Correspondence

How to Pass a Fleet over a River Bar.

MESSRS. EDITORS :—I was just reading an account of the naval expedition down the coast, and that it was to enter the waters of Pamlico Sound, where there was some difficulty expected in passing over the bar, as the water was represented to be only eight feet, while most vessels drew a great deal more. I suggest the following mode for crossing bars :—Let the steamers—say half dozen or more—be lashed together, one immediately behind the other, and advance slowly to the bar, the hindmost one throwing a small anchor over the stern as soon as they enter the soft mud. By holding the boats thus, and keeping the wheels in motion, the soft mud will be drawn from the first boat to the next, and so passed along until it is thrown behind the last in deep water. As the way is cleared the boats can be moved ahead slowly, so as not to compress the soft mud under the bow of the first. In this way, I think, the difficulty can be overcome. I will simply state my reasons for thinking so. I was one of a party, in the fall of 1828, passing from Great Egg Harbor to Little Egg Harbor, and when we came to the bar, the tide being down, six of us could not row our boat through, although we could move the mud quite freely with our oars. I proposed that we should rock the boat gently, at the same time using our oars as paddles, close to the side of the boat. In this way we progressed, and in a short time we were over. J. P.

Dayton, Ohio.

The Motion of Rockets.

MESSRS. EDITORS :—The writer, "Civil Engineer," of an article under this head, in the SCIENTIFIC AMERICAN of Jan. 18th, makes an intricate question of the matter by quoting prominent scientific names on the subject, and concluding by expressing his own opinion that the cause of a rocket's motion is by the resistance of the atmosphere to the issuing gas, and that "it is doubted whether a rocket would ascend at all in a vacuum."

In reply, if a cylinder containing steam, or other gas, be surrounded by air, compressed to the same density, there would be no tendency in the gas to burst off the end, and if the end were removed by some means foreign to the cylinder there would be no tendency to motion. But if the density of the surrounding air be lessened the inclosed gas would become available to give motion, in proportion to the density of the air, and, when in a vacuum, the action would be perfect.

The above writer alludes to the impossibility of propelling a steamboat by an opening in the rear end of the boiler, and conceives his argument strengthened thereby, which is not apparent. However, this is not theoretically impossible, and a speculative paper on the subject was forwarded by me to the *Franklin Journal* about the year 1843-4, at which period I was an occasional contributor.

If the tube leading aft from the boiler were protected from losing heat, and of such (impractical) length that the steam at the end should have expanded down to atmospheric pressure, we should have an efficient and economical steam engine. T. W. B.

Cincinnati, January, 1862.

A Question in Relation to Steam.

MESSRS. EDITORS :—Will you please state your views upon the following through the columns of your paper :—I have a steam heater, consisting of an iron cylinder, inclosed in a jacket, also of iron ; the article to be heated is placed in the cylinder, and steam admitted between the cylinder and jacket ; there is a safety valve on the heater, weighted 10 pounds to the inch ; also, a pipe to admit steam, and one from the bottom to carry off the water of condensation. Both the pipes have throttle valves, so as to keep the pressure at about what the safety valve will hold down, viz., 10 pounds per inch. Under certain unfavorable circumstances the heater will not heat fast enough, and the question is, will it heat more rapidly if the pressure in the boiler is raised from 40 pounds (the present pressure) to 50 or 60 pounds per inch—the steam after passing into the heater of course falling down to 10 pounds, the highest pressure admissible there? J. J. B.

Burlington, Iowa, Jan. 18, 1862.

[Steam at 10 pounds pressure must always be at a temperature of 240°, provided it is heated through the water; but if our correspondent will carry his pipe through the fire, so as to superheat his steam, he may have his steam at any temperature that he pleases with a pressure of 10 pounds to the inch.—EDS.

Making Core Boxes for Casting.

MESSRS. EDITORS :—The following is a description of a method which I employ to obtain core boxes for small castings. By the mode described, the form of the cavity intended for the core is very exactly and easily obtained. I will endeavor to make it intelligible by describing the mode of making a core box for the core of a tube, two inches in length and one-half of an inch in diameter. I screw together near their ends, two pieces of wood, four inches long, one-half an inch wide and one-quarter of an inch thick. Centering it at the joint I turn the united pieces to within one-half an inch of each end, that is to say, three inches of the same, down to the diameter of the tube (one-half of an inch), and cut off the unturned ends, all of which is explained by the figure below, A B between the dotted lines being the space representing the part turned. I then lay one of these half-round pieces on a smooth board, flat surface down, and upon it I lay a flask of the same length, namely, three inches, one inch wide and three-quarters of an inch deep, as represented by figure 2. Having oiled the upper side of the pattern I fill the flask with fluid plaster of Paris. When this has hardened I remove the flask and lay the other half of the pattern on the half imbedded in the plaster, and on it place another flask of the same dimensions as the first, and like it, having semicircular notches in its ends to fit the pattern. After oiling the surfaces of the pattern and of the first cast of plaster, I fill the second as before with fluid plaster of Paris. When this latter cast has hardened, I separate the two flasks, and removing the pattern from each they form the core box (adjusted by means of splints upon the sides and ends) in which a core can be molded, as at C, of sufficient length for the tube and for half an inch to support each end in the sand mold at the foundry.

Fig. 1

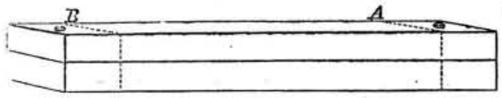
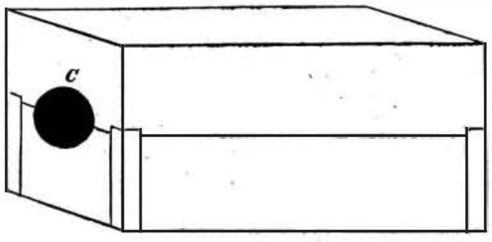


Fig. 2

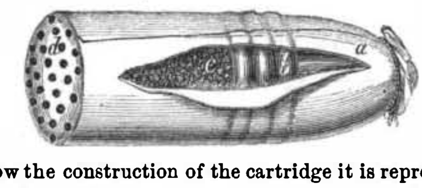


Other shapes than circular may be obtained by the same method, which will often save much time, produce an improved core box and facilitate its manufacture. T. M. COFFIN.

Plymouth, Mass., Jan. 11, 1862.

RICHARD'S IMPROVED CARTRIDGE.

The powder for loading muskets for use in the battle field is always measured out in quantities sufficient for a single charge, which is inclosed in a paper wrapper and attached to the bullet, the whole forming a cartridge. In loading, the soldier bites off or opens the end of the cartridge, so that he may pour the powder into his musket, after which he drives down the ball and the paper of the cartridge with his ramrod. The biting of the cartridges often produces serious injuries. In the first place it makes the mouth very dry, causing in long battles extreme thirst. The powder is apt to make sores in the mouth, and is very injurious to the front teeth ; not unfrequently disabling the soldier for the performance of his duties. These inconveniences have long been recognized by army officers, and many efforts have been made to devise a cartridge which would not require to be bitten in loading, and several contrivances have been invented for cutting off the cartridge. The annexed cut represents one of the latest of the plans of forming a cartridge to obviate the necessity of tearing the paper at the end of the cartridge with numerous holes, so that the flame from the percussion cap may reach the powder without having the paper torn. To



show the construction of the cartridge it is represented with a little slit in the paper. The paper, *a*, beyond the base of which it extends a sufficient distance to form a receptacle for the powder, *c*. The end, *d*, of the cartridge is perforated with holes which are two small to permit the escape of the powder, but which will readily admit the flame from the percussion cap.

Application for a patent for this invention has been made, through the Scientific American Patent Agency, and further information in relation to it may be obtained by addressing the inventors, T. C. Richards, at Milwaukie, Wis.

THE CHEMISTRY OF COAL.

Number III.

THE THREE SERIES.

The substances resulting from the destructive distillation of coal vary with the temperature at which the distillation takes place. There are three series of these substances, each series the result of a peculiar distillation, which are at the present time occupying a large share of the attention of the civilized world. The first is formed in making illuminating gas, the second in the manufacture of coal oil, and the third constitutes petroleum or rock oil. Illuminating gas is produced at a bright cherry-red heat, about 1,400° Fah., coal oil at a temperature of 650° to 700°, and petroleum under conditions which have not been ascertained.

Of these three series only one has received any considerable examination—the series formed in the manufacture of illuminating gas. Coal oil, illuminating gas and petroleum are all composed of mixtures of various hydrocarbons. Hydrogen and carbon combine with each other in a great number of proportions, far greater than any other two elements, forming a corresponding number of substances varying very materially from each other in many of their properties. There is no class of substances in nature more interesting than the hydrocarbons, and as the production of these is the primary object in the distillation of coal, we propose to give considerable space in these articles to their examination, and as those produced in the manufacture of gas are the only ones that have been investigated, our attention must be confined to them. We shall reserve their examination for our next article, merely remarking at this time that they differ from the hydrocarbons which constitute either coal oil or petroleum. For instance, one of the most interesting and valuable of all the hydrocarbons in the coal-gas series is benzole. It is not only applicable to a variety of uses when isolated, but it is the substance from which the brilliant dyes solferino, magenta, &c., are made. There is a volatile hydrocarbon in petroleum, assimilating benzole in some of its properties, but it is not benzole, neither is there any benzole in coal oil, if the retorts are kept at the usual low temperature of 650° to 700° during the distillation. In our next article we shall describe briefly the mode of distilling coal for the manufacture of gas, and shall afterward proceed to an examination of the products.

AN INVENTION OF THE CAMP.—We have in our possession a very clear working drawing of a firearm invented in the camp of one of the New York regiments. The drawing was not only done in camp, but the drawing pen with which it was executed was made there also from a piece of sheet iron obtained from the armorer of the regiment.

A COMPANY with a capital of $250,000 has been formed in England for cultivating cotton in Queensland ; another with a capital of $1,000,000 for cultivating cotton in Venezuela, and another, with a capital of $250,000, for cultivating it in Natal.

Binks's Experiments on the Constitution of Steel.

The following is Muspratt's account of Mr. Binks's experiments on the constitution of steel, alluded to in an article on our editorial page :—

Mr. C. Binks, in a series of interesting experiments upon the manufacture and true composition of steel, has advanced suggestions of very great importance. His experiments were conducted upon iron, submitted to different reagents, at a full red heat, as in case hardening, or in the cementation process. His results were as follow :—

1. That a small rod of iron packed in boxwood charcoal, in a closed porcelain tube, and kept at a full red heat for twelve hours, did not, after being tempered, show a hard steel surface, nor did it exhibit, under high and different degrees of heat, the play of colors peculiar to real steel. It still remained malleable iron.

2. But when atmospheric air is admitted to such an arrangement, in such quantity only as still to keep the carbon in excess, then, in the first instance, the surface of the iron, and, finally, if the time of contact be long enough, the whole of the iron is converted into steel.

3. That the application to the iron of nitrogen gas does not produce steel.

4. That neither does the application of carbonic oxide give steel.

5. That the application to the iron of a hydrocarbon—as when olefiant gas is passed through the tube, or when the red-hot rod is dipped into oil containing no nitrogen—does not produce steel.

6. But that the application of olefiant mixed with ammoniacal gas, or the application of gaseous cyanogen, produces steel, as does also the dipping of the hot metal into a nitrogenized oil or fat.

7. That the application of ferrocyanide of potassium, as has been so long known, gives steel.

8. That equally with the ferrocyanide does the application of simple cyanide of potassium result in the production of steel; therefore, it is not to the iron contained in the ferrocyanide that the steel-making property of the latter salt is due.

9. That potassa applied to the hot iron, or the keeping the hot iron in the vapor of potassium, does not yield steel.

10. That with iron of the kind that has so far been referred to and used, *id est*, commercially pure wrought iron, containing no material proportion of carbon, the application to it of ammoniacal gas, or of nitrate of ammonia, fails to produce steel.

11. But that the application of ammoniacal gas or chloride of ammonium to iron containing a considerable proportion of carbon, ninety-five to five, results in its conversion into steel.

These results tabulated, and the composition of the reagents expressed in chemical formula, will better exhibit the inevitable deductions to which they lead :—

1. Fe+C—in excess, every other element excluded............leaves iron.
2. Fe+C—in excess+atmospheric air...gives steel.
3. Fe+N—nitrogen....................leaves iron.
4. Fe+C O—carbonic oxide............leaves iron.
5. $Fe+H_4C_4$—olefiant gas............leaves iron.
6. $Fe+H_4C_4$—in excess+NH_3—ammoniacal gas....................gives steel.
7. $Fe+NC_2$—cyanogen................gives steel.
8. $Fe+K_2FeCy_3$—ferrocyanide of potassium.......................gives steel.
9. Fe+K Cy—cyanide of potassium.....gives steel.
10. Fe+KO—potassa....................leaves iron.
11. Fe+K—potassium..................leaves iron.
12. $Fe+NH_3$—ammoniacal gas..........leaves iron.
13. $Fe+NH_4Cl$—chloride of ammonium.leaves iron.
14. $\frac{Fe+C}{95\ \ 5}+NH_3$—ammoniacal gas.....gives steel.
15. $\frac{Fe+C}{95\ \ 5}+NH_4Cl$—chloride of ammonium......................gives steel.

The conclusions drawn from these experiments are thus stated by the author :—

That the substances, by the application of which to pure iron it is converted into steel, all contain nitrogen and carbon, or nitrogen has access to the iron during the operation.

That carbon alone added or applied to pure iron does not convert it into steel.

That nitrogen alone so added or applied does not produce steel; but that it is essential that both nitrogen and carbon should be present, and that no case can be adduced of conversion in which both of these elements are not present and in contact with the iron.

That both nitrogen and carbon exist substantially in steel after its conversion; and the presence of both is the real cause of the distinctive physical properties of steel and of iron, in which latter these elements do not exist.

That presumptively, but not demonstratively, the form of combination is not that of cyanogen—though that compound plays so important a part in conversion—but is that of a triple alloy of iron, carbon and nitrogen.

Lastly, that experimental research is yet required to determine the relative proportions of the elements when their union gives pure steel.

The reader will perceive that these investigations and their results are deeply interesting, and throw an entirely new light on the composition of steel. May not the nitrogen take the place of that portion of carbon which is eliminated from the cast iron during the process of its conversion ?

Cotton and Sugar at the West.

The Commissioner of Patents, in a circular just issued states that the cultivation of cotton in the milder portions of the free States is beginning to attract general attention. To prevent failures in its cultivation, it is proper to remark that it is a principle in vegetable physiology that tropical plants can never be acclimated North except by a repeated reproduction of new varieties from seed. The attempt to grow Sea Island cotton, such as is now brought from Hilton Head, would prove a failure in any portion of the free States. The only variety capable of successful cultivation in those sections now seeking its introduction is the "green seed" cotton, such as is now being raised extensively in Arkansas, Missouri, Tennessee, and portions of Kentucky, and which produces the "white fiber." Seed should be obtained from these localities. The modifications of soil and climate will influence the size of the plant, the length and fineness of the fiber, and the product of the crop. No reasonable doubt is entertained of the success of the culture in all mild portions of the Middle States, and efforts are now being made to procure the proper seed for distribution.

The results of the cultivation of sorgho the past year settle the question of its entire practical success. The value of its product is now counted by millions, and its cultivation is becoming a subject of absorbing interest. One of the difficulties presenting itself is the want of pure seed. To meet this want the Patent Office has ordered seed from France for distribution the ensuing spring. It must be borne in mind, however, that the same causes which has produced deterioration here exist there, and well-grounded apprehensions are entertained that the seed thus imported may not be free from suspicion. Farmers interested should secure pure seed from among themselves when it is possible, as the season is so far advanced that direct importations from Africa or China would be impracticable,

A correspondent of the Philadelphia *Ledger* remarks respecting the cultivation of cotton North :—

The Southern shore of Lake Erie possesses an altogether peculiar climate. A strip of land about sixteen or twenty miles in width, adjacent to the lake and extending almost across the State of Ohio, has its temperature very much modified by the influence of the large body of water north by which the northern winds are greatly tempered. A distinguished naturalist who resided for many years at Cleveland, observed that both animals and plants were found in this belt of land which belonged further South than even Cincinnati. A short distance in the lake is found Fisher's Island, which is now the best place in the United States for the culture of the grape.

Whether or not this shore region is adaped for cotton culture can only be determined by actual experiment, and I trust it will be made this coming season.

A region suitable for the cultivation of the vine may not be adapted for the cotton culture. Early frosts are the great drawback to the raising of cotton. It is a plant which is almost as tropical in its character as the orange. It is stated that there is a species of cotton raised in Japan, in sections on the same line of latitude as Southern New York and New Jersey. Probably this variety may be cultivated with success in the Middle States.

No less than 27,000,000 cubic feet of timber are imported annually into Great Britain. Most of this comes from Canada and the United States.

Dividends of Manufacturing Companies.

The following is a table of semi-annual dividends on the manufacturing stocks of several leading New England corporations :—

Manufacturing Companies.	Capital.	Dividends. July. 1861.	Dividends. Jan. 1862.	Amount. Jan. 1862.
Appleton	$600,000	4	6	$36,000
Bates	800,000	5	6	48,000
Chicopee	420,000	0	6	25,200
Cocheco	2,000 shs.	0	$25	50,000
Douglas Axe	300,000	3	3	9,000
Dwight Mills	1,700,000	2	4	68,000
Franklin	600,000	3	4	24,000
Great Falls	1,500,000	3	4	60,000
Hill (Lewistown, Me)	400,000	5	5	20,000
Hamilton Cotton	1,200,000	0	6	72,000
Jackson	600,000	3	5	30,000
Lancaster Mills (par 450)	2,000 shs.	$13½	$12	24,000
Lowell Bleachery	300,000	5	5	15,000
Manchester Print Works	1,800,000	3	4	72,000
Middlesex	500,000	5	5	25,000
Nashua	1,000,000	3	5	50,000
Naumkeag	700,000	5	4	28,000
Newmarket	600,000	3	4	24,000
Pacific	2,425,000	3	4	97,000
Portsmouth Co.	183,200	3	5	9,160
Salisbury	750,000	5	10	75,000
Salmon Falls	1,000,000	2	4	40,000
Stark Mills	1,250,000	3	5	62,500
Washington Mills	650,000	—	3	49,500
Total				$1,013,360

The stocks here enumerated represent a capital of $25,000,000. The half-yearly dividends amount to upward of $1,000,000, averaging fully 8 per cent per annum. The amount of dividends paid on the same stocks last midsummer was only $617,900.

Sorghum in Wisconsin

The Wisconsin *Farmer* says :—We have favorable reports of the sorghum crops of the past season. The opening of the war and the certainty of advanced prices had the effect to stimulate the farmers, and the result appears to have been an increased supply of sorghum molasses. As appears by the statistical returns, the number of acres planted in 1860 was 318 85-100, yielding a product of 51,135½ gallons of molasses and 3,493 lbs. of sugar. Last year the crop must have been considerably larger than this, though we have not sufficient data for a safe estimate. We have never believed that sorghum would come to be a great staple crop in our State, but the success which has attended its cultivation on a small scale should be an encouragement to more of our farmers to cultivate it for their own use. Next season we shall expect a much larger crop than ever before.

Prince Albert.—It is observed by *The Atheneum* that the knowledge of the Prince Consort was very great, and it lay in many unexpected nooks and corners. Of music he knew far more than an average man—played on more than one instrument—sang well—and wrote down his thoughts in musical works of some length—if not with high creative power, yet with a steadiness and sensibility not to be found in the works of ordinary gentlemen who write. It is known to the public that he was a very good etcher. "We have heard an engineer declare that the Prince knew more of fortification than any non-professional person he had ever met; and the Secretary of the Photographic Society assures us he was a very admirable photographer."

World's Fair Agency.—Our readers will notice the advertisement in another column of G. H. Sanborn, of Boston, in which he proposes to become an active agent for American exhibitors. We remember Mr. Sanborn at the Great French Exhibition of 1855, and regard him well qualified to meet all the wishes of our countrymen at the approaching London Exhibition.