

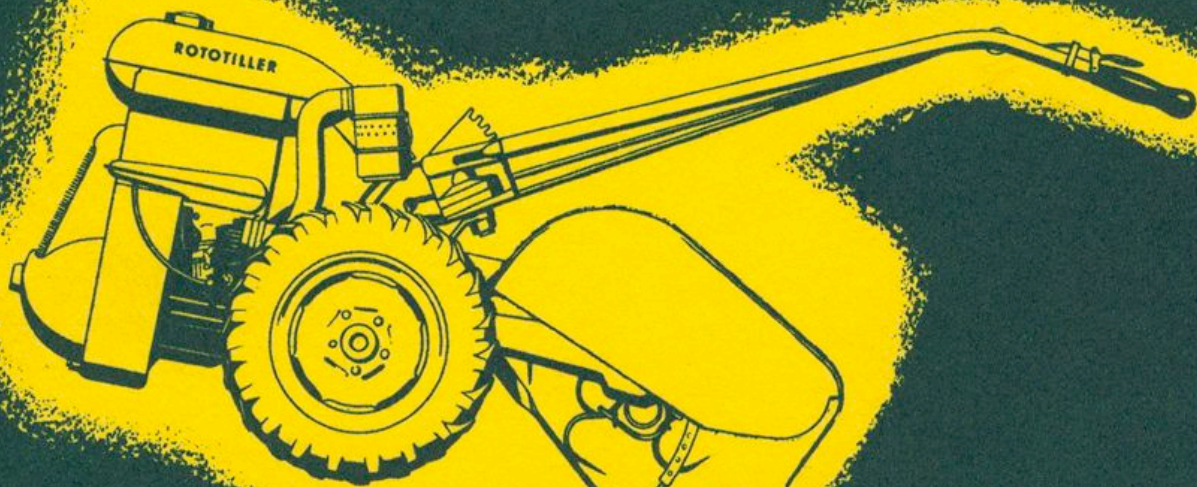
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ROTOTILLER*

Models BI-7, BI-7RS and BI-6

OPERATORS MANUAL

- Construction • Operation
- Care



FRAZER FARM EQUIPMENT COMPANY

AUBURN, INDIANA

* "Registered Trademark-Duro Corporation, Oak Park, Michigan"

NOTICE !

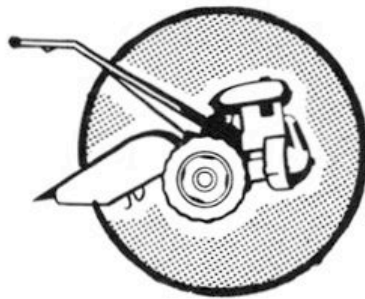
In response to so many requests from owners who lost or misplaced their Operators Manuals or from owners who never received any with their machines, we have re-printed the original Operators Manual for the B1.7 Models.
The machines of the B1-6 model have a handle bar control arrangement with four control rods instead of three. This being the major difference between the two models. We have illustrated the B1-6 handle bar arrangement on page 8. All other operating procedures explained will generally apply.

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LIST OF ILLUSTRATIONS

Figure	Page
Frontispiece	4
1. Model B1-7—View of Left Side	6
2. Model B1-7—View of Right Side	7
3. Model B1-7—Handle-Bar Attachment	9
4. Model B1-7RS—Operating Controls	13
5. Hood and Depth Runner Adjustment	15
6. Field Tilling Diagram	16
7. Tines	18
8. Installing 'Pointed' Tines	18
9. Tine and Spring Dimensions	19
10. Tine Installation	19
11. Cross Sectional View of Model B1-7	25
12. Adjustment of Fairbanks-Morse Magneto	27
13. Adjustment of Edison-Splitdorf Magneto	28
14. Timing Marks—Cooling Fan	29
15. Timing Marks—Fairbanks-Morse Magneto	29
16. Timing Marks—Edison-Splitdorf Magneto	30
17. Float Setting	32
18. Cross Sectional View of Starter Assembly	34
19. Starting Spring and Pulley—Ready for Installation	35
20. Driving Clevis Pin into Housing	36
21. Wheel and Hub Removal	37
22. Removal and Installation of Wheel Hub Clutch	38
23. Reverse Gear Installation	40
24. Transmission Shift Link Adjustment	44

TABLE OF CONTENTS

PART I

OPERATOR'S SECTION

	<i>Page</i>
Foreword	5
Differences in Models	8
Handlebar Controls (B1-6)	8
Uncrating and Assembling	9
Starting Preparations	11
Starting and Stopping the Engine	12
How to Use the Controls	13
How to Till	15
Tines	17
Removal and Installation of Tines, Tine Holders, and Tine Spring Holders	19
Preventive Maintenance	20

PART II

REPAIR SECTION

Adjustment Reference	24
Specifications	24
Ignition System	26
Fuel System	31
Manual Starting System	33
Disassembly of Models B1-7 and B1-7RS Power Tillers	36
Reassembly of Models B1-7 and B1-7RS Power Tillers	42



FOREWORD



The Rototiller Power Tiller is fully guaranteed because it is built of only the finest of tested materials, each selected for the particular work the part is to perform. In modern design and in fine workmanship, it is comparable to the highest priced automobile.

There are only three major moving parts in the engine, the piston, the connecting rod, and the crankshaft. There are no valves, valve springs, tappets, camshaft, camshaft gears or camshaft bearings, etc., to wear and cause breakdowns with loss of time and increased maintenance costs.

The large accurately balanced crankshaft is mounted in high radial capacity ball bearings to reduce friction and improve operating economy. Only in expensive Diesel and Aviation practice, is this type of construction found. The shafts in the transmission and tiller housings are also mounted in large ball and roller bearings.

The simplicity of the modern design—the fine workmanship—the sturdy and well engineered construction, mean that your Rototiller Power Tiller will last longer and operate more efficiently, with lower maintenance costs.

PROTECT YOUR INVESTMENT—GIVE IT THE CARE IT DESERVES.



FRAZER FARM EQUIPMENT COMPANY

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First Edition

Page 5

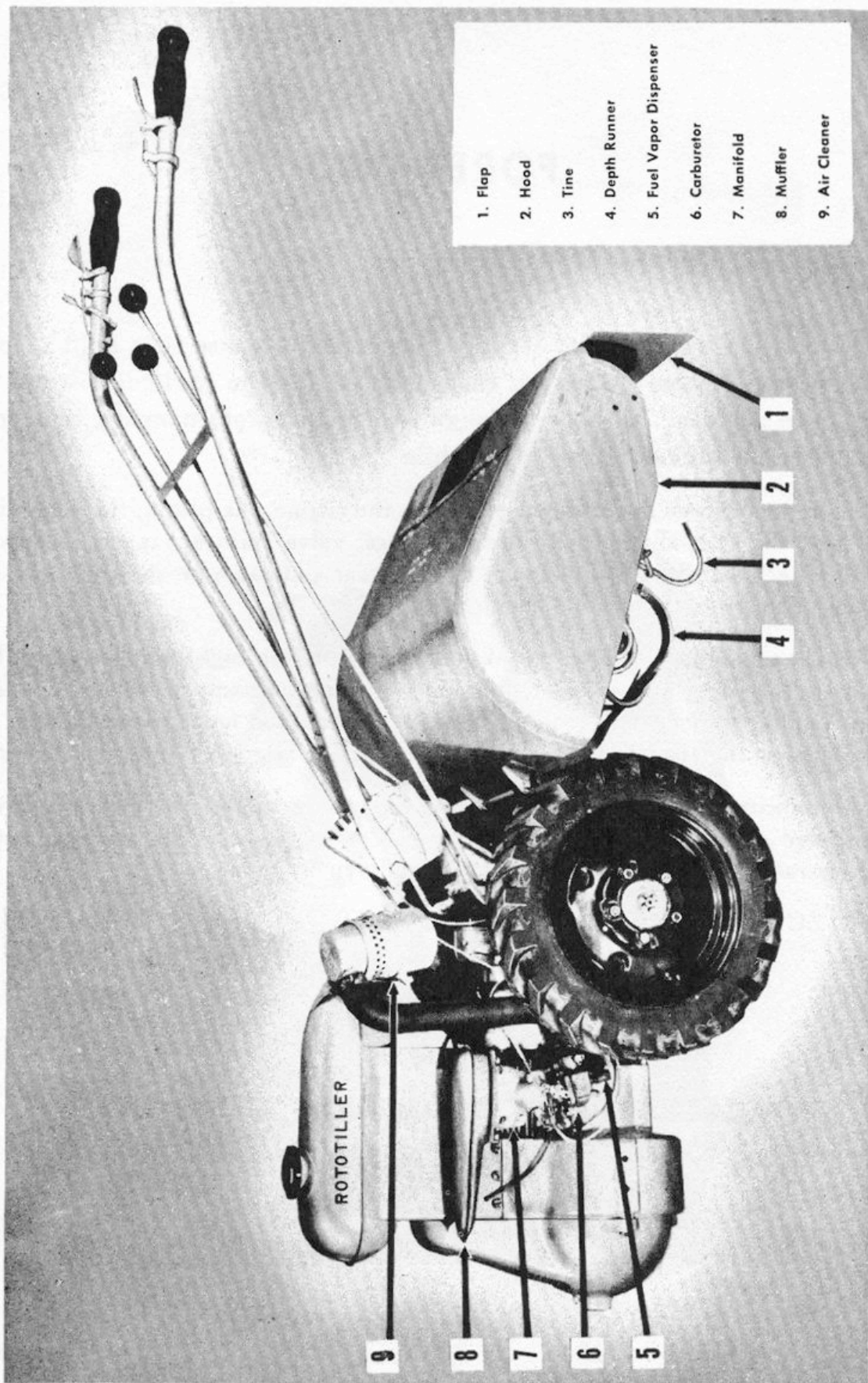


Figure 1. Model B1-7—View of Left Side

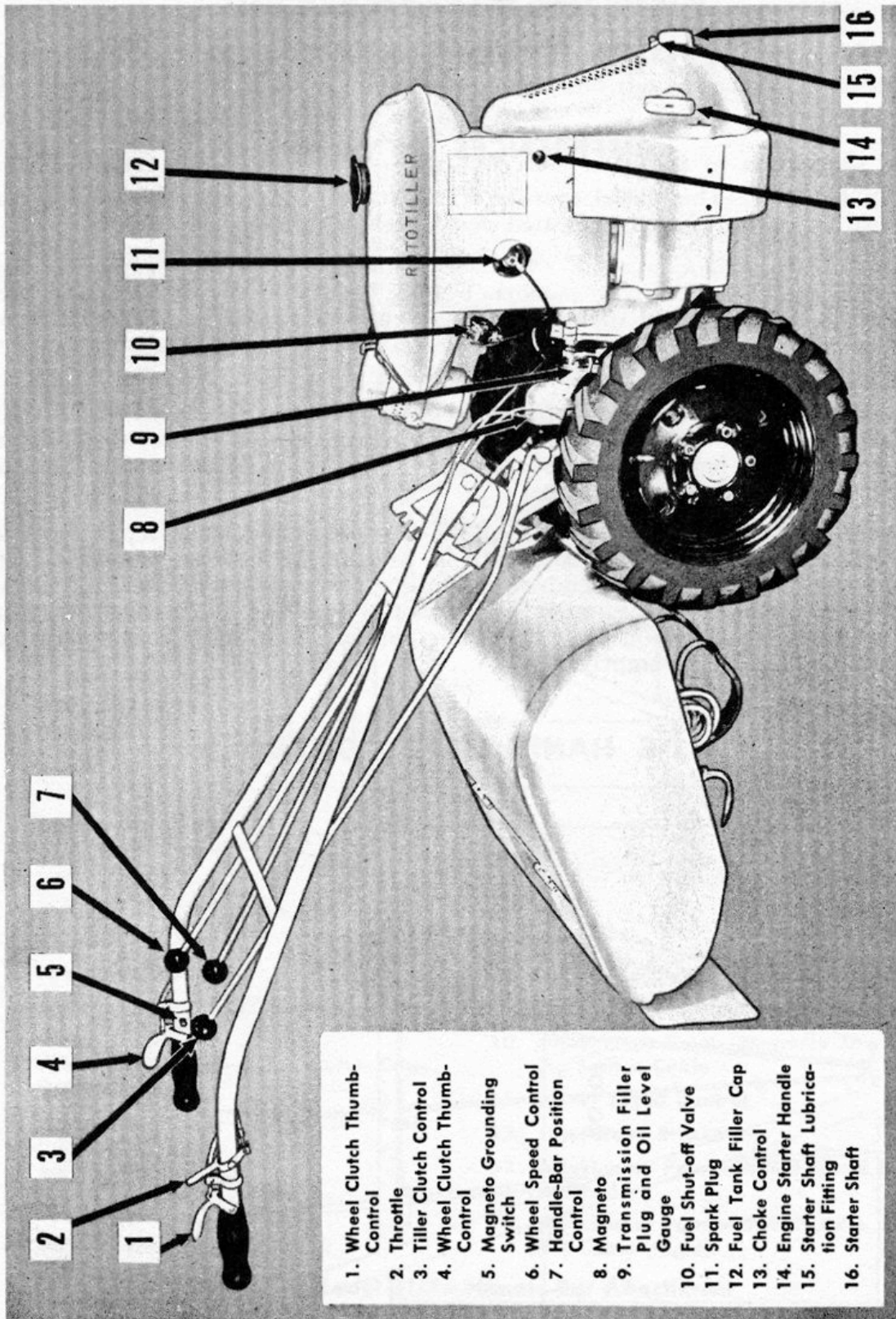


Figure 2. Model B1-7—View of Right Side

PART ONE

OPERATOR'S SECTION

DIFFERENCES IN MODELS

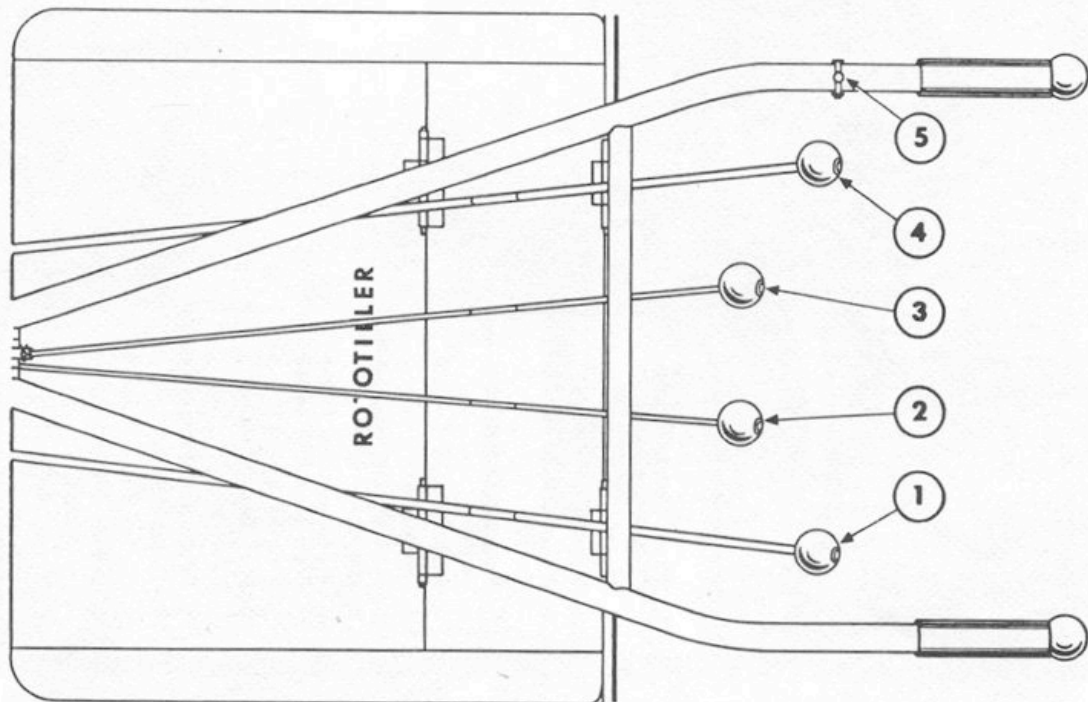
MODEL B1-7.—This model consists of the standard Rototiller Power Tiller as shown in figures 1, 2, and 3. Cleated steel wheels are optional.

MODEL B1-7RS.—Consists of the standard Model B1-7 plus a reverse gear unit as shown in figure 4. Engine numbers bearing the prefix "R", are delivered with reverse gear installed at the factory. The reverse gear unit may be installed on Model B1-7 Rototiller Power Tillers, or Model B1-7RS can be purchased complete from your Frazer Farm Equipment Dealer.

Model B1-7 units will bear Serial Nos. 60,001 through 92,000; Model B1-7RS units, Serial Nos. 101,001 through 111,000. Serial numbers are stamped on a plate located directly beneath the choke button. Engine numbers are stamped on the right side of the engine crankcase.

ORDERING REPLACEMENT PARTS.—If you have a local Repair Service, it will be our pleasure to cooperate in working with your repairman. He may use the postage-paid addressed mailing form we have sent you, giving the model and serial number and stating that the parts are for your Rototiller. Whether you place the order yourself or it is by your repairman it will be shipped promptly.

B1-6 HANDLEBAR CONTROLS

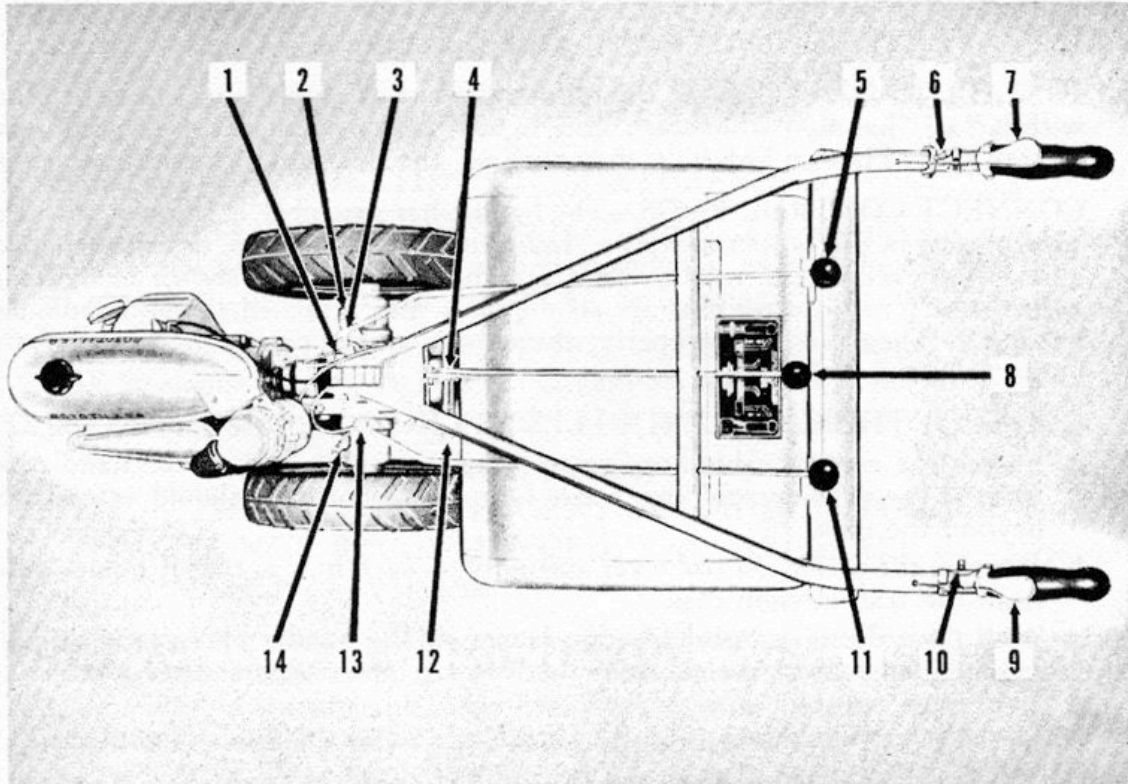


No. 1—Transmission Gearshift Control. No. 2—Handle Bar Horizontal Control. No. 3—Handle Bar Vertical Control. No. 4—Tiller Engagement Control. No. 5—Throttle.

UNCRATING AND ASSEMBLY

To facilitate packing and to save shipping space, Rototiller Power Tillers are shipped from the factory with the handle-bar assembly, and the control rods and hood, removed. Directions for assembly are as follows:

1. REMOVE FROM CRATE.—After top, sides and ends of crate have been



- | | |
|-------------------------------------------------------|---------------------------------------------------------|
| 1. Handle-Bar Fork Bolt | 8. Handle-Bar Position Control |
| 2. Attachment Point—Wheel Clutch Control Cable (Left) | 9. Wheel Clutch Thumb-Control |
| 3. Attachment Point—Tiller Clutch Control Rod | 10. Attachment Point—Magneto Grounding Switch Cable |
| 4. Attachment Point—Handle-Bar Position Control Rod | 11. Wheel Speed Control |
| 5. Tiller Clutch Control | 12. Tiller Hood Bracket |
| 6. Throttle | 13. Attachment Point—Wheel Speed Control Rod |
| 7. Wheel Clutch Thumb-Control | 14. Attachment Point—Wheel Clutch Control Cable (Right) |

Figure 3. Model B1-7—Handle-Bar Attachment

removed, cut hold-down straps securing the Power Tiller to bottom of crate, then cut the wires which hold the hood in place and remove hood after disconnecting adjusting bar from rear of tiller. (See figure 5.) Remove long bolts which secure front housing to bottom of crate.

CAUTION

Under no circumstances should these bolts be screwed back into the front housing. The four cap screws in the sides of the front housing may be removed if desired, but should never be replaced by longer ones.

2. INFLATE TIRES.—Inflate tires to 10-12 lbs. pressure.
3. INSTALL HANDLE BARS.—Install handle-bar assembly and secure in place with $\frac{3}{8}$ " x 3" handle-bar fork bolt. (See figure 3.) To provide necessary clearance, tighten slotted nut on fork bolt, then back off one slot, and lock with cotter pin.
4. CONNECT CONTROL RODS.—The handle-bar assembly is shipped with the control rods in the proper locations. Inasmuch as the rods are not interchangeable, simply secure the rods to their attachment points as shown in figure 3, with cotter pins. (Cotter pins are strung on a wire attached to the handle-bar bracket.) When installed properly, the elbows at the connecting ends of the outer rods, point down.
5. CONNECT THUMB STEERING LEVER LINKAGE. (See figures 3 and 22.)
 - a. Fasten the control cable housings coming from each side of the handle-bar fork, to the clips on each inner axle hub. Cable housings should extend just beyond the clips.
 - b. Position the clutch control lever assembly on each hub so that it points away from the transmission case.
 - c. With both thumb control steering levers on the handle bars raised as high as possible, connect the control cable wires to the clutch control lever trunnions, and tighten the set screws securely.
 - d. Operate both thumb controls and check levers for full travel. (45° approx.)
6. CONNECT THROTTLE CONTROL.
 - a. Insert end of cable housing in clamp on body of carburetor, and tighten the clamp screw securely.
 - b. Insert inner wire through swivel on carburetor throttle lever BUT DO NOT TIGHTEN LOCK SCREW.
 - c. Move throttle on the right handle bar to full closed position (toward operator) and then forward until there is from 1/16" to 1/8" clearance between the throttle and handle bar.
 - d. With throttle in that position, move throttle lever on carburetor to full closed position (rearward) and tighten the swivel screw securely, to lock inner control wire in place.
7. CONNECT MAGNETO GROUNDING WIRE.—Fasten the wire coming from the left handle bar, to the terminal on the right side of the magneto.
8. INSTALL HOOD ASSEMBLY OR TRANSMISSION PLATE.—If the machine is to be used as a Power Tiller, attach the hood assembly to the hood bracket (see figure 3) by inserting the bracket pin and securing it in place with a flat washer and cotterpin on each end. Connect hood adjusting bar to rear of tiller, using clevis pin and cotterpin. (See "How to Till", page 15.)

If the machine is not to be used as a tiller but as a tractor, a transmission plate obtainable from your Rototiller Dealer may be installed as follows:

- a. Place a clean pan under the rear of the transmission, then remove four cap screws and lockwashers which fasten tiller drive housing to transmission.
- b. Slide tiller away from transmission taking care not to injure the gasket.
- c. Set gasket in place, then secure transmission plate to case with the four cap screws and lockwashers taken from the tiller.
- d. Check transmission lubricant level with dip stick; add additional lubricant, if necessary.



STARTING PREPARATIONS

1. FUEL AND LUBRICATING OIL MIXTURES.

FOR ALL TEMPERATURES BELOW 70°F.—Thoroughly mix one pint of finest grade SAE 40 engine oil with each gallon of gasoline for the first 50 hours of operation; thereafter, use ½ pint for each gallon of gasoline.

FOR TEMPERATURES ABOVE 70°F.—Thoroughly mix one pint of finest SAE 50 engine oil with each gallon of gasoline used during the first 50 hours of operation; thereafter, use ½ pint for each gallon of gasoline.

IMPORTANT

THE USE OF DETERGENT OR INHIBITED OILS
IS NOT RECOMMENDED. Fuel tank capacity is
from 8½ to 9 quarts.

Because of the extra oil added to the gasoline during the first 50 hour period, considerable smoke from the exhaust may be expected. Should difficulty be experienced in starting the engine, inspect the spark plug for fouling due to the additional oil added to the gasoline during the “breaking-in” period. Close fuel shut-off valve, then open three to five full turns to permit fuel to flow to carburetor.

2. **TRANSMISSION LUBRICANT.**—With the Power Tiller in horizontal position, check oil level in transmission. If low, bring to “full” mark on dip stick with SAE 90 automotive gear oil. If the weather is extremely cold, SAE 80 should be used. (Lubricant from the transmission flows to and lubricates the tiller axle gears and bearings.)

Note

The use of hypoid gear lubricant is not recommended.

3. **CARBURETOR AIR-CLEANER.**—Fill carburetor air-cleaner to proper level with SAE 40 engine oil; SAE 20, if weather is extremely cold. (See page 21.)
4. **STARTER.**—Check lubrication of starter. See that the starter shaft moves “in” freely with thumb pressure and springs all the way back when released.
5. **WHEEL CLUTCHES.**—The handle-bar-operated wheel clutches are packed with sufficient lubricant to last for the life of the machine. Wheel clutch operation should be checked as follows:
 - a. Raise the machine so that the driving wheels are clear of the ground, or place machine on shipping crate mount.
 - b. Push the wheel speed control-rod forward to engage the transmission gears.

- c. Depress the thumb controls on the handle bars, fully; the driving wheels should rotate freely when turned by hand.
- d. Raise the thumb controls fully; the wheels should now be engaged with the transmission gears and turn the engine over, when rotated.

Note

If wheels fail to engage and disengage when the thumb control is operated, disconnect the control wires from the clutch control levers and operate the levers by hand. If the clutches work properly, re-connect the control wires so that the "engaged" and "disengaged" positions are obtained by the thumb controls.

6. CONTROLS.—See that all controls are lubricated and that they operate freely.
7. TIRES.—Inflate tires to 10-12 lbs. pressure.



STARTING AND STOPPING THE ENGINE

1. Open the throttle control on the right handle bar about one-third, and see that the wheel-speed and the tiller clutch controls are disengaged (neutral). (See figures 2 and 3.)
2. To crank a cold engine, pull the choke button all the way "out", then push "in" on the starter shaft to engage the starter and give a quick steady pull on the starter handle. The lanyard will rewind automatically as the starter handle is returned to the case.

CAUTION

Never release the starter handle suddenly; unless permitted to wind up slowly and evenly, the lanyard may become fouled and jump off the pulley.

3. Should the engine fail to start, push choke button "in" about half-way and continue cranking. It is seldom necessary to use the choke when the engine is thoroughly warm. The fuel vapor dispenser on the carburetor (see figure 1) collects the unburned vapors when the engine is stopped and prevents flooding. In addition, it facilitates starting a warm engine. A few drops of gasoline dripping from the dispenser after engine is stopped, is natural and does not indicate a leak.
4. When the engine starts, immediately push the choke button "in" as far as possible without affecting the even running of the engine, then partially close the throttle.
5. As the engine warms up, push the choke all the way "in" and close the throttle.

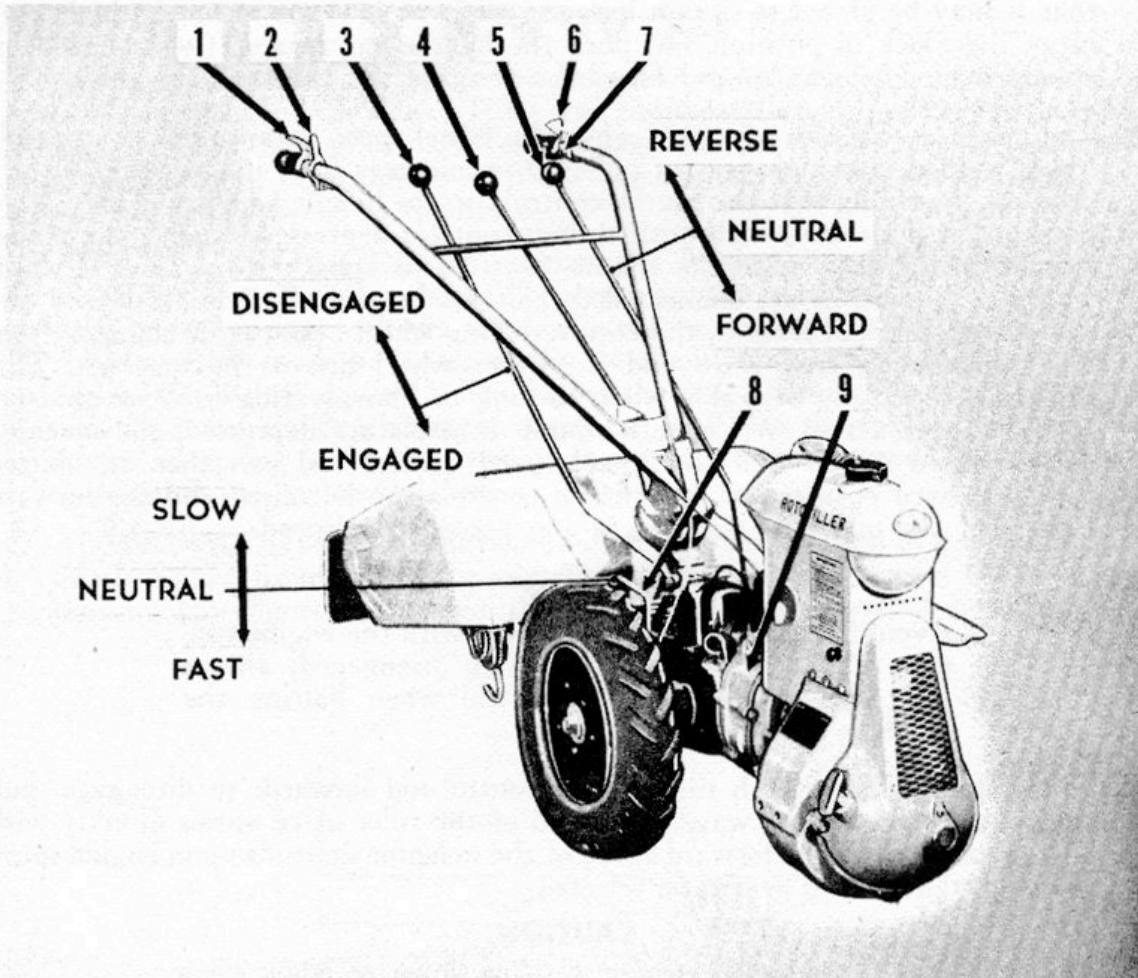
CAUTION

NEVER "RACE" THE ENGINE. This practice is injurious at any time, particularly when the engine is new. During the "breaking-in" period, the engine should not be run at continuous high speeds or under heavy load. When moving the Power Tiller from place to place without load, do not exceed $\frac{1}{4}$ throttle. When necessary to move the machine for long distances, it should be towed or hauled.

6. To stop the engine, press button on left handle bar until engine has come to a complete stop, then shut off fuel supply at strainer beneath the fuel tank.
7. When all engine adjustments are correct and the engine is running properly, it will miss an explosion occasionally when running at idling speed. This trait is inherent in two-cycle engines; therefore, **if the engine runs smoothly and develops adequate power under load, do not change the carburetor or timing adjustments.**

● ● ●

HOW TO USE THE CONTROLS



- | | |
|---------------------------------------|--------------------------------------|
| 1. Wheel Clutch Thumb-Control (Right) | 6. Wheel Clutch Thumb-Control (Left) |
| 2. Throttle | 7. Magneto Grounding Switch |
| 3. Tiller Clutch Control | 8. Wheel Speed Control |
| 4. Handle-Bar Position Control | 9. Reverse Gear Unit |
| 5. Reverse Control | |

Figure 4. Model B1-7RS—Operating Controls

1. After the engine is warmed up, adjust the handle bars up or down to suit the height of the operator. This is done by pulling the center control-rod which releases the horizontal and vertical locking latches. The handle bars can also be moved horizontally so that the operator does not have to walk on newly tilled soil.
2. Two forward speeds are available; gear selection is made by moving the wheel-speed control-rod forward to obtain high speed and to the rear to obtain low speed. When the control rod is moved to the center position, the transmission is in neutral and the machine will not move regardless of the position of the handle-bar thumb controls which govern the wheel clutches.

If the unit is equipped with reverse gears, the wheel-speed control is located at the rear of the transmission case as shown in figure 4. Turn the handle so that it may be raised to obtain low gear ratio or lowered to obtain high gear ratio, then lock in position and push the handle-bar reverse (wheel-speed on standard models) control-rod forward to engage the transmission gears.

3. The machine will move forward when the wheel-speed (transmission) control-rod is pushed into high gear or pulled into low gear from its center (neutral) position, providing that the thumb controls on the handle bars are in the raised position, or if desired, with both thumb controls depressed, engage the transmission gears, then raise the thumb controls to start the machine forward. The thumb controls are connected to clutches on the wheel hubs; if any one thumb control is depressed, the corresponding wheel becomes disengaged from the transmission gear train and the other wheel drives the machine. This feature is especially desirable when turning or maneuvering in close quarters at the end of a row. When both thumb controls are depressed, the machine will come to a halt and the wheel speed control rod can then be shifted to any desired position, or, the thumb controls can be raised and the forward motion of the machine, resumed in any pre-selected speed.

Note

Avoid leaving the machine in gear with the engine running while the wheel clutches are disengaged; always shift the transmission to neutral when halting the machine for any length of time.

4. To engage the tiller, push tiller clutch control-rod forward; to disengage, pull control-rod back all the way. The speed of the tiller drive varies directly with engine speed, while the forward speed of the machine depends upon engine speed plus the transmission gear ratio selected.

CAUTION

Never permit the engine to slow down or labor when doing unusually heavy work; depress both thumb controls, then shift into low gear and then raise thumb controls, or, ease up on the handle bars until the engine regains its normal working speed.

5. When bringing the machine to a halt while tilling, always disengage the tiller first, then depress the thumb controls and shift the transmission to neutral. This procedure, if performed properly, will stop the forward motion of the machine immediately and remove the load on the gears, thus permitting easy shifting to any transmission speed.

6. In order to “back-up” machines equipped with reverse gears, simply shift the reverse control rod past “neutral” to the rear. If desired, the shift from “forward” to “reverse” may be made without shifting the tiller clutch to “neutral”, because the tiller will disengage automatically; however, when shifting to “neutral” from “forward” always disengage the tiller clutch first.

ALWAYS:

- a. Engage drive wheels before engaging tiller clutch.
- b. Lift tiller from the soil before disengaging tiller clutch.
- c. Disengage tiller clutch before halting the machine.
- d. Shift transmission to neutral after halting the machine by depressing the thumb controls.

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HOW TO TILL

The most explicit directions cannot entirely take the place of personal instruction; however, operation of the Power Tiller is so simple and easy, that very little experience is required to achieve desirable tillage for practically every conceivable growing condition. With the Power Tiller in position ready for work, but with the engine stopped, proceed as follows:

1. **ADJUST DEPTH RUNNER**—Adjust the depth runner for the desired depth of tillage (from 0 to 9 inches). The depth runner is located directly under the tiller drive housing, with the adjustable end extending upward toward the rear. Adjustment is made by inserting the clevis pin in the hole which provides the desired depth (see figure 5). The higher the depth runner is set, the deeper the cut; the lower the depth runner is set, the shallower the cut. Adjust the depth runner according to the condition of the soil (or depth desired) but not so deep as to cause the engine to labor.
2. **ADJUST HOOD.**—Adjust the height of the hood in relation to the height of the depth runner, by means of the adjustment located at the rear of the tiller drive housing (see figure 5). Adjust the hood until a clearance of one inch exists

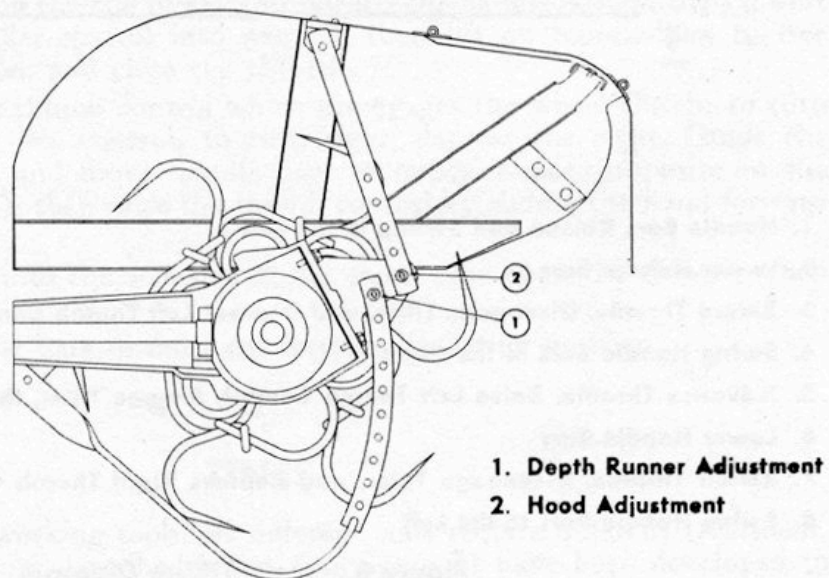
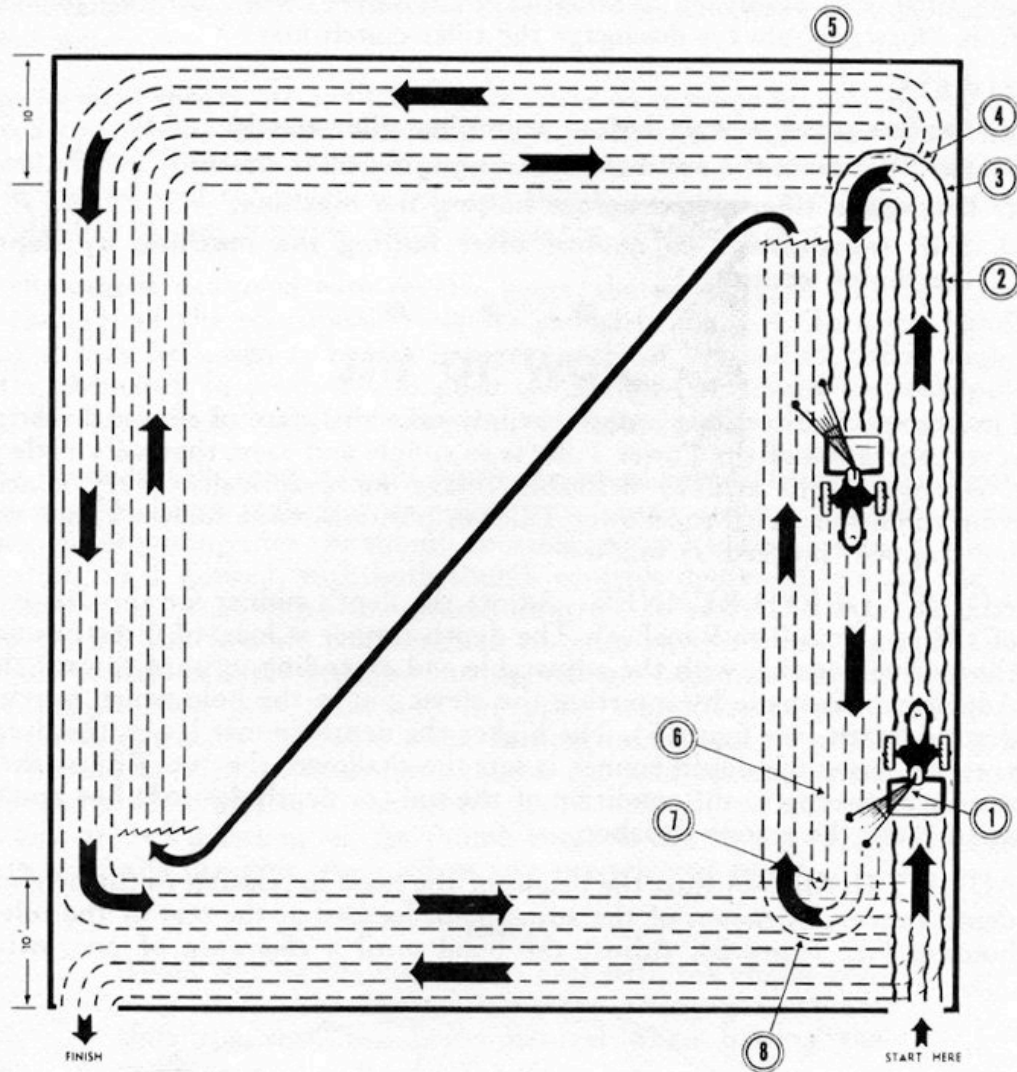


Figure 5. Hood and Depth Runner Adjustment



1. Handle Bars Raised and Swung to the Left
2. Lower Handle Bars
3. Retard Throttle, Disengage Tiller, and Depress Left Thumb Control
4. Swing Handle Bars to the Right
5. Advance Throttle, Raise Left Thumb Control, Engage Tiller, then Raise Handle Bars
6. Lower Handle Bars
7. Retard Throttle, Disengage Tiller, and Depress Right Thumb Control
8. Swing Handle Bars to the Left

Figure 6. Field Tilling Diagram

between the hood sidewalls and the ground. Should the hood be adjusted too low, the sidewalls may cut into the soil and damage the hood, place a "drag" on the engine, or leave an unsightly seed bed. Should the hood be adjusted too high, soil will be thrown from under the sidewalls, leaving the edge of the seed bed indistinct and difficult to find when joining on the next working strip.

3. **SELECT PROPER SPEED.**—With the engine running at a fast idle, select the desirable forward speed range and start the machine forward. The speed used is dependent upon the soil condition, depth of cut, and nature of seed bed.
4. **ENGAGE TILLER.**—Engage the tiller clutch by pushing the control rod forward, then lower the tiller by depressing the handle-bars, and open the throttle at the same time. **The tines should be lowered gradually. Do not bear down on the handle-bars—heavy pressure is not necessary.** The lifting and lowering of the tiller should be done gradually. Too quick lifting of the tiller causes the engine to race; too quick lowering may stall the engine.

Should a stony or extra hard plot of ground be encountered and the engine start to labor, lift up on the handle-bars slightly to reduce the load.

WARNING

When tilling unworked ground, avoid possible damage to the Power Tiller by removing heavy stones, large exposed roots or other major obstructions. If an obstruction is encountered, halt the machine by disengaging the tiller clutch and depressing the thumb controls, then clean the tines and examine them for damage or serious distortion. (See figure 10.)

5. **ADJUST HANDLE BAR POSITION.**—Pull the center rod to release the locking latches, then move the handle off center to avoid walking on the newly tilled soil, and up or down to suit the height of the operator.
6. **STEERING.**—To turn the machine, the following procedure is suggested: (See figure 6.)
 - a. When approaching the end of the row, adjust the handle bars to their lowest position, shift tiller-control into neutral, then lift on handle-bars to free tiller from the soil, and close the throttle.
 - b. Now depress the thumb control which disengages the wheel clutch; to turn left, depress the left control; to turn right, depress the right. Guide the machine around and move handle bars to opposite side (opposite to the direction of turn), then raise the thumb control by sliding the hand forward and beneath it.
 - c. Lower the tiller into the soil and at the same time open the throttle, then engage the tiller.
 - d. Adjust the handle bars to most comfortable operating position.



TINES

The tines are the soil working tools. As different soils require different treatment, the various types of tines described below (see figure 7) have been developed to meet varied ground conditions and may be purchased from your Rototiller Power Tiller Dealer:

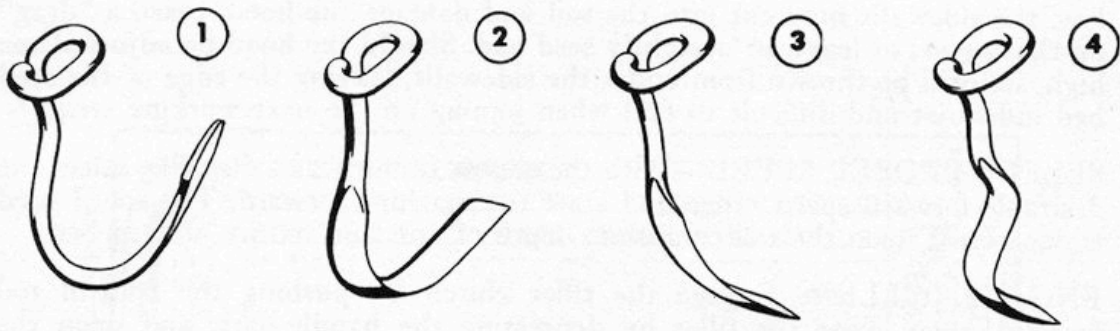


Figure 7. Tines

1. Pointed Tine.—A general purpose tine used for practically all types of work.
2. Paring Tine.—For weeding or cultivating at shallow depth.
3. Knife Tine.—For tilling soils with heavy covercrops, or stable manure.
4. "S" Tine.—For half or full depth tilling of soil encrusted with coarse obstacles, such as stones and roots. This type of tine should be used for woodland tilling.

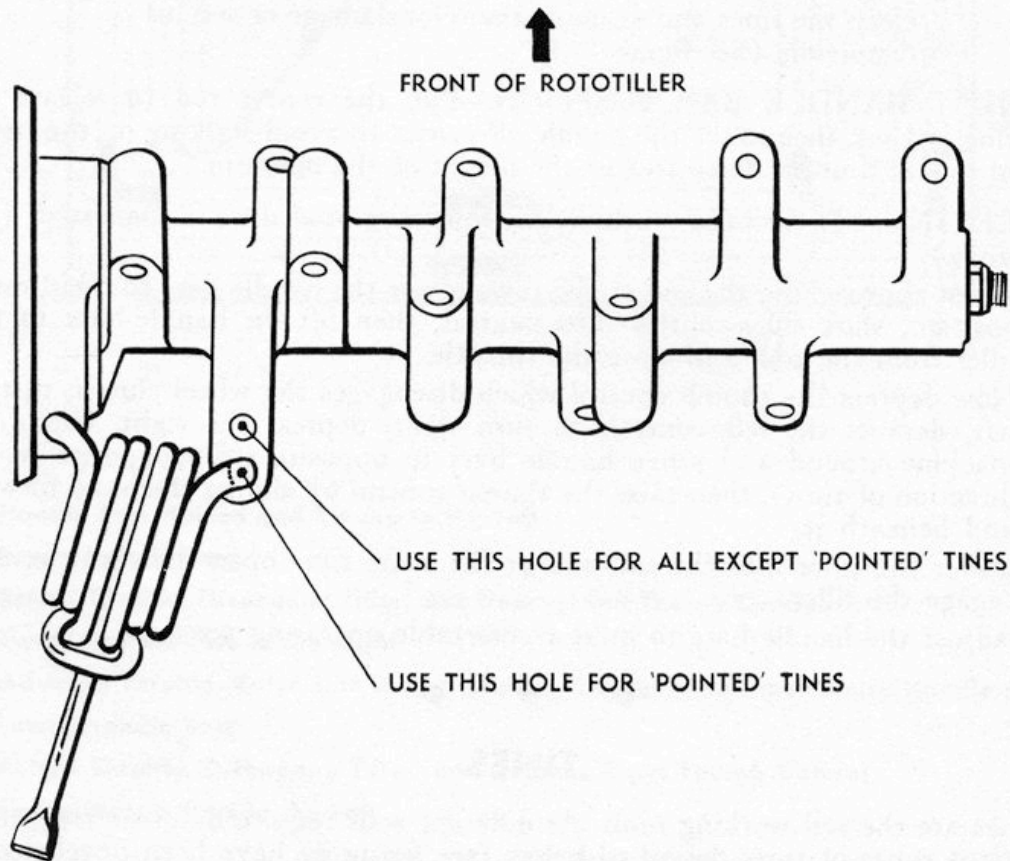


Figure 8. Installing Pointed Tines

IMPORTANT

When using the Pointed Tine, make sure that the outer prongs of the two center spring holders are installed in the tine holder casting as shown in figure 8. This angular position permits even tillage and helps to eliminate ridges below the center of the drive housing. If installing the Paring or "S" Tine at an angle, be sure that tines clear housing.



REMOVAL AND INSTALLATION OF TINES, TINE HOLDERS, AND TINE SPRING HOLDERS

1. REMOVAL.

- a. **TINE.**—Using a hammer, loosen the tine by driving it back to the narrow portion of the coil spring loop, then remove by turning it to the right.
- b. **TINE HOLDER.**—Remove cotter pins from ends of tine holders, then drive from casting.
- c. **TINE SPRING HOLDERS.**—Remove hood, then remove self-locking nut and washer from end of tine holder assembly. If studs unscrew at inner ends, remove stud, nut, and washer together. The tine spring holder can then be pulled from the shaft after tapping gently with a soft hammer.

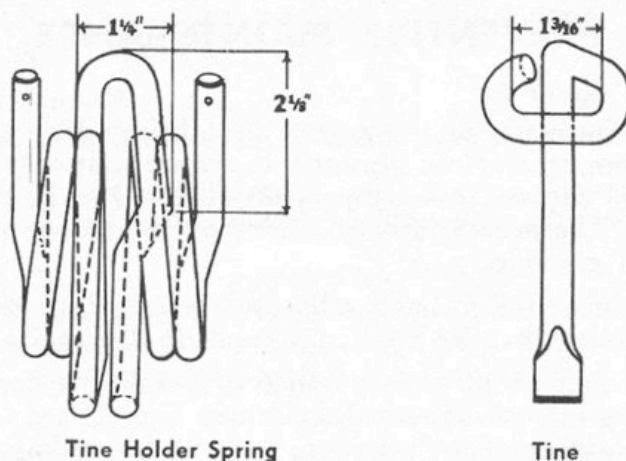
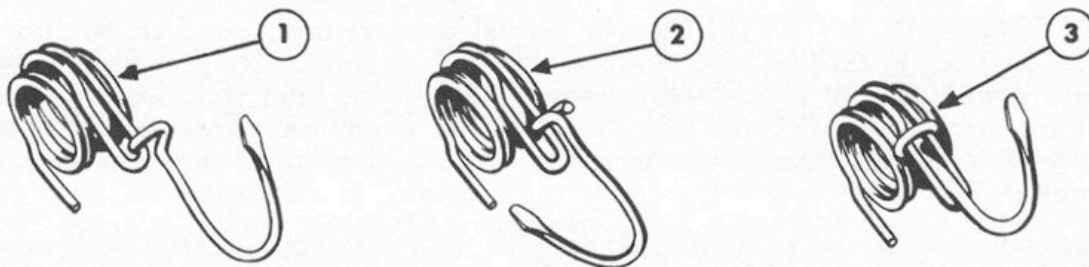


Figure 9. Tine and Spring Dimensions



1. Starting Position

2. Half Turn Position

3. Full Turn (Locked) Position

Figure 10. Tine Installation

2. INSTALLATION.

- a. **TINE SPRING HOLDERS.**—Assemble clearance washers, tiller drive keys, and studs onto shaft, then slide spring holder onto shaft followed by steel washer. Lock assembly in place tightly with a new self-locking nut.
- b. **TINE HOLDERS.**—Install tine holders onto casting as shown in figure 8. If necessary, tap spring lightly until cotter pin can be installed.
- c. **TINES.**—Facing the coil spring, and holding tine with the point up, enter the hook of the tine over the right side of the coil spring loop. Turn the tine one-half turn to the left and push back to the narrow part of the loop, then turn the tine another one-half turn to the left and pull forward into locked position. (See figure 10.)

Note

On some springs, the loop (or center portion) may be found to be off center. These springs are still usable and can be installed in any position except the two next to the tiller housing. For these two center positions (which are on an angle), the springs with loops most nearly centered should be installed to eliminate possibility of the tines damaging the housing. Tines or springs which do not meet the dimensions shown in figure 9 or are otherwise distorted, should be replaced by new ones.



PREVENTIVE MAINTENANCE

LUBRICATION. (See figure 2.)

ENGINE.—All moving parts of the engine are lubricated by the oil mixed with the gasoline; therefore, it is of the utmost importance that only the finest quality of SAE 40 engine oil be used. For temperatures below 70° F, use SAE 40; above 70° F, use SAE 50. The proper ratio of engine oil to gasoline is one-half pint of oil to each gallon of gasoline.

Less than one-half pint of oil in the gasoline, or the use of an inferior grade of oil, or oil lighter in viscosity than SAE 40, may result in damage to the engine.

More than one-half pint of oil to each gallon of gasoline is not necessary except during the "breaking-in" period, because it may cause hard starting, excessive engine smoking, excessive carbon formation, and possible fouling of the spark-plug.

THE USE OF DETERGENT OR INHIBITED-TYPE OILS IS NOT RECOMMENDED

TRANSMISSION AND TILLER.—In normal temperatures, use SAE 90 automotive gear oil; in extreme cold weather, use SAE 80 automotive gear oil. **Use of hypoid gear lubricant is not recommended.** To add or refill transmission with lubricant, remove dip stick and filler plug. Oil level should be maintained between the "low" and "full" marks on dip stick, with the Power Tiller in horizontal position.

Drain transmission and tiller drive, then flush entire system and refill with new oil after every 250 hours of operation or oftener under severe dust conditions, and always at the beginning of the Spring season. See directions for draining and flushing under "Starting after Storage."

Tiller bearings are lubricated by lubricant from the tiller drive housing, the tiller drive housing, in turn, is kept supplied with lubricant from the transmission; therefore, **it is important that the transmission be kept filled to the proper level with the correct gear lubricant.**

STARTER SHAFT.—Lubricate every 250 hours of operation with non-fibrous chassis lubricant. **Avoid over-lubricating starter shaft to prevent lubricant from being thrown on starter cable and fan.**

CARBURETOR AIR CLEANER.—Keep cup filled to indicated level with SAE 30 engine oil for normal operation. In extreme cold weather, SAE 20 or 10 engine oil is recommended; for extreme hot weather SAE 40 engine oil is recommended.

IMPORTANT

The life of the engine is greatly dependent upon proper and regular servicing of the air cleaner. **CLEAN CUP DAILY—OR OFTENER UNDER SEVERE DUST CONDITIONS—AND REFILL WITH NEW ENGINE OIL.**

Remove body of cleaner and rinse thoroughly in kerosene every 250 hours of operation, or oftener if required.

HANDLE-BAR CONTROL CABLES, POSITION LINKAGE AND CHOKE CONTROL.—Lubricate with engine oil every 250 hours of operation, or as often as required.

FUEL STRAINER.—Clean sediment bowl and filter screen every 250 hours of operation, or oftener if required.

GENERAL MAINTENANCE.

TIRE PRESSURE.—Inflate tires to 10-12 lbs. pressure at normal air temperature.

TIGHTENING.—To prevent vibration and excessive wear of connecting parts, keep all screws, nuts and bolts properly tightened at all times.

STORAGE.

OFF SEASON OR WINTER STORAGE.—When machine is to be idle for several months, proper storage will not only prolong its life but will also greatly reduce maintenance and operating cost. The following procedure is recommended:

1. Thoroughly clean off mud and dirt, then wipe dry.
2. To prevent settling of sediment and formation of varnish, the fuel system including the carburetor, should be completely drained. Leave drains open.
3. Store in a clean, dry, and preferably dark place. Light, especially sunlight, is injurious to the rubber parts.
4. To lengthen the life of the tires, place blocks under the driving wheel axles to take the weight off the tires, and reduce air pressure to approximately 50% of normal. Be sure the tires are free from oil and grease.
5. To keep rust from forming inside the cylinder, remove the spark plug and pour two tablespoonfuls of engine oil into the cylinder through the spark plug opening. Before re-installing the spark plug, crank the engine three or four times to distribute the oil over the cylinder wall, piston, and piston rings.
6. Stop up engine exhaust muffler with rags to keep moisture from entering the cylinder and crankcase.

REMOVING TILLER FROM STORAGE.—After the machine has been stored for any length of time, it will need careful attention before it is ready for use.

1. Remove plug from exhaust pipe.
2. Remove spark plug and pour $\frac{1}{4}$ cup of light oil through the spark plug opening into the cylinder. Do not replace the plug in the engine.
3. Crank the engine for several revolutions so that the fresh oil will be distributed throughout the engine.
4. Replace spark plug.
5. Lubricate all the working parts.
6. Fill fuel tank.
7. To prevent damage to the fine finish of the gears and bearings by dirt and abrasives in the lubricant, the transmission and tiller axle housing should be thoroughly flushed out with a good grade of flushing oil before the Power Tiller is put into service after a long period of storage. These units should be flushed out after every 250 hours of operation or at least once each year as follows:
 - a. So that tiller housing will drain quickly and more completely, tilt the machine forward until it rests on front of engine crankcase.
 - b. Remove transmission dip stick, filler plug and drain plug, to permit transmission and tiller housing to drain completely.
 - c. Re-install transmission drain plug, return the machine to horizontal position, and pour four or five pints of flushing oil into transmission.
 - d. With the handle-bars, tilt the machine back and forth slowly in a rocking motion to flush the old lubricant out of the tiller housing and into the transmission.
 - e. Again tilt the machine forward on engine crankcase, and remove drain plug; after transmission has been completely drained, repeat flushing operation as given in paragraph c. Generally, flushing twice as outlined is sufficient to remove all of the old lubricant; however, the operation should be repeated for a third time, if necessary.
 - f. Depress the handle-bars to lower the tiller drive housing, then remove the cover plate from the rear of the housing; with a clean rag, remove any remaining flushing oil and sediment.
 - g. Return the machine to horizontal position; replace tiller drive housing cover plate and transmission drain plug; then fill transmission with six pints of SAE 80 or 90 automotive gear oil. Replace filler plug and dip stick, then re-check housing cover, drain plug, and filler plug for leakage.

Note

Sufficient time should be allowed for the tiller axle housing to fill before checking the lubricant level in the transmission, because the lubricant flows from the transmission housing to the tiller axle housing.

8. If rubber tires are used, restore the correct air pressure (10-12 lbs.)

FACTS TO REMEMBER

● Engine lubrication is accomplished only by the oil mixed with the gasoline. Too little oil may seriously damage the engine—too much may foul the spark plug, cause hard starting and excessive smoking.

- Never pour oil or gasoline into the fuel tank without first thoroughly mixing them. For the first 50 hours of engine operation (the “breaking-in” period) mix one pint of finest quality SAE 40 or 50 engine oil with each gallon of gasoline, depending on the weather. After the “breaking-in” period, mix one-half pint of SAE 40 or 50 engine oil with each gallon of gasoline, depending on the weather.
- The life of the engine greatly depends upon the proper care of the carburetor air cleaner. Keep it clean and filled to the level mark, with engine oil.
- Never allow the engine to slow-down or labor when doing unusually heavy work—ease up on the handle bars until the engine regains its normal speed.
- Unexpected engine stoppage is usually due to one of the following: (1) Running out of fuel. (2) Fuel so low in tank it will not flow to carburetor when tiller is deep in ground. (3) Vent in gas cap plugged, preventing air from entering tank. (4) Fuel line plugged. (5) Fouled or dirty spark plug. (6) Spark plug shorted by blade of grass or other material across terminal. (7) Dirty connection, or spark plug wire loose at magneto.
- It is good practice to go over all screws, bolts, and nuts regularly to be positive they are tight.
- The experienced operator never bears down on the handle bars or “fights” the machine. **LET THE ROTOTILLER POWER TILLER DO THE WORK.** Grasp the handle-bar with only sufficient pressure to guide the machine.
- Never engage tiller with the engine running above a fast idling speed, or permit the engine to race when the tines are out of the ground.
- Never use “any kind” of grease in transmission—use only the prescribed automotive gear oil.
- It is dangerous to clean or change tines when the engine is running.
- **YOUR ROTOTILLER POWER TILLER** is honestly built and combines mechanical excellence with outstanding performance. Treat it well.



PART TWO

REPAIR SECTION

ADJUSTMENT REFERENCE

AXLE—TILLER.

Back Lash (ring gear and pinion)..... .005" to .010"

CAPACITIES.

Transmission and Tiller Axle Housing Combined:

Model B1-7 6 pts.

Model B1-7RS 7 pts.

Fuel Tank (oil and gasoline mixed)..... 8½ to 9 qts.

Carburetor Air Cleaner ½ pt.

CARBURETOR.—Fixed jet for greatest fuel economy with maximum engine performance above idling speed. To adjust mixture, turn adjusting screw on carburetor. Not more than a quarter turn of the screw should be required at any one time. To regulate engine idling speed, turn throttle lever stop screw. Make adjustments only when engine is thoroughly warm.

IGNITION.

Spark Plug Gap027"

Magneto Point Gap:

Fairbanks-Morse020"

Edison-Splitdorf014" to .016"

Ignition Timing 16.5 Deg. B.T.D.C. (Marks on fan and crankcase).

SPECIFICATIONS

ENGINE: Single cylinder, two cycle, bore 3", stroke 3", displacement 22.97 cubic inches, cooling by turbo air fan; aluminum alloy piston with treated surfaces, 3 compression rings held in place by special anchors. High radial capacity single-row ball-bearings on crankshaft, and hardened needle roller bearings in both ends of connecting rod.

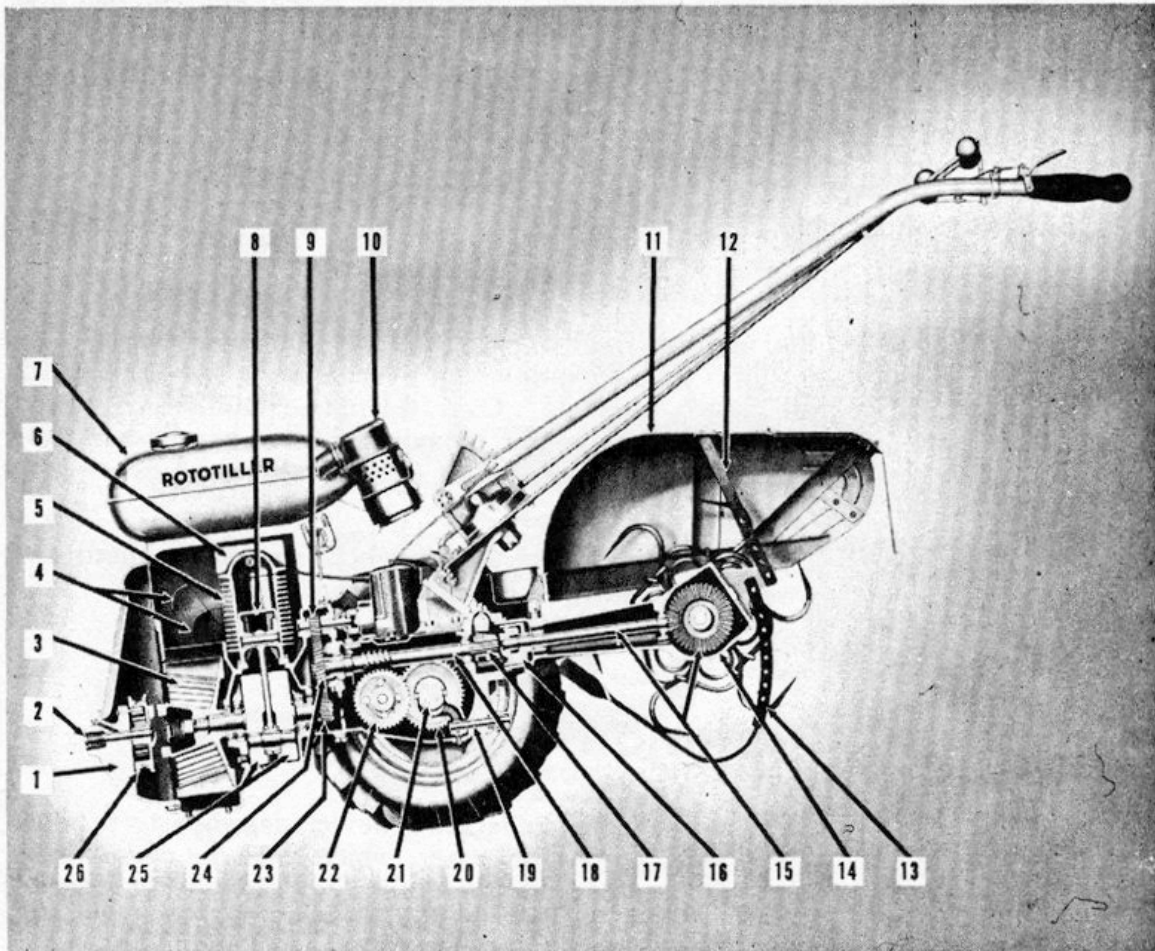
CARBURETOR: Up-draft, with fuel vapor dispenser to prevent flooding. Fixed jets covering all speed ranges except idle range which is controlled by an adjusting needle.

CARBURETOR AIR CLEANER: Oil-bath deep bowl type, for angle operation.

IGNITION: High tension, dust and water-proofed magneto with impulse coupling, gear driven. Spark plug size—18 mm.

LUBRICATION: Engine; oil mixed with gasoline. Tiller axle; lubricant flowing from transmission. Starter; grease gun.

TRANSMISSION: Two speeds forward. Triple reduction drive consisting of one set helical gears, one worm and worm wheel, and two sets of spur gears driving the wheels. Spur gears are for low and high speeds; in constant mesh. Speed selection made by meshing a sliding dog clutch splined to wheel shaft. Worm shaft mounted in roller bearings.



- | | |
|---------------------------------|-------------------------------------------|
| 1. Cooling Fan Housing | 15. Tiller Drive Pinion |
| 2. Starter Shaft | 16. Shock Absorber Housing |
| 3. Cooling Fan | 17. Tiller Clutch Sliding Dog |
| 4. Air Deflectors | 18. Transmission Worm Shaft |
| 5. Cylinder Block | 19. Transmission Shift Fork and Shaft |
| 6. Cylinder Head | 20. Transmission Low Speed Gear |
| 7. Fuel Tank | 21. Transmission Shift Sleeve |
| 8. Piston and Rod Assembly | 22. Transmission Worm and Pinion Assembly |
| 9. Magneto Drive-Gear and Shaft | 23. Crankshaft Gear |
| 10. Air Cleaner | 24. Transmission Drive Gear |
| 11. Tiller Hood | 25. Crankshaft Assembly |
| 12. Hood Adjusting Bar | 26. Starter Pulley |
| 13. Depth Runner | |
| 14. Tiller Drive Bevel Gear | |

Figure 11. Cross Sectional View of Model B1-7

WHEEL CLUTCHES: Spring type. Individually operated; controlled by thumb operated levers on handle-bar.

TILLER DRIVE: Pinion driven—straight bevel gear. Pinion mounted in hardened roller needle bearings at front end; single row ball bearings at rear end. Splined dog clutch with leather lined coupling to absorb shock.

Bevel gear keyed to drive shaft. Drive shaft mounted in two tapered roller bearings.

WHEELS: Disc 12" x 3.00"

TIRES: 2 ply 4.00" x 12"

STARTER: Recoiling cable.

SPEEDS WHEN TILLING: $\frac{3}{4}$ mph in low gear; $1\frac{1}{3}$ mph in high gear.

GENERAL: Weight 450 lbs. approx. Tread (center distance between wheels) 19". Turning radius (overall machine) 66". Overall width over tires 24". Overall width over hood and flaps, 20" tiller—28"; tiller—33". Overall length (handle-bars down) $84\frac{3}{4}$ "; (handle-bars up) $70\frac{3}{4}$ ". Overall height (maximum with handle-bars up) $59\frac{1}{8}$ ". Width of cut 20" or 26" as ordered. Depth of cut 0" to 9" as adjusted. Tire inflation 10-12 lbs.

EQUIPMENT: Hammer, screw driver, pliers, end wrench, special magneto and wheel wrench, spark plug wrench, grease gun for lubricating starter shaft.



IGNITION SYSTEM

DESCRIPTION.

MAGNETO.—The magneto is an electrical generating device designed to produce controlled electric-spark discharges. These discharges, which must be of sufficient intensity to meet the ignition requirements of the Rototiller Power Tiller internal combustion engine, are produced independently of any external source of electric power. The magneto depends slowly upon the mechanical energy supplied by hand cranking, which obviates the need for a heavy battery or the generating system to keep it charged.

To increase engine starting efficiency, an impulse-starter mechanism has been incorporated with the magneto, which rotates the magneto shaft much faster than the engine cranking speed, thereby producing a high-intensity spark for cranking purposes. This device functions only at cranking speeds and automatically retards the ignition spark while in operation.

SPARK PLUG.—The actual ignition spark which occurs in the engine cylinder, takes place between the electrodes of the spark plug; therefore, the importance of the type and the condition of the plug should never be over-estimated. The spark plug used in the Rototiller Power Tiller engine is commonly referred to as the "cool" type of plug, all spark plugs being classified into five groups; "hot", "warm", "normal", "cool", and "cold". "Cold" plugs are fitted with short insulators which quickly carry heat from the core, while "hot" plugs are fitted with long insulators which dissipate the heat slowly.

MAGNETO IGNITION MAINTENANCE.

GENERAL.—If the ignition system is suspected as being the cause of any difficulty in starting or running it may be checked as follows:

1. Remove spark plug with wire attached, and lay on its side on the engine so that the firing points are clear of any nearby metal part.
2. Check spark plug for a gap setting of .027".

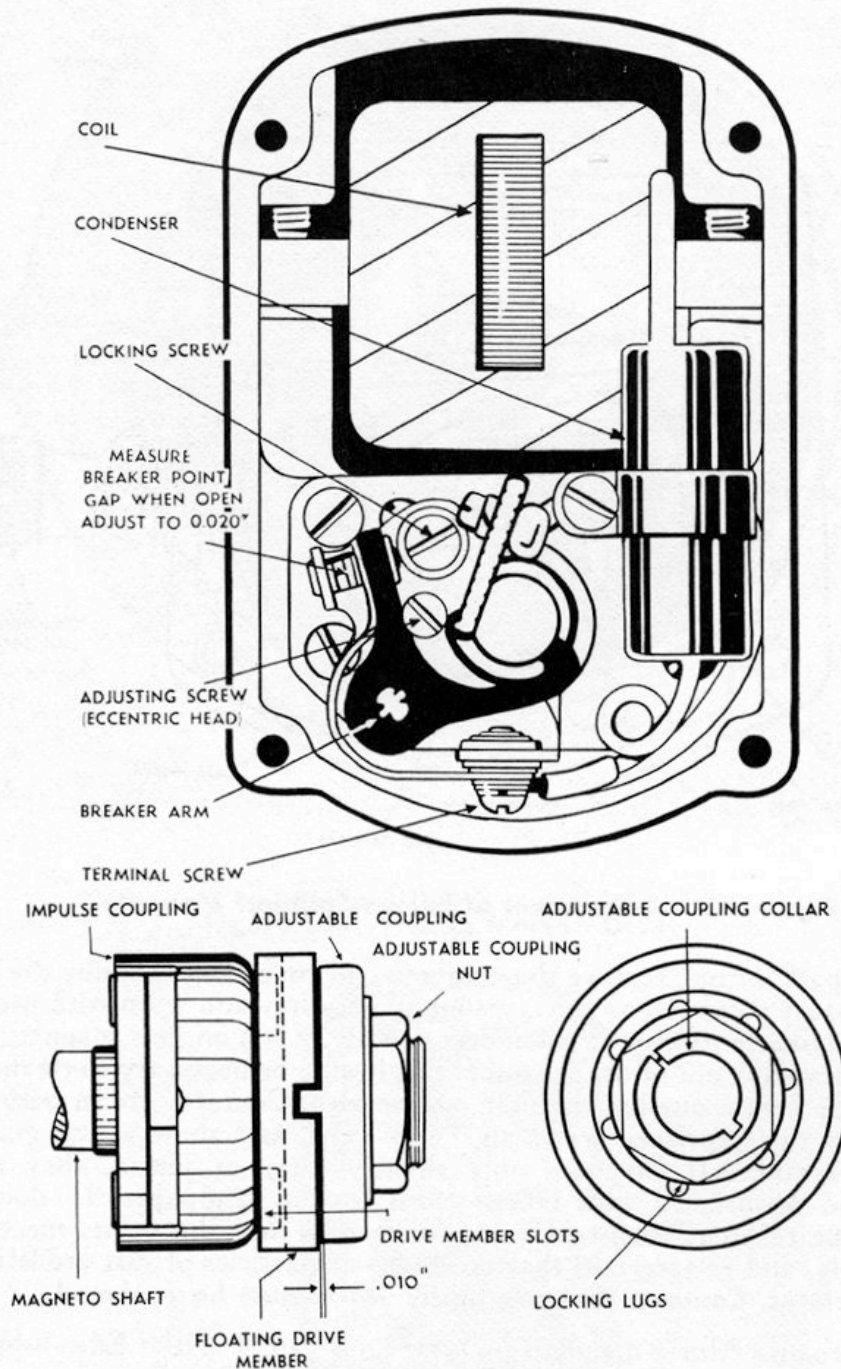


Figure 12. Adjustment of Fairbanks-Morse Magneto

3. Crank the engine until impulse coupling clicks, noting whether plug fires.
4. If no spark occurs at the plug, remove the wire, hold it $\frac{1}{8}$ " from the cylinder and re-crank the engine. If a good spark occurs between the wire and the engine, the plug is faulty and should be cleaned or replaced.

5. If no spark occurs in the last test, remove cable and fasten another short wire to the magneto terminal, bringing the free end within $\frac{1}{8}$ " of magneto frame or engine. Re-crank the engine; if a good spark occurs, the cable is faulty and should be replaced.

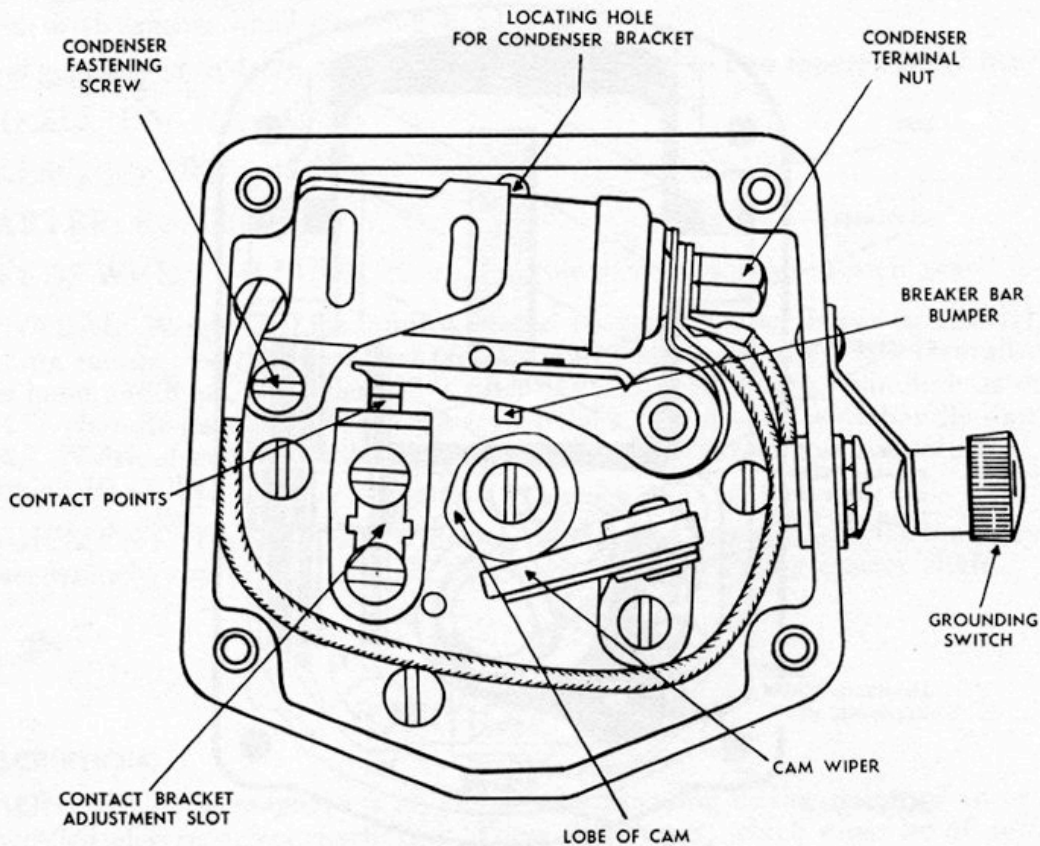


Figure 13. Adjustment of Edison-Splitdorf Magneto

6. If still no spark occurs, remove the magneto end cover and examine the contact points. Contact points on any magneto may get dirty and worn with use, therefore, it is advisable to inspect them occasionally. Even on new magnetos which have been standing out of use for sometime, it may be necessary to clean off any film of oxide before putting the unit into service. Contacts are in perfect condition when their surfaces are clean, fairly even, and show a fine grained or frosty appearance. If they are only slightly dirty or pitted, they may be cleaned and re-surfaced with crocus cloth or fine sandpaper. In doing this, care must be taken to maintain a true surface so that the points meet evenly and squarely, and to ascertain that no shreds or particles of dirt are left on the contact surfaces. **Contacts that are badly worn must be replaced.**
7. Adjust Fairbanks-Morse magneto contacts for a gap of .020"; Edison-Splitdorf, for a gap of .014"—.016". (See figures 12 and 13.) If the foregoing procedure does not produce a good spark, the magneto should be taken to an authorized service station for further examination.

IGNITION TIMING.

1. Remove cooling fan housing, exposing fan. (Fastened in place by two cap screws.)

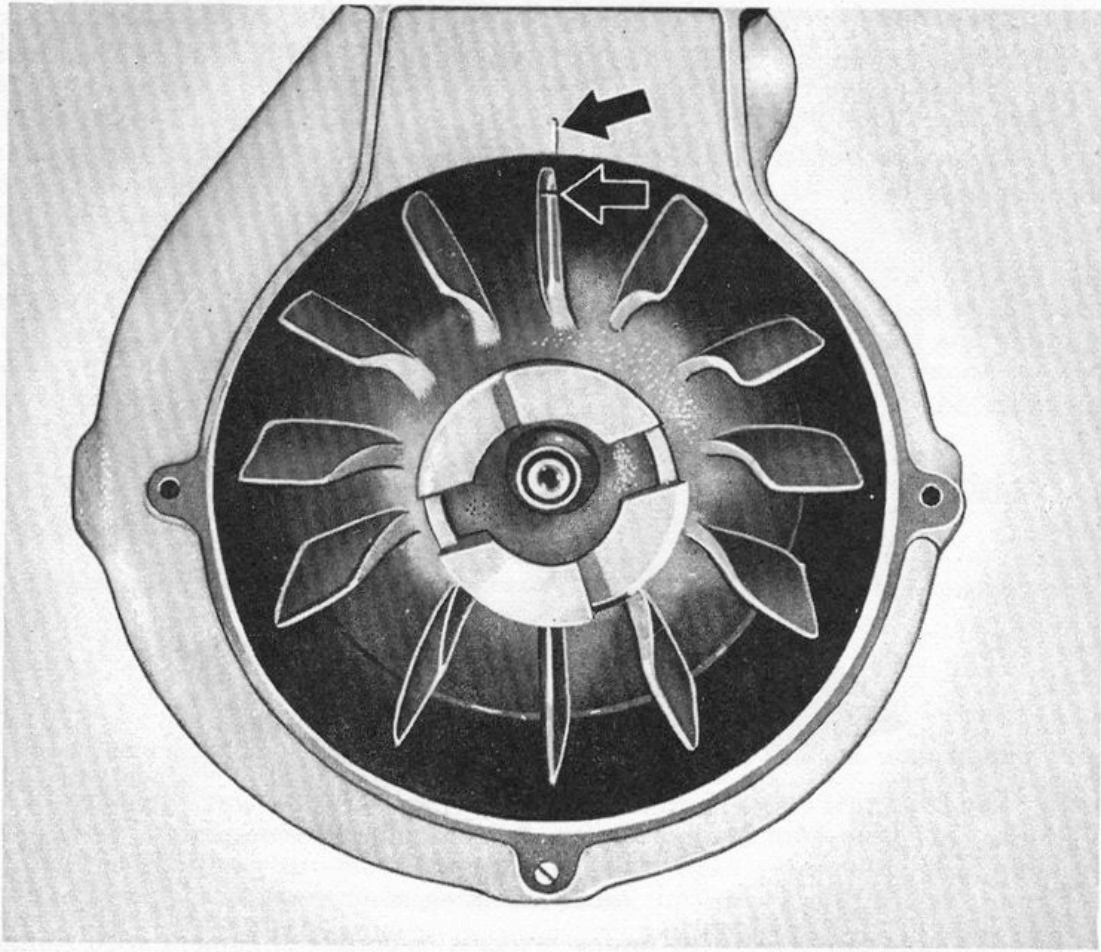


Figure 14. Timing Marks—Cooling Fan

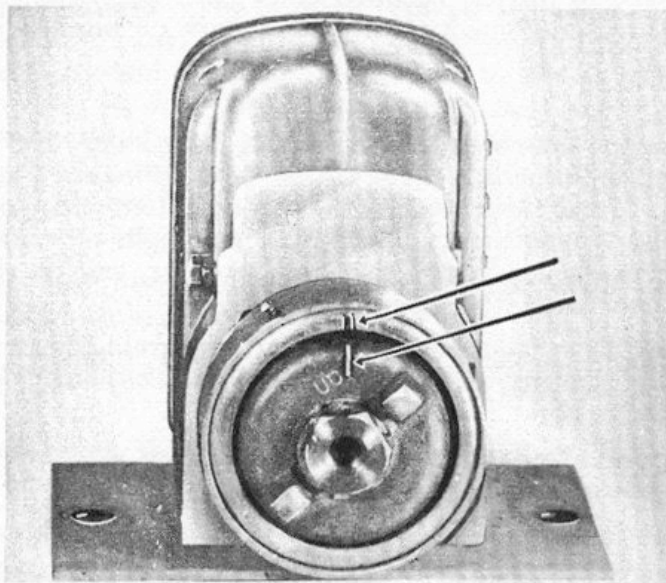


Figure 15. Timing Marks—Fairbanks-Morse Magneto

- Using a screw driver, straighten lock washer lugs to free magneto lock nut at coupling. Holding fan stationary, loosen adjustable coupling lock nut and back off three or four turns. The special magneto and wheel bolt wrench supplied in tool kit should be used.

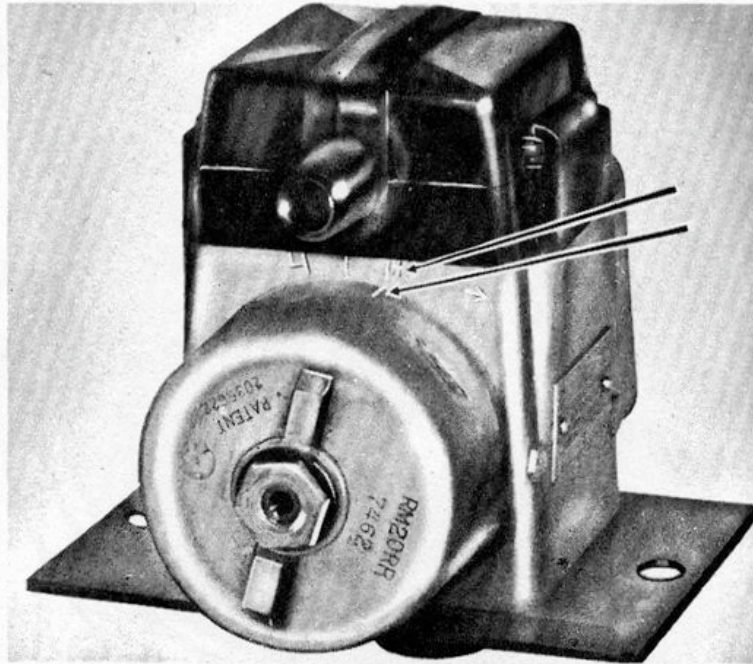


Figure 16. Timing Marks—Edison-Splitdorf Magneto

- Remove spark plug (to permit easier cranking of engine).
- Turn fan until fan blade with timing mark, is in perfect alignment with timing mark on crankcase. (See figure 14.)
- Turn magneto adjustable coupling to the right (clockwise) until impulse starter trips. (The impulse starter makes a loud clicking noise when it trips.) Next, turn coupling back to the left (counter-clockwise) until timing mark on drive member is in perfect alignment with timing mark on impulse starter housing. (See figures 15 and 16.)

Note

Directions for checking and setting the timing of the Edison-Splitdorf Magneto are the same as for the Fairbanks-Morse Magneto, with the exception that the impulse timing marks are located just right of center on the outer surface of the impulse cover, and on the front surface of the magneto housing.

- Holding magneto drive coupling to prevent its turning, insert a .010" feeler gage between the floating drive member and the coupling flange, (see figure 12) then tighten lock nut finger tight.
- Holding fan to prevent its turning, securely tighten magneto lock nut, again using special wrench provided for that purpose.
- Fasten lock nut in place by bending the lugs of the lock washer over flat surfaces of nut.
- Re-install cooling fan housing and spark plug, then install spark-plug cable.

FUEL SYSTEM

FUEL TANK.—The fuel tank is constructed of two halves welded and soldered together at the central flanges. The threaded adapter which extends from the lower rear, is soldered to the inside of the tank. If fuel will not flow freely into the fuel strainer, the fuel tank cap vent should be cleared. If this does not remedy the trouble, the tank should be removed, flushed thoroughly with clean gasoline, and then blown clear with compressed air.

FUEL STRAINER.—The fuel strainer provides an effective means for filtering the fuel mixture before it reaches the carburetor. (See figure 20.) Fuel flows through the shut-off valve directly into the glass sediment bowl and upward and through the strainer screen into the carburetor fuel line. The fuel strainer should be disassembled and cleaned as follows when dirt or water is visible in the sediment bowl:

1. Close gasoline shut-off needle valve by turning it to the right until tight.
2. Loosen clamping thumb-screw beneath sediment bowl.
3. Remove sediment bowl and fine-mesh strainer screen; clean thoroughly.

CAUTION

Care should be taken not to puncture the strainer screen.

4. If the cork gasket is dried out, cracked, or broken, replace with a new one.
5. To replace strainer, reverse above procedure taking care to seat bowl and gasket properly, with screen on top of cork gasket next to main body of assembly. Tighten clamping thumb-screw securely, then open gasoline cut-off valve by turning approximately four turns to the left.

Note

If leakage of gasoline occurs at needle valve, tighten packing nut on valve body.

CARBURETOR AIR CLEANER.—The oil-bath type air cleaner is bracket mounted to the left side of the fuel tank. (See figure 2.) Air enters the cleaner through the holes in the upper body and is directed downward to the oil cup. As the incoming air is forced to reverse its direction of flow immediately above the surface of the oil, the heavier particles of dust are carried into the oil by the momentum. The air then is drawn upward through a copper gauze filter-element where the remaining dust is removed, thence to the carburetor through the air hose. The air cleaner should be removed and thoroughly cleaned every 250 hours of operation as follows:

1. Disconnect air hose from air cleaner to carburetor, then loosen clamp which secures air cleaner to bracket.
2. Remove lower cup from air cleaner, then wash cup and interior of main body in kerosene.
3. Examine screen-mesh side of body for freedom from dirt, dust, and foreign matter, then blow out with air pressure.
4. Clamp air cleaner to bracket, then connect carburetor air hose to pipe. Refill cup with proper grade of oil up to mark, and replace in lower end of air cleaner making sure that both clips are engaged.

IMPORTANT

Empty and clean the oil cup daily or oftener under severe dust conditions. Refill with clean engine oil SAE 10 or 20 for cold weather, SAE 30 for warm weather, and SAE 40 for extremely hot weather.

CARBURETOR. (See figure 20.)—The Tillotson Updraft Carburetor (YC Series) is sturdily built and carefully designed for industrial requirements. No external air bleed holes are required, as all air is taken through the air horn, which equalizes or balances internal air pressure, thus preventing rich nozzle metering due to a clogged air cleaner. The idle mixture is controlled by an adjusting needle; all other speed mixtures are controlled by a fixed jet. A fuel vapor dispenser which prevents flooding also aids in dissipating water condensation and promotes vaporization of the fuel and oil mixtures.

CARBURETOR MAINTENANCE.

CLEANING.—To obtain maximum efficiency from this carburetor, it must be kept free of dirt, grit, and water. To clean, remove carburetor from engine and use compressed air; never use a wire or fine drill for small holes. Where compressed air is not available, a wooden toothpick may be used. The carburetor bowl may be cleaned and then flushed and drained through the plug at the bottom of the bowl.

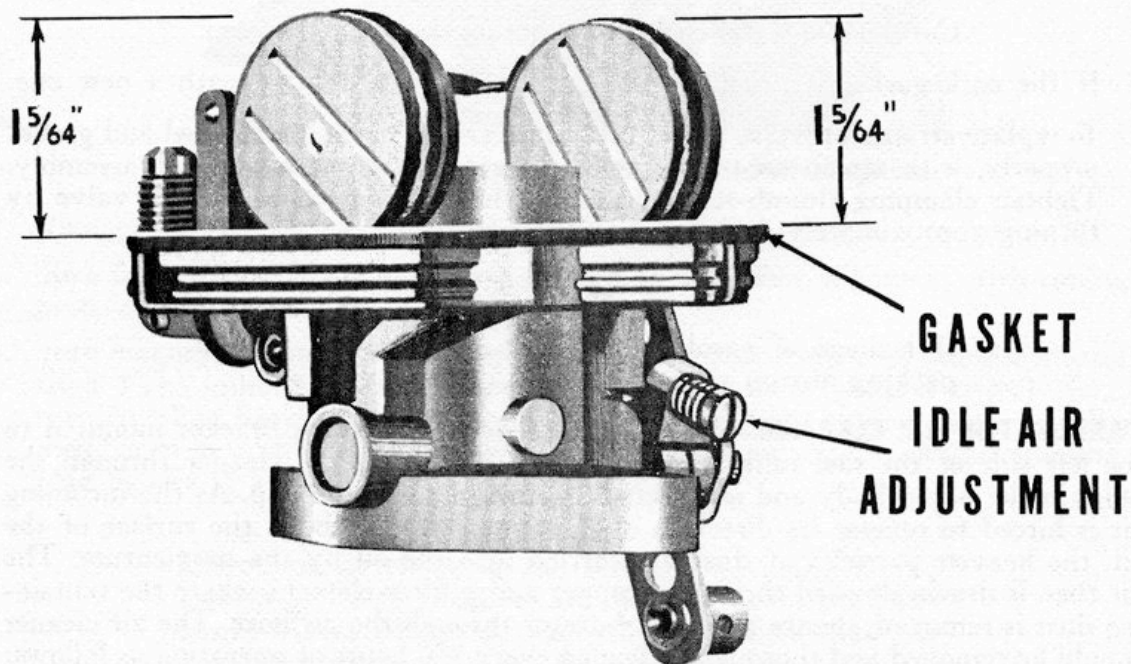


Figure 17. Float Setting

FLOAT LEVEL ADJUSTMENT.—Remove carburetor (see paragraph 5 under "Disassembly"), then remove throttle body by unscrewing the six cap screws which secure it to carburetor body. Turn throttle body assembly upside down, and with float level resting on the inlet needle, carefully bend each lever arm so that the distance between the face of the body gasket and the top of the raised seam encircling each float is 1 5/64". (See figure 17.)

Note

This measurement is critical and must be maintained for both floats to obtain proper performance.

FUEL VAPOR DISPENSER.—Immerse in clean kerosene, then dry with compressed air.

INLET NEEDLE.—Inspect for ridges or any defect which could prevent proper seating.

CARBURETOR ADJUSTMENTS

THROTTLE CONTROL.—Connect throttle control cable to carburetor in the following manner:

1. Clamp housing so that it extends through bracket.
2. Insert wire through swivel on carburetor throttle lever.
3. Move throttle control lever on right handle-bar to full closed position (toward operator) and then move throttle forward until 1/16" to 1/8" clearance exists between throttle and handle-bar.
4. Move throttle lever on carburetor to full closed position (rearward) and tighten swivel set-screw to lock control wire in place securely.
5. Operate throttle to check for restrictions, then start engine and set idle speed with adjusting set-screw to 600 rpm.

CHOKE CONTROL.

1. Loosen choke wire clamp screw at swivel, then place choke lever in wide open position.
2. Push choke control in as far as it will go, then hold in this position and clamp wire at lever swivel.
3. Check choke button operation.

IDLE MIXTURE.

1. With engine idling at about 600 rpm, turn adjusting screw until engine runs evenly.
2. Open throttle and run engine fast for a few seconds to clear manifold, then reset idling speed to 600 rpm.
3. Recheck idle mixture if necessary.

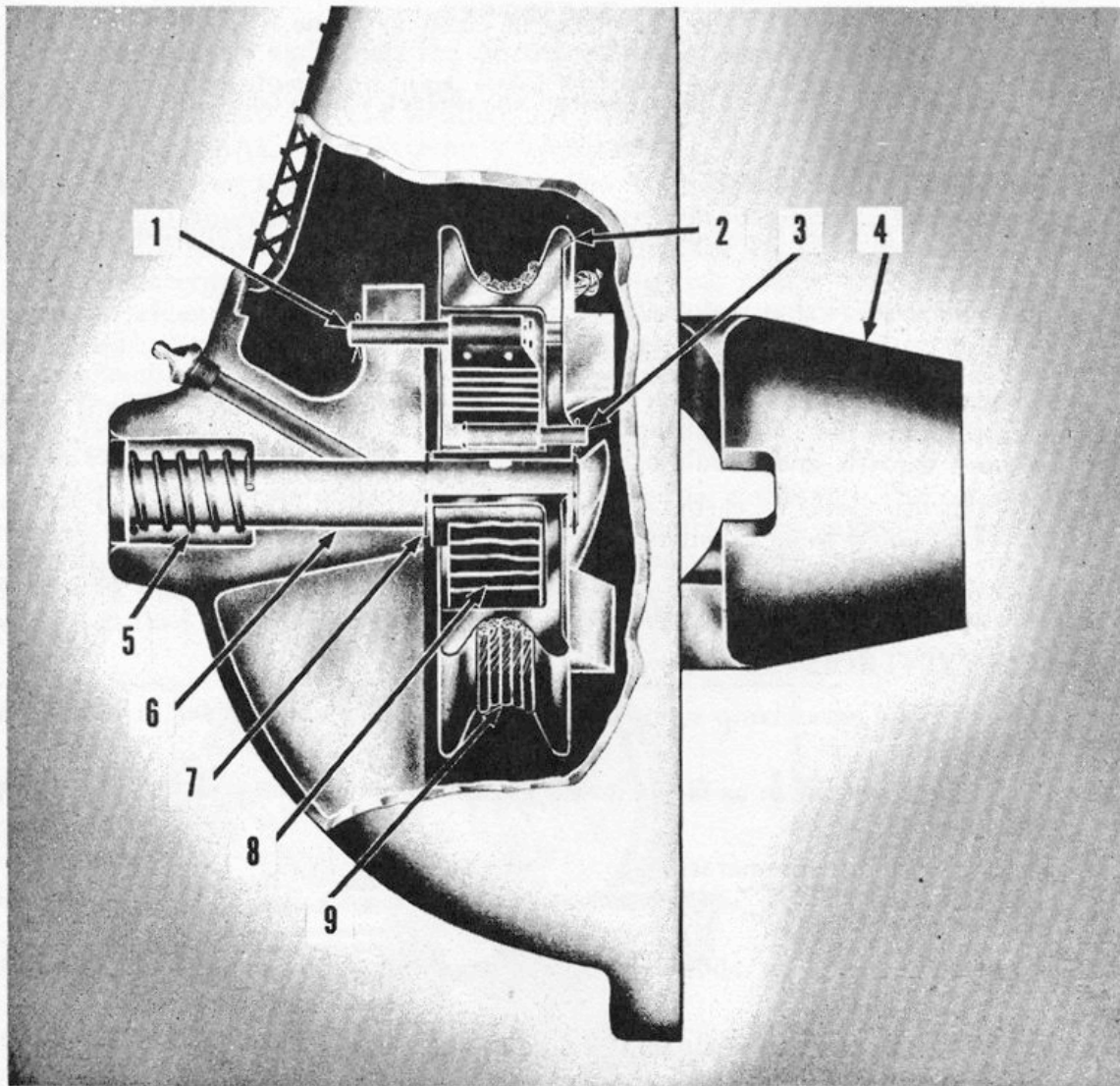


MANUAL STARTING ASSEMBLY

DESCRIPTION.—The recoiling type starter rewinds the starting cable automatically when the handle is released. When the end of the starting shaft at the front of the engine is pushed "in", the dogs on the starting pulley engage the starting dog attached to the cooling fan. (See figure 18.) The pulley and the starting dog will remain engaged as long as pull is exerted on the starting cable unless the engine starts or the cable is released to rewind for another cranking cycle. Always rewind cable slowly to avoid slack which can cause the cable to jump off the pulley.

CABLE REPLACEMENT.

1. Remove engine front cover.
2. Remove damaged cable from pulley.
3. Attach new cable to handle and insert through housing and spring cable guide.



- | | |
|-----------------------------------|---------------------|
| 1. Clevis Pin (Spring to Casting) | 5. Shaft Spring |
| 2. Pulley | 6. Starter Shaft |
| 3. Clevis Pin (Spring to Pulley) | 7. Shaft Snap Ring |
| 4. Starting Dog (Engine) | 8. Rewinding Spring |
| | 9. Starter Cable |

Figure 18. Cross Sectional View of Starting Assembly

4. Turn pulley counterclockwise by hand until recoil spring is completely wound, then engage cable knot in pulley slot, and release starter handle slowly so that the lanyard winds up completely.

Note

If pulley slot is less than one-half turn from the spring cable guide when the recoil spring is completely wound, wind cable one complete turn clockwise around the pulley, then engage knot in pulley slot.

CABLE REWINDING SPRING REPLACEMENT.—To replace the cable rewinding spring, remove the engine front cover, then proceed as follows:

1. REMOVE CABLE.
 - a. Pull on starter handle until end of travel is reached.
 - b. Holding pulley in that position with one hand, release starter handle and unwind remaining loop from pulley.
 - c. Remove knotted end of cable from pulley slot, then permit pulley to wind up slowly.
2. REMOVE AND DISASSEMBLE PULLEY. (See figure 18.)
 - a. Remove snap ring from end of shaft.
 - b. If spring is unbroken, reach behind pulley and remove cotter pin from clevis pin which anchors rewinding spring to housing. Withdraw pulley and spring from shaft, and remove clevis pin.
 - c. Remove cotter pin from clevis pin which anchors spring to center of pulley. Then remove spring from pulley.

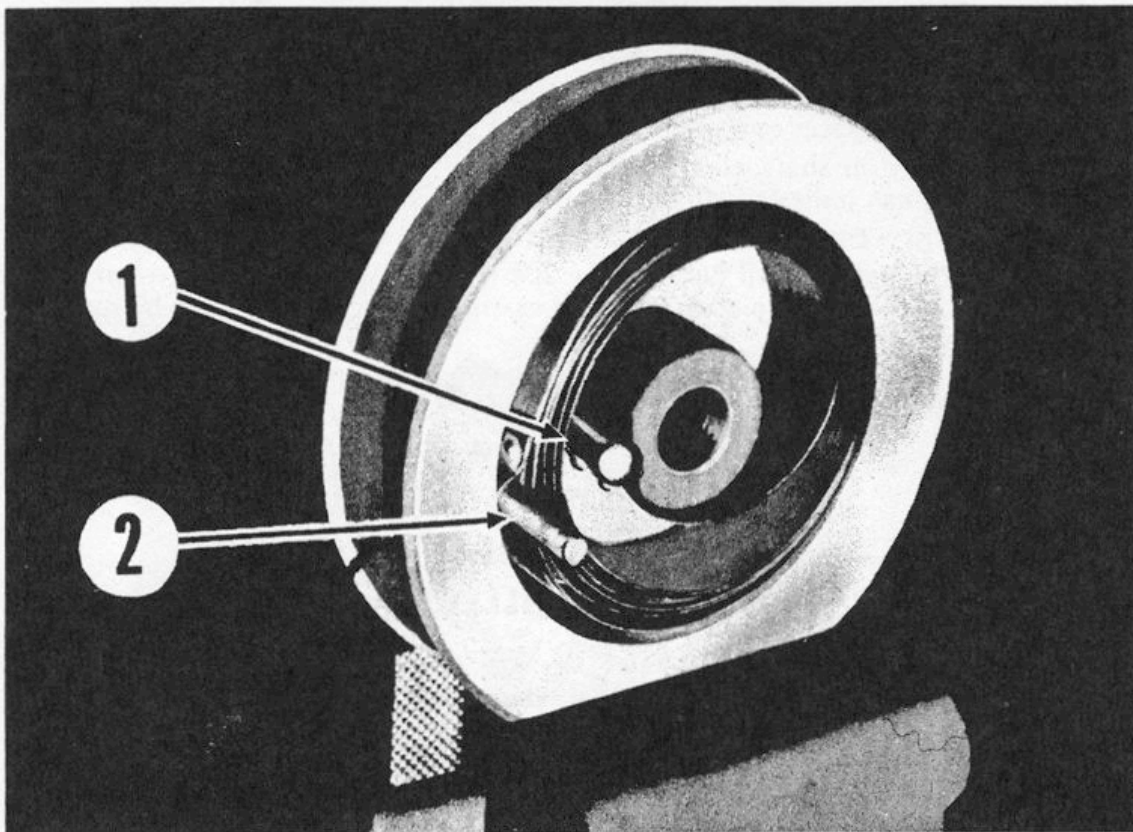


Figure 19. Starting Spring and Pulley Ready For Installation

3. ASSEMBLE AND INSTALL SPRING AND PULLEY ASSEMBLY.
 - a. Fasten end of spring to pulley (using the short clevis pin), so that pulley must rotate clockwise to wind spring; then secure clevis pin with cotter pin.
 - b. Secure pulley in a vise so that the jaws grip the flanges, then wind spring



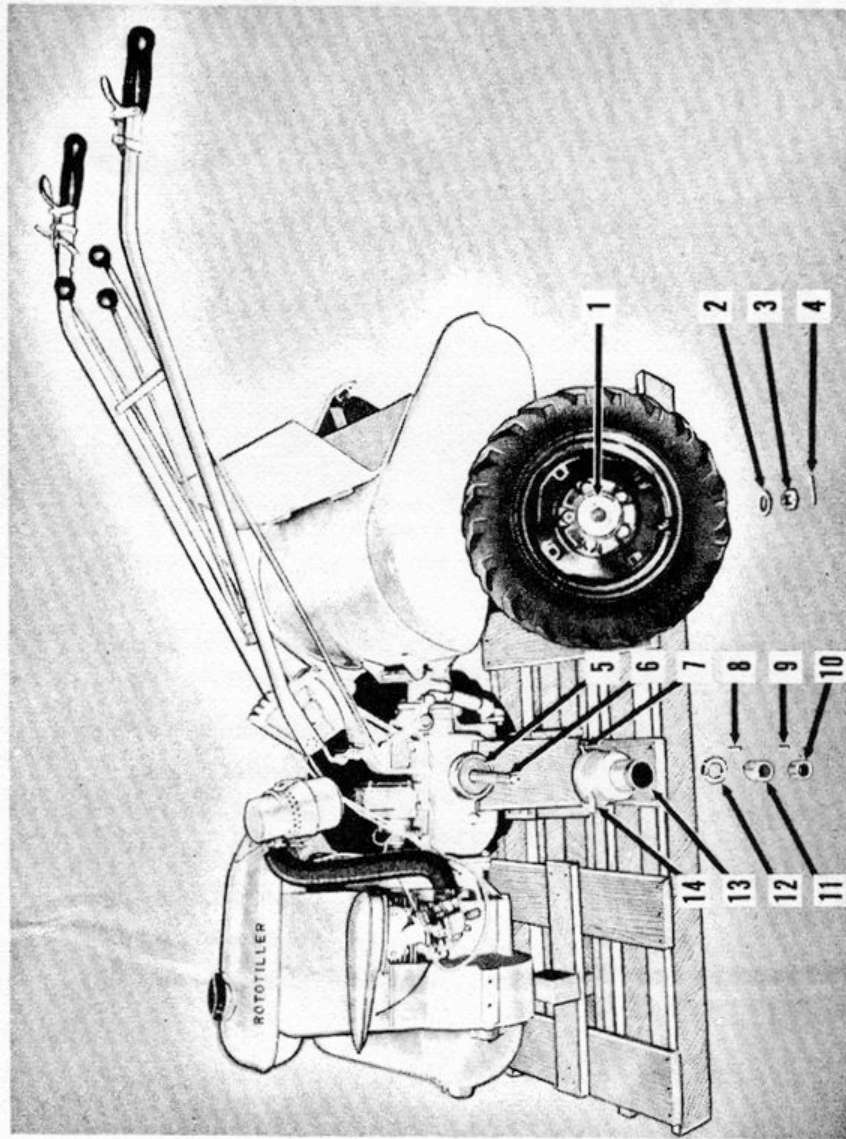
Figure 20. Driving Clevis Pin Into Housing

- carefully, alternately pulling, then winding until the loop on end of spring is ready to be forced into the pulley.
- c. Insert the long clevis pin into the spring loop so that the end containing cotter pin hole faces out; then force end of spring into pulley. (See figure 19.)
 - d. Place pulley on shaft, then rotate until protruding clevis pin enters hole in housing; push pulley on all the way.
 - e. Install a new snap ring on end of shaft to secure pulley in place.
 - f. Rotate the pulley until hole (figure 20) lines up with clevis pin, then, using a punch, drive clevis pin through the casting until cotter pin can be installed in clevis pin.
4. **INSTALL CABLE.**—Install cable as directed in the preceding paragraph entitled, "Cable Replacement."

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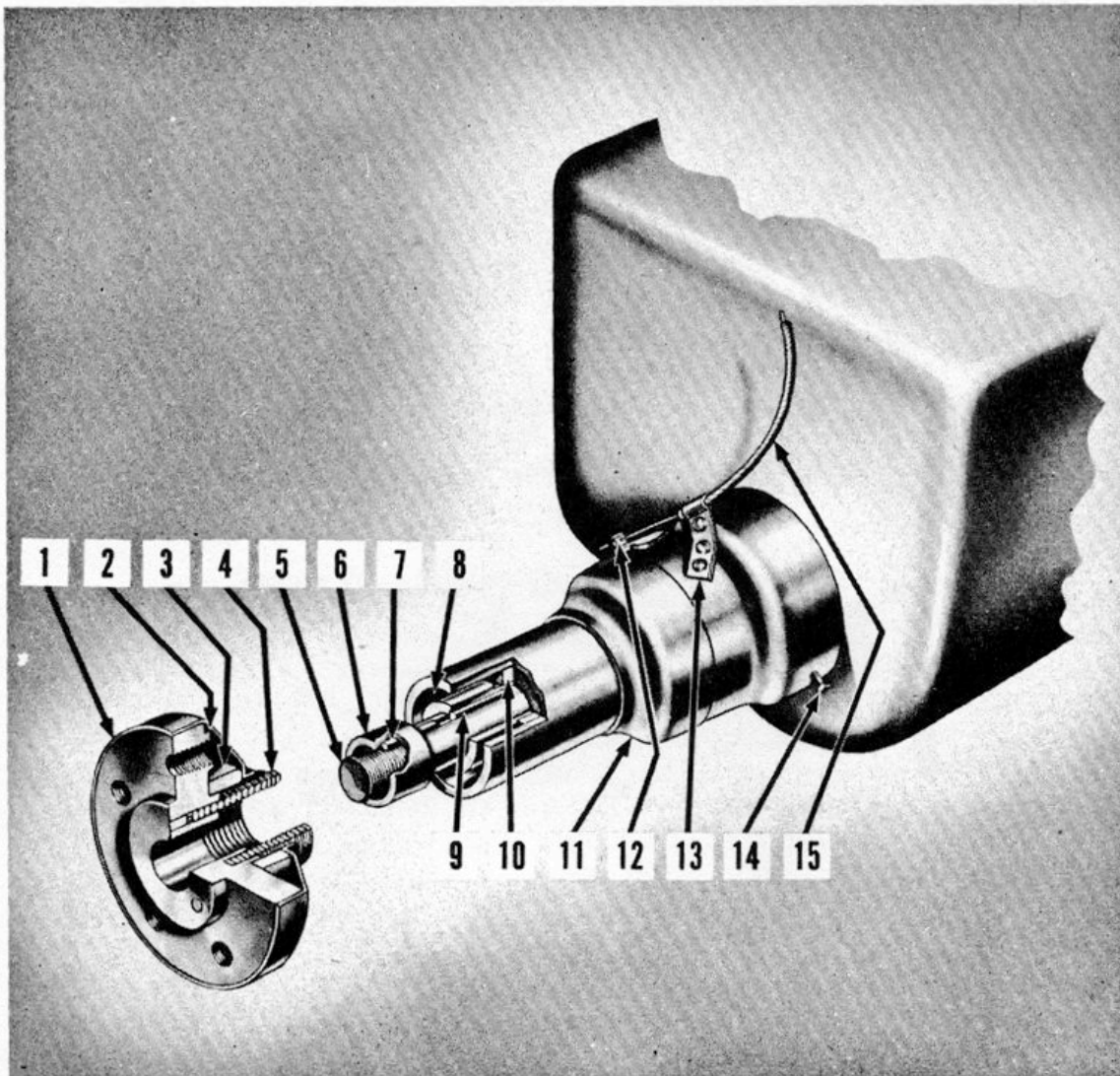
**DISASSEMBLY OF MODELS
B1-7 AND B1-7RS
POWER TILLERS**

1. **REMOVE HANDLE-BAR ASSEMBLY.**
 - a. Disconnect throttle control housing clamp and wire, at carburetor.
 - b. Disconnect ground wire at magneto.
 - c. Loosen clamp at engine; then pull throttle control housing free. On units equipped with reverse gear, loosen intermediate cable clamp on transmission case flange. (See figure 23.)
 - d. Remove cotter pin and disconnect each of the following; tiller clutch control, horizontal control, and wheel speed or reverse control rods.
 - e. Remove handle bar fork bolt, then lift complete assembly from machine.
2. **REMOVE WHEELS AND AXLE SHAFT.** (See figures 21 and 22.)
 - a. Raise machine until wheels are clear, then place blocks under transmission, or hoist onto shipping crate.



1. Outer Hub (Attached to Wheel)
2. Flat Washer
3. Axle Nut
4. Cotter Pin
5. Thrust Washer
6. Axle Shaft
7. Inner Hub Set-Screw
8. Inner Race Key
9. Sleeve Bearing Key
10. Sleeve Bearing
11. Inner Race
12. Energizing Ring
13. Inner Hub
14. Control Cable Clip

Figure 21. Wheel and Hub Removal



- 1. Outer Hub
- 2. Seal Retainer
- 3. Oil and Dust Seal
- 4. Clutch Spring
- 5. Axle Shaft
- 6. Sleeve Bearing
- 7. Bearing Key
- 8. Inner Control Race

- 9. Inner Race Key
- 10. Energizing Ring
- 11. Inner Hub
- 12. Clutch Lever
- 13. Control Cable Clip
- 14. Set Screw
- 15. Control Cable

Figure 22. Removal and Installation of Wheel Hub Clutch

Note

If machine is to be hoisted, it will balance if suspended from handle-bar bolt hole.

- b. Remove cotter pin, axle nut, and flat washer from left wheel, then pull off wheel and outer hub assembly.
 - c. Remove sleeve bearing from end of shaft, then remove shaft key.
 - d. Disconnect control wires from wheel clutch control levers on both hubs, then remove control wire housing clips.
 - e. Remove square-head set screw from under-side of inner hub, then pull hub from axle.
 - f. Remove inner thrust washer from transmission case.
 - g. Pull right wheel from transmission and remove the wheel, outer hub, inner hub, and axle shaft as an assembly. If necessary, remove hubs and wheel from shaft as described above.
 - h. If loose, remove inner thrust washer from right side of transmission case.
 - i. Remove inner race and energizing ring from inner hub, and remove shaft key.
3. REMOVE HOOD ASSEMBLY.
 - a. Remove tiller hood adjusting-bar wing-nut and bolt.
 - b. Remove tiller hood mounting bracket nuts under tool box, and lift assembly from unit.
 4. REMOVE STARTER ASSEMBLY. Unscrew two cap screws at front of cooling fan housing to remove housing and starter assembly.
 5. REMOVE CARBURETOR, MUFFLER, AND MANIFOLD.
 - a. Loosen clamp screws at air-cleaner tube to carburetor.
 - b. Shut off gas at fuel filter valve, then disconnect fuel line at carburetor.
 - c. Remove choke control housing and wire from carburetor.
 - d. Remove two nuts and two cap screws, then lift off muffler, manifold and carburetor.
 6. REMOVE FUEL TANK AND AIR CLEANER.
 - a. Disconnect fuel line at strainer, and remove line.
 - b. Remove spark plug wire and spark plug.
 - c. Remove six-round-head cap screws which fasten base of fuel tank to crankcase, and remove assembly.
 7. REMOVE MAGNETO. Remove cap screws at base of magneto and remove magneto assembly. Remove magneto adjustable floating coupling.
 8. REMOVE HANDLE BAR BASE. Remove four cap screws holding handle-bar base to transmission, and remove the handle-bar base. If machine is the reverse gear type, the speed shift lever bracket and spring can be lifted off.
 9. REMOVE TILLER DRIVE ASSEMBLY.
 - a. Place blocks under engine to support weight when tiller drive assembly is removed.
 - b. Remove four cap screws at flange between tiller drive housing and rear of transmission, then slide housing away from transmission.
 10. REMOVE ENGINE.
 - a. Remove six bolts from flange between rear of engine and transmission, using two 3/8" x 8" bars or bolts as guides to slide engine away from transmission.

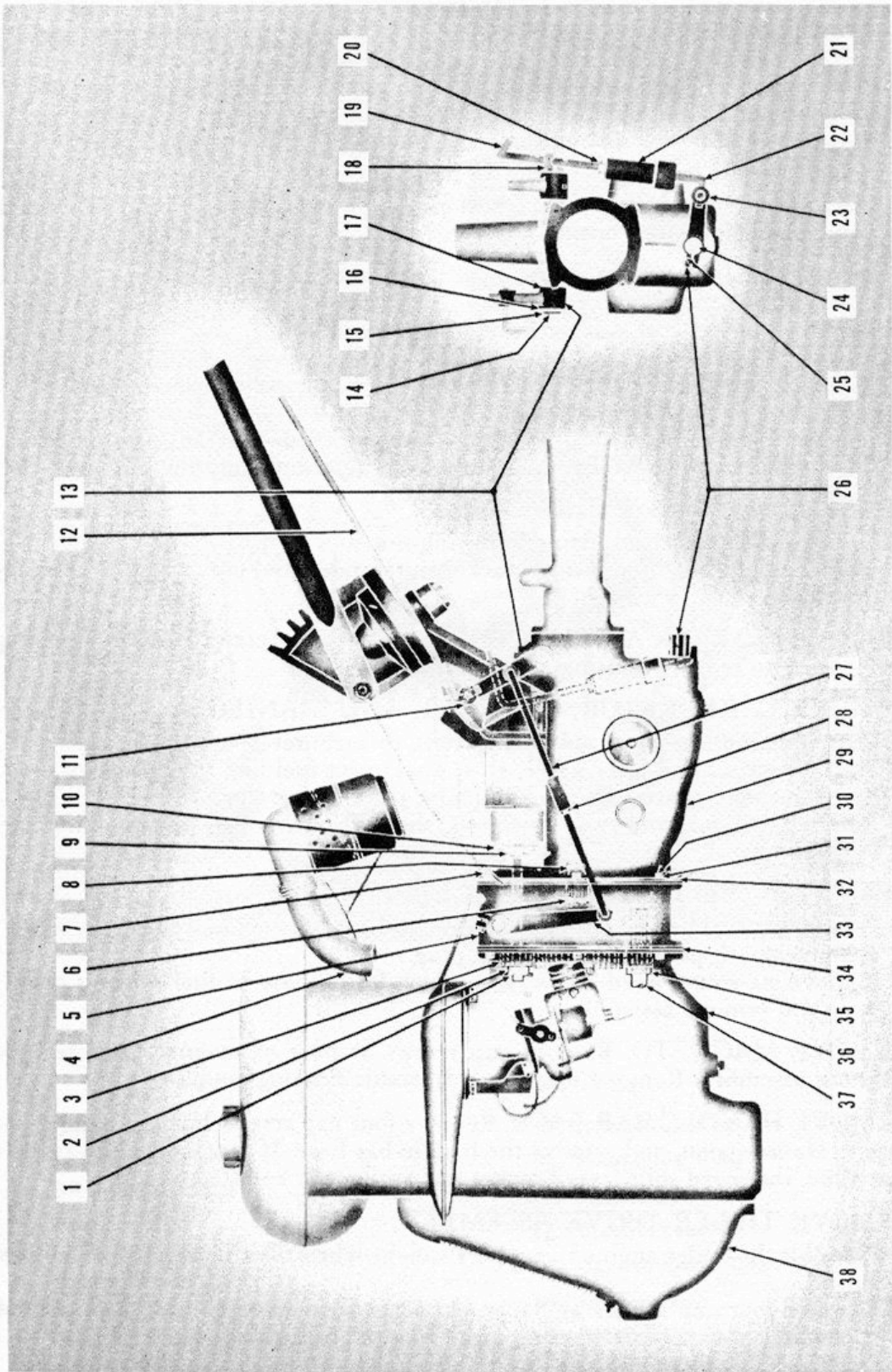


Figure 23. Reverse Gear Installation

- | | |
|------------------------------------------|-----------------------------------------|
| 1. Thrust Washer | 20. Lock Nut |
| 2. Spacer | 21. Control Link Housing |
| 3. Magneto Drive Gear and Shaft | 22. Lower Control Link |
| 4. Air Cleaner-to-Carburetor Tube | 23. Transmission Shift-Arm Trunnion |
| 5. Reverse Gear Case | 24. Transmission Shift-Fork Shaft |
| 6. Reverse Gear Worm Drive Shaft | 25. Clamp Screw |
| 7. Throttle Control (Intermediate) Clamp | 26. Transmission Shift Arm |
| 8. Transmission Worm Shaft | 27. Reverse Control Link |
| 9. Magneto Adjustable-Coupling Nut | 28. Lock Nut |
| 10. Magneto Adjustable Coupling | 29. Transmission Case |
| 11. Shift Lever Trunnion | 30. Cap Screw |
| 12. Reverse Control Rod | 31. Lock Washer |
| 13. Shift Lever | 32. Reverse Gear-to-Transmission Gasket |
| 14. Reverse Control Shift-Lever Shaft | 33. Reverse Control Lever |
| 15. Snap Ring | 34. Reverse Gear-to-Crankcase Gasket |
| 16. Flat Washer | 35. Reverse Gear Main Drive Pinion |
| 17. Felt Washer | 36. Engine Rear Crankcase |
| 18. Bracket and Spring Assembly | 37. Engine Crankshaft |
| 19. Wheel Speed Control Lever | 38. Cooling Fan Housing |

- b. Remove magneto drive-gear thrust washer, or, if equipped with reverse gears, thrust washer and spacer from end of magneto drive shaft in transmission.
11. REMOVE REVERSE GEAR UNIT. (IF EQUIPPED.) (See figure 23.)
- a. Disconnect reverse control link assembly from reverse control lever.
 - b. Loosen adjustable coupling nut, and slip coupling from the magneto shaft, then remove shaft key.
 - c. Remove magneto drive gear and shaft from gear assembly.
 - d. Remove six cap screws and lock washers, and remove intermediate cable clamp, then separate reverse gear case from transmission case.

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REASSEMBLY OF MODELS B1-7 AND B1-7RS POWER TILLERS

1. INSTALL REVERSE GEAR (IF EQUIPPED) TO TRANSMISSION. (See figure 23.)
 - a. Using a new gasket, assemble reverse gear unit to transmission case with six cap screws and lock washers, after matching splines of transmission worm shaft with splines of reverse gear worm drive shaft. Install intermediate cable clamp under cap screws at upper left side.
 - b. Install magneto drive gear and shaft, so that shaft end emerges through the bearing in the transmission case.
 - c. Install shaft key on magneto drive shaft, then fit adjustable coupling onto shaft, and tighten nut just enough to keep coupling from sliding off.
 - d. Connect reverse control link assembly to reverse control lever. Secure with cotterpin.
2. INSTALL ENGINE.
 - a. Make sure that gasket surfaces are clean, and place a new transmission-to-crankcase, or reverse gear case-to-crankcase gasket in position.
 - b. Inspect the magneto drive gear thrust washer; if worn or distorted, install a new one on end of magneto drive shaft. On reverse gear units, install spacer then the thrust washer onto magneto drive shaft.
 - c. Set the engine and transmission on blocks, then aligning the two units with two long tapered drive-pins as guides, slide carefully together taking care to mesh gears and guide magneto drive shaft into engine-case bearing. On reverse gear units, take care to enter crankshaft splines into reverse gear main drive pinion. (See figure 23.)
3. INSTALL WHEEL AND AXLE ASSEMBLY. (See figures 21 and 22.)
 - a. Install inner thrust-washer in right side of transmission case, then install axle shaft complete with right wheel and hubs, from right side through the left side of transmission.

Note

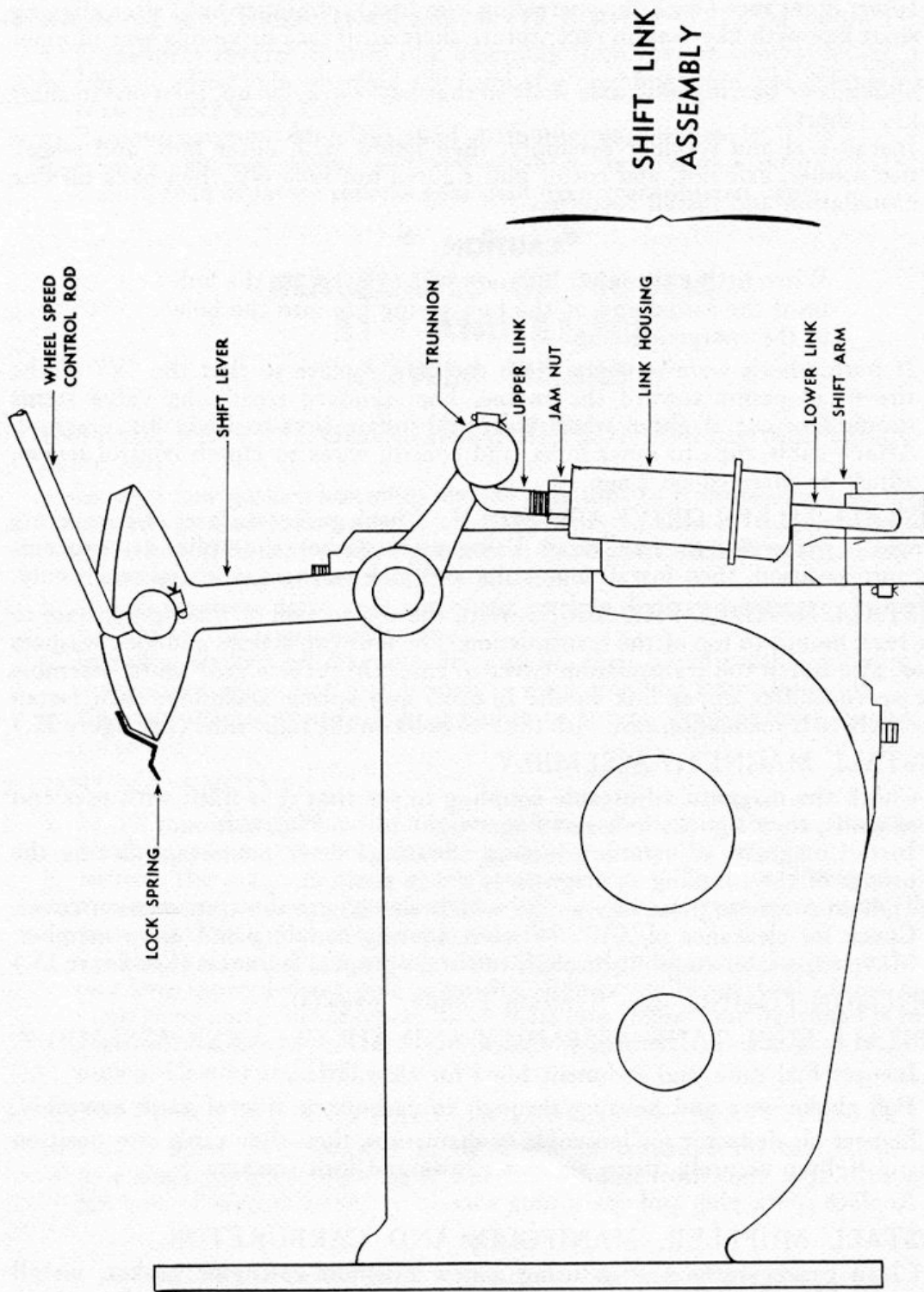
- The end of the shaft without the bushing, enters the case first. Enter the shaft carefully, to avoid burring the low-gear bushing.
- b. Install inner thrust-washer in left side of transmission case, then install left inner hub onto shaft. Rotate hub until set-screw holes line up, then install and tighten square-head set-screw.

- c. Install key (long) into axle-shaft groove.
- d. Install energizing ring onto inner race so that "V" groove faces out; the ring should fit over the drive lips and against the race shoulder.
- e. Insert inner race (with the energizing ring first) into inner hub, after aligning shaft key with key-way in race; rotate shaft until race drive-lips seat in inner hub.
- f. Slide sleeve bearing onto axle shaft so that key-ways line up, then install shaft key (short).
- g. Install seal and retainer assembly, then follow with outer hub, and wheel, flat washer, axle nut, and cotter pin; tighten nut securely, then back off one castellation and install cotterpin.

CAUTION

When fitting the outer hub onto the axle, rotate the hub until the raised end of the hub spring fits into the hole in the energizing ring.

- h. If both wheels were removed from the axle, replace so that the "V" of the tire tread points toward the engine. For standard tread, the valve stems should face out. Tighten wheel bolts and inflate tires to 10-12 lbs. pressure.
 - i. Attach cable clips to inner hubs, and control wires to clutch control levers; adjust as directed on Page 10.
4. **INSTALL TILLER DRIVE ASSEMBLY.**—Check gasket surfaces of connecting flanges to make sure they are clean. Using a new gasket, slide tiller drive assembly into position, then install four bolts and lock washers, and tighten evenly.
 5. **INSTALL HANDLE-BAR BASE.**—With the cog section of handle-bar base to the rear, mount to top of the transmission. The four cap screws and lock washers used, also fasten the transmission cover to case. On reverse gear units, assemble the speed shifter upper link to the bracket and spring assembly, then fasten assembly to transmission case with the two bolts on the right side. (See figure 23.)
 6. **INSTALL MAGNETO ASSEMBLY.**
 - a. Check the magneto adjustable coupling to see that it is flush with rear end of shaft, then tighten lock nut finger-tight to hold in position.
 - b. Install magneto adjustable coupling (floating) drive member, indexing the prongs of the coupling as magneto is slid in position.
 - c. Tighten magneto plate cap-screws which also secure the transmission cover.
 - d. Check for clearance of .010" between floating coupling and drive member. Move adjustable coupling on shaft to obtain proper clearance. (See figure 15.)
 7. **IGNITION TIMING.**—See "Ignition Timing," page 00.
 8. **INSTALL FUEL TANK ASSEMBLY AND AIR CLEANER ASSEMBLY.**
 - a. Inspect fuel tank and sediment bowl for cleanliness.
 - b. Pull choke wire and housing through to carburetor side of tank assembly.
 - c. Inspect air deflector for looseness or distortion, then slide tank into position and tighten securely, using six cap screws and lock washers.
 - d. Replace spark plug and spark plug wire.
 9. **INSTALL MUFFLER, MANIFOLD, AND CARBURETOR.**
 - a. Clean gasket surface, then using a new manifold-to-engine gasket, install manifold and muffler assembly with two cap screws and lock washers.
 - b. Before installing carburetor, insert choke control wire and housing through clamp bracket at back of carburetor. Clamp housing into position so that it just extends through the bracket, then thread choke wire into swivel.



SHIFT LINK
ASSEMBLY

Figure 24. Transmission Shift Link Adjustment

- c. Using a new gasket, install carburetor (if removed from manifold) with two cap screws and lock washers.
 - d. With the choke control (on right side of engine) pushed in as far as it will go, back off $1/32$ " , then set choke lever in wide open position and tighten the choke swivel set screw. Work the choke control and inspect for full range operation.
 - e. Install gas line and tighten connections at fuel tank and carburetor. Open fuel shut-off valve and inspect for fuel leaks if tank is filled, then close valve.
 - f. Install air cleaner-to-carburetor air tube and tighten tube clamps.
10. INSTALL STARTER AND COOLING FAN HOUSING.—Install housing to front of engine using two cap screws and lock washers.

IMPORTANT

Before installing the starter and fan housing, pull starter cable out to full length. Check to see that slot in starter pulley which holds the knot end of starter cable, is on opposite side of cable pull. This will prevent cable from pulling out. In addition, make sure that spring winds the cable its full length.

11. INSTALL HOOD ASSEMBLY.—To install tiller hood, replace bracket nuts, then install tiller hood adjusting-bar wing nut.
12. INSTALL HANDLE-BAR ASSEMBLY.
- a. Support handle-bar assembly in position, then secure in place with $3/8$ " x 3" handle-bar fork-bolt.
 - b. Tighten slotted nut on fork bolt, then back off one slot to secure necessary clearance, and install cotter pin.
 - c. Install control rods in the following order: (See figures 3 and 4.) Wheel speed control (or reverse control), horizontal and vertical control, and tiller shift control.

Note

Speed control and tiller control rods should be installed so that bent portions containing cotter pin hole, point down.

13. CONNECT THROTTLE CONTROL.—Connect throttle control as directed under "Care of Fuel System", page 33.
14. ADJUST MODEL B1-7 TRANSMISSION SHIFT LINKAGE. (See figure 24.)
- a. Inspect shift control linkage for excessive play or wear. Replace worn parts.
 - b. If the lower link can be pushed into the control link housing for any distance at all without encountering spring pressure, remove link assembly and disassemble by unscrewing housing cap. Examine the compression springs; they should measure $1\frac{1}{2}$ " in length, uncompressed. Install new springs, if necessary, and reassemble control link, lubricating with one ounce of No. 3 cup grease.
 - c. Install control link, then pull the wheel speed control rod all the way back and raise handle-bar thumb controls.
 - d. Push the Rototiller forward until the wheels lock. This indicates that the transmission clutch is engaged.
 - e. Remove cotter pin and disconnect the upper control link from the shift lever.

- f. Press shift arm down while rocking the Rototiller back and forth to insure complete clutch engagement.
- g. With shift lever resting against the lock spring (see figure 24), loosen the jam nut on upper link, and turn until it can slip easily into the shift lever trunnion, then replace the cotter pin.

Note

The upper link must enter the trunnion without pushing or pulling the link. Adjustment must be made by screwing the link threads in or out of the spring housing.

- h. With thumb controls raised, push the wheel speed control lever all the way in, then push the Rototiller forward until the wheels lock. If the link is properly adjusted, the shift lever will appear on the other side of the lock spring, or exactly opposite of the position shown in figure 24.

15. ADJUST MODEL B1-7RS TRANSMISSION SHIFT LINKAGE. (See figure 23.)

To adjust the reverse and the transmission linkages, place the reverse control rod in "reverse" position and raise the handle-bar thumb controls, then proceed as follows:

- a. Disconnect shift link assembly from transmission shift arm.
- b. Press down on transmission shift arm and push the machine forward until the wheels lock.
- c. Operate the speed shift lever so that the upper notch is engaged with the bracket.
- d. Loosen jam nut on upper link, and turn link housing until lower link slides easily into shift arm.
- e. Tighten jam nut and install cotterpin in lower link.
- f. Disconnect reverse control link from reverse control clutch lever.
- g. Operate reverse control rod so that shift lever quadrant is just to the rear of lock spring.
- h. Loosen jam nut on reverse control link and adjust link so it can be inserted easily into the reverse control clutch lever.
- i. Tighten jam nut and install cotterpin at reverse control clutch lever.

16. LUBRICATE MACHINE.—Lubricate the machine completely as directed under "Preventive Maintenance" page 20.