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Contents:

(Illustrations are indicated by an asterisk.)

COSTLINESS OF COMPLICATED STEAM ENGINES.

Some men design steam engines without the slightest regard to economy of construction, to say nothing of their duty when at work. Link is piled on link, rod succeeds to rod; devious, winding, tortuous passages, as intricate as the Cretan labyrinth, and as contracted as the mouth of a miser's purse, are found in abundance, and there seems to be nothing but an insane desire manifested to be different from some other builder. The constructor feels this fault and the owner of the engine has to pay for it; in the end the designer loses his reputation

Drawings are sent to the foundry with piece after piece to be cast together, when joints and bolts should be used instead. Air pumps and condensers are cast on bed plates, great long legged columns for cylinders to set upon are also cast in, and each particular piece is often broken or cracked before it leaves the pit from the effects of expansion and contraction, which the foundryman strives in vain to prevent. Crooked cores, and water or steam ways unnecessarily long and inaccessible, are a vexation from beginning to the end. To the pattern-maker who makes the boxes or the sweeps, to the molder who sets the cores in place, to the laborer who cleans the cores out, and to the engineer, who suffers from the injury caused by the failure to remove the sand entirely, these things are alike a vexation and a loss. When steam chests and small valve seats that require to be bored in a lathe are cast on cylinders, very great unnecessary expense is entailed which ought to be avoided. The cumbrous casting has to be turned and laid in all possible positions to get at the job, and to do an hour's work on some special part, the labor of ten men and their time is required to put the casting in position for the machinist. We are not imagining cases. Examples of the bad practice here alluded to are fresh in our mind. Time, which involves more than money in a machine shop, is lost, and means squandered in devising special machines to accomplish some of the tasks presented for the ingenuity of the machinist to overcome.

No engine performs any better or burns less fuel for having a fancy exterior, and every engine loses a notable per cent of the coal put into the boilers to drive the piston, by having cramped steam and exhaust ports, crooked water passages in the pumps, a wilderness of pipes through which the steam and water must pass in and out, and a bristling array of levers, to maneuver which makes a true engineer tear his hair merely to look at. Time was of old when men built engines with as many rods, levers, counter-weights, cranks, bell-cranks and what not, as it was possible to get in the machine. The side lever engine is an example. We regard it as a favorable sign that none of these machines are now built in this country, and creditable to our sagacity that but few of them ever were made. The vertical engine, the oscillating, and the beam are the chief varieties, and with those who regard engineering science in its proper light simplicity of construction and harmony in the design are prime requisites.

WELDING BY PRESSURE.

When a machinist drives a dry key into a dry key seat it sticks fast and cannot be got out, oftentimes, without drilling it. In this case the surface fibers of the material are interlaced, and are as firmly united as if they were one. The same action takes place in drawing metals, and an English company, working a patent for a peculiar method of drawing metal tubes, have found that where one tube has been forced over another a perfect union takes place, and no joint can be discovered when they are cut across. When a blacksmith unites two pieces of iron the heat and the percussion of his hammer effects nothing more than an intimate union of the two parts. If he had sufficient strength, and applied it in the proper way, he might join two pieces of iron quite as well cold as hot.

It will probably be some time, however, before we have machinery sufficiently powerful to unite masses of metal so that they shall be practically welded, and break at any part rather than at the points of junction. Could such machinery be devised or rendered practical in its results, it is easy to see that an immense saving would be gained in point of time. In some kinds of work this cold welding, so to speak, is already done. Car wheels are pressed on to their axles and remain fast without any key. This is not due to merely pushing a large body into a bore slightly smaller, for if the machinist leaves the axle too large the wheel stretches or splits, and the job is not properly done. The wheels stay on the axles because the two metals, although of different natures, one being cast and the other wrought, have an intimate relation with each other, amounting to an absolute surface weld; very many wheels split before they can be removed.

Welding by pressure and by heat in connection with pressure has been experimented with abroad. *Galignani's Messenger* speaks of a case, which we here append:—

"Experiments have lately been made at Paris by M. Duportail, engineer, in the workshops of the Western Railway, to ascertain whether iron might be welded by hydraulic pressure instead of by the sledge-hammer. The latter, indeed, has not a sufficient impetus to reach the very core of the metal, while continuous pressure acts indefinitely to any depth. In the experiments alluded to M. Duportail caused two iron bars, 1½ inches in diameter, and heated to the welding point, to be placed between the piston and the top of an hydraulic press. The bars were welded together by this means with extraordinary ease, the iron being, as it were, kneaded together, and bulged out at the sides under the pressure. The action of the press was suspended when the part welded was brought down to the thickness of the bars. After cooling, the welded part was cut through to examine the inside, which was found perfectly compact. To try it, one of the halves was placed under a forge-hammer weighing 1,800 kil., and it was not until the third stroke that the welding was discovered."

Heavy steamboat shafts are very often hollow at the center from a want of power in the trip hammer, or through an imperfect manipulation of the "pile" they are fagotted from. Masses of hot metal drawn between revolving rolls are indeed subjected to pressure, but the iron thus made is not of so good quality as hammered metal. It is not in connection with preparing iron for market that these remarks are made, but it would seem not at all impracticable to make a neat and perfect weld by heavy continuous pressure for a short time, rather than by the ordinary method of hammering. Time would be gained both in the smith and finishing shops. That it is perfectly feasible there is no question, and for heavy connecting-rods, rudder-posts, keels of iron vessels, or similar parts, a great economy of time would be apparent, while equal, if not better, workmanship would result.

WHY CAKE TASTES OF TURPENTINE.

We are told by a person of experience in cooking, that if in using oil of lemons to flavor her cakes she gets too large a quantity, she will frequently have the exact flavor of spirits of turpentine. It is probable that the oil of lemons is actually changed into oil of turpentine.

An atom of the oil of lemons is composed of 20 atoms of carbon and 16 atoms of hydrogen, C_{20} H_{16}, and oil of turpentine has precisely the same composition, C_{20} H_{16}. The two substances are isomeric. Among all of the wonders of chemistry there is none more wonderful than this principle of isomerism. That two substances composed of the same elements in the same proportions should vary so greatly in their odor, flavor and other properties as oil of turpentine and oil of lemons is a puzzling mystery.

The oil of turpentine is isomeric not only with oil of lemons, but also with the oils of oranges, cloves, camomile, thyme and bergamot. All of these are composed of only the two elements, carbon and hydrogen, and all in the same proportions, C_{20} H_{16}. The great difference in the odor and flavor of these several substances is to be accounted for only on the supposition of a different arrangement of the atoms. It is not difficult to conceive that if an atom of the oil of lemons is subjected to certain influences, that peculiar arrangement of its 20 atoms of carbon and 16 of hydrogen which gives it its peculiar properties should be broken up, and these atoms should receive that other arrangement which produces the properties of the oil of turpentine.

Heretofore chemists have not known what conditions were requisite for effecting the change in these two substances, so as to transform oil of lemons into oil of turpentine, and if our informant is correct in her observation she has made an interesting discovery in chemical science. But in other cases the transformation of one substance into another of the same chemical constitution is not only understood by chemists and practiced in the laboratory, but conducted on a large scale in the industrial arts. An atom of starch is composed of 12 atoms of carbon, 9 of hydrogen and 9 of oxygen, C_{12} H_9 O_9, with the addition of water, and sugar has precisely the same constitution. When a kernel of barley or other grain sprouts and begins to grow, the starch which it contains is transformed into the isomeric compound, sugar. It is for the purpose of effecting this transformation that grain is malted. The sugar thus produced is afterward converted into alcohol by fermentation. Thus the production from grain of beer, whisky, and all other fermented and distilled liquors, and therefore the great industries of brewing and distilling, as well as the prevalence of intemperance, with its immeasurable evils, all depend upon the power of transforming one substance into another of isomeric constitution by simply changing the arrangement of its atoms.

THE RUSSIAN MONITORS AT SEA.

One of the Russian monitors has recently had a trial trip and the results are thus described by the *Messenger de Cronstadt*. This journal gives a detailed account of the trip from which we make the following extract:—"The monitor *Vestchoune*, accompanied by the steam-vessel *Vladimir*, and hoisting the flag of Rear-Admiral Likhatchew, chief of the ironclad squadron, left Cronstadt August 3, and, after touching at one or two ports, entered Reval on the 5th, which place she left on the 8th, at 8 30 A. M., and at 4 P. M. reached Helsingfors. In this trip she had to contend against a rough sea, which washed over the deck, and the waves even at times reached the top of the turret. Notwithstanding this the monitor behaved admirably, and did not lesson her speed for one moment. Her engines worked well, as did also the isolating apparatus on which the compass rests, in order to protect the magnetic needle from the action of the iron and to diminish its declination. This apparatus consists of a long copper tube, in the interior of which the compass is fixed with the Mariner's card reversed, but reflected in a mirror. On the 11th the *Vestchoune*, still sailing in company with the *Vladimir*, again set sail, and on the 12th, after a short stoppage at Glasholm, they continued their cruise in the vicinity of that place. However, the wind having freshened, a heavy sea arose, and the waves were

again thrown on the ironclad's decks. She rolled in a peculiar manner, quite different to that of other vessels. Her oscillations described angles of 7½ and and even 8 degrees. Notwithstanding this she steamed ahead quite well, and her engines continued to work in the most satisfactory manner. The vessels entered Routchesalm to await the subsidence of the gale, and on the 14th steam was again got up and they crossed the reefs, meeting a heavy sea, which the monitor encountered as well as possible. Anchor was cast at Transund, whence the route was continued to Cronstadt, which was reached on the 17th at 6 in the morning."

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week ; the claims may be found in the official list:—

Ejector for Oil Wells, &c.—This invention consists in procuring oil, water or other fluids from artesian and other wells by a new and peculiar mode of forcing air up the usual tubing by means of a forcing pump through an inner pipe to which is attached a nozzle of peculiar construction, which is term an "ejector," and which is so applied as to direct the compressed air upwards within the well tubing in a thin continuous stream, which thereby induces or causes a current of the contents of the well to ascend in a continuous stream to the top, where it is discharged into a proper receptacle. G. M. Mowbray, of Titusville, Pa., is the inventor.

Improvement in Horse Covers.—This invention consists in providing ventilating louvers in a horse cover, by which the excessive heat and perspiration that now attend the use of horse covers when the animal is at work are avoided, and a perfect ventilation is maintained about the back and loins of the animal, whilst he is perfectly protected from rain, snow, and inclement winds. E. L. Perry, of New York city, is the inventor.

Shade Fixture.—This invention relates to an improvement in that class of shade fixtures in which the shade roller is provided with a spiral spring for the purpose of automatically winding up the shade. The invention consists in providing the shade roller with a stop or fastening composed of a pawl which engages with notches in a hub attached to one of the end plates of the roller, all being arranged in such a manner that the shade may be retained or held at different points or hights in the length or scope of its movement, and the shade adjusted by a simple manipulation of the same, the usual cord for operating or turning, the shade roller being dispensed with entirely as well as counterpoises, which have, in some instances, been employed in connection with spring rollers for holding the shade at any desired point. S. Hartshorn, corner 4th avenue and 10th street, New York city, is the inventor.

Propeller and Steering Apparatus.—The inventor of this propeller, Mr. Henry Ressel, is the son of Joseph Ressel, who took out a patent in Austria on a screw propeller in 1827, and had the same practically tried in 1829 on the steamsr *La Civetta*, in the harbor of Trieste—the first trial of a screw propeller on record. The object of this invention is to render the use of a propeller as a steering apparatus practicable on vessels of any kind and size, and particularly on war vessels. Heretofore it has been considered impracticable to use a propeller as a steering apparatus on sea-going vessels, and the attempts made to effect this purpose have been confined to small vessels running on inland waters, particularly on account of the great difficulty to produce a strong and durable joint between the main driving shaft and the propeller shaft. The joint which forms the subject matter of this present invention is composed of a socket attached to the main driving shaft, and provided with two or more studs which project in segmental grooves in the ball or globe attached to the propeller shaft in such a manner that the propeller can be moved to an angle of 37° degrees (more or less), to either side of its normal position, without interfering with its connection with the main driving shaft, and that it can be rotated when in an angular position with comparatively little friction. The globe is protected by a hemispherical cap and semicircular rings placed in circular grooves cut in the journals and journal boxes of the propeller shaft, relieving the studs in the ball and socket joint from all strain in the direction of the shaft. This invention has been assigned in full to Dr. M. Priester, of 451 Grand street, New York.

Device for Transmitting Motion.—The object of this invention is a simple and effective device to overcome the dead center in machines, in which reciprocating motion is to be converted into continuous rotary motion. The invention consists in the use of two shafts, which are connected by a belt or provided with a fly-wheel, each in combination with an eccentric, or one connecting with a crank on the other shaft, and with the main crank that connects by a pitman or other suitable means with the crosshead of a steam engine or other source of power, in such a manner that by the combined action of the cranks, eccentric, and flywheel or flywheels the dead centers are overcome, and the reciprocating motion of the piston of the engine or other prime motor is converted into continuous rotary motion. John W. Browning, of Mattoon, Ill., is the inventor.

Apparatus for Setting Off Blasts.—The principal object of this invention is to enable miners in setting off blasts at the bottom of a shaft to to get away before the explosion takes place, or, in other words, to enable a man engaged in blasting rocks to set off a blast from such a distance that he is perfectly safe from injury.

The invention consists in a barrel, provided at one end with an opening to receive the end of the fuse, and with a spring catch or dog to hold the fuse in said opening, and furnished in its interior with a nipple and spring piston or hammer, said dog and hammer being provided, one with a prop and the other with a trigger, which are connected with each other by means of a chain or cord, in such a manner that when the barrel is secured to a fuse by the dog and the hammer is set or worked by pulling a cord or chain connecting with the trigger, the hammer is relieved and a percussion cap placed on the nippel in the barrel is exploded, thereby setting fire to the fuse, and at the same time the dog releases the fuse and the barrel can be hauled in or up out of harm's way before the explosion takes place. J. E. Hughes, of McCartysville, Cal., is the inventor.

MISCELLANEOUS SUMMARY.

The Atlantic Cable, which is to be laid next summer between England and America, was recently tested to try its strength and ductility. A given length was taken, suspended, and gradually weighed until it broke, the elongations succeeding each additional weighting being duly registered. The cable selected bore the weight of six three-fifth tuns. The case, the spiral wires involving it, the insulating body, the jute yarn, and each separate strand of the cable were similarly tested. It was found from those experiments that the more the fibers of wire were brought into a state of tension, the greater became its strength, and that as an insulator gutta percha, although not so perfect as India-rubber, is far more durable. and that the cable as now manufactured will be able to bear a strain four times its own weight when laid at the bottom of the Atlantic.

Recovering a Sunken Engine.—The *Mechanics' Magazine* says:—"The *Matilda*, a twin screw steamer, built for the blockade service, and fitted with costly engines, was wrecked last spring on her trial trip near Lundy Island. Mr. M'Duff, of Portsmouth, with Messrs. Palmer and Hicks in their vessel, the *War Hawk*, have recovered most of the valuable property on board. M'Duff, equipped in Mr. Siebe's diving apparatus, has taken her engines to pieces, and sent them up. He has worked six hours a day, unscrewing bolts, etc., as if he were in a factory on shore, instead of being 42 feet under water, and exposed to a ground swell setting in from the Channel."

A Glass Steam Engine.—The troupe of glass-blowers at Hope Chapel furnish a very interesting evening's entertainment for those who are fond of practical things. A steam engine, most beautifully constructed of different colored glass, is working by steam all the time. The nature of the material affords an opportunity to see all the several parts moving at once, and it is really a very curious sight, even to an engineer, and one that will well repay a visit.

An invention for the recovery of sulphur from the waste produced in the manufacture of soda has been provisionally specified by Mr. B. Jones, of Warrington, England. He allows hot water to flow over "blue waste" placed in a suitable vessel, and in a few hours he draws off the liquor. He precipitates the sulphur with hydrochloric acid, and then filters and evaporates to dryness. The precipitate is then treated in a furnace similar to that commonly used for producing sulphur from sulphur stone. He proposes to condense the sulphuric acid in a water tower and to collect the sulphur at the bottom.

Adulterated Beer.—The principal of the Inland Revenue Department of England has just examined twenty-six samples of beer, of which twenty were adulterated. In fourteen of these samples, he found the prohibited articles called grains of paradise—grains which, however, fit for Eden, are by law unfit for beer. In one of the fourteen he found, beside the prohibited grains, a portion of tobacco; in two others, cocculus indicus was present in large, and even dangerous quantities; two samples contained capsicum; and two others proto-sulphate of iron.

Cure for the Whooping Cough.—An effectual cure for the whooping cough, extensively practiced in France, Sweden, and England, is sending the patients to gas works to inhale the air from the purifying apparatus. A Mr. Backler, of London, says:—"It often occurs that as many as a dozen children are brought to the gas works at one time—and the managers have now come to regard this new custom as part of the daily routine of business."

A New Brunswick Pearl.—There is now to be seen at the store of Mr. Hutchinson a very fine pearl of unusual size. It weighs 27 grains, is perfectly spherical, without a flaw or defect of any kind, and is valued at between $130 and $150. This fine pearl was taken from a common mussel, in Stone's Brook, near Penobsquis Station, and has caused quite a search in the neighborhood, which has resulted in the discovery of smaller ones.

Anti-Incrustation Powder.—Mr. H. N. Winans, of this city, has been for many years engaged in the sale of a powder to remove incrustations from steam boilers. Judging from the testimonials of its efficiency shown us, it is a valuable article, and one calculated to prevent the evil referred to. An advertisement can be found on another page.

Petroleum Discovery near Rochester.—The City of Rochester, in this State, is excited by the discovery of petroleum in that vicinity. The lands have been leased, a company has been formed, and steps are being taken to sink a well without delay.

Tuns of cucumbers are annually sent to this city every fall to be made into pickles. For Westchester county alone the product this year is set down, by good authority, at $1,300,000, cash value, or 130,000,000 cucumbers.

In the illustration of Dykeman and Bolton's Variable Exhaust, given in our last number, the address was erroneously given "Harlem Railroad." It should have been *Hudson River Railroad.*