then screw in the said pipes again, as fast and tight as possible ; then light the fire at B. No. 1 ; when the water in L boils, the handle of the regulator, marked Z, must be thrust off from you as far as it will go, which makes all the steam rising from the water in L press with ir resistible force through O No. I, into P No. 1, making a noise as it goes ; and when all is gone out, the bottom of the vessel P No. 1 will be very hot. Then pull the handle of the regulator towards you, by which means you stop O No. 1, and force your steam through O No. 2 Into P No. 2, until that vessel has discharged its air through the clack R No. 2 up the force pipe. In the mean time, by the steam’s condensing in the vessel P No. 1, a vacuum of emptiness is created, so that the water must and will necessarily rise up through T, the sucking pipe, lifting up the clack It No. 3, and filling the vessel P No. 1.

“ In the mean time, the vessel P No. 2 being emptied of its air, turn the handle of the regulator from you again, and the force is upon the surface of the water in P No.l ; which surface being only heated by the steam, it does not condense it, but the steam gravitates or presses with an elastic quality like air, still increasing its elasticity or spring, till it counterpoises or rather exceeds the weight of the water ascending in S, the forcing pipe, out of which the water in P No. 1 will he immediately dis charged, when once gotten to the top ; which takes up some time to recover that power, which having once got, and being in work, it is easy for any one that never saw the engine, after half an hour's experience, to keep a constant stream running out the full bore of the pipe S. For on the outside of the vessel P No. 1 you may see how the water goes out, as well as if the vessel was transparent; for as the steam continues within the vessel, so far is the vessel dry without, and so hot, as one is scarce able to endure the least touch with one's hand ; but ns far as the water is, the said vessel will be cold and wet, where any water has fallen on it ; which cold and moisture vanish as fast as the steam in its descent takes place of the water. But if you force all the water out, the steam, or a small part thereof, going through R No. 1, will rattle the clack, so as to give sufficient notice to pull the handle of the regulator to you, which at the same time begins to force out the water from P No. 2, without the least alteration of the stream ; only some times the stream of water will be somewhat stronger than before, if you pull the handle of the regulator before any considerable quantity of steam be gone up the clack R No. 1 ; but it is much better to let none of the steam go off, (for that is but losing so much strength,) and is easily prevented by pulling the regulator some little time before the vessel forcing is quite emptied. This being done, immediately turn the cock or pipe of the cistern X on P No. 1, so that the water proceeding from X, through L Y, (which is never open but when turned on P No. 1 or P No. 2, but when between them is tight and stanch ;) I say, the water falling on P No. 1 causes by its coolness the steam (which had such great force just before, by its elastic power) to condense—to become, in the language of our author, ‘a vacuum or empty space.' So that the vessel P No. 1 is, by the external pressure of the atmos phere, or what is vulgarly called suction, immediately refilled while P No. 2 is emptying ; which being done, you push the handle of the regulator from you, and throw the force on P No. 2, causing the steam in that vessel to condense, so that it fills while the other empties. The labour of turning these two parts of that engine, viz. the regulator and water cock, and tending the fire, being no more than what a boy's strength can perform for a day together.

“The ingenious reader will probably here object, that the steam being the cause of this motion anil force, and that steam is but water rarefied, the boiler L must be in some

certain time emptied, so as the work of the engine must stop to replenish the boiler, or en∣langer the burning out or melting the bottom of the boiler.

“ To answer which, be pleased to observe the use of the small boiler D, when it is thought fit, hy the person tending the engine, to replenish the great boiler, (which requires an hour and a half, or two hours' time to the sinking one foot of water.) Then I say, by turning the cock of the small boiler E, you cut off all communication between S the great force pipe and D the small boiler, by which means D grows immediately hot ; by throwing a little fire into B No. 2, the water of which boils, and in a very little time it gains more strength than the great boiler ; for the force of the great boiler being perpetually spending and going out, and the other winding up and increasing, it is not long before the force in D exceeds that in L ; so that the water in D being depressed in D by its own steam or vapour, must necessarily rise through the pipe K into L, running till the surface of the water in D is equal to the bottom of the pipe H.

“ Then the steam and water going together, will, by a noise in the clack I, give sufficient assurance that D has discharged and emptied itself into L, to within eight inches of the bottom. And inasmuch as from the top of D to the bottom of its pipe II is contained about as much water as will replenish one foot ; so you may be certain it is replenished one foot—of course then you open the cock I, and refill D immediately.

“ By which you will see that there is a constant motion, without fear or danger of disorder or decay ; and if you would at any time know if the great boiler L be more than half exhausted, turn the small cock N, whose pipe will deliver water, if the water be above the level of its bottom, which is half way down the boiler; if not, it will deliver steam.

“ So likewise will G show you if you have more or less than eight inches of water in D; by which means nothing but a stupid neglect or mischievous design carried on some hours, can any ways hurt the engine. And if a master is suspicious of the design of a servant to do mis chief, it is easily discovered by those gauge-pipes. For if he comes when the engine is at work, and finds the surface C of the water in L below the bottom of the gauge-pipe N ; or the water in D below the bottom of G, such a servant deserves correction, though three hours after that the working on could not damage or exhaust the boiler. So that, in a word, the clacks being in all waterworks always found the better the longer they are used ; so here the same effect is found, and all the moving parts of the engine being of like nature, the furnace being made of *Sturbridge* or *Windsor* brick or firestone, I don't see it possible for the engine to decay in many years.

“ For besides, the clacks, boxes, and water-pipes, regulator and cocks, are all of brass, and the vessels are made of the best hammered copper, of sufficient thick ness to sustain the force of the working engine. In short, the engine is so naturally adapted to perform what is required, that even those of the most ordinary and meanest capacity may work it for some years without injury, if not hired or employed by some base person on purpose to destroy it. For after the engine is once fixed and at work, I may modestly affirm that the adventurer or super­visor of the work will be freed from that perpetual charge, expense, and trouble of repairs which many engines are generally liable to.”

One of the first uses of Savary's engine, proposed by himself, was to raise water into a reservoir, from which it should he allowed to fall on a millwheel, turning round the machinery in the same way as a common fall of water ; and alter reaching the bottom, it was again to be raised by the steam-engine to the upper reservoir, for the pur­