

with an inclined projection, depresses the gate as much as the depth of the immersion of the boat, and as much water escapes as can pass between its sides and the walls of the contracted part of the basin. The same action takes place in ascending, except that a certain amount of power must be expended to enable the boat to surmount the difference of level between the basins. The quantity of water wasted by each boat would be in proportion to its immersion and the speed at which it passed over the gate. In case of different sized boats passing along the same canal, it is proposed to have a small gate forming part of the main gate, so as to avoid the loss of water which would ensue from the whole width being open for the passage of a small boat.

This system has only been tried by models; but it is proposed to make an essay on an extensive canal next summer, when the results will be communicated to the Institution.

May 5, 1840.

The PRESIDENT in the Chair.

The following were balloted for and elected:—Angier March Perkins, St. George Burke, and Beriah Botfield, as Associates.

“Description of the Engines on board the Iron Steam Tug, the Alice.” By J. Patrick, Inst. C. E.

The Steam
Boat, the
“Alice.”

The speed of this boat having far exceeded the constructor's expectations, induced the author to send a description of her proportions, and of the construction of the engines. The chief peculiarity in the engines is their being placed in the centre of the vessel, with the two cylinders in a line with the keel, and placed at an angle of 45°, inclining inwards towards the paddle shaft, to which the motion is communicated direct (without the use of side beams) by long connecting rods attached to the cross heads, which are placed at the lower ends of the cylinders, instead of being on the top as in the usual manner; the connecting rods are thus enabled to be three times instead of twice the length of the stroke, as is usually the case. The framing is entirely of wrought iron on the tension principle, and appears to resist the tendency to vibration better than cast-iron framing. For the two cylinders of 31 inches diameter, there is only one air pump of 22½ inches diameter, with 19½ inches length of stroke, instead of the usual complement of two air pumps, 18 inches

diameter each ; this is found to be sufficient, as a vacuum of $13\frac{3}{4}$ lbs. per square inch is maintained. One of the advantages proposed by this mode of construction is the reduction of weight ; these engines only weighing 9 cwt. per horse power. The small space occupied leaving more room for passengers, they are particularly adapted for river navigation, where the breadth of beam must be limited. The simplicity of their construction renders them less liable to expensive repairs.

The principal proportions of the Alice are—

	feet	inches
Length between perpendiculars	95	
Breadth of beam	20	
Draft of water	4	6
Diameter of wheel	14	
Size of engines	two	30 horse power
Diameter of cylinder	31	inches
Length of stroke	3 ft.	3 in.

The engines were constructed by Messrs. Davenport and Grindrod, of Liverpool. Drawings of the boat and engines accompany this communication.

“Description of an Apparatus for preventing the Explosion of Steam Boilers.” By Robert M'Ewen.

The frequent explosions of steam boilers, caused in many instances by the steam being confined until it acquires a density greater than the boiler can resist, induced the author to invent a simple, self-acting apparatus, intended to warn the engineer whenever the pressure exceeded the proper degree of safety. Apparatus for preventing the explosion of Steam Boilers.

The apparatus under consideration is constructed on the principle that steam, in proportion to its density, will support a column of water, or mercury, of a given height, and that any fluid will find the same level in two or more vessels, provided there be a free communication between them. It may be called a mercurial safety valve, and consists of a cylinder, within which are two cups, with two pipes dipping into them of a length proportioned to the pressure of the steam ; these pipes are connected at the top with two valves on one spindle, so arranged, as that when one is open the other must be closed. On the top is a waste steam pipe open to the atmosphere. One pipe being filled with mercury, and the valve connected with it being open, the mercury remains stationary until the pressure of the steam exceeds its proper point. It will then be blown out and