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THE SCIENTIFIC AMERICAN SUPPLEMENT.

No. 308,

For the Week ending November 26, 1881.

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THE FONTAINE LOCOMOTIVE.

A short time since there appeared in the SCIENTIFIC AMERICAN SUPPLEMENT (No. 305, November 5) several illustrations of the new type of locomotive engine devised by Mr. Eugene Fontaine, accompanied by a letter from Mr. John Ortton, Mechanical Superintendent of the Canada Southern Railway, describing the construction of the engine and the behavior of engine No. 1, in regular service on that road.

Referring to Mr. Ortton's communication and the testimony of the engineer in whose charge that engine and engine No. 3 had been run, we said: "From the evidence thus furnished it seems to be abundantly established that the Fontaine locomotive marks a long stride forward in the direction of speed and economy in railway service."

This recognition of the apparent importance of the changes in locomotive construction introduced by Mr. Fontaine has greatly displeased the *Railroad Gazette;* and in a long article on "The Fontaine Fallacy" it seeks to demonstrate the incapacity of the Fontaine locomotive to do the work and attain the speed accredited it by those who have witnessed its operation, and at the same time the incapacity of the SCIENTIFIC AMERICAN to correctly estimate the value of the evidence furnished as to the practical utility of the improvements it embodies. This would-be demonstration is fortified by a column of diagrams which lack only pertinence to the questions at issue to be very convincing. Admitting the correctness of the *Gazette's* argument, but one inference is possible, namely, that our worthy contemporary is talking about some other engine than the real Fontaine engine, which has been doing for months the very things the *Gazette* so elaborately proves to be impossible.

We are concerned not with Mr. Ortton's or any other man's theories, but with the actual behavior of the new engines on the road. The inventor claims that by a better plan of construction and method of applying the power to the drivers he is able to secure greater speed with a given consumption of fuel, or equal efficiency with less fuel, in comparison with other engines of the same size.

Mr. Ortton says that in practical service the new engine amply sustains the claims of the inventor; and Mr. Ortton's testimony is confirmed by that of Mr. W. P. Taylor, General Manager of the Canada Southern Railway, as will be seen in Mr. Taylor's letter printed at length in another column. On the basis of the actual performance of engine No. 1, Mr. Taylor pronounces it a perfect success in saving fuel as well as in developed power and speed. Mr. Taylor continues: "The engine has been running for several months on our road in freight and passenger service. A test was made with her against one of our best Baldwin engines, with the same sized cylinders, running on regular passenger trains. An accurate record was kept of the fuel consumed, which shows that the Fontaine made an average of fifteen miles more to a ton of coal than the Baldwin engine doing the same amount of work."

Touching the capacity of the engine for speed, Mr. Taylor specifies time and circumstance and witnesses (including railway officers of national reputation), proving the ability of the engine to haul a "good sized train a mile a minute without difficulty." Using from 25 to 40 per cent less fuel than other engines of the same size, the Fontaine, Mr. Taylor says, "can perform the same service and has greater speed," either for passenger or freight service.

Until the *Gazette* has successfully impeached the testimony of Mr. Taylor, Mr. Ortton, and others, touching the actual behavior of this engine, it is obviously a little unfair, not to say injudicious and beside the question, to declare offhand (and evidently without taking the trouble to go across the river and look at the machine) that the inventor "seems to sincerely believe that he is able to get what in the West they call a 'twist' on the action of mechanical forces, and that he gets more power out of the cylinders of his engine than ever goes into them." It is worse than injudicious to add, as the *Gazette* does: "Under this mistake he [the inventor] is spending his own money, which is unwise; but what is worse is that the oldest and most widely circulated scientific paper in this country, by corroborating the erroneous theories which have been advanced concerning the engine, may induce other people to spend money on a device which the first and fundamental principles of mechanics should show to be irrational."

Repeating that we are concerned not with Mr. Fontaine's theories, actual or hypothetical, but with the practical performance of his engine, the SCIENTIFC AMERICAN persists in having a higher respect for the results of Mr. Fontaine's alleged irrationality and unwisdom than for the critical acumen of the *Gazette*. The question is not as to the possible performance of a theoretical engine, but what a real engine does.

After the "impossible" has been accomplished it usually turns out that the argument which established the supposed impossibility is found to be somewhere defective. Usually, too, the error is found to lie not in the logic of the argument, but in its inapplicability to the case in hand. That the flaw in the argument of the *Gazette* is of this nature is evident from its comparison of the Fontaine locomotive to the Keely motor, and its assertion that those who accept the performance of that locomotive as evidence of its value "are inclined to believe that Mr. Fontaine has made a 'corner' on the law of gravitation and the conservation of energy."

The *Gazette's* mistaken idea of the Fontaine locomotive may rightly be comparable with Mr. Keely's mythical invention; but the real engine, which has proved its capacity to haul a seven car train at a rate exceeding a mile a minute, and to handle freight trains as satisfactorily as much larger engines of the old type, is manifestly quite another thing.

It is easily possible that under the varying conditions of railway service, particularly as roads are now made, the Fontaine locomotive may not in all respects come up to the expectation of the inventor and his friends; it may not, for instance, accomplish a speed of ninety miles. Nevertheless, what it has already done, if human testimony is worth anything, justifies the position taken by this paper, that it marks a notable advance in locomotive construction, and that—to repeat our own words—"if experience shall confirm the promise held out by the performance of the engine now on trial," the new locomotive "must materially increase the economy of railway service." As yet we have seen no adequate reason for doubting the probability that the future behavior of the engine will confirm the record it has already made.

THE POSSIBILITIES OF THE COTTON INDUSTRY.

At this time less than one-tenth of the superficial area of the Southern States is under cultivation. The late census report shows that less than a third of the cultivated area is devoted to cotton. Under more skillful cultivation it is not improbable that one third of the land now devoted to cotton would produce the entire crop of the present day. The possibilities of increasing the yield of cotton in the South are, therefore, practically unlimited.

Is there any risk of raising more cotton than can be marketed?

The census of 1880 shows that we had then 10,700,000 spindles. The product of only 700,000 spindles was exported, the rest going for home wear. The State Department has at Atlanta specimens of fabrics, prices, etc., from all parts of Asia and Africa. Ninety per cent of the Chinese, the largest body of cotton-wearing people in the world, are clothed with cloth that is manufactured in the primitive way, without machinery. Almost all Asia is clothed in the same way. Cotton manufacturing machinery has hardly touched this immense demand. Mr. Atkinson is authority for the statement that when drills can be sold in New York or Boston at seven cents a yard, they can be sold cheaper in Asia than the native hand-made goods. When middling cotton is nine cents a pound in New York, drills can be made and sold profitably at seven cents a yard.

The question of unlimited extension of cotton manufacture thus obviously hinges on the possibility of producing cotton at an average price of nine cents at the mill. It is believed that much more than the difference between nine cents and the market price for cotton is habitually lost by Southern planters through careless handling. It is reported that a farmer recently brought to the cotton fair at Atlanta a lot of cotton in the seed which he would willingly have sold to a factor for ten and a half cents a pound (lint), the market price on that day. The manufacturer examined it and gave him sixteen cents a pound. In other words, the intermediate steps between planter and manufacturer cost the planter five and a half cents a pound. The greater part of this five and a half cents loss is caused not by commissions, insurance, storing, and shipping—all these are comparatively small, and will compare favorably with similar costs in handling other produce—but by the universally careless method of handling the cotton. Careful picking from the field, careful ginning, secure baling so as to prevent soiling and to keep out sand, and a careful assortment of the different grades saved five and a half cents a pound.

It is not to be supposed that the extra care in this case cost the farmer anything like five cents a pound, or roughly, half the entire cost of his cotton. The desired price, nine cents a pound, mentioned above, is for cotton as it usually reaches the mill. It would be worth several cents more if in proper condition, increasing correspondingly the farmer's profit without enhancing at all the cost of the cloth.

From these figures it would seem easy for our cotton planters to increase their profits and at the same time furnish our manufacturers with cotton at such a price—improved condition being considered—as would enable them to command the markets of the world, even in competition with the hand work of savages. Of course with possible improvements in processes and appliances the margin of profit to the cotton planters of the South may be still further widened.

THE CAUSE OF FAILURE OF STEEL BOILER PLATES.

Steam Boiler Notes in the SCIENTIFIC AMERICAN of August 20, contain an account of the failure of Russian war yacht's steel boiler shells, and an abstract of a report on their behavior by Mr. W. Parker, chief engineer of Lloyds' Register, which was read before the Institute of Naval Architects of England. These plates, after having passed through the various tests required by the English authorities, gave way in a most astonishing manner under the official hydrostatic test after the boilers were completed. The analysis of the metal given by Mr. Parker showed a want of uniformity in their chemical composition. The papers lately read before the British Iron and Steel Institute shed more light on this important subject.

The paper of Mr. W. D. Allen, on the use of a mechanical agitator in the manufacture of Bessemer steel, shows that, in addition to the bubbly conditions of the ingots arising from confined gas generated by the admixture of the spiegeleisen or ferro-manganese to the decarbonized iron, there are veins or streaks of metal of different qualities and composition running in all directions through the mass, which are invisi-