of the bridge, have been employed; the effect of temperature being only to very slightly sway the bridge laterally, but not so as to be detrimental to stability. This also requires 5 or 6 feet more length of pier, than what is necessary to bear the vertical pressure.

Again, the king braces have been made with two branches diverging from the elbow to a base of 2 or 3 feet in width, according to height of truss. This plan has been used in a large number of bridges, with satisfactory results. But it contracts to a small degree, the available width of bridge; not, however, so as to produce material inconvenience.

Another device is, the introduction of two or more long beams, extending 5 or 6 feet outside of the trusses, say at the first thrust uprights from the ends (as over Figs. 3½, 3½, Fig. 18), with guys extending from the connecting bolt at the upper chord, to the ends of said long beams (see g Fig. 38).

Arches may also be introduced at the ends of the bridge, attached to the king braces, say a quarter of the way down from the top, and with the connecting bolt at the elbow. These may be made with a full, or an open-work web, and flanges of 2½ or 2½ inch angle iron upon both sides of the web, at the top, and around the arch, and either angle iron or plain flat bars, along the sides next the king braces.

A web of 3½" plates placed edge to edge, and battened upon both sides with plates of the same about 4" wide, riveted alternately on each side of the seam, with angle iron, etc., as above, riveted once in 6", forms a stiff and substantial arch for the purpose under consideration, such as have been used effectively in a bridge of 160 ft. span.