PEYER'S STEAM-TRAP.

We subjoin an engraving of a form of steam-trap designed by Mr. Alfred Peyer and constructed by Messrs. Schmerber Brothers, of Mulhouse, this trap being arranged so as to discharge both air and water automatically. The apparatus consists of two chambers connected by a short pipe, at the bottom of which is a valve-face fitted with a partially rotating valve, as shown on the plan. To an arm on this valve is coupled one end of a bent tube filled with liquid and hermetically closed, the other end of this tube being fixed as shown.

PEYER'S STEAM-TRAP.

It follows from the arrangement adopted that if the bent tube be heated the liquid in it will expand, and so cause the partial uncoiling of the tube, this uncoiling movement partially rotating the valve and causing it to close the openings. The upper vessel, it will be noticed, is fitted with a screen, to keep dirt from getting to the valve, and to this chamber the pipes to be drained of water, etc., are connected.

The action of the apparatus is as follows: When steam is not admitted to the pipes or vessel to which the steam-trap is connected, the bent tube is of course cold, and the valve is entirely open. If now steam be turned on, the air will first be discharged from the pipes, and then there will be a greater or less flow of water of condensation. This water being warm, the liquid in the bent tube will be expanded, causing the valve to be rapidly closed. When, however, the water thus discharged has run out of the lower vessel, the external air enters and cools the tube, causing the valve to be again opened, and so on. The apparatus is simple, and, we believe, acts promptly.—*Engineering.*

NEW STEAM CONDENSER WITHOUT AIR-PUMP.

At the recent meeting of the Institution of Mechanical Engineers at Birmingham, a paper "On McCarter's Condenser without Air-Pump, for Steam-Engines," was read by Mr. Francis Preston, of Huddersfield.

The air-pump and condenser combined, in 1765, by either James Watt or Gainsborough, and successfully introduced by James Watt, have undergone very little modification since they first left his workshop. The few alterations that have

been introduced have in no essential altered the principle or general arrangement. Many attempts, with varied success, have been made to introduce a condenser without an air-pump. The writer believes there has been no successful application of a condenser without the aid of an air-pump, and capable of lifting its own injection-water, previous to the one now forming the subject of this paper.

The late John McCarter, of Londonderry, was the inventor of the condenser that forms the special subject of the present paper, and he made further improvements in subsequent years for perfecting his original invention. Unfortunately he has not lived to reap the merited reward of his beautiful and simple invention, having died last year, just at the time when his invention was beginning to be practically appreciated. McCarter's invention takes as a basis the ordinary condenser, and adheres pretty much to the present recognized proportion, admitting the exhaust steam and the injection-water in the usual way. To dispense with the air-pump is the object he had in view, and to substitute a simpler and less costly mode of discharging the water and air that continually accumulate in the condenser when at work, and at the same time be enabled to place the condenser in any position and elevation with respect to the cylinder that is found most convenient. This condenser draws its own injection-water from any depth as in the ordinary condenser, and, being enabled to work at any elevation, it can be so placed as to allow the waste water to flow back again to any desired level. The condenser is provided with a small auxiliary condenser placed at the bottom of the ordinary or condenser proper. This is worked separately and independently, and is connected with the ordinary condenser by two intermediate india-rubber foot-valves. These two intermediate india-rubber foot-valves are worked by means of forming a vacuum in the auxiliary condenser by introducing a separate jet of steam and water, supplied alternately by independent mechanical means, thereby alternately creating and destroying a vacuum about five times per minute. The act of making this vacuum enables the two intermediate valves to open, forming a connection with the condenser proper, thereby allowing the accumulated water to flow into the auxiliary condenser, and the destroying the vacuum by a jet of steam admitted into the auxiliary condenser causes the two intermediate india-rubber valves to close, and at the same moment opens the delivery valve in the hot well, thereby discharging the hot water and air, which flow away in the ordinary manner.

Fig. 1 is an elevation of the condenser, with the small auxiliary condenser and hot well complete, and ready for the connections. Fig. 2 is an elevation in section, showing the two foot-valves which connect the condenser proper and the auxiliary condenser; and Fig. 3 is an elevation in section, showing the independent water and steam valve in connection with the auxiliary condenser. C is the tappet shaft, giving motion to the two equilibrium valves. This shaft revolves about five times per minute, and is worked either direct from the engine or from any other convenient shaft. In Fig. 3 is shown the water-valve, which is connected with a supply of water at a higher elevation than the auxiliary condenser; and also the equilibrium steam-valve in connection with the boiler, from which it receives a supply of steam five times per minute. This jet of steam is diminished in pressure by a diminishing valve placed near the boiler, so as to give the jet of steam at an average of 3 lb. to 4 lb. pressure above atmosphere when entering the auxiliary condenser. McCarter's condenser draws its own injection-water in the same way as an ordinary condenser, and there are some at work successfully lifting their own water 22 ft. to 24 ft. vertically.

These condensers have now been successfully at work upwards of three years in conjunction with engines from 12-in. cylinders to 37-in. cylinders, and they are giving great satisfaction, effecting a considerable saving in coal—25 to 33 per cent—besides giving much steadier motion to the machinery, caused by the regularity of the working of the condenser, without the great strain being put upon the engine through the ordinary air-pump at every revolution of the engine. The power required to work the tappet shaft is hardly worth a consideration; and this shaft can be either worked direct from any convenient part of the engine or may be worked from any counter-shaft or other independent motive power. As an illustration of the successful application of these condensers, the writer would mention the first condenser introduced in Yorkshire, and which was applied to a compound horizontal engine, with a condensing cylinder 20 in. in diameter. This application was introduced in order to make the power previously absorbed in working the air-pump available for driving the engines three strokes per minute faster, with the same machinery thereon, and without any especial reference to economy. The result was stated by the proprietors of the mill to be that the engines have done more work in the mill than in any other month, with a regular speed and with greater ease, besides saving fuel in money value amounting to 33 per cent.—*The Engineer.*

NEW OFFICE WATER-GAUGE.

The accompanying engraving shows a system of fitting water-gauges on boilers, oil-tanks, spirit-vats, etc., by which

STEAM CONDENSER WITHOUT AIR-PUMP.

necting stand-pipe to gauge; H, stand-pipe attached to boiler; J, gauge-glass to ditto, ordinary fittings; K, copper return-pipe; L and L', cocks to cut off boiler connection; M, boiler-plate; N, cup into which the return-pipe enters. The tube being entirely filled with cold water to the water line in the stand-pipe, a glance at the drawing will show that the water in the stand-pipe and the return-tube K will always be upon

OFFICE WATER-GAUGE.

the same level. If the water falls in the stand-pipe, it will fall also in the pipe K, and the movement of the water falling in K being continuous throughout the entire tube, it causes the colored liquid at A to fall also; thus showing in the instrument the fall or rise of the water in the stand-pipe, and by that means continually indicating in the instrument the height of water in the stand-pipe, which, being attached as shown to the boiler, always gives the true level of the water in the boiler. Open tanks or cisterns do not require either the stand-pipe H or the pressure-gauge B.—*The Engineer.*

IMPROVEMENT IN CANAL BANKS.

By W. RODNEY, New-York.

THE object is to give the water in a canal a rotary motion, thereby avoiding the excessive wash over the bank. This is effected by my invention of a concave canal wall. By thus decreasing the height of the following wave and protecting the bank, the speed of the boat or vessel may be increased and transportation facilitated.

The degree of concavity of the canal wall may be deter-

PROPOSED IMPROVEMENT IN CANAL BANKS.

mined by the width and depth of the canal, and the speed of the boat or vessel used.

This form of wall may be applied in several ways, as shown in the transverse views of the accompanying drawings, Fig. 1, a a, where the entire wall is concave; Fig. 2 and Fig. 4, where the concave wall a a is placed on an outward-sloping wall, B B; Fig. 3 and Fig. 5, where there is a vertical wall, c c, with the upper part a a concave.

The concave bank may be used also on one side only of a canal where the other is a vertical outward-sloping, a natural bank, or of any other configuration.

RUSHES.

IN an interesting article on rushes, a contributor to the *Gardeners' Chronicle* points out that the plant has really rendered considerable service to commerce. The canals or water-ways constructed by the Duke of Bridgewater owed much of their stability to the rushes that were planted all along their banks, and particularly on the towing-path side, where the fringe of rushes saved the rope from fretting; in short, the plant seemed essential to the canal, for its toughly-matted roots bound the banks firmly, and formed the crowning sod, making an elegant fringe, as useful as if it were made of hewn stone. Unlike the working of any shrub or tree that would outgrow its place in a year or two, the rush retains its evergreen wisps to all appearance for ever; and hence we see Brindley's rushes little more than a foot high after a generation of boatmen have brushed their tops ten times a day.