It is not possible to push the sliding sleeve beyond the clutch carrier because the travel space between gearbox front cover and the intermediate plate has been appropriately limited and, in addition, gears of the 1st and 2nd speed are larger than the inside diameter of the sliding sleeve.

When a shift is made with the car in motion, entirely different conditions prevail. The synchronizing mechanism must equalize the difference in rotation speed existing between the output shaft and gear 2 (countergear) of the gear to be engaged; it must also prevent that the sliding sleeve comes into contact with the toothed drive ring on the clutch carrier prior to equalization of the rotation speed.

The mechanical connection between the engine and gearbox must be positively broken whenever shifts are made; that is to say, the clutch must be fully disengaged. This is necessary because the clutch plate represents part of the mass to be synchronized and, thus, must be accelerated or slowed down, as the case may be.

As illustrated in Fig. 2. the friction contact between the sliding sleeve (1) and the synchronizing ring (4) causes the synchronizing ring to slip somewhat, with one of its ends coming to rest against the slider (5a). The slider pushes against one of the brake band segments (7) which, in turn, presses against the inner surface of the sliding sleeve (4), with the stop (6) acting as its anchor. As a result, radial thrust is exerted upon the sliding sleeve (4) by the brake band segment (7) and by the stop which pivots on its base.

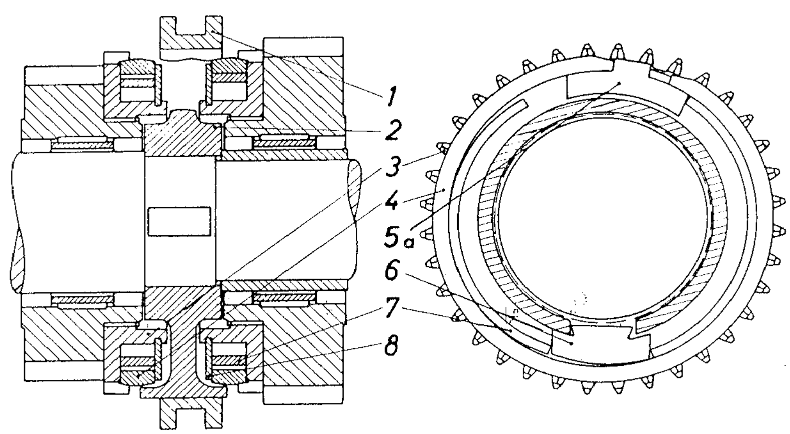

Fig. 2

At the beginning of the synchronization process, the frictional forces existing between the sliding sleeve and synchronizing ring were caused only by the spring tension of the synchronizing ring. As the synchronization process continued, the servo-thrust mechanism came into action and began to exert an additional and increasing radial thrust upon the synchronizing ring.

Thus, the synchronization utilizes a servo-thrust coming from within and exerted upon the sliding sleeve via the brake band segments. The servo-thrust mechanism is so designed that the servo effect governs itself and prevents a self-lock.

As long as there is a difference in rotation speed between the sliding sleeve, with its coupled output shaft, and the gear to be engaged, the radial thrust of the servo mechanism prevents a reduction of the diameter of the synchronizing ring and, in this way, prevents an engagement of the sliding sleeve. On the other hand, the frictional forces at the synchronizing surfaces decrease in proportion to a decrease in rotation speed difference existing between the sliding sleeve and respective gear.