sive to construct or work a draw with two equal arms, and covering two equal water channels (which is often highly advantageous), than one having one short arm, with extra weight as a counterpoise to the long arm. This is not the case as to the retractile draw, which shows one advantage in favor of the pivot draw.

Equal arms also serve to balance the action of wind upon the pivot draw, which often effects a serious drawback to the convenient working of the swing bridge, and this would seem to give some advantage to the retractile draw, over the swing draw with unequal arms.

The portion extending over the water channel, in both the retractile and the swing draw, require the same weight of material, and the same counterpoise toward the opposite end. Consequently, the weight to be moved in working the draw, requires to be about the same in both. But the retractile is to be moved bodily, and if withdrawn obliquely at $45^\circ$ with its longitudinal axis, must move through a space equal to the width of channel multiplied by $\sqrt{2}$. If withdrawn in the direct line of its length, it moves over the width of channel, in addition to the movement required for the displacement of the section of road ($a, a'$, Fig. 69), equal in length to said width of channel, making an amount of movement about equal to that required in case of the oblique withdrawal.

The swing draw, gyrating about its centre of gravity, the amount of movement equals twice the weight of the long arm (the one spanning the water channel), moving through the quadrant of a circle with a radius equal to the distance of the centre of gravity of said long arm, from the centre of motion; which distance is about 55 per cent. of the width of channel, allowing