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**Author:** Latrobe, Benjamin Henry, 1764-1820.

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A N S W E R  
TO THE  
JOINT COMMITTEE  
OF THE  
SELECT AND COMMON COUNCILS  
OF  
PHILADELPHIA,  
ON THE SUBJECT OF A PLAN FOR  
Supplying the City with Water, &c.

GENTLEMEN,

**I**N compliance with your desire—"that I should  
"state in as concise and clear a manner as possi-  
"ble, the detail of the plan proposed to be executed  
"for supplying the city of Philadelphia with pure and  
"wholesome water," which has been adopted by the  
councils, "and also, the progress which has been  
"made towards carrying the same into effect"—I now  
submit to you the following statement :

IT is proposed that a short canal shall be cut from the Schuylkill, near the middle ferry, to terminate at the foot of the bank at the end of Chestnut-street, upon which stands an old redoubt. This canal is to be deeper than the lowest water-mark, and may be so furnished with gates, as to receive only the water of the ebb.—When the canal arrives at the foot of the hill, it will be continued through a short tunnel into a well, sunk in the old fort, of about eight feet diameter. Over this well will stand the first engine-house. From the engine-house along Chestnut-street and Broad-street, a brick tunnel of considerable dimension, and lying at

least three feet below the surface, will convey the water pumped into it by the engine, into Centre-square. The steam engine will be of sufficient power to supply in twenty-four hours, whenever required, three million of gallons. Supposing that 10,000 houses are to be supplied, the daily demand, in the winter months, cannot often exceed 300,000 gallons.—In rainy weather, when the river may be turbid, the demand will also be confined to domestic consumption, and cannot easily exceed the same quantity. The tunnel will contain about 8,000,000 gallons, being a supply for a much greater length of time than any rain can, in common seasons, be expected to continue. In the tunnel the water will not only become cool, but should it have been pumped up in a turbid state, which will scarcely ever be necessary, it will deposit its sediment.

An engine of a power twice as great as that proposed, might not only have pumped up the water from the Schuylkill, but have forced it into the reservoir in Centre-square, and thus have rendered a second engine unnecessary. No immediate saving would have been effected by this means; such an engine could not have been constructed in America, but might have been imported. Expense might have been saved during the time of the greatest supplies, as the power of an engine increases in a greater ratio than its consumption of fuel. But the advantage of the tunnel, considered in the point of view stated above, and the avoiding of those risks to which pipes are liable, far outweigh any trifling saving which could thus have been made.

In Centre-square another engine is to be erected, which, raising the water to an elevated reservoir, will, from thence, distribute it in wooden pipes over the whole city and suburbs. Every citizen will have the choice of supplying his family, either at the public plugs, or by leading the water through private pipes to any part of his house, at an easy water rent. There

are few houses in Philadelphia, to the highest apartments of which it could not be conducted, and during the day it may run a constant stream. The subscribers to the proposed loan, will, on the terms offered by the corporation, have the advantage of receiving it for three years free of rent.

At every square, opposite to the public alleys, a fire plug will be placed. By this an inexhaustible quantity of water will be supplied to the fire engines, in cases of fire; and as the method used in London may be adopted, the engines will be filled by means of leathern hose or pipes, and the citizens, being relieved from the fatiguing duty of handing the buckets, will be at liberty to give the most active assistance to the preservation of the lives and property of the sufferers.

Considerable progress has been already made towards the completion of this plan. The steam engines are already ordered, and some progress is made in their construction: and although a great variety of obstacles have occurred, and some delay has thereby been occasioned, there is still remaining a very reasonable hope that they will be completed by the time originally contemplated. The expense, at which these engines are contracted for, does not exceed the estimate which has been stated to the committee. One of the principal persons engaged in constructing them, was the agent of Messrs. Bolton & Watt in Holland, where he put up a very large engine for the purpose of draining a lake, the success of which was complete. Under his management, and that of several other very skilful workmen, an excellent engine has already been constructed in this country; and any gentleman, to whom it may be convenient to call at Mr. Roosevelt's works, on Second River, near Newark, in the Jerseys, may convince himself how well founded are the expectations that I have entertained on this subject. Very accurate information respecting the maintenance of the en-

gines is before you, and it is evident from thence that their annual expense will not, at an average of their greatest and smallest supply, very materially exceed the annual expense of the pumps, with which I have been furnished.

Several other conditional contracts have been entered into, all of which are for less sums than the estimate submitted to you, and especially in the very important article of distribution, conditional agreements have been made for logs, and boring, which authorize me to believe that the estimate of half a dollar per foot, will cover every expense contemplated under it. Thus far the business has proceeded, and I think a reasonable hope may now be entertained, that no common obstacles can prevent an early completion of the work under your direction.

The many attempts which have been made in this country to adapt steam engines to the navigation of boats against the stream, and which have miscarried, have occasioned a prejudice against them, which does not exist in Europe, where also every attempt to apply them to the same purpose has failed, but where, in every other respect, they have completely succeeded.

Another prejudice, respecting the repairs of steam engines, prevails, which I am anxious to remove. It is necessary that the joints of the machine should be frequently oiled; and the piston of an engine in constant work, requires *packing*, or refurnishing with tow, perhaps once a week—this is the work of an hour, and is done by the man who attends the fire. Other repairs are trifling, and arise in general from the bad original construction of some detailed part of the work. But *once* in ten years it is necessary to furnish the engine with new valves. The valves are the only part of an engine *liable*, from their necessary construction, to injury. The contractor for the city engines esti-

mates, in his contract, the renewal of this part of the engine at 500 dollars, which appears to me to be a reasonable charge. As to the annual repairs, they form the least considerable item in the contract for maintenance.

Unwilling to recommend to you any scheme which has not been ascertained, and the success of which might be therefore precarious, I subjoin the following account of engines which are applied to the use of supplying large cities in Europe with water. As many of our fellow-citizens have been in Europe, its authenticity may be easily verified; and, though I state it from memory, I believe there is no reason to doubt its perfect correctness.

I am, with great respect,

Yours, faithfully,

B. HENRY LATROBE, Engineer.

*Philadelphia*, March 2d, 1799.



## ACCOUNT OF STEAM ENGINES, &c.

THE cities of London and Westminster are in part supplied with water by the following engines.

I. Chelsea water-works: Two engines. The water is received from the Thames at high-water, into several basons and canals, through flood-gates which shut when the tide falls, and prevent its return. The water supplies the lower parts of Westminster, and is in part forced up into Hyde-park by the engines. A smaller engine forces it still higher than the park reservoir.

This reservoir and the smaller engine supply the extreme north-western part of the town.

II. Hungerford water-works.—A large, but badly constructed, atmospheric engine, near the Adelphi, raises the water to the top of a high tower, from whence it supplies a considerable part of the town about the Strand.

III. The New River-head, is sufficiently elevated to supply a very extensive portion of the cities, but not sufficiently for some parts about Islington and Mary-le-bone. A large quantity is therefore raised by an engine near Sadler's wells, into an elevated reservoir, from whence it is then distributed. In the year 1794, a cast iron main had been nearly completed, by which the New River water was to be conveyed across a very deep valley, falling, and again rising, with the ground. A steam-engine was to be erected at the end of Tottenham-court road to raise the supply to an elevated reservoir. By this measure near a million feet of wooden pipe will be saved.

IV. Stratford le Bow. A very large engine forces the water of the river Lee into an elevated reservoir, from whence many eastern parts of the town are supplied.

V. Wapping near Shadwell: This is the largest engine in London, and receives its waters from the Thames.

VI. Lambeth Marsh on the south side of the Thames, takes also its water from the river.

In Southwark there are more engines than one. My memory does not retain their exact situations. Mr. Whitebread's brewery, Mr. Thrall's, Mr. Dickinson's, and Mr. Sellon's, and many others, have all engines of



considerable power, which pump the liquor, and do all the other work.

For the purposes of manufactories, &c. their number is also very great.

The city of Worcester is entirely supplied with water by a very excellent engine. There are many other cities in England of which I know that they are in the whole, or in part, supplied with water by steam engines; but as I cannot detail the extent of their power or effect, I omit to mention them.

Every one who has been at Paris, knows that water was carried about in the streets by innumerable water-porters, whose cry had something remarkable in it, to the ear of a foreigner. This was very inconvenient, and (I believe in the year 1784 or 1785) a very extraordinary steam engine was erected in Paris, for the purpose of raising and conveying the water by means of pipes, to different parts of the city. It was constructed in England, by Mr. Wilkinson, and was (if I am not mistaken) the largest double engine which, till then, had been made. Its cylinder is, I believe, 4 feet, 2 inches in diameter. It was in operation in the year 1788, and I have good authority for asserting, that lately the shares in this concern were sold at an advance of 600 per cent. upon their original cost. Soon after the invention, steam engines were justly considered as dangerous, man had not yet learned to controul the immense power of steam, and now and then they did a little mischief. A steam engine is, at present, as tame and innocent as a clock.

B. H. LATROBE, Engineer.

*Philadelphia*, March 2d, 1799.