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AUTOMOTIVE DEVELOPMENTS

By HORACE M. MACFARLAND, JR., M.E. 1

Have you ever stopped to figure out why your modern straight-eight runs so smoothly and noiselessly? Why you never have to have the springs oiled? The present-day auto is not radically different from its predecessors except that it has been refined to a very high level.

A mere listing of the refinements now in use would be impossible in a short article, but the most significant ones can be described perhaps the one most noticed by the general public is the carburetor silencer and air-cleaner. This device cleans the air to be used by the motor and by a clever manipulation of sound waves silences the "power roar." Springs need not be oiled because a push of a plunger, conveniently located, sends the proper amount of oil to each spring. Some cars even have automatic oiling systems, where one has only to keep the oil reservoir full. By using a little device which sends a drop of oil to be mixed with your gasoline you may now drive an eight 50,000 miles before new piston rings will be needed. These are merely indications of the trend toward making cars faster, quieter, and safer. A few of the improvements would include a more rigid chassis, more powerful motor, self-energizing brakes, two-way hydraulic shock absorbers, full power muffler, adjustable seats and steering wheels, aviation type instruments, insulated and rattle proof bodies, gasoline pump, "shock absorbing" clutches, etc.

The engineers have been busy on other things, too, free-wheeling is one of them. Studebaker, who pioneered this economical contrivance, has allowed its use by Lincoln, Hupmobile and Studebaker-owned Pierce-Arrow. Using free-wheeling which Lincoln calls "the gliding transmission" many miles may be covered in the course of a day with the engine idling. In congested traffic this feature makes it possible to take advantage of quick pick-up yet allow the engine to drop to idling speed when it is not required, without touching the clutch or gear shift. The gliding unit is an over-running clutch which slides on the transmission spline shaft and engages with the constant mesh second or high speed gears inside the high and second speed sliding gear. It consists of two parts which automatically lock themselves into a unit when the engine is driving the car and float free of each other when the car is coasting. The action is accomplished by means of eight rollers which lock themselves tightly between the two

members when the engine tends to run faster than the car, thus transmitting power to the wheels. When the engine drops to idling, the rollers are dislodged and free-wheeling results.

The Auburn uses a device similar in action but possessing fewer parts. In the Studebaker type the unit is located on the gears, but Auburn places its unit in the rear of the transmission giving free wheeling in all four speeds. This unit known as the L. G. S. Free Wheeling Unit contains only three parts: a drum, a coiled spring inside the drum, and a force against which the spring presses when in separation. The outer drum is permanently connected to the drive shaft, a coiled spring inside the drum is permanently connected

to the gear-box spline shaft. When the motor is accelerated the spring is forced out by centrifugal force locking the two parts and sending the power out to the rear wheels.

Modern traffic has made it imperative that gear-shifting be done quickly and easily. General Motors has met this need with Syncro-mesh transmission. It is used, with a few modifications on Cadillac, La Salle, Buick and Oldsmobile. This gear-set is of the selective sliding type with three speeds forward and one reverse. All gears except low and reverse are in constant mesh. The synchronizing mechanism consists of two friction cones and a gear clutch. In shifting, the conical friction cone engages a corresponding member on the second or high-speed gear before the teeth on the gear and the gear clutch actually meet. This causes the rotating parts to travel at the same speed, en-

abling complete engagements to be effected readily and without clashing. The advantage of the syncro-mesh transmission are quietness in second gear and ease of operation. Auburn uses a gear-set which incorporates these features also, using the same principle, helical gears in constant mesh. Those cars already mentioned, which are equipped with free-wheeling, likewise have these features.

Before the advent of the syncro-mesh transmission, Graham-Paige brought forth a solution to the troublesome shifting in traffic. Their four-speed transmission has an internal gear on the front end of the propeller shaft. This gear corresponds to the second gear in other types. Due to the internal construction it is, of course, very silent and may be shifted, either forward or backward, at any speed. Since the second speed gear is the most needed in traffic the other three gears

(Continued on Page 20)

No radical changes have been made in recent years in automobile design and construction with the exception, of course, of the innovation of the front-drive. Such technical progress that has been made seems to be confined to the precincts of refinement of standard models. This, despite glaring advertisements, is generally conceded.

The author, in this article, points out a few of these developments that have been made within the last decade. It is interesting to note such information as ". . . the Cadillac of 1914 had a rumble seat, and a four-speed transmission appeared even before that. . . ."

—Editor.

AUTOMOTIVE DEVELOPMENTS

(Continued from Page 7)

are standard spur type. An unusual feature of this transmission is the secondary low. It is not ordinarily used and to be used, an unlocking catch on the shifting handle is operated.

The latest and most significant development in the automobile field has been the front-drive. It offers something entirely new in passenger car production—that of pulling the car instead of pushing it. Cord, the pioneer in this field, has designed the power plant, clutch, and transmission as a single unit. This eliminates long inefficient drive shafts, moving parts under the rear of the car, shimmy at high speed, and a tendency to skid on wet and slippery streets. The motor, developing over 30 B.H.P., is placed in front as in the conventional car, except that it is turned end for end. This places the clutch and flywheel in front of the motor. Directly forward of the clutch is the standard 3 speed transmission. Leading out of the transmission is a short shaft connection to the differential. The differential has two short rigid shafts linked to two universal joints. These joints are inside of the front wheel brake drums. From the inner universal joints the front axle shafts connect to the universal joints on the front wheels. These joints are double-acting, permitting power to be applied until the wheels reach an angle of 42° . Together with the front axle, they form the fundamental principle of the front drive. The front drive axle designed and invented by Harry Miller, the famous racing car builder, is an extra strong tubular one, going around in front of the car, forming a semi-ellipse. It is designed to withstand 15 times the force that would ordinarily break the front end of an ordinary automobile.

Outside of structural changes probably the biggest improvement is a down-draft carburetion. This change in design places the carburetor above the intake manifold. There is no need for a suction to deliver the gas to the cylinders. In placing the carburetor at the highest point in the fuel delivery system all "dead spots," where gas might collect are eliminated. With a manifold such as this, a much better mixture, more power and pick-up are given on the same amount of gasoline. Down-draft carburetion practically necessitates the use of the lately developed fuel pump, because the ordinary vacuum tank could not adequately force the gasoline to the higher level.

In comparing the 1931 automobile with those which have gone before it we find not such a great difference in structure, with the exception of the front-drive, as we might naturally expect. The

(Continued on Page 22)

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AUTOMOTIVE DEVELOPMENT

(Continued from Page 20)

difference lies mainly in refinement. Some unknown commentator has said that everything that can be done to alter the build of motor cars already has been done. This is to a certain degree true. Almost every present-day invention has been preceded by something very similar to it. There was a front-drive, the Nash Quad in 1918, the Cadillac of 1914 had a rumble seat, and a four-speed transmission appeared even before that. So it is probable that there will be no radical changes in design or structure for several years yet.
