

ENGINEERING INVENTIONS.

An improvement in traction-rope railways has been patented by Mr. Samuel H. Terry, of Guthrie, Mo. The invention relates to traction-rope railways, and it consists in certain improvements in the invention for traction rope railways for which a previous application for Letters Patent was filed by the same inventor. The improvements consist, first, of a series of friction rolls for the traction rope, secured to and arranged on one side of removable sections of the gutter, said sections being provided with suitable openings arranged in connection with covered basins or wells in the street, whereby an open channel without obstructions on one side is formed, and the refuse matter in the gutter may readily be swept into the covered basins and removed therefrom, the covered basins being connected preferably with a sewer or water-way, and the sections may be removed when necessary to adjust said rollers, or for other purposes.

Mr. James Manes, of Baltimore, Md., has lately patented a novel machine for the purpose of extracting gold and silver from their ores or from tailings, which consists, mainly, in a series of metal cylinders placed horizontally and made cone-shaped or tapering, so as to be larger at one end than at the other, the said cylinders being provided at their large ends with detachable heads, and being arranged with the large end of one above the small end of the other, and the cylinders being connected by spouts arranged alternately at opposite ends, so that the ore travels by gravity down to the larger end of the cylinder and enters the smaller end of the next subjacent cylinder, and in each of which cylinders is arranged a rotary shaft bearing mullers, brushes, or other devices for pulverizing, stirring, and mixing the ore with mercury or other chemical as it passes through the machine. The invention also consists in combining the cylinders, brushes, and an outer casing with a steam-heating device for regulating the temperature according to the requirements of the case.

An improvement in car brakes has been patented by Messrs. William Augustus Kearney and Joseph George Davis, of Logansport, Ind. In this device a lever carrying a pawl moves a ratchet wheel fixed to a shaft carrying a peculiar shaped cam, which works the brake chain in such a manner as to quickly take up all slack and then apply great force for operating the brakes. A pawl under control of the foot holds the brake on.

A spark arrester of that kind located in the smoke box of the boiler, or in the space between the ends of the tubes of the boiler and the smoke stack, has been patented by Messrs. Geo. W. Moore and Abraham O. Frick, of Waynesborough, Pa. It consists in arranging within the smoke box a perforated and ribbed deflecting plate extending from the tube sheet in a nearly horizontal but slightly dipping direction to nearly the back end of the smoke box, and combining therewith a second deflecting plate which rises beneath the same from the bottom of the smoke box to nearly the ribbed and perforated plate, and leaning also to the back of the boiler. The lower plate is made adjustable, either bodily or on a pivot, whereby it may form either a receptacle for containing the sparks or is made to create a continuous circulation of sparks in the smoke box.

A novel snow plow has been patented by Mr. Horace Resley, of Cumberland, Md. This invention relates to improvements on a snow plow patented by the same inventor October 10, 1876, No. 183,207, in which is shown a scoop having a slight vertical adjustment and bearing a swinging deflector and vertical cutters, with a supplementary removable plow arranged above said parts. In the present device the inventor has dispensed with the supplementary plow and vertical cutters, and has made several important improvements relating to the scoop.

An improvement in tanks for the storing of petroleum has been patented by Mr. George W. King, of Georgetown, D. C., on the patent No. 234,291, granted to the same inventor November 9, 1880. The present invention covers several features of improvement upon that patent, which consist in means for automatically causing the pan or lid to rise in case of fire and close the tank; in means for preventing the charging of the tank and its contents with static electricity of different polarity, and thus obviating any static discharge which would ignite the inflammable gases; in the peculiar construction and arrangement of an automatic cut-off in the filling pipe of the tank, which cut-off is controlled by the movement of the rising and falling pan; in the peculiar form of the lid or pan; in the combination, with the lid or pan, of a supplemental float attached to the bottom of the pan; and in the peculiar means for equalizing the movements of the pan.

The Naval Defenses of England.

Those who complain of the inefficient condition of our navy, and who think that Great Britain is far ahead of us in point of naval defense, should read the late address of Sir W. G. Armstrong, before the Institution of Civil Engineers. It is given in full in our SUPPLEMENT 322. Sir William refers to certain light unarmored ships lately built in England for foreign powers, which, with a displacement of only 1,300 tons, have attained a speed of 16 knots an hour, and are able to steam 4,000 miles without replenishing coal. They are armed with two 10-inch guns capable of piercing 18 inches of iron armor. He further states that there is not at present a single ship in the British Navy, that carries an armament competent to engage them, that could overtake them in pursuit, or evade their attack when prudence dictated a retreat.

Gas Engine Patents in England.

It will be remembered that last year Messrs. Crossley, of Manchester, sued, through Mr. Otto, a Mr. Linford, the maker of a gas engine which Mr. Otto asserted was an infringement of his invention. The case was argued at great length before Vice-Chancellor Bacon, and he decided for the defendant Linford, and thereupon Otto appealed. This appeal lately came on for a hearing before the Master of the Rolls and Lord Justices Brett and Holker. The evidence taken at the trial was before the Court, and counsel were heard on both sides. The result of the appeal has been to reverse the decision of Vice-Chancellor Bacon; and an injunction has been granted to restrain Mr. Linford from making or vending gas engines. This decision, says the *Engineer*, has a far wider range perhaps than appears at first sight. For some years great attention has been devoted to the invention and making of gas engines; within the last two years especially something like two hundred and fifty patents have been granted for improvements in this class of machinery. There are several firms employed in their manufacture. Should it be found that these engines come within the decision of the Court of Appeal, the practical result will be that Messrs. Crossley will enjoy a monopoly of the construction of gas engines for several years to come. In a word, the verdict of the Master of the Rolls and his two brother judges may be found to affect a very large amount of capital, and even to deprive inventors, who have worked hard and successfully, of the fruits of their labor. We do not say that it will. That is a question which remains for discussion.

The Court of Appeal has interpreted Otto's specification with great care; and no doubt exists as to what the judges, at all events, hold that it means. This is a great gain—it clears the ground. According to the Master of the Rolls—his fellow judges concurring—Otto patented the idea of producing a gradual explosion in the cylinder of a gas engine, and the means of applying the idea in practice. It was urged by Linford, be it understood, that Otto's patent was bad. The Court hold it to be good on two points, but these cover much. To explain them it is necessary to say that Otto secures the end he has in view by introducing first air, then a mixture of gas and air, into the cylinder, compressing the whole and igniting the mixture. In this way he claims that he gets a quiet or gradual explosion; but it is not quite clear to us how the result is brought about. A comparison was drawn with precision by Lord Justice Brett between Lenoir's engine and that of the plaintiff Otto. It was alleged by the defendant that Lenoir's engine was an anticipation of Otto's. From this view his lordship dissented. He deduced from Johnson's—Lenoir's—specification that Lenoir rather wanted to produce a violent explosion than the reverse; and that for this, among other reasons, it was not an anticipation. Otto says, according to the Master of the Rolls, "I am going to turn that which was a sudden explosion of gas," as in Lenoir's engine, "into a gradual explosion of gas, and I am going to do that by the introduction of what Otto calls a cushion of air in one place between the piston and the combustible mixture."

The Cost of European Governments.

A recent British Parliamentary report gives a comparative statement of the revenues of several European States, from which it appears that Austria (not including Hungary) has direct taxes of £7,762,553; indirect ones of £21,406,978, and miscellaneous ones of £4,726,447, or a total tax of £33,895,979 (about \$167,429,500) for a population of 22,132,684 souls, which is more than \$7 for each man, woman, or child. Hungarians are somewhat better off, the total taxes being £19,965,263 (about \$99,826,000) and the population 15,608,723—say \$6.50 per person. But the Austrians and Hungarians are taxed much less heavily than their neighbors in Prussia, where the total is £56,421,875, and the population 27,251,067—showing an average of about \$10 per person. The French are still worse off. The totals for them are £107,303,975 of taxes and 36,905,788 of population, or about \$15 of tax per head. This the people of Belgium, a neutral country, free from wars and Nihilism, nearly equals, their showing being, taxes £14,911,502, and population 5,476,939. Better off than any of these people are the Russians—or apparently so, one should say, for the burden of a tax lies not so much in the amount of it as in the inability to pay it. The Russians pay £60,362,731 in taxes, several millions more, that is, than the Austria-Hungary people, or the Germans and Poles of Prussia, but they outnumber their neighbors by tens of millions—the Prussians by 45,000,000, the Austria-Hungary races by 34,000,000. For these \$300,000,000 of Russian taxes there are 72,692,000 people among whom to divide them. Thus every European Russian pays a tax of \$4, while every Frenchman pays some \$15, and yet Russia is internally the most disturbed great country in Europe, and France the most peaceful.

An Agate Forest.

The workmen on the Denver and New Orleans Railroad, while within from twenty to twenty-five miles of Denver, Col., between Cherry and Running creeks, encountered a somewhat remarkable obstruction to their further progress, consisting of a buried forest. The trees are all petrified and agatized, of various sizes, and are buried at depths of from ten to twenty feet, as deep as the men found it necessary to go. These trees were met in half a dozen localities, are very perfect, and if proper machinery was used could be unearthed nearly or quite whole.—*Northwestern Lumberman.*

Collapse of a Large Gasholder.

The Newark *Daily Journal* gives the following account of the collapse of the gasholder belonging to the Citizens' Gaslight Company, on the evening of January 31st ult.:

About seven o'clock it became evident to those in charge of the works of the Citizens' Gaslight Company on Front street, that the iron frame which held the gasholder was giving way. Two of the columns were cracked, and the fierce gale which was blowing caused the iron frame to bend and twist, so that at every moment the structure was expected to go down. Mr. Andrew A. Smalley, the president of the company, was sent for, and he immediately stationed men at each end of the street to warn those who might intend to pass of the danger. Several families residing in the neighborhood left their houses and some prepared to remove their furniture. The gasometer was 97 feet in diameter, with a capacity of about 300,000 feet, and was about one-third filled. The gas was being drawn off and transferred to another holder, when, a few minutes before nine o'clock, the structure went down, and as it fell, with a hissing sound, a column of flame more than 50 feet shot in the air. People were momentarily blinded with the sight. Women became frantic, and even some men thought for a moment that the day of judgment had come. The flame was visible only for a minute, and then the whole portion of the city north of the canal was left in total darkness. The fire department turned out, but there was no occasion for their services. No person was injured, and, with the exception of the blistering of the paint on the cupola of Ballentine & Sons' brewery, no building received any serious damage.

Mr. Smalley stood in a doorway within 30 feet of the gasometer when it fell, and he remained there. He says he had no fear. He believes the flame was caused by the gas being ignited from sparks struck from the iron frame when in falling it crashed against the sides of the tank. The gasometer was torn and rent like a great balloon cut in pieces. There was no explosion; it was simply a collapse. About 20 feet of the wall along Front street is broken down, and 10 feet of the coping thrown from the side wall. Beyond the destruction of the gasometer and frame this is all the loss the gas company has sustained, except the loss of gas and custom. The damage is estimated at \$20,000. The tank is uninjured.

The gasometer was erected about thirteen years ago. The columns, which were of cast iron, show numerous old cracks and flaws in the iron, indicating that the contractor had done his work very imperfectly. There were no braces or stays at the base, and, considering the bad material and the careless construction, it now seems strange that the structure stood as long as it did. Gasometers are strengthened at the base of the columns with extra braces of wrought iron.

Connection with the mains of the Newark Gaslight Company has already been made, and Mr. Smalley promises that to-night no part of the city shall suffer from want of gas. Fortunately the new gasometer in Orange is ready for use, though it has not yet been used.

About sixty days will be required in which to rebuild the gasometer. The columns are always kept ready by the contractors, and they will be put up immediately. The main delay will be in building the holder.

Harrison was brightly illuminated by the burning gas. At the time a number of firemen were in the engine house, and they hastily made a start to roll the apparatus before they discovered their error.

The flame from the gas was witnessed by many residents of Roseville, Orange, Montclair, and many other elevated suburban places. It burst upon the stormy sky in a broad red glare, and seemed like an enormous cloud sweeping with lightning rapidity at the houses. Many women were frightened, as even at two miles distance the flame seemed to dart at the windows, and during a moment rooms in which no lights were burning were brilliantly illuminated. The time during which the flames were seen could not have exceeded one minute. They disappeared as suddenly as they came.

A Fly-Wheel Cat.

A white cat which was about Winchester's shop was missed recently. In the forging department of the drop shop is an upright engine where the blowing is done for the forges. The other morning the man started his engine, and looking about the wheel he noticed something on the fly-wheel. The wheel was making a great number of revolutions per minute—going so fast that the spokes were invisible. He did not make out what it was, but paid no particular attention to it, as he thought it was the sun shining on the wheel. Glancing that way occasionally, he noticed the same thing several times. He started the engine at 7 o'clock, and at about 9:30, noticing the object again on the wheel, he thought he would stop the engine and see what it was. He stopped it and got over where it was, and found it was a white cat clinging to the wheel. There the cat had been hanging on for two and a half hours. He took the cat down, and it had become cross-eyed. He put the cat in a box and cared for it, and in about two or three days it began to get around and its eyes commenced to have their natural look. In about a week it came to the room of the foreman, J. D. Eager, a branch of the forge department. Mr. Eager fed it and commenced to train it. The animal reciprocates the kindness shown, remaining about the forge all the time and evincing quite an interest in the business, and is quite a pet among the workmen. The above is a fact.—*New Haven (Conn.) Journal and Courier, February 6.*