of the mode proposed for constructing the machinery and applying the power of steam,—a mode which has been pronounced, by skilful and practical mechanicians, visionary and impracticable.

As to the Marquis de Jouffroy, his experiments are so completely unknown, that, for any benefit derived from them, they might as well never have existed. And it is the general belief respecting them that they were incomplete, and unfit for bringing the undertaking to a favorable conclusion. That such a belief was not unfounded may be inferred from the imperfect state of the steam-engine of that day, and the failure of the subsequent and imitative attempts said to have been made by De Blan and Fulton; the latter of whom, Fulton, was only able to accomplish his object after having had an opportunity of minutely examining Mr. Symington's boat, receiving explicit answers to printed questions, and jotting down his observations as he was carried along the canal on board of the vessel.

Contending, therefore, that the mere idea of the practicability of steam-navigation, without the ability for its realization, possesses but little if any value, I feel myself warranted in claiming for him who first successfully applies the power of the steam engine for the propulsion of vessels, the honor and credit of the invention; and I feel myself warranted in my proceeding, by the firm conviction that he was indebted to no one for the idea, it having occurred to himself long before he became aware of its ever having been entertained by others.

In 1784 he imagined it possible for steam power to be rendered applicable to terro-locomotion; and in 1786, he exhibited in Edinburgh a working model of a steam-carriage. He then bethought himself that the same power might be rendered available for propelling vessels. His first boat appeared on Dalswinton Lake, in 1788, and his second on the Forth and Clyde canal the succeeding year. Both of which as completely illustrated the practicability of steam-navigation as any ever since exhibited.

In your Magazine it is stated that the first boat appeared in 1789, on the Forth and Clyde canal, and resembled Hull's, in being a tug. This is an error, as neither the one of 1788, nor that of 1789, at all resembled the boat proposed by Hull; nor were they intended to be used solely as tugs; and furthermore, the first never made its appearance upon that canal. It was the vessel constructed twelve years afterwards for Lord Dundas, which was designed to be used for dragging shipping, a purpose which, on several occasions, she satisfactorily and successfully executed.

It has been attempted to represent the whole of these experiments as failures; but too much respectable and unquestionable evidence can be adduced in their favor to render any hostile assertions likely to be either accredited or believed—the more especially, as many practical, well-informed engineers have declared their conviction that the machinery was well contrived, and its mode of application most ingenious. Indeed the declaration may at once be hazarded, that in several important points it possessed many advantages over that which is even at present employed. And it may also be averred, that to be more highly prized, it needs but to be better understood.

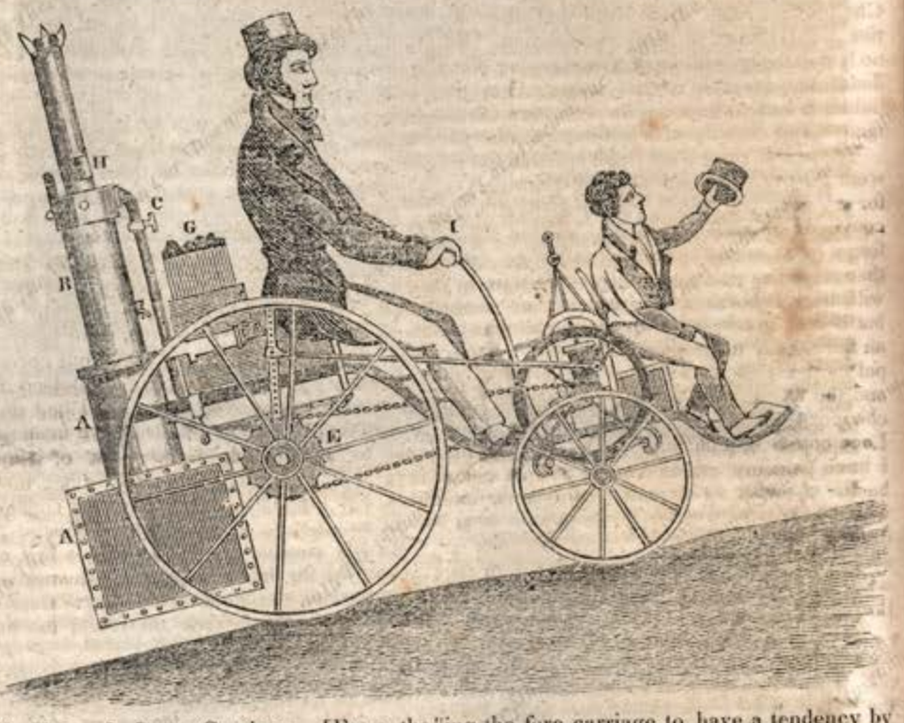
As a proof of Mr. Symington's ingenuity, and of the obstacles which genius will surmount, may be mentioned, that although Mr. Hull's patent rights were said to have been prestrained, strictly guarded, and rigidly enforced, Mr. Symington invented and brought into use an improved steam-engine, which was more simple, manageable, and economical for many purposes than that of his celebrated contemporary and competitor, without, in the slightest degree, rendering himself liable to the charge of encroachment. And he gave still further evidence of inventive powers by *dismissing the beam*—a desideratum so important as to have called forth the following opinion from the writer of the article which has led to this communication. "And if the beam shall ever be dismissed, and a rotatory motion obtained, the triumph over inertia and friction will raise the wonder still higher."

I have the honor to be, Sir, your most obedient servant, ROBERT BOWIE.

[*From the Mechanics' Magazine.*]

TRAVELLING BY STEAM ON COMMON ROADS.—Although the state of the roads in this country will not at present allow us to be very sanguine of the advantages to be derived from carriages propelled by steam, we are satisfied that our readers will be gratified to possess a record of what is doing in other countries, and we hope it will rouse them to fresh exertions in promoting internal improvements here. The annexed account of the "Triumph" steam carriage, from a recent number of the London Mechanics' Magazine, will be read with interest, as also the observations it has elicited from two most valuable correspondents to that journal. One of them, Mr. J. O. N. Rutter, has been for several years looked up to as an authority on most subjects connected with engineering. He claims to be the inventor of a method of substituting water for fuel in steam engines, alluded to at page 117, Vol. II. of this Magazine, and has stated that it has succeeded equal to his most sanguine expectations at the gas works in Lymington, of which he is the superintendant.

If our information is correct, we shall have it in our power to prove that the credit of the invention is due to an American citizen; and a patent was taken out for it in 1817, by Mr. James Morey, of New-Hampshire. Why it has not been acted upon we are at present uninformed, but we hope in our next to be able to give a full description of it, accompanied with such drawings as may be requisite.—[ED. MECH. MAG.]



The Triumph Steam Carriage. [From the London Mechanics' Magazine.]

SIR,—I did not intend to send you the prefixed rough drawing of my little Triumph steam carriage until I could faithfully inform you of its full powers, in regard to speed and weight propelled; but, from considerations of expense and ill health, delay succeeds to delay until I fear some claims of priority, which I pretend to, may be denied to me. It is the little carriage, (built in 1828, and first mentioned in your Journal of 29th May, 1830,) improved in construction, but the same in principle, and which was the first that ever ascended a rise of one in six; the chief alteration is the application of two main levers, to obviate the necessity of having very large wheels.

It is built on what I at present consider the best principles of my theory, namely, placing nearly the whole weight, when in motion and needful, on the propelling wheels, giving a varying leverage to the power, to any required extent, and making the line of direction of the power, when acting on the propelling wheels, to be such that its action and re-action shall as near as possible be parallel with the line of progress, by causing the fore carriage to have a tendency by its weight to propel the hinder part.

The main axle, wheels, and springs of this carriage, are so attached to the carriage frame that they can be shifted backward or forward to vary the centre of gravity of the whole at pleasure, and also keep the endless chain stretched.

A A is the tubular boiler; B, tubular chimney and steam chest; C, steam pipe, cased deep in flannel, &c.; D, a pair of cylinders, pistons, &c. working an endless chain wheel on the crank shaft and two small fly-wheels; E, another endless chain wheel, either fast or loose on the main axle; F, a pin on each fly-wheel, working alternately two main levers, that catch in two clutch wheels fixed on the main axle; G, coke box and water cistern; H, feed door in the chimney; I, pilot pole.

As soon as the engines start, the pins F on the fly-wheels begin, by means of the connecting rods, to pull at the main levers, which levers, by a re-action (if they are in gear), have a tendency to lift the fore carriage off the ground. (I have seen it thus lifted quite off.) By this operation the weight of the fore carriage is partly thrown

on the hind wheels, increasing their interlocking force with the ground, and at the same time tends to pull them round by its gravity. *Note*, I do not mean to say that power is thereby gained, as all power comes from the steam, but that the power is acting in its best direction, being a transfer of the power of the steam to the gravity of the fore carriage, as the steam, with a varying leverage, cannot well act direct on the main axle. When the road is level and good, the main levers are in a few seconds put out of gear, and the unvarying endless chain, E, put in.

I would say a word or two to Mr. Alexander Gordon and the *ultra* locomotionists. Steam locomotion on common roads is no longer a question of possibility, but of economy. Messrs. Ogle and Summers could tell, if they would, how much cheaper (or dearer) they went to Liverpool by steam than if horses had taken them (including wear and tear, but rejecting accidents); and Sir C. Dance could state his profits on the Cheltenham road. Both these and other parties richly deserve public assistance. But no! somebody will have a monument when dead, but no help whilst living. Yet the public is not to blame; for to whom of the many projectors must it extend its bounty?

There was once a carriage and four horses went twenty miles an hour, at Newmarket, for a wager, and won it, yet the mails still are conveyed at half that speed. These Ultras forget that steam pistons cannot go more than 2½ miles an hour, and at that rate they will, like a horse, do a great deal of work; but if they must propel any thing at 20 miles an hour, they must either have little to propel or there must be a great many of them; and the question is, can these many be kept cheaper than horses? This waits for proof. Locomotion is a darling theme of mine, but I have paid my visit to *Utopia*, and am come back. I wish again and again some one would build an 8 or 10 horse-power steam drag, to work one of the stage waggons at about its present rate of going, and then see what power could be spared for increasing the speed.

SAXULA.

March 14, 1833.

SIR,—"Saxula" has named his carriage the "Triumph"; but I shall not consider the triumph complete until he has run it daily for six or twelve months on a common road, and given an accurate statement of the costs arising from wear and tear, fuel, attendance, and interest of capital. It is no proof that the anxiously desired object has been attained,—of running steam carriages on common roads,—because a carriage has been constructed that will run a certain distance at a certain rate, with a certain number of passengers or tons of merchandize. Many important undertakings have proved splendid failures, simply, as I conceive, on account of the conditions implied in their principle being imperfectly understood, or totally neglected. The necessary conditions for locomotive carriages on common roads may, I think, be clearly ascertained by a careful attention to those employed on railroads. If the published statements in reference to the engines at work on the Liverpool and Manchester railroads are to be credited, it appears that, with friction and abrasion at a minimum, those engines involve a prodigious outlay of capital in their original construction and in their subsequent repairs. Now, supposing it should be found advisable to go to a considerable expense in the construction of any future railroad, either in polishing it or in having a double line of road, each inclining throughout its whole length, but in opposite directions; and if, by these or any other arrangements, it should be found that the first expense of engines and their subsequent wear and tear would be thereby reduced, should we be any nearer than we are at present to turnpike road engines? I rather think we should be farther off than ever. On railroads, the friction, the agitation, and the consequent abrasion of surface, are found to be the chief impediments to success. How, therefore, can we expect to succeed, where we have to contend with more friction, more agitation, more abrasion, and, last, but not least, inequalities of surface, which do not exist on railroads? Far be it from me to think or say that the object is unattainable; many more unlikely things have happened, and will doubtless continue to do so almost every day. But we never can move safely towards a result until we thoroughly understand the principles of our experiment, and make ourselves conversant with its conditions. I wish "Saxula" success, and I sincerely hope he will favor your readers, from time to time, with the data he obtains in his experiments on this interesting subject.

J. O. N. RUTTER.

April 18, 1833.

SIR,—Some time has now elapsed since you favored me with the insertion of a few lines on long and short cranks, which I hazarded in opposition to the theory of locomotion promulgated by your ingenious correspondent "Saxula," in which I promised the result of a series of experiments I had then in contemplation, but which I have been unable to accomplish, from want of time, change of residence, &c. Trusting, however, that my not having fulfilled my engagement may not debar me from your pages, I beg, as a constant reader, to offer a few remarks which have suggested themselves since reading the account of the "Triumph Steam Carriage" in your Journal of the 6th of April last.

I am still at a loss to comprehend what advantage "Saxula" anticipates from the use of the main levers over that of an ordinary crank, save that he will by that means be able to increase his power at a very great reduction of speed, and, I conceive, a great waste of power at the same time. In the first place, does he mean to deny that a short crank would accomplish the same end, provided the power were increased in due inverse ratio, and to uphold that more can be accomplished by the use of long cranks, or *main levers*, than by short ones? If so, I need say no more, for of that I shall never be convinced. Again, if the adhesion between the periphery and the road be sufficient to enable him with his long lever to lift the fore carriage off the ground, where is there any necessity for an increased resistance or *interlocking force?* Such a tendency would only cause a loss of power and straining to the machinery, besides which there would be an irregularity in the motion of the vehicle, which would also be attended with very serious waste of power, arising from the reciprocal action of the main levers. Although "Saxula" may have accomplished the ascent of a hill, having an inclination of 1 in 6, I still maintain that the same thing might be accomplished by means of a short crank, provided the cylindrical power of the engine were increased proportionately. "Saxula" may perhaps here ask —but why cumber your engine with more power than is actually necessary? Let him make his engine on that principle, and run it on a road—not one rolled and brushed for the purpose—and he will soon find he will be "put to a stand still." Hills are not the only obstacles which present themselves (Mr. Gurney well knows this). Newly-formed roads, or repaired ones, are much more serious objections to steam carriages on common roads. We will suppose a road (as is often the case) repaired at intervals, of say a quarter of a mile—would the "staid and sure" pair of long levers be used? or alternately levers and cranks, to the great annoyance of passengers, and prejudice of the machinery? So many delays would completely do away with steam travelling, if there were no other objections to it.

But the objections to such a mode of conveyance on common roads, compared with railroads, are so numerous, and rendered so obvious by the daily experience on the Liverpool and Manchester railway, as to need but little comment. I understand the estimated cost of an engine for common roads, capable of conveying about 20 passengers, is £1,500, while the utmost speed which could with safety, or *otherwise*, be accomplished, would be 12 to 14 miles per hour. Now, an engine capable of conveying upwards of 300 passengers in covered carriages on a railway, at 20 miles per hour, costs only £800 or £900. The wear and tear of an engine on high roads is also very considerably greater than that on a railroad, owing to irregularity of surface. I believe at 15 miles per hour it would be 7 times greater, and the force of traction 12 times as great. Supposing, therefore, that only the same consumption of fuel should take place, the diminished number of passengers would, of course, raise the fares in due proportion. But certainly the expediency of using locomotives on common roads can only be proved or disproved by actual experience. I heartily agree with "Saxula" in wishing some practical results to be given forth by the numerous and extensive speculators in such machines. I am afraid "Saxula" will find himself in error, when he states that an engine of two horses' actual power will be able to accomplish the labor of two horses on common roads. This is daily proved to be impossible: even on a railroad a portion of power is lost by the re-action, or *backsliding* (if I may so term it), produced by the deposition of extraneous matter on the surface of the rail, which causes the wheel, or rather the engine, to retrograde in a slight degree. This I have proved very frequently when travelling on the above railway. I have in fine weather invariably found that 86 beats or strokes of the engine are necessary to traverse the distance between the ¼ mile distance accurately measured, thus proving that 2 revolutions are lost in each instance, the wheel being precisely 5 feet diameter. This I have observed at speeds of from 14 to 18 miles per hour. At 25 miles per hour nearly 4½ revolutions are lost. This, I think, would militate greatly against "Saxula's" two horses.

I am, sir, yours, &c.

DUBITANS.

Liverpool, May 7, 1833.

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 35 WALL STREET, NEW-YORK, AT THREE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, Editor.] SATURDAY, NOVEMBER 9, 1833. [VOLUME II.—No. 45.

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AMERICAN RAILROAD JOURNAL, &c.

NEW-YORK, NOVEMBER 9, 1833.

upon an average thirty miles the hour, would be laughed at, yet such a prediction, if made, will be more than verified.

Increased Facilities for Travelling.—We learn that the Philadelphia and Trenton Railroad is completed from Trenton to Bristol, twelve miles, and that the section between Bristol and Philadelphia will be ready for use early in the spring. The New-Jersey Railroad, from Jersey City through Newark and Elizabethtown to New-Brunswick, is also progressing rapidly, and will, probably, be in use in the course of the ensuing summer. These roads when connected by a permanent *track road*, for which the timber is now landing at

duce a more permanent bond of union to the States than can otherwise possibly be effected.

The daily performance of the engines on the Liverpool and Manchester railway testifies the perfection which has been there attained in the conveyance of light goods and passengers, the ordinary rate of travelling being from 20 to 30 miles an hour; but they seem to be excelled by those in the neighborhood of Glasgow in another very important application of the power of locomotive engines, viz. the transmission of heavy goods, in which so great speed is not of such importance as the diminishing the expense of conveyance by increasing the quantity conveyed. The other day one of the engines on the Garnkirk and Glasgow railway, hauled a train of *seventy* loaded waggons from Gartkill colliery to the depot at Glasgow, a distance of 8 miles, in one hour and five minutes