CHRYSLER "Overdrive"

Gives the Effect of Two High Gears

Ratio's Are 4.30 & 3.04 . . . Shifting Is Automatic

BY HAROLD F. BLANCHARD ,

EVERYONE must appreciate the advantages of having two high gears, one for acceleration and hill-climbing, and the other for smooth, economical running at high speed. One way to obtain the result is to use a dual-ratio rear axle, but a similar effect may be achieved by placing a silent, two-speed transmission back of the regular three-speed transmission, and it is this plan which Chrysler has recently adopted. The device is standard on the Chrysler Imperial and Imperial Custom Eights, and optional on the Chrysler Eight and the DeSoto.

With the two-speed transmission in direct, the 4.3 rear axle ratio provides excellent acceleration and hill-climbing ability. But when the other speed is engaged, the engine is geared up so that the overall ratio between it and the wheels becomes 3.04 to 1 and cuts engine speed down nearly 30 per cent. Helically cut, planetary gears are used for the "overdrive" so that it is perfectly silent. The overdrive, by the way, is adequate for most hills.

Let's put a prospect behind the wheel of one of these new cars without telling him about the overdrive. He goes through his gears as usual and when he gets into high he starts out of town. So far, he sees nothing unusual about the car. However, once he is on the open road, any time he exceeds a speed of 40 m.p.h. and then lifts his foot from the accelerator, a miracle happens—for he notices that there is a marked reduction in engine speed because the device has automatically shifted into the overdrive. The engine is much smoother and quieter. Unless his ears are very sensitive he does not hear the shift. But he is pleasurably conscious of the way the car glides along because of its slow-running engine—at 50 m.p.h., the engine turns 1500 r.p.m. in the overdrive, as against 2200 r.p.m. in direct.

The car stays in the overdrive down to 35 m.p.h. At any speed below this figure, if he lifts his foot, the overdrive goes back into direct. He notices the change by the increase in engine revolutions. The shift itself cannot be heard.

When in the overdrive, if he wishes exceptional acceleration or unusual hill-climbing ability, he may shift to second. The overall ratio between engine and rear wheels then becomes 4.53, and inasmuch as the gearing is adequately silent, this ratio becomes in effect a third "high gear." This is also an excellent gear for retarding the car while descending mountain grades.

If he then lifts his foot when running less than 35 m. p. h. the overdrive shifts to direct, and he is in conventional second gear. Similarly if he should speed up above 40 m. p. h. in conventional second, he goes into the overdrive with second still engaged.

It must be emphasized that he has secured these important improvements in car performance without knowing that the device is on the car. There is nothing new for him to learn. He operates the car as usual.

The overdrive unit has a conventional free-wheel built into it. The free-wheel is automatically locked out in the overdrive but operates in direct. Both the free-wheel and the overdrive may be locked out by pulling out a button on the dash.

According to Chrysler engineers, the adoption of the overdrive improves fuel economy 15 per cent and cuts oil consumption in half. It is stated that because of the added smoothness, the average driver will increase his cross-country average 10 m. p. h. by its use. The overdrive should result in a marked increase in engine life. A rough estimate is that engine wear is cut in half, and if MoToR may venture an opinion, so also are noise and vibration.

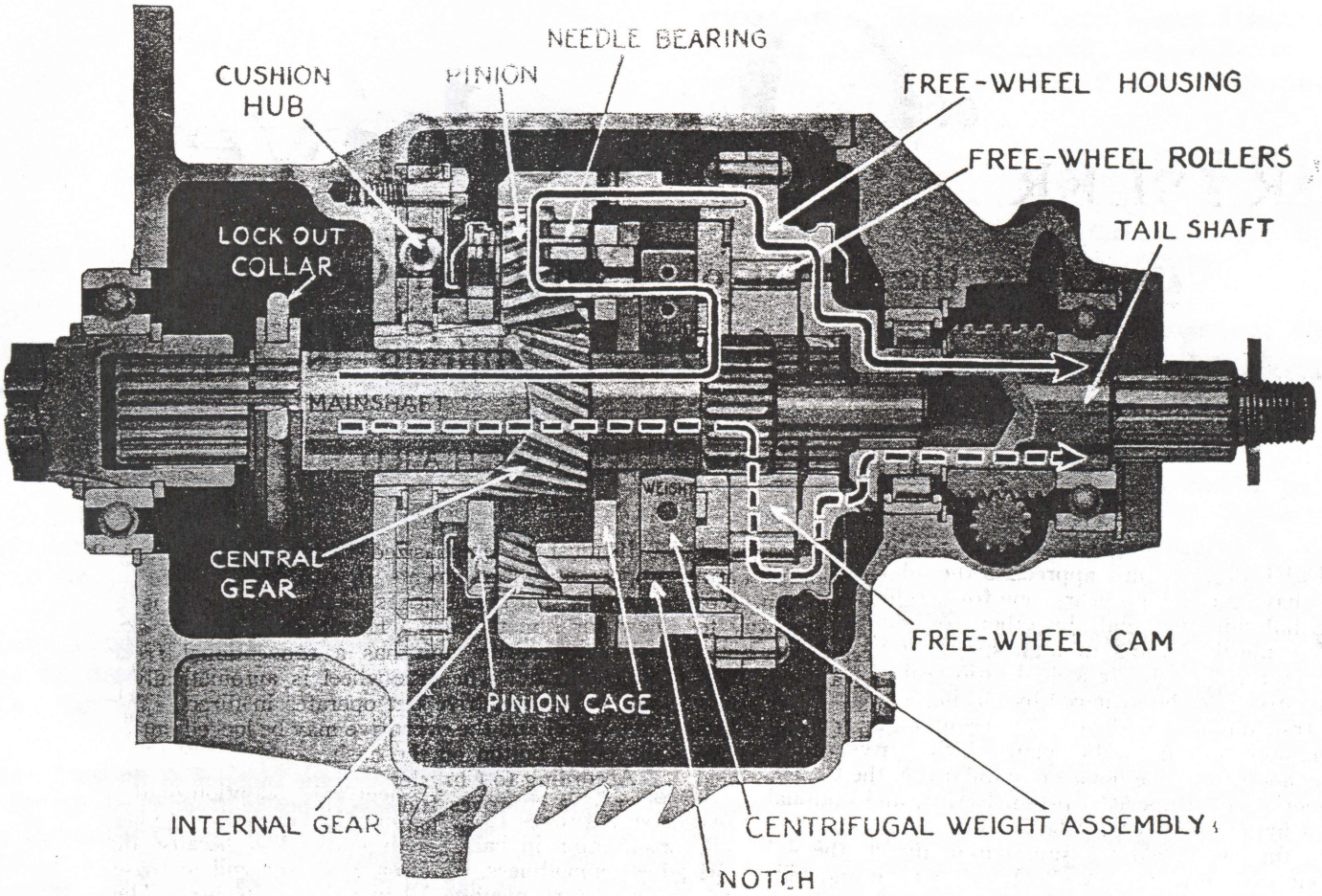
Referring to the sectional view of the overdrive transmission, it will be seen that when the mainshaft is in the position shown, the teeth on its right end mesh with both the free-wheel cam and the centrifugal weight assembly. In direct drive, the flow of power is indicated by the broken arrow, being from the mainshaft, to the free-wheel cam, through the rollers to the free-wheel housing which is integral with the tail shaft.

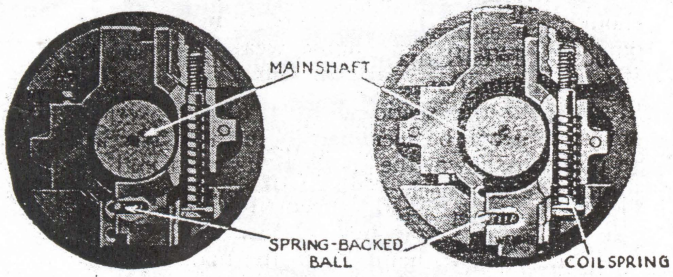
THE overdrive is obtained with planetary gearing and the shift is accomplished by centrifugal weights. A central gear is freely mounted on the mainshaft but is prevented from rotating by attaching it to a "cushion hub" such as is used in the hub of a clutch plate. The cushion hub in turn is bolted to the transmission case.

The central gear is surrounded by five pinions on needle bearings which are mounted in a suitable cage. The pinions mesh with an internal gear which is riveted to the tail shaft assembly. A notched drum is attached to the pinion cage. Examination of the gearing will show that in direct drive this drum rotates more slowly than the centrifugal weight assembly.

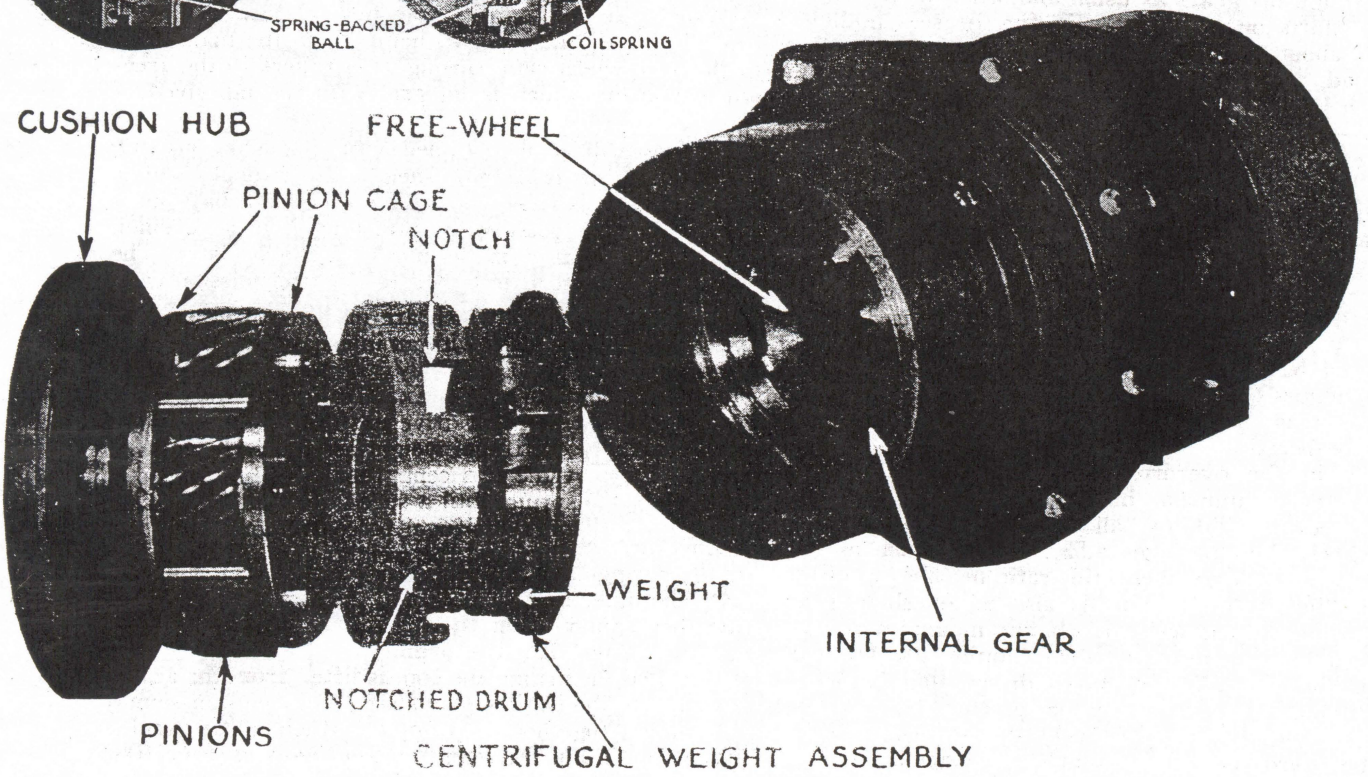
Each of the two centrifugal weights is held inward by a coil spring until a speed of 40 m.p.h. is exceeded. At this time, centrifugal force overcomes the resistance of the springs and the weights tend to fly out. However, the outer surfaces of these weights are so curved that they cannot enter the notches as long as they are rotating faster than the drum.

But, just the instant the foot is lifted from the accelerator pedal, the engine, mainshaft, and weight assembly slow down together. As soon as their speed reaches that of the drum, the weights (*Continued on page* 108)





The two-speed overdrive transmission is placed at the rear of a conventional three-speed transmission. The illustration above shows the overdrive in direct. At any speed exceeding 40 m.p.h. if the accelerator pedal is released, the weights fly out and lock into a drum, thus bringing the planetary gearing into action for the overdrive. The weight mechanism in both "in" and "out" positions is shown at the left.



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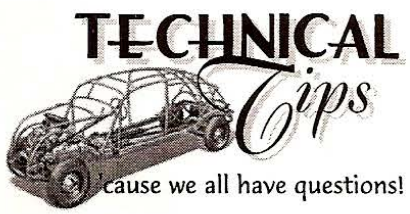
are able to insert themselves in the closely fitting notches. The mechanism is now locked in the overdrive. The path of power in overdrive is indicated by the black arrow. The "cushion hub" previously mentioned softens the shock of the shift so that you have to listen hard to hear it. It also removes the last vestige of noise from the gearing.

Looking at the centrifugal weight pictures, it will be noted that a spring-backed lock ball helps to hold the weights in either their inner or outer position. This feature prevents "wandering" of the weights at some critical speed, and it also causes the overdrive to cut in at 40 m. p. h. and cut out at 35. When the weights are at their inner position, both the lock ball and the main coil spring are resisting centrifugal force, requiring, in this case, a speed of 40 m. p. h. to overcome both. But when the weights are in their outer position, the spring must overcome both the lock ball and centrifugal force, which means that centrifugal force must drop far below its former value before the spring is able to overbalance both this force and the resistance of the lock ball. A walking beam (not shown) connects the two weights so that they act in unison.

Both free-wheel and overdrive are locked out by sliding the mainshaft to the right.

It is important to note that if the driver wishes to stay in direct drive while exceeding a speed of 40 m. p. h. all he has to do is be careful not to allow engine speed to drop to 30 per cent below propeller shaft speed. If he wishes to slow down for traffic or a turn, he lifts his foot enough to allow the car to free-wheel but with engine racing somewhat instead of idling. The change to overdrive does not occur until engine speed has dropped 30 per cent below propeller shaft speed.

Lubrication of the unit is supplied by the transmission. To add lubricant, remove transmission oil level plug and fill to proper level. This will automatically take care of the overdrive. However, if the overdrive unit is dismounted or drained, the oil level plugs should be removed from both transmission and overdrive. Fill the transmission to proper level, then fill the overdrive until lubricant flows out the oil level hole in the transmission.



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Taken from an article in MoToR, March 1934