Suggestions Page

(231)—A Meccano Front Wheel Drive

(R. Blake, Twickenham, Middlesex).

The great majority of cars on the road to-day are propelled by means of the rear wheels. This arrangement, although so popular, suffers from several disadvantages, the most serious of which is the liability to skid. When the direction of the motion of a car is changed in turning a corner, the tendency is for it to continue travelling in the original direction—in other words to skid, and this is intensified considerably by the effect of the rear wheel drive. If the engine drives the front wheels, however, it will be seen that a car will be drawn or pulled round a corner instead of being pushed, as is the case with the more usual form of transmission, so that the danger of a front wheel skid is greatly reduced. Many other advantages are claimed for this unique form of transmission, such as a low slung body, made possible by the elimination of the cardan shaft and the ordinary type of back axle, and the greater steering "lock" that may be placed on the front wheels. All these effects combine to make a car that is extremely safe to handle on bad road surfaces and under adverse weather conditions.

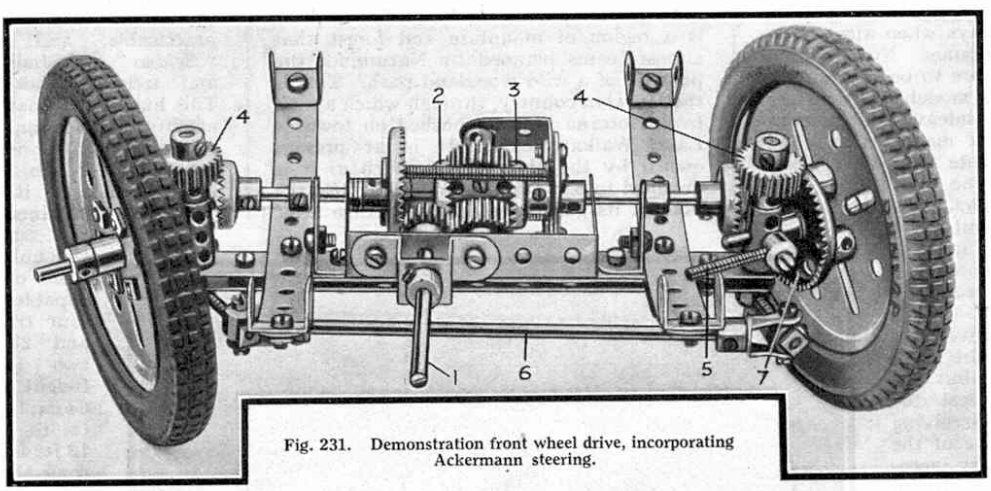

Fig. 231. Demonstration front wheel drive, incorporating Ackermann steering.

Meccano is an excellent medium for demonstrating mechanisms of all kinds, so that it is not surprising to learn that many readers have turned their attention to the designing of front-wheel drives, with the result that we have received many suggestions of this nature. It would appear, judging from the suggestions received, that most boys have only a vague idea of the difficulties in designing such a mechanism, so that it may be useful to consider some of the more important points before passing on to the description of the model shown in Fig. 231.

One of the first problems to be considered is that of conveying the drive from the engine to the front wheels. Whatever form of drive is employed, it must be such that the front wheels may be freely turned for steering purposes, and also may rise and fall easily under the action of the springs. A well-known make of British front wheel drive car employs universally jointed drive rods to attain this end, which is quite satisfactory in actual practice; but we are immediately confronted with an acute problem when an attempt is made to apply such a method to Meccano practice.

A Meccano Universal Coupling cannot be used to articulate the drive rod on account of its length. The reason for this statement will be readily seen when it is remembered that the centre of the Universal Coupling must coincide with the point about which swivels the stub unit. This is done in order to prevent the end of the drive rod describing an arc when the front wheels are put over to "full lock." By making the centre of the stub pivot and the Universal Coupling coincident, the road wheel is placed at a considerable distance from the pivot. This is a very undesirable state of affairs, as actually the wheel should be as close as possible to the pivot in order to make steering easy and to reduce the bending stresses on the stub axle unit.

This is a point that almost every contributor misses, and it will be observed that even in the model about to be described the position is far from ideal. It may be mentioned here that particulars of a new Meccano front wheel drive will shortly be published in the "*M.M.*" In this model particular attention has been paid to the points just referred to, and by the employment of an entirely novel form of universal coupling the wheel track has been made practically coincident with the centre line of the pivot pins.

The front axle of the model shown in Fig. 231 consists of two pairs of 5½" Strips spaced apart by three Washers on the shanks of the bolts connecting them together. Each stub axle on which the road wheel is mounted, and is free to revolve, is secured in the plain transverse bore of a Coupling. A 1" Rod is secured in each end of the Coupling. A ¾" Pinion 4 is mounted boss downward on the upper 1" Rod, and the lower Rod is journalled in the end holes of the front axle.

The ¾" Pinion is in constant mesh with a 1½" Contrate 7 that is secured to the road wheels by bolts. A ¾" Contrate Wheel, also in mesh with the Pinion, is secured on the end of each of the Rods leading from the differential. The outer ends of these Rods are journalled in 1" × ½" Angle Brackets; and the inner ends are journalled in the longitudinal bore of a Coupling, a ¾" Contrate 2, 3, being secured to each Rod. The Coupling has secured in its centre transverse bore a 1½" Rod on which run ¾" Pinions in constant mesh with the ¾" Contrate Wheels 2 and 3. A 1½" Contrate Wheel is mounted freely on the Rod carrying the Contrate 2, and is driven by means of a ½" Pinion secured on the Rod 1.

A Bush Wheel is mounted loosely on the opposite Rod against the Boss of the Contrate 3, and is connected by 2" Screwed Rods to the 1½" Contrate, so that the two parts turn as one unit. Two 1" × ½" Angle Brackets bolted to the Bush Wheel engage with the ends of the Rod carrying the ¾" Pinions. The Rod 1 is connected to the gear box of the chassis, and in order to allow for the vertical movement of the complete unit, due to the springing, it will be found necessary to incorporate two Universal Couplings between the output shaft of the gear box and the end of the Rod 1. The latter may, of course, be made much shorter than that shown in the illustration, but it is rather a disadvantage that the space taken up by the gear box and front axle unit is so great, as it makes the bonnet of the car unduly long.

A 1" Screwed Rod is inserted in the tapped hole of a Collar on the lower extremity of the 1" Rod forming each stub axle pivot, and is provided with a Swivel Bearing that serves as a means of connecting it to the track Rod 6.

The drag link from the steering arm is connected to a 1" Screwed Rod **5**, which is screwed into a Collar fixed to the Coupling by a bolt that is inserted in its tapped hole.