brake acting on the differential gear on the countershaft and a hand emergency brake acting on drums fastened to the driving wheels. The latter is, of course, double, and is of the expanding ring type and double acting; it is so constructed that the reaction of the brake resistance is taken up by a rod pivoted to the frame and that the wheels can be taken from the axle without disturbing the brakes.

The weight of the vehicle complete is 2,020 pounds.

The Transmission Gear of the Toledo Gasoline Touring Car.

We illustrate herewith the transmission mechanism of the 16 horse power gasoline touring car manufactured by the International Motor Car Company, of Toledo, Ohio. Fig. 1 is a vertical section of the transmission including the clutch and flywheel, gears and clutch pedal. Fig. 2 shows the transmission mechanism with the upper half of the aluminum transmission case removed. The reverse gears are not shown in Fig. 1, but are plainly seen in Fig. 2. While this transmission is of the common sliding gear type, it possesses a number of features worthy of special mention.

Referring to Fig. 1, H is the engine shaft which is elongated and carries at its extremity a ball thrust bearing *a*, against which the outer end of the clutch spring A presses; the other end of this spring presses against the clutch member *b*, thus holding the clutch in driving relation to the flywheel member B. The object of this construction is to equalize the end thrust in the main bearings of the motor shaft.

The tension of the clutch spring A is regulated by the nut and check nut at the extremity of the engine shaft; these nuts are accessible upon turning a movable sleeve exposing the angular space I into which a suitable wrench may be inserted.

M is the clutch pedal and 9 the fork which actuates the movable clutch member *b* when the pressure of the foot is applied to the pedal M.

The primary shaft (Fig. 1) carries three pinions, 1, 2 and 3, while the secondary shaft S carries three gears, 1′, 2′ and 3′. When pinion 1 is in mesh with gear 1′ the vehicle is running on the first or slowest speed; when No. 2 pinion is in driving relation to gear 2′ the carriage is running on the second or intermediate speed, while the high speed is obtained when pinion 3 is driving gear 3′, as shown in the illustration.

The secondary shaft carries the driving

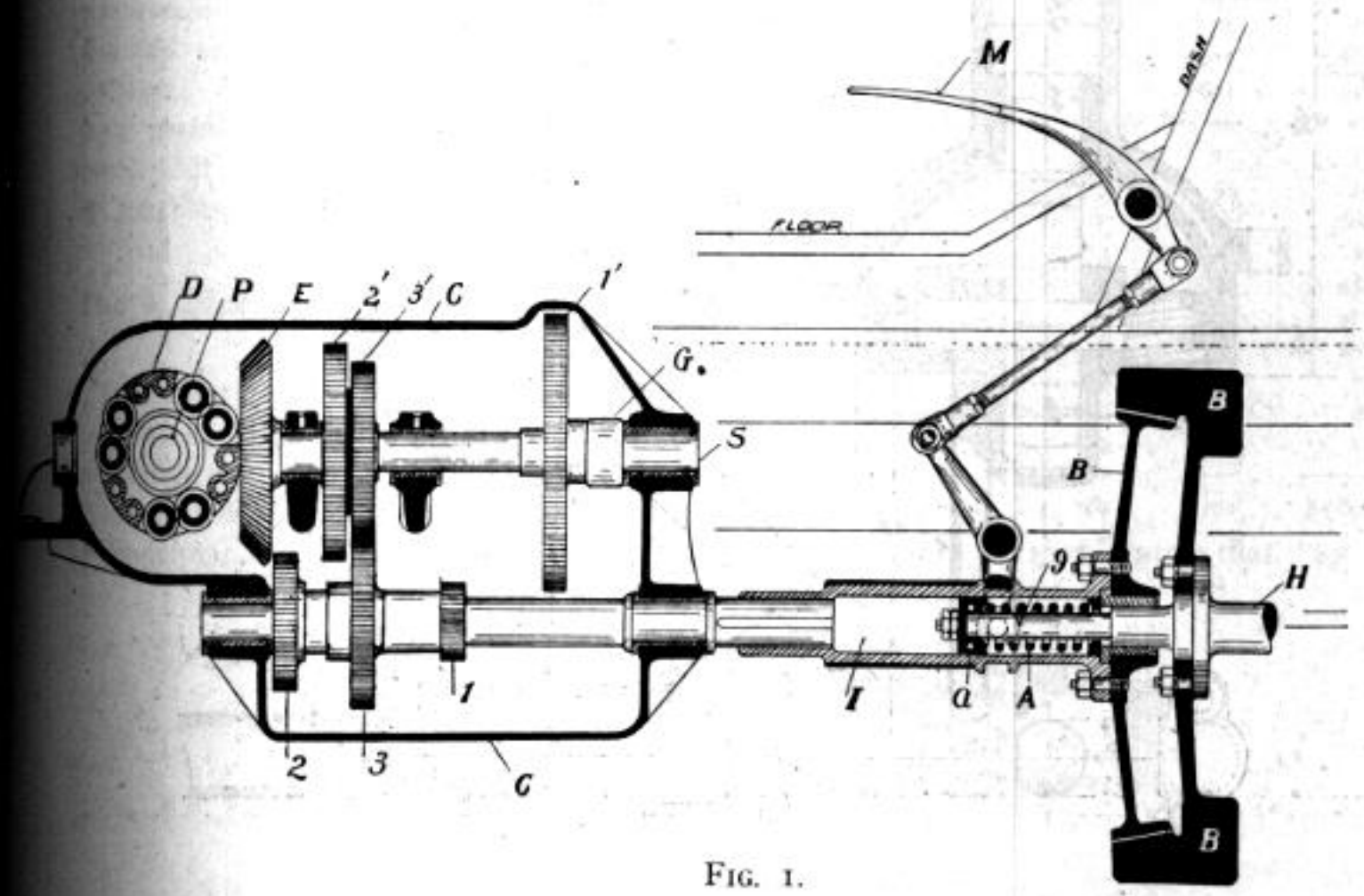

FIG. 1.

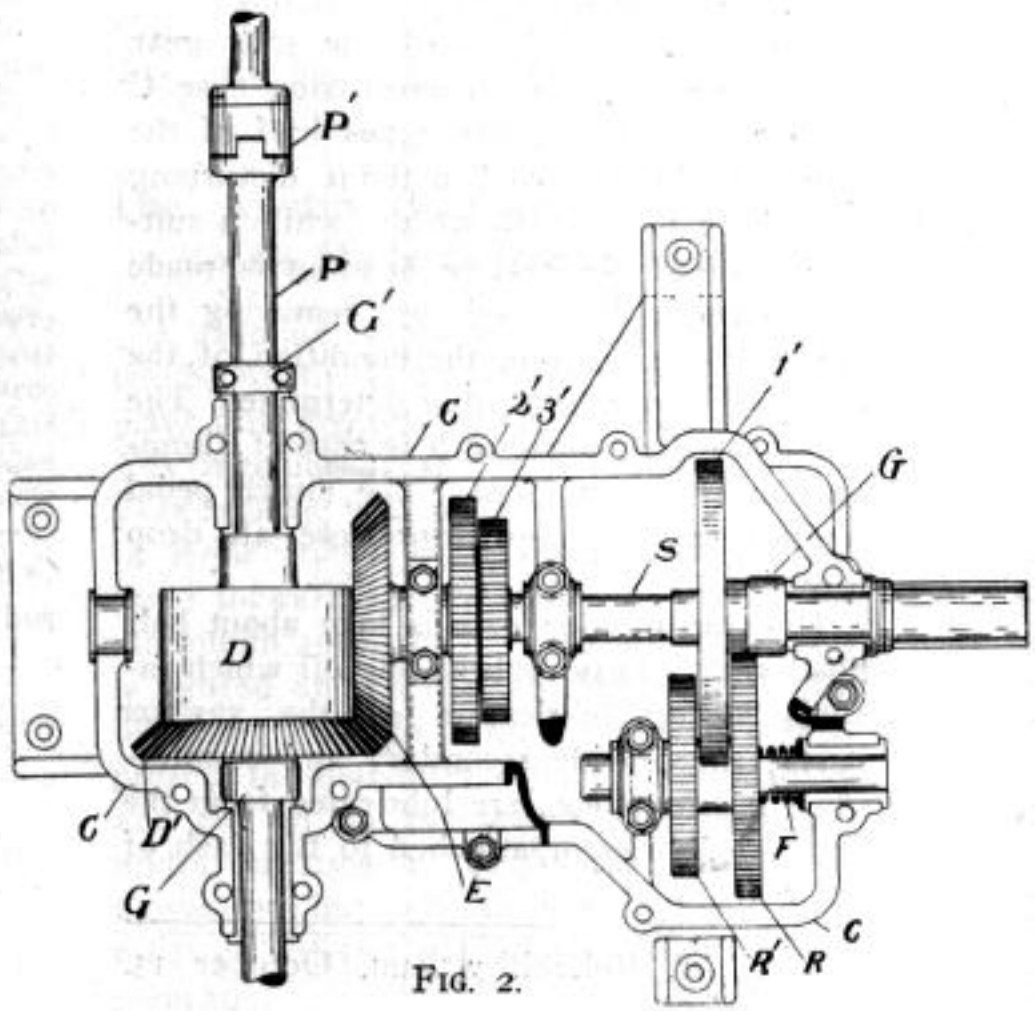

FIG. 2.

bevel gear E, which is in constant mesh with the gear D′ attached to the end of the differential D, thus driving the countershaft P. (See Fig. 2.) Ball thrust bearings G and G G are fitted to take up the end thrust.

The pinions 1, 2 and 3 on the primary shaft are shifted by means of a yoke or fork suitably attached to the hand operating lever, which fork engages in the groove between pinions 2 and 3 (Fig. 1).

As shown in Fig. 2, the reverse gears R and R′ are mounted on a short separate shaft provided with suitable bearings below the secondary shaft S and in front of the primary shaft. The reverse is operated in the following manner: Moving the change speed hand lever to the reverse position when the first speed gears are in driving relation shifts the pinion 1 until it meshes with reverse gear R. A further movement of the reverse lever causes both reverse gears R and R′ to move with the pinions of the primary shaft, the driving relation being maintained between pinion 1 and reverse gear R until the reverse gear R′ meshes with secondary shaft gear 1′. When the driving clutch is released the pinion 1 (Fig. 1) is in mesh with the reverse gear R (Fig. 2), and the reverse gear R′ is in mesh with the secondary shaft gear 1′. The interposition of the reverse gears between the driving pinion 1 and the secondary shaft gear 1′ causes the secondary shaft to rotate in the opposite direction as when directly driven by the primary shaft pinion 1.

When the speed lever is thrown forward in order to engage the first forward speed gears, the spring F (Fig. 2) forces the reverse gears back into their original position, and they remain idle until again called into requisition by reversing the change speed lever.

This transmission mechanism is claimed to be made in the best possible style. All of the gears and pinions are cut from drop forged blanks made at the factory of the company at Toledo. The teeth are beveled off to facilitate their proper meshing.

The differential D is of the spur gear type. The aluminum transmission case C is so arranged that the upper half of the case may be removed without disturbing any of the mechanism within, while a suitable covered observation opening is made in the upper half, and by removing the cover of this opening the condition of the gears, etc., may be readily determined. The movable clutch member *b* is cast of aluminum and leather faced. The clutch pedal connecting links and forks are all drop forged.

The transmission case is kept about half filled with a heavy lubricating oil which insures perfect lubrication of the various parts; the outside secondary and countershaft bearings, etc., are lubricated from the pressure lubricator attached to the dash of the car.
