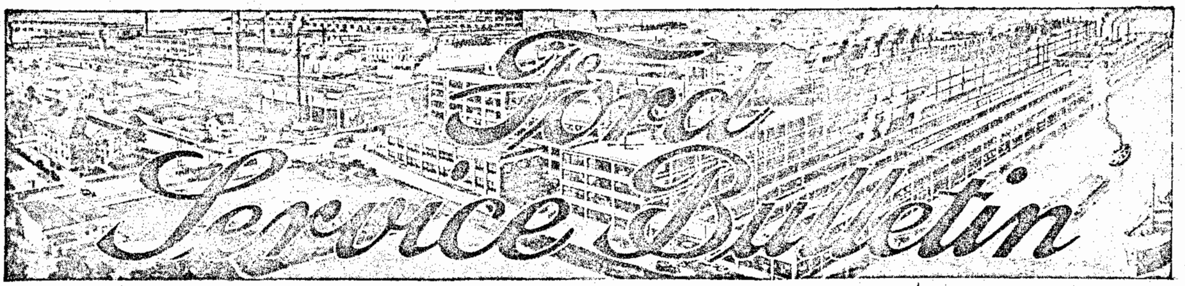

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Further Proof That the "Flat Rate" Should Be Adapted 100%

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AUTOMOBILE TRADE JOURNAL

Many Electric Service Stations Adopt Flat Rates

Here Are Some Typical Time Averages and Flat-Rate Charge Systems in Actual Use

Plan Has Proven Very Satisfactory to Owner and Service Station

Suggestions in This Article Will Help Form Foundation for Labor Charges for Flat-Rate System. Charges Based on Time ... Must be Accurate

Our Service Department Gives You a

FLAT RATE

On All Repairs to Any Automobile

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Schedule of Flat Rate Operations for the Hupmobile Model R

Lincoln Alloy Pistons

The pistons which have been used in all Lincoln engines since engine No. 5705 are made of a specially heat-treated alloy which is very nearly as hard as cast iron. The hard grey iron from which Lincoln cylinders are cast will show a Brinell hardness of 175 to 200, and the piston alloy Brinells at 125 to 165. These pistons have a number of advantages, chief among which are:

1st. Extreme light weight contributing greatly toward eliminating motor vibration. This piston weighs 12 to 13 oz. less rings and wrist pins.

2nd. Carbon will not adhere to and build up on this alloy as it does on cast iron.

3rd. Great heat conductivity, tending to keep the piston head cool.

4th. The alloy piston is fitted to the cylinder bore with the same clearance as a grey iron, i. e. from .002″ to .005″. The design of this piston allows for expansion without danger of seizing. The skirt is cut away from the head on both sides of the wrist pin bosses and is slotted vertically on one side. (See Fig. 56.)

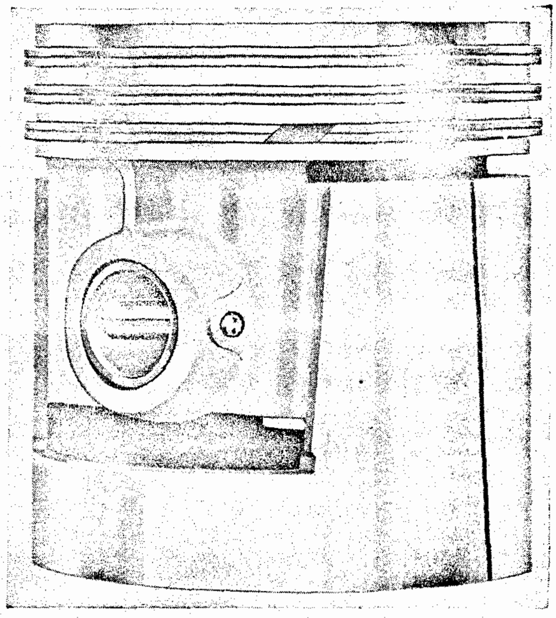


Fig. 56

Notwithstanding the fact that the alloy piston is considerably lighter in weight than the thin iron piston, there is still sufficient material used in its construction to insure the rapid dissipation of heat from the piston head.

The piston rings used with the alloy pistons have a deeper section than the ones used with the cast iron, thus giving them a larger bearing area or surface on the sides of the ring groove. The fit of the piston ring in the ring groove and on the cylinder wall are of vital importance in controlling oil pumping and leakage. Contrary to popular belief the gap between the ends of the ring is a minor consideration. If the ring has considerable up and down motion in the ring groove, it will act as a miniature oil pump. (See Fig. 57.) As the piston moves downward the ring moves to the top of the groove. The oil in the cylinder wall is collected in the space under and back of the ring. When the piston starts upward the ring shifts to the bottom of the groove and the oil below and in back of the ring is forced around to the upper side. As the piston reaches the top of the stroke and starts downward the ring again shifts to the top of the groove and the oil is deposited on the cylinder wall at a point above the top ring and, therefore, cannot be carried back with the piston on its down stroke. It will be seen that a large amount of oil will be pumped into the combustion chamber in this manner, as, at a speed of 20 miles per hour, this action takes place approximately 1000 times in each cylinder while the car is covering one mile.

Leakage past the face of the ring is eliminated in the Lincoln engine with the extreme care with which the cylinder bores are finished and the piston rings inspected. Each ring is tested for flatness, roundness and tension. The rings fit the ring grooves with a clearance of .001″ to .0025″. The gap between the ends of the ring is from .010 to .020. We have had cases where mechanics have fitted oversize rings to standard pistons in order to close up the gap tightly. Under no consideration should this be done. The piston rings are machined so as to be perfectly round when compressed to the diameter of the cylinder bore. When an oversized ring is compressed to go into a standard bore, it is no longer round but assumes an elliptical shape and the leakage resulting is many times greater than could possibly take place through the gap.

The piston rings, being the point of contact between the piston and cylinder wall, convey the greater part of the heat from the piston head to the cylinder walls which are maintained at an even temperature by the cooling liquid with which they are jacketed. Therefore, it is necessary that a definite clearance be allowed between the ends of the ring to allow for the expansion of the ring caused by this heat. This is even more necessary with an alloy piston than with cast iron, since the alloy conducts the heat much more rapidly than the cast iron and it is not localized in the piston head to such an extent. Consequently the rings in the alloy piston operate under a higher temperature than those on a grey iron. If the rings are fitted with too small a gap the ends will touch before the ring is fully expanded. Further expansion of the ring will in all probability score the cylinder wall and break the ring. When fitting alloy pistons the following precautions must be observed: Care should be taken when installing piston rings to see that the small oil groove at the edge of the ring is toward the bottom of the piston. The piston pin has a very snug fit in the bosses. Do not attempt to drive it in place. The piston should be immersed in hot water for 15 or 20 minutes, then the piston pin can be pushed in by hand. Driving the pin in will distort and strain the piston walls. Also make certain that when assembled in the motor, the slot in the piston skirt faces the left side of the engine regardless of which block they are in.

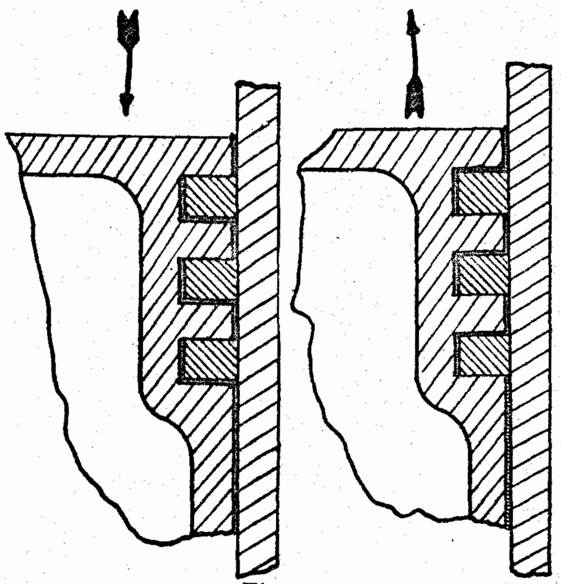


Fig. 57

When installing pistons make certain that all pistons are the same weight. The weight is stamped on the head of each piston in ounces and quarter ounces, for example 12.3 is $12\frac{3}{4}$ oz.; 12.2 is $12\frac{1}{2}$ oz., etc.

Twistest Connecting Rod and Piston Aligning Jig

On page 60 of the January Service Bulletin we mentioned the importance of aligning the pistons and connecting rods before assembling them in the cylinder. Let us again mention that **this is a very important operation,** for many times oil pumping and piston knocks are caused by failure to do this on the part of the mechanic.

The Twistest Aligning Jig (Figs. 58 and 59) is especially designed for Ford work. Fig. 58 illustrates the connecting rod mounted on the jig with the aligner held mounted through the piston pin hole. You will note that it aligns at four different points and is especially designed to allow the mechanic to see these four points at one time. If the head does not touch these four points at once bend the rod slightly with a bending bar. Fig. 59 illustrates a rod and piston assembly mounted on the jig. Note the long shaft to which the rod is attached, this to allow the piston to be tested out on the opposite side without changing its position on the shaft. This is after

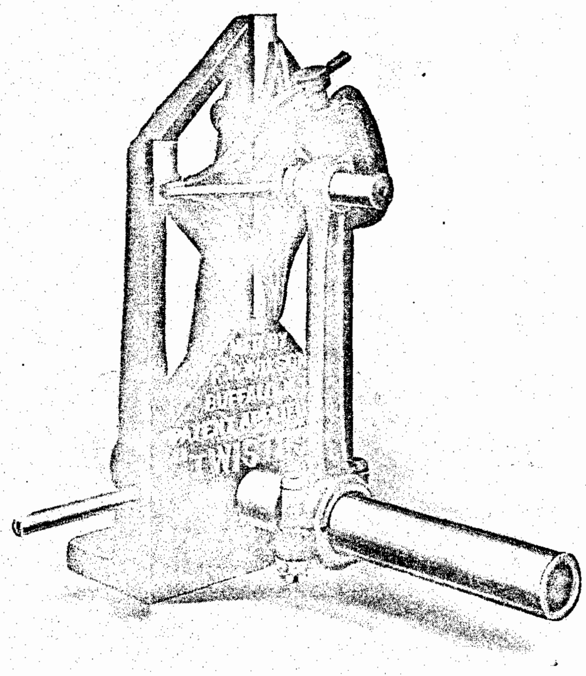
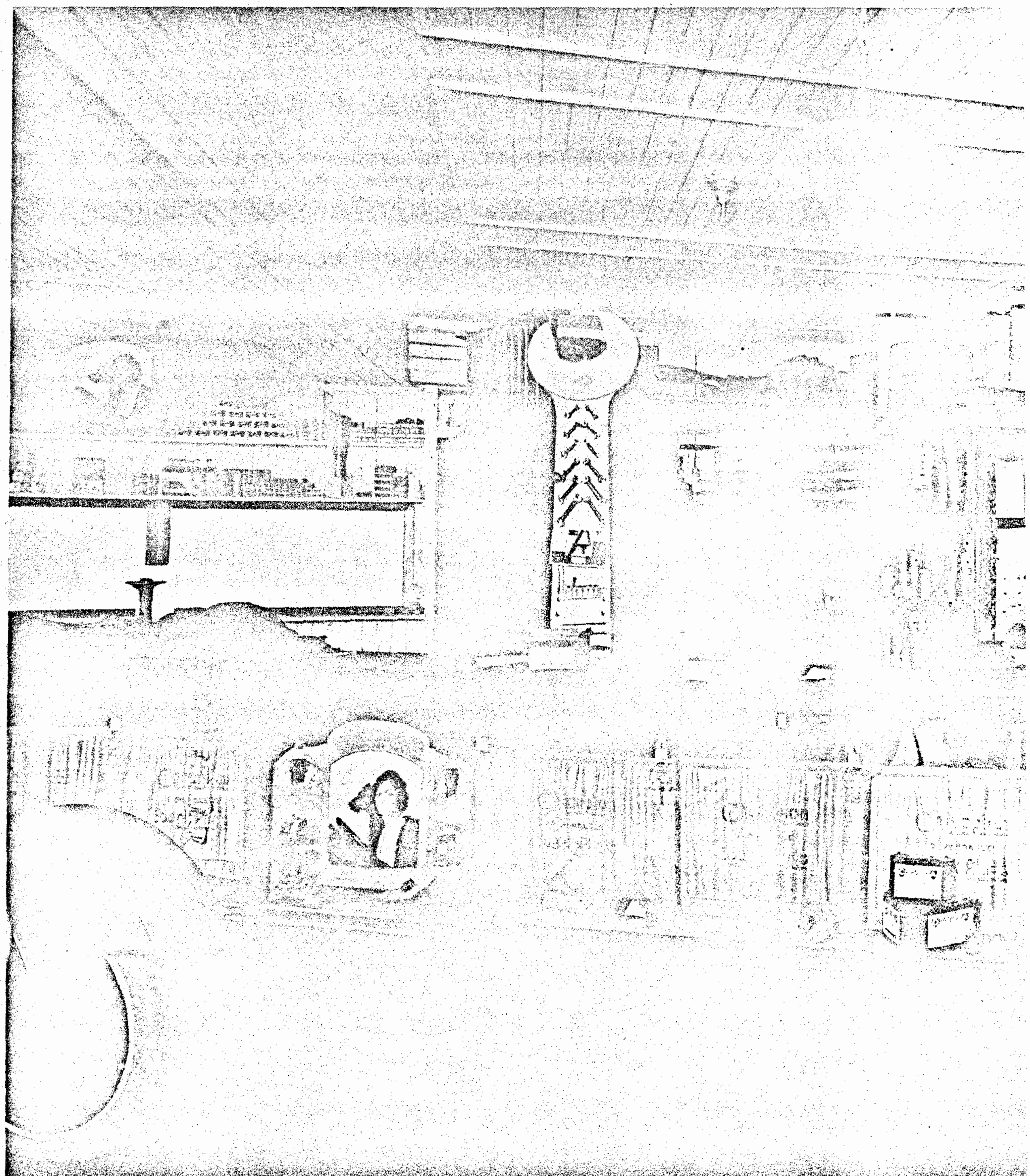
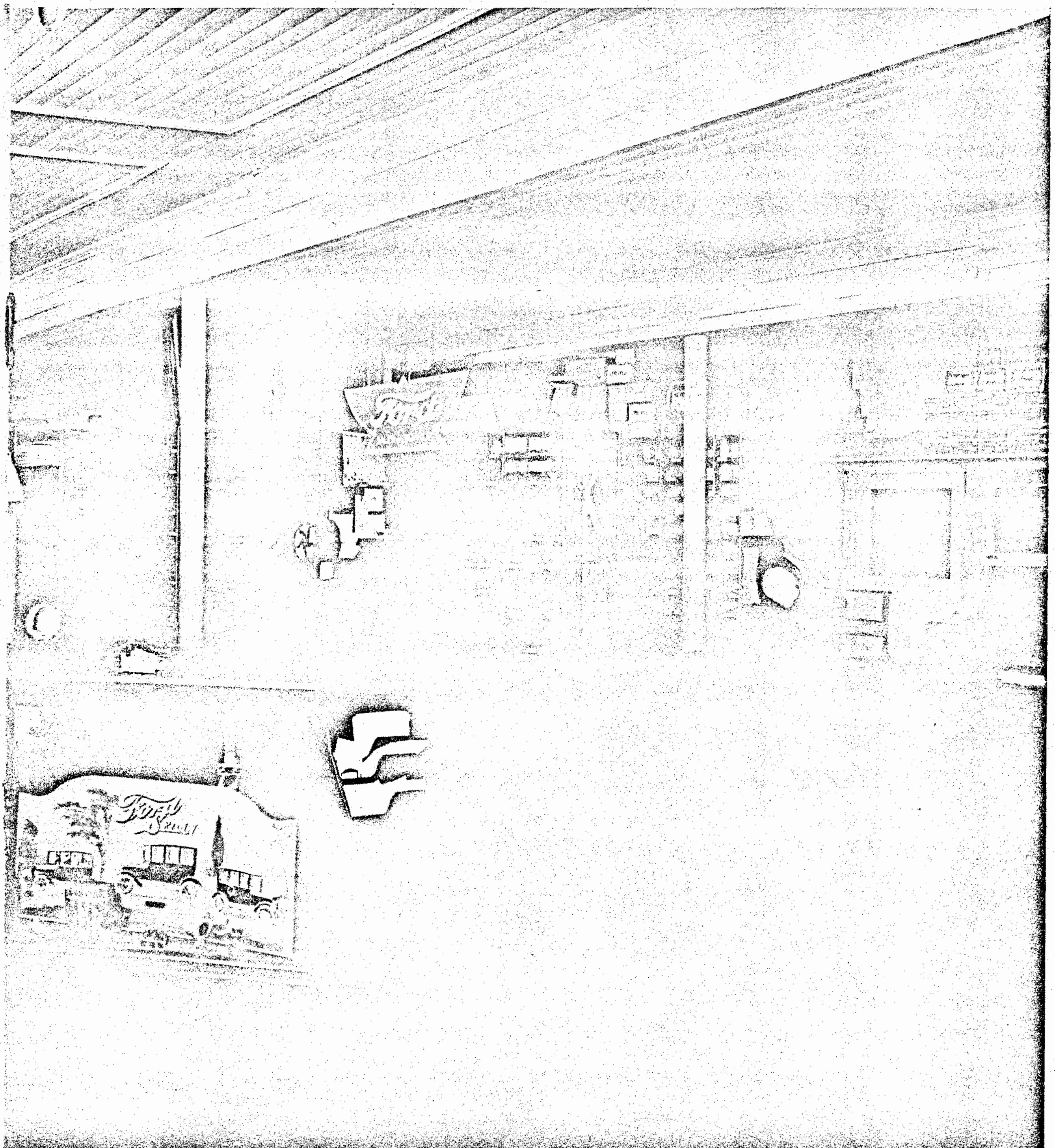


Fig. 58

(*Continued on Page 70*)



"Attractiveness and Cleanliness" is the motto of Messrs. See &
stockroom, equipped with Lupton Bins. These bins may be se



)uggan, Urban Dealers in Toronto, Ont., who maintain the above
e.. rom Messrs. John Millen & Sons, Ltd., Toronto and Montreal.

Twistest Connecting Rod and Piston Aligning Jig

(Continued from Page 67)

you have tested it out on one side, pull the shaft out and insert the other end and test the other side of the piston. If it does not align up properly use a bending bar on the rod as before.

At the base of the aligning device (Fig. 59) you will see a rod projecting from the side. When tightening clamp screw in piston, mount piston on this rod by inserting it through the piston pin. This saves distorting the piston as is ofttimes the case when it is placed in a piston clamp.

This aligning device can be purchased from John Millen and Sons, Ltd., Toronto and Montreal, and Cutten and Foster, Limited, Toronto, Ontario.

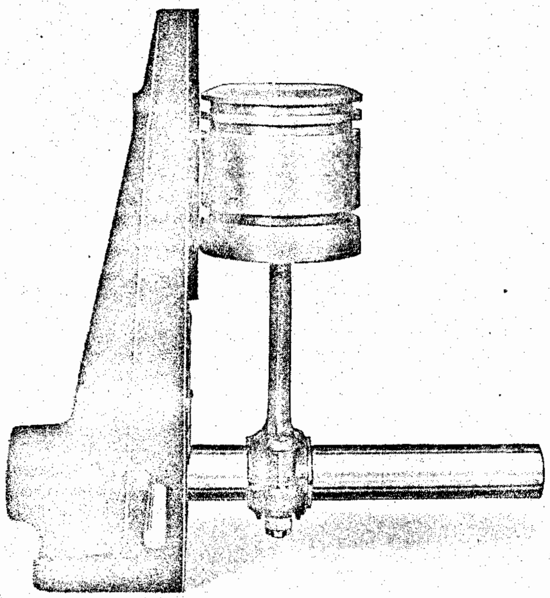


Fig. 59

Ford Mechanics' Section

(Continued from Page 63, January, 1923, Service Bulletin)

Clutch—(Continued)

Types

Cone Clutch—This type operates by a cone shaped wheel which is fastened to the main drive shaft by means of splines and is operated by a spring which engages it to the inner bevelled surface of the flywheel. It is disengaged at the will of the operator by a foot pedal called the clutch pedal. The engaging surface of the cone shaped wheel is lined with a type of no-burning lining.

Multiple Disc—Dry or running in oil. This clutch is composed of two sets of flat discs, one set fastened to the drive member and one set fastened to the driven member. The driven member is engaged with the drive member by one or a set of springs which force the driven plates gradually against the drive plates. It is disengaged in a similar manner to the cone clutch. The dry type usually has some type of asbestos between each disc to keep from burning the discs. The wet type runs in a continued bath of oil which allows the plates to engage gradually and prevents sudden grabbing and excessive wear.

Ford Type

The Ford clutch is a multiple disc type, **running in oil.**

It is mounted on the transmission shaft which is fastened to the flywheel and to the crank shaft by drive pins and cap screws. The disc drum is keyed to the transmission shaft. This disc drum drives the small discs which fit over it and are fastened to it by six notches, which fit into grooves on its outer surface. The driven member, which is also the brake drum, also operates on the transmission shaft but is allowed to turn freely on it. This brake drum is attached to the drive shaft by a drive plate which attaches to the universal joint (which will be explained later). The driven discs or large discs are fastened to the inside outer rim of the brake drum in a similar manner to the small discs. When the two sets of discs are assembled in the clutch, they are placed alternately, first a large disc, then a small disc until the assembly is completed. This places disc drum inside of the brake drum. The clutch push ring is then put in place and the driving plate is fastened in place by six studs. The three lugs on the clutch push ring extend through three holes in the driving plate, which has three fingers with adjustable screws, which press the push ring against the discs, causing them to be pressed together, which engages to two sets of clutch discs, causing the driven member to turn with the drive member. The engaging pressure is applied to the clutch fingers by a spring which is held in place on the drive plate shaft by a clutch spring support and key. The spring pressure of 90 lbs. is applied to a clutch shift which bears against the fingers. These fingers act as a second-class lever and cause this pressure, on the push ring, to 324 lbs.

A foot pedal is provided which acts on the clutch shift, allowing the operator to engage and disengage the clutch at will.

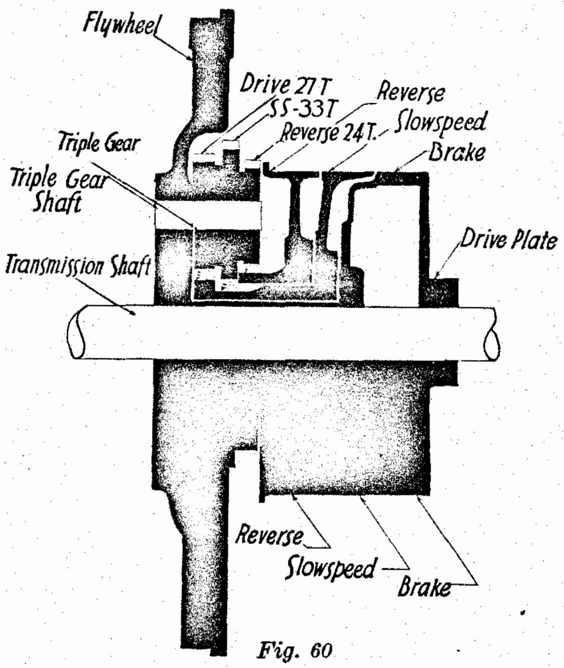


Fig. 60

This multiple disc clutch is small and compact and has metal to metal friction and operates in a constant bath of oil, which insures perfect lubrication. This oil also allows the discs to come into engagement gradually without shock to the mechanism, because the intervening film of oil must first be squeezed out from between the discs so that engagement is not immediately positive.

Transmission—Its Construction

To understand the action of the transmission in slow speed and in reverse it is necessary to know its construction. (See Fig. 60.) First we have the brake drum (previously mentioned as being the driven part of the clutch assembly). This drum is fastened into the end of a long sleeve, called the brake drum sleeve, which revolves freely upon the transmission shaft. Then we have the slow speed drum riveted to a shorter sleeve, which slips over the brake drum sleeve and turns freely upon it. The front end of the slow speed drum sleeve has 21 teeth cut on its outer circumference, forming the central slow speed gear. The third drum, or reverse drum, is riveted to a still shorter sleeve, with 30 teeth cut on its outer surface, which forms the central reverse gear. This revolves freely upon the slow speed drum sleeve. Each sleeve is bushed to fit the next sleeve. Each drum and sleeve turns independently, and the brake drum sleeve turns freely on the transmission shaft. A 27 tooth spur gear is keyed on to the front end of the brake drum sleeve, just ahead of the slow speed gear. This is the driven gear and turns with the brake drum and consequently with the drive shaft.

Mounted on three pins pressed into the web of the flywheel 120 degrees apart, are three sets of planetary spur gears, each set having three gears riveted together. The drive gear (next to the flywheel) has 27 teeth and meshes with the 27 tooth central driving gear. The next gear (slow speed triple gear) has 33 teeth and meshes with the 21 tooth central slow speed gear. The rear one (reverse triple gear) has 24 teeth and meshes with the 30 tooth central reverse gear.

(To be continued)

NOTICE

This Bulletin is issued for the purpose of assisting Dealers and Service Stations.

If you have devised any special tools or short cuts on repair work let us have the information, regardless of how small it may seem.

Any such articles will be fully appreciated and published in the Bulletin if suitable.

The Fordson Transmission

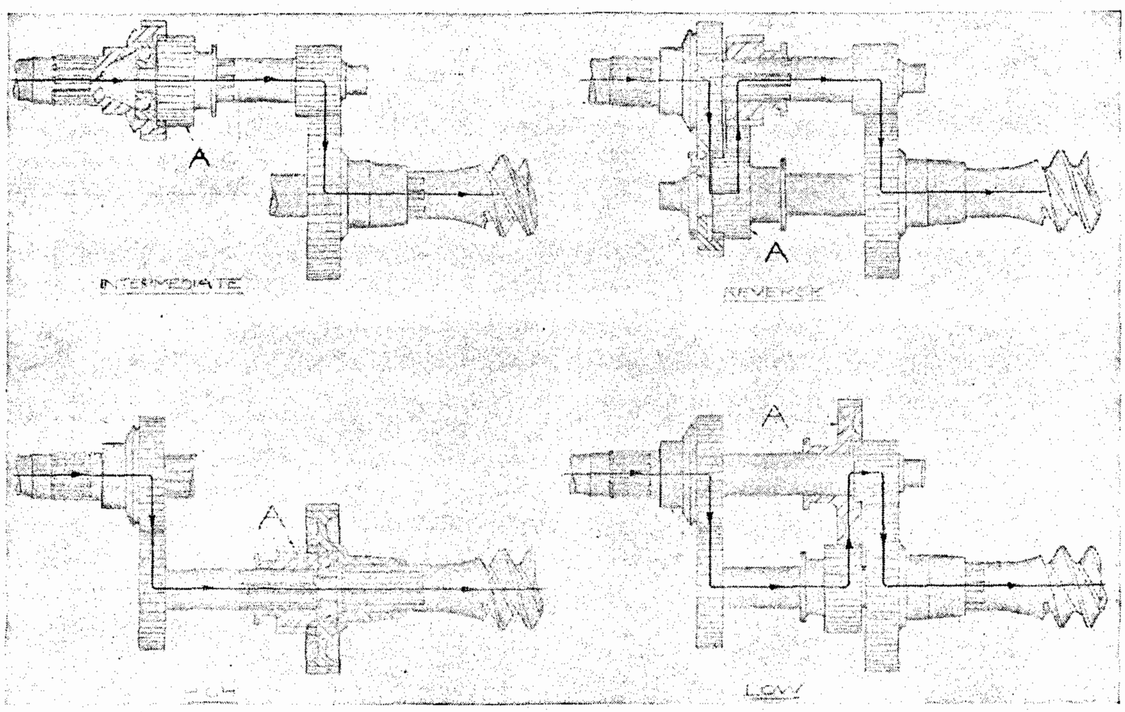


Fig. 61

The constant mesh selective type transmission of the Fordson possesses many advantages over the ordinary automobile type sliding gear transmission used in practically all other tractors.

Constant mesh does not mean that the gears of the transmission do not slide on their shafts for we know that is the purpose of the hand shifter lever. It does mean, however, that the gears on each shaft never shift far enough to come out of mesh with those on the other shaft.

This is accomplished by providing four special internal gears which act as separate clutches for each speed as shown in Fig. 61. Only the gears actually used for the speed indicated are illustrated and these are shown shifted into position for driving the wheels. In each case gear "A" has been shifted into mesh with a concentric gear of the same number of teeth. This means that when shifting, all the teeth of "A" engage with the teeth of the other gear simultaneously, thus dividing the shock equally between all the teeth instead of its being absorbed by one or two teeth as in sliding gear transmissions.

The weight or size of the transmission is not increased by the special internal gears as they are cut inside of the other gears.

The illustration also shows that four of the external gears are provided with extra wide faces so as to give them sufficient length to enable them to mesh with the internal gears while transmitting power to the other shaft. This, of course, adds to the strength of the transmission and reduces wear on the parts.

In high and intermediate speeds there is only one gear reduction in the Fordson transmission. In low and reverse three pairs of gears are working. The power loss in high speed and in intermediate, which is used most of all, is a practically negligible quantity. Likewise the efficiency is exceptionally high in operating in both low speed and reverse.