass in spectacles designed to simply shade the eyes or to protect them from dust, cinders, or flying particles of metal or stone for travelers, millwrights, grinders, polishers, and others whose work necessitates such protection. Vessels of mica are often used in the chemical lecture room, and are particularly serviceable in the experimental illustration of the properties of certain gases—the burning of metals in oxygen, etc.

The powdered or crushed mineral has recently been used, in connection with nitroglycerine, in the preparation of a kind of dynamite called mica blasting powder. It has also been employed as a filling for fireproof safes, as a non-conducting covering for boilers and steam pipes, and, in connection with water glass, as a fireproof varnish or paint. The larger sheets, applied after the manner of shingles, make a very good fireproof roofing material.

Formerly most of the merchantable mica used in this country was imported, but for the past few years—since 1867—our supply of the mineral has been derived chiefly from mines located in Mitchell, Heywood, Yancey, McDowell, and Macon counties, North Carolina. The product of these mines is at present hardly equal to the demand, which is increasing very rapidly.

The discovery—or rather rediscovery (for some of them show signs of having been worked centuries ago)—of these valuable beds of mica in the Carolina gold fields was. like the Western "finds" above referred to, one of the results of a search after the precious metals.

The Atlanta Exposition.

The International Cotton Exposition at Atlanta, Georgia, was formally opened October 5. Among the thousands of visitors present were many representatives of the North and West. The assemblage was called to order by Governor Colquitt. After prayer by Bishop Elliott, of Texas, the buildings and grounds were presented to the Exposition Association by Director General Kimball. In responding Governor Colquitt highly complimented the executive committee and expressed the belief that the energy bestowed in the development of the enterprise thus far had never been exceeded. All the space in the several large buildings has been taken, but a fortnight must elapse before all the exhibits can be in place and in presentable condition. After the machinery was started Senator Vance, of North Carolina, delivered an address of welcome on behalf of the Southern people. Senator Voorhees, of Indiana, followed with an oration in which he took strong grounds in favor of the development of Southern industry through the fostering influence of a protective tariff. "Free trade," said he, "is a seductive sound that can mean nothing except where it is purely reciprocal, and exists between nations of equal strength. It is the duty of the government to protect its own industries before it practices benevolence."

This is the first world's fair ever held in the South, and while it properly takes its name from the leading Southern product its scope includes all the material interests of the Southern States. The two hundred and twenty-two classes of exhibits are distributed in forty-one groups arranged in six departments, the first four of which are for competitive exhibition and awards, the other two for exhibition only. These departments are: I. Productive machinery, implements, processes, etc. II. Natural products, especially textile products. III. Manufacturing machinery, chiefly textile, etc. IV. Manufactures. V. Miscellaneous natural products. VI. Non-textile machinery and manufactures, art products, etc.

The site of the fair is Oglethorpe Park, which covers fifty acres, just outside the city. The buildings cover more than twenty acres, the number of exhibits having vastly exceeded anything at first contemplated. The exhibits pertaining to cotton, its cultivation, handling, and manufacture, are beyond comparison superior to anything ever seen before. The wealth of general exhibits is not less a surprise to all. Particularly rich is the show of minerals, woods, and other natural products of the South. The Executive Committee announce the following special weekly exhibitions:

Fruits and flowers, commencing October 25; cattle and mules, commencing November 1; sheep and swine, commencing November 8; bench show of dogs, commencing November 15; poultry, etc., commencing November 22; dairy products, commencing November 29.

October 27 is set down for "Governors' Day," it being expected that the State Governors in attendance at the Yorktown Centennial Celebration will that day visit the Exposition accompanied by their several staffs.