STEAM BOILER NOTES.

On the 6th of February a large rendering tank exploded at the works of the East St. Louis (Mo.) Rendering Company. The works are located northerly from the National Stock Yards. The building in which the tank was fixed was completely demolished by the explosion. John Casseca was killed and Jerome Tyler and John Meyerhoffer were seriously injured. The property loss is estimated at $15,000.

Rendering tanks are simply cylindrical vessels, usually upright, made of boiler iron plates riveted together as steam boilers are. Into these portions of the animal that are suitable for lard or tallow are introduced through man holes, which are then closed and steam is admitted at a temperature and pressure such as will most promptly and economically separate the grease from the animal tissue. The steam is conveyed to the tank from any suitable steam generator through pipes in the usual manner. The tanks should therefore be as strong as the steam boiler. Similar vessels called keirs are used in a form modified to suit the requirements for bleaching cloth and yarn.

Rags and other paper stock are usually bleached in large rotating iron cylinders mounted horizontally on gudgeon-bearings riveted to their end plates, through which steam is admitted while they slowly revolve upon their axes. Bleaching liquid is run in after the stock is put in through the man-holes, which are then closed steam tight and the steam turned in. Radial pins are fixed to the interior of the cylinder for the purpose of lifting and turning over the stock as the cylinder revolves.

In some digesting processes acid liquids are used, in which case the vessels are made of either copper or some lead or tin lined metal plates. The various arts now require many modifications of this method of the employment of moist heat at higher degrees than can be obtained under atmospheric pressure in open vessels.

The extraction of coloring matter from dyewoods, and dyeing by some of the modern methods; the impregnating of woods and lumber with various preservative and fireproof compounds, by means of steam pressure and the accompanying heat, are, in addition to rendering, bleaching, boiling, dyeing, and extracting, familiar examples of the use of high saturated steam in detached vessels.

In vulcanizing hard rubber goods steam heat is used to heat the dies and formers in the process of pressing, because it can be perfectly distributed and controlled to the fraction of a thermal degree, which is not the case with direct furnace heat. It is obvious, therefore, that a proper study, in connection with boiler construction and explosions, is that of detached steam vessels which are now being used in such great variety in the industries of this steam age.

The records of boiler explosions, therefore, properly include explosions of detached or secondary steam vessels, and from such records it appears that bleaching, digesting, rendering tanks, and the like, which are too weak either constructively or on account of acquired defects to sustain the pressure at which they are attempted to be worked, burst or explode in a similar manner, and produce similar results to those that attend the explosion of steam generators that are exposed to the fire and to other causes of deterioration peculiar to their conditions of use. And, considering the many thousands of steam boilers now in use, the ratio being perhaps five hundred generators to one secondary steam vessel—it is astonishing that so many of this latter class distinguish themselves by exploding disastrously; more especially since none or almost none of the older explosion theories can by any stretch of imagination be made to apply to them. No fire is near these vessels; all their heat comes through pipes from a distant steam generator, and the burning of the plates of which they are made, or any other of the deteriorating effects of the fire, cannot furnish a foundation for low water, explosive ebullition, lifting of water or gas from decomposed water theories, that many people still hanker after and cull such facts as appear to support their favorite theories and offer only such in explanation, asserting that such and such are the most common, or, perhaps, the universal causes of destructive boiler explosions. Reverting to the East St. Louis tank explosion which has furnished the text for this note, it is possible that the nitro-glycerinists—a sect still extant—may gather imaginary support from the fact that the rendering tank contains all the elements of their favorite explosive, wanting perhaps only the sulphur, which may have been accidentally present from some carelessness on the part of a workman or otherwise. True such a thing as the assembling of all the elements of this most powerful explosive compound in a lard or tallow rendering tank is possible, yet the same may be said of the human stomach, with still greater appearance of probability, since a breakfast of ham and eggs contains the sulphur also which is generally absent in the rendering tank.

In the lard rendering process, there accumulates in the tank considerable water from the condensation of the steam exposed to the cooling effect of the iron of the tank and also from the animal tissue. While the water is kept in circulation by the action of the entering steam, the grease and water are intimately commingled though not chemically mixed, so to speak. This must continue till the grease is separated from the tissue; then the water may settle at the bottom, and, cooling to atmospheric pressure, the lard or grease is drawn off by siphon or a series of openings in the side of the tank.

During the rendering process the mingled grease and water have a temperature, due to the pressure of steam, which is often far above the atmospheric boiling temperature. Should a sudden rupture of the shell of the tank take place during the height of the process, especially a longitudinal rupture of considerable extent, the highly heated liquid gives out its extra heat, or that above 212° Fah., instantly on being relieved of pressure by the bursting of the shell. The water in the greasy liquid becomes largely steam, or rather it instantly expands and divides the whole liquid into a heavy spray with a suddenness that gives the character and almost the effect of a detonating compound, and the results are similar to those that obtain when a steam generator containing a like quantity of equally heated liquid breaks in a similar manner.

An experiment may be easily made by any person having the means at hand that will illustrate the fact that water practically explodes when relieved with sufficient suddenness of a high pressure, while at a temperature due to that pressure, as it is in a steam boiler. Place a piece of dry wood or other not very strong dry porous body inside of a short piece of iron pipe containing water. The pipe, say a short piece of steam pipe, having been fitted for this experiment by attaching to one end a gate valve with an open way as large, or nearly as large, as the opening in the pipe, and to the other end of the pipe attaching a steam pressure gauge and a safety valve, the whole will be a miniature steam boiler with water and a bit of wood in it. After fixing the small boiler firmly upon a suitably firm foundation, where steam can be raised, apply heat and raise steam to any desired safe pressure and maintain it till the porous body in the water becomes thoroughly saturated with the boiler water—a few minutes will suffice; then let the gate valve be opened with a jerk.

The instantaneous escape of the steam, followed so closely by the exploded water as to be sensibly simultaneous, may be expected, and the porous bit of wood (which should be of considerable size), if it can be found at all, will be reduced to fine splinters by the expansion, practical explosion, of the water with which its pores have been filled.

A practical application of this experiment is the reduction of wood and other suitable material to fibers preparatory to making paper pulp. This has been successfully done, but it was found too slow when conducted on a safe scale, and dangerous when done on a commercially economical scale.

N. Johnson was killed and four other injured by the explosion of a boiler in Tyler's sawmill at Bardstown, Ky., February 3. The mill was wrecked.

A dispatch from Doctor Town, Ga., says the boiler in the Kirkham Mill there exploded, February 19, killing David Mitchell and scalding six others.

The boiler in the Georgia Car Works at Cartersville, Ga., exploded just before seven o'clock, February 17, killing instantly five men and injuring a number of others, two of whom have since died. Superintendent Lucas, of the Lucas sleeping cars, and the engineer, named Wood, were injured, the latter, it is thought, fatally. The damage to the building is very great. The cause of the explosion has not yet been ascertained. The dead men are Leonard Choice, Matt Bomar, Hardy Hammond, David Richards, R. L. Patterson, and Sam Davis. E. L. Wood, the engineer, will probably die. Henry Hickson and Ellis Lowe are badly hurt. Mr. E. C. Lucas's injuries are not dangerous. The damage to the property is about $6,000. There is no theory as to the cause of the explosion.

A boiler in the Marion Distillery, at Portland, Ky., exploded, February 17. John Blake, the engineer, was seriously scalded. The roof was torn from the building in which the machinery was located. The loss will reach $2,000 or $3,600.

On the 23d of February one of a battery of three boilers in the rolling mill of A. M. Byers & Co., Pittsburg, Pa., on the south side, exploded, scattering its *débris* in all directions, injuring three men, and completely demolishing the boiler shed. F. Myers and John Lavelle, two of the men injured, escaped with slight wounds on the head. The other, name not ascertained, was seriously and, it is thought, fatally hurt. The explosion is ascribed to a broken flange connecting the boilers with the mud drum.

More "Innocent Purchasers" that Need Protecting

It is is reported that Missouri farmers are now buying experience in the guise of patent wagon-tongue rights.

Sharper No. 1 comes along, says he is doing a big business in wagon tongue patents, but is on his way home and will sell the right for that county for $250. The wary granger declines to be taken in, and the discomfited visitor says, "All right; but if you think better of it let me know;" and insists on leaving his address. A few days later No. 2 comes along. He has heard that granger has the county right for the patent, and will give $400 for it. The farmer sees an opportunity to make $150 in a quiet way, and sells the right. No. 2 pays $10 to bind the bargain, and goes his way. The farmer sends his note for $250 to No. 1—and the circuit is complete.

The Life Saving Service.

In a speech in favor of a bill to promote the efficiency of the Life Saving Service, Congressman S. S. Cox presented the following interesting statistics of the service since its establishment ten years ago:

Number of disasters reported, 1,347; value of vessels endangered, $16,083,320; value of cargoes, $8,429,167; value of property saved, $14,958,895; value of property lost, $9,853,592; number of lives imperiled, 12,259; number of lives saved, 11,864; number of persons succored, 2,610; number of day's succor afforded, 7,350.

Besides 11,864 lives saved from vessels in distress, the lives of sixteen persons were saved who were not on board vessels. Of 395 lives reported lost, 183 were on the Huron and the Metropolis, the loss of the former vessel happening when the stations were not open; while in the case of the latter the service was impeded by distance from the scene of the disaster. It is only in the last five years that the operations of the Life Saving Service have embraced the sea and gulf and part of the lake coasts of the United States. In 1871-72 its operations were confined to the coast of Long Island and New Jersey. Mr. Cox said that before the establishment of the Life Saving Service the loss of life on the coast of New Jersey alone amounted to hundreds annually. Since its establishment 315 disasters have occurred imperiling the lives of 2,754 persons, of whom 2,725 were saved.

The bill was passed February 20, providing for the establishment of 30 additional life saving stations and 6 houses of refuge.

An Explosion Caused by Lightning.

Lightning in winter is not common in this latitude; yet the accident which happened in the new tunnel of the New York, Ontario, and Western Railroad, above Hoboken, Feb. 21, showed that it is not always prudent to disregard the possibility of lightning in February. From the inquiries made by a *Times* reporter it appeared that the wires usually employed to supply the electric lamps in the excavation were used for the purpose of firing the charges, being disconnected from the electric light system for the moment and connected with the explosives. As a rule, six charges were fired together, those of the afternoon relay of men being exploded at very regular hours—the last six usually at 5:45 P.M. There were only 16 men in the shaft, and the work of connecting the wires had commenced, when the flash of lightning that occurred at 5:42 P.M. suddenly charged the conductors and produced the explosion. There were two flashes of lightning between the hours of 5 and 6 o'clock on Tuesday afternoon, the first taking place at 5:23 and the second 19 minutes later. The former simply caused a slight perturbation of the lights in the tunnel, but did not extinguish them. Five minutes later the work of disconnection and reconnection began, but only two of the six charges were ready for the pressure of the button when the last flash interrupted the proceedings. Fortunately the nature of the rock was such that none of the men employed in the shaft was fatally hurt by the untimely explosion. Miners employing electricity in firing charges will do well to suspend blasting during storms in winter as well as in summer.

Gains of the Metropolitan Museum.

The report of the trustees for the past year shows that the museum is now entirely free from debt. A number of very valuable additions have been made to the museum by gifts during the year. Among them are a very large and superb series of illustrations of ancient glass, of Phœnician, Greek, and Roman work; also a few specimens of Egyptian glass. Mr. Henry G. Marquand, one of the trustees, has enabled the museum to acquire, at a cost of $15,000, a collection of Greek, Roman, and mediæval glass, which admirably illustrates the historical sequence in the art (from the Roman period), and Mr. Jackson Jarves presented to the museum his own valuable collection, comprising a series of very beautiful illustrations of the revived art at Murano (Venice) and its achievements in Europe down to modern times.

By the gift of $6,000 from Mr. John Taylor Johnston the museum has been enabled to acquire the collection of engraved gems made by the Rev. C. W. King, of Trinity College, Cambridge, England. This collection includes 331 examples of Asiatic, Egyptian, Greek, Roman, and a few modern European gems. These have been catalogued and described by Mr. King himself, as have also a number of engraved stones and pottery seals, presented heretofore by Mr. Joseph W. Drexel, and a collection of Asiatic engraved cylinders purchased two years ago. The combined collection furnishes for the first time to American students an excellent series of examples of the glyptic art from its beginning through successive ages down to our own.

Mr. Joseph W. Drexel has presented a fine collection of gold, silver, and bronze coins from Egypt, and Mr. Alphonse Duprat a series of casts of ivory carvings, which next to the possession of the originals, now scattered in museums and private collections in Europe, are the best possible aids to students.

Among the most interesting works of historic character acquired during the past year are two bronze crabs, presented to the museum by Lieutenant-Commander Gorringe. These crabs formerly stood, with two others now lost, at the corners of the base of the Alexandria obelisk, which now occupies its place in Central Park, near the museum building.

Another gift to the museum mentioned in the report is that of Mr. Paul Jean Clays, Mr. H. Le Roy, and several other gentlemen, who united in providing the means for purchasing an old painting by Mr. Clays, "The Celebration of the Fiftieth Anniversary of the Freedom of the Port of Antwerp," now in the gallery. The trustees also mention, with sincere sorrow, the death of their late associate, Mr. S. Whitney Phœnix, whose beautiful collection of ivories, silver, Oriental lacquers, embroideries, bronzes, paintings, estimated to be worth $50,000, was bequeathed to the museum.