Brittanica 1854

The method of Sir George Wright, proposed in 1805, is as follows : A hole is drilled through the block of stone, in which a long iron bolt is inserted for the saw to work round as a centre ; this bolt forms the axis of the cylinder which is to be taken out, and projects considerably beyond the block at both ends. Another hole is drilled in the intended circumference ; and into this the blade of the saw is introduced. The frame of the saw is so disposed, that when it is wrought to and fro, the blade is guided, by means of the centre bolt, so as to describe the intended cylindrical circumference. In this way a solid cylindrical core of stone is detached, and a cylindrical cavity or pipe left in the block. Or the saw may be made to describe a circle without drilling a hole in the centre, by drilling a hole in the circumference, and fixing on the surface of the stone two metallic concentric rings, so that the hole shall be included in the interstice between the rings. The saw is then introduced into the hole, and being worked, it cuts in the circular path formed by the interstice of the rings. See Repertory of Arts, second series, vol. viii. Mr Murdoch's method, for which he obtained a patent in 1810, is preferable in practice to the above-mentioned method. He employs a cylindrical saw to form the pipe. A plug of wood is inserted in the centre of the intended pipe ; this plug receives the lower end of a vertical spindle, longer than the intended pipe ; and this spindle is square, with sockets sliding on it, On the upper part of the spindle is a pulley or toothed-wheel, by which the spindle is made to revolve. Near the lower end of the spindle is a wheel, having a circumference like a hoop, three inches broad. The diameter of this wheel is somewhat less than that of the pipe to be bored. It regulates the motion, and fits in the inside of a tube of metal attached to the spindle. The diameter of the tube is nearly equal to that of the intended pipe ; but its length is greater by two feet. On the lower edge of the tube is a rim of metal, so much thicker than the tube that the groove cut in the stone by the rim may admit the tube to move freely in it. This rim has an edge like that of a stone-cutter s saw, and in fact per forms the office of a saw. The tube is caused to make a reciprocating circular motion round the spindle. There is a cistern placed above the tube, for the purpose of conveying a mixture of sand and water into the cylindrical groove formed in the stone, whilst the machine is working. Stone pipes, made in the above described way, have been tried for conveying water in London. They were joined by means of Parker's cement, which consists of clay ironstone, burnt, ground to a fine powder, and mixed with mortar. This was the best material that could be got tor forming the joints; but these joints cracked and allowed the water to escape, in consequence of the motion of the carriages on the streets under which the pipes were laid, or of the requisite beating down of the superincumbent earth.

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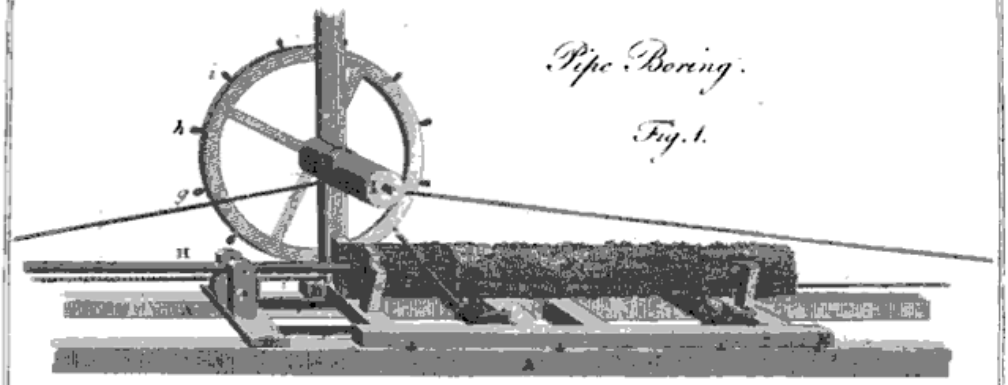
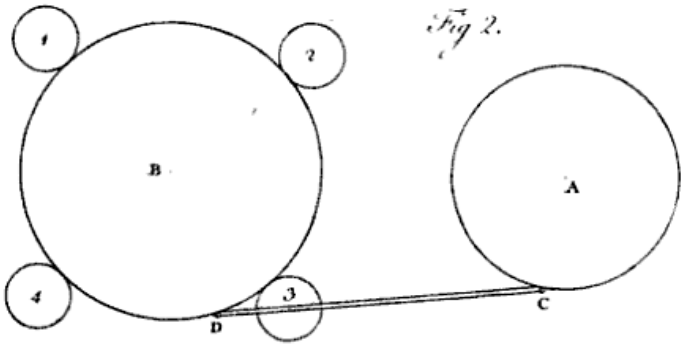
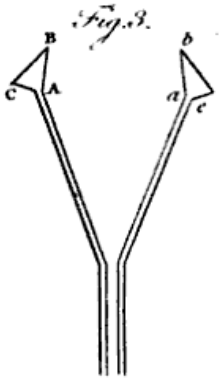
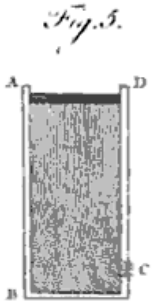
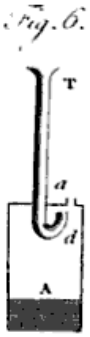
The company for the Manchester water, works employ stone pipes for the communication of the water. The stone which they have found as most suitable to their purpose is in a quarry at Fox Hill, in the parish of Guiting Power, Gloucestershire. The stone is much of the same quality as Portland stone, though not quite so dense, the Fox Hill stone requiring 17 cubic feet to weigh a ton, while the Portland stone requires only 16 feet. The works at Fox Hill for the purpose of boring the stone are ingeniously constructed. The first mover is a steam engine of considerable power, giving rotatory motion to a shaft posited horizontally, and running from one end of the works to the other. The works are divided into compartments, each of which serves for the simultaneous boring of four pipes. By means of the usual contrivance of bevel-gear motion is communicated from the main horizontal shaft, to a vertical arbor, at the top of which is the wheel A (fig 2. pi. 139). The rotatory motion of this wheel by means of a crank bar CD, gives a reciprocating motion to the larger wheel B, and this later motion is such as to give rather more than a complete rotation to each of four smaller wheels, 1 , 2, 3,4, placed diametrically opposite, with respect to the larger wheel B, the mutual connection between them and it being by means of teeth or cogs. Thus the wheels 1, 2, 3, 4, go through somewhat more than a complete rotation in one direction, and then rather more than a complete rotation in the opposite direction; and so on alternately. On the vertical shafts beneath the wheels 1, 2, 3, 4, are placed iron tubes which are suffered to act by their weights upon the stones to be bored, and by means of their rotation to bore those stones by attrition. The stones are cut in to lengths of 6 or 8 feet, and bored into pipes of various diameters. When the pipes are of 14-inches diameter, the thick ness of stone allowed is about 5 inches. The tubes by which the boring is effected are then of course 14 inches diameter, and weigh about 14 cwt. They are made of thin plate iron, except their circular rim or sole at the bottom, which is about half an inch thick. As the attrition wears away the stones on which the soles of the tubes rest, they sink lower and lower; the whole is kept moist by means of a semifluid mixture of sand and water, which runs down from the wheels 1 , 2, 3, 4, at top of the tubes, and after sinking to the bottom of those tubes, carries up with it the particles of the stone taken off during the process of boring. Thus the boring proceeds with tolerable rapidity. The principal defect we saw in the machinery was in the jostling occasioned by the bar CD on every reciprocation of the wheel B: but this may be easily remedied. Previously to the adoption of these tubes for boring, the work was effected by the circular saws invented by sir James Wright: but these saws were soon abandoned, by reason of their frequent derangement, when multiplied and worked by machinery.

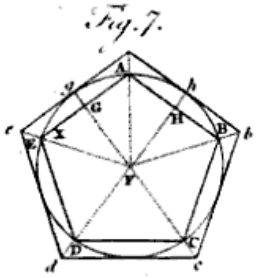


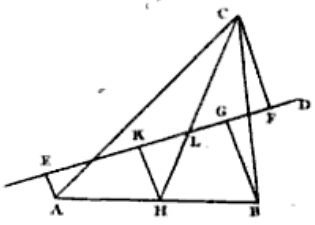


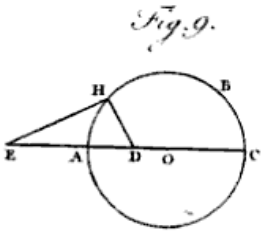












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