NEW ROADWAY BRIDGE.

The new roadway bridge over the river Ouse at Bedford, illustrations of which we give, has been now completed and, amid great rejoicings, formally opened. The bridge consists of one central span and two smaller side spans, the distance between the faces of the north and south abutments being 200 ft. The arches are segmental, and consist of four central wrought iron ribs, spaced 5 ft. apart, to carry the vehicular traffic, and two outer ribs to carry the parapet and passenger traffic. The main ribs of the central span are made of 4 angle irons 4 in. by 4 in. by $\frac{1}{16}$ in. and two web plates $\frac{1}{16}$ in. thick; the horizontal member consists of two angle irons 6 in. by 4 in. by ½ in., with braced spandrels of channel iron 5 in. by 4½ in. by 23 lb. The other ribs are of the same construction, with the thicknesses reduced in proportion. All the ribs are well braced laterally with angle iron 3 in. by 3 in. by ½ in., and rest upon strong cast iron skewbacks let into the Bramley Fall springings. The outer ribs are fitted with ornamental cast iron spandrels and cornice, as shown in our illustration, and surmounted with a handsome parapet railing. The flooring of the bridge is made of Westwood and Baillie's corrugated plates 6¼ in. deep, and covered with asphalt and concrete, on which is laid the macadam. The clear width between the inside of parapet railing is 35 ft., with footways 7 ft. wide.

The foundations have been taken down to the rock, which lies about 12 ft. below the surface. The piers and abutments are made of Portland cement concrete, in the proportion of from 7 to 10 to 1, according to the position, and are faced with 14 in. and 9 in. brickwork up to the springings, and above with Darley Dale stone from Mr. Boden's quarry, the pilasters of the piers and abutments being entirely of this stone. Ornamental cast iron lamps are fixed to the cap of each of the pilasters. The bridge is approached on the north side by a new road, with a gradient of 1 in 87, having slopes of 1½ to 1, and fenced with Baltic red wood posts 9 ft. apart, with three angle iron rails. The approach on the south side has a gradient of only 1 in 127, and has a close wooden fence on one side 5 ft. 9 in. high, and a paneled brick wall on the other, on the top of the retaining wall. This retaining wall, which is about 15 ft. high at the abutments, is built of cement concrete 10 to 1, faced with white brickwork 14 in. and 9 in. thick, having a batter of 1 in 12, and was necessary on account of the contiguous property.

The works have been designed by Mr. John J. Webster, Assoc. M. Inst. C. E., of Stephenson Chambers, Liverpool, who also superintended the construction and erection. The contractors for the masonry, brickwork, and concrete, etc., were Messrs. S. W. Pilling & Co., of Manchester and Bolton; and for the ironwork, Messrs. Goddard and Massey, of Nottingham; and great credit is due to them for the excellent manner in which they have completed their contracts. The whole cost of the works, exclusive of the purchase of land, has been about £8,000; which must be gratifying to the engineer, as it is within his original estimate. This cost is extremely low, and considering the amount of labor necessary for such a class of bridge in comparison with the weight, it will be found to compare most favorably with any existing structure, either at the rate per ton or per superficial foot of space covered. The north approach is 530 ft. long, and the south one 576 ft., and 40 ft. wide, having footways 8 ft. wide paved with York 3 in. tooled flagging, and the roadway of macadam. The river Ouse has also been very much improved near the bridge, from plans prepared by Mr. Webster.—*The Engineer.*

STEAM BELL FOR LOCOMOTIVES.

The secondary railways of the rural districts of Austria have neither gates nor guards at crossings, and

LOCOMOTIVE STEAM BELL.

are as open as tramways. It is therefore necessary to take special precautions to prevent accidents and give warning of the approach of a train at a sufficient distance from the crossing. For this purpose preference is given to bells rather than to whistles, as the latter have the inconvenience of frightening horses. The annexed figure shows the arrangement of the steam bell adopted upon Austrian locomotives. It is of the simplest construction possible. It consists of a cylindrical cast iron reservoir, A, slightly tapering at its upper part and closed by a valve, B, upon which is fixed, at the end of a lever, a hammer, D, which strikes the bell, C. The steam enters through a small lateral tube situated at the lower part of the reservoir. As the aperture to which the valve, B, is applied has a much larger diameter than the steam tube, it results that the steam escapes from the cylinder more rapidly than it enters. Every time the valve opens, the pressure lowers and causes it to fall back, and the hammer is thus made to strike the bell. The valve is provided internally with a collar that allows it to travel a certain distance before the steam can escape, and to thus regulate the fall of the clack and the density of the blow. The latter is still further increased by means of a spring which prolongs the lever, and acts at every rise of the valve in such a way as to accelerate the fall. The starting and stoppage are effected by the simple maneuver of a cock; but since a certain condensation occurs in the cylinder, A, every time the bell is rung, this cock is so arranged that in a position of rest it shall establish a communication of the cylinder, A, with the exterior, through a small aperture, and thus allow all the water of condensation to flow out.

Upon varying the pressure and the aperture of the cock, the number of blows per minute may be made to vary between 130 and 240.—*La Nature.*

Automatic Arctic Exploration.

The Chicago *Current* says: Probably the most wonderful thing in connection with the whole sad history of Arctic exploration is the recent discovery of an ice-floe in the waters of Davis' Strait—west of Greenland—which had drifted from a point in the Arctic Ocean northeast of the Lena delta—where the crew of the Jeannette divided into three parties and took to the open waters—to the southernmost point of Greenland, and north again to Baffin's Bay. Upon this floe were a corpse and many indubitable relics of the expedition, including an article of wearing apparel marked with the name of seaman Noros, who, it will be remembered, in company with seaman Nindermann went a few miles ahead of poor De Long, and lived to write the most extraordinary experience ever penned by a human hand. Had these two simple seamen been able to tell, in the Siberian tongue, that their comrades were only eleven miles back, the whole De Long party would have lived to join Melville and Danenhower.

Now, the floe discovered by the Greenlanders has, perhaps, crossed directly over the North Pole. From the Jeannette floe to the southern point of Greenland, in a direct line across the Pole, is 3,500 miles, but by way of the northern shore of Asia and Europe—past Cape Northeast, Nova Zembla, Spitzbergen, and Iceland, and north again into Baffin's Bay—would be a distance of at least 6,000 miles. Scientifically, the life of a moving ice-floe for so many years, and its migration from one side of the world to the other, ought to furnish suggestions and data more valuable than all the other fruits of polar research combined. Self-registering meteorological apparatus, and possibly gauges of the miles traveled, may in the future reveal to the investigators what the sacrifice of thousands of lives has otherwise failed to discover.

ROAD BRIDGE OVER THE OUSE AT BEDFORD.

A Waterproof Varnish for Paper.

One part dammar resin and six parts acetone are digested in a closed flask for two weeks, and the clear solution poured off. To this four parts of collodion are added, and the whole is allowed to clear by standing.