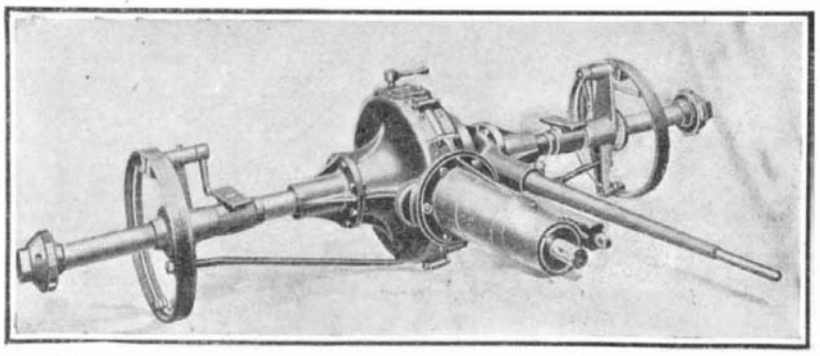
# TRANSMISSIONS

### A NOVEL TWO-SPEED, DIRECT-DRIVE TRANSMISSION GEAR.

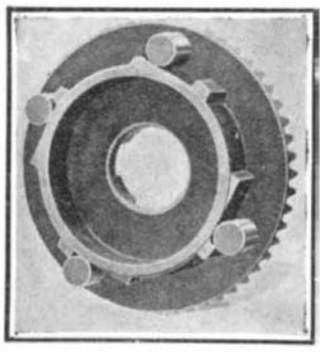
A new form of two-speed-and-reverse transmission, in which the high and low speeds are obtained by a double set of bevel gears, is shown in the illustration in the center. This transmission is adapted to be used as a countershaft or on the rear axle, and it is combined with the usual differential that is used in either of these two places. There are two large bevel gears, *A B*, one placed inside the other, located upon the same shaft as the differential and directly alongside of it. Opposite these gears is another large bevel gear, *C*, intended to be used for the reverse. This large gear, as well as the smaller gear opposite it, can be locked to the central squared sleeve by means of a jaw clutch, *J*. This sleeve is attached to the casing of the differential, and the latter is driven by means of it. Another double jaw clutch, *K*, can be slid so as to lock either of the two pinions to the driving shaft. The back of the smaller, or high-speed, bevel gear, *B*, is finished off with a ring having wedge-shaped projections on it, as shown in the small cut. Four rollers are placed on these projections, and are adapted to wedge between a projecting ring of outer gear, *A*, and that of gear, *B*, when power is transmitted to the former. Thus the drive is continued through the inner gear and squared sleeve, *S*, to the differential. Should the car be running on the high gear, and the low gear be then thrown in, the center and smaller bevel gear will keep on rotating at the speed given it by the movement forward of the car; and not until the larger bevel gear, *A*, attains the speed of the smaller one, and catches up with it, so to speak, will the rollers jam and the drive be taken up by *A*. On account of this arrangement the operator can shift the clutch, *K*, so as to drive through the outer pinion while the car is running along on the high speed, and this can be done without the subsequent jerk and strain on the transmission which would occur if this is done with the usual type of planetary gear. To obtain the reverse, it is necessary to shift the jaw clutch, *H*, so as to engage the other large bevel, *C*, and then to clutch the pinion, *a*, to the driving shaft. If the car is running on the low speed, the reverse can be thrown in without releasing the clutch, though this is hardly advisable. The change can be made from low to high, however, simply by throwing the jaw clutch, *K*. This transmission, although apparently somewhat complicated, is in reality fairly simple, and a decided improvement over the usual form of two-speed planetary gear. When assembled on a rear axle or countershaft, it has a very neat appearance. The four line cuts show the settings of the different parts in the four positions to which they can be moved. The transmission is very substantially built, and it is an exceedingly efficient one, as there is but a single reduction through bevel gears.

### A NEW FORM OF TWO-SPEED TRANSMISSION COMBINED WITH THE DIFFERENTIAL

On most light-weight automobiles, such as runabouts and very light touring cars, a two-speed transmission is found adequate, as probably ninety-five per cent of the running is done on the high speed. On most of these cars the only available kind of transmission gear heretofore has been the well-known planetary type.

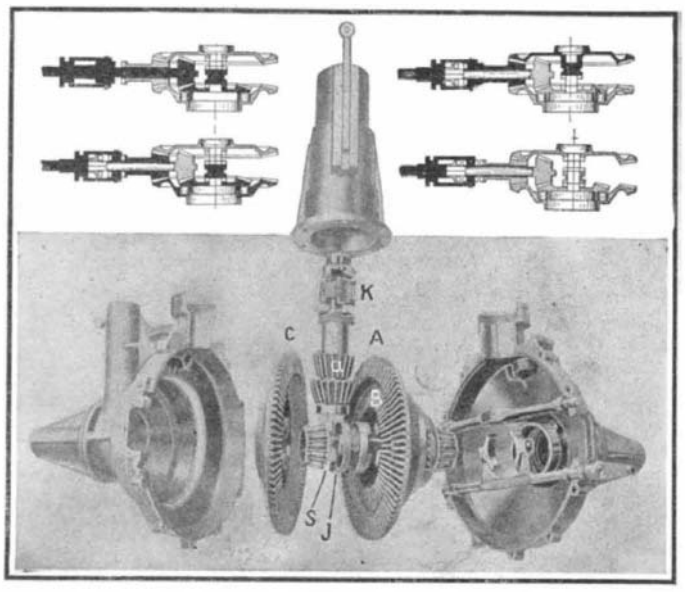


PLEUKHARP TWO-SPEED TRANSMISSION ASSEMBLED ON A REAR AXLE.



ROLLER RATCHET CLUTCH ON BACK OF SMALL BEVEL GEAR.

Where this transmission was used with a shaft drive, it was somewhat less efficient than where a direct drive with a chain was employed, but the reason of this was that bevel gears were employed on the rear axle, and not that the transmission itself was inefficient. On the high speed, as is well known, with the planetary type of transmission, all parts of the gear are locked together in a single piece, and there is a positively direct drive from the motor to the rear axle. With the new type of transmission shown herewith, this is still the case. At the rear axle, however, there is a speed reduction through a spur gear and pinion that is not had with the ordinary bevel-gear drive.



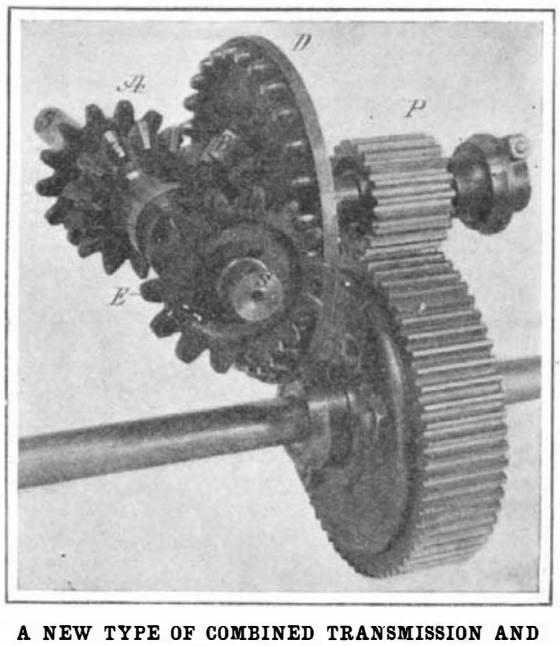

TRANSMISSION TAKEN APART. THE LINE CUTS SHOW GEARS AND CLUTCHES IN ACTION ON THE DIFFERENT SPEEDS.

High speed. Reverse.
Low speed. Neutral.

On the shaft that carries the spur pinion, *P*, there is a large disk, *D*, having cone-shaped pin teeth, and in the center of this dick is a bevel gear, *B*. This gear meshes with another bevel, *C*, of the same size, which is loosely mounted on the projection in the gear case of the propeller shaft, *S*, and which can be locked to this shaft by one side of a double jaw clutch. When the jaw clutch is moved out of engagement with the bevel gear, the other side of it engages with teeth in the small pinion, *A*, that meshes with the pins in the periphery of the disk, *D*. This pinion then drives the disk and its spur pinion at a reduced speed, and thus the low speed is obtained. The reverse is had by locking the other pinion, *E*, to the shaft, *S*, by means of another jaw clutch. Thus this combination gives two speeds forward and the reverse in an exceedingly simple manner, and with practically no more loss of power than is had in the usual bevel-gear drive. As the propeller shaft can be made to extend forward to the engine in a practically straight line, there is very little loss of power in the universal joints, due to their angularity. The loss of power in the spur-gear transmission is said to be not over three per cent, while owing to the conditions just mentioned, the loss in the propeller shaft and bevel gears is not as great as it is with the ordinary car. The transmission is practically noiseless on the low and reverse speeds, and when running on the low speed or with the car standing stationary there is not that grinding noise that is heard with many of the planetary transmissions, no gears being in motion in the latter case. The combined transmission and differential is easily accessible, as large inspection plates on the top are provided. As it is placed above the axle, the road clearance is as great or greater than that usually obtained. This transmission appears to be one of the neatest and simplest two-speed gears that have thus far been placed upon the market. It is used on the Logan and Marion runabouts, and other makers will doubtless adopt it.

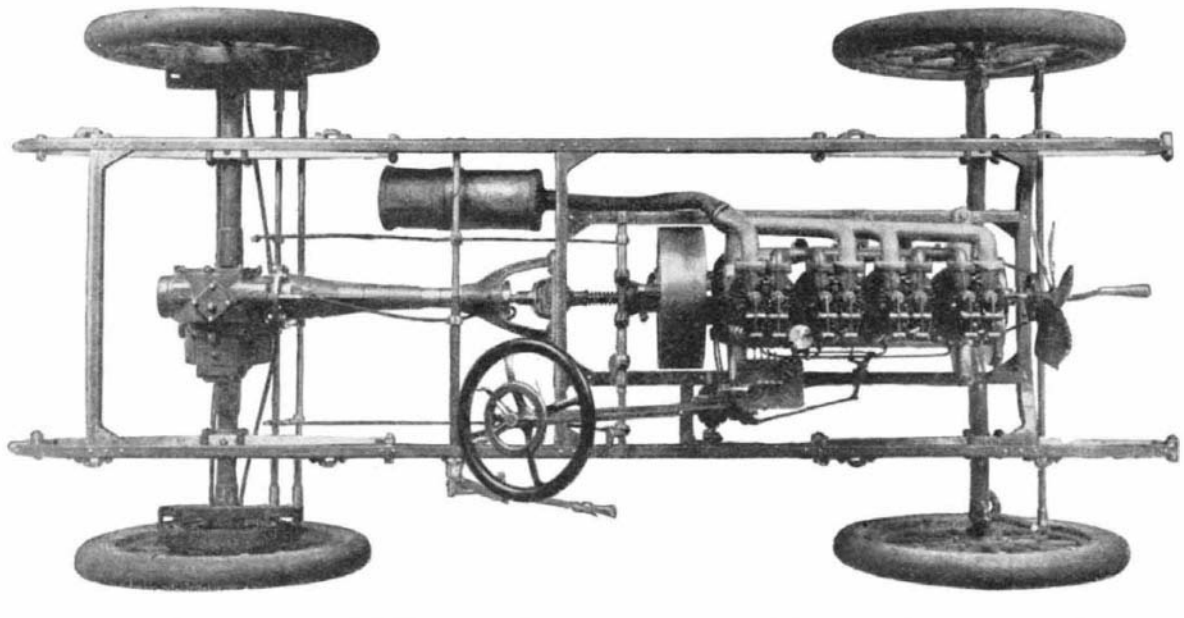
### A TRANSMISSION WITH INDIVIDUAL JAW CLUTCHES.

Still another type of transmission giving three speeds and a reverse is that used on the new Deere-Clark car, in which sliding jaw clutches replace the sliding gears. As a result of this construction, the gears are always in mesh. They are locked to the shaft by two double jaw clutches, either one of which may be slid to engage the proper gear, by means of a suitable lever working in the usual H-shaped slot. Each clutch is provided with sixteen strong teeth, and as all engage at once, there is less chance of stripping than where the strain comes on only two or three teeth. Besides this, the main clutch in the engine flywheel is interlocked with the jaw clutches, so that the latter can not be slipped in except when the former is out. The one sliding gear in this transmission—the reverse pinion—can be thrown in instantly by pulling the lever straight back from the high-speed position. This makes it easy to stop quickly in case of emergency, which is very desirable, and not easily accomplished with the usual sliding gear. The shafts of this transmission run on Timkin roller bearings. A good idea of its construction can be had from the cut on page 47.




A NEW TYPE OF COMBINED TRANSMISSION AND DIFFERENTIAL.

*A*. Low speed driving pinion. *B. C.* Bevel gears for high speed. *D.* Disk with pin teeth for low speed and reverse. *P.* Spur pinion driving differential. *S.* Longitudinal driving shaft from clutch in flywheel.



PLAN VIEW OF LOGAN RUNABOUT CHASSIS, SHOWING NEAT APPEARANCE OF REAR AXLE EQUIPPED WITH HASSLER TRANSMISSION.

A novelty on this car is the small wheel within the steering wheel for controlling the speed-change mechanism of the transmission.