ported by a grip from the upper part of the conveying-rope and by wheels on the lower part. This carriage can convey two loaded bags weighing 420 lb. each suspended from a hook below the carriage. An elevator takes the coal bags from the deck and hoists them to the masthead. The conveying carriage, in coming in to the masthead, immediately locks itself. As soon as the lock is released by an attendant, the engine operator hauls in the lower part of the conveyor line. The upper part of the line is thus drawn from the rear drum, thereby shipping the specially-contrived friction devices. In this way the carriage crosses from collier to warship, sufficient tension being supplied to insure that the bags shall clear the water between the vessels. The rope is drawn in at the rate of 1000 ft. per minute. The object of the sea-anchor line is to support the carriage, when empty, on its return to the collier. It allows the conveying-line to be slack, and prevents the overturning or twisting of the carriage; and at times it also helps to support the load in its transit across.

Another important exhibit was the Gruson turret, which has been erected between the two Ordnance Buildings. It is 55 ft. in diameter, and mounted within it was a 12-in. gun. This type of gun represents the largest which will be manufactured in the United States for coast defence. The turret and its equipment are the first of the kind made in the country; they served to show the latest steps taken towards forming an impregnable system of defence. The exhibit was so arranged that visitors could go inside and examine the interior, the magazine, the method of supplying ammunition to the gun, and the various contrivances for attaining efficiency in actual service.

The collective ordnance exhibit was extensive, all the largest builders of arms and ammunition in America having been represented. The collection made an imposing display, and attracted great numbers of visitors.

THE NEW VICTORIA STATION AT NOTTINGHAM.

(*Concluded from page* 800.)

THERE are four interesting bridges across the station at Nottingham, and the important features in the design of these are illustrated on our two-page plate this week and on pages 832 and 833.

In substitution of some of the streets demolished to provide a site for the station, a bridge, 40 ft. wide, for all kinds of traffic, has been constructed across the cutting at the northern end of the station, in addition to the public footbridge. It is known as York-street Bridge, and connects Mansfield-road with the eastern part of the town. This bridge is illustrated by Figs. 115 to 144 on the two-page plate. Two roads run at an angle on to the bridge at the western, or Mansfield-road, end, as shown on the plan (Fig. 115), forming a Y on end on the girder plan. The outside girders carrying the flooring of the triangular spaces at each side rest on the main bridge girders, which are therefore of heavy section, especially as their span is 70 ft. 10 in. The main girder on the north-west corner has the heaviest load. It is 5 ft. deep, with $\frac{3}{8}$-in. web, reduced to $\frac{1}{2}$ in. at centre, and divided into 3-ft. 4-in. bays. The flanges at the centre, where the diagonal girder rests, is 1 ft. 10 in. wide, and is built up of six $\frac{5}{8}$-in. plates. The diagonal member is connected with angles and bent plates for the whole depth of the girders, as shown in the various sections given. It has a span of 74 ft. $2\frac{1}{4}$ in., and is on a gradient of 1 in 36, and does not differ materially from the other members of the bridge. Figs. 134 to 138 illustrate the general type of longitudinal girder (D 1). There are five spans in the length of the bridge, which is 278 ft. 3 in. over all between abutments, the structure being at about the widest part of the station. The spans vary, as marked on plan, from 66 ft. 9 in. to 47 ft. 8 in., and there are five lines of longitudinal girders, diagonally braced at intervals of 10 ft. along the length of the structure, as shown, while between two of them provision has been made for a pipe-way for gas and water mains, &c., as shown on the cross-section (Fig. 116).

As shown in section, the cross-girders are 1 ft. 4 in. deep, They are spaced 10 ft. apart, and are riveted to the webs of the longitudinal members. Trough flooring, 8 in. deep and $\frac{1}{2}$ in. thick, is laid upon and connected to the top flanges of the main girders. Concrete and granite sets make up the roadway. The parapets are carried by brackets built at 10 ft. centres as cantilevers upon the outer longitudinals. They are of $\frac{3}{8}$-in. plates, and 6 ft. high.

The bridge is supported on abutments and columns, and as a type of the columns in use throughout the station we reproduce the principal drawings on the two-page plate (Figs. 124 to 138). They are 2 ft. 6 in. by 2 ft. over all, and have been built up of twelve angles 4 in. by 4 in. by $\frac{1}{2}$ in., connecting $\frac{1}{2}$-in. plates. The base of each column is 5 ft. by 4 ft. by 1 in. thick, connected to the shaft by gusset-plates, as shown in Figs. 125 and 126. The cap and its connection are somewhat similar (Fig. 124). Each set of five columns for carrying the girders of the York-street bridge are braced together by lattice horizontal members, 1 ft. 4 in. deep, spaced 5 ft. apart, with diagonal bars 7 in. by $\frac{1}{2}$ in. braced at the points of intersection (Figs. 120 and 121). The foundations of these columns and the cast-iron bases are illustrated by Figs. 120, 130, and 131.

The public footbridge across the station, under the main roof, is illustrated on the two-page plate by Figs. 145 to 160. It is practically independent of the station; although the requirements of the town necessitated such a position that it penetrates right through the blocks of buildings on the platforms marked A and C on plan (Fig. 1 on page 678 *ante*). The girders are carried right through without any connection with the buildings; but it militates somewhat against the otherwise effective architectural appearance of the buildings. The construction of the bridge, which is 15 ft. wide, will be readily understood by reference to the engravings, Figs. 145 to 150 showing the main lattice girders, Figs. 151 to 154 the columns, and Fig. 152 the section through the station generally, while the bracing is shown on Figs. 153 and 154. Two massive stone fronts in the classic style of architecture have been built at the entrances to the footbridges from the new street along the east side of the station. Along this street, too, is a boundary wall partly carrying the main roof of the station and its principals, and this is faced with best pressed red facing bricks, with stone dressings, the bricks having been supplied by the Nottingham Patent Brick Company.

The footbridge reserved for railway passengers, and extending from the booking-office across the station to the new street on the east side of the cutting, is 20 ft. wide for the greater part of its length, but is reduced to 8 ft. beyond the second platform, as it provides only an exit to the eastern part of the town, and not as an entrance to the station platforms. This bridge is illustrated on page 832 (Figs. 161 to 178). The bridge is constructed of lattice girders. The western span is 63 ft. 3 in., the centre span 86 ft. 9 in., and the eastern span 65 ft. 3 in. The girders in the two former cases (Figs. 161 to 168) are 7 ft. 11 in. deep over angles, but in the last-mentioned span, where the width of the structure is reduced, it is only 6 ft. 6 in. The main girders are braced at top with a flat arch of lattice construction (Figs. 171 and 172). The floor is composed of rolled steel joists 15 in. deep, placed at 3-ft. 8-in. centres, with $\frac{5}{16}$-in. curved plates between, and resting on $2\frac{1}{2}$-in. by $2\frac{1}{2}$-in. by $\frac{3}{8}$-in. angles riveted to the joists (Figs. 172 and 175). These in turn are filled in with cement concrete, upon which 3 in. jarrah block flooring is laid (Figs. 177 and 178). This superstructure is carried on steel columns bolted at the platform level to foundations of brickwork carried to the bed-rock. At the western end one of the longitudinals is supported by a steel built-up column, similar to those shown by Figs. 151 to 154 on the two-page plate, the other being carried upon the projecting end of one of the girders carrying the floor of the booking-hall, and forming a cantilever. This form of support was determined upon as it was desired to have a gangway from this passenger footbridge communicating with the public footbridge which crosses the railway a few yards to the north. This gangway, 12 ft. wide, will facilitate the exit of large crowds from the west end of the passenger footbridge without blocking the booking-hall. The gangway is immediately to the east or station side of the booking-office building, and, as already indicated, is supported on a projection of the girders carrying the floor of the booking-hall. This is the only connection the public footbridge has with the