A SHAM BOILER INSPECTION.

The boiler of the Hudson River steamboat Riverdale, which exploded August 28 (noted in the SCIENTIFIC AMERICAN of September 8), has been raised, a coroner's jury has made an examination, and rendered a verdict which states that the boiler "ruptured from the insufficiency of the plates in the bottom of the cylindrical shell to withstand a working pressure less than that assigned to them by one of the United States inspectors for this district, in consequence of their having become weakened by internal oxidation from their unusual exposure to the corrosive action of the feed water."

The verdict further expresses the opinion that "the United States law is not sufficiently mandatory in its requirements as to the usual examination of a boiler, so far as it may be practicable; that the pressure test alone is insufficient in its period of application, fallacious, and pregnant with disaster both to human life and property, as is fully evidenced in the case under consideration, namely, this boiler was tested in June last and withstood a pressure of 62 pounds to the square inch, yet in the brief period of less than ten weeks it ruptured under a pressure not exceeding 32 pounds, in consequence of the neglect of observance of its condition at the time of testing it." A censure of the engineer and the United States Inspector was offered, but was not indorsed unanimously.

The boiler had become weakened by reason of corrosion, the original one-quarter inch thickness being corroded so that portions could be broken off by the hand. According to one newspaper report, a supervising inspector said that "the flues would prevent the bottom's being sounded by a hammer to test its strength. A hammer could not reach on the outside either, on account of the low position of the boilers in the boat. Under those circumstances the corroding process would work on unnoticed till the bottom of the boiler became too thin to stand the strain." Another supervising inspector said that "it would take twenty times the number of inspectors to examine thoroughly and test such boilers as this."

Yet it appears that a certificate of inspection was issued, and on this baseless certificate the boat was permitted to run, to the loss of human life and the destruction of property.

An assistant inspector testified that the absence of rivets which had been eaten away by corrosion could have been seen from the front by holding lights at the back, so that the rays could reach the place. The assistant inspector who assumed to have examined the boilers on the 21st of June last, acknowledged, in his testimony, that the boilers were not empty when he examined them! Witness said he did not test the boiler with a hammer, but merely looked at it. Witness acknowledged that in his inspection of the boilers of the Riverdale in 1881–82 and 1883 he never was inside of the boilers, but merely looked into the manhole.

Comment on such testimony is scarcely required. It shows the farcical character of so-called boiler inspections under the present system. A man looks into a boiler the bottom of which is covered with water and the interior dark as Erebus, pronounces the boiler all right, and signs a certificate of safety, and in just two months the boiler bursts and kills half a dozen persons. "Boiler inspection" forsooth!

THE MILDEW OF THE GRAPE.

Closely related to the potato rot fungus, an account of which was given in our issue of September 8, is the mildew upon the grape vine. These two fungi belong to the same genus, the former being known to science as *Peronospora infestans* and the latter as *Peronospora viticola*. The mildew of the grape is much slower in its action, though the general behavior and appearance of the two pests are much alike. The grape mildew makes its first appearance upon the under surface of the grape leaves in the form of small frost like patches. The smooth leaved varieties of grapes exhibit this parasite to much better advantage than those sorts the leaves of which are covered with a dense coat of hairs. These patches of a crystalline appearance consist of the tips of branching threads which come out of the breathing pores of the leaves and bear the summer spores on their many terminations. These spores are formed very rapidly, fall away from their attachments, and are carried by the wind, and otherwise, to new ports and then germinate, thus propagating the mildew. The substance of the grape leaf below the "frosty" patch is interlaced with the threads of the fungus, which branch and send short suckers into the walls of the leaf cells and rob them of their nourishment. The mildew lives upon the stolen juices of the grapevine and thus does its injury. The infested leaves soon turn brown and die unless some measures are taken to destroy the parasite.

The conditions most favorable for the growth of the grape mildew are, a moist atmosphere with bright sunshine. A succession of showers in late June is very apt to result in an abundance of mildew. This season it has been unusually destructive, owing to excessive moisture of early summer. The fungus does not confine itself to the leaves, but spreads to the stems and the fruit. The writer has examined many clusters this season, the berries of which were discolored within when only partly grown; while on the outside they had the attractive color of half ripened fruit. When sections of these prematurely ripened grapes were placed under the compound microscope, they were found infested with the filaments of the grape mildew. The skin of the grape being tough and without breathing pores, prevents the fungus from coming to the surface and forming the summer spores. The diseased grapes cease to grow, become shriveled, and finally drop as worthless masses from the stems.

Some varieties seem to be more injured than others by the mildew. The fungus thrives best on the thin leaved sorts, but none of the varieties, so far as we know, are proof against the pest. Some varieties are more vigorous and perhaps are better able to withstand the attacks of the mildew. The remedy for the mildew on the grape is flowers of sulphur. It should be dusted on or blown on, with a bellows, so soon as the first signs of the trouble may be seen. The sulphur is more lasting in its effects if applied when the foliage is wet, either with dew, in early morning, or with rain. It is important to get the yellow powder upon the under side of the leaves and in contact with the "frosty" patches. It is too late to apply the remedy this season, but all grape growers should make the necessary preparations to meet this enemy upon its first appearance early next summer.

A second form of spore is formed by the mildew and within the substance of the infested part. It results from the union of the contents of two cells, and is of slow growth. These spores are provided with thick coverings of a brown color and do not germinate until the following spring. The sexual spores, as they are called, are most abundant in the foliage in late autumn, and remain in the substance of the foliage until set free by the processes of decay, etc. It is evident that these spores are designed to carry the mildew over the winter season, and may be called *winter* spores in distinction from those found early in the season, which might be designated *summer* spores. Very many fungi have these two forms of spores, and in some the number is increased to five or more.

The leaves of the vineyard after they have fallen should be gathered into piles and burned, and in this way a vast number of the spores within the leaves would be destroyed. This part of the work of checking the spread of the grape mildew may still be done this season. It is a prevention, an ounce of which is worth a pound of cure. The remedy is applied in early summer in the form of flowers of sulphur. Many vineyardists are as careful about "sulphuring" their vines as they are in manuring the ground or gathering the crop. Others are careless of this, and lose by it.

There is another mildew of the grape vine, closely related to if not the same as the fatal *Oidium* of European vineyards.

New Process of Mineral Painting.

A new process of mineral painting, invented by Herr Adolph Keim, of Munich, was lately exhibited in operation and by executed specimens at the Art Training School, South Kensington, London. Mr. T. Armstrong, the art director, explained that when he visited the Art Exhibition at Nuremberg some months since, he saw numerous specimens of this new form of decoration. It was to some extent analogous to distemper painting, and offered facilities resembling those possessed by the antique decorators for the rapid execution of ornamental paintings, scrolls, and arabesques on a surface of gesso or plaster without reflecting the light. The science and art department purchased two large pieces illustrating the process, which were now hung at a proper level in the Architectural Court at South Kensington, and Herr Schraudolph, a Munich artist, had been engaged during the present term to execute work by this process before the students of the National Art Training School.

Some specimens of that work, life-sized studies of female figures and floral decoration executed on canvas, and smaller sketches on tile, glass, slate, and marble surfaces, were exhibited in the room. At the conclusion of Mr. Armstrong's explanation, Herr Schraudolph showed to the audience how the work was done, the outlines being traced on a ground kept moist by a spray, and then filled in with moist colors and fixed by repeated sprays of potash water glass, after which carbonate of ammonia and benzine were applied to the surface. Skill and judgment are needed to insure that the process of fixing is not carried too far, or a troublesome and unsightly efflorescence is formed on the surface similar to that which disfigures the frescoes in the House of Lords.

As to the permanency of the process, Herr Schraudolph stated that some work which had been done on marble ten years ago, and other specimens on canvas two years ago, showed no signs of deterioration at present, but the process was quite a modern one. Mr. Armstrong added that there was no attempt to simulate tapestries, and any development in that direction resembling the dyed fabrics now to be seen in the Bond Street and Regent Street show rooms was to be deprecated. It was equally as effective as tapestry, and, as could be seen from the exhibits, allowed a wide range of color.

The following description of the process has been prepared by Professor Church:

Herr Adolph Keim's process of "mineral painting," although identical in principle with the stereochromy of Fuchs, differs from that process in several important particulars. For the simple mortar, or plaster, of lime and sand generally used in stereochromy as the painting ground, Herr Keim substitutes a composition made by the careful admixture of 4 parts quartz sand, 3½ parts marble sand artificially prepared and free from dust, one-half part infusorial earth, and 1 part quicklime slaked with distilled water. The pigments are admixed with various substances before use, so as to render the action of the fixative solution upon them, when the painting is complete, more uniform.

The pigments are also treated with alkaline solutions (of potash or ammonia) so that any change of hue which might ensue from the use of alkaline liquids in fixing the paintings may be anticipated by treating the paints themselves before use with the same solutions. But not only do the pigments and the materials of the painting ground offer novel features in this process of Herr Keim, but the fixing of the painting with a hot solution of potash waterglass and its subsequent treatment with a solution of carbonate of ammonia differ from the process adopted in stereochrome painting. It should be stated that paintings may be executed not only upon external and internal walls coated with the specially prepared plaster, but also upon tiles, slate, glass, etc., similarly coated, and even upon canvas, which has been washed with baryta water, and is kept moist with a fine spray of distilled water.

The operations of "mineral painting" may be thus summarized: upon an ordinary but perfectly dry mortared surface a coat of the painting ground material is laid without "floating;" a thin coat, but rough and porous, being secured. Then the dry painting ground is soaked with a solution of hydrofluo-silicic acid. When the ground is sufficiently dry to be again absorbent, it is treated with a solution of potash waterglass. The outlines having been traced upon the ground, kept moist with a fine water spray (distilled or rain water), the painting is carried out with the prepared colors, which are kept in glass bottles, in a moist, pasty condition. These colors, it has been before stated, contain certain admixtures, as the hydrates of alumina, magnesia, or silica, oxide of zinc, carbonate of baryta, feldspar, powdered glass. The colors used are those which have been found available for the stereochromic process. The fixing of the picture is accomplished by means of a hot solution of potash waterglass, thrown against the surface by means of a spray producing machine, in the form of a very fine spray. This fixing done, by several repetitions of the process, a solution of carbonate of ammonia is finally applied to the surface. The carbonate of potash, which is thus quickly formed, is removed with repeated washings with distilled water. Then the picture is dried by a moderate artificial heat. Finally, a solution of paraffin in benzine may be used to enrich the colors, and further preserve the painting from adverse influences.

Taking Time.

The annual report of the astronomer in the observatory of Yale College gives some interesting reports of the work in his department of horology for the last year. From these it appears that the American Watch Company, of Waltham, Mass., received 22 Class 1 certificates for watch movements, and next to the highest mark during the year 1883. Barraud & Lunds, of London, stood at 82, and Constantin & Vacheron, Geneva, Switzerland, 85. The observatory furnishes time by signals to the headquarters of every railroad in Connecticut.

To encourage the public confidence in the accuracy of these telegraphic time signals, the custom has been established of furnishing, as a news item to all the newspapers in the State, the mean monthly errors of these signals at 12 o'clock noon. This time is identical with that of New York city.

The report suggests the establishment of a school of horology in this country. The report says:

"A school of this character is no doubt needed by one of our leading industries, and it will not be difficult, should the financial support be furnished, to establish a course of study and manipulation which should lead to a certificate of training and ability in this direction."

Cornelius Whitehouse.

The *Journal of Gas Lighting* announces the decease on the 7th of August last of Mr. Cornelius Whitehouse, the original patentee of wrought iron gas tubes, the manufacture of which is now one of the staple trades of Wednesbury. Mr. Whitehouse was in the 89th year of his age. It may be mentioned in this connection that the bulk of the tubes now made are still manufactured in the manner described by Mr. Whitehouse's English patent, taken out in 1847. In that year he commenced business, trading as Whitehouse & Co., at the Globe Tube Works, Wednesbury; and the trade mark of the firm—the "Globe"—became one of the best known for tubes in England and abroad. In common with most other patentees, the benefits Mr. Whitehouse conferred on all countries through his invention did not leave his latter days with such substantial means as, considering the importance of the industry he created, one could have wished him to have enjoyed.

Coefficients of Friction.

Professor Thurston states that the coefficients of friction of lubricated surfaces under pressure, as given in text books, are much too high; instead of 4 to 7 per cent, as stated therin, he has obtained as low as one-fourth of 1 per cent with sperm oil. This, he says, is the best he ever found for heavy pressures, and he has made experiments all the way from very light up to 1500 pounds per inch of surface. The crank pins of beam engines on steamboats, where a thousand pounds pressure to the square inch is not uncommon, run as low as one-half of 1 per cent for the friction.