pose of again descending on the wheel. We are not, however, aware that any machine was applied in this manner during Savary’s life ; but after his death several of them were erected by a Mr Joshua Rigley, at Man chester, and throughout Lancashire, to impel the machinery of some of the earliest cotton-mills and manufactories of the district. One of these, of which we have here given the figure, was erected at St Pancras, London, at the manufactory of a Mr Kier, where it long continued to turn lathes, &c. We have taken the following description of it from Nicholson’s Journal.

“ The figure is the section **of** this engine taken through the centre. B represents a boiler shaped like a waggon, seven feet long, five feet wide, and five deep ; it was considered as being of dimensions sufficient to work a larger engine; a circumstance which must, in a certain degree, diminish the effects of the present one. The boiler feeds itself with water, from a cistern, elevated by a pipe which descends into the boiler and has a valve in it at the upper end, which shuts downwards, and is connected by a wire with a float on the surface of the water within the boiler, so as to open the valve whenever the water subsides below its intended level ; for the float which swims on the water then sinks, and by its weight draws the valve up to allow the water from the cistern to run down the pipe, and supply the deficiency ; but as the water in the boiler rises

the float closes the valve. The boiler, therefore, remains constantly, or nearly, at the same degree of fulness.

“ The steam is conveyed by a pipe **C** to a box D, through which, by the opening and shutting of a valve, it can be admitted to the cylindrical receiver A. The axis K serves as a key to open and shut the valve, which is a circular plate formed conical on the edge, and fits in a corresponding aperture in the bottom of the box D ; H is a cistern from which the engine draws its water, through a vertical suction-pipe, in which a valve G is placed, to prevent the return of the water ; F is another cistern, into which the water is delivered from the receiver A, through the spout F, which is provided with a valve

opening outwards; WW represents an overshot water wheel. 18 feet in diameter, of which the axis S communicates motion to the lathes and other machines used in the **manufactory.**

“ The engine raises the water from the lower cistern H, by suction, into the receiver A, from which it runs into the upper cistern F, and thence flows through a sluice into the buckets of the waterwheel W, to give it motion. The water as it is discharged from the buckets of the wheel falls again into the lower cistern H. As the same water circulates continually in both the cisterns, it becomes warmer than the hand, after working a short time; for which reason the injection-water is forced up by a small forcing pump from a well. This injection pump is worked by the waterwheel by means of a loaded lever or pump handle, which is raised up by the motion of the wheel, and then left to descend suddenly by its weight and force up the water into the receiver. A leaden pipe passes from this forcing pump to the upper or conical part of the receiver A, for the purpose of injecting cold water at the proper time. Neither of these could be represented with convenience in the present section.

“ The manner in which the steam and cold water are alternately admitted into the receiver A, remains to be ex plained. Upon the extremity of the axis S of the water wheel a solid wooden wheel T is fixed ; it is about four feet in diameter, and turns round with the water wheel. It is represented separately, as seen in the front. *a b c d* are four cleats, all or any number of which may be fixed on the wheel at a time Each cleat has its correspondent block, *e f g h* on the opposite surface of the wheel. The use of these is to work the engine. Thus, suppose the waterwheel and this wheel T, with all the revolving apparatus, are turning round, one of the cleats, *a*. meets in its rotation with a lever, which it lifts up, and this opens the steam-valve D by a rod of communication reaching to the handle of the axis K. The steam consequently passes into the receiver A, and the steam-valve shuts again as soon as the cleat *a* of the wheel T has passed away from the lever by the motion of the wheel. All this time the correspondent block *e* on the other side of the wheel T had been operating to raise up the loaded lever which forms the handle of the forcing pump. And at the same instant that the steam-valve D is shut, as above mentioned, the block *e* quits the loaded lever, after having raised it up, and leaves it to descend suddenly by its own weight. This depresses the forcer of the pump, and thereby throws a jet of cold water up into the receiver A, and it falls in a shower of drops through the steam which fills the receiver, so as to cool and condense the steam, and make a vacuum therein. The pressure of the atmosphere upon the surface of the water in the cistern H then causes the water to mount up the perpendicular suction-pipe, through the valve G, towards the exhausted receiver.

“ When the engine is first set to work, the waterwheel being motionless, the steam-valve and injection-pump are moved by hand ; and if the engine has been long out of work, two or three strokes may be necessary to raise the water to the top of the receiver A, so as to fill it full of water. As soon as this is the case, and the steam valve is opened to admit steam into the receiver, the whole contents of water above the spout and valve F then flows out of the receiver A, by its own gravity, into the upper cistern R.

“ The water which is thus raised is suffered to flow from the cistern upon the overshot waterwheel W, through a sluice, and by that means keeps the wheel in motion, and replenishes the lower cistern. There is no reservoir for the injection-water, but the requisite quantity is driven