



The
CHRYSLER

FLUID

DRIVE



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FLUID DRIVE

The old mill wheel used in the cover design of this booklet illustrates, in its simplest form, the basic principle of the Chrysler Fluid Drive.



Foreword

THE engineering ideal of a car that, under all ordinary conditions, may be driven without using the clutch or gear shift lever has been attained in The Fluid Drive, now offered as standard equipment on the Chrysler Custom Imperial line for 1939.

The Fluid Drive, as developed by Chrysler Corporation engineers, involves the adaption of an entirely new principle of transmitting power from the engine to the rear wheels. It gives to a car powered by the conventional type of gasoline engine all the flexibility of steam or electricity, without any of the disadvantages that caused these sources of power to be abandoned for personal transportation. The basic soundness of principle and complete practicability of operation have been proved by Chrysler Corporation engineers in exhaustive laboratory and road tests.

While the mechanical elements that comprise The Fluid Drive are extremely simple, the effect of its use on the manual operation and performance characteristics of the Chrysler Custom Imperial are so unusual and far-reaching that we believe a great number of people will be eager to learn something about the construction and operating principle of the device.

In succeeding pages, we undertake to explain The Fluid Drive, not in the parlance of engineers, but, insofar as possible, in non-technical terms that we hope will be understandable to the average motorist. Frequent reference to diagrams and other illustrative material will aid in clarifying certain points that may not be fully grasped in the text.

THE *Principle* OF THE **FLUID DRIVE**

WE are all familiar with what a conventional automobile flywheel looks like—a solid, carefully balanced disc of cast iron, bolted to the engine crankshaft. It performs three functions: first, it stores up energy and smooths out the power impulses imparted to it by pistons and connecting rods; second, it provides a flat surface against which bears the friction plate of the clutch; and third, it carries the ring gear which meshes with a pinion on the starting motor.

The Fluid Drive eliminates this type of flywheel and substitutes for it what is called a fluid coupling. This coupling performs all the functions of a flywheel except that of providing a contact surface for the clutch plate, which, as we shall see later, is mounted in a somewhat different manner.

Now, having replaced our old type flywheel with a fluid

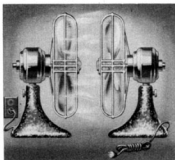


FIG. 1

coupling, bolted, just as was the flywheel, to the engine crankshaft, let's examine the coupling itself, identify its few simple components, and explain the principle on which it works.

Figure 1 shows two ordinary electric fans facing each other a few inches apart. If we start

and requires no adjustment or attention of any kind beyond keeping the fluid contents at the proper level.

In Figure 4, we see at the right the coupling completely assembled and fastened to the crankshaft. At the left is a back view of the coupling showing the splined shaft which carries the runner, or driven member, and through which power is transmitted by means of the conventional friction clutch and transmission to the rear axle of the car. Surrounding this shaft is a simple and ingenious type of gland or seal which prevents any leakage of fluid from within the casing.

Through one of the small filler holes, we pour into the casing a special type of oil, which has the property of maintaining an almost constant viscosity over a wide range of temperature. In practise, it is impossible to over-fill the coupling, because the filler hole can only be uncovered at an angle that permits filling to no more than 80% capacity.

Now, we have our coupling complete, installed, and ready to run. When the engine is started, the coupling revolves with the crankshaft just as the flywheel did.

But what's happening inside it? The vanes attached to the casing are rotating with it, throwing the oil around and outward like a vertical whirlpool until it crosses the quarter inch gap between the driver and runner, impinges on the vanes of the runner and causes it to turn. Thus we visualize the oil whirling around and around in this closed circuit, snaking in and out between the vanes of the driver and runner—picking up a load of energy from the driver—carrying it across to the runner—and returning again and again to the driver for more energy. In operation, the path of the oil spirals like the stripes on a barber pole bent into a hoop.

Actually, of course, the driver, revolving at crankshaft speed, always turns just a little faster than the runner, or driven member resulting in what might be called a "cushioning" effect. And, it is this inherent principle of the fluid coupling that imparts to The Fluid Drive certain amazing characteristics of performance that are impossible to attain in any motor car without it.

ADVANTAGES OF THE *FLUID DRIVE*

IT is not in any sense an over-statement to say that the adoption of Fluid Drive for the Chrysler Custom Imperial represents the most far-reaching improvement in motor car construction since chains and sprockets were discarded in favor of bevel gears.

From here on, you will find a number of statements in this booklet that are difficult to believe, because they are so definitely opposite to any experience you have ever had behind the wheel of a motor car. It will, indeed, be no reflection on your open-mindedness if you say, finally, "I'll believe these things only when I see them done."

For instance, you would not think of stepping into your present car, and starting the engine with the gear shift lever in **HIGH** and the clutch **ENGAGED**. Yet you can do exactly that with Fluid Drive, without the slightest injury to any mechanical part. Your engine will not stall; it will continue to operate. Moreover, you will not feel the faintest jerk or jar as the car moves from a standstill. This is true even if you suddenly push the accelerator pedal right down to the floor board. The car seems to gather momentum as smoothly as a toboggan on a gradual slope.

Does that statement suggest some further possibilities? It should—and you probably are thinking: "That ought to make it possible to drive the car in high gear about 99% of the time, under ordinary conditions." Believe it or not, that is actually and demonstrably true—not only under ordinary conditions, but also under conditions that might be referred to as extraordinary.

Take, for example, slow moving traffic—icy, slippery



Over the route pictured above, Car "B" with conventional drive would necessitate using the clutch and gear shift lever at least sixteen times. Car "A", the Chrysler Custom Imperial with Fluid Drive, would traverse the same route without declutching or changing from high gear.

pavements—moderately steep hills—tough going over a muddy stretch of road—all these you can take in stride, without ever touching the gear shift lever or clutch.

The cushioning characteristics of The Fluid Drive are such that the engine does not stall when the car is stopped with clutch engaged and gear shift in high, second, low, or reverse.

By now, you probably are about to ask, "If all this is so, why equip the car with a clutch and transmission—The Fluid Drive seems to serve the purpose of both?" To a very large extent, that is true, but there will be times when you need to use the clutch to shift gears.

It is necessary to shift through the gears when rapid acceleration is required from a standing start, and the clutch must be used when going into reverse. Therefore, a conventional friction clutch is mounted between the fluid coupling and the transmission, as shown in the accompanying illustration.

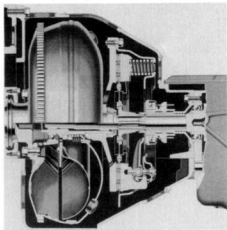
In addition to making the operation of the Chrysler Custom Imperial easier and more enjoyable, The Fluid Drive yields other advantages that are of equal importance. The clutch, transmission and rear axle are protected from shocks due to the sudden application of power. In fact, it is very difficult to cause any jerky movement of the car, no matter how harshly the accelerator may be used. Every torque reaction that the engine might set up, even that due to frequent missing, is damped by The Fluid Drive.

A surprising and most desirable feature is the action of the car on an icy pavement. Here acceleration and deceleration through the foot throttle are accomplished so gently and evenly that the danger of skidding is substantially reduced.

It has been established by Chrysler Corporation engineers, through a long series of tests, that The Fluid Drive con-

tributes very materially toward keeping the mechanical efficiency of the car at a higher point over a longer period of time. As for the device itself, it involves nothing that can wear out, and nothing that requires adjustment. There is, however, one requirement that admits of no compromise—the fluid used in the coupling must be of the correct chemical analysis and viscosity. This fluid is obtainable **ONLY** through the Chrysler Parts Corporation, and no other should be used under any circumstances.

If this booklet has stimulated your desire to ride in the new Chrysler Custom Imperial, by all means take the first opportunity of doing so. You will be amazed and perhaps puzzled by the experience. Moreover, you will be among the very first to acquaint yourself with a development that we feel certain forecasts revolutionary and far-reaching improvements in American motor cars. Chrysler Corporation engineers again are pioneering, as they have done in the past, with high speed engines, hydraulic brakes, Floating Power and all-steel safety bodies. The Fluid Drive seems destined to be an even greater achievement.



Sectional view, showing fluid coupling, friction clutch and front end of transmission case. Power is transmitted from the engine solely through oil, which fills the fluid coupling to 80% capacity.

Questions

A N D A N S W E R S

QUESTION: Is it possible to start the engine of a car equipped with Fluid Drive by pushing or towing the car?

ANSWER: Yes—in exactly the same manner as any other car equipped with overdrive. In this case, the oil is energized by the runner, thus turning the driver, which transmits its rotary motion to the crankshaft of the engine.

QUESTION: Does Fluid Drive permit the engine to be used as a brake on long, steep grades?

ANSWER: Yes, the same as any conventional car equipped with overdrive.

QUESTION: How can a car as large as the Chrysler Custom Imperial be driven through the medium of only two gallons of oil?

ANSWER: While it is true there are but two gallons of oil in the coupling, this fluid circulates so rapidly that an amount equal to the weight of the car leaves the driver and enters the runner in as little as nine seconds.

QUESTION: What happens if the level of fluid in the coupling should drop considerably below normal?

ANSWER: While such an occurrence should be extremely rare, nothing of a serious nature could happen. The efficiency of the drive would be temporarily impaired, and this would be noticed immediately in the sluggish operation of the car and in excessive engine speeds.

QUESTION: What damage might be done through using the wrong kind of fluid in the coupling?

ANSWER: The proper fluid is a low viscosity mineral oil, which also serves to lubricate the bearing enclosed in the coupling. The pour point is such that the oil will pour at the lowest anticipated temperature, and it has no corrosive effect on the steel parts of the unit. A substitute fluid lacking in any of these qualities is likely to cause trouble. If the recommended fluid is used, no trouble of any kind will be experienced.

QUESTION: What type of seal is used to retain the fluid in the coupling?

ANSWER: The seal is of the metallic type, consisting of two flat lapped surfaces, held in contact by a continuous spring load. The finish on the surface of this sealing unit is so accurate that, when held in contact by the spring, oil will not pass through even though rotation exists.

QUESTION: Is the seal adjustable?

ANSWER: No means of adjustment is provided, because none is ever required.

QUESTION: Do extremes of heat or cold have any material effect on Fluid Drive?

ANSWER: No, because the viscosity of the recommended fluid is not sensitive to extremes of temperature.

QUESTION: What effect does Fluid Drive have on fuel economy?

ANSWER: None.

QUESTION: What material is used for the parts of the fluid coupling?

ANSWER: The major structural parts are made entirely of steel—stamped, pressed or forged. The seal is made of brass and bronze. No castings are used. Hubs for the impeller housing and runner are forged—the impeller housing, the runner disc and the cover are pressed from cold rolled steel, and the fins are stamped from the same material.

QUESTION: Is there any sacrifice of acceleration through The Fluid Drive?

ANSWER: None whatever—maximum acceleration is available by shifting through all gears, just as in a standard car.

QUESTION: With Fluid Drive, under what conditions is it necessary to shift into lower gears?

ANSWER: When maximum acceleration is desired from a standing start—when climbing an exceptionally steep grade—when pulling the car out of a ditch or deep chuck-hole.

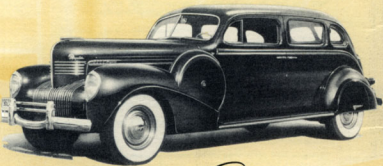
QUESTION: Is there anything new to learn about the operation of cars equipped with Fluid Drive?

ANSWER: Nothing whatever, except to develop the habit of using the clutch and gearshift lever much less frequently.

QUESTION: How does The Fluid Drive operate when the car is in reverse gear?

ANSWER: There is no difference in operation of The Fluid Drive in forward or reverse gear. The fluid coupling always turns forward, and the reverse drive is obtained in the transmission behind The Fluid Drive.





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Custom Imperial

THE
FIRST AMERICAN
MOTOR CAR OFFERING

FLUID DRIVE

AS
STANDARD EQUIPMENT

