

STEAM BOILER NOTES.

REMARKABLE EXPLOSION.

The boiler of the tugboat Henry C. Pratt, lying at pier No. 8, foot of Walnut street, Philadelphia, Pa., exploded at 4:30 A.M., March 23, killing four men, and causing the burning and sinking of the tugboat Ella, lying at the wharf below, and the burning of the passenger and freight station-house of the Philadelphia and Atlantic City Railway. It is believed that the furnace doors were left closed until the steam pressure rose so high as to explode the boiler. The latter was but four years old, and said to be a good one.

The verdict of the coroner's jury stated that there was too much steam pressure on the boiler, and that the boiler was handled in a reckless manner. The jury recommended that the United States law compel two safety valves to be attached to each boiler.

SAFETY VALVES.

The terrible results of the tugboat boiler explosion given above, and the sensible verdict of the coroner's jury, draw attention in a special manner to the subject of safety valves, since the jury very properly recommended "that the United States law compel two safety valves to be attached to each boiler." There is in Philadelphia a municipal regulation of this kind relating to stationary boilers, and, although it would seem to be almost a sure precaution against disasters from overpressure, yet the din of the Wilt & Son's and the Gaffney explosion, both of which boilers were in Philadelphia, and fitted with two safety valves each, according to law, has scarcely died away. The clamor that followed the former disaster was prolonged by a memorable and still (said to be) unsettled law suit, brought by the widow of the dead engineer against the Hartford Steam Boiler Inspection and Insurance Company, she claiming the extravagant damage of \$50,000 for the loss of her husband; while the Gaffney explosion of last summer brought out the subject of cast iron flat boiler heads, and a severe censure of the same insurance company by a jury of experts.

The former was a case of weakness of the boiler, and the latter had every appearance of having been a case of inoperative safety valves, two precisely alike, both on the same steam nozzle, and both sworn to as having been stuck in their seats on former occasions. The history of this case may be found in the SCIENTIFIC AMERICAN, dates of July 2, 9, and 30, and SUPPLEMENT No. 308.

We have constantly admonished steam boiler owners to see to it that their safety valves were well kept, and that their boilers were not getting weaker from unusual wear and bad usage. The other very necessary precaution is a working supply of water; a preventive of excessive deterioration rather than of immediate disaster well understood and generally well attended to by the most stupid boiler attendant, since he believes that his life depends upon observing it.

Low water is, however, sometimes the cause of frightful disasters, equivalent many times to an explosion of a boiler shell, from the overheating and softening of large flues and furnace crowns. The application of two safety valves to each boiler is, however, strongly recommended both for land and marine use; and such valves as are in reality safety valves, first, last, and all the time.

The great importance of this subject is well understood by government inspectors and by insurance inspectors, although neither are in condition to enforce their opinions and insist on expensive changes in existing conditions. Personal interests and business consideration can hardly be eliminated from the minds of both the officials and the owners of the boilers.

Many of the rules adopted by the United States Board of Supervising Inspectors relate to steam boilers to be built after the approval of the rule. The one relating to safety valves, Rule 36, begins thus: "Safety valves to be attached to steam boilers, intended for steam vessels built six months after the approval of this rule, shall have an area of not less than one square inch to two square feet of grate surface, when the common safety valve is employed." This rule was promulgated in 1877, and it appears that all the thousands of boilers in steam vessels then navigating the waters of the United States will be exempt from the operation of this rule so long as the old boilers can be made to hang together and bear the official test.

"But when safety valves are to be used, the lift of which will give an effective area of one half of that due to the diameter of the valve, the area required shall not be less than one half of one square inch to two square feet of grate surface." This is the second section of Rule 56, and relates to reactionary valves, some of them known as "pop" safety valves.

The construction of this class of valves is such that when the steam pressure is sufficient to raise the valve slightly from its seat, it passes the seat proper and impinges on a larger disk area, or issues downward, guided by an annular lip of the valve, against the area surrounding the seat, which causes the valve to rise more quickly and higher than the common lever valve does at an equal pressure of steam.

It will be seen that the government rule quoted above allows the use of this class of safety valves having a disk area of one half that required in the common disk valve, provided the issuing steam at working pressure will lift the valve so high that the annular opening between the valve and its seat shall equal one half the area of the free opening through the seat. For example, a valve $2\frac{1}{2}$ inches diameter

will have approximately an area of 5 square inches. Its circumference is 7.854; the lift must, therefore, be about 0.32 inch to give the required half of 5 square inches area. This appears to be about one-eighth the diameter of the valve, so that a one inch valve must rise one-eighth inch, and a two inch valve one-quarter inch. It will be entirely safe to recommend one valve of each class for each steam boiler, and that they be both kept in perfect order at all times.

ENGINEERING INVENTIONS.

An improvement in car trucks has been patented by Mr. Gustavus B. Simonds, of Albuquerque, Territory of New Mexico. This invention relates to that class of railroad trucks known as the "diamond truck;" and it consists in improvements in the construction of the bolster by which the truck is made firm and rigid, and may be run with safety should a spring lose out or get broken, the spring hanger and sand boards being entirely dispensed with.

An improved coal excavator has been patented by Mr. Henry Wilverth, of St. Charles, Ky. This invention relates to that class of excavators in which a rod of iron with a pick projecting in line from its end is used, and its object is to enable the operator to make a long and deep trench. The improvement consists of a grooved wheel journaled in a swiveled trunnion bed or pillow block and supporting in its groove the excavating rod and pick. An adjustable weight is secured on one end of the rod to counterbalance the weight of the pick on the opposite end.

Mr. Albert Berryhill, of Pittsburg, Pa., has patented an improved nut lock which consists of two grooved blocks held in a longitudinal slot of a plate placed on the bolts and over a recessed plate, which in turn is placed against the fish plate or against a plate resting against the fish plate, which blocks are held against the nuts to prevent them from turning by a locking wedge placed between them and into the recess of the recessed plate, parts of the slotted plate being bent outward to form an aperture to admit the locking wedge.

An improvement in valve operating mechanism has been patented by Mr. Louis C. Lugmayr, of Water Valley, Miss. The object of this invention is to work the valves of steam engines for cutting off with one eccentric, and also allow reversal of the engine with the same mechanism. The invention consists in a slide block connected with the eccentric and valve rod and carried by a guide pivoted to swing for shifting the valve.

A novel spring has been patented by Mr. Roger A. McLean, of West Bay City, Mich. This invention consists of a box or well cast with vertical channels in which are loosely placed spring metal strips arranged in pairs upon and across or at right angles to each other in such manner that the strips are free to move downward either at their ends or in the center in answer to the load, the whole being surmounted with a suitable follower attached to or separate from the load.

Mr. John F. Taylor, of Sharon Springs, N. Y., has patented a simple and convenient device for unloading, transporting, and dumping cargoes of guano, sand, and other bulk cargoes from vessels. The invention consists of a bucket provided with trunnions, by which it is supported on a car frame, so that it can be hoisted therefrom and lowered into a vessel to be filled, and then be replaced in position and transported on the car to a place for unloading, when it can be turned upside down on its trunnions and be emptied.

An improved car roof has been patented by Mr. Gustavus B. Simonds, of Albuquerque, Territory of New Mexico. This invention consists in a corrugated sheet metal covering for the roofs of railroad cars, attached so that the contraction and expansion of the metal will not exert injurious strain upon any part of the roof.

Mr. John M. Sailer, of Ionia, Mich., has patented an improved valve reversing gear, which will easily and readily regulate the lead of the valve during the stroke of the engine, and may be used to reverse the motion of the engine when desired. The invention consists of a novel eccentric adjusting cam in combination with the valve rod eccentric, the latter being loosely fitted on the engine crank. The adjustment is secured by sliding the cam in one direction or the other by means of a clutch lever.

Mr. Austin Leyden, of Atlanta, Ga., has patented an improved car coupling. This invention consists in providing mechanism whereby the bolt may be operated from the sides, top, or platform of the car without the necessity of going between the cars to connect and disconnect them, as is now the practice, and of an automatic stop adapted to hold the bolt elevated until the link enters the bumper.

Mr. James L. Griffin, of Cusseta, Texas, has patented an improved device for coupling cars automatically. The invention consists in a lever pivoted in the front of the top of the draw head and provided at its outer end with an aperture, through which the coupling pin is passed into the aperture in the draw head, below which lever another lever is pivoted, hanging vertically across the front opening of the draw head, and provided at the upper part of its inner edge with a projection, so that when the coupling link pushes the lower lever inward the upper lever and the pin are raised, and drop as soon as the link has passed into the draw head. The draw head is provided with two apertures at the sides for the coupling pin when it is not in use. The coupling pin has an annular recess directly below the flattened head, for retaining this coupling pin in the aperture of the pivoted lever.

An improved crank paddle has been patented by Mr.

Julius I. Lengsfeld, of Greenville, Miss. The object of this invention is to construct a propeller in which the paddles enter and leave the water in or near a perpendicular line, and thus avoid the striking and lifting of the water. The paddles are so arranged as to propel the vessel continuously. The depth of the stroke is adjustable.

Preserving Fence Posts.

A correspondent of the *Country Gentleman* says: I have tried a number of methods of preserving posts, and none have been satisfactory except perhaps one to be mentioned presently. Heart oak, if seasoned, will last a great many years without any application whatever—how many I am not old enough to say. Sap wood will not last. Coal tar has some preservative effect, but after having used it on thousands of fence posts I am almost convinced that its application does not pay. In fact I am so nearly without faith in its efficacy that I have not used it at all on fence posts recently set, although I have a barrel on hand purchased chiefly for that purpose. About my yard and premises I have set, since the war, a good many posts of pine, that being the only sawed timber I could get. These have had to be replaced in four or five years after setting; some have completely rotted off in three years, though heavily dosed with hot coal tar.

Now for the exception referred to above. Ten years ago I built a grapey at the end of the house, as a screen against the western sun, using sawed pine posts. Anticipating the difficulty of ever replacing these posts after they became covered with vines, I took the extra precaution of completely saturating the lower ends with kerosene—common coal oil—before applying the tar. These posts are now perfectly firm, and almost as sound as they were when put in. All other pine posts set at that date have entirely rotted and perished. The result of this experiment so thoroughly impressed me with the value of coal oil as a preservative of timber under ground, that I now use it on all posts in building, afterwards covering with hot coal tar. This is essentially the plan proposed by Mr. Parker Earle.

I add this, however, which I think will doubtless prove of great value: I bore a half-inch or three-quarter inch hole in the post near the ground, slanting downward and reaching beyond the center, this is to be filled with kerosene from time to time—perhaps once in three or four years will answer. I feel sure that insects very greatly hasten the decay of timber, to say the least; and kerosene being repellent to them, makes it a valuable application at any point where they are likely to do mischief.

Electrical Capacities of Heated Bodies.

It is well known that a burning match or a gas flame acts as a discharger of electricity, and the fact has been applied by Sir William Thomson to his portable electrometer in observing the potential of the atmosphere at any point. Recent experiments of Professor Guthrie, F.R.S., have shown that an incandescent platinum wire also acts as a discharger of electricity, and displays a preference for discharging a negative rather than positive charge. If a platinum wire, made incandescent by an electric current, is placed between two gold leaf electroscopes, one charged with positive and the other with negative electricity, it will be found that the negative charge is rapidly drawn off, while the positive charge remains almost unaffected. The wire in this experiment was at a dull red heat; and it is probable that a higher temperature would also have affected the discharge of the positive electricity. Professor Guthrie likewise shows that a red-hot metal ball at certain high temperatures will not accept a charge of positive or negative electricity from the conductors of a glass electrical machine; while at certain lower temperatures it will accept a negative charge, but not a positive one, and at still lower temperatures it will take both a positive and negative charge.

Glacier Scratches in the Catskills.

Dr. Julien, in the Transactions of the New York Academy of Sciences, vol. i., No. 2, states that he has found no glacial scratches near the Clove above 2,900 feet, the highest observed occurring on the "High Ledge," Parker Mountain, at 2,874 feet, and on the southeast slope of Round Top at 2,871 feet; the direction of the former S. 18° W., magnetic; of the latter S. 35° E. He remarks that the highest scratches observed in the Catskills occur on Overlook Mountain, at an elevation of about 3,100 feet, showing that the ice surface was at least 3,200 over this part of the Catskill region. He concludes that there were two movements over the region—the movement of the Continental glacier southeastward, and that of the Hudson River valley, southward.

THE important event for Newfoundland, the first railway trip, took place on March 12. The train ran in on the road as far as it is ballasted, a distance of about ten miles, and then returned to town, the party expressing themselves highly pleased with the success of the trip. It is a strange coincidence, says *India and the Colonies*, that the steamer that landed the first locomotive ever seen in Newfoundland was the one that thirty-two years ago first connected Newfoundland with the United States and British North America by carrying the mails. But the steamship Merlin has degenerated since those days. She was then a steamer of the Cunard line; she is now a seal hunter, the property of Mr. A. M. McKay, superintendent of the Anglo-American Telegraph Company.