PHOTOGRAPHIC NOTES.

Glazing Gelatino-Bromide Prints.—The use of highly hand-polished sheet vulcanite rubber for imparting a high gloss to the surface of gelatino-bromide prints is now well known, but, in consequence of the difficulty in obtaining good samples, and of its high cost, the general use of it has been somewhat limited. A substitute, in the shape of ferrotype plates, costing but a mere fraction of the rubber, has been recently tried with success. Upon the smooth varnished side of the sheet is laid the moist print, film side down. It is then squeegeed by passing a rubber roller over the back, which presses out all the air bells. In an hour or so the print, when dry, can be pulled off at one corner, and will possess a high gloss.

A slight heat applied on the rough side of the metal sheet will materially hasten the drying.

Portable Apparatus for Generating Oxygen Gas.—Prof. L. H. Laudy, of Columbia College, New York, exhibited before the New York Society of Amateur Photographers, on the 8th inst., an improved apparatus for generating oxygen gas, designed as a substitute for oxygen gas bags and cylinders, and showed how applicable it was for the use of amateurs in producing a powerful lime light for the optical lantern.

The blow through jet was used; the ordinary street gas, taken from the gas fixture, furnishing the hydrogen. The oxygen mixture of chlorate of potash and manganese was held in a metal tube of tin, 2 feet long by 2 inches in diameter, supported in a horizontal position on a light stand, about 8 inches above the base. A special improvement in these cylinders, invented by Prof. Laudy, consisted in having a removable metal conical-shaped brass plug at one end, which was held in place, after being driven in by a slight tap of the hammer, by the compression of the end of the tube. The object of the plug was to permit the materials to be easily discharged from the tube after the oxygen had been exhausted, then to be refilled again with fresh potash and manganese.

To produce the gas, it was only necessary to heat the tube with a Bunsen burner, commencing at one end and gradually sliding it along on the base under the tube at intervals until the oxygen was exhausted from the chemicals. Leading from the oxygen tube was a rubber pipe, which communicated with a copper gas holder, 18 inches in diameter by about the same depth.

The upper cup fitted into a similar inverted bottom cup, having a deep annular recess, which held about three quarts of water, the latter acting as a seal. The whole was supported in a light wood frame.

An improvement devised by Prof. Laudy consisted in making a square tube (¼ inch square), extending from the top of the upper gas cup, act as a guide to the upward or downward movement of the holder. On the upper portion of the wood frame was a metal sleeve, through which the exit square guide tube passed. From the upper end of the latter extended a flexible tube to the burner. A weight placed on the upper cup of the gas holder gave a uniform pressure to the gas.

To start the apparatus, the Bunsen burner was lighted and placed under one end of the oxygen tube; as the gas was generated, the upper cup of the holder filled and ascended, similar to the action of a gasometer.

When half elevated, the lime light burner was lighted, and in a short time a brilliant light was produced, perfectly noiseless, steady, and estimated to be equal in intensity to 125 candles.

One tube of the mixture would supply sufficient gas for an hour's exhibition.

The advantages were that it was noiseless, non-explosive, absolutely safe, and could be made ready for use at short notice.

It was explained that a practical apparatus for producing oxygen from tubes where the gas was burned as fast as generated was invented as long ago as 1870. A lantern slide of the apparatus was thrown on the screen.

The estimated cost of operating a lime light with Prof. Laudy's apparatus was but twelve cents an hour, and its simplicity made it well adapted for use in parlor or lecture exhibitions, where a good, soft, strong light is oftentimes required, without delay and trouble.

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The Eddystone Lighthouse at Liverpool.

One of the most attractive and novel features of the Liverpool Exhibition, lately opened by the Queen, will be the full size representation of the New Eddystone Lighthouse, now being erected in the grounds. Externally, the structure will be an exact representation of the original, every detail, even to the courses of the stones, being faithfully reproduced. The height from the ground line, or bottom of base, to the center of the light is 150 ft., and the total height to the top of the lantern roof is 170 ft. As the base of the structure is nearly 150 ft. above the level of the quay wall at the landing stage, the height of the light will be about 300 ft. above the sea level. The diameter of the base—which has a vertical face of 20 ft. high—is 44 ft. The diameter of the structure, starting from the top of the base, is 35 ft. 6 in., and this gradually tapers to a diameter of 19 ft. near the top of the main structure, to receive the lantern.

This lantern is 14 ft. diameter inside, thus leaving a width of 5 ft. outside for a gallery. The height of the lantern is 16 ft. 6 in. to the eaves of the roof, 12 ft. 6 in. of which is glazed with diagonal "squares," rolled and cut to the exact shape and size. Beginning at the bottom of the tower, 36 strong foundation bolts are secured to heavy anchor plates, buried 20 ft. below the surface of the ground, and on massive blocks of cement concrete are fixed the base plates of the main ribs, the foundation work being done by Mr. Henshaw, of Chatham Street. There are six of these main ribs, and a space of 9 ft. is left in the center, forming a shaft in which will work the passenger lift. The ribs are constructed of wrought-iron rolled beams, tee bars, angle irons, and flat bars, braced together, dividing each rib vertically into thirteen bays, the level of each bay corresponding to a floor line in the original lighthouse. The ironwork has been constructed at the works of Messrs Timmins & Pirrie. The iron framework will first be covered with a wooden framework, spaced 18 in. apart, by Messrs. Brown & Backhouse; this framework will be covered by cement plaster slabs. The lift is being made by Messrs. Waygood, of Liverpool and London. The cage will be hexagonal in shape, 8 ft. across, and about 9 ft. high; it will be made of polished walnut, and fitted with beveled mirrors and ornamental lead lights.

The lighthouse will be illuminated at night by a powerful revolving light, having an electric lamp and lenses of the fourth order, this work being supplied by Messrs. Chance Bros., of Birmingham. To prevent accidents, the balcony will be protected by a strong wire network cage. There will be over one hundred tons of ironwork in the structure, made up of over 4,000 pieces of iron. The engineer for the work is Mr. John J. Webster, Assoc.M.Inst.C.E., of Stephenson chambers, Lord Street, under whose superintendence the work is being carried out.—*Building News.*

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Steam Boiler Explosions and Their Prevention.

In the *Rivista Scientifica Industriale Italiana* we read that Prof. Giovanni Luvini has presented to the Societe des Ingenieurs et Industriels of Turin an important memoir upon the explosion of steam boilers, and upon the means of preventing them by facilitating the boiling of the liquid. The author particularly examines explosions due to superheating of water—the only ones that are ever unavoidable, even by continual care and attention.

As well known, when a liquid at rest is slowly heated its temperature will often rise above its boiling point. A superheated liquid is thus obtained whose temperature rises above the boiling point.

Superheated water contains within it a quantity of heat that is capable of serving to volatilize it, and, if any cause whatever (such as a shock, some part of the boiler getting hotter than others, the entrance of an air bubble into the water, or the introduction of substances that favor ebullition) puts an end to the conditions to which the superheating is due, a part of the water will abruptly evaporate at the expense of the heat that it contains in excess, and there will occur a sort of explosion, whose energy will depend upon the difference between the temperature of the superheated water and its minimum temperature of ebullition.

When such difference is considerable, the quantity of steam formed, and its pressure, may become great enough to burst any boiler whatever.

It results from the experiments of all the physicists who have studied the subject, and particularly from those of Bellani and Donny, that water free from air cannot boil at any temperature, and that, pressure being equal, the temperature of ebullition becomes so much the higher in proportion as the water contains less air.

Prof. Luvini repeated most of Bellani's and Gernez's experiments for the purpose of finding a remedy against the explosion of boilers through superheating, and studied the influence on ebullition of the size and form of a tube, closed at one end (of either glass or metal), introduced into the water. He found (1) that the effect produced depends in nowise upon the material used, but upon the contained air; (2) that the larger the tube or vessel, the larger and fewer are the bubbles of air that form in the steam; (3) that if the internal empty space in the tube or vessel terminates in a tapering point, the tube's property of facilitating ebullition appears indefinite, while if it be rounded its action ceases in a few hours; (4) that a bundle of small glass tubes, with their apertures pointing downward, and placed in a glass flask containing boiling water, gives rise to an abundant production of steam—a result that may likewise be reached through a horizontal brass, copper, or iron cylinder provided beneath with a large number of small conical holes, a millimeter or two in diameter; and (5) that if water be heated in a flask, provided with a thermometer, we shall sometimes see the latter indicate 104° to 105° C. before the water begins to boil in large bubbles; and when the metal cylinder is introduced, the ebullition will at once become brisk and regular, and the temperature of the water will immediately fall a few degrees.

Now, the question is to know for how long a time these glass tubes or metallic cylinders can produce the effect described. Prof. Luvini's predecessors in this field of research operated with glass only, and considered the space of time indefinite, although their experiments did not last over 24 hours.

Prof. Luvini performed one experiment that lasted 82 hours, during which the water boiled 53 hours—9 the first day, 14½ the two following days, and 15 on the last. When the cylinder was put into water on the first day, the boiling was proceeding slowly, and was accompanied with large bubbles, and the thermometer marked 105°. After the introduction of the cylinder, the ebullition became regular, and the temperature fell promptly to 100°, and stood during the hour of ebullition between 99·3° and 100·5°. During this time the barometric pressure fell from 739·7 mm. to 734·1 mm. After the cylinder was removed, the temperature soon rose to 102°.

This same experiment was repeated with two flasks—one of them provided with a cylinder, and the other not. In the first twelve days the temperature of the first rose from 100·5° to 101·2°, and that of the second from 101° to 104°, and the pressure from 739·1 mm. to 750·5 mm. At the end of the twelfth day, the water of the first flask began to boil with great vigor, like that of the second, and at the beginning of the thirteenth day the cylinder had ceased to act.

The water employed in all these experiments was potable and yielded much deposit, which, when the water was boiled in the flask for two or three days without the cylinder, adhered firmly to the glass, and formed a scale that could not be detached by simple washing; while, on the contrary, when the water was boiled in the presence of the metallic cylinder, what deposit occurred was in the form of a loose powder upon the bottom of the vessel.

For the purpose of ascertaining whether water produces a larger quantity of steam when it boils vigorously and at a high temperature, Prof. Luvini performed the following experiment: While keeping the gas flame constant under the flask, he weighed the boiling water, and then continued the ebullition for 10, 20, or 30 minutes, alternately with and without the metallic cylinder, and taking the weight each time.

Upon repeating this operation several times, he found that, within the limits of probable errors as to the equality in time, the same quantity of water is consumed in each case. The only difference is that, with the cylinder, the vaporization is complete, and that without it there is carried along much water, which evaporates in the air.

So Prof. Luvini proposes a new apparatus, and one which is simple, efficacious, and cheap, which can be applied to any steam generator, old or new—an apparatus which does not require a mechanic to apply it, and which is an absolute preventive of the explosion of boilers by superheating, by its rendering the development of steam more regular.

This apparatus consists of a small metallic frame, called a vaporizer. It may be made of any kind of metal, may be of any form, and is applicable to any sort of boiler. The lower surface of the vaporizer is provided with cavities of a suitable form. Four vertical legs hold it at a distance of one or two centimeters (four-tenths or eight-tenths inch) from the bottom of the boiler. These cavities imprison air during the descent of the vaporizer, and act after the manner of the small tubes used by Prof. Luvini in his experiments. The upper surface is provided with a ring, with which the apparatus may be handled.

Prof. Luvini's experiments show that this vaporizer is capable of protecting a boiler for from ten to twelve days without a renewal of the air contained in the apertures. By taking it out and putting it back, then, once a week, we can be secured against any danger of explosion due to superheating.*

It is to be noted, further, that the vaporizer secures a saving in fuel, for three reasons: (1) because, through the presence of the air in the apparatus, the water boils at a lower temperature than it otherwise would; (2) because, as a consequence, the difference between the temperature of the boiler and that of the surrounding air is less, and consequently the loss of heat through contact and radiation is likewise less; and (3) because, since the vaporizer does not allow of a turbulent ebullition, there is no water carried along.—*Chronique Industrielle.*

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To Cure Damp Cellar Walls.

The following, it is said, will accomplish an admirable result: Boil two ounces of grease with two quarts of tar for nearly twenty minutes in an iron vessel, and having ready pounded glass one pound, slaked lime two pounds, well dried in an iron pot, and sifted through a flour sieve. Add some of the lime to the tar and glass, to form a thin paste only sufficient to cover a square foot at a time, about an eighth of an inch thick.

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* It would seem that blowing out the boiler would measurably answer the same purpose.—ED.