necessity for all cases within the reach of our present investigation, and that their introduction was not rendered theoretically necessary in order to sustain the uniform load; in other words, that they are totally incapable of opposing any resistance to change of form in the panels; therefore the material thus applied is a dead load upon the useful members, and consequently necessitates an additional amount of material in them to transfer this load to the abutments. So much for the question of economy; but there is another feature in the use of a single system of triangles, which begins to assume important proportions as soon as the spans are increased beyond the ordinary limits now considered safe; which is due to the increasing dimensions of the diagonals nearest the points of support. It is evident, from a consideration of Fig. 6, that these members must be capable of sustaining a strain equal to one-half the entire load upon the truss multiplied by the ratio between the diagonal and perpendicular. Now as the span increases, all other things being proportional, so must this strain increase, and as a natural consequence the sectional area of resisting material; and when this area reaches a certain limit it becomes necessary to introduce expensive appliances to fulfil the necessary conditions. In the case of a Howe truss, this limit is reached at a span of one hundred and fifty feet, as will be seen in the discussion of that particular system in a subsequent portion of this paper. Bearing these facts in mind, it is presumed that we are now in a position to appreciate the introduction of two independent systems of triangles in the arrangement of the web. Referring to Fig. 7, it will be observed that the diagonals represented by full lines, form, with the top and bottom chords, a continuous Warren girder, precisely similar to Fig. 6, with the exception of the vertical members. These members, we have seen, are rendered practically necessary in the transmission of intermediate load to the diagonals. They add to the dead weight to be carried, and do not in any way increase the general strength of the structure. Suppose, as in Fig. 7, that these verticals be dispensed with, and a second Warren system introduced