Engine.—Vertical beam. Diameter of cylinder, 90 inches. Length of stroke of piston, 12 feet.
Boilers.—Two, tubular. Located in hold. No blowers to furnaces.
Water-wheels.—Diameter, 25 feet. Material, iron.

REMARKS.—This steamer is of white oak, locust, &c., and is square fastened with copper and treenails. Her floors are filled in solid. Iron straps diagonally and double laid, 5 by $\frac{3}{8}$-inches, extend around her frame, and in other ways she is constructed in the most approved manner. Her bottom is coppered, and she is furnished with pumps, injections, and cocks to all openings.

The Steamer Shamrock, now the Gunboat Isnomia.—Hull built by Thomas Stack, Brooklyn, L. I. Machinery constructed by James Murphy & Co., New York. Original owners, Arthur Leary and others.

Hull.—Length on deck, 211 feet. Breadth of beam, 27 feet 6 inches. Depth of hold, 9 feet 6 inches. Number of deck, 1. Draft of water, 5 feet 6 inches. Frames, molded, 12 inches, sided, 6 inches, apart at centres, 26, 28, and 30 inches. No rig. No bulkheads. Tonnage, 585, O. M.
Engines.—Vertical beam. Diameter of cylinder, 45 inches. Length of stroke of piston, 11 feet.
Boiler.—One, tubular. Located in hold. No blowers to furnaces.
Water-wheels.—Diameter, 28 feet. Material, iron.

REMARKS.—This vessel is of white oak, chestnut, and hacmetac, and is square fastened with copper, iron, and treenails. She is strapped with iron straps, 3 by $\frac{7}{16}$-inches, and her bottom is coppered. She has knees under her main deck, and is considered a fine steamer. The speed shown by her in her trial-trip induced the Navy Department to purchase her, and fit her for blockading duty. E. M. B.

(To be Continued.)

For the Journal of the Franklin Institute.

Work and Vis-viva. By JOHN W. NYSTROM.

My "masked battery" opened upon Professor De Volson Wood, of the University of Michigan, appears to have had a greater effect than was anticipated, and I can well afford to slacken my fire, although unaware of my "vulnerable points," which, he says, "cannot stand a fierce assault." It is not necessary to reply to the greater part of Professor Wood's last article, lest the discussion degenerate into a useless squabble. I shall therefore confine myself to the important points, with a view to clear up the confusion which still pervades the questions of power and work, inasmuch as he yet seems to maintain the old stereotyped error that "power is the work done in a unit of time."

The number which expressed the work done in a unit of time, will be equal to the number which expresses the power in operation, but that does not prove the two quantities to be alike.

Six cubic feet and six square feet, although identical in number, do not prove that a cubic foot is a square foot, merely because their numbers are alike.

Professor Rankin and others also say that "power is the work done in one minute," which is substantially the same as saying that a square foot *one foot thick* is a cubic foot.

Professor Wood further remarks: "Again, he (Mr. Nystrom) says F V T is the expression for work. Now, if T = one second, minute, or hour, do we not have F V = *the work* which is done in a unit of time?" Here it is necessary to resort to the elementary, and inform Professor Wood that T does not disappear in the formula for work, merely because it equals one or the unit, for on his reasoning we may set F = 1, and the work will be = V T = S the space, which is equally absurd. It will first be necessary to explain the difference between addition and multiplication.

When a quantity is multiplied by an abstract number, it will not change the *nature* of that quantity, but the product will be the same as the sum of so many concreate quantities added together; but when a quantity is multiplied by another quantity, the product becomes a third quantity different from the two first.

Let two square feet, for example, be multiplied by the abstract number three, and the product will be six square feet, or the sum obtained by adding together three times two square feet, which will also be six square feet; but if two square feet be multiplied by a *thickness* of three linear feet, the product will be six cubic feet, which is radically a different quantity from two square feet, or from three linear feet, which constitute its elements.

Professor Wood, however, in his examples above quoted, confounds specific or concreate quantities, such as time and velocity, with abstract numbers.

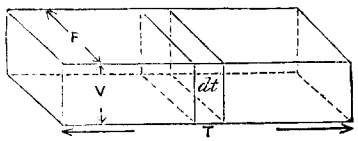
Power F V = F V $\times$ 1 the abstract number, and

Work F V T = F V $\times$ 1 minute, or whatever time or unit of time is a specific quantity.

Professor Wood quotes my statement that *power is the differential of work*, and says: "Do we not rightly infer from this that power is a part of work, an infinitessimal portion of it, and hence of the same kind as work?"

In answering this question it will be best to refer to a parallelopipedon, by which work has before been illustrated.

Let the accompanying cubic figure, F V T, represent the work, then the cross section F V represents the power, and F V dt the differential work. Now let us diminish dt until it becomes infinitely small, say = 0; then the solidity of the differential work F V dt = F V $\times$ 0 = 0, or there will be no solidity, or no work, whilst the quantity F V, which represents the power, is unchanged.



It may please Professor Wood better to say that "power is the differential coefficient of work."

I trust this will satisfy him that power is not the work done in a unit of time, and that the English unit for power is not a unit for work.

The popular expression "force of momentum" is perfectly correct. It does not mean that momentum is force, but that force is an element of momentum; same as we say, "the length of a rectangle" or "the surface of a solid." The momentum divided by time is the *force of momentum.*

It is to be regretted that in the conclusion of his article he "will pass over many important points," for the object of our discussion ought to be to reveal the subject, not to conceal it. I am, as Professor Wood has remarked, "a truth seeker," and think it unkind of him to "pass over important points."

The *Scientific American* says: "The main purpose of Mr. Nystrom seems to be to deny the position that work is independent of time, and he succeeds in involving the question in considerable confusion." After which, the editor of the *Scientific American* suggests to "free our minds from confusion" by taking "most important steps to use words always in their exact signification," *par example.* "Regarding work as the overcoming of physical resistance, it is plain that the aggregate amount of any given quantity is independent of the time required for its performance." Does not the *Scientific American* here convey the idea that *work is independent of what it requires,* namely, the time? The editor evidently means to say, that "a given quantity of work may be performed in any desired length of time," but he does not seem to conceive that the *work is dependent on whatever time required for its completion.*

On Aniline Black. By M. LAUTH.

From the London Artizan, March, 1865.

Aniline black is a new colored derivative of aniline, which, so to say, completes the series of brilliant colors derived from this base. It differs, however, in many respects from the other colored derivatives. The mode of production, the way of fixing it on fabrics, and the insensibility to physical and chemical agents which it presents are points on which it differs essentially from the red, blue, and violet of aniline. Mr. Lightfoot's process, which the author quotes, is well known to our readers, and we shall only quote from this paper the author's new process for aniline black, which, it will be seen, and, indeed, is admitted to be, but a simple modification of Mr. Lightfoot's. Mr. Lauth's process consists in printing with the mixture of hydrochlorate of aniline and chloride of potassium an insoluble oxidizable salt, which will become soluble on the fabric—sulphide of copper, for example. By the oxidizing action of the chloric acid (or the chlorine which is set free by the reaction of hydrochlorate of aniline on chlorate of potas-