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Electricity and Steam Boilers.

[The accompanying experiments and news respecting the causes of steam boiler explosions, and the means of preventing the same, are by Mr. Quarterman, of this city.]

We will, in the first place, speak of the causes of steam boiler explosions. Secondly, on the mode of preventing the same; and, thirdly, conclude with some general remarks.

CAUSES .- Theory :- That the steam boiler is, simply considered, a hydro and thermo electrical machine, and that the surrounding wood, &c., particularly in steamboats, by heat and paint, become almost perfect non-conductors; the boiler is, in consequence, nearly perfectly insulated.

That water has a great capacity for electricity-that this capacity changes, in degree, with variations of pressure and temperature; and also that its conducting power varies from the same causes; that saline and foreign matter, impregnating it, affect both its capacity and conduction.

That, as the atmospherical electricity, near the earth, particularly in stormy weather, frequently changes from positive to negative, and vice versa,—this change taking place, almost instantaneously, there is much danger of the boiler exploding, before the equilibrium of the electricity, between the inside and outside, of the same; can be restored-either by induction, diffusion, &c., particularly if the water and steam should be highly charged, and the engine be at rest.

That this danger would arise, principally from the insulated state of the boiler, in connection with increased temperature, and the crust or deposite on the inside ; the former increasing the quantity, and the latter the intensity of the electricity, until, like a Leyden jar overcharged, the boiler will discharge itself.

A great difference exists, however, between fectly insulated.

Cases of this nature may probably be confirmed by examining portions of the exploded boiler, to see if a change of the metallic parnomena can be discovered.

That, when the water is low enough in the and red hot, a change from negative to positive, &c., may then be generated. In this case steam is decomposed-the red hot iron first absorbing a portion of the oxygen, pro- mised. ducing black oxide of iron, then hydrogen is taken up, reducing the black oxide to the metallic state.

During this operation, the electricity is set electric fluid will have no means either of dif-

drogen will be present; should chlorine be ra-

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too occult. and its pheno Chlorine is also a . conductor TODRnot he far from varied, to be demonstrated mechanically or city, and should it exist in a pure, or even an serve an equilibrium, in relation to the inside 000 in value-a great amount, truly, and impure state, may obstruct the passage of that and outside of the boiler, so far as positive committed theoretically on a few sheets of pawhich should oause every reflecting person to per; much has, however, been accomplishedfluid, even when the engine is first put in mo- and negative principles go, we intend to insert pause and enquire, "cannot we manufacture metallic conductors, insulated or otherwise, as much more will, no doubt, be yet discovered. tion or after a stroke or two of the piston. In this beautiful fabric ourselves ?" such cases a spark or flash may ensue, and an the case may require, either in the boiler alone By degrees we approach nearer the truth, and The Manchester spinners are in hopes that may, ultimately, arrive at both cause and conexplosion be the result. But the greatest dan--the ends of which shall be below, or above they will be able to spin fine flax on their cotsequence, and at the same time disarm steam | ton machinery, but we do not believe they canger is, therefore, the vast accumulation of elec- the water line ; and so arranged that they shall tricity. form a complete or broken circuit, moveable or of its terrors. They say, "we used upwards of 770,000,000 Again, equal measures of chlorine and hy. otherwise; or to connect the steam chest, con-Medical Discovery. pounds of cotton last year, or about 1000 tons Our moustached friends will be glad to per day," and they are afraid to be so depend. drogen unite explosively : flame, greater or denser, &c., with the boiler, longitudinally or less heat, the sun's rays, diffusive daylight, transversely, &c., as experiment may further delearn that the London National and Military ent, as they have found themselves to be, on the electric spark, decomposition of water, &c., monstrate ; said metallic conductors to be tu-Gazette has made the discovery that the cotton. It is time at least, that we devoted bular, solid, ribbon, or spiral-shaped, as may will cause this unity. wearing of moustaches is conducive to health. more attention to the manufacture of flaxen Cή It affirms that the meustaches, acting as a fabrics-if we never commence to make, Water at rest and at a temperature of 32°, hereafter be deemed expedient.

the temperature of 158°, only 65 volumes hence its danger in steam boilers.

Again, the red hot flues, while bare, may absorb a portion of electricity, destroying the ward explosion, passing into the fire; but the sudden introduction of water, covering the fiues. or a motion from the engine would probably prevent this. In such cases, viz., the latter, the tension of the electricity would be increased, and the danger still greater.

That inferior materials, bad workmanship, defects by fire, neglect in examining and cleaning, over-pressure, corrosion, &c., are amongst the causes of explosions. But there is much evidence, on record, which goes to prove the fact that other causes exist also-by some persons, called an explosive and an imponderable agent.

Faraday has experimented extensively upon a boiler, called the hydro electrical machineand has produced great results-but has overlooked or .not mentioned the fact, that the same electrical power exists in every working and what variations will be produced in its boiler.

It is also an established fact, that steam issuing through a small orifice produces exceedingly large quantities of electricity.

Locomotive engines, not being so completely insulated, and being almost surrounded by perfect conductors, the electric fluid, in the a pure atmosphere, are not so liable to explosions, as those of steam vessels. And amongst the latter, the high pressure will be the most liable.

A leyden jar or a coated flask, cannot be charged, when filled with hot water, as the electricity passes off with the steam.

So with the steam boiler, when it has its due portion of water, and a mean pressure of steam, viz., within the limits of its rated weight per square inch; if at the same time there be an emission of steam, by the working taken place? Even while they have a proper of the engine &c.

Now if it were possible, by diligence, care the two, viz, the jar is only the receiver of &c., to keep the engine in this working state, electricity, and is not insulated-but the boil- | an uniform current of electricity being estaber is the actual generator, and is almost per- lished, viz., from and to the boiler, a great portion of heat would be secured. For in proportion as the electric fluid is exhausted, other things being equal, so in proportion will the heat diminish in the boiler. See Faraticles have taken place, or other electrical phe- day's hydro electrical experiments, and W. R. Grove's communication, on magnetic heat, to the Royal Society of London, May 24, 1850. boiler to allow the flues, &c., to become bare | The probability is, that there will be a greater uniformity of working, less jarring and vibration of the machinery-less foaming of the water, and a large percentage of heat econo-

Lastly, there are many indications that electricity is a compound, that its various phenomena are produced principally by catalysis and condensation; that positive, negative, &c., free by decomposition, and its accumulation is are only modifications of the original fluid very rapid. Should the engine be at rest, the depending entirely upon the generating powers, and the physically constituted properties

of steam boilers.

tor, communicating with the boiler or with | cold of the air before it enters the nostrils, and the other conductors, so arranged that an electrometer, and a prime conductor, &c., can be made permanent and sheltered, being at the tenacity of the iron, and may cause a down- same time in full view of the engine room and engineer.

> Also, in connection with those, we intend to add a movable or fixed pointed conductor or conductors, and so placed that an excess of the electric fluid may be drawn off silently, when the engine is at rest, &c. The correct distances of those conductors can only be ascertained by repeated and prolonged experiments.

> The whole to be so fixed that they will neither disfigure the machinery, nor be at all in the way.

GENERAL REMARKS .- 1st. If oxygen should be partly absorbed, by the red hot flues, and the hydrogen should not re-act upon the black oxide of iron, will it combine under peculiar pressure, and temperature with the water and steam, and form a new compound? If so, what will be the properties of that compound, yield of seed is ten bushels per acre, though in conducting powers? If oxygen, hydrogen, The ordinary price per bushel where the seed and atmospheric air exist separately, will electricity cause them to re-unite explosively?

2nd. The water pumps form a metallic connection with the boiler, still, if they are not boiler, if in excess, may find a shorter path, as in similar cases of imperfect conductors.

water upon the red hot flues, by assuming a hydrostatic presses, some of them having a spheroidal form, increase the intensity of the electricity, and an explosion result from the same, and after the engine being at rest, will not the stroke of the piston produce vibration, recoil, &c., in the boiler?

the boilers, through which the explosion has supply of water.

5th. Chlorine can only be generated in marine engines, and only by negligence, in allowing the water to become too low in the boiler, as mentioned in the preceding hypothesis.

6th. Is not electricity the principle of latent heat? Will not its extraction from water, (other things being equal,) diminish the temperature of the latter? Will not the converse hold good ?

7th. We are aware that most all the dangers mentioned in our theory arise from negligence and over-pressure. But if it be possible to counteract those evils completely, in the manner we have proposed, much good will result both in the saving of life and property.

8th. If magnetism and electricity should be discovered to be latent heat, set free by evaporation, &c., whereby the temperatures of fluids are diminished, will not an established ourrent of electricity in the steam boiler preserve a greater uniformity of heat, and at a less cost.

9th. Is not electricity the phlogistic princi-

theory are without defects. The subject is portation of foreign manufactured flax goods will still be abundantly increased.

are consequently a preservative against consumption. Hence it fellows, according to the Gazette, that the regiments which wear moustaches are much less subject than the others to diseases of the chest.

-----Flaz, its Cultivation and Manufacture.

Last week we published a very interesting article from the pen of Mr. Leavitt, of Maysville Ky., on the subject of "Linen." In it, he advances the doctrine that America may yet become the greatest country in the world for manufacturing linen. At present, we beliave there is not a single skein of fine linen yarn, or a single yard of fine linen cloth made in our country. This is rather singular, and not very creditable to us, considering the great amount of flax which is cultivated. In some of the rich districts of Ohio, particularly in the Miami valley, this branch of agriculture is carried on to a great extent. The average some instances it reaches fifteen bushels. is principally sold and the oil extracted from it, is eighty cents to a dollar; but last year, owing to the scarcity, the price ranged from a dollar and ten cents to a dollar and forty cents per bushel of 52 pounds. The amount of seed worked up in the oity of Dayton, Ohio, annually, is put down down at 150,000 bushels. 3rd. May not the sudden introduction of There are five mills, which altogether use ten power of 1,000 tons each. The oil is principally sent to Cincinnati and thence to New York, and the oil cake is exported to England. where it brings \$40 to \$50 per ton, and is used for fattening cattle and sheep. In other coun-4th. Is it not often the strongest part of tries the seed and oil is generally subsidiary to the stalk, it is different with us. In every other country, flax has been cultivated for its adaptation to to the manufacture of cloths. Records of the linen manufacture have been preserved from the earliest ages of the world. The fine linens of Egypt occupy a place in the oldest worke, and formed the subject of commercial traffic when the Indumens and the Ishmaelites were the rival merchants of the East. Specimens of their manufactures in linen have descended to the present age.

Fiax is not a plant of difficult growth. It requires good land and careful cultivation, but it well repays their employment. It grows over a wider surface of the world than any plant of a similar character that could be named.

Any individual acquainted with paper manufacture, is aware that the product from linen rage is stronger than that from cotton; and while the introduction of cotton in the manufacture of textile fabrics has been a very great blessing to all, and especially to the industrial classes, yet it has not improved the strength of printing and writing paper.

Our American paper cannot, in general, fusing itself into the atmosphere or being conple also? And can combustion take place of those powers, being in many respects anacompare with that made in England. Ireland without the evolution or absorption of that logous to light and heat, except in its most ducted to the condenser, &c. is the greatest country in the world fer the Another dangerous cause in marine engines. condensed forms, as thunder storms, &c. If fluid. quantity of linen clothe made. It is estimais the presence of chlorine, accruing from the 10th. There are two important points in our further experiment should demonstrate this ted that the linen trade of Great Britain and theory, which we wish to be clearing underdecomposition of sea water, or being evolved to be the fact, it is possible, and even proba-Ireland amounts to more than $\pounds 12,000,000$ stood : first, too little water in the boiler, pro-(from the salt deposited in the boiler) by the ble, that electricity will then become a great sterling per annum (near \$60,000,000). A ducing decomposition, &c., as before menred hot flues, &c. and useful motive power, at all events it may draw-back upon this is the price for the raw Now, if part of the oxygen be absorbed, hygive a new impetus to the science. tioned; and, second, by not blowing off steam, material, a great deal of which is raised in at a certain pressure, &c., when the engine is We now conclude our present theory : what America. The cultivation of flax is becoming pidly evolved, it will not only take up the li- further experiments may develope we cannot stopped; because the emission of steam premore extensive than ever, in Ireland, and hopes vents an accumulation of the electricity in berated hydrogen, but will aid the further de- tell. are entertained that they will be able to suthe boiler. composition of the water and steam, in order Secondly, we will venture to describe the persede cotton in a great measure, with a raw 11. We do not presume that our mode and material raised in Britain. The annual imto unite with the latter gas, and electricity mode we have adopted to prevent explosions

will absorb 180 volumes of chlorine; and at Also a chain or some other metallic conduc- part of the breathing apparatus, absorb the never will make.