materials and in about the proportions following:—33 parts (by weight) of finely divided charcoal; 33 parts of highly aluminous clay; 33 parts of carbonate of lime or wood ashes; 1 part carbonate of soda; 1 part carbonate of potash. I stratify the iron with this cement in an ordinary cementing furnace, and heat it in the same manner as is now generally followed. I thus obtain a steel possessing all the qualities of that known as German, or 'Rives,' or shear steel (*acier d'Allemagne ou de Rives*). The successive heats and firings do not cause it to part with the carbon which is intimately combined with it, as in cast or in shear steel. And for this reason, carbon having but a small affinity for iron, requires, in order to enter into intimate combination with it, 1st, to be added in an incipient state; 2d, to be assisted in its combination by numerous electric currents. Now these conditions are fulfilled by my process, for—1st. The mutual reaction of the carbon and the carbonates causes the greater part of the carbon to assume a molecular state; 2d. This *change* of the carbon and of the carbonates, the action of the red-hot iron upon the oxides of aluminum, of calcium, of potassium, of sodium, with the carbon in the molecular state, produce or generate numerous currents of electricity. Further, the earthy and alkaline metals appearing in an incipient state, greedily absorb sulphur, phosphorus, and the other metalloids. Thus prepared, this steel may be used as shear steel or German steel (*acier d'Allemagne*), the properties of which it possesses. In order to convert this steel into cast steel, the ordinary processes of fusing in pots is followed, but with the addition to the metal in the pots of from five to six per cent., by weight, of the following mixture, which, as far as possible, must be kept from contact with the atmosphere:—4 parts (by weight) dry carbonate of soda; 4 parts dry carbonate of potash; 3 parts wood ashes; 2 parts borax; 3 parts oxide of manganese; 4 to 7 parts hydrogenated charcoal, soot, lamp-black, &c. The four parts of carbonate of potash may have substituted for them two parts of caustic potash. The mixture of these substances should be effected with care, and their number and proportions may be varied to suit the nature of the products to be obtained."

The reactions of these substances are said to be the same as in the former case.

For the Journal of the Franklin Institute.

Improvement of the Ohio River. Reply to some Remarks of Mr. Ellet.
By W. MILNOR ROBERTS, Civ. Eng.*

In the October number of the *Journal*, Mr. Charles Ellet, Jr., Civ. Eng., invites my attention to an "error" or "oversight," as he terms it, in my paper in the treatment of the question of saving water on the reservoir plan, by means of a modification of Mr. Haupt's plan of low open dams. He, however, disclaims any "wish to participate in the discussion now going on in the *Journal*," &c. In briefly replying, I desire it to be understood, therefore, as entirely separate from, and outside of, the paper now in the course of publication in the same *Journal*.

Mr. Ellet's remarks are calculated, though of course undesignedly, to convey a very erroneous impression as to my position in the controversy. I am not the *advocate* of low dams to be fed with reservoirs. I am the advocate of a regular slackwater navigation to be composed of locks and dams, and not at all dependent on artificial reservoirs, or artificial supply of any kind. At most, I have merely suggested that the plan of low open dams should be retained in the discussion, as auxiliary to the reservoir plan; all of which is directly antagonistical to my own. Here is what I said, in the September number referred to by Mr. Ellet:—"If it can be established beyond question, that this plan (low open dams), as compared with Mr. Ellet's, of keeping up the flow of the unobstructed river, may save two-thirds of the cost of the artificial reser-

* Received too late for insertion in its proper place.—EDITOR.

voirs, that fact might lead to its adoption as an economical *adjunct to the system of artificial reservoirs*, in case they should be deemed preferable to locks and dams." But I beg to decline being held up as the *advocate* of any plan in any degree connected with artificial reservoirs for making a navigation on the Ohio. My plan is, locks and dams.

At the same time, I may be permitted to add, that the *ipse dixit* of Mr. Ellet, or of any one, is not likely to settle the mooted points. The idea of having a river "standing on an inclined plane," belongs to Mr. Ellet; it is not an invention of mine. I did not even suggest that the river would present a uniform plane, with the system of open dams; nor will it do so, except in floods. If Mr. Ellet will carefully consider the entire question, as stated, keeping in mind that the river is already but a succession of deep pools and ripples, or natural dams, he may yet find that the low open dams would create a navigation about 6 feet deep, with *very much* less water than would be required to keep up the same depth along the unobstructed river. He will observe, that I have not contended that with the open dams in operation, the water would be raised five feet above its original natural plane, on all parts of the river.

He says, "I do not wish to enter into detailed investigation of this problem." To which it may be added, that it is not necessary, at present. But hereafter, should the slackwater plan be discarded in favor of the artificial reservoirs, then the problem will be investigated in detail; when it will perhaps be found to present a new problem. But even should it hereafter be *proved* that such open dams would not save water enough to warrant their use as *adjuncts to the reservoir system*, it would not militate in the slightest degree against the slackwater navigation, the only plan advocated by me, which would rest as before, on its own merits, notwithstanding Mr. Ellet's assertion, at the close of his communication, that locks as well as dams are "*unnecessary*." Any one, with equal propriety, may arrogate the right to assert that *reservoirs* are unnecessary, but I claim no such privilege in a public discussion of this character, because these are the *very points* under consideration: another tribunal must decide who is right, and point out the *corrections* that ought to be made in any of the views the different parties may have expressed.

FRANKLIN INSTITUTE.

Proceedings of the Stated Monthly Meeting, October 15, 1857.

John C. Cresson, President, in the chair.

John F. Frazer, Treasurer, present.

B. Howard Rand, Recording Secretary, pro tem.

The minutes of the last meeting were read and approved.

Donations to the Library were received from the Statistical Society of London; L. A. Huguet-Latour, Esq., Montreal, Lower Canada; The Regents of the University of the State of New York, Albany, New York; Hon. James H. Campbell, U. S. Congress; Hon. J. Holt, Commissioner of Patents, Washington City, D. C.