

The gear to be engaged is forced to assume the same speed as the pinion shaft by the sliding sleeve. As long as there is a difference in speed between the sliding sleeve and the synchronizing ring, which is constrained to rotate with the gear, the radial force exerted by the brake band prevents the synchronizing ring from being compressed. It is thus impossible for the teeth on the sliding sleeve to engage with the teeth on the ring attached to the gear until their speeds are equal.

As the difference in speed between the sliding sleeve and the gear decreases, the friction force between the synchronizing surfaces is reduced. When the two speeds are equal the slider no longer transmits a force to the brake band which in turn no longer expands the synchronizing ring, allowing it to be compressed by the sliding sleeve. The sliding sleeve passes over the synchronizing ring and engages the toothed ring of the gear, thereby firmly engaging it with the pinion shaft. The synchronizing ring expands in the shallow V-groove in the sliding sleeve, holding the sleeve in engagement. A locking device to hold the selector shaft when a gear is engaged is therefore unnecessary.

The same synchronizing and locking components are used for all gears of the gearbox with the exception of the first gear. Since this gear is often engaged from a standstill, care has been taken to insure that it can be engaged easily without interference from a locking mechanism.

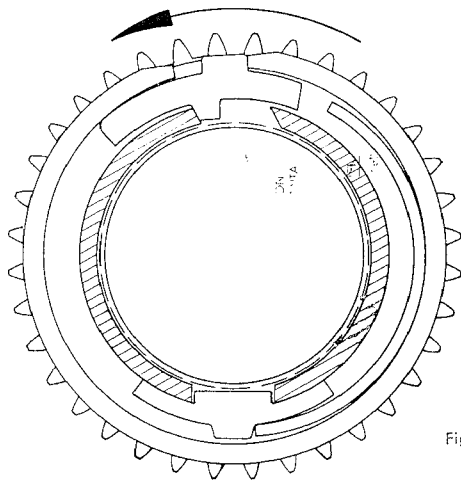


Fig. 3

As shown in Fig. 3 the slider used in this case is equipped with a lug which engages directly in a recess in the hub of the toothed ring attached to the gear. Also, one brake band has been omitted. Compared with driving speeds, the idling speed of an automobile engine is very low. If the clutch is disengaged in order to engage first gear, the main shaft will quickly come to rest. To reduce this time still further, and thereby enable the driver to engage first gear quickly without grinding, a synchronizing mechanism is required (to act as a brake).

When braking the gear, the force exerted by the friction between the sliding sleeve and synchronizing ring acts on the slider, and through its lug, directly on the gear. The lug is sloped so that the slider is forced outward while its longer end bears against the inside of the synchronizing ring. This small force is sufficient to enable first gear to be easily engaged while providing sufficient synchronization to prevent gear clash.

If a change from second to first gear is made while the vehicle is in motion, the first gear must be accelerated. There is a normal brake band on the side that comes into operation in this event, giving the same servo action as in all the other gears (Fig. 4).

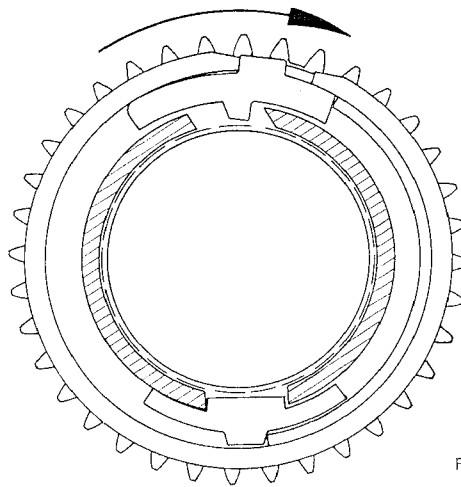


Fig. 4