The rod X of the piſton P is ſuſpended from the arch oſ the wot king-beam, as was repreſented in the preceding ſketch (fig. 7). An upright bar of timber FG is also ſeen hanging by a chain. This is ſuſpended from a concentric arch of the beam, as may be ſeen alſo in the ſketch at φδ. This bar is called the p*lug-beam,* and it must riſe and fall with the piſton, but with a flower motion. The uſe of this plug-beam is to give motion to the different pieces which turn the cocks.

The ſteam-pipe K is of one piece with the bottom of the cylinder, and riſes within it an inch or two, to prevent any of the cold injection water from falling in­to the boiler. The lower extremity Z of the ſteam- pipe penetrates the head of the boiler, projecting a little way. A flat plate of brass, in ſhape resembling a racket or battledore, called the *regulator,* applies itſelf exactly to the whole circumference of the ſteam-pipe, and completely excludes the ſteam from the cylinder. Being moveable round an upright axis, which is repre­ſented by the dotted lines at the fide of the ſteam-pipe in the profile, it may be turned aſide by the handle *i,* η I. The profile ſhows in the lection oſ this plate a protuberance in the middle. This refis on a ſtrong flat ſpring, which is fixed below it athwart the mouth of the ſteam-pipe. This ſpring preſſes it ſtrongly to­wards the ſteam-pipe, cauſing it to apply very cloſe ; and this knob Aides along the ſpring, while the regula­tor turns to the right or left.

We have ſaid that the injection water is ſurniſhcd from a ciſtern placed above the cylinder. When this ciſtern cannot be ſupplied by pipes from ſome more elevated ſource, its water is railed by the machine it­ſelf. A ſmall lifting pump *ik* (fig. 7.), called the *jack­head* or *jacquette,* is worked by a rod γι*,* ſuſpended from a concentric arch ε γ near the outer end of the work­ing beam. This forces a ſmall portion of the pit water along the riſing pipe *i* LM into the injection ciſtern.

In figure 8. n⁰ 1. and 2. the letters QM 3' repre- ſent the pipe which brings down the water from the injection ciſtern. This pipe has a cock at R to open or shut the paſſage of this water. It ſpouts through the jet 3', and daſhing againſt the bottom or the piſton, it is disperſed into drops, and ſcattered through the whole capacity of the cylinder, ſo as to produce a ra­pid condenſation oſ the ſteam.

An upright post A may be obſerved in the perſpective view of the cylinder, &c. This ſupports one end B of a horizontal iron axis BC. The end C is ſupported by a ſimilar poſt, of which the place only is marked by the dotted lines A, that the pieces connec­ted with this axis may not be hid by it. A kind of stirrup *abcd* hangs from this axis, ſupported by the hooks *a* and *d.* This ſtirrup is croffed near the bottom by a round bolt or bar *e,* which passes through the eyes or rings that are at the ends of the horizontal fork *bfg,* whoſe long tail *h* is double, receiving between its branches the handle *i* of the regulator. It is plain from this conſtruction, that when the ſtirrup is made to vi­brate round the horizontal axis BC, on which it hangs freely by its hooks, the bolt *e* muſt pull or puſh the long fork h*fg* backwarks and forwards horizontally, and by ſo doing will move the regulator round its axis by means of the handle 2. Both the tail of the fork and the handle of the regulator are pierced with ſeveral holes, and a pin is put through them which unites them by a joint. The motion of the handle may be increa- ſed or diminiſhed by choosing for the joint a hole near to the axis or remote from it ; and the exact poſition at which the regulator is to ſtop on both ſides is deter­mined by pins ſtuck in the horizontal bar on which the end of the handle appears to rest.

This alternate motion oſ the regulator to the right and left is produced as follows : There is fixed to the axis BC a piece of iron *ok l,* called the Y, on account of its reſemblance to that letter of the alphabet invert­ed. The stalk *o* carries a heavy lump *p* of lead or iron; and a long leather ſtrap *qpr* is faſtened to *p* by the middle, and the two ends are faſtened to the beam above it, in ſuch a manner that the lump may be alternately catched and held up to the right and left of the per­pendicular. By adjuſting the length of the two parts of the ſtrap, the Y may be flopped in any desired. poſition. The two, claws *k* and *l* spread out from each other, and from the line of the ſtalk, and they are of such length as to reach the horizontal bolt *e,* which croffes the ſtirrup below, but not to reach the bottom of the fork *hfg.* Now ſuppoſe the ſtirrup hanging perpendicularly, and the ſtalk of the Y alſo held per­pendicular ; carry it a little outward from the cylinder, and then let it go. It will tumble farther out by its weight, without affecting the ſtirrup till the claw Z ſtrikes on the horizontal bolt *e,* and then it pushes the ſtirrup and the fork towards the cylinder, and opens the regulator. It lets it in motion with a ſmart jerk, which is an effectual way of overcoming the cohesion and friction of the regulator with the mouth of the ſteam-pipe. This puſh is adjuſted to a proper length by the ſtrap *q ρ,* which ſtops the Y when it has gone far enough. If we now take hold of the ſtalk of the Y, and move it up to the perpendicular, the width be­tween its claws is ſuch as to permit this motion, and ſomething more, without affecting the ſtirrup. But when puſhed ſtill nearer to the cylinder, it tumbles to­wards it by its own weight, and then the claw *k* ſtrikes the bolt *e,* and drives the ſtirrup and fork in the oppo­ſite direction, till the lump *p* is catched by the ſtrap *rp,* now ſtretched to its full length, while *qp* hangs flack. Thus by the motion of the Y the regulator is opened and ſhut. Let us now ſee how the motion of the Y is produced by the machine itſelf. To the horizontal axis BC are attached two ſpanners or handles *m* and *η.* The ſpanner *m* paſſes through a long slit in the plug­beam, and is at liberty to move upwards or down­wards by its motion round the axis BC. A pin π which goes through the plug-beam catches hold of mwhen the beam riſes along with the piſton; and the pin is ſo placed, that when the beam is within an inch or two of its higheſt riſe, the pin has lifted m and thrown the ſtalk of the Y paſt the perpendicular. It therefore tumbles over with great force, and gives a ſmart blow to the fork, and immediately ſhuts the regulator. By this motion the ſpanner *m* is removed out of the neigh, bourhood of the plug-beam. But the ſpanner *n,* mo­ving along with it in the same direction, now comes in­to the way of the pins of the plug-beam. Therefore, when the piſton deſcends again by the condenſation of the ſteam in the cylinder, a pin marked & in the side oſ the plug-beam catches hold of the tail of the ſpan­ner n, and by preſſing it down raiſes the lump on the