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Contents:

(Illustrations are indicated by an Asterisk.)

WATER AS FUEL.

There are before the community several schemes for employing water as fuel, and some of them are recommended by authorities which command the attention and respect of large numbers of persons.

It is well known that the burning of hydrogen produces a more intense heat than the burning of any other substance, and as hydrogen is one of the two elements which combine to form water, the idea has naturally occurred to many that if water could be cheaply decomposed, it would furnish an inexhaustable supply of the very best fuel. The cheapest mode yet discovered of decomposing water is by means of carbon. If water in the form of superheated steam is thrown upon charcoal or coke at a white heat—about 1,800°—the oxygen of the water combines with the carbon, forming either carbonic acid or carbonic oxide, and the hydrogen is set free in the form of gas. When the hydrogen thus set free is brought into contact with the atmosphere and set on fire, it burns, combining with the oxygen of the atmosphere, and again becoming water. One pound of hydrogen takes from the atmosphere eight pounds of oxygen to form nine pounds of water.

When the idea was first suggested of obtaining fuel by decomposing water, it immediately occurred to all who believe in the conservation of force, that the heat consumed in decomposing the water would be precisely equal to that produced by the re-combination of its elements, and investigations were commenced by several eminent chemists to ascertain by actual experiments whether this is the case. These experiments, conducted by different persons and by different methods, have fully established the law, that the heat absorbed or consumed in decomposing water is precisely the same as that which is produced by the burning of its hydrogen. All schemes, therefore, for obtaining an increase of heat by decomposing water belong to the class of delusions which are grouped under the name of "perpetual motion."

In actual practice, indeed, there is a considerable loss of heat. The water must first be heated to 212°, then about 1,000° are consumed in converting it into steam, and a further quantity of heat in raising it to the temperature at which it escapes into the chimney. All of this heat expended upon the water is simply thrown away.

Notwithstanding this inevitable loss, however, in the aggregate quantity of heat, there may be an advantage under certain circumstances in throwing a steam jet into a furnace. The fuel may be carried along so as to effect the combustion nearer the place where the heat is wanted, or the ashes may be blown from the coals and the combustion made more constant. As in the best steam engines nine-tenths of the heat is wasted, it is even conceivable that in some cases these advantages may more than counterbalance the loss in heating the water to the boiling point, in evaporating it, and in heating the steam to the temperature at which it escapes into the chimney. The necessity, however, of encountering this additional loss makes this one of the most unpromising of all conceivable plans for effecting an economy of fuel.

SPARE THE CENTERS.

The practice of knocking off the centers of turned work is a mischievous one. It is merely doing work that is not only needless, but that at some future day will have to be done over again. When a center is once properly made in a shaft, or any other part, it is unalterable except by chipping or purposely changing its position, and work once turned true on good centers will always be true, provided no damage occurs to it. It is just in this particular that the true center is useful, for if a shaft is bent or an arm on one thrown out of line, the old centers are available and the injured piece can be made as good as new in a short time. Suppose, however, that the journal of a shaft is worn oval, or that the collar is battered and jammed up, how is it possible to find the true center of the shaft? It never can be found; the shaft may be made to run straight but not by its old centers if they have once been cut off. When shafts are forged too long in cutting them to the right length great "tits" are left on the ends, which are both ungainly and in the way. This is the blacksmith's fault, and must be remedied by the machinist; cut the shaft to the right length first, knock off the centers if they are too long, and then re-center the job and finish it according to the drawing. In steam-engine work especially, the centers of shafts are essential to nice adjustment, and they should never be removed.

A foolish notion prevails among some mechanics that centers injure the finished appearance of the work, but it seems to us that this is an erroneous view which ought not to be tolerated. Drill every center, and drill it deep; counter-sink it so that it will have a good bearing on the centers of the lathe, and the workman will have the satisfaction of knowing that, all other things being equal, he will have a good job, and one that can at any time be easily repaired if damaged.

THE "DICTATOR."

On the 16th of August, 1862, we stated that Captain Ericsson had just signed a contract to build two iron-plated vessels on the *Monitor* pattern, designed to be the fastest and most formidable ships-of-war in the world. These vessels have been named the *Dictator* and the *Puritan*, and the progress of their construction has been noted from time to time in our columns. They are now both drawing rapidly to completion. The *Puritan* is still on the stocks at Greenpoint, but the *Dictator* is afloat alongside of the wharf at the foot of 13th Street, North River, with her machinery on board; and the carpenters are at work on her cabins and berths.

The *Dictator* is an iron ship, iron-plated, carrying one turret with two large guns. She is propelled by a screw driven by two engines, each having a cylinder 100 inches in diameter with 4 feet stroke. There are 56 furnaces which supply the power for driving the fabric through the water. There are 12 engines on board, 2 for propelling the ship, and 10 smaller ones for ventilating the vessel, turning the turret, and performing other subordinate offices.

The inner shell of the turret is now being dragged along the wharf from the house where it was built to its place on board the vessel. It is slid along on greased ways by means of an immense pulley-block, the rope being wound on a windlass by horse-power. The turret rests stationary on its ways till the rope is stretched to a certain tension, when it slips forward a foot or more at a step. This interior shell is formed of 4 plates, each one inch thick. When it is in place on the vessel it is to be surrounded from top to bottom by hoops, each 5 inches thick and 11 inches wide; these hoops being formed in quarter sections so that four pieces reach round the turret. These hoops are not pierced by bolt-holes, but are held in place by the outer shell of the turret which is 6 inches thick, built up of plates each 7-8ths of an inch in thickness. This outer shell is to be put together just above the turret, and then lowered into its place with the aid of hydraulic presses.

C. H. Delamater is the constructor of the *Dictator*, but several shops in different parts of the country have contributed work in their respective departments. The large forgings were all done at Bridgewater in Massachusetts. The most massive of these is the propeller shaft, which is 21 inches in diameter.

All of the materials used in the construction of this ship appear to be of the very best quality, and the workmanship is faultless in every respect. A thorough examination of the vessel impresses one with the conviction that she is an exceedingly staunch, swift and comfortable craft, and a most powerful instrument of destruction.

MUDSILLS.

Before the outbreak of the present war, when open hostilities were unknown, the grandees of the South could find no more bitter reproach for the mechanics of the North than the term "mudsills." Senseless as the appellative was to intelligent men, it served to show the estimation in which traitors held labor and those who live by it, and was expressive of their utter scorn.

A just retribution has fallen upon these traitors to their country, for through the want of those despised "mudsills" their railroads are in ruins, their factories, such as they have, short-handed, and only worked by "Northern men with Southern principles," and their steamers, for all offensive purposes, useless. Though the fields of the South at this moment require all the cultivation that can be bestowed upon them, there are none but slaves to plant the crops or to reap them if they were sown. The North is equally short-handed, but when men disappear from the homestead or the factory, dumb assistants supply their place, and the crops are not only gathered in cheaply, but are, or might be, increased in quantity by the employment of the useful agricultural machines which are now in market.

All other callings and trades are equally prosperous at the North, and only in the war-ridden South is the voice of labor hushed in the field, the hum of the factory replaced by solitude and ruin. The Southern journals, such as still exist, are full of demands for "mudsills;" they lament bitterly the loss of machine shops and foundries, and are inconsolable in being debarred the privileges of certain manufacturing towns which have recently been wrested from them in Georgia and Mississippi. It is, of course, the products of labor that they miss so greatly, but these products are the fruits of the skill and ingenuity of Northern "mudsills," whom they once derided, but now mourn and refuse to be comforted therefor.

Let them take this unction to their souls:—One day the Southern factories, mills and machine-shops shall be busy again; and a peaceful and smiling land acknowledge with gratitude the benefits which "mudsills" confer upon them.

COPPERING IRON SHIPS.

WE publish herewith some account of an English invention for coppering the bottoms of iron ships. The prospectus of the patentee (Mr. Warren) says:—

"The question of the day, in connection with iron ships is how to preserve them from fouling, and prevent galvanic action, where copper is used. Many expensive and troublesome plans have been adopted, but all are more or less failures. By order of the Lords Commissioners of the English Admiralty a vessel has been coppered at Portsmouth, England; she has been visited, while coppering, by officers of station and influence, engineers and ship-builders, by whom the plan has been reported on, in the most satisfactory manner. The price for a 'royalty,' including the cost of the materials for preparing the ship for the reception of the copper, is 1s. 6d. per superficial foot."

Appended is a description of the process:—

"The upper edge of the copper is secured with the ordinary coppering nails to a batten, which batten is secured to the side of the ship with screws; and above, or on the batten, a rubbing piece is worked, to prevent boats, &c., from injuring the upper copper. The sheets of copper are fastened together by Mr.

Warren's patent rivets, prepared expressly for this purpose. Holes are punched in the edges and butts of the sheets of copper to receive the rivets, and when placed through the holes, and struck with a light hammer, the points (being split and slightly turned out) coming in contact with the insulator, are opened, and form a most perfect clinch. After the rivet-holes are made in the copper, the copper must be warmed, then carefully covered on the side to be placed next the insulator, with Hay's glue (a patent preparation). The bottom of the iron ship is covered all over with a material such as felt, which, being coated with Hay's glue, or other suitable composition, is to form an insulator; this is made to stick or adhere to the ship in the following manner, viz.: —Place the felt or other material, against the ship, and turn back a small part of the end of it, say about 12 inches, then well saturate with glue the part of the felt turned back: cover also the bottom of the ship with glue, and as quickly as possible, whilst the glue is hot, place the saturated part of the felt against the glued part of the ship, and press it hard home; then proceed to glue small portions of the felt and bottom of ship, pressing the felt home quickly, until the ship is entirely covered with felt. The outside of the felt must then be carefully covered all over with glue, which will then form a most efficient insulator between the bottom of the iron ship and the copper. It is then ready for coppering. Proceed to secure the copper to the insulator, in the following manner, viz.—Place some sheets of copper, either the upper or lower tier, against the insulator on the bottom of the ship, and temporarily secure them with small shores; then place the second tier either above or below, as the case may be, allowing the usual amount of lap for the edges or butts, and clinch them with the prepared rivet. Then put a hot plate over each sheet of the first and second tier, and force them home with a piece of backing and small shores, place the third tier on the insulator, in a similar manner to those, and proceed in this way, tier after tier, until the bottom of the ship is entirely covered with copper."

R. B. Forbes, Esq. of Boston, Mass., (to whom we are indebted for this paper) says:—"The inventor gives certain figures to show the advantages of coppering iron vessels, compared to those not coppered. My experience teaches me that figures generally lie when applied to the estimated cost of ships, especially steam ships; they very seldom tell the truth when treating of the speed, and never as to distances run in a given time with a certain number of revolutions, and a certain amount of steam; and as to consumption of fuel it is very seldom actually tested during trial trips. Nevertheless, Mr. Warren's figures show a gain of nearly $10,000 in six years with ships coppered by his method over others not coppered. In order to arrive at this result he assumes that the copper will last pretty well for that time, and that he will get off old copper sufficient to pay for the new, within £423, or about three-fourths of the original value. Admitting what my own experience has never yet warranted, that copper will last six years and only deteriorate 25 per cent., Mr. Warren makes a poor show for the new system, and illustrates forcibly how greatly his figures lie, by making no account of that never-sleeping element, interest, which begins in his case to eat up his substance from the date of coppering. As he gets no returns from old copper until the end of six years, the cost is about £3,580, and on this the interest for six years may be safely called 33⅓ per cent., so that he will have nearly expended £4,773 (nearly) against £4,062 and interest, which leaves the advantage whittled down to a very small sum.

"Mr. Warren enumerates, but leaves out of the account, sundry advantages to be secured, which would seem to be of some importance; they are as follows: —If the vessel was well painted originally, the damage by cleaning would be slight; fouling is the most serious evil. The estimate in Mr. Warren's prospectus for docking a ship of 3,668 tuns at £100 for 14 days is very small. But supposing the figures to be true, and the steamship to have cost $125 per tun, or $458,500 the gain—£1,787 at $5—gives only $8,935, or less than 2 per cent. on the cost of the ship, and less that 2½ on a valuation of $100 per tun. The never-sleeping interest account reduces this slight gain to a nominal sum.

"When I come to estimate the difficulty of bringing the 'insulator' to the 'sticking point,' and the difficulty in making copper stand six years in a fast ship, I cannot but be very skeptical as to Mr. Warren's mode of coppering iron vessels. I can scarcely believe that, in the damp climate of Great Britain and in the damp docks, an iron ship can be so completely dried as to make a perfect contact between the hull, the felt, and the metal—a contact so perfect as to preclude all danger of stripping off the metal sheathing, by the various strains and vibrations of machinery.

"I am inclined to think that well-braced iron ribs, covered with teak plank, or well-fitted yellow pine, will furnish a combination of great durability and capacity, costing less than a complete iron vessel. The iron-rib vessel is more especially adapted to commercial uses that for a vessel-of-war, because in the latter much of the interior is ceiled over, rendering it difficult to clean and paint the iron frames, which is an essential element of durability, whereas, in a merchant vessel, nearly the whole of the interior may be exposed to view whenever the cargo is discharged."

NEW BOOKS AND PUBLICATIONS.

The Practical Metal-workers' Assistant. H. C. Baird, Publisher, 406 Walnut street, Philadelphia.

It is a matter of much importance to know that the mechanics and working-mengenerally, of this country, are so zealous for education and anxious to be informed on all that relates to the advancement of their special trades. None know this or can better testify to the truth of the observation than ourselves; for there is scarcely a day that passes in which we do not receive earnest inquiries for some mechanical work of the kind previously alluded to do. No man can hope to become eminent, or, indeed, maintain his position in his trade, who is contented to remain in ignorance of the improvements daily occurring about him; and, while his limited knowledge may have been useful at at one time, in these latter days he finds himself left behind by the great mass who are anxious to achieve something more than a mere common existence—who burn to not only distinguish themselves, but earn a competence by availing themselves of the researches and investigations of others.

Mr. Henry Carey Baird, the publisher of the work here alluded to, has devoted himself for years expressly to this class of mechanical literature; and his stock now on hand and in course of preparation will no doubt exceed that of any other publisher or publishers in the country. We regard Mr. Carey as a benefactor in one sense; for, while we do not wish to be understood as saying that he is uninterested in the matter, we do say that his works are not only appropriate to the times and the country, but that they are low-priced, durable, and creditable specimens of the art of bookmaking. The type is large and clear; the paper is firm in texture and handsome in surface; the binding is serviceable; and the contents of the books are all that he asserts them to be. We have said this much in Mr. Carey's favor because he is deserving of it, and not from a desire to laud him over others.

"The Practical Metal-workers' Assistant" is a book that is much needed by mechanics in general, since it contains a large number of lucid articles on practical subjects, which are in the highest degree instructive. We cannot begin to enumerate the subjects treated on in a mere notice; the reader will find a long advertisement in the Scientific American for March 26th [page 207], which will give him some idea of the work. Suffice it to say here that "The Practical Metal-workers' Assistant" comprises metallurgic chemistry, and the arts of working all metals and alloys; forging of iron and steel, hardening and tempering, melting and mixing, casting and founding, works in sheet metal, the processes dependent on the ductility of the metals; soldering and the most improved processes and tools employed by metal-workers, with the application of the art of electro-metallurgy to manufacturing processes. This information is collected from original sources, and from the works of Holtzapffel, Bergeron, Leupold, Plumier, Napier, and others. The author is Oliver Byrne. A new revised and improved edition, with additions by John Scoffern, M.B., William Clay, William Fairbairn, F.R.S., and James Napier, has just been published. The work is embellished with five hundred and ninety-two engravings, illustrating every branch of the subject, and forms one volume 8vo., price six dollars. It is sent by mail, free of postage, to any address.

Mr. Baird is about to issue a new catalogue shortly, which will contain the announcement of some other mechanical works he has in press.

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:—

Magnetic Globe.—This invention consists in the production of geographical globes with magnetic powers, by making them of a metal possessing magnetic properties, so that small objects, also possessing magnetic properties, will be attracted and adhere to the surface of the globe and thus enable the illustration to the eye of the principle of the power of the earth's attraction—a physical fact which teachers have heretofore found difficult to demonstrate successfully to the minds of the young. Any information regarding this invention may be obtained of the inventor, Elbert Perce, 71 Hicks street, Brooklyn, N. Y.

Marine Log.—This invention consists in a certain novel arrangement of a dial, indices, gearing and springs in combination with a slide which has attached to it, by a line of suitable length, a chip, bucket or float, which, by dragging in the water astern of a vessel while the instrument is arranged upon the taffrail, is made to produce a greater or less draft upon the slide and tension upon the springs according to the speed at which the vessel passes through the water, thereby causing the slide so to act through the gearing upon the indices as to indicate upon the dial the speed of the vessel in miles and fractional portions thereof. In order that the draft of the line may be always direct upon the slide, the case of the instrument containing the springs, gearing, dial and slide, is balanced on journals or between centers. The invention further consists in so arranging the several working parts of the instrument as to permit the whole to turn within the case, that when the vessel is making lee-way the slide may be drawn by the line and chip or float to a position oblique to an imaginary line passing longitudinally through the vessel and to indicate the lee-way upon a graduated scale provided on the case of the instrument. A. E. Lozier, of No. 322 Pearl street, New York city, is the inventor of this improvement.

Grain Drier.—This invention consists of a series of perforated revolving cones arranged in the interior of a tower or suitable shell, and applied in combination with a series of conveyers, perforated platforms, chambers for receiving and for discharging hot and cold air, and one or more suction blowers, in such a manner that grain, introduced through a suitable spout or hopper in the upper part of the tower, will be scattered successively over the cones and spread by this action, combined with that of the conveyers, on the platforms and finally discharged through a perforated chute being exposed throughout its whole course to a current of hot or cold air, which can be regulated by equitable dampers or simultaneously to a current of hot and of cold air, and by the action of the shell or tower the moisture is expelled with the spent air, while the grain is cooled by the cold air. R. T. Sutton, of Rochester, N. Y., is the inventor of this improvement.

Percussion Fuse for Rifle Shells.—This invention consists in the construction of the metal plunger which is employed in a percussion fuse plug for explosive projectiles to effect the explosion of the percussion cap or other percussion priming, with one or more small longitudinally projecting columns or prongs are bent aside or twisted off, and so caused to leave the plunger free to move lengthwise and thereby effect the explosion of the percussion cap or priming when the projectile strikes. Robert P. Parrott, of Cold Spring, N. Y., is the inventor of this improvement.

Condenser for obtaining Fresh Water in Steam Vessels at Sea.—The object of this invention is to obtain a plentiful supply of fresh water on board of steam vessels, and to this end it consists in the employment of one or more pipes leading from the steam chimney or steam chamber of one or more of the boil-