



## L. Queries on steam-boats

Mr. George Rennie

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*L. Queries on Steam-Boats. By Mr. GEORGE RENNIE.*

*To Mr. Tilloch.*

SIR, — **W**HETHER reflects on the numerous improvements in the arts and sciences, to which a short but eventful period has given birth, cannot but hail with pleasure the recent introduction of steam-vessels,—an improvement of the highest importance, which discloses a new æra in navigation, and demands every effort for its further improvement. I have therefore sent the following queries in reference to this interesting subject; trusting that such of your readers as may deem an inquiry of this nature interesting, will turn their scientific talents to its further elucidation, which I will also endeavour to do, should not other avocations intervene to prevent me.

I have the honour to be, sir,  
Yours, &c.

London, March 12, 1817.

GEORGE RENNIE.

I. Steam-vessels (unlike ships, whose velocity is always irregular and varied at every augmentation or diminution of the wind) have one assigned velocity, according to their respective propelling powers. What is the best form that ought to be given to the head and stern? The extreme length, breadth and depth? Whether flat or round bottom, in order that the requisites of stability, velocity and strength, may attain a minimum?

II. It has been found that the ratio of the resistance being as the squares of the velocities (especially in large surfaces and great velocities) does not maintain; or, in other words, that an engine of a quadruple power will not produce a double effect or velocity:—can any formula be adapted to practice so as to include the circumstances of friction, imperfect fluidity, or adhesion?

III. From the experiments of Dubuat, it is deduced that the whole impulse to be withstood or overcome by the external force is the sum of the plus and minus pressures and of friction; that the non-pressure on the hinder part was prodigiously diminished (1·4th), by making the length of the body triple its breadth; from which he infers that the lengthening of a ship diminishes the resistance;—a paradox, for it supposes a less power to displace a greater quantity of fluid than a small quantity, independent of other circumstances. How far is this consistent with theory and practice?

IV. Admitting perfection to the steam,—to which Mr. Watt to his everlasting credit has been so instrumental;—how far consistent with œconomy, saving of fuel, and attendance on two furnaces,

furnaces, is the adoption of two boilers in place of one, still used in many steam-vessels, and situated athwart the vessel?

V. Two steam-engines have been and still are used in some steam-vessels. What advantage have they over one of double the power?

VI. Steam-engines have been constructed with the beam working above, to the rejection of the beams below. Does not this lessen the stability of the vessel, by removing the centre of gravity higher, and how far is it an improvement?

VII. What is the best situation of the paddle-wheels;—at the extreme breadth of beam, or where? The proper velocity for the floats or paddles? Their area with reference to the section of the immersed part of the vessel? Their properest form? and their depth with regard to their width? The angle best adapted to the velocity of the wheel and vessel; so that no impediment shall arise from the improper displacement of the fluid? and lastly, the number of floats?

VIII. The momentum acquired by a steam-vessel in motion, after a short time, is analogous to that of a fly-wheel;—ought the addition of this fly, adopted in many steam-vessels, to be considered superfluous?

IX. One of the most insuperable objections to steam-vessels, in long voyages across the ocean, must lie in the vast consumption of fuel and bulk occupied by it. How far can this be overcome, without the substitution of some new power? the attainment of which is the grandest desideratum in mechanical science.

X. In the event of steam-vessels being employed in war;—what is the best mode of rendering the paddles shot proof? Would the middle of the vessel render that protection? as without this a vessel disabled under such circumstances, must necessarily be at the mercy of her enemy.

XI. Presuming the above-mentioned difficulty as got over, might not they choose their position? and their distance? By presenting neither masts nor yards, they might cripple their enemy without suffering in turn; their movements would continue all along optional; they might escape from their enemy by steering against the wind. A calm to them is a fair wind.

XII. By presenting no top weight of masts or yards, which are merely temporary, the continual tendency to destroy the hull would be avoided; and all the advantages of trussing on Mr. Seppings's principle could be included, which would at once add stability and strength, rendering her free from the uncertainty of leeway and heave of the sea, and render the reckoning more certain. By being flat-bottomed, and of course drawing little water, the advantages of crossing shallows, and entering harbours

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at times when other ships cannot; of towing vessels in rivers, and a variety of other useful occupations. Neither, from their extra length and breadth, would they pitch or roll so much. A sail might be occasionally used in lieu of the engine to save fuel.

XIII. It would follow from the last premises, that in action their guns might be pointed with more precision, and the heeling after firing would be less.

XIV. The objections to the employment of steam-boats or barges in canals, is the destruction occasioned to their banks by the violent action of the water during the passage of the steam-boats, and to the want of width in the locks. Would these objections be partly remedied by placing the paddles behind? (for we have all along supposed paddles the best) or could any of the modes hitherto practised for propelling boats answer; so as to be of use in doing away with the number of horses and men usually employed in this service?

XV. Would not the advantages attending a steam-boat, solely for the purpose of towing other boats with passengers and goods, be superior to the present mode, of having the passengers and goods in the same boat as the engine, thereby rendering the vessel weaker by its great length, and unequally strained by the greater or less weight of passengers and goods, which is always liable to vary, and must sink the vessel more or less; thus drowning her wheels or paddles, and consequently obstructing her motion?— independent of those dreadful accidents, frequently liable to arise from bad engines, as lately in America, and one instance in this country.

XVI. Lastly, and politically speaking, are the benefits heretofore stated, as liable to occur by the employment of steam-vessels in war, in navigation and commerce, by defeating our enemies abroad, by facilitating conveyance at home, and rendering cheaper the commodities of foreign countries, to be counterbalanced by consuming with additional extravagance the very vitals of our country (which our coals are) by the great capital consumed in the rapid destruction of the materials of which steam-vessels are composed; and by creating a superabundant population, which have been, still are, and probably will be, the curse of this great and hitherto happy country? G. R.

## LI. *On Mr. HORN's Theory of Vision.*

*To Mr. Tilloch.*

SIR, — **Y**OUR correspondent J. Q. R. not having seen "*The Seat of Vision determined*," has unconsciously attributed some inconsistencies