MODERN BOGIES . . .

of adoption. In any case, modern bogies would stand to gain little from such a practice.

The arrangement of the wheels on each leg is governed by the roadway-loading index. The spacing of the wheels is of greater importance than the tire pressure, and it is advantageous to spread the load over the greatest possible area of runway, both to prevent distortion of the runway at the point of contact of each tyre, and also to relieve runway bending-moments. The size of tyre adopted is determined by the maximum pressure which can be used and the loading on the tyre. Shortly after the second world war, some attention was given to the “Compacta” tyre, of small diameter and flat profile, excessive tread-width being used to provide considerable ground-contact area. It will be appreciated that the tyre was unsuited to high pressures—which, ideally, demand a circular-section tyre—and “Compacta” development has now been all but abandoned.

Although high-capacity expanding-tube brakes are still being made, this country has turned its attention chiefly to the manufacture of plate brakes. Braking conditions have today reached a somewhat critical stage, where the energy to be dissipated cannot be carried away by slipstream during the landing run. This in turn has demanded the provision of a considerable mass of metal within the wheel, sufficient to absorb the kinetic energy of the aircraft as heat energy—at over 1,000 B.Th.U./sec—without causing undue rise in temperature. Modern plate or disc brakes can approximate to this ideal, and it is interesting to note that the Fokker S.14 Mach-Trainer, which has no hydraulic systems, is generally enforced by placing a stop on the castoring angle of the front of the bogie to strike a cam situated on the yoke arm; it also has a large girder-type radius-rod with top and bottom extrusions and plate webs. The Victor unit employs a bogie beam formed from two light-alloy castings or forgings. The biggest part of the Dowty bogie for the Avro Vulcan is a massive casting produced by Sterling Metals, Ltd., in ZS2 magnesium alloy. Use of this material has kept the weight of the component down to 560 lb; an almost identical casting of the same strength would weigh 540 lb. The Electro-Hydraulics undercarriage of the Victor has two large struts attached to a Y-fashion, to the globe arm; it also has a large girder-type radius-rod with top and bottom extrusions and plate webs. The Electro-Hydraulics undercarriage retracts with the bogie hanging at its acute trail angle, in which condition the front of the bogie strikes a cam situated on the radius rod, thus rotating the bogie beam to the inverted position.

It may be said that, although several types of anti-skid device have been developed to improve safe application of maximum brake torque, it is essential on a bogie-type undercarriage to fit one of these units to each wheel. If the device were fitted to one wheel only the slightest trace of bogie porpoising could cause all the wheels to lock solid.

The requirements of modern aircraft tyres are, if anything, even more difficult to fulfil than are those for the remainder of the undercarriage. Particular difficulty has resulted from the continued adoption of high pressures and high airspeeds. In 1945, the average bomber had a tyre pressure of some 70 lb/sq in and could, therefore, be operated from dry grass. Modern tyres are operating efficiently at over 200 lb/sq in and developments are in hand that will increase this figure to above 250 lb/sq in.

High pressures not only make great demands upon the runway surface but they also cause the tyres to heat up very quickly and, as the maximum permissible temperature of a tyre is a function of rim diameter and this is in direct conflict with the loading on the tyre during most of the landing run, thus the tyre was unsuited to high pressures—which, ideally, demand a circular-section tyre—and “Compacta” development has now been all but abandoned.

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It is worth noting that both units are housed in the wing with the bogie inverted. In the Dowty undercarriage this condition is achieved by hauling up the front axe by means of a small trellis-frame in the main-leg; when the undercarriage retracts with the bogie hanging at its acute trail angle, in which condition the front of the bogie strikes a cam situated on the radius rod, thus rotating the bogie beam to the inverted position.

Enough bogie experience has now been gained for it to be said that such undercarriages can be made lighter than those employing fewer, but larger, wheels. The leg itself is usually heavier in