tinuous curve traces the variation of the hydrodynamic resistance, R, to the boat's speed, v_s, when she is sailing upright before the wind. The various shorter curves relate to changes in the hydrodynamic resistance at different angles of heel, including the induced resistance due to leeway. For example, the values of the resistances at $v_s \cong 6$ knots show that the resistance when sailing to windward at an angle of heel of 35° is almost 40 per cent greater than when in an upright position on a run.

The total resistance of a yacht can be divided into two sections, each of which has its special influence in accordance with the course being sailed. When running before the wind, the hull will mainly develop skin friction resistance, R_f, and wave-making resistance, R_w. In Fig. 175 this is marked by the vector $R_f + R_w$. As the boat comes closer to the wind, two other forms of resistance at once become of greater importance: resistance due to leeway, R_i, and resistance due to heeling, R_h. At small angles of heel, the induced resistance, R_i, is the more important of these, but at greater angles of heel the resistance due to heeling, R_h, takes precedence. Their relative magnitudes (shown in Fig. 176) relate to a keel yacht, the 6-Meter *Jill,* which in the shape of its hull resembles *Gimcrack,* and whose L.W.L. is 23.5 ft. For clarity, the scale of the resistance R is 5 times greater than that for

Fig. 176