

Expert Explains Easiest and Best Ways To Shift Gears

In visualizing the gears in the transmission just remember that the propeller shaft is, by means of the universal joint, connected with the main shaft of the transmission, and that the front end of the transmission mainshaft fits into a hole in the clutch shaft. There are two gears which slide on this mainshaft. These gears, however, rotate positively with the mainshaft since there are usually four keys or splines integral with the mainshaft which mesh with four keys in the hub of each gear. One of these gears is "second" and the other is "low," the latter being considerably larger than the former. By moving the shifting lever either "second" or "low" may be slid into mesh with a mating gear on the so-called countershaft in the transmission.

When the second gear is engaged, for example, the path of the gear from engine to rear axle is as follows: It enters the front end of the transmission via the clutch shaft, where a gear on the end of this shaft transmits the power to a gear on the countershaft which meshes with it. These two gears are always in mesh except on one particular make of car. The power travels along the countershaft gear, which meshes with "second" and then passes through the "second" gear along the mainshaft and so to the propeller shaft and rear axle. All the gears on the countershaft are fastened securely to it, and they always occupy the same position.

Travels To Mainshaft.
When "low" is engaged the path of the power is similar except in this case the power travels from the countershaft back to the mainshaft through the "low" gear. Reverse is obtained by sliding "low" into mesh with the gear on the mainshaft and so to the propeller shaft and rear axle. All the gears on the countershaft are fastened securely to it, and they always occupy the same position.

High Gear is Obtained by Locking the Clutch Shaft to the Transmission Mainshaft so that the two rotate as one. The power then passes straight through and does not go through the countershaft. The locking device consists simply of a dog clutch, one member of which is located on the front face of "second" gear and the other on the rear face of the gear on the end of the clutch shaft. High gear is engaged by sliding "second" forward until the two members of the clutch are in contact. In modern cars the dog clutch is not as popular as an internal-external gear clutch. The front face of "second" is formed into an internal gear which slides over an external gear immediately to the rear of the gear on the end of the clutch shaft.

Gears Have Ratio.
For all practical purposes, these gears may be considered to have a one, two, three ratio. If the engine runs 1,000 revolutions per minute at twenty miles per hour on high, it will run 2,000 on second and 3,000 on third, at twenty miles per hour. Therefore, it should be clear that in order to shift silently from high to low gear the engine speed must be increased from 1,000 to 3,000. Fortunately, however, it is not necessary to measure the speed of the engine except by ear, and a little experience and practice will show just how much its speed must be increased or decreased for the purpose of gear shifting.

There are few occasions when necessity will demand a shift from high to low at a speed of twenty miles per hour, or even at fifteen for that matter. In descending a very steep hill if the brakes should fail to hold the car it is conceivable that an immediate shift from high to low at twenty miles per hour might be required. Yet such a shift is all but an impossibility on most cars, less the engine is speeded up for a brief moment with clutch out to make the teeth speeds of the meshing gears somewhat similar. Having made the shift to low the throttle may be closed.

In Ascending a Hill it is possible that the car might pull up at a speed of fifteen or twenty miles on high, when a very steep rise around a sharp bend would demand an immediate shift to low.

Increase Speed.
It is a safe rule that when going from high to low the engine speed must be tripled, and going from high to second or second to low must be nearly doubled. The shift from high to second is one very frequently made, and therefore is the one that interests the average driver much.

Few car operators are able to make this shift with perfect silence some also have difficulty in making it so quickly that the car will not show an appreciable loss in speed. The easiest way to shift from high to second, or in fact to make any "down" shift, is not well known. Few motorists know about it.

It is a shift that the writer has used for several years, and has taught and many friends. It is easily learned and yet never causes difficulty.

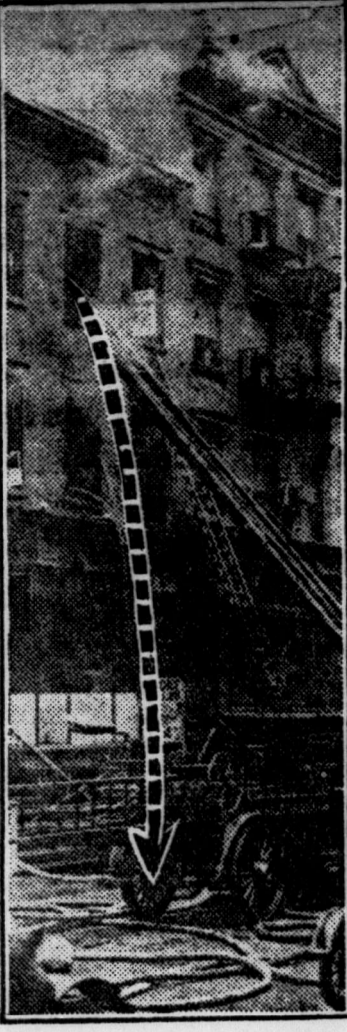
On a hill this shift is made with the throttle wide open, and on the level with the throttle partly open. The throttle is held open while the clutch pedal is depressed. As the clutch is disengaged the engine has reached the speed demanded by the second gear, the shift should be made and the clutch engaged. In practice the whole operation takes but a fraction of a second. The clutch is depressed with fair rapidity, the gear is shifted the instant the engine speed is making 1,500 revolutions, and the clutch let back in as quickly as possible. In practicing this shift, and until confidence is gained, both clutch pedal and gear lever must be manipulated with the greatest deliberation. Push the clutch out ever so slowly and watch the engine speed mount gradually. When it is high enough, move the gear lever over from high to second and then let the clutch back in. The shift from second to low is similarly made. After a little practice this shift can be made silently and so swiftly that the car will not lose momentum in shifting from second to low on an unexpectedly sharp grade. If this method is used it is never necessary to anticipate your shifts. If you are traveling up a 20 per cent grade on second and suddenly strike a spot that is over 10 per cent it will be time enough to shift when you reach it.

Don't Open Throttle.
In shifting to a lower gear when on the level, as in traffic, it is not necessary to hold the throttle all the way open. One-third or half-way is enough. On the other hand, if you are faced with the necessity of making a quick shift going down hill, it may be better to shift with the throttle wide open, closing the throttle, of course, the instant the gear is engaged. Thus the speeding engine does not add to the rate at which the car is traveling.

Shifting from a lower to a higher gear is correctly done by most motorists, but the occasional hard-shifting car is a problem worth explaining.

Intutions on low, its speed should drop to 1,000 revolutions before second is engaged, and to 550 before high is entered, assuming that the rate at which the car is traveling is constant. On most cars it is very easy to bring the engine, or rather the clutch-shift, to the right speed. The clutch pedal is depressed, and simultaneously the throttle is closed, and as soon as the engine speed drops the required amount the shift is performed.

If the clutch is very heavy in its parts, it may continue to rotate rapidly for some seconds after the engine speed has dropped. The shift should not be made until the clutch speed has dropped. Experience will show how long this period must be. The time of waiting is likely to be roughly proportional to the square of the speed. If it is necessary to wait a half second to make a silent shift at ten miles per hour, it will be



THREE GIRLS with clothes ablaze hung until exhausted and then dropped to death from window sills in a loft of a three-story manufacturing building in Thirteenth street, New York. Three more were probably fatally burned and a dozen seriously injured in the mysterious blaze.

necessary to wait about two seconds to shift silently at twenty miles per hour.

Provided With Brakes.
Most clutches are provided with brakes to slow them down more quickly. The clutch brake acts when the clutch is pushed out all the way. It should now be clear that in order to make a silent shift to a higher gear the waiting period after the clutch is depressed may be anything from a negligible fraction of a second to several seconds, depending on the weight of the clutch parts, the effectiveness of the clutch brake and the speed at which the engine was running immediately prior to depressing the clutch.

Once behind the wheel of a strange car these things can be quickly determined. If the first shift is not silent, try waiting a longer or a shorter period, and note the result. After a few shifts the driver should have no difficulty in gauging the length of wait required to perform a noiseless gear change.

If the shift is made too soon after the clutch is depressed the gears will grind because the tooth speeds of the gears being engaged are too much at variance. Likewise, if you wait too long the speed of the clutchshaft will drop so low that the gears will grind and perhaps it will be impossible to engage the higher gear at all. If the clutch brake acts with extreme rapidity the clutchshaft may drop way below the desired speed the instant that the clutch pedal is depressed. In this case, shifts from a lower to a higher gear can only be accomplished when the clutch pedal is not pushed all the way out. The exact amount to depress it can be determined by trial. If you have difficulty in shifting upward, try depressing the pedal some what less than its full travel, and see if this will not cure the trouble.

Miss Your Gear.
If in shifting upward you miss your gear because the speed of the clutch shaft has dropped too low, obviously it is not necessary to bring the car to a full stop and start all over again. All that is needed is to raise the speed of the clutchshaft. This can be accomplished in an instant. Bring the lever to neutral, let the clutch in, speed the engine up considerably above the rate required on high, and disengage the clutch before you allow the speed of the engine to fall again. Then shift. The whole operation need not occupy more than a second.

When the car is stopped, if you have trouble in moving the gear lever from neutral to the gear you want, let the clutch in for just an instant, assuming that the engine is running. Of course, remember that if the clutch brake is very quick acting the clutch pedal should not be pushed out all the way.

If you have been coasting with the

gear lever in neutral, you should raise the speed of the clutch shaft a little above the speed demanded by the car before engaging high again. This practice prevents the clashing of the gears and minimizes strain on engine and driving mechanism.

If you wish to coast with the engine dead you may do so by disengaging the clutch and leaving the lever in high. When you let the clutch back in to start the engine, do so very gradually so as to minimize the strain on engine and driving mechanism.

Coast in Neutral.
It is also possible to coast with the gear lever in neutral and the engine dead if the car is equipped with a self-starter, so that the engine may be started again before an attempt is made to get back into gear. It is very difficult to engage a gear with a car coasting and the engine dead. Therefore, if you have parked your car on a hill and wish to start the engine by gravity, the best way is to start the engine with the gear in high, the instant the car starts rolling. It should be possible to engage this gear before the car has moved two inches. Allow the car to pick up some momentum before letting the clutch in, and be sure to engage it gently.

The engine may also be started on second or low, or reverse, if the car is pointed up the hill, but in using the lower gear care must be exercised to engage the clutch promptly but smoothly, so as not to jolt the mechanism unnecessarily. With a little experience, reverse or low may be used to advantage where the grade is so slight that a low car speed may be obtained.

It is always better to use the starter, but there are times when some defect in the electric system may make it desirable to start the engine by gravity. The car may be similarly started on the level if a man or two can be found to push it for a short distance. Or, if the crank is missing and the starter is on strike, engage high gear, jack up a rear wheel, pull out choke, turn rear wheel, thus priming engine, close choke to normal starting position, set throttle and spark lever, turn on lights, and start the engine. When engine starts put gear shift lever in neutral position, jack down rear wheel and—you're off!

If, after following these directions, you have any difficulty in shifting gears, you may conclude that clutch or transmission are not functioning properly, and usually the trouble is caused by one of three things: a clutch brake that is out of order, a clutch which does not fully disengage or which drags, or looseness in the bearings.

PETROLEA

Special to The Advertiser.
Petrolea, Nov. 8.—Fire completely burned the barn of Isaac Farrow yesterday. The contents including a team of horses, two cows, some pigs and the season's crops were also destroyed. Mr. Farrow had finished milking but half an hour before, and did not notice the fire till warned by a passer-by. It had gained considerable headway when it was possible to save much. By the hard work of the neighbors, the implements and poultry were saved. The total loss is about \$2,000, which is partially covered by insurance.

Mr. and Mrs. Fred Saunders and family returned from Tampico, Mexico, this week after spending ten years in different parts of the world as a driller. Mr. Saunders spent ten years in Egypt and the remaining three in Mexico. Mr. Saunders is now superintendent of the Corona Oil Company.

D. Lambert after drilling in Persia and Mesopotamia for the past two years returned to Petrolea yesterday. Mr. Lambert is a driller for the Anglo-Persian Oil Company.

Sam Babcock and family returned from Sumatra, where he has been drilling for the past five years. Mr. Babcock has been employed by the Royal Dutch Oil Company for fifteen years.

MUSSOLINI PLANS SEVERAL CHANGES

Chamber of Deputies Will Reconvene For Short Session.
Rome, Nov. 9.—The Chamber of Deputies will reconvene Nov. 26, but probably will sit for only a fortnight. Premier Mussolini is expected to put through a heavy program, including the transfer of public utilities, telephones, telegraph, and railways, to private ownership, all having been operated at a loss. The premier will inform the chamber of the government's action in reducing the police, carabinieri, royal guards, customs officers and detectives from 150,000 to 75,000.

at different times in the federal and provincial parliaments. He was a minister without portfolio in the Bordegn cabinet for a time.

Signor Mussolini will ask the chamber for full power to put into effect his project of bureaucratic reform, which is regarded as one of the Fascist's boldest schemes. Experts are engaged in investigating the cost at which the various departments have been maintained and the amount of work done, as well as the minimum figure at which such work may be efficiently performed.

CAN SELL COAL AT \$16.50, SAYS BRANTFORD DEALER.
Special To The Advertiser.
Brantford, Nov. 9.—That coal can be purchased by local dealers that would retail for \$15.50 a ton was the statement made by the manager of the Mann Coal Company.

This statement was qualified, however, by an additional one, to the effect that this class of coal cannot be obtained in sufficient quantities to supply the needs of Brantford. In evidence of this the manager said that out of 28 carloads received recently only five tons were of the cheaper variety. This latter sort is not sold at \$15.50 per ton, but according to the coal company, is sold at an average price of \$18, this figure being arrived at by combining the cheaper and more expensive varieties. Coal dealers claim that this price

gives them just an ordinary profit. B. A. Caspell of the Wood Coal Company, when asked concerning the above statement, said that as far as his company was concerned, he did not care to make any statement for publication, other than that his company would welcome an investigation by the fuel controller.

"We have nothing to fear," said Mr. Caspell, "and would be glad to see all this tangle cleared up by a thorough investigation."

HAMILTON POLICE HOLD MAN FOR U.S. AUTHORITIES
Hamilton, Nov. 9.—At the request of Washington, D. C., authorities police here today arrested Max Muesman, alias Mandel Muesman. It is alleged Muesman is wanted on a serious charge in Danville, Ill., where he jumped his bail and escaped to Canada.

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