

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 33½ 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 tons at £100 for 14 days is very small. But supposing the figures to be true, and the steamship to have cost \$125 per ton, 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 than 2½ on a valuation of \$100 per ton. 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-men generally, 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 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 metallurgical 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 boll-