FOOT BRIDGES AT THE GRAND SURREY DOCKS.

WE illustrate on Plate XXII, two varieties of foot bridges erected across the entrance of the Grand Surrey Docks. Although the several gates of entrance to the docks carry narrow footways, as usual, these cannot be used with safety at very high tides in rough weather; and several foot bridges, therefore, have been erected for available use, either when the tide is up, as stated above, or when the gates are open for the various requirements of the services of the docks. At one point, where clear space for a swing bridge could not be spared, a rolling bridge of the construction shown by the upper figures in Plate XXII has been placed; while at two or more other points swing bridges have been provided, these latter bridges being constructed on the plans shown by the lower figures of Plate XXII.

The rolling bridge consists of two light lattice girders, 61 ft. 6 in. long, and 3 ft. 8 in. deep in the centre, diminishing in depth by an easy and equal curvature of both the top and bottom members, so that the depth is reduced to 8 in. at the ends. The top and bottom members each consist of two angle irons, each 3 in. x 2½ in. x ⅞ in., and are connected by vertical struts, placed at a distance of 3 ft. 6 in. apart in the centre of the girders, that distance being gradually reduced towards the ends in about the same ratio as the depth of the girders, while the tops and bottoms of the successive struts are connected by diagonal ties crossing each other in the centre of the spaces between the struts.

The ties are made of flat bars, 1½ in. x ⅜ in. in the centre of the girders, increasing gradually to 2½ in. x ⅜ in. at the ends, and the struts are made throughout of two flat bars, each 2 in. x ⅜ in. in section. The distance between the girders is 3 ft. 4 in. from centre to centre, and they are connected transversely by three T and L-iron stays, while at one end they are bolted to a cast-iron framing carried upon two pairs of cast-iron railway wheels, 3 ft. 6 in. in diameter, keyed upon axles which run loose in bearings provided in the framing. The distance between the centres of the axles is 10 ft., and the gauge of the rails upon which the wheels run is about 4 ft. 4 in.

Two cast-iron A frames, 7 ft. 9 in. high, are fixed to the top members of the girders between the carrying wheels, and a 1¼ in. truss rod is carried from the crown of each of the A frames to about 7 ft. beyond the mid-length of the girders on one side, and to the end of the cast-iron frames on the other side.

The platform of the bridge consists of planks, 7 in. wide by 1¼ in. thick, with ½ in. spaces between them; a light hand-railing, 3 ft. high, is fixed along each side of the bridge, in such manner as to leave a clear space of 3 ft. 6 in. in width for passenger traffic. The platform is at a level of 4 ft. above the ground, and is reached by a flight of steps provided at the back end of the cast-iron frame; these steps consist of solid cast-iron blocks, 9 in. x 7 in. in section, and answer at the same time as balance weights; a number of other balance weights besides these are packed transversely into the space between the pair of end wheels underneath the platform of the bridge.

The machinery for rolling the bridge in and out of position consists of a short horizontal shaft fixed against the A frames, and worked by an ordinary crane handle, this shaft through a pair of level wheels giving motion to another shaft inclined downwards; this shaft again, by means of another pair of level wheels, gives motion to a horizontal shaft placed below the platform, and a spur pinion, keyed upon this shaft, gears into a large spur wheel keyed upon the axle of the inner pair of wheels, and through the latter motion is finally communicated to the bridge.

When in position, the free end of the bridge rests upon an independent carriage, consisting of two light wrought-iron frames, which may be rolled backwards and forwards for a short distance on two pairs of small wheels, and the bottom members of the girders of the bridge are made to take a solid bearing upon a couple of shoes, which rest upon a couple of large square-threaded bearing screws, and may be raised or lowered at will by means of hand wheels fitted to the screws.

The swing bridges, which we have already mentioned as having been erected to accommodate the foot traffic at two other points, are of the construction shown by the lower figures of Plate XXII. They consist, each, of two cantilevers, having a horizontal projection of 32 ft. 6 in. from the centres of the swinging posts. When the bridge is closed the cantilevers meet over the mid-width of the lock, forming a graceful low arch with a rise of 4 ft. 9 in., while at the same time the platform has a fall of about 12 in. from the centre towards the quays. The