and its connection with the chord, sufficient to warrant the systems being called by different names. Fig. 3 presents the main features of what is familiarly known as the Howe Truss, without the counter-brace system; and Fig. 4 applies similarly to the old Pratt bridge, somewhat better known, under a slight modification, as the Whipple; see Fig. 10. But as we have seen, all vertical members, be they ties or braces, involve an expenditure of material which is not in a position to resist the action of the force, \( P \), in the most economical manner, and a consideration of this fact in all probability led to the introduction of what is known as the Warren girder.

An inspection of Fig. 5 will suffice to show that a diagonal arrangement of both struts and ties is the most economical for the requirements of a web; and it is equally evident, that the angle made by the diagonals with the vertical, must have an important bearing on the relative efficiency of diagonal systems having different inclinations. It has been clearly demonstrated, both theoretically and