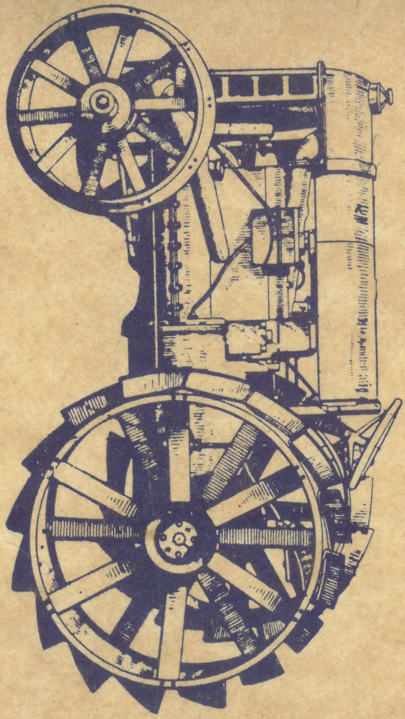


FORDSON

FARM TRACTOR



CONSTRUCTION

OPERATION

REPAIR.

FORDSON

FARM TRACTOR

CONSTRUCTION

OPERATION

REPAIR.



BY
VICTOR W. PAGE M.S.A.E.
1925

CHAPTER VII

OPERATION AND MAINTENANCE OF FORDSON TRACTOR

Putting Tractor in Service—Precautions before Starting the Tractor—Transmission Oiling Important—Fill Both Fuel Tanks—Control Lever Arrangement—How to Start Fordson Tractor Motor—How to Shift Gears—To Put Tractor in Action—To Stop Tractor—How to Drive the Tractor—How the Clutch Works—How Vaporizer Works—Best Mixture of Air and Gas—Function of Shunt Valve Lever—Function of Float Mechanism—How Vaporizer is Adjusted—Gasoline May Be Used—Water in Fuel Causes Trouble—Construction and Action of Air Washer—Fordson Tractor Maintenance—Transmission Lubrication—Keep Timer Oiled—Keep Tractor Clean—Lubrication Chart—Putting Tractor Up for Winter—Important Instructions to Operator Summarized—Don't Race the Motor—Shifting Gears—Braking the Tractor—Lubrication—Hitch.

THE Fordson tractor has been in the market now for several years and thousands have been given tests that demonstrate their practical value in the numerous applications in agricultural work to which they have been applied. The general construction of this tractor, which is made by Henry Ford and Son of Dearborn, Mich., has been described in the preceding chapter, but owing to demands of our readers, information regarding the operation and use of this tractor as furnished by its makers has been compiled in a separate chapter because the importance of the subject warrants a more complete exposition in this 1920 edition.

Many farmers are already familiar with the opera-

The Fordson Tractor

tion of the Ford tractor motor which is modified slightly from that used in the passenger car for tractor use and increased in power. The ignition system is the same as used in the Model T, as is the cooling and engine lubrication. The gearing operates on the sliding gear principle, however, and the carburetor uses kerosene as fuel for regular operation though gasoline is used for starting purposes and for running the engine until it gets warmed up enough to use the heavier fuel.

The instructions that have been given in preceding chapters relative to repairs of the model T power plant apply just as well to that of the Ford tractor. The engine is subject to the same troubles as that of the passenger car and truck and the same remedies will cure them. Special instructions are given for handling the clutch and gear shift of the tractor, which differ in operation from similar devices in the touring car or truck. Suggestions are also given for the use of the tractor in plowing and interesting photographs are presented showing the tractor at work.

Putting Tractor in Service.—Before starting the tractor, the following instructions must be followed: (1) Fill the radiator with clean water. (2) Fill the crank case to the proper level with heavy, high-grade motor oil. (3) Fill the transmission housing to the level with heavy fluid gear oil. (4) Fill the kerosene tank nearly full. (5) Fill the gasoline tank nearly full. (6) Fill the air washer with clean water.

Precautions Before Starting the Motor.—Before starting the motor fill the radiator, by removing cover at top (see Fig. 117), with clean fresh water. If clean water cannot be obtained it is advisable to strain it through muslin or other similar material to prevent any foreign

Putting Tractor in Service

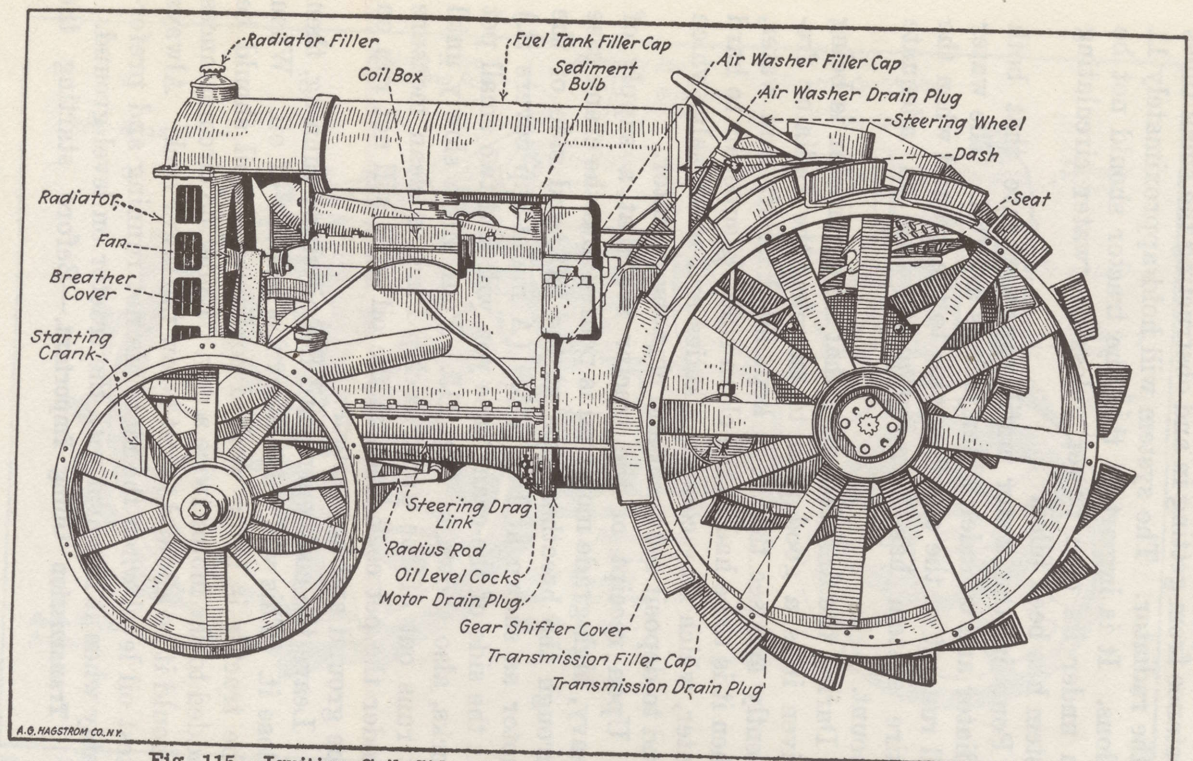


Fig. 115.—Ignition Coil Side of Fordson Tractor Showing Air Washer Location.

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substance from getting in and obstructing the small tubes of the radiator. The system will hold approximately 11 gallons. It is important that the tractor should not be run under its own power unless the water circulating system has been filled.

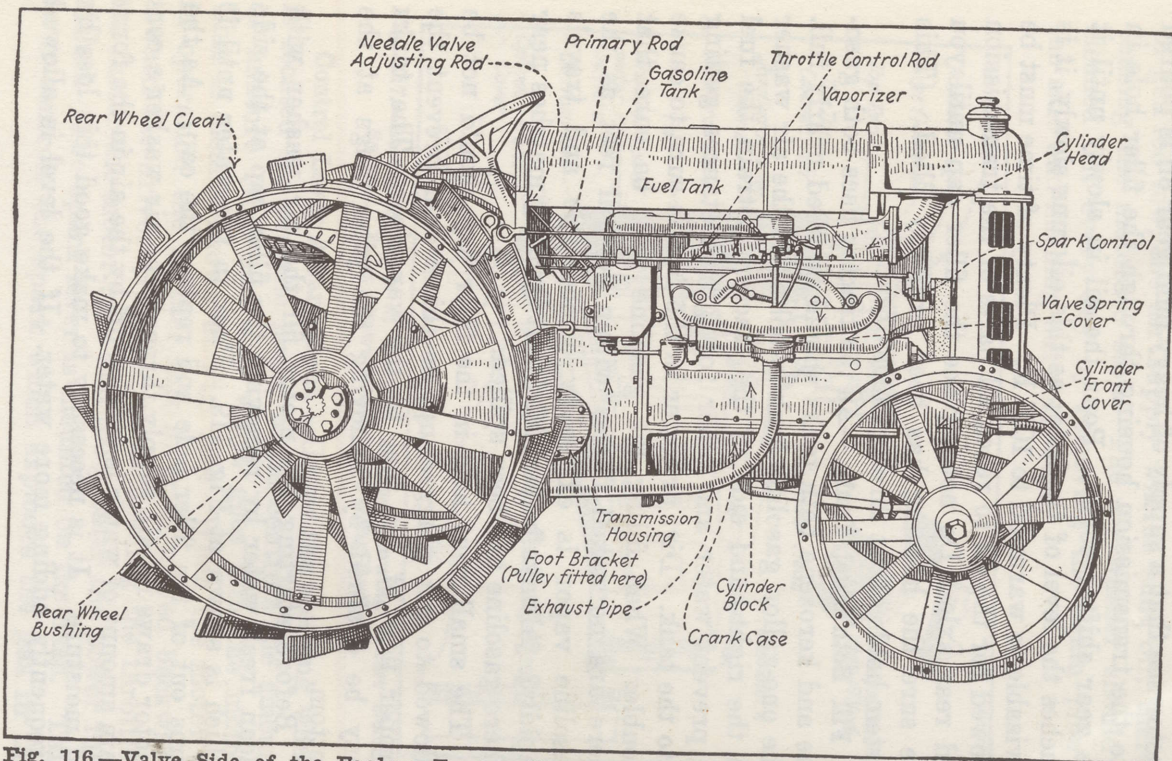
Pour in the water until you are sure that both radiator and cylinder water jackets are full. The water will run out of the overflow pipe to the ground when the entire system has been supplied with an adequate amount.

During the first few days that a new tractor is being driven it is a good plan to examine the radiator frequently and see that it is kept filled. Soft rain water, when it is to be had in the clean state, is superior to hard water, which may contain alkalies and other salts which tend to deposit sediment and clog the radiator.

Upon receipt of the tractor see that a supply of heavy, high-grade motor oil is poured into the crank case through the breather pipe at the left-hand side of the motor as shown at Fig. 115. (A metal cap covers it.) At the side of the crank case you will find two small pet cocks, also shown at Fig. 115. Pour oil in slowly until it runs out of the upper cock. Place a clean measure under the pet cock to catch the oil so it will not run on the ground and be wasted.

Leave the cock open until the oil stops running, then close it. This will take about $2\frac{1}{2}$ gallons of oil. When the tractor is being worked continuously, oil should be added to the motor twice a day. Under no circumstances should it be allowed to get below the lower cock. Always test oil level when the motor is not running and preferably when it is warm with the tractor on level ground.

Transmission Oiling Important.—Before starting the



Putting Tractor in Service

Fig. 116.—Valve Side of the Fordson Tractor Showing Auxiliary Tank for Gasoline and Location of Kerosene Vaporizer.

The Fordson Tractor

tractor see that a supply of heavy fluid gear oil is poured into the transmission housing through the filler hole in the gear shifter cover. Pour the oil in slowly until it reaches the level of the hole; as this oil runs slowly, it is advisable to warm oil to 100° F. Plenty of time must be allowed for the oil to reach all parts of the transmission and rear axle. Do not replace the filler cap until you are sure the housing has been properly filled. (This system holds about three gallons of oil.)

Fill Both Fuel Tanks.—As the tractor uses both gasoline and kerosene both tanks should be filled nearly full. The one-gallon gasoline tank is bolted to the air washer on the right-hand side of the tractor. Strain the fuel to prevent water and other foreign substances getting into the tank. Dirt or water in the fuel is sure to cause trouble. When filling the gasoline tank be sure that there are no naked flames within several feet as the gasoline vapor is extremely combustible and travels rapidly. Always be careful about lighting matches near where gasoline has been spilled.

The small vent hole in the filler cap should not be allowed to get plugged up, as this would prevent the proper flow of the fuel to the vaporizer. The tanks may be drained by removing the pipe plugs at the bottom.

Before starting the motor fill the air washer with clean fresh water by removing the filler cap at the side which is shown at Fig. 119. Pour in the water until it runs out of the filler hole and replace the cap. As the motor draws its air supply through the air washer a certain amount of water is carried off by the air in the form of moisture. It is necessary to make good this loss by frequently adding more water. If the level is allowed

Control Lever Arrangement

to get too low, the air supply will be shut off, thereby causing the motor to stop. The air washer should be cleaned out every day by removing the drain plug at the side and flushing out with water.

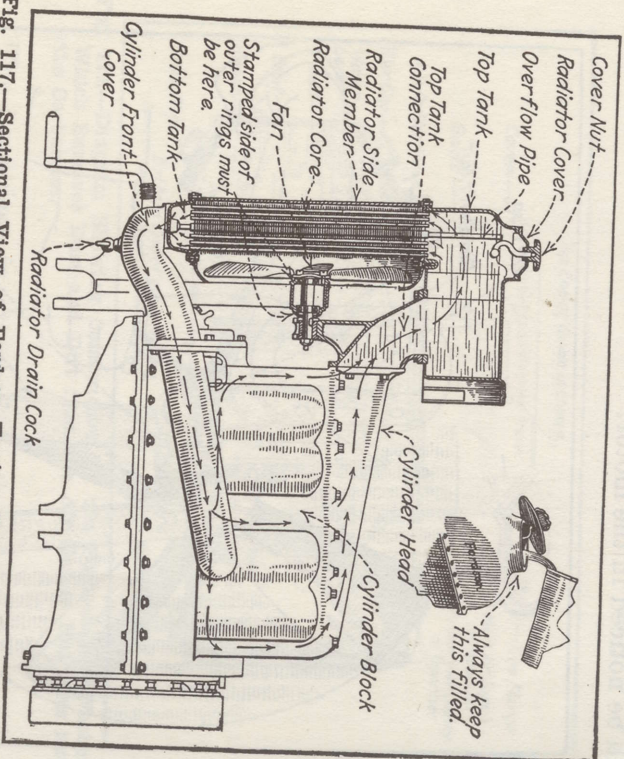


Fig. 117.—Sectional View of Fordson Engine Showing Water Cooling System. Inset Shows Method of Filling Radiator.

Control Lever Arrangement.—Under the steering wheel is located the throttle lever, which controls the amount of mixture (fuel and air) which goes into the motor. This is clearly shown at Fig. 120. When the motor is in operation the farther this lever is moved backward toward the driver (referred to as opening the throttle) the faster the motor runs and the greater the power furnished. The spark lever is mounted on the dash. This lever controls the spark which explodes the gas in the

cylinders of the motor. Moving the lever "upwards" advances the spark. It should be moved until the motor seems to reach its maximum speed. If the lever is advanced beyond this point, a dull knock will be noticed in the motor.

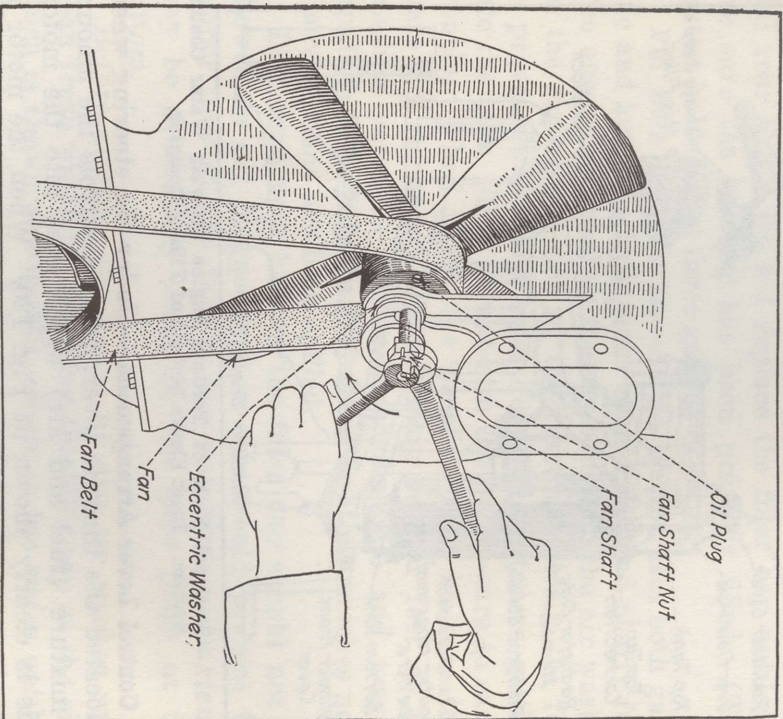


Fig. 118.—Diagram Showing Method of Tightening the Fan Belt on Fordson Tractor.

The spark lever should usually be moved upwards to the third or fourth notch. The throttle should usually be opened about one-third of the way. A little expe-

rience will soon teach you where the levers should be placed for proper starting. Care should be taken not to advance the spark lever too far, as the motor may back-fire and injure the operator through the crank kicking back.

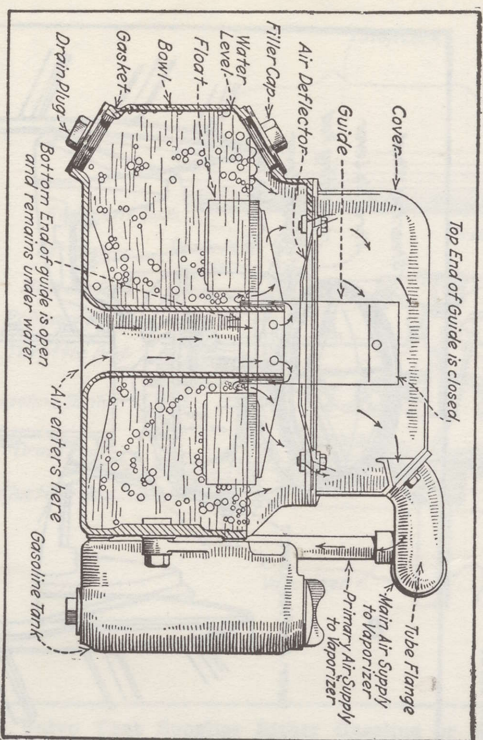


Fig. 119.—Diagram Showing Construction of the Fordson Air Washer Which Removes Dust and Dirt from the Air Before It Passes into the Carburetor.

The vaporizer is attached to the right side of the tractor, fastened on the side of which near the top is located the shifter valve. Turn this lever to the horizontal position, uncovering the letter G, allowing the motor to start on gasoline. This is shown at Fig. 121A in the kerosene position and covering the letter "G."

Near the center of the vaporizer is a shunt valve lever, as shown at Fig. 122, which controls the amount of heat supplied to the kerosene vapor tube. When starting the motor move this lever upwards to the "off" position so that the exhaust gases will not come directly

in contact with the vapor tube. After running the motor until the vaporizer is properly heated (usually one to five minutes, varying with the weather), move the shifter valve lever to the vertical position shown at Fig. 121A, uncovering the letter "K," turning the motor on to kerosene.

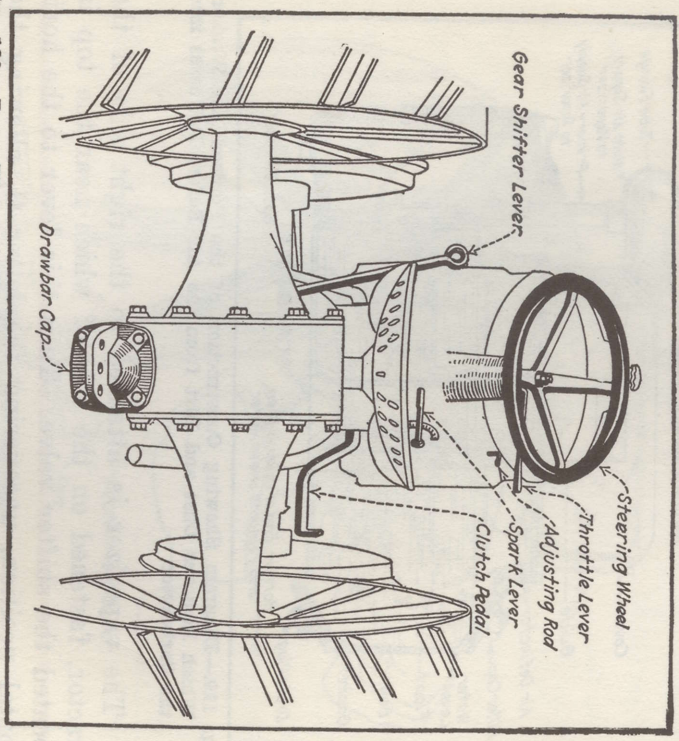


Fig. 120.—Rear View of Fordson Tractor Showing Control Members and Drawbar Cap.

How to Start Fordson Tractor Motor.—See that the gear shifter lever on the side of the transmissions is in the neutral (central) position, i.e., the position in which it can be moved freely from side to side. Turn on the

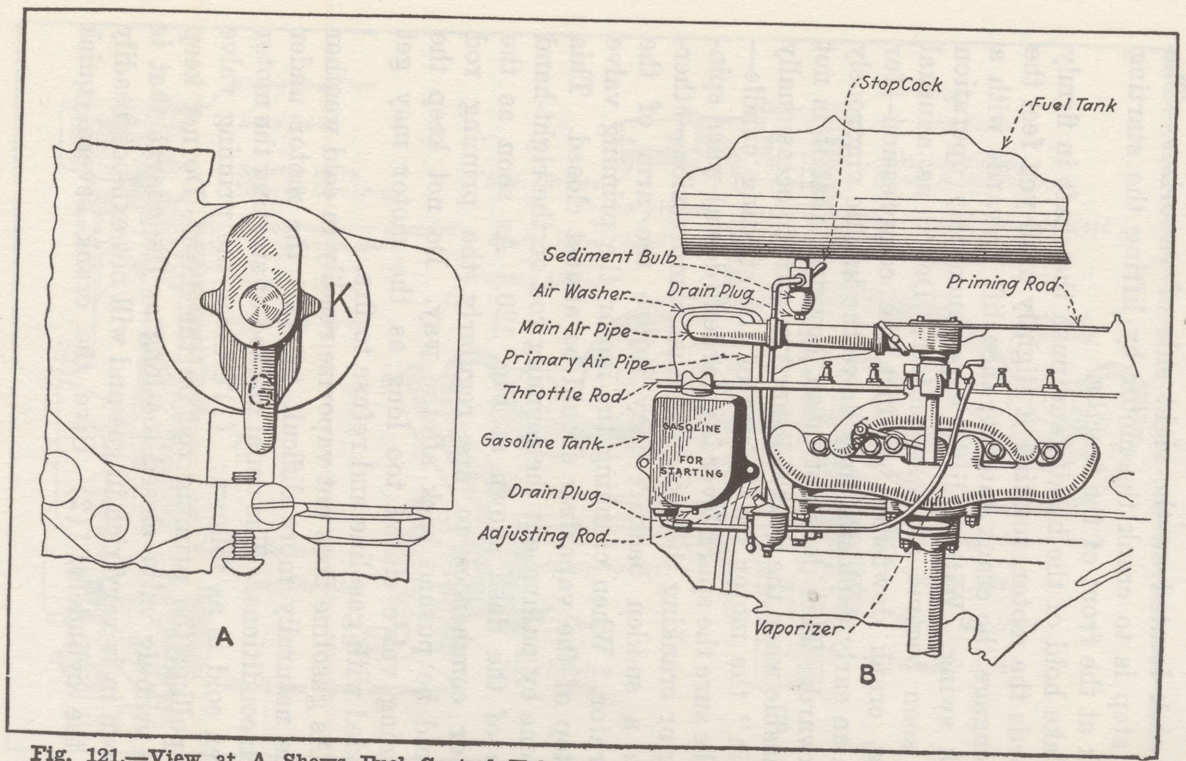


Fig. 121.—View at A Shows Fuel Control Valve That Supplies Either Gasoline or Kerosene to the Vaporizer. At B the Method of Installing the Vaporizer is Clearly Shown.

stop cock located on the right side of vaporizer. The next step is to crank the motor by lifting the starting crank at the front of the tractor.

Take hold of the handle and push the shaft in firmly towards the motor, rotating it slightly until you feel the pin engage the crank ratchet; then lift upwards with a quick swing. With a little experience this operation will soon become an easy matter. Don't, as a usual thing, crank downward against the compression—for then an early explosion may drive the handle vigorously backward. This does not mean, however, that it is not advisable when the tractor is hard to start to occasionally "spin" the motor by the use of the starting handle—but be sure the spark lever is retarded (down) when spinning or cranking the motor against compression—otherwise a sudden backfire may injure the arm of the operator. When cranking the motor the priming valve on top of the vaporizer should be almost closed. This is done by pulling out the priming rod on the right-hand side of the dash shown at Fig. 120. As soon as the motor commences to fire regularly the priming rod should be pushed back all the way. Do not keep the priming valve closed too long as the motor may get flooded with gasoline and refuse to fire.

As gasoline does not vaporize readily in cold weather it is naturally more difficult to start the motor under such conditions. The usual method of starting the motor when cold is as follows: (1) Close the priming valve by pulling the priming rod on the dash. Do not keep the priming valve closed too long as the charge that is drawn in is very rich in gas and will not explode readily in the cylinders. (2) Give the crank several quick

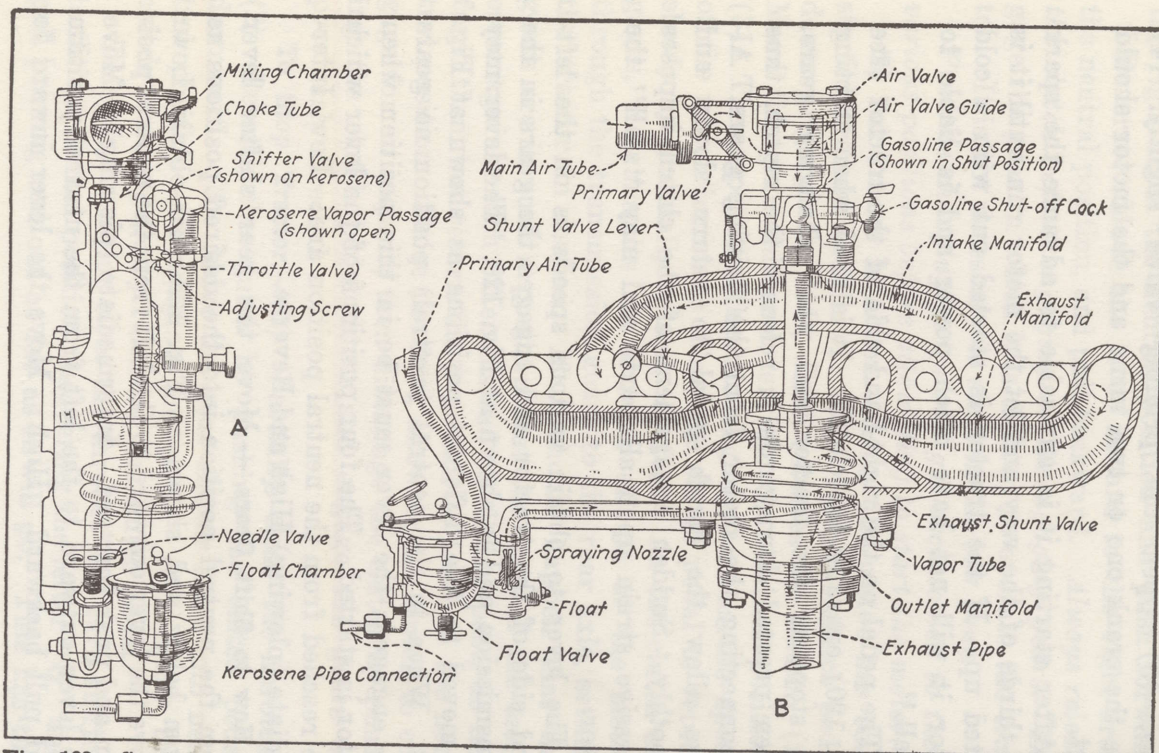


Fig. 122.—Sectional Views of Fordson Tractor Vaporizer Which Uses Kerosene as Fuel for Regular Running and Gasoline Only for Starting.

turns. (3) Open the priming valve slightly. (4) Give the crank one or two turns and the motor should start.

After starting it is advisable to advance the spark two-thirds of the way and let the motor run until it is heated up. If the tractor is started out with a cold motor it will not have much power and is liable to "stall."

The pedal on the right-hand side of the tractor (see Fig. 120) operates the clutch. It is used when starting and stopping the tractor and when changing gears. When pressed downwards it releases the clutch, thus disconnecting the motor from the driving gears. Always allow the clutch pedal to return slowly and smoothly. Sudden engagement of the clutch imposes excessive strain upon all parts and may "stall" the motor.

The lever to obtain various speeds is on the left-hand side of the tractor and engages the gears in the transmission and is shown at Fig. 120. The lever may be moved to five different positions as shown at Fig. 123. When in the neutral (central) position no gears are engaged; the lever must be in this position when motor is started. The four positions of the lever which are reached from the neutral position are: Low, Intermediate (plowing) High and Reverse.

How to Shift Gears.—Move the gear shifter lever from the neutral position into the desired positions as given below and shown at Fig. 123. To obtain Low: Move the lever outward to the left from the neutral position and push forward. Intermediate (plowing): Move the lever outward to the left from the neutral position and pull backward. High: Move the lever inward to

the right from the neutral position and push forward. Reverse: Move the lever inward to the right from the neutral position, and pull backward. *Always release the clutch before engaging or disengaging gears.* Engage the gear in which it is desired to operate the tractor. It is not necessary to start in the low gear.

Practice changing gears and get accustomed to their various positions before attempting to start the motor.

To Put Tractor in Action.—After the motor has been started proceed as follows: (1) Push the clutch pedal downward with the foot, which releases the clutch. (2) Move the gear shifter lever into the desired position. (3) Then open the throttle slightly and as the speed of the motor increases allow the clutch pedal to return slowly by gradually raising the foot. As the clutch engages, it transmits the driving efforts of the motor through the transmission gears to the rear axle, setting the tractor in motion. If it should happen that the gears are in such a position that the ends of the teeth come against each other instead of sliding past, do not force them but return the gear shifter lever to the neutral position. Raise the foot, allowing the clutch to engage for an instant; then disengage the clutch by pushing the clutch pedal down and engage the gears as previously directed.

To Stop Tractor.—(1) Partially close the throttle. (2) Release the clutch by pushing the clutch pedal downward. (3) Move the gear shifter lever into neutral position—disengaging the gears. (4) Allow the clutch to re-engage by releasing the clutch pedal.

To stop the motor close the throttle and turn shifter to the horizontal position uncovering the letter "G" and pull priming rod out as far as it will go. This has the

effect of shutting off the air and filling the cylinders with a rich gasoline vapor which facilitates starting. Never pull out priming rod while motor is running on kerosene. How to Drive the Tractor.—Good operators drive

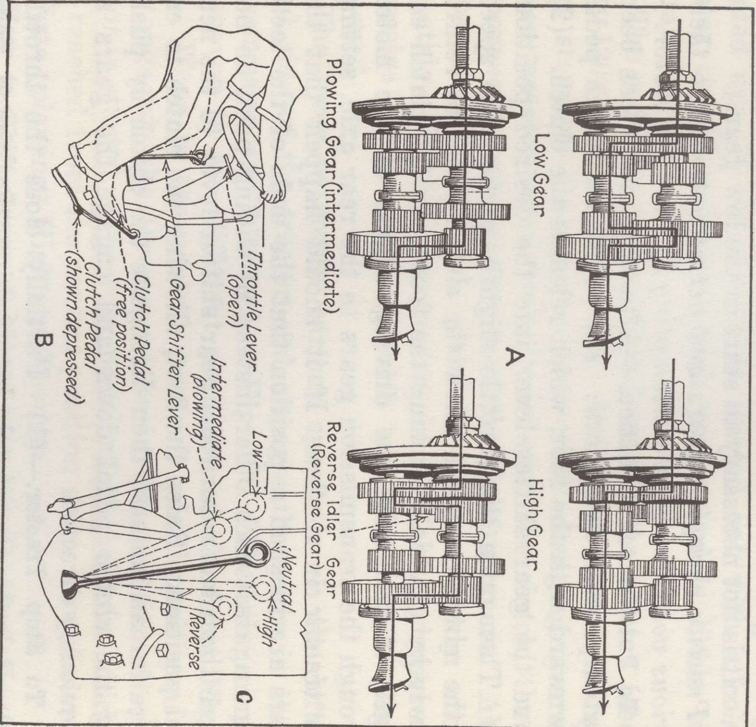


Fig. 123.—Diagram Showing the Various Combinations of Driving Gears to Obtain Different Speed Ratios and Course of Power Through Shaft and Gears at A. The Method of Operating the Clutch and Gear Shift Lever is Shown at B. Positions of the Gear Shift Lever to Obtain Various Speeds is Shown at C.

with the spark lever advanced just as far as the motor will permit. But if the spark is advanced too far a dull knock will be heard in the motor, due to the fact that

the explosion occurs before the piston in the cylinder has completed its stroke. The spark should only be retarded when the motor slows down under a heavy load or when idling. Care should be taken not to retard the spark too far, for when the spark is late, instead of getting a powerful explosion a slow burning of the gas with excessive heat will result. The greatest economy in fuel consumption is obtained by driving with the spark advanced sufficient to obtain the maximum power.

Always change the gears to suit load conditions. Always use the highest gear ratio on which the tractor will give the necessary pull. A little experience will soon teach the driver the proper gears to engage and the best speed at which to run the motor. Never try to do any heavy work in high gear. The speed of the motor is controlled by opening or closing the throttle to suit operating conditions and should be kept nearly constant at all working speeds of the tractor. When running at 1000 revolutions per minute the motor delivers its greatest driving effort and this is the speed at which it should be run when the tractor is working.

When the motor is running at 1000 revolutions per minute the four gear changes give the tractor the following speeds: Low: $1\frac{1}{2}$ miles per hour. Intermediate (plowing): $2\frac{3}{4}$ miles per hour. High: $6\frac{3}{4}$ miles per hour. Reverse: $2\frac{1}{2}$ miles per hour. Use the gear changes to obtain variations in the tractor speed. Never run the motor above the proper speed.

The speed can be judged by observing the number of complete turns made by the rear wheels in one minute. In low gear the rear wheels turn 12 times per minute. In intermediate gear the rear wheels turn 22 times per minute. In high gear the rear wheels turn 54 times per

minute. In reverse gear the rear wheels turn 21 times per minute.

The tractor is of simple construction and very accessible so most of the ordinary adjustments can be made by the driver, who will soon learn to make them himself. In making any extensive repairs or replacements it is best to employ the services of the skilled mechanic who thoroughly understands the tractor.

Remember that a new machine requires more careful attention during the first few days it is being driven than after the parts have been thoroughly "worked in." The tractor which is driven carefully when new usually

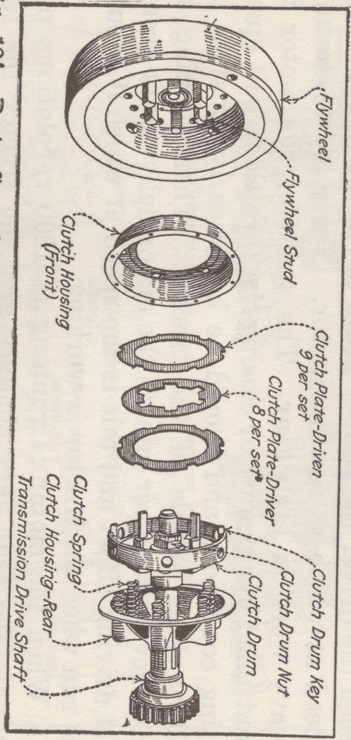


Fig. 124.—Parts Comprising the Fordson Tractor Clutch Assembly as They Appear When the Clutch is Dismantled.

gives the most satisfactory service in the end. See that the tractor has plenty of oil and water before starting work. If the tractor is left in the open over night, see that it is properly covered. The tractor cover is supplied for that purpose. Nothing will shorten the life of the tractor or in fact any farm machinery more than being left exposed to the weather. *Inspect the tractor daily and see that all bolts and*

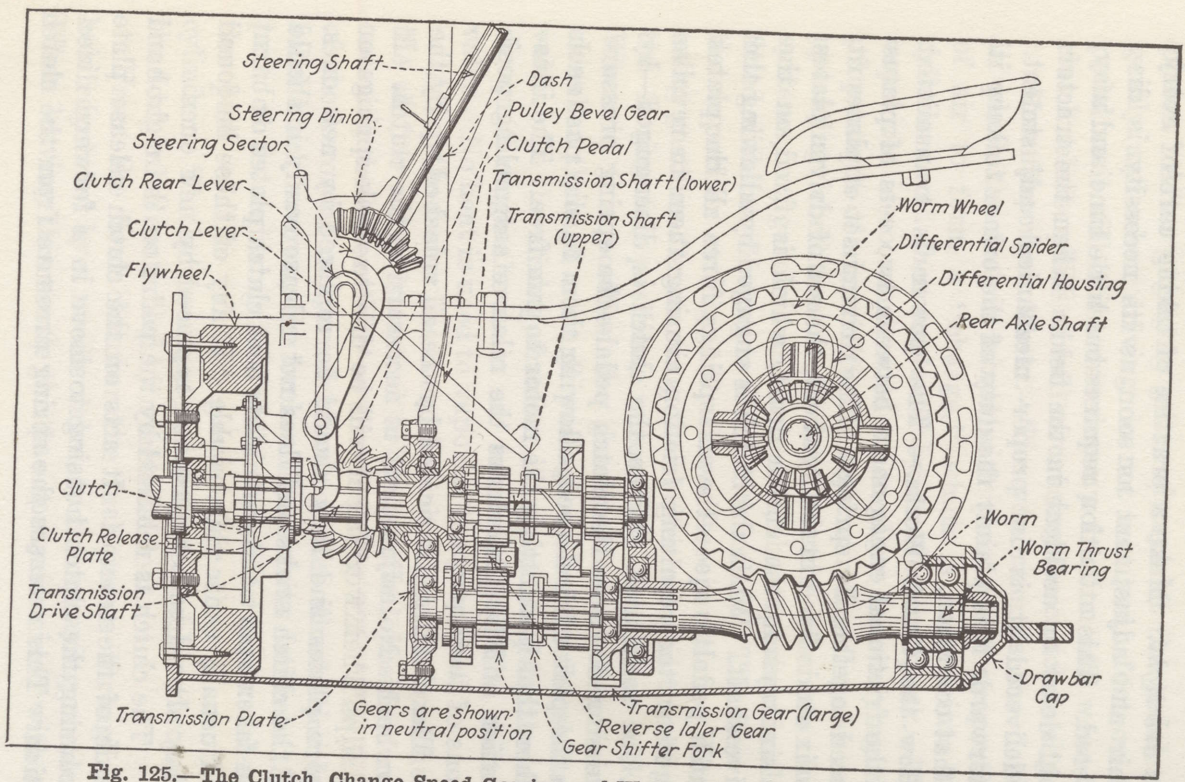


Fig. 125.—The Clutch, Change Speed Gearing and Worm Drive Gearing of the Fordson Tractor.

nuts are tight. Make a practice of taking care of every repair and adjustment as soon as its necessity is discovered. This attention requires but little time and may avoid delay or accident in the field. When the tractor is delivered it is in proper mechanical adjustment. Afterwards it is plainly the duty of the owner to keep it in that condition.

How the Clutch Works.—The power is transmitted by the frictional engagement between two sets of plates forced together by springs. The driving set of plates fit on six studs fixed in the flywheel; the set of driven plates fit six keys in the clutch drum, which is fixed on the drive shaft. When the clutch is engaged by allowing the clutch pedal to rise—the six springs force all the plates together, the resulting friction causing them to revolve as one solid unit. When the clutch is disengaged—by pressing down on the clutch pedal—the spring pressure on the plates is released, allowing them to slip past each other, thus permitting the motor to run free. The illustration at Fig. 124, shows the relative assembling positions of these parts.

The clutch is lubricated by the oil splashed up by the flywheel. No adjustment is necessary in the clutch. If it slips when working it will be due to weak springs or worn plates and they should be replaced by new ones. If the clutch sticks and does not release easily it should be taken apart and examined; bent clutch plates or burnt oil usually cause this trouble. If any of these be found they should be removed and replaced by new ones.

The clutch is released by the pedal on the right-hand side of the tractor. It acts on the clutch release plate causing the clutch housing to move in a forward direction. This releases the spring pressure from the clutch

plates. After engaging gears always let the pedal rise gently and when driving do not rest your foot on the pedal as it will cause unnecessary friction and wear the clutch release plate as well as causing the clutch to slip.

How Vaporizer Works.—The vaporizer is the device in which the fuel is mixed with the correct proportion of air to form a "charge," which is sucked into the cylinders and then exploded by an electric spark. The vaporizer is so constructed as to allow for varying the proportions of air and fuel to meet varying climates and operating conditions. As the tractor has two fuel systems, i.e., gasoline and kerosene, the vaporizer is also fitted with two devices to work with either. The view of the vaporizer at Fig. 132, shows its operation. When using gasoline for starting, the shifter valve is turned to the horizontal position, uncovering the letter "G." When in this position the gasoline enters the mixing chamber through a small passage drilled in the shifter valve. In the mixing chamber it is vaporized by the air drawn through the main air tube and past the shifter valve. No heat is used to vaporize the gasoline.

After the motor has been running at least one minute, the shifter valve is turned to the vertical position uncovering the letter "K," as shown at Fig. 121. The path of the kerosene mixture is shown on the illustration by solid black arrows; the broken line arrows indicate the path of the entering air, while the white arrows show the path of the exhaust gases after they leave the cylinder. The kerosene enters the float chamber through the float valve controlled by a metallic float.

From the float chamber the fuel passes through a hole regulated by a needle valve, to the spraying nozzle. When leaving this nozzle the fine spray is mixed with a

small amount of air entering through the primary tube and is drawn up the heated vapor tube, where it is completely vaporized and forms an extremely rich vapor. The heated vapor then passes through the shifter valve and enters the mixing chamber at the choke tube; there it is mixed with the balance of the air drawn through the main air tube.

The mixture is then in the proper proportion for perfect combustion and is sucked into the cylinders through the intake manifold. The volume of gas mixture entering the cylinders is regulated by the throttle valve just under the choke tube.

Best Mixture of Air and Gas.—A lean mixture has too much air and not enough fuel. A rich mixture has too much fuel and not enough air. A rich mixture will not only quickly cover the cylinder heads, pistons and valves with soot but will also tend to overheat the cylinders and is likewise wasteful of the fuel. It will often choke the motor and cause misfiring at low speeds.

The mixture should be kept as lean as possible without the sacrifice of any of the power of the motor. Too lean a mixture will result in backfiring through the vaporizer, for the reason that the gas burns slowly in the cylinder and is still burning when the inlet valve opens again, causing the gas in the intake manifold to ignite by the backfire. A rich mixture is shown by a heavy exhaust smoke. Proper mixture will cause very little smoke or odor.

The air valve is located at the top of the mixing chamber and automatically controls the quantity of air entering the vaporizer. It is so proportioned that while on its seat it admits the air necessary for idling and lifts gradually as the throttle valve is opened. It gives the

correct proportion of air to the mixture at any speed and load.

Function of Shunt Valve Lever.—This is used to regulate the amount of heat necessary to vaporize the kerosene in the vapor tube. When the valve lever is at the "on" position the exhaust from the cylinder passes around the vapor tube giving the maximum heating effect. When the lever is shifted to the "off" position the exhaust then passes through the center of the shunt valve and does not pass around the vapor tube. This gives a lower temperature at the mixture and should only be used when the tractor is doing heavy pulling in hot weather. If the motor is left running without load the lever must be shifted to the "on" position and the spark fully retarded—otherwise the motor will smoke and the spark plugs will get dirty.

Function of Float Mechanism.—This automatically controls the flow of kerosene into the vaporizer. The float should close the valve when the kerosene reaches the proper level, indicated by a groove inside the float chamber. The level must not be above this line or more than one-eighth of an inch below. The flow of kerosene entering the vaporizer through the fuel pipe is automatically regulated by the float valve raising and lowering on its seat. Should any particle of dirt become lodged in the seat, which prevents the valve from closing, the kerosene will overflow and leak out.

How Vaporizer Is Adjusted.—The vaporizer has but one adjustment—the kerosene needle valve as outlined in the side view at Fig. 122A. The usual method of regulating is to start the motor on gasoline and run it for two or three minutes—keeping the shunt valve on the "off" position. Turn down the needle valve lightly to

its seat, then open it two and one-half turns. Turn the shifter valve on to kerosene, also shifting shunt valve lever to the "on" position; retard the spark lever to about the fourth notch and open the throttle until the motor is running at a good speed. The flow of kerosene should then be cut off by screwing the needle valve down to the right until the motor begins to misfire; then gradually increase the kerosene supply by opening the needle valve until the motor reaches its highest speed and no smoke comes from the exhaust.

After the best adjustment has been found the driver should observe the angle of the adjusting rod on the dash. In cold weather it will probably be found necessary to turn the adjusting rod one-quarter turn to the left, particularly before the motor has been thoroughly warmed.

Gasoline Can Be Used.—If desired gasoline can be used with results quite as good as those obtained when using kerosene. It should, however, be put into the fuel tank and used in exactly the same manner as kerosene. Running the tractor for a period of more than five minutes from the small gasoline tank may burn out the vapor tube. When running the tractor on gasoline, always have the shunt valve on "off" position.

Water in Fuel Causes Trouble.—The presence of water in the gasoline or kerosene tank, even in small amounts, will prevent easy starting and may cause the motor to misfire and stop. As water is heavier than either gasoline or kerosene, it settles to the bottom of the tank and into the sediment bulb. It is advisable to frequently drain the sediment bulb under the kerosene tank and also the gasoline tank by removing the pipe plug in the bottom.

During cold weather the water which accumulates in the sediment bulb may freeze, preventing the flow of kerosene to the vaporizer. Should this happen wrap a cloth around the sediment bulb and keep it saturated with hot water for a short time. The water should then be drained off. In the event of water getting down into the carburetor and freezing the same treatment may be applied.

The gasoline passage in the shifter valve being very small a minute particle of grit or other foreign matter will clog up the hole and prevent the motor from starting. Should this occur, remove the shifter valve and clean out the small hole.

Should dirt get into the kerosene it may clog the spraying nozzle causing the motor to misfire and slow down. The nozzle can be taken out and cleaned by removing the plug which screws into the float chamber just under the nozzle.

If the motor runs too fast with throttle fully retarded unscrew the throttle lever, adjusting screw until the motor idles at suitable speed.

Construction and Action of Air Washer.—It serves two purposes. First: To remove all dust and solid matter from the air before it enters the cylinders of the motor, preventing excessive wear to the pistons and cylinder walls. Second: It moistens the air in its passage through the water and helps to avoid pre-ignition of the gas mixture in the cylinders. The suction of the pistons in the cylinders draws the air into the air washer through the central passage. It is then guided downward and into the water. In its passage through the water it gets rid of all dust and becomes moist. The air is then drawn off through the tube flange on top to the

The Fordson Tractor

vaporizer. The interior construction is clearly shown at Fig. 119.

In order to get proper operation of the air washer, it is necessary that the air should enter the water at a certain distance below the water level. To compensate for the variation in the water level a float is used. The float then keeps the open end of the air guide at the proper distance under water.

The dust collected from the air causes the water to become muddy and in a short time would prevent its proper operation. The water and mud should be removed every day by unscrewing the drain plug at the side and the air washer flushed out. Replace the plug and fill up to the level of the filler hole with clean water.

If the water level is allowed to become low the guide fixed to the float cuts off the air supply, causing the motor to miss fire and stop.

Fordson Tractor Maintenance.—The most important feature in the maintenance of the tractor is proper lubrication. The plan view at Fig. 126 shows the points of lubrication and the chart specifies the attention required. This chart should be studied carefully and often. Only high-grade oils should be used and the instructions regarding time and kind of oil should be carefully followed. Frequent inspection and lubrication is essential to insure the proper running and long life of the tractor.

The oiling of the motor must be given close attention. Use only a heavy, high-grade motor oil. It should have sufficient "body" so that the pressure between the bearing surfaces will not force the oil out and allow the metal surfaces to come in contact and seal piston ring clearance. Inferior oils have a tendency to

Tractor Oiling Chart

carbonize quickly, also to gum up the piston rings, valve stems and bushings.

The motor is oiled by the splash system from the oil reservoir in the crank case. Oil should be added at

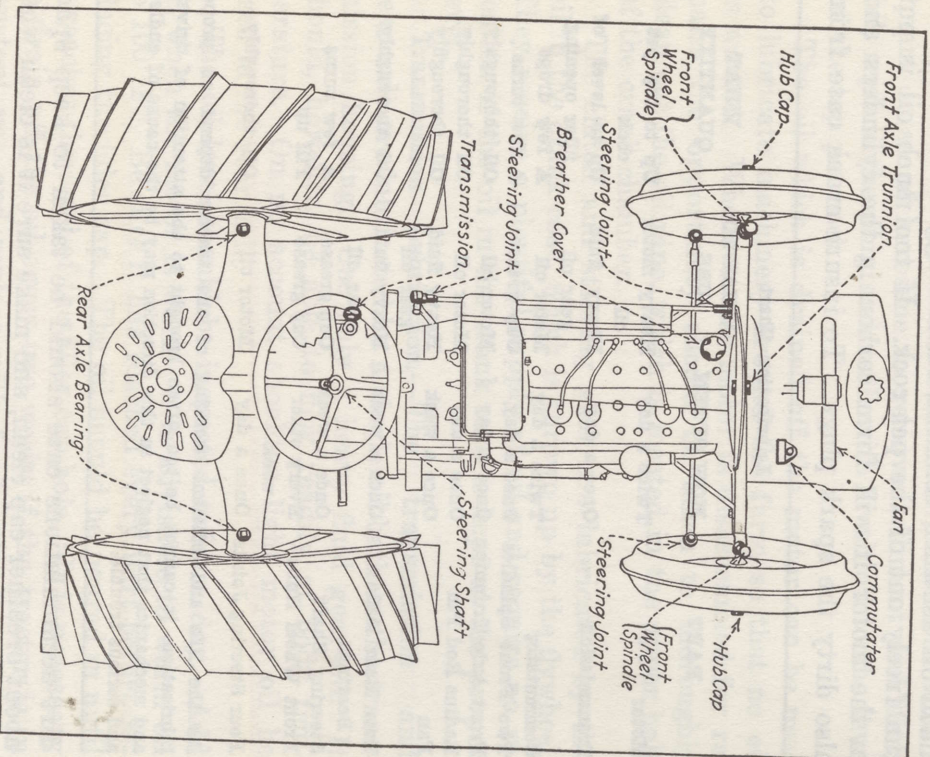


Fig. 126.—Plan View of the Fordson Tractor Showing Points That Demand Periodical Lubrication.

least twice per day and under no circumstances should the level be allowed to drop below the lower pet cock. It is best to test the oil level and fill the motor when it is warm. This will avoid the possibility of adding too much oil as when cold the oil is sluggish and may not run freely out of the pet cock. If too much oil is put in the motor it will form carbon in the cylinders and also dirty the spark plugs. To insure crank case from

Lubrication Chart

PART	HOW OFTEN	WHAT TO USE	WHAT QUANTITY
Motor	Twice a day	Heavy motor oil	Up to top pet cock
Transmission	Once a day	Heavy fluid gear oil	Up to level of filler opening
Commutator	Twice a day	Motor oil	A few drops
Two Front Spindles	Once a day	Cup grease	A few turns
Front Axle Trunnion	Once a day	Motor oil	Oil thoroughly
Radius Rod Pin	Once a day	Motor oil	Oil thoroughly
Fan	Once a week	Heavy fluid gear oil	Oil thoroughly
Two Rear Axle Bearings	Once a week	Heavy fluid gear oil	Oil thoroughly
Steering Shaft	Once a week	Cup grease	A few turns
Front Wheel Hubs	Every other week	Cup grease	Fill up
Four Steering Joints	Once a day	Motor oil	Oil thoroughly

As the life and efficient working of the tractor depend on proper lubrication, it cannot be too often brought to the attention of drivers and mechanics that neglect in this direction may be the cause of endless and serious trouble.

dirty accumulations care should be taken to keep space about breather cap clean, and make sure it is clean when oil is poured in.

When a new tractor has been driven a few days the

oil in the crank case must be drained off and the motor refilled with entirely fresh oil. It will be necessary to repeat this operation every week if the tractor is being used continuously. Remove the drain plug underneath the crank case and drain off the oil, flush out with a quart or so of kerosene to remove sediment and dirty oil, replace the plug and refill with fresh oil to the level of the top pet cock.

The oil which is drained off the motor can be used to lubricate machinery around the farm so that no oil is wasted. Whenever the motor is disassembled for repairs the opportunity should be taken to thoroughly clean out the oil pipe, which is located in the upper half of the crank chamber.

The clutch and steering gear are lubricated by the oil in the crank case, which is thrown up by the flywheel. They receive a plentiful supply of oil and require no attention if the oil in the crank case is kept at the proper level.

Transmission Lubrication.—The transmission and rear axle are lubricated by a single oil bath in the transmission housing. Use only a heavy fluid gear oil. It should, however, be able to flow readily at body temperature. On no account should a light motor oil be used in the rear axle.

The oil level should be inspected twice a day. Add oil when the motor is warm; it is advisable to warm oil to 100° F. Be sure it has reached every part before replacing the filler cap. The oil should be poured in until it reaches the level of the filler cap hole. It is necessary to drain off the oil every two weeks if the tractor is in constant use and replace with fresh oil. Remove the drain plug underneath the housing, and after all oil has

been drawn off, flush it out with a quart or so of kerosene. Replace the plug and refill with fresh oil. This operation should be done when the tractor is warm as the oil will then flow more readily.

Should the oil be left unchanged too long, or if a light oil is used, the transmission housing will become very warm when the tractor is in use. This condition must be remedied immediately or excessive wear will be caused to the moving parts.

Keep Timer Oiled.—Keeping the commutator well oiled is a matter of far greater importance than many drivers believe and is necessary in order to have a smooth operating motor. Do not be afraid to put a little light oil into the commutator twice a day. Remember that the commutator brush revolves very rapidly, and without sufficient lubrication the parts soon become badly worn. When in this condition perfect contact between the brush and the four contact points is impossible and as a result the motor is apt to misfire when running at a good rate of speed.

Keep Tractor Clean.—The tractor should be kept free from rust or dust. If allowed to accumulate it may in time get carried into the bearing surfaces and cause unnecessary wear. Wash the tractor frequently and keep it well painted to prevent rusting. When washing care must be taken that no water reaches the wiring coil box or spark plugs as this would result in short-circuit and failure of the ignition system.

The most important point in maintenance of a tractor is proper and efficient lubrication and cleaning. Frequently inspect the tractor. See that it is kept properly adjusted and that all bolts and screws are tight.

The ball bearings used in the tractor will last in-

definitely if they are kept well lubricated and free from grit. When the tractor is being overhauled or repaired the ball races should be cleaned with kerosene and examined carefully. If any chipping of the balls or pitting of the races is found, the bearing should be replaced by a new one. It is impossible to replace a broken ball. Be careful that all bearings are replaced with the stamped face of the outer ring in the correct position, or seated against the shoulder in the housing.

Putting Tractor Up for Winter.—Drain the water from the radiator and then put in about a quart of denatured alcohol to prevent freezing of any water that may possibly remain. Drain the water from the air washer. Drain off the kerosene and gasoline. Drain off dirty oil from the crank case and refill with fresh oil; crank the motor enough so that the different parts get covered with oil. Cover the tractor with the tractor cover and store in a dry place.

Important Instructions to Operators Summarized.—If the motor develops a knock it is important the cause be investigated at once and corrected. If not corrected, it becomes more pronounced, thereby causing lack of power and tending to shorten the life of the motor.

Never attempt to continue work with the tractor when the motor fires only in two or three cylinders. Besides losing power and wasting fuel, it causes raw kerosene to get into the crank case, thinning the lubricating oil.

Don't Race the Motor.—The worst abuse that can be given the tractor is by racing the motor. Drivers must avoid this at all times. The proper speed to run the motor is 1000 revolutions per minute. This will give the tractor the correct working speeds as previously given. When the motor is idling cut the speed down as

low as possible and retard spark (spark lever down). When starting do not speed the motor to heat up the vaporizer quickly. This is destructive to the tractor and will not accomplish your purpose.

Shifting Gears.—Do not attempt to engage or disengage gears until clutch pedal has been pushed down all the way, nor while the tractor is in motion. When changing gears, if the clutch is not entirely disengaged the teeth on the gears will not mesh readily and there is danger of breaking off the edges of the teeth so that in time they will not remain in mesh. Always close the throttle to slow down motor when shifting gears.

Braking the Tractor.—Do not run the tractor downhill with the gears in neutral or with the clutch released. Engage the gears either in low or intermediate speed and use the throttle to govern the speed of the motor. In low gear, for every revolution made by the rear wheels, the motor must turn eighty-five times, which acts as an effective brake.

Lubrication.—The importance of correct lubrication cannot be too strongly impressed on tractor drivers. The proper grades of oil must be used in the motor and transmission—motor oil must never be used in the transmission. The proper oil level must be maintained at all times. Do not forget that lubricating oil wears out and gets dirty and should be replaced frequently.

Clean oil will protect the motor bearings and cut down spark plug trouble.

Hitch.—The drawbar cap (see Fig. 120) is provided for your convenience in hitching. Always hitch to this drawbar cap. Do not hitch a chain or rope around the rear axle housing under any circumstances.

When pulling a heavy load—or in case the tractor be-

comes mired—be sure to keep your foot on the clutch pedal. Do not race the motor or let the clutch in suddenly, as this might lift the front end of the tractor off the ground. Should this happen, release the clutch immediately—this will bring the front wheels back to the ground at once.

If the tractor should become mired, always pull out in low gear. Do not attempt to pull tree stumps or to do any similar work that might bring the tractor to a sudden stop.

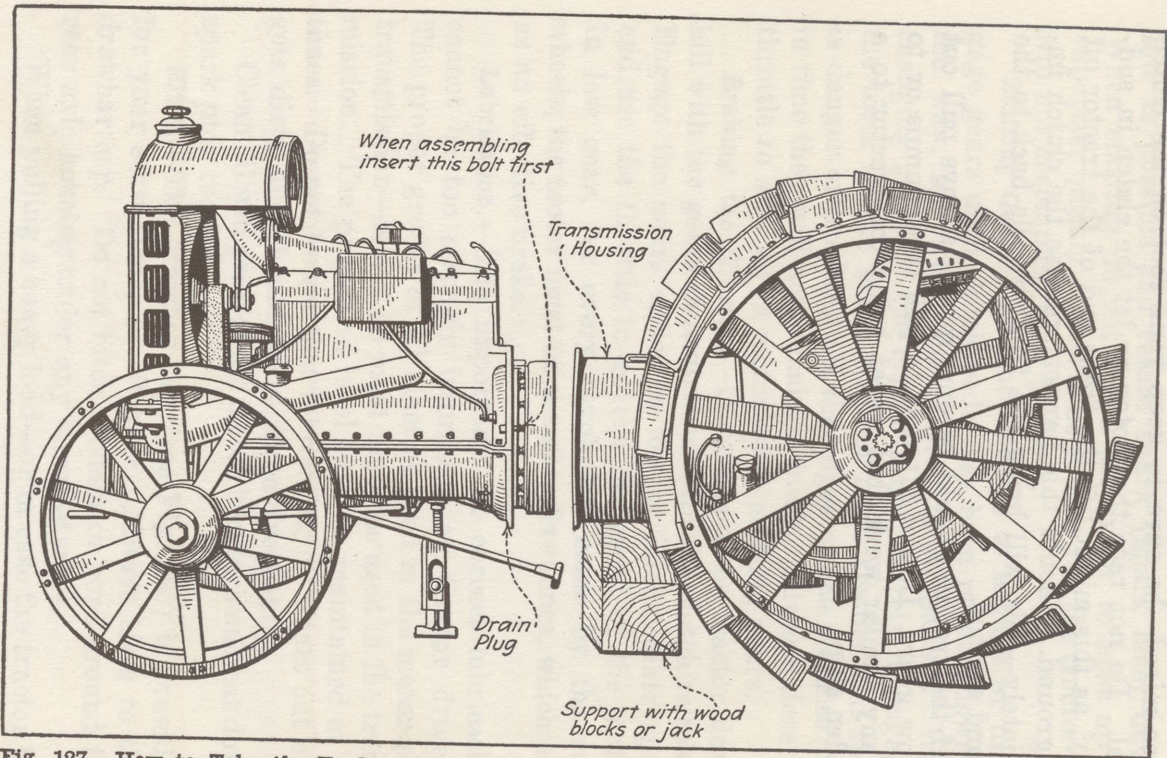


Fig. 127.—How to Take the Fordson Tractor Apart in the Middle to Gain Access to the Change Speed Gearing or Clutch.

CHAPTER VIII

REPAIRING AND USING FORDSON TRACTOR

How to Dismantle Tractor—Removing Clutch—Tractor Running Gear Parts—Removing Front Axle—Adjusting Front Wheel—Fitting Drag Link Ball End—Dismantling Rear Axle—Removing Differential Gear from Shaft—Removing Wheel—Roller Bearings Need Oil—How to Remove Transmission—Summary of Motor Troubles and Their Causes—Motor Fails to Start—Motor Lacks Power or Runs Irregularly—Motor Stops Suddenly—Motor Overheats—Motor Knocks—Timing Fordson Tractor Motor—Fordson Tractor Plowing—Adjusting Penetration of Plow—Fordson Tractor Has Many Uses—Combination Hitches—Power Needed for Hauling—Energy Absorbed by Plows—Fordson Horsepower—Fordson Power Take-Off—Installing and Using Belt Pulley Attachment—Extension Rims—Tools and Equipment for Care of Tractor—Combined Tractor House and Farm Workshop.

How to Dismantle Tractor.—When it is necessary to disassemble the motor or transmission for repairs or adjustment proceed as follows: (1) Drain the oil from the motor. (2) Empty radiator and water jackets by opening the small cock under the radiator. (3) Close stop cocks on sediment bulb and gasoline tank and remove fuel tank. (4) Remove the air washer and gasoline tank. (5) Disconnect the steering arm from the drag link and the control rods from the commutator and vaporizer. (6) Remove the dash by unscrewing the four cap screws holding it to the transmission housing. (7) Jack up the transmission housing as well as the

motor separately, being careful to place a wedge on both sides between the cylinder front cover and the front axle so as to prevent the motor from tilting over when it is disconnected. (8) Remove the bolts from the cylinder flange holding the motor to the transmission housing; the rear part of the tractor can then be drawn away from the motor (see Fig. 127).

When assembling the tractor it is important that the two bolts, one on each side of the cylinder flange just above the crank case, be inserted first. The holes in which these two bolts fit are smaller and being reamed accurately they bring the motor and transmission into correct alignment.

Removing Clutch.—Remove the motor from the rear part of the tractor. Remove the nut on the end of the drive shaft which holds the clutch in place and pull the clutch off. The clutch can then be taken apart by removing the eight bolts holding the front and rear housings together. In assembling, oil the plates well and be sure they are replaced in their proper order; that is, the driving and the driven plates must alternate and the two end plates must be driven plates. (Have the slots on the outside edge.) When replacing the clutch on the drive shaft, be sure the split ring is in place and that the clutch drum fits over it properly.

After the tractor has been in use for some time the wear on the clutch release plate may cause the clutch pedal to strike the foot rest, before the clutch is fully disengaged. When this happens it can be adjusted in the following manner:

- (1) Remove the air washer.
- (2) Remove the dash.
- (3) Take out the pin holding the steering gear sec-

tor on the steering arm (inside the dash) and remove the steering arm.

(4) The cam which fits on the end of the clutch pedal can now be removed.

(5) Advance the cam one or two notches to the right and replace, being sure that the split ring, which it holds, is in place.

(6) Try out the new position of the clutch pedal and if it is satisfactory replace the dash.

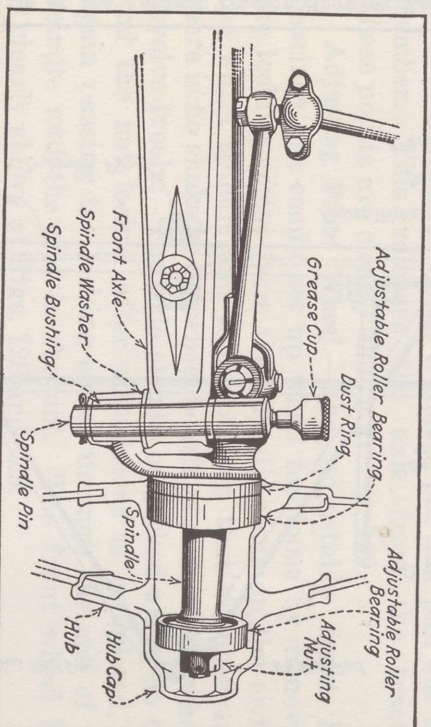


Fig. 128.—View of Fordson Tractor Front Wheel Showing Bearing Mounting.

Tractor Running Gear Parts.—These should be carefully gone over every week to see that all bolts and connections are secure, and any looseness in the steering joints should be taken up. The working parts should be well lubricated at all times and kept free from dust and mud. Should the axle or spindle become bent, extreme care must be used to straighten the parts accurately. Do not heat the forgings, as this will temper the steel, but straighten them cold. If con-

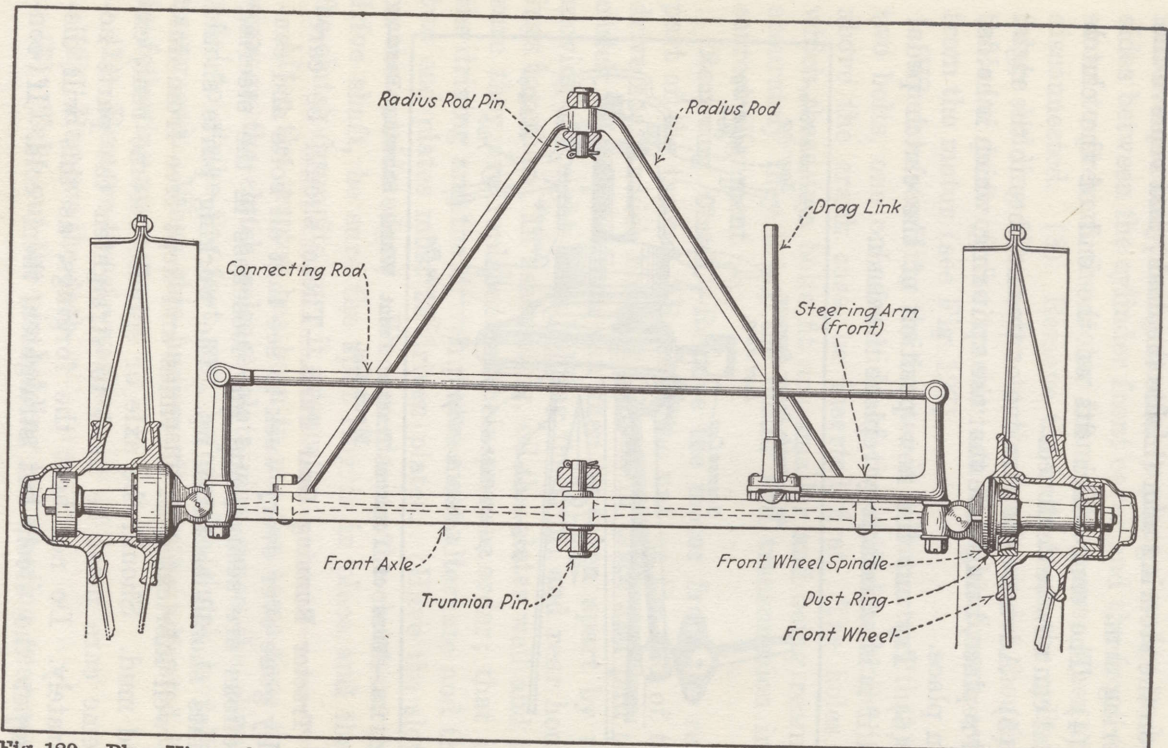


Fig. 129.—Plan View of the Front Axle of the Fordson Tractor, Showing Radius Rod, Steering Connections and Front Wheel Construction.

Removing Front Axle

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venient, it would be better to send such parts to a regular repair shop, where they may be properly straightened by fixtures designed for that purpose. It is very essential that the wheels line up properly, as improper alignments will cause defective steering and strain the parts.

Removing Front Axle.—Jack up the front of tractor so that wheels can be removed. Disconnect steering drag link from the steering arm—rear. Remove cotter pin from radius rod hinge pin and pull out pin. Remove locking cotter from trunnion pin and pull out that member. This releases the axle from the tractor. These points are clearly shown at Fig. 129.

Adjusting Front Wheel.—The adjustable front hub bearings are easily set up when too loose by removing the locking cotter from the adjusting nut on the end of the wheel spindle and tightening up that member until there is no shake in the wheel bearings and yet the wheels revolve freely. The axle should be jacked up to do this and the nut locked after adjustment is completed, by again passing the locking cotter through the end of the spindle and the slot in the nut. The front wheel hub is clearly shown at Figs. 128 and 129.

Fitting Drag Link Ball End.—If the drag link ball end is loose on the ball on the steering knuckle arm, the bolts holding the cap may be removed, to release the cap and the surface of the cap filed so it will fit more tightly against the ball. This cap and its bolts are clearly shown at Fig. 128.

Dismantling Rear Axle.—The rear axle shafts, worm and the differential assembly may be removed from the axle as a unit and afterward dismantled as shown at Fig. 131. To do this, it is first necessary to remove the wheel, then the dust cap. The flange at the end of the

axle housing is bolted to the differential housing and when these retaining members are taken out, the axle housing may be pulled off of the axle shaft and away

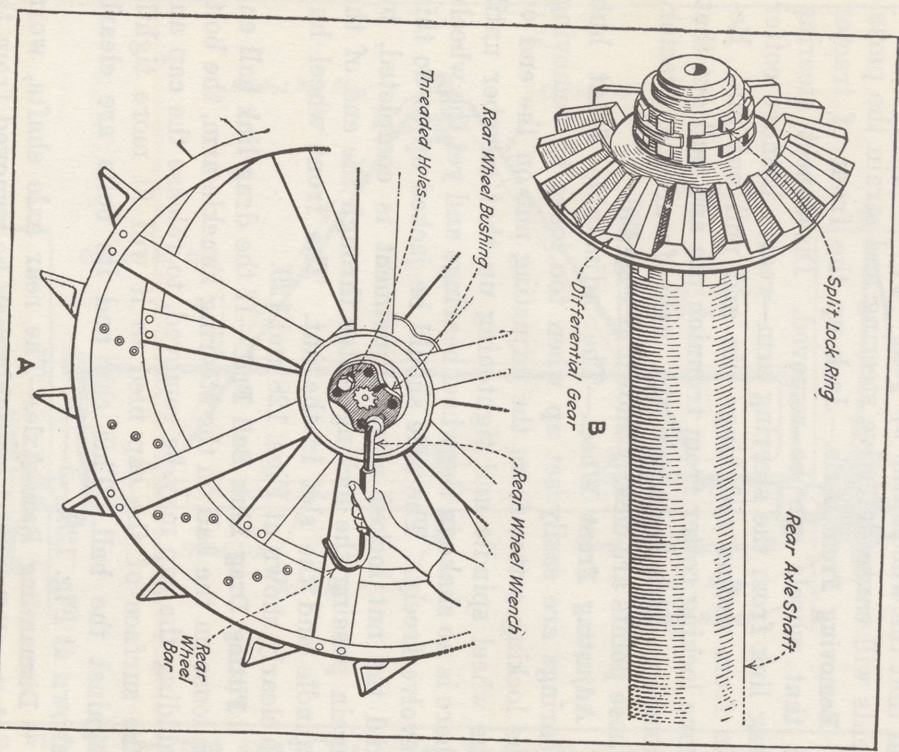


Fig. 130.—Diagram Showing the Method of Removing Fordson Tractor Rear Wheel at A and Differential Bevel Gear at B. After both housings are removed, the differential and axle shaft assembly may be taken

Dismantling Rear Axle

out. Two men are needed, one at each shaft end. The worm gear is lifted out of mesh with the driving worm and by tilting the differential assembly by lifting up one shaft end and bearing down on the other, it may be removed from its housing. The two halves of the differential casing are separated by releasing the bolts which clamp them to the worm gear. The appearance when dismantled is shown at Fig. 131.

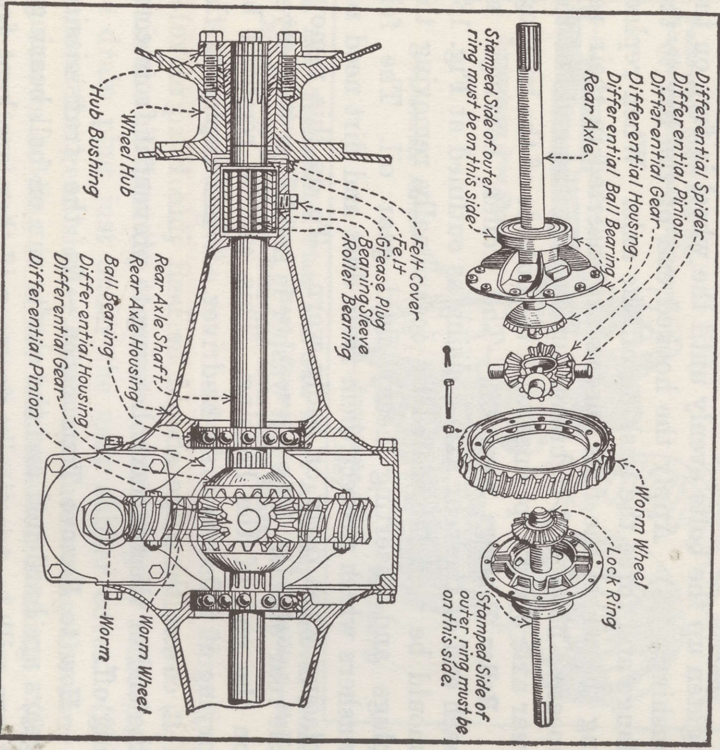


Fig. 131.—Phantom View of Fordson Tractor Axle at A Showing Ball Bearings Used for Supporting Worm Driving Gears and Differential Assembly and Roller Bearing at Wheel End of Axle. At B the Parts of the Differential Mechanism are Shown as They Appear When This Assembly Is Removed from the Axle.

The Fordson Tractor

Removing Differential Gear from Shaft.—(1) Press the gear back along the shaft until the split locking ring is exposed. (See Fig. 130.) (2) Remove the ring and press the gear off the shaft.

Removing Wheel.—(1) Jack up the rear axle until the wheel is clear of the ground. (2) Remove the four bolts from the hub using the box wrench and bar sent in the tool box. (3) Then insert two of the bolts in the tapped (threaded) holes of the rear wheel bushing; tighten up the bolts evenly until the wheel is free on the bushing. (4) Apply the hooked end of the bar to the flange and force the bushing off the axle. When replacing the wheel the four screws are inserted in their respective holes and tightened up equally, the ends of the rear axle being kept flush with the outside of the bushing.

Roller Bearings Need Oil.—The roller bearings at each end of the rear axle housing as outlined at Fig. 131 should be well lubricated by occasionally removing the plugs and inserting heavy fluid gear oil. The felt washers which protect them from dust and dirt need replacing when dirty or badly worn. To do this remove the rear wheels. The felt washer is inside the steel cover on the end of the housing. This can be removed by prying it off with a screw-driver. When replacing the felt cover, the edge should be bent into the groove in the end of the rear axle housing to prevent it from coming off.

How to Remove Transmission.—As the transmission gears are hardened and the shafts run on ball bearings, there will be practically no wear if they are kept free from grit and well supplied with a good grade of oil. No adjustments are provided or are necessary. If the bronze bushing in the reverse gear wears in time, it

How to Remove Transmission

should be replaced by a new bushing. If an attempt is made to change gears without first disengaging the clutch it will chip or break the ends of the gear teeth. Should this happen the transmission should be taken apart and washed out with kerosene to remove any particles of steel which would damage the gears or bearings.

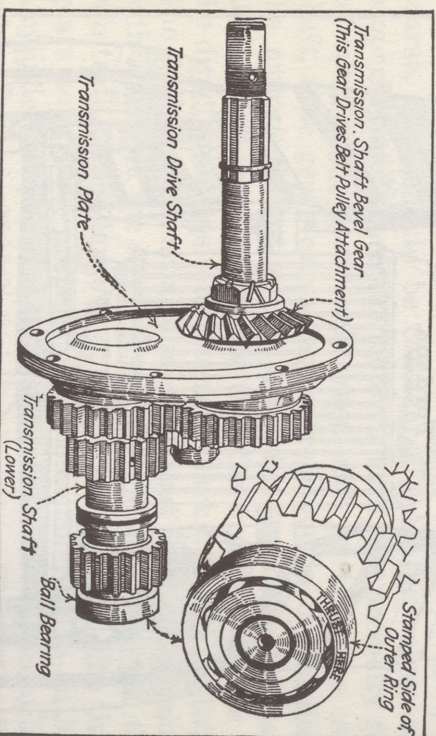


Fig. 132.—Transmission Plate and Gear Shaft Assembly Removed from the Fordson Tractor. Inset Shows Method of Installing Ball Bearings if These are Removed from Gear Shaft.

After removing the rear half of the tractor from the motor as previously described proceed as follows: (1) Drain the oil from the transmission housing by removing the drain plug just under the gear shifter cover. (2) Remove the gear shifter cover by unscrewing the four cap screws holding it to the transmission housing. (3) Unscrew the clutch drum nut from the end of the transmission drive shaft and draw off the clutch. (4) Remove the eight cap screws holding the transmission plate; then by pulling on the drive shaft, the plate to-

gether with the lower transmission shaft can be removed from the housing in one unit as shown at Fig. 132. (5) Remove the upper transmission shaft with its gears.

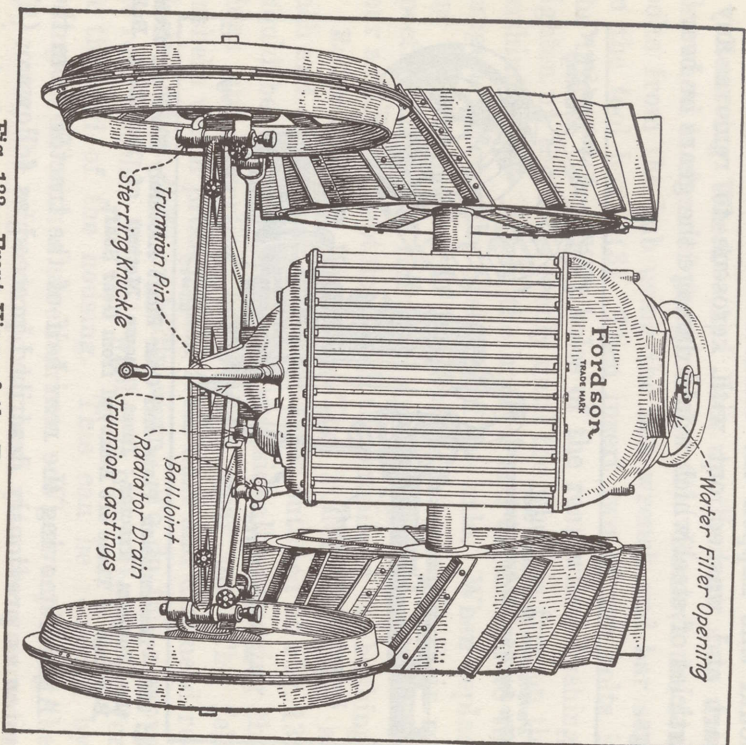


Fig. 133.—Front View of the Fordson Tractor.

Before replacing the gears in the housing clean them well with kerosene; the housing should also be flushed out with kerosene to remove any grit or gummed oil. Also clean and examine all ball races. If it has been found necessary to remove the ball bearings be very careful in assembling them on the shafts again, that

they are replaced in exactly the same position as before removing, i.e., the stamped face of the outer rings must face towards the ends of the shafts as shown at inset in Fig. 132. The inner ring of the bearing is pressed on the shaft while the outer ring slips into its seat when the parts are being assembled.

Timing Fordson Tractor Motor.—In timing the motor the points of opening and closing of the valves are, of course, what should be considered. As the valves are properly timed when the motor is built, the necessity for retiming would occur only when such parts as the cam shaft, time gears or valves are removed in overhauling the motor. In fitting the large time gear to the cam shaft it is important to see that the first cam points in the direction opposite to the zero mark. (See Fig. 135.) The time gears must also mesh so that the tooth marked with a zero on the small time gear will come between the two teeth on the large gear at the zero point. The time gears now being properly set, the exhaust valve on No. 1 cylinder is open and the intake valve closed, the other valves being in the position indicated in Fig. 135. The opening and closing of the valves is as follows: The exhaust valve opens when the piston reaches $\frac{1}{4}$ inch of bottom center, the distance from the top of the piston head to the top of the cylinder casting measuring 4-11/16 inches. The exhaust valve will close on top center, the piston then being 1/16 inch above cylinder casting. The intake valve opens 3/64 inch to 1/16 inch after top center, the distance from top of the piston then being from 1/64 inch to level with cylinder casting and closes 7/16 inch to 15/32 inch after bottom center, the distance from the top of the pistons to the top of the cylinder

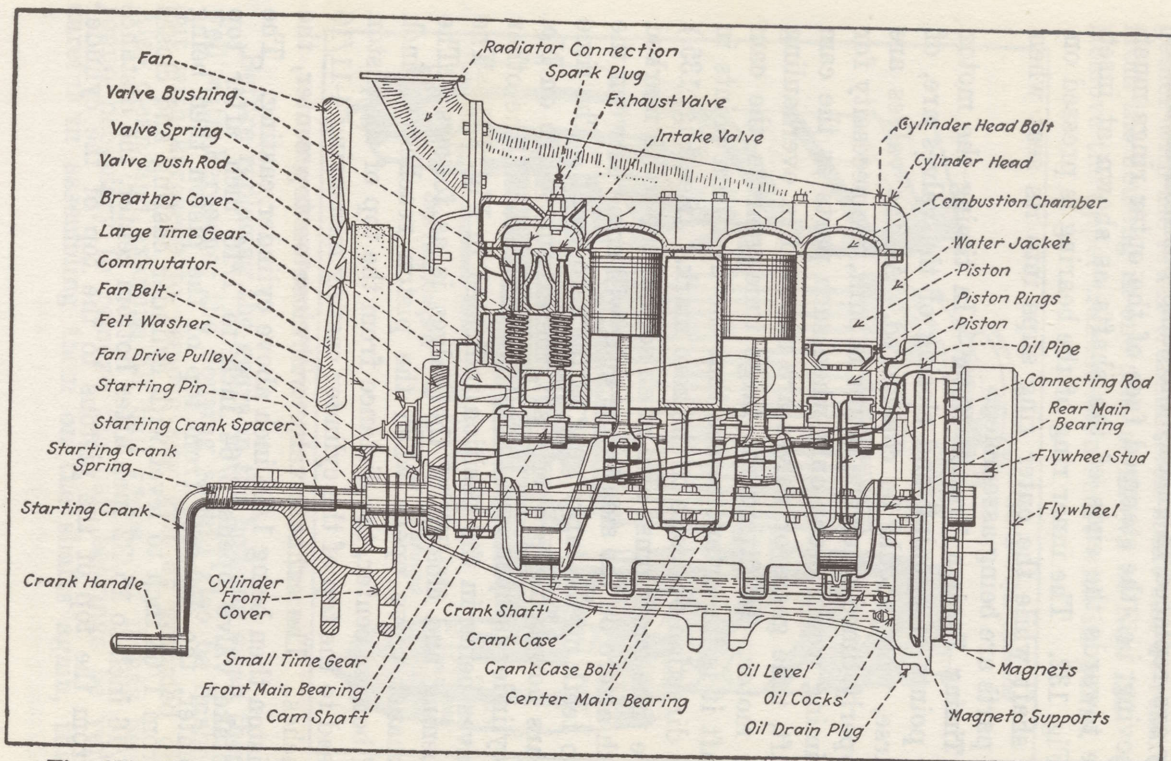


Fig. 134.—Phantom View of the Fordson Tractor Engine Showing Relation of the Various Parts Comprising the Power Plant Assembly.

Motor Troubles and Causes

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SUMMARY OF MOTOR TROUBLES AND THEIR CAUSES.

(a) Motor Fails to Start.

1. Gas mixture too lean or poor grade of gasoline.
2. Water in fuel.
3. Vibrators adjusted too closely.
4. Water or congealed oil in commutator.
5. Magneto contact point obstructed with foreign matter.
6. Gasoline supply shut off.
7. Lack of water in air washer.
8. Water frozen in bottom of gaso-line tank.
9. Water or spark plug or wire terminals.

(b) Motor Lacks Power—Runs Irregularly.

1. Poor compression on account of leaky valves.
2. Imperfect gas mixture.
3. Spark plugs dirty.
4. Coil vibrator burned or improperly adjusted.
5. Air leak in intake manifold.
6. Weak exhaust valve spring.
7. Too great clearance between valve stem and push rod.
8. Spark plugs dirty or points imperfectly adjusted.
9. Commutator contact imperfect.
10. Burnt out vapor tube.

(c) Motor Stops Suddenly.

1. Fuel tank empty.
2. Water in fuel.
3. Dirt in vaporizer or feed pipe.
4. Magneto wire loose at either terminal.
5. Magneto contact point obstructed.
6. Overheated on account of lack of oil or water.
7. Gas mixture too lean.

(d) Motor Overheats.

1. Lack of water.
2. Lack of oil.
3. Fan belt torn, loose or slipping.
4. Carbon deposit in combustion chamber.
5. Spark retarded too far.
6. Gas mixture too rich or too lean.
7. Water circulation retarded by sediment in radiator.
8. Dirty spark plugs.
9. Lack of water in air washer.

(e) Motor Knocks.

1. Carbon deposit on piston heads.
2. Loose connecting rod bearings.
3. Loose crank shaft bearings.
4. Loose piston or piston pins.
5. Spark advanced too far.
6. Motor overheated.
7. Gas mixture too rich or too lean.

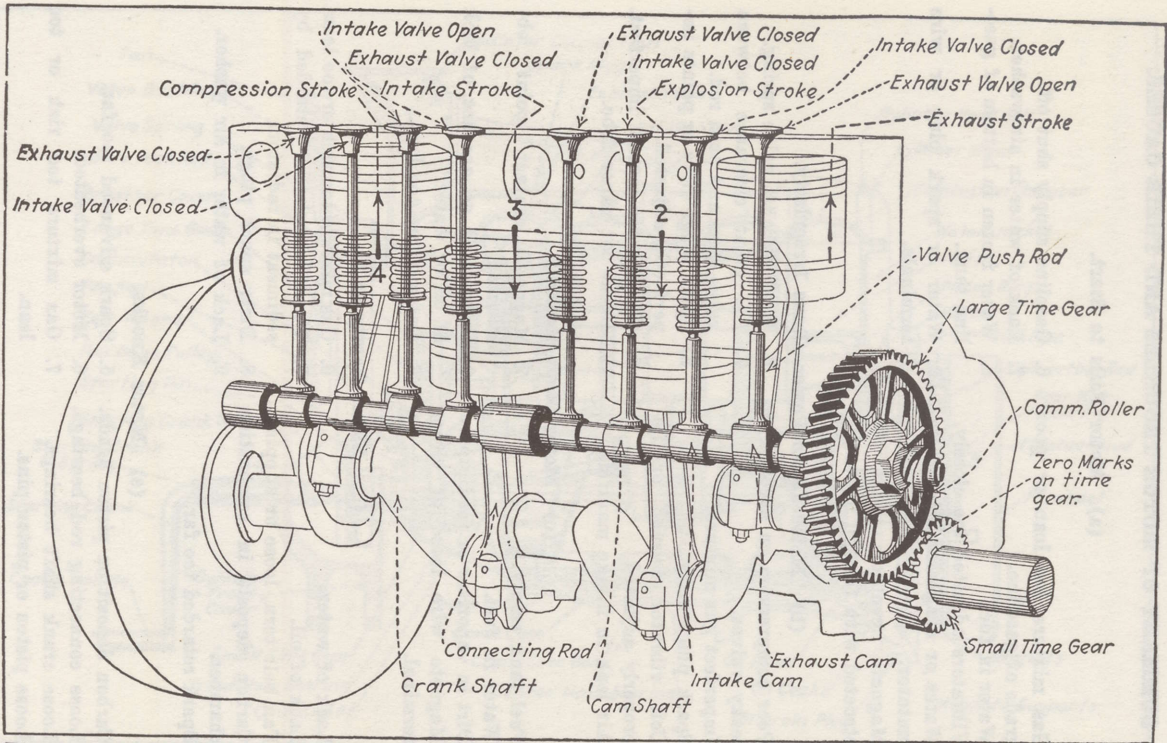


Fig. 135.—Diagram of Fordson Cylinder Assembly Showing Correct Position of the Valves with the Timing Gears Properly Set According to the Zero Marks on Gear Teeth, Also the Relative Position of Pistons in Their Strokes. The Firing Order of the Cylinders is 1, 2, 4, 3.

casting then measuring from 4-15/32 inches to 4 1/2 inches. The clearance between the push rod and valve stem should be .020 inch and should measure this amount when the push rod is on the heel of the cam. When retiming, the opening of the intake valve and the closing of the exhaust valve are the points which should be observed.

Fordson Tractor for Plowing.—A self-lifting two-bottom plow is the proper outfit to use. The tractor will pull in plowing gear two 14-inch bottoms in average soil

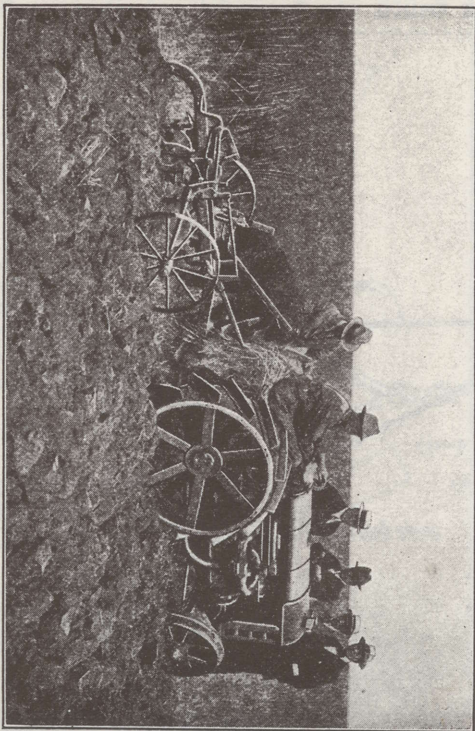


Fig. 136.—The Fordson Tractor and Oliver No. 7 Two Bottom Plow at Work.

as shown at Fig. 136. The conditions, however, determine the size of bottoms to be used. The tractor must be able to do the work in plowing gear as it will not be found as economical to plow continuously in low gear. By using the self-lifting plow the driver can operate both the tractor and the plow from the tractor seat, as all operating levers are within easy reach. The

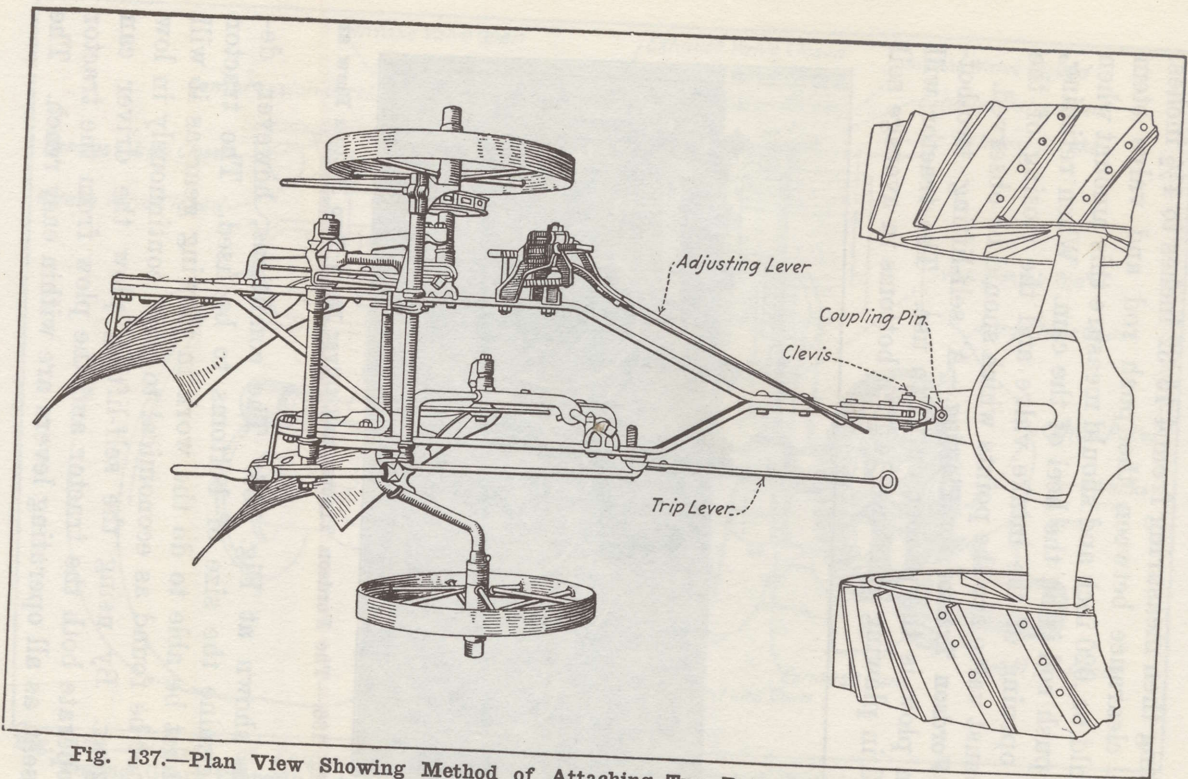


Fig. 137.—Plan View Showing Method of Attaching Two Bottom Plow to Fordson Tractor.

Fordson Tractor for Plowing

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two wheel tractor plow is attached to drawbar cap, and can be readily backed when necessary. *Note—Never use chain hitch around rear axle housing.*

Attach the clevis shackle of the plow to the center hole of the drawbar cap of the tractor. This must be done without a chain or other flexible connections so that the plow can be backed up. (See Fig. 137.) The center of draft of the plow must be in line with the center of the tractor, otherwise difficulty will be found in steering

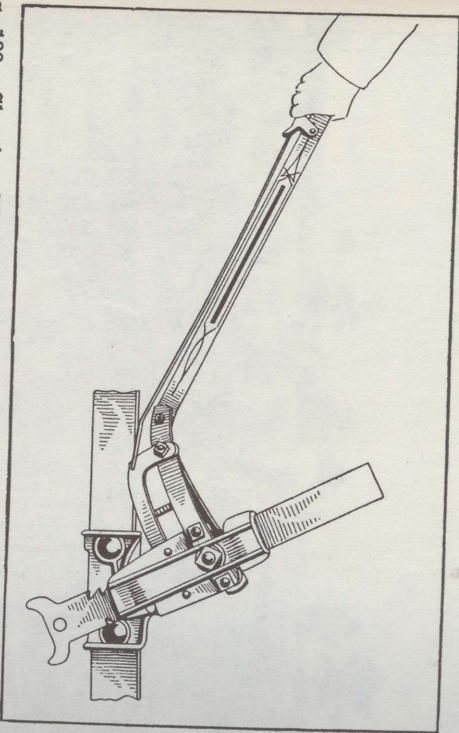


Fig. 138.—Showing Method of Raising and Lowering Plow Shares by Hand Lever Provided for That Purpose.

and a loss of power will result owing to side draft. The illustration at Fig. 137 shows the proper position of the plow behind the tractor.

The center of draft of the tractor lies midway between the two driving wheels. The center of draft of the plow lies about midway between the two bottoms; and when hitched to the tractor the center of draft of the plow and tractor will be in line and will run parallel

to the furrow. The right-hand front and rear wheel must be in the furrow. (See Fig. 136.) This brings the center of draft of the plow line with the center of draft of the tractor and eliminates all side draft and makes steering easy.

Adjusting Penetration of Plow.—The clevis plates have three holes in the rear for adjusting the penetration of the plow. The clevis plates should be so adjusted that

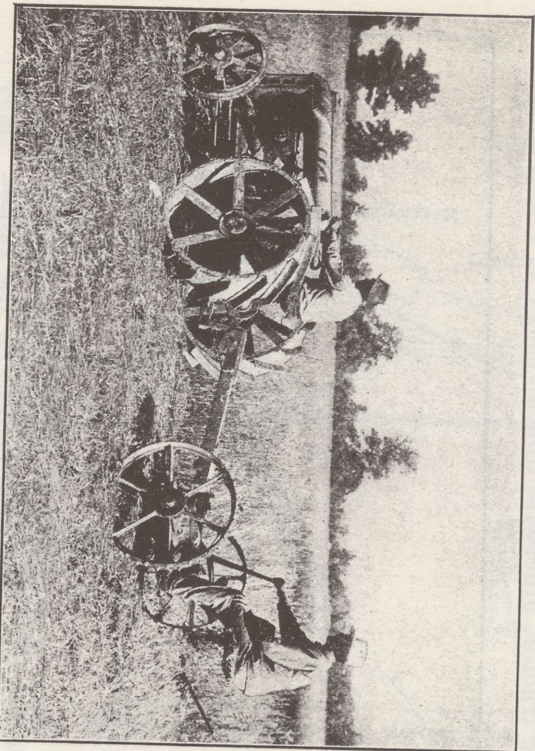


Fig. 139.—Illustration Showing How Fordson Tractor is Used to Pull Mowing Machine.

the bottom of the land side on the rear base will touch the ground slightly, or will be raised not more than one-half an inch off the bottom of the furrow when plowing. If the plow is hitched to low, it will not enter the ground quickly enough, and will cause unnecessary friction on the bottom of the land side. If it is hitched too high the bottoms will run on the points of the shares, caus-

ing wear and heavy draft. The proper time to make your final clevis adjustment is after you have opened up the land and the furrow wheel of the plow is running in the furrow.

The adjustment of the plow shares is varied by working the adjusting lever attached to the plow. When it is desired to plow deeper, grasp the end of the lever, at the same time pressing the hand latch firmly against

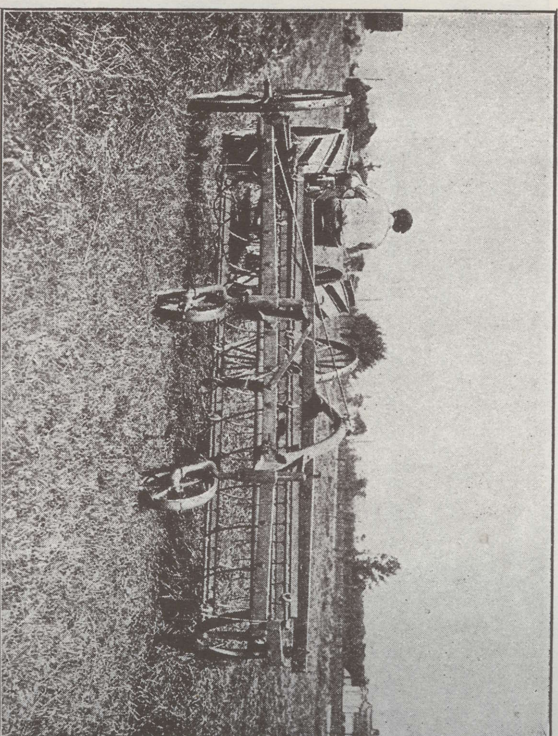


Fig. 140.—The Fordson Tractor May Be Used for Hauling the Hay Rake Advantageously.

the lever; then move the lever up and down. (See Fig. 138.) To plow shallower, move the lever up and down, but do not hold the hand latch.

As the tractor and plow wheels are on unplowed ground when opening land, it is necessary to have a different adjustment to the bottoms than that used after

The Fordson Tractor

the back furrow has been plowed. This is done by turning the screw crank in the rear of the plow. This adjustment depends on the depth of the furrow desired by the front bottom. After you have opened the land and the furrow wheel is running in the furrow, turn back the screw crank sufficiently to level the plow.

The plow is dropped or engaged by pushing the trip lever firmly downwards when the tractor has entered the

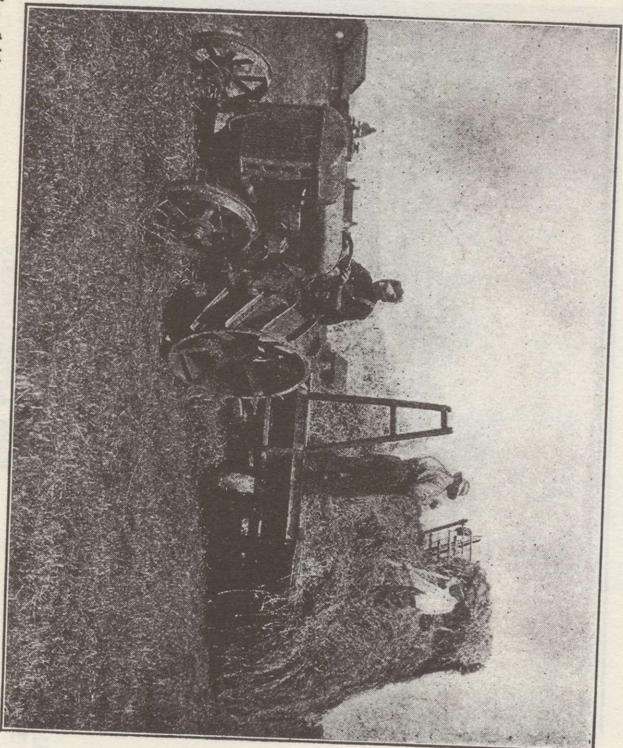


Fig. 141.—Fordson Tractor May Be Used to Assist in Loading the Hay and Also for Hauling the Hay Wagon to the Storage Barn.

furrow and the rear wheels have just passed off the headland. The plow may be dropped while in motion or when standing.

The plow is released by raising the trip levers attached to the plow when the rear wheels of the tractor

Tractor Has Many Uses

have just passed on to the headland. The trip lever is raised slowly until the plow begins to rise; the tractor being kept moving until the locking device engages.

The lie of the land and the shape of the field will determine the best method. When planning your plowing



Fig. 142.—The Fordson Tractor Used in Unloading the Hay Wagon after it Reaches its Destination.

avoid traveling with the plow out of the ground as much as possible. For making turns a headland of about twenty feet is required. When plowing hilly land it sometimes becomes advisable to hitch the clevis shackle



Fig. 143.—A Number of Fordson Tractors and Harvesting Machines Can Be Used Advantageously in Large Fields.

Tractor Has Many Uses

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into the holes on either side of the drawbar cap of the tractor in order to counteract the tendency of the plow to slide down hill.

Fordson Tractor Has Many Uses.—It is not only in plowing work that this tractor may be used to advantage, but in all kinds of draft and belt work as well. It not only prepares the ground for planting by plowing, harrowing and rolling it, but also harvests the crops. It may be attached to any agricultural machinery that can be hauled by animal power. It is shown at work harvesting hay in the series of photographs, Figs. 139 to 142 inclusive. It is attached to the mowing machine by a special tongue or pole, having bent iron pieces at the end to raise the pole to the proper angle, these being hitched to the drawhead by a simple coupling bolt.

In the illustration Fig. 140 the tractor hauls the hay rake and stacks up the hay in long windrows. The next operation is shown at Fig. 141, where the tractor is hitched to a hay wagon and loader to bring in the hay and after the wagon is towed to the barn it can be used to unload the hay from the wagon as shown at Fig. 142. As will be evident, it has successfully replaced horses in every operation except eating the hay, which can be fed to farm animals having a food value or producing food products instead of to animals useful only for draft purposes.

The Fordson tractor may be used to advantage in harvesting and threshing cereal grains, as shown at Figs. 143 and 144. The former shows its use for hauling combined mowing and binding harvesters; the latter shows its use "in the belt" for running a threshing machine as well as serving as a mechanical horse to bring the loaded wagons with sheaves of grain to the threshers.

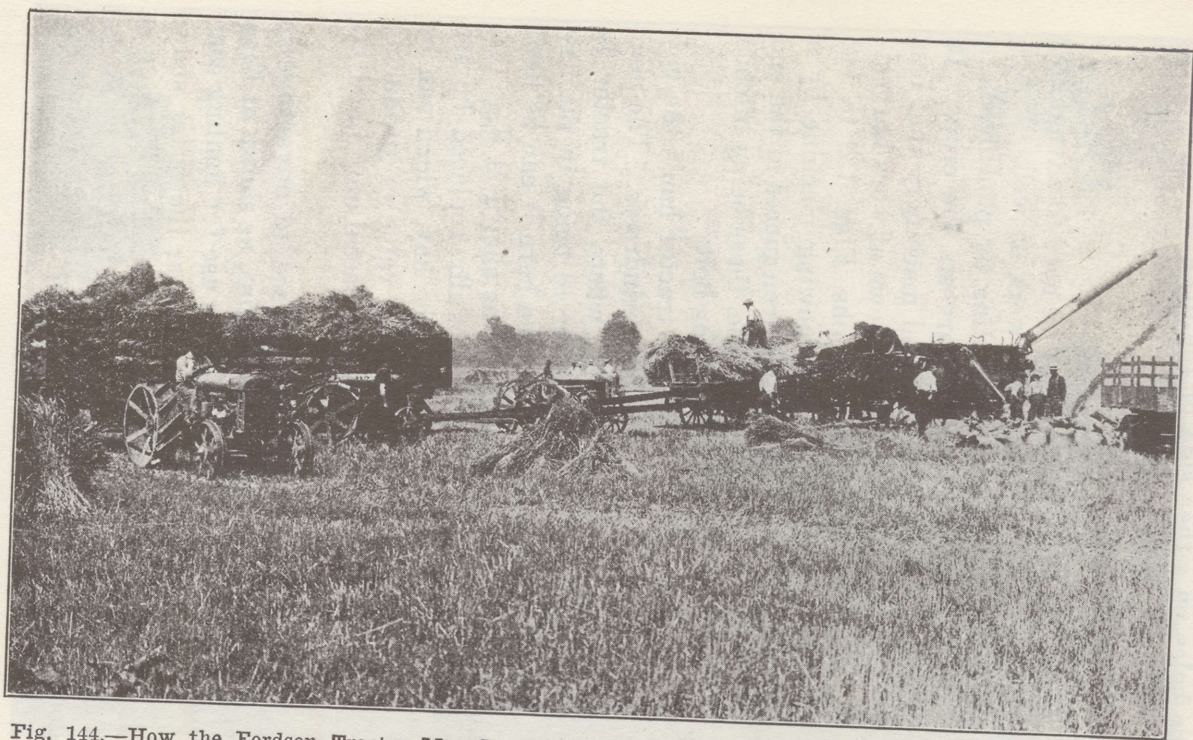


Fig. 144.—How the Fordson Tractor May Be Employed for Driving a Threshing Machine by Suitable Belt Connection.

Combination Hitches

Combination Hitches.—When it is possible, several machines may be drawn at the same time to save going over a certain strip of ground more than once. This

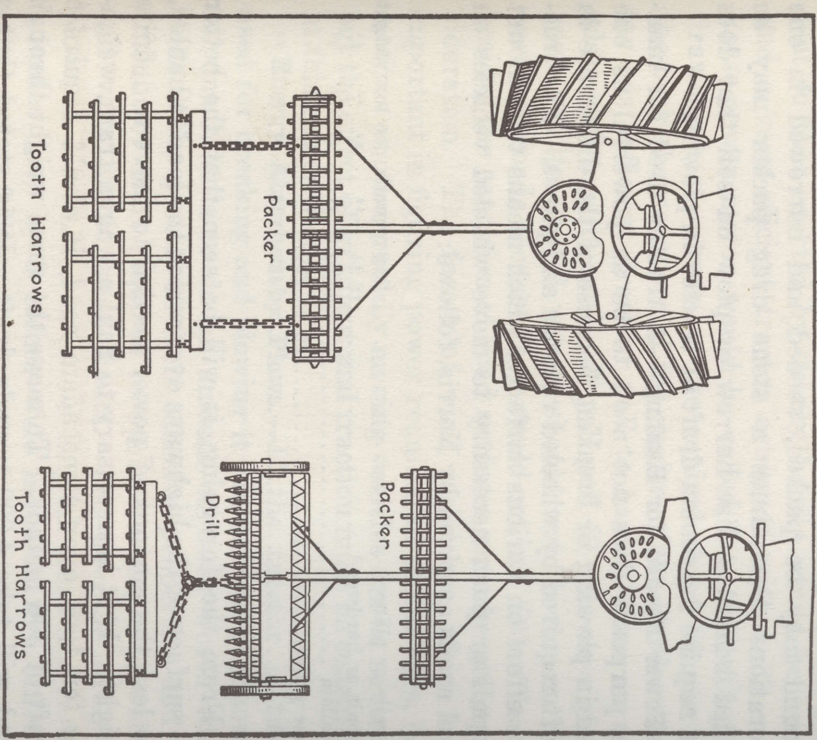


Fig. 145.—Diagram Showing Time and Labor Saving Combination Hitches.

applies only to such machines as have light draft and judgment must be used not to overload the tractor. Two combination hitches are shown at Fig. 145 that can be used in connection with the Fordson tractor. At A a

packer and tooth harrows are drawn by the tractor and the ground may be packed and harrowed at the same time. The hitch shown at B shows a seeder interposed between the packer and tooth harrows and a strip of ground may be packed, seeded and harrowed in one operation. Sometimes a stone drag packer may be pulled behind a disc harrow or plow on soil that does not require maximum draft of tractor in plowing.

Power Needed for Hauling.—A tractor used for hauling purposes does not need to be as powerful as one used in plowing or breaking because of the difference in draft required by wheeled vehicles and plows. The tractive effort on various surfaces, which means the amount of pull or push necessary to move wheeled vehicles on level roads as given by Norris, follows:

On rails or plates.....	5.16	pounds	per	ton	weight
Asphalt or hardwood.....	12.24	"	"	"	"
Macadam	30.60	"	"	"	"
Loose gravel.....	150 to 200	"	"	"	"
Sand	400	"	"	"	"

From the foregoing, it will be seen that the better the surface of the highways over which the load is hauled, the less the amount of power needed to move a definite weight. If it is necessary to haul a wagon train, weighing ten tons over a macadam road, it would require a draft of 306 pounds. To move the same weight through sand will take 4,000 pounds draft. It is stated that a horse-power is equivalent to a draft of approximately 187 pounds at the rate of two miles per hour. In the first case, where the highway surface is good, a drawbar pull equivalent to that exerted by two horses would be sufficient to pull ten tons. A 5 to 6 horse-power trac-

tor, if properly designed, would be adequate to move this load, provided that there were no grades or stretches of unfavorable highway to be encountered. At the other hand where the road conditions are poor, a pull equivalent to that exerted by twenty horses would be needed and a very efficient tractor equipped with a 35 or 40 horse-power motor would be called for, computing the drawbar horse-power as the equivalent of 50 per cent the brake horse-power of the engine. The Fordson tractor has sufficient drawbar pull to haul 60 tons on macadam or 5 tons in sand. It will pull 10 tons on a gravel road but its cleated wheels should not be run on hard surfaced roads because they would cut in. Other factors besides the condition of road surfaces must be given consideration. The factor of wind resistance, which is so important in figuring power required of motor cars, locomotives or other rapidly moving vehicles can be neglected but the effect of gradient and traction must be considered in this connection.

Energy Absorbed by Plows.—If the tractor is to be used for breaking and plowing it will have to be a powerful one if it is to do an amount of work worth while. Soils differ greatly in their cohesive properties and the amount of draft required to operate a single plowshare will vary within wide limits. The average draft of plows as determined in an old English test for a furrow 5 inches deep by 9 inches wide made in five different soils, was as follows:

Loamy sand.....	227	lbs.
Sandy loam.....	250	"
Moory soil.....	280	"
Strong loam.....	440	"
Blue clay.....	661	"

This represents an extreme range of 94 per cent. One heavy horse would be needed to pull a plow in sandy loam and in doing this he would be exerting a draft having a value greater than one horse-power. A team of two heavy horses would be needed to pull the shares

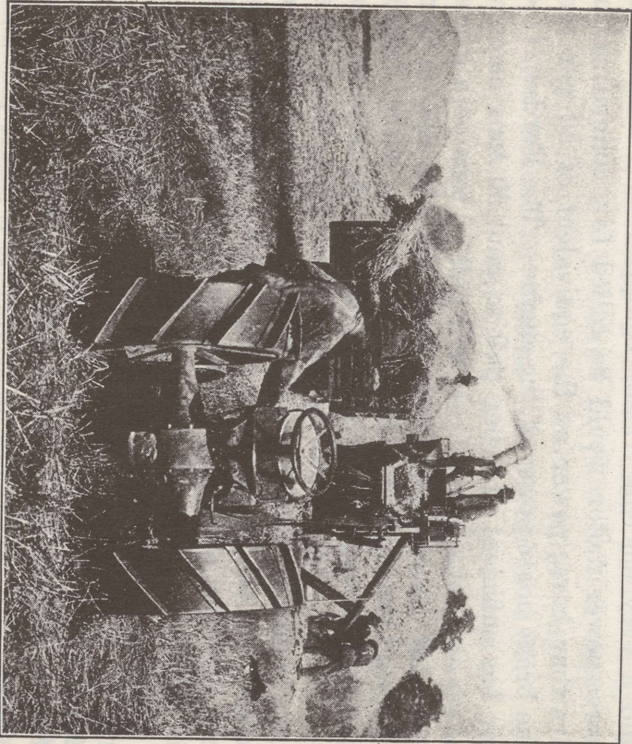


Fig. 146.—A Rear View of Fordson Tractor Showing Belt Connections Between Power Take-off on Tractor and Pulley on Threshing Machine.

through strong loam, while in plowing the blue clay three heavy or four light horses would be required to pull the plow continuously for a working day.

Fordson Horse-Power.—The motor develops twenty horse-power when running at 1,000 revolutions per

minute and using kerosene. It will maintain a drawbar pull of 1,800 pounds at plowing speed. In low gear a drawbar pull of 2,500 pounds is obtained. As the Fordson tractor power plant will develop its full brake horsepower when used in belt work it will be apparent that this engine may be used successfully for operating much of the machinery that must be run by belt. The utility of the tractor for this purpose is clearly indicated at Figs. 146 and 147. The tractor is run to where the work is to be done and a simple belt connection with any machine serves to drive it.

The power needed to operate various forms of machines under belt as given by the International Harvester Company follows:

4-Roll Deering Husker and Shredder.....	12
6-Roll Deering Husker and Shredder.....	15
4-Roll McCormick Husker and Shredder.....	12
6-Roll McCormick Husker and Shredder.....	15
24" x 40" Thresher.....	15
28" x 44" Thresher.....	20
4-Hole Keystone Sheller.....	12
6-Hole Keystone Sheller.....	12

From the above, it will be evident that there is considerable machinery that can be operated by the tractor. It may be belted to a circular saw for sawing wood and can also be utilized for running feed grinders, ensilage cutters and numerous other farm appliances that require power within the engine rating. It will be well to limit the engine when "in the belt" to driving machinery that does not require in excess of 15 horse-power, because there is a certain power loss in power take-off and driving belt.

Fordson Power Take-Off.—The "Fordson" belt pul-



Fig. 147.—Side View Showing Method of Driving Threshing Machine by Belt Power Indicates That a Long Belt May Be Run Slack.

Power Take-off Attachment

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ley and power take-off is furnished as an accessory and was designed especially for use with the Fordson tractor to operate such pulley driven implements as grain separators, silo fillers, hay balers, feed grinders, corn huskers, buzz saws, etc. The pulley is driven direct from the motor through the drive shaft and spiral bevel gears, and runs at the same speed as the motor. The location of the drive gears is clearly shown at Fig. 125 and the pulley assembly and its parts at Fig. 148.

When the motor is running at a speed of 1,000 revolutions per minute, the pulley will develop approximately 20 horse-power, which is sufficient for operating practically all medium-sized farm machinery. The drive pulley is constructed of special paper fiber, which requires no refacing, and prevents slipping of the drive belt. The drive pulley is nine and one-half inches in diameter, six and one-half inches wide and is slightly crowned to insure the drive belt running in the center of the pulley at all times.

Installing and Using Belt Pulley Attachment.—(1) Place jack under drawbar cap, slightly toward the right-hand side. Jack up the tractor sufficiently to remove the right wheel, first making sure that the tractor is properly blocked before removing it.

(2) Remove foot bracket, and satisfy yourself that the tractor is equipped with transmission drive shaft spiral bevel gear. This is the gear that drives the pulley attachment and must be installed before the pulley can be operated. If you find that this gear is not installed you can procure one (free of charge) from your nearest dealer.

(3) Install pulley attachment assembly so that the hole in the pulley housing is in a downward position,

to let the lubricating oil drain back into the transmission.
 (4) Two paper gaskets are provided with each pulley attachment and are to be applied before bolting the pulley housing to the transmission case.

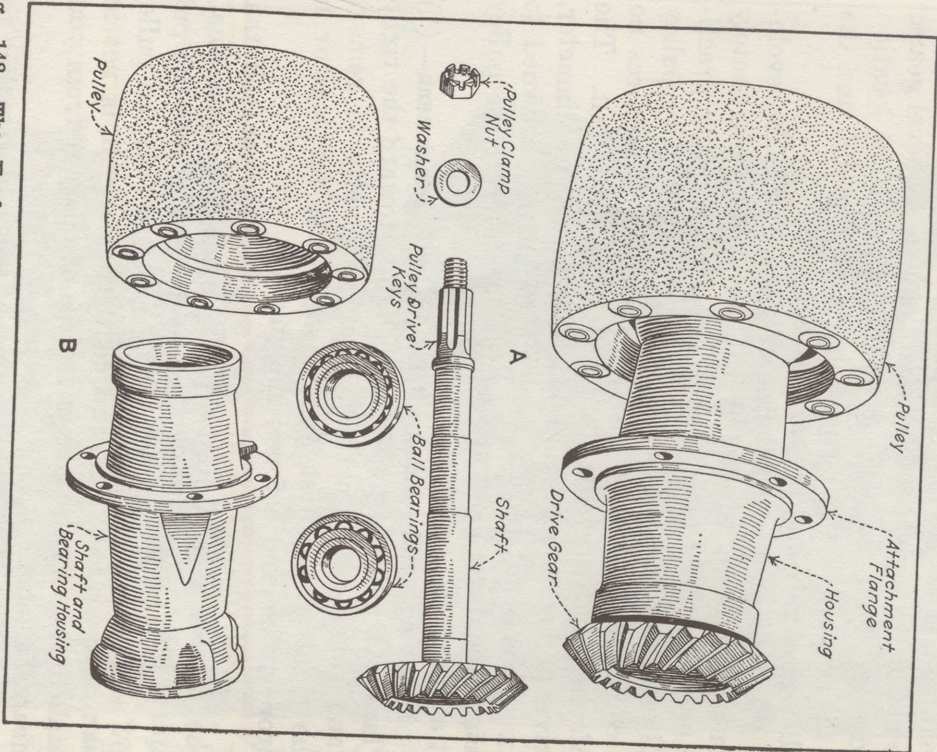


Fig. 148.—The Fordson Tractor Power Take-off or Driving Pulley Attachment Shown at A, and the Various Parts Used in This Assembly are Depicted at B.

(5) After tightening up the six cap screws, hold the pulley between the two hands and make sure that there is a slight play or back lash between the two gears; otherwise a grinding noise will be noticed while running which indicates that the gears are too tightly meshed. Operating in this condition will cause the premature

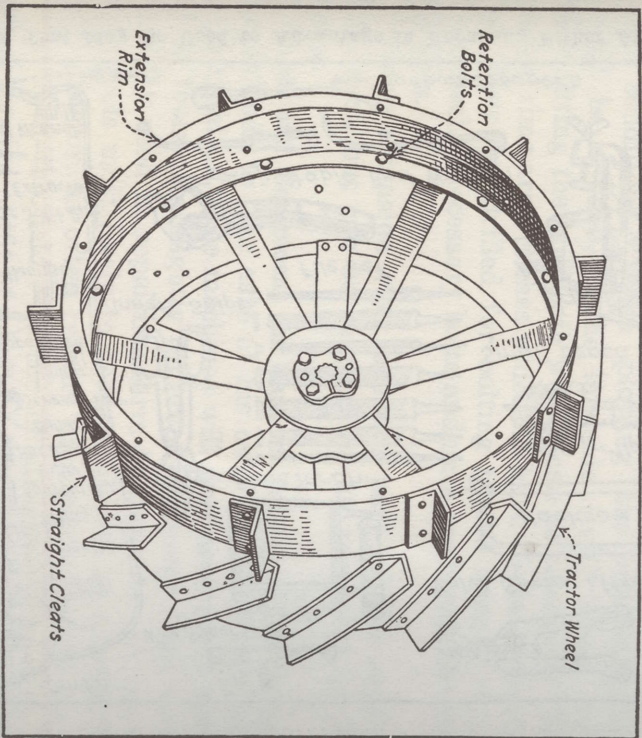


Fig. 149.—The Extension Ring That May Be Applied to Fordson Tractor Wheels When Tractor Is Used on Soft Soil or Where Traction Conditions Demand More Wheel Support.

wearing of gears and ball bearings in addition to consuming more power than is required. After installing pulley attachment, if the gears are meshed too tightly, a third gasket should be applied. This can be made from ordinary wrapping paper.

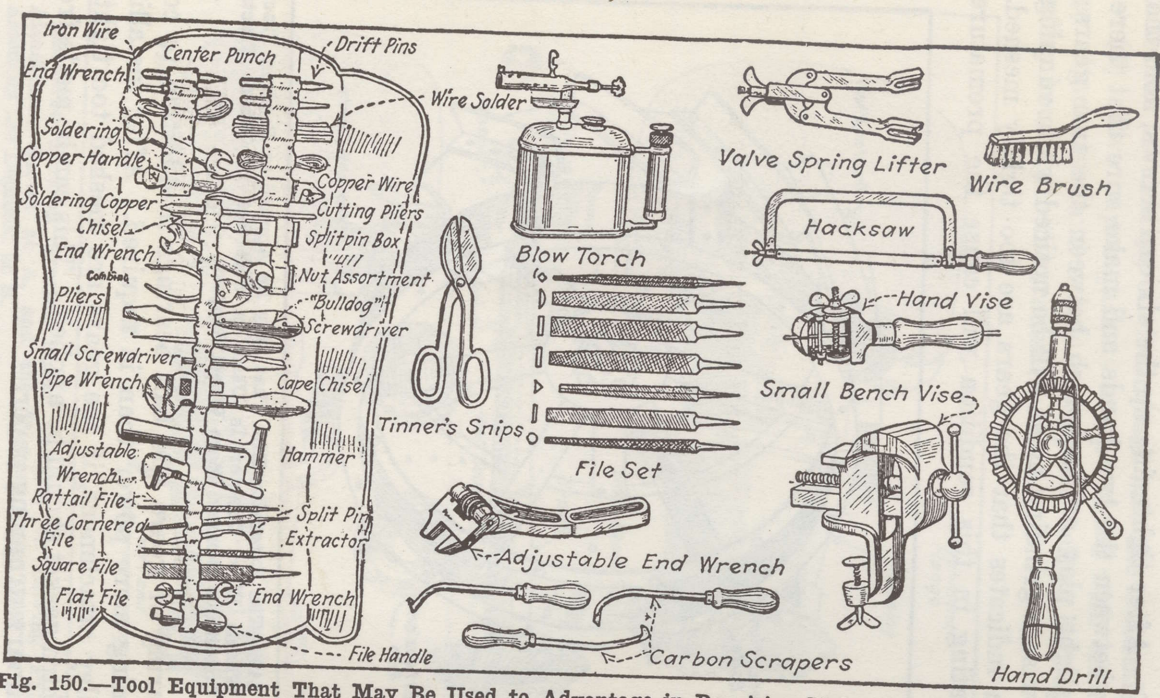


Fig. 150.—Tool Equipment That May Be Used to Advantage in Repairing Either Automobiles or Tractors.

(6) In cranking the engine after the belt has been applied, see that the clutch pedal is held down, or difficulty will be experienced in turning over the motor.

Extension Rims.—As shown in the illustration at Fig. 149 these can be fitted to the rear wheels for working on sandy or unusually light soil. They will give the tractor sufficient support and traction to work even under these conditions. When plowing the extension rim should be applied to the landside (left) wheel only. When fitting the land both wheels can be equipped. Extension rims are 7 inches wide and have 10 cleats riveted on. They are drilled for bolting to the flanges of the rear wheel. Necessary bolts and nuts are furnished with the rims.

These extension rims are not part of the regular equipment, but can be supplied as an accessory by the dealer.

Tools and Equipment for Care of Tractor.—The farmer who intends to take care of his own tractor or one who has several of these machines will find need for a number of tools of a slightly different character from those generally used in repairing farm implements. A set of small tools most likely to be used should be carried on every tractor, as often repairs of a minor nature must be made in the field. In the illustration (Fig. 150) a comprehensive outfit of small tools and devices that will be found especially valuable in making repairs for the tractor engines or transmission system are outlined. The tool roll contains an assortment of tools that are more generally used and is a modified form of the tool kit generally supplied for automobile repairing. The only difference between the tools is that these are larger and more substantial in order to handle the more rugged

The Fordson Tractor

parts of the tractor mechanism. The tool roll shown contains all necessary wrenches, pliers, screw-drivers, punches, drift pins, chisels and files as well as miscellaneous supplies necessary to make ordinary repairs. The tools shown at Fig. 151 are those supplied with the Fordson tractor.

In addition to the tools outlined a small bench vise that can be attached to any convenient point on the trac-

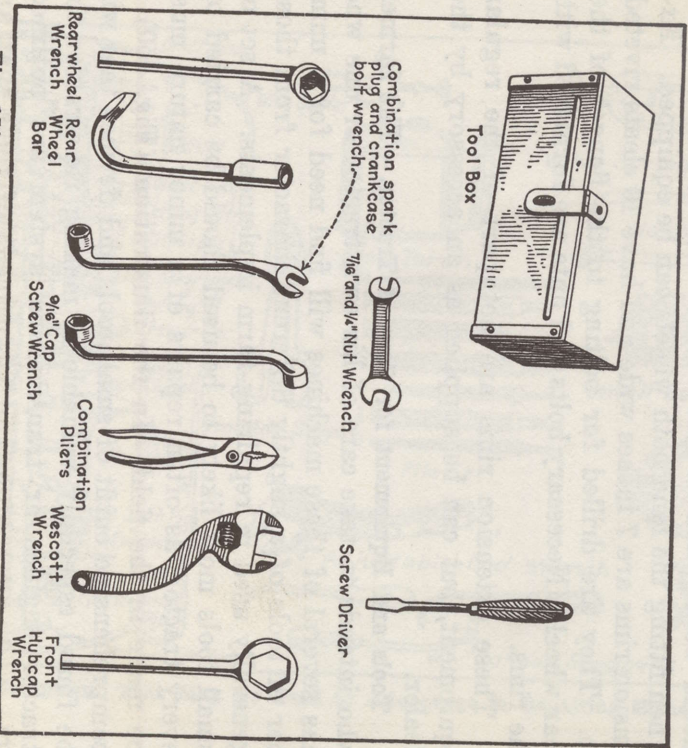


Fig. 151.—Tool Outfit Supplied with the Fordson Tractor.

tor will be found of considerable value. The large file assortment may be kept at the workshop for use in making more extended repairs. This is true also of the

Tools for Care of Tractor

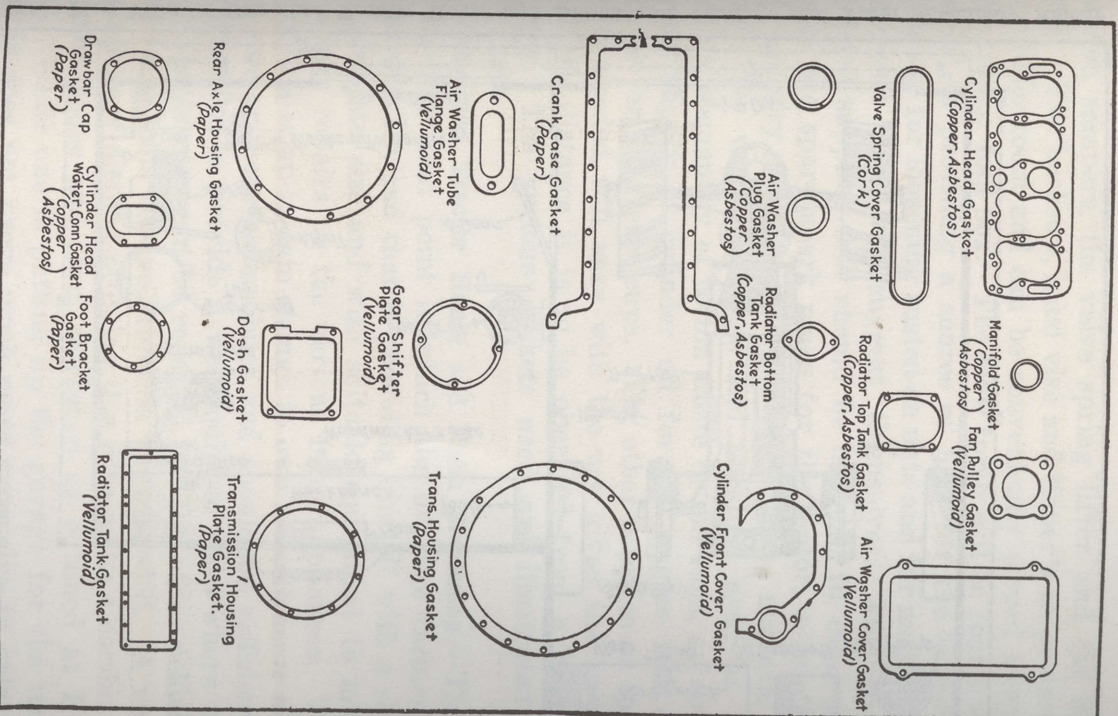


Fig. 152.—The Various Gaskets and Packings Used on the Fordson Tractor and the Material of Which They Are Made.

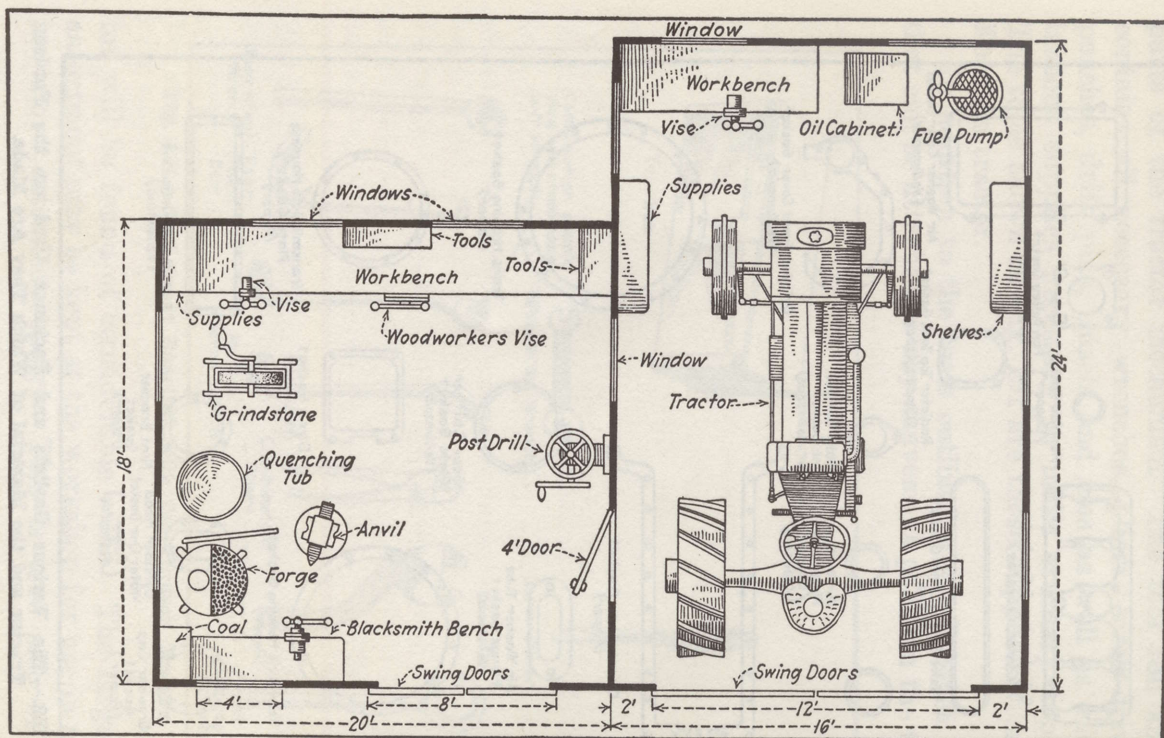


Fig. 153.—Plan View of Combined Tractor House and Automobile, Carriage and Farm Machinery Repair Shop.

carbon scrapers, the valve spring lifter and the hand drill. The hacksaw, hand vise and timer's snips occupy but little room and can be conveniently stored away in the tractor tool box. The blow torch will be found very useful in providing a source of heat for the soldering iron and for loosening rusted-on nuts and for many other purposes that will suggest themselves. Among the general supplies that should be included in the equipment are spare spark plugs for the motor, a few feet of primary and secondary electric wire, material to make the various gaskets and packings used on the engine, a quantity of cotton waste or old rags, an emergency supply of cylinder oil for the engine and cup grease for the grease cups. The other supplies or spare parts needed will vary with the use given the tractor and the distance it is to be operated from a base of supply. The various gaskets used are illustrated at Fig. 152.

Combined Tractor House and Farm Workshop.—There is an important point in which the average farmer is somewhat lax and that is providing himself with a shop of adequate size and with suitable equipment to make ordinary repairs on the various farm appliances. The farm that is up-to-date enough to own a gas tractor also has one or more automobiles and should be sufficiently progressive to provide a well-equipped shop where not only the tractor can be repaired but the other vehicles and farm tools receive attention when needed. A very satisfactory method of doing this is to make a combined tractor house and farm workshop as outlined at Fig. 153. While one is putting up the garage for the tractor, it does not prove much more expensive to enlarge the structure somewhat and have a separate room in

which the various tools needed to do wood work and metal work, such as smithing, can be housed and which can also be used as a garage.

It is not expected of the average farmer that he qualify as a blacksmith or machinist, but at the same time there are many little tasks that he can do just as well as the blacksmith or wagon builder that will not only save money by providing work for a period of leisure when conditions do not permit outside work to be carried on but that may also save valuable time during the rush period of plowing, seeding, or harvesting, by saving a trip to town.

A shop may be equipped with all necessary wood and metal working tools to make ordinary repairs for considerably less than \$200. This includes a complete set of carpenter's tools, a forge and blacksmith's outfit, and the various small tools necessary to properly care for the tractor or automobile engine. The plan shows a tentative layout that may be followed to advantage but that can be varied at will. In this the workshop is provided with a long bench at the back end, a portion of which is reserved for wood work, while the remainder is convenient to forge and anvil. An 8-foot door is provided so any automobile or farm wagon or other appliance may be run into the building when it needs repairing and be worked on in comfort. While general dimensions are given, these and the arrangement of tools may be varied to suit individual requirements.

