INVENTION

Which Was the First Steamboat?

"A Classic of Science"

Would These Early Inventors Have Been More Successful If They Had Experimented More and Quarreled Less?

Rumsey

A SHORT TREATISE ON THE APPLICATION OF STEAM, whereby is clearly shewn, from Actual Experiments that Steam may be applied to propel Boats or Vessels of any burthen against rapid currents with great velocity. . . . By James Rumsey. Philadelphia. Printed by Joseph James, M,DCC, LXXXVIII (1788).

THOSE who have had the good fortune to discover a new machine, or to make any material improvements on such as have been already discovered, must lay their account to encounter innumerable difficulties; they must arm themselves with patience to abide disappointments; to correct a thousand imperfections (which the trying hand of experience alone can point out) to endure the smarting shafts of wit, and what is perhaps more intolerable than all the rest put together (on the least failure of any experiments) to bear up against the heavy abuse and bitter scoffs of ill-natured ignorance. These never fail to represent the undertaker as an impostor, and his motives the most knavish. Happy for him if he escape with so gentle an appellative as that of a madman.

This is the fate of the unlucky projector, even in the cities of Europe, where every material is at his command, and every artificer at his service. A candid public will then consider my situation, thrown by hard fate beyond the mountains, and deprived of every advantage which that grand mover, money, produces. They will easily perceive how my difficulties have been multiplied, which is the only reason of my not exhibiting my long promised BOAT before this; and which I hope will be a sufficient apology. Even now, these difficulties render my machinery very incomplete; but Mr. Fitch's endeavouring to procure patents for his boat, by uncandidly representing, to the different Assemblies, that my boat had nothing to do with steam, although he had been informed that I was before him, both in the idea and the application of steam, and he had actually procured an exclusive right from two respectable Assemblies, who had granted me the same in the year 1784, before I was aware what he was about; such treatment obliged me, circumstanced as I was, to make an experiment, in order to secure to myself my own discovery, by shewing my principles, as Mr. Fitch's conduct gave me reason to fear that he would adopt my plan, as soon as he found his abortive. And my machine, with all its misfortunes upon its head, is abundantly sufficient to prove my position; which was, "that a boat might be so constructed, as to be propelled through the water at the rate of ten miles in an hour, by the force of steam; and that the machinery employed for that purpose, might be so simple and cheap, as to reduce the price of freight at least one-half in common navigation; likewise, that it might be forced, by the same machinery, with considerable velocity, against the constant stream of long and rapid rivers.

Such a machine I promised to prepare, and such a boat to exhibit; this I have now so far performed, in the presence of so many witnesses, and to the satisfaction of so many disinterested gentlemen, as to convince the unprejudiced, and deprive even the sceptic of his doubt. . . .

Fitch

THE ORIGINAL STEAM-BOAT SUPPORTED; or, A Reply to Mr. James Rumsey's Pamphlet, shewing the True Priority of John Fitch, and the False Datings, &c. of James Rumsey. Philadelphia: Printed by Zachariah Poulson, M DCC LXXXVIII (1788).

Preface

AGREEABLY to a promise made in the Independent Gazetteer, I now present to the Public a reply to the Pamphlet published by Mr. Rumsey, of Virginia,—and as I have no matter to conceal, or disguise, and wish my Readers to have a full and fair view of the whole controversy, I have reprinted and annexed Mr. Rumsey's Pamphlet, which will discover, to every impartial person who will take the trouble to examine the subject, that he hath no sort of just pretensions to the claims he hath exhibited.—His skill in the mechanism of a Steam Engine, may possibly be greater than mine, and in the article of *Condensation* I freely acknowledge he is my superior, having acquired the art of *condensing* (with the dash of his pen) one *whole year* into the compass of *six days*.

JOHN FITCH.

Philadelphia, 10th. May, 1788.

It is the duty of every man not only to avoid the commission of a crime, but so to conduct himself through life as to bear the strictest scrutiny.

In a Pamphlet published by Mr. James Rumsey and lately circulated in this city, as well as probably in other States, I am charged as the perpetrator of crimes atrocious in their nature, but of which my conscience fully acquits me. It is an exercise of malevolence in the extreme thus publicly to prefer charges against an innocent person without previously knowing or enquiring for the defence of the supposed offender, and shows an inability in the accuser to support his charges. Unfortunately for Mr. Rumsey, I trust we are now before an impartial Public, where Justice, unbiassed by party or undue influence, will decide between us—Conscious of my conduct, in the prosecution of this business, being that of an honest man, it is incumbent on me to recite the circumstances, and facts relative thereto.

I confess the thought of a Steamboat, which struck me by mere accident, about the middle of April 1785, has hitherto been very unfortunate to me; the perplexities and embarrassments through which it has caused me to wade, far exceed any thing, that the common course of life ever presented to my view. After pondering some days on the thought, I made a rough draught, but not daring to trust my own opinion too far, I consulted Mr. Daniel Longstreth, the Revd. Nathaniel Irvin and sundry other Gentlemen of Bucks county Pennsylvania.

About the beginning of June 1785,

I went to Philadelphia and shewed it to Dr. Ewing, Mr. Patterson and other respectable characters in the city, from whom I met with no discouragement. In June and July I formed models and in August laid them before Congress, as will appear on their files. In September I presented them to the Philosophical Society, as per certificate. . . .

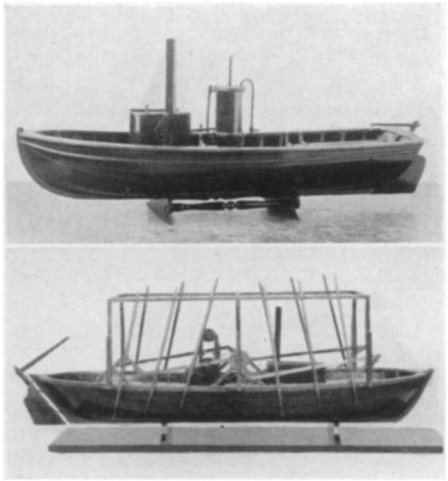
From Lancaster I went to the Assembly of Virginia, first waiting on Gov ernor Johnson, of Maryland, who, notwithstanding the letters he has since written in favour of Mr. Rumsey, acknowledged a merit in my invention, and that it ought to be encouraged, as will presently appear. During my journey through Maryland, in October, I passed through Frederick Town, and every where published my Plan. In Virginia I waited on his Excellency General Washington, who, in the course of conversation, informed me, that the thought of applying steam was not original, that Mr. Rumsey had mentioned Steam to him; but nothing that passed in the conversation with General Washington had the least tendency to convey the idea of Mr. Rumsey's relying on Steam, and General Washington's letter, page 10, in Mr. Rumsey's Pamphlet, clears up the matter—for the General himself did not conceive any such thing. Knowing that the thought of applying Steam to Boats had been suggested by other Gentlemen *long before,* I left his Excellency General Washington with all the elated prospects that an aspiring projector could entertain, not doubting but I should reap the full benefit of the project, for although I found that *some* had *conceived* the thought before, yet I was the first that ever exhibited a plan to the public; and was fully convinced that I could not interfere with Mr. Rumsey, otherwise the known candor of General Washington must have pointed out to me such interference. I immediately applied to the Legislature of Virginia for assistance, to execute my plan, who signified their wish to encourage my designs, but that the state of their finances prevented it—the then Governor of the state, Patrick Henry, Esqr., received from me an obligation with provision, that if I procured in that state a sale for one thousand of my Maps of the N.W. part of the United States, at 6/8 each, I should exhibit a Steam Boat on the waters of Virginia, within nine months or forfeit and pay to the State of Virginia £350. . . .

Rebuttal for Mr. Rumsey

REMARKS ON MR. JOHN FITCH'S REPLY TO MR. JAMES RUMSEY'S PAMPHLET. By Joseph Barnes, formerly assistant, and now attorney in fact to James Rumsey. Philadelphia: Printed by Joseph James, M,DCC,LXXXVIII (1788).

MR. RUMSEY, before his late departure for England, by an advertisement, begged the candid public to suspend their opinion respecting the controversy between him and Mr. Fitch, until time should be afforded to state his claim, and answer such objections as should occur, from a pamphlet which Mr. Fitch then had in the press, but had not appeared before he left this city.

Since that time Mr. Fitch has been busily employed in traducing Mr. Rumsey's character, and endeavouring to establish in the public mind an opinion, that Mr. Fitch was the first person who actually attempted to apply the force of steam to the purposes of navigation. If this assumption was admitted, which however will be fully disproved, nothing would thence follow prejudicial to Mr. Rumsey's claims; for it will appear from a cloud of testimony, that although both of them entertained the idea of applying the force of steam to the purposes of navigation, their modes of effecting it were as different from each other as possible. Mr. Fitch proposed to apply the action of steam by a number of cranks to oars or paddles; Mr. Rumsey thought of the force of reaction on the fore part of the boat by a column of water forced through a trunk in the body of it. That Mr. Fitch originally entertained no other idea than applying the force of steam to the working of paddles, will abundantly appear from his repeated models and experiments; from the plan published in the magazine, taken from a draught sent to the proprietors of that publication by Mr. Voight; and from his public declarations that Mr. Rumsey's scheme could not be made effectual. That Mr. Rumsey had a different mode of applying the force of steam to navigation, is sufficiently apparent, not only from his publications on the subject, but from his apparatus now in this city, which was fitted between two and three years ago, and was last year actually applied to the purpose on the river Potomac, and produced the desired effect, by propelling a boat, with a burthen of three tons on board, at the rate of four miles an hour, against the stream of that river.



ANCESTORS OF THE LINER

Fitch's boat had a row of oars on each side, which were rowed by a steam engine. Rumsey's boat, above, had a cylinder called the "trunk" running longitudinally through the hull, from which water was squirted out at the stern. (Photographs of models in the U. S. National Museum.)

An Attempt at Witticism

In order to destroy Mr. Rumsey's character and views, which Mr. Fitch has thought dangerous to his interests (altho' fortified by an extraordinary act of assembly) he has published a pamphlet containing a variety of depositions and certificates, tending to show that Mr. Rumsey has anticipated a whole year, and by an attempt at witticism, has acknowledged his powers of condensation in this respect. That Mr. Rumsey's narration of facts is true, will be proved (if further proof was necessary) by the several certificates and depositions hereto annexed, to which the reader is referred; but this is not the immediate object of the present publication: Mr. Rumsey had in the year 1785 prepared a steam-engine upon the plan used and improved in Europe, to propel his boat, but was prevented by the frost from exhibiting it that fall; being thus prevented, he employed himself during the ensuing winter in projecting more easy

methods of producing the like effects; and by experiment he discovered a mode of generating steam so effectual as to promise very great advantages to the inventor. To bring this invention to act on his former machinery, required some time, which was employed in perfecting it; several experiments were accordingly made, and in the end Mr. Rumsey's principles were proved to be good. During this time Mr. Arthur Donaldson, a very ingenious mechanic (whether from the strength of his own genius, or from hearing something of Mr. Rumsey's scheme, is not material in this dispute with Mr. Fitch to ascertain) took up the idea, and made several experiments, which fully proved that the reaction of a column of water, forced with rapidity from the stern of a boat, would propel her forward so as to answer the end required for navigation. Mr. Donaldson communicated his ideas and experiments to many gentlemen in Philadelphia, who were satisfied of his principles, but they doubted whether the size of a boiler, and the quantity of fewel necessary to keep it heated, would not occupy so large a part of the boat as to render her freight of no value: to reduce this to a certainty, gentlemen acquainted with Steam-engines in Europe, were consulted, and their opinions confirmed the doubts entertained, so that Mr. Donaldson gave up the idea of prosecuting his scheme. While Mr. Donaldson was employed in experiments, Mr. Fitch had applied to the assembly of Pennsylvania, for the exclusive privilege of navigating by the force of steam, and was opposed before a committee of the house by Mr. Donaldson, when Mr. Fitch claimed all possible modes, whether *invented or to be invented by himself or others,* of using steam for that purpose; and as Mr. Donaldson, before a report was made by the committee to the house, was convinced by his friends that no boiler *then known* would generate steam in a sufficient quantity and at a cheap rate, to answer the end, he declined his opposition, and a grant was made to Mr. Fitch, of the exclusive use of steam for navigation, in very large and comprehensive words. Since this grant Mr. Fitch, and a large company, who associated with him, have made many experiments to reduce their boat to practice; all of which were to apply the force of steam (generated in a large boiler, agreeably to the old practice long used in Europe) to the working a number of paddles on the sides of the boat, the abortive events of which have been too public to need repetition.

[Those who wish to follow this controversy in detail will find these three rare pamphlets reprinted in full in "The Magazine of History with Notes and Queries," extra numbers 100 (1924), 122 (1926) and 139 (1928). Both inventors tried to obtain money to build boats for complete tests. They had the interest of most of the famous men of their time, but were unable to carry out their plans. Rumsey died broken-hearted, Fitch committed suicide. Yet both men had actually run their steam-propelled boats upstream on swift rivers. Thus the steamboat dates from the Eighteenth Century.]

Science News Letter, April 23, 1932

PHYSIOLOGY

Scientist Traces Evolution Of Firefly Light Reaction

Finds Special Ability Has Developed From One of Biochemical Processes Underlying Ordinary Respiration

ORGANISMS that shine in the dark, like fireflies, and the bacteria that cause the light of "punkwood" or "fox-fire," have evolved this special ability from one of the biochemical reactions that underlie ordinary respiration. Reasons in support of this view were presented before the opening session of the American Philosophical Society's annual meeting by Prof. E. Newton Harvey of Princeton University.

Prof. Harvey, who has been working on the problems of "living light" for many years, traced a close parallelism between the reaction of the glowing substance "luciferin" and oxygen, brought about by the enzym "luciferase," and the "hydrogen acceptor" mechanism involved in the oxidation of food substances to set free energy in common non-luminous forms. The outstanding difference between the two processes is that in ordinary oxidation the end-product is carbon dioxide, whereas in the light-producing reaction this substance is not set free. Instead, the oxygen involved seems to be tied to hydrogen atoms to form water, and the oxidized luciferin is later caused to lose its oxygen and thus be ready for use all over again.

Luminescence is a capacity possessed by many organisms scattered all over the evolutionary family tree; which leads Prof. Harvey to believe that the shift-over from ordinary respiration to the special case of luminescence has occurred many times, and is not confined to any one line of descent.

There are two main modes of luminescence; continuous glow, exhibited by bacteria, and intermittent glow, exhibited by practically all other organisms. The intermittent type is the one most familiar to the majority of people; it is well exhibited by the common firefly. Intermittent luminescence ordinarily takes place only in response to a stimulus. It may serve an evolutionary end, such as scaring off enemies or attracting prospective mates. The anatomical mechanisms for its production are often quite complex.

The continuous glow of bacteria is emitted without stimulus and apparently serves no useful purpose to the organisms that display it. It seems to be produced simply by the secretion of luciferin within the bacterium's body, and the oxidation of this luciferin when it makes contact with the air.

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