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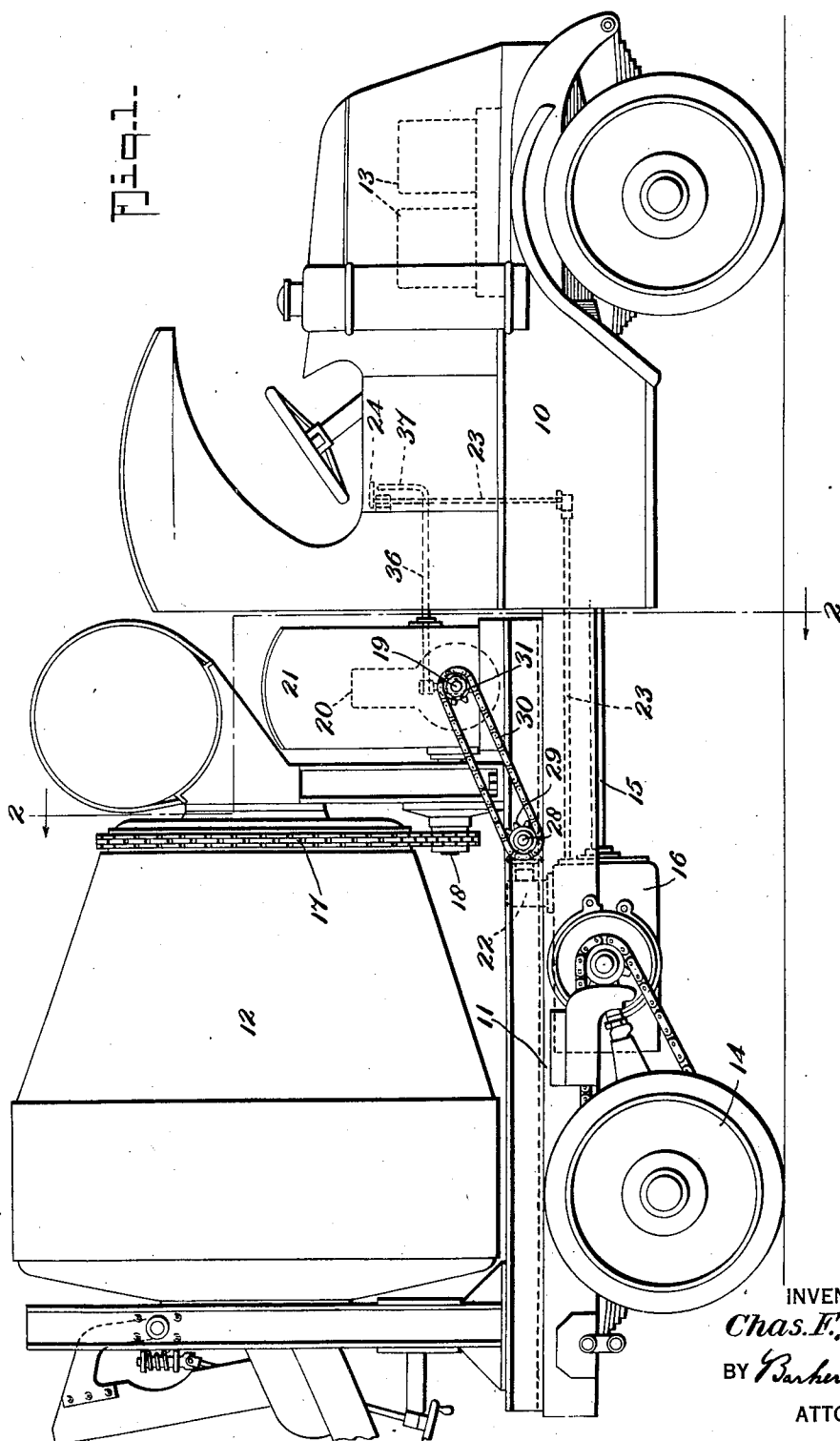
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APPARATUS FOR STARTING INTERNAL COMBUSTION ENGINES

Filed Nov. 10, 1930

4 Sheets-Sheet 1



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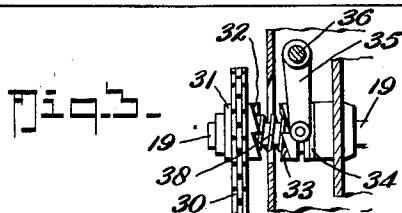
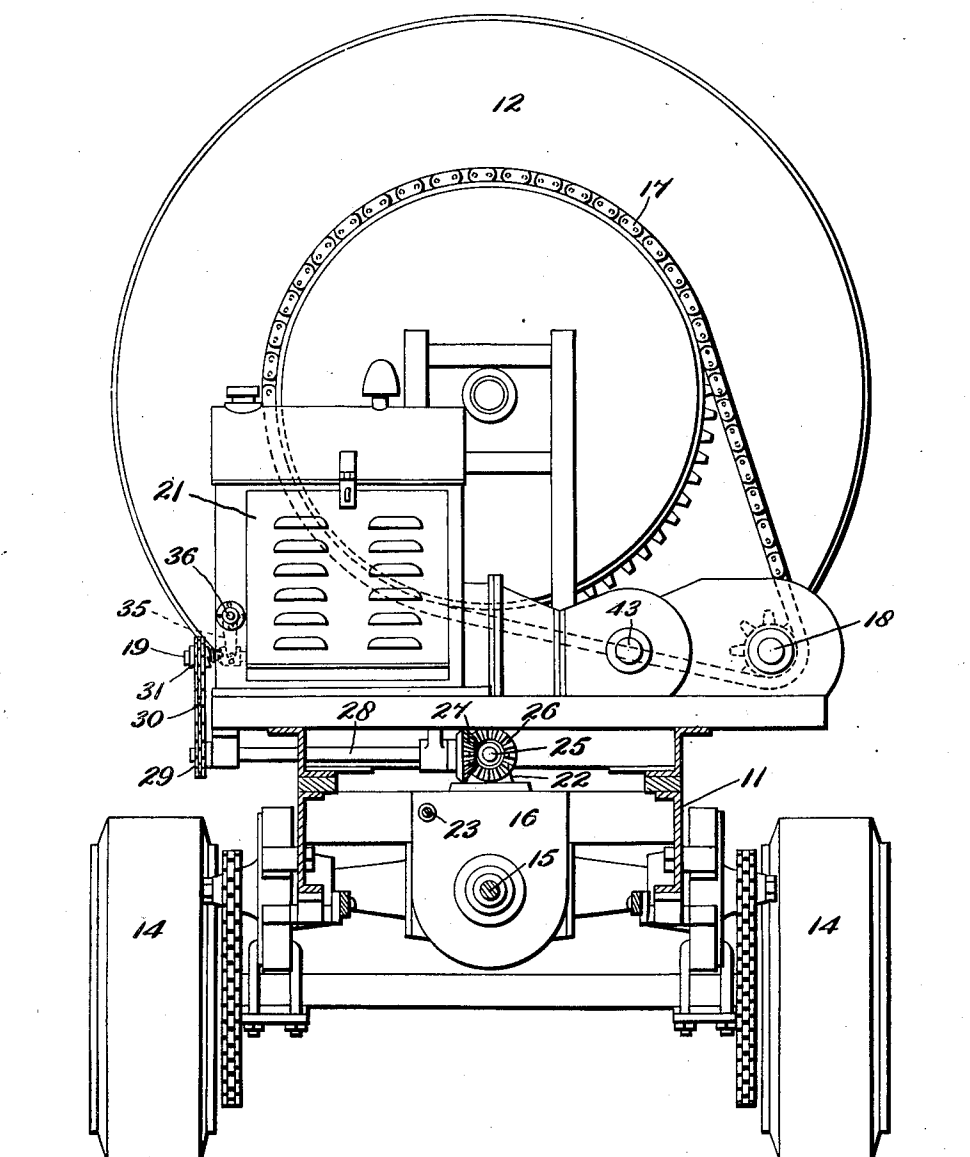
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4 Sheets-Sheet 2

Fig. 2.



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4 Sheets-Sheet 3

Fig. 4.

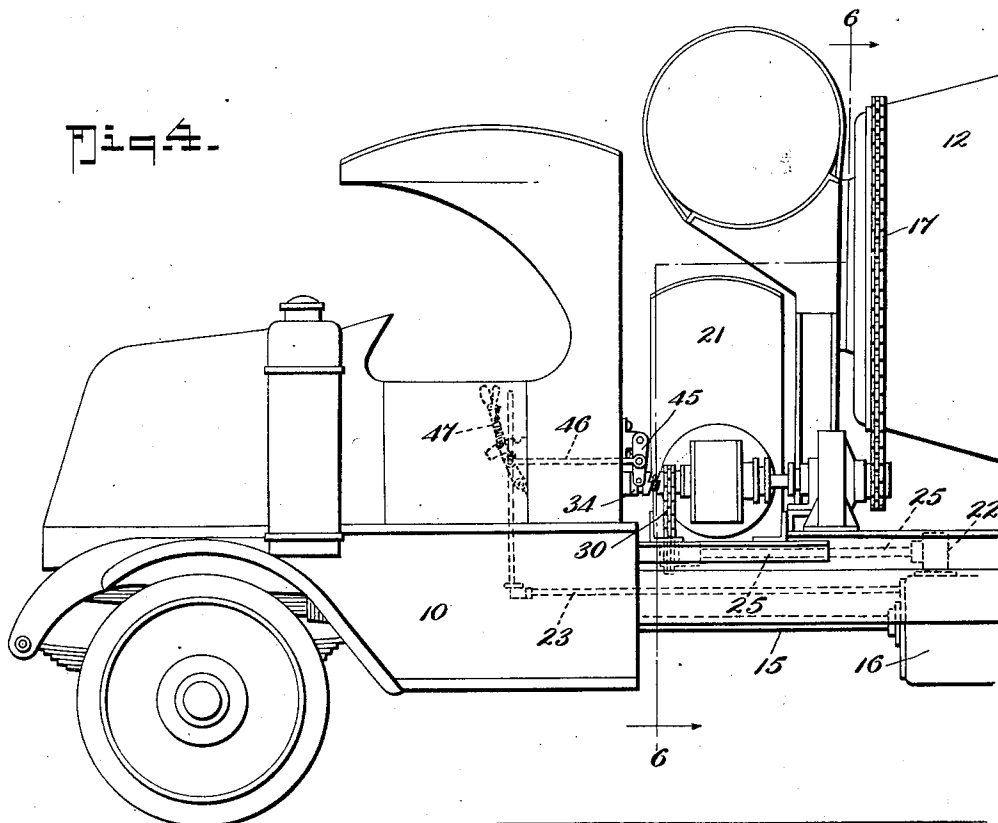
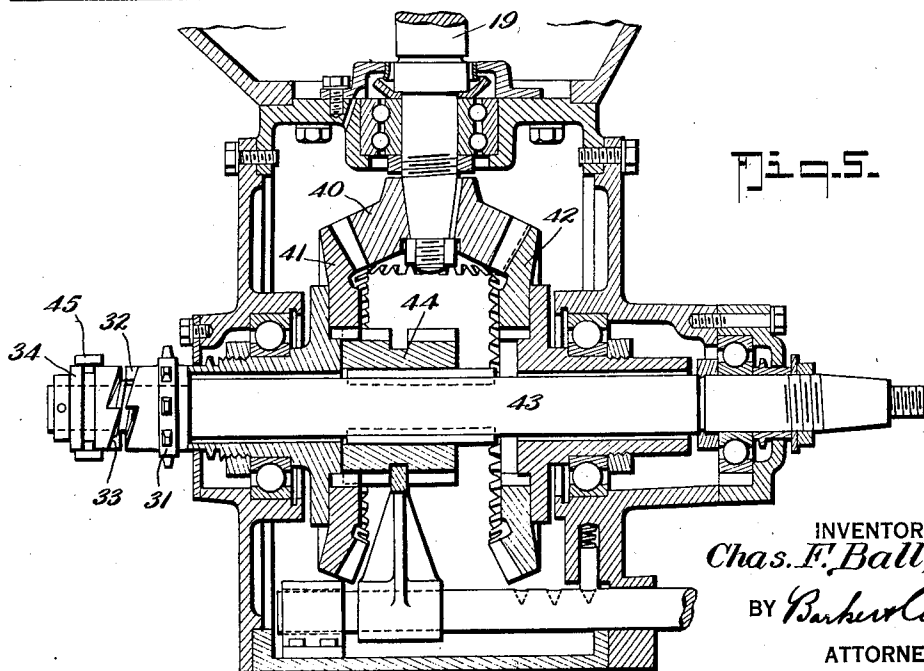


Fig. 5.



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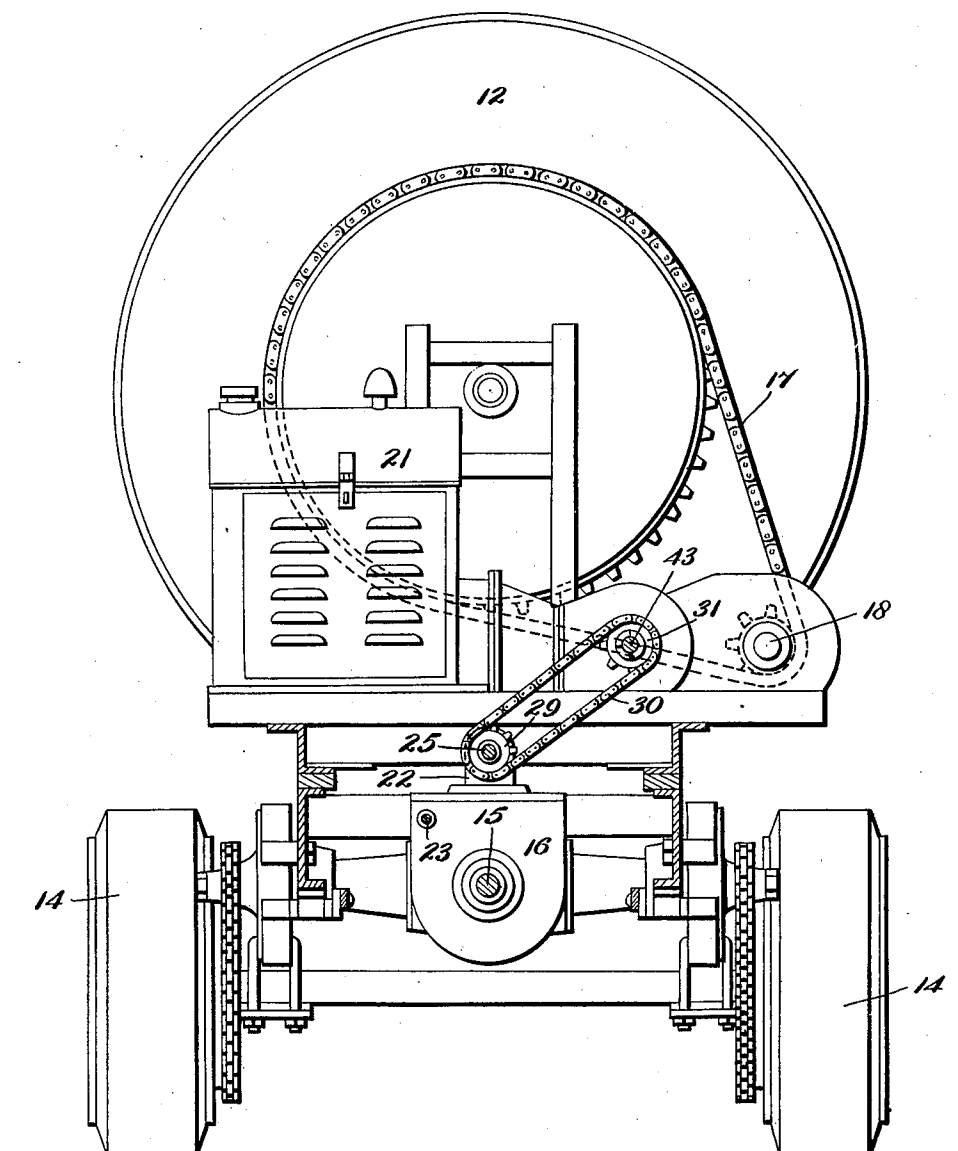
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4 Sheets-Sheet 4

Fig. 5.



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APPARATUS FOR STARTING INTERNAL COMBUSTION ENGINES

Application filed November 10, 1930. Serial No. 494,823.

This invention relates to apparatus for starting internal combustion engines and has for its object the provision of means which is particularly, although not solely, adapted for starting the independent or auxiliary motor employed in certain types of transit concrete mixers for rotating the mixing drums, through power derived from the main vehicle motor.

For reasons well understood by those skilled in the art, it is desirable in the operation of transit concrete mixers to employ an independent motor mounted upon the vehicle chassis for supplying the power necessary to rotate the concrete mixing drum, rather than to derive such power from the vehicle motor itself. Ordinarily these independent motors are started through cranking them by hand and since under present day practice it usually happens that it is not necessary or desirable to actuate the mixing drum throughout the entire time of transit of the mixer from the place where the raw materials are stored to the point of use of the mixed concrete, it is necessary that at some point during the trip the vehicle must be stopped and its operator must descend to the ground and crank the independent motor to start it in order that rotation of the mixing drum may be accomplished.

The present invention is intended to provide means whereby the independent motor may be temporarily connected to the driving connections between the main truck motor and the traction means without stopping the vehicle, whereby it is possible to start the independent motor through power derived from the main truck motor and thus eliminate the loss of time incident to stopping and starting the vehicle at the time the auxiliary motor is to be started.

With the above and other objects in view which will appear as the description proceeds, the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the appended claim.

Referring to the accompanying drawings forming a part of this specification in which

like reference characters designate like parts in all the views:—

Figure 1 is a side elevational view of a well known form of transit concrete mixer embodying one form of the present invention, whereby the independent motor may be started from the truck motor;

Figure 2 is a transverse sectional view taken approximately on the plane indicated by the line 2—2 of Figure 1, looking in the direction of the arrows;

Figure 3 is a fragmentary detail sectional view of the one-way clutch and its operating mechanism for transmitting power to the crank shaft of the independent motor;

Figure 4 is a fragmentary side elevational view of a transit mixer embodying a somewhat modified form of the invention;

Figure 5 is a horizontal sectional view through a portion of the power transmission gearing of the independent motor illustrated in Figure 4, showing how the power from the main motor is transmitted therethrough for the purpose of starting the auxiliary motor; and

Figure 6 is a vertical transverse sectional view taken approximately on the plane indicated by the line 6—6 of Figure 4.

Referring more particularly to Figures 1, 2 and 3, 10 indicates generally a motor vehicle having the chassis frame 11 upon which is suitably mounted for rotation a concrete mixing drum 12. The vehicle 10 is provided with the usual internal combustion motor 13 which is employed for driving the rear wheels 14 through the drive shaft 15 and transmission gearing 16 in the usual and well known manner. The mixing drum 12 is driven through the sprocket chain 17 from the countershaft 18 which in turn is driven through suitable reduction gearing from the crank shaft 19 of the auxiliary or independent motor 20 contained within the motor housing 21.

It is common practice in motor vehicles of this character to provide means for taking off power from the main vehicle motor such as 13 for various extraneous purposes, such power take-offs usually being located upon the transmission housing 16 or in some

instances upon the drive shaft 15. The present invention may use either form of power take-off, but for purposes of illustration there has been shown diagrammatically a power take-off 22 mounted upon the transmission housing 16. This said power take-off may be of any of the well known standard forms and in itself it constitutes no part of the present invention since they are customarily furnished, if desired, with vehicles of this character. It may be said, however, that such take-offs are ordinarily controlled by means of a clutch operated through linkage 23 extending to a manual control lever 24 located within the vehicle cab adjacent the operator's seat. By means of this operating lever 24 and its connected linkage 23 the clutch of the take-off may be engaged or disengaged at will, as will be readily understood by those skilled in the art.

In the form of the invention shown in Figures 1, 2 and 3 the shaft 25 of the power take-off 22 is provided with a bevel gear 26 which meshes with a companion gear 27 carried by a transverse jack shaft 28 which also carries a sprocket 29 about which passes a sprocket chain 30 which extends to and around a sprocket 31 loosely mounted upon the crank shaft 19 of the auxiliary motor 20. The hub of the said sprocket 31 is provided with clutch teeth 32 which are adapted to be engaged by companion clutch teeth 33 formed upon a collar 34 which is splined to the said crank shaft 19. The collar 34 is shifted longitudinally of the shaft 19 by means of a clutch shifter 35 actuated by means of the rock shaft 36 which extends forwardly into the cab and terminates in a handle 37 by means of which it may be oscillated, as will be readily understood. The spring 38 is preferably interposed between the clutch elements 32 and 33 to assist in automatically throwing out the clutch when the auxiliary motor starts.

In the operation of this form of the invention, when the vehicle operator reaches that point in the trip from the storage yard to the place of use of the mixed concrete where it is desired to start operation of the mixing drum 12, instead of stopping the truck, descending and cranking the auxiliary motor by hand, he merely moves the handle 37 of the rock shaft 36 to bring the clutch elements 32 and 33 into engagement and then shifts the handle 24 to engage the clutch of the power take-off mechanism 22 so that power from the vehicle transmission 16 is transmitted through the take-off 22 to its shaft 25, thence through the bevel gears 26 and 27 to the jack shaft 28 and through the sprockets 29, 31 and sprocket chain 30 to clutch element 32, clutch element 33 and collar 34 to the crank shaft 19 of the auxiliary motor 20. As soon as the said motor starts its crank shaft is revolved at a greater rate of speed

than that imparted to it through the starting mechanism just described, with the result that the collar 34 will be speeded up and the clutch element 33 will be caused to disengage the clutch element 32 under the influence of the spring 38 as well as due to the inclination of the rear faces of the clutch teeth. The crank shaft of the auxiliary motor 20 will thus be automatically disengaged from the starting mechanism upon the starting of the said motor, and the operator may disengage the power take-off clutch through the manual operation of the handle 24 as soon as the handle 37 is automatically returned to its initial position.

The form of the invention shown in Figures 4, 5 and 6 is closely analogous to that just described except that the power from the take-off is transmitted to the auxiliary motor through a portion of the transmission gearing of the said motor instead of directly to its crank shaft. As will be seen from Figure 5 the drive end of the crank shaft 19 is provided with a bevel pinion 40 which meshes with the bevel gears 41 and 42 freely journaled upon the transmission shaft 43 and adapted to transmit power thereto through the slidable clutch elements 44 splined to the said shaft 43. This gearing constitutes a portion of the speed reduction gear commonly employed in apparatus of this type and also the reversing mechanism. In this form the transverse jack shaft 28 is dispensed with and the sprocket 29 is mounted directly upon the power take-off shaft 25 while the sprocket 31 is freely mounted upon an extension of the transmission shaft 43. The collar 34 carrying the clutch element is splined to this said shaft and the clutch shifter 45 is adapted to be actuated through a link 46 extending forwardly into the cab and adapted to be reciprocated through the hand lever 47. The operation of this form of device is identical with the preferred form, except that the power for starting is applied to the drive end of the crank shaft 19 rather than at the crank end thereof.

It will of course be understood that any desired form of one-way or over-running clutch may be substituted for the jaw clutch 32, 33, which is shown merely for purposes of illustration.

It will thus be seen that this invention provides means whereby it is possible to connect and easily start the auxiliary motor of a transit mixer through power derived from the truck motor, or rather from the driving connections between the said motor and the traction means of the truck, whereby it is possible for the operator to start the said auxiliary motor without leaving his seat and without stopping the transit of the vehicle.

It is obvious that those skilled in the art may vary the details of construction as well as the precise arrangement of parts without

departing from the spirit of the invention, and therefore it is not wished to be limited to the above disclosure except as may be required by the claim.

5 What is claimed is:

The combination in a motor vehicle having a motor, traction means, driving connections between said motor and traction means, a power take-off from said driving connections, 10 means for controlling said take-off, and an independent motor for supplying power to instrumentalities carried by said vehicle, of power transmitting connections including a clutch between said take-off and the shaft of 15 said independent motor; means for positively engaging the elements of said clutch, whereby the latter may be started through power derived from the vehicle motor; and means for automatically disengaging the clutch elements when said independent motor starts. 20

In testimony whereof I affix my signature.

CHARLES F. BALL.

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