and the lift span 69 feet long. Attached to the shore end of the lift span and securely riveted to the top flanges of the girders are two segmental girders the bottom flanges of which, as their name signifies, are circular. Above these segmental girders and connected to them is a large steel box, which contains the concrete counterweight. The depth of the girders in the lift span is 7 feet, while the girders in the roll span are 6 feet deep.

On the top flanges of the roll span girders are two cast steel track plates. On these plates spaced alternately at 1 foot 9½ inches centre to centre are teeth, each tooth being 7 inches long, 3½ inches wide and 1¼ inches high. As the bridge rolls from the closed to the open position these teeth mesh with corresponding holes in the 1½ inch rolled steel plates on the circular flanges of the segmental girders and so prevent the bridge from having any lateral motion.

On either side of the roll span and about fifteen feet above it is a platform from which the bridge is operated. On each side of the bridge there is a crank, connected to which is a pinion, the teeth of this pinion mesh with the teeth of a rack, along which it travels causing the segmental girders to roll backwards, the counterweight to drop and the bridge to rise. A side elevation of the bridge is shown on Plate 9, but a practical illustration may be obtained by inspecting the working model which I have here.

BRIDGE DESIGN

In the design of a bridge the first thing to be remembered is that the total weight of the bridge, and anything passing over it, has in some way to be carried into the soil. The following is a table giving the approximate bearing power of soils:—

Rock, the hardest	200	tons	per	square	foot.
Rock, equal to best ashlar masonry	30	"	"	"	"
" " " brick "	20	"	"	"	"
" " poor " "	10	"	"	"	"
Clay in thick beds always dry	6	"	"	"	"
" " " moderately dry	4	"	"	"	"
Clay soft	2	"	"	"	"
Gravel and coarse sand well cemented	10	"	"	"	"
Sand clean dry	4	"	"	"	"
Quicksand, alluvial soils, ets	1	"	"	"	"

As the total reaction at one end of the smallest kind of bridge is about 140 tons and as bridges are usually built across streams, the banks of which are composed of sandy or moderately dry clay soil, we can safely assume that the average bearing power on the soil is not more than 4 tons per square foot. By