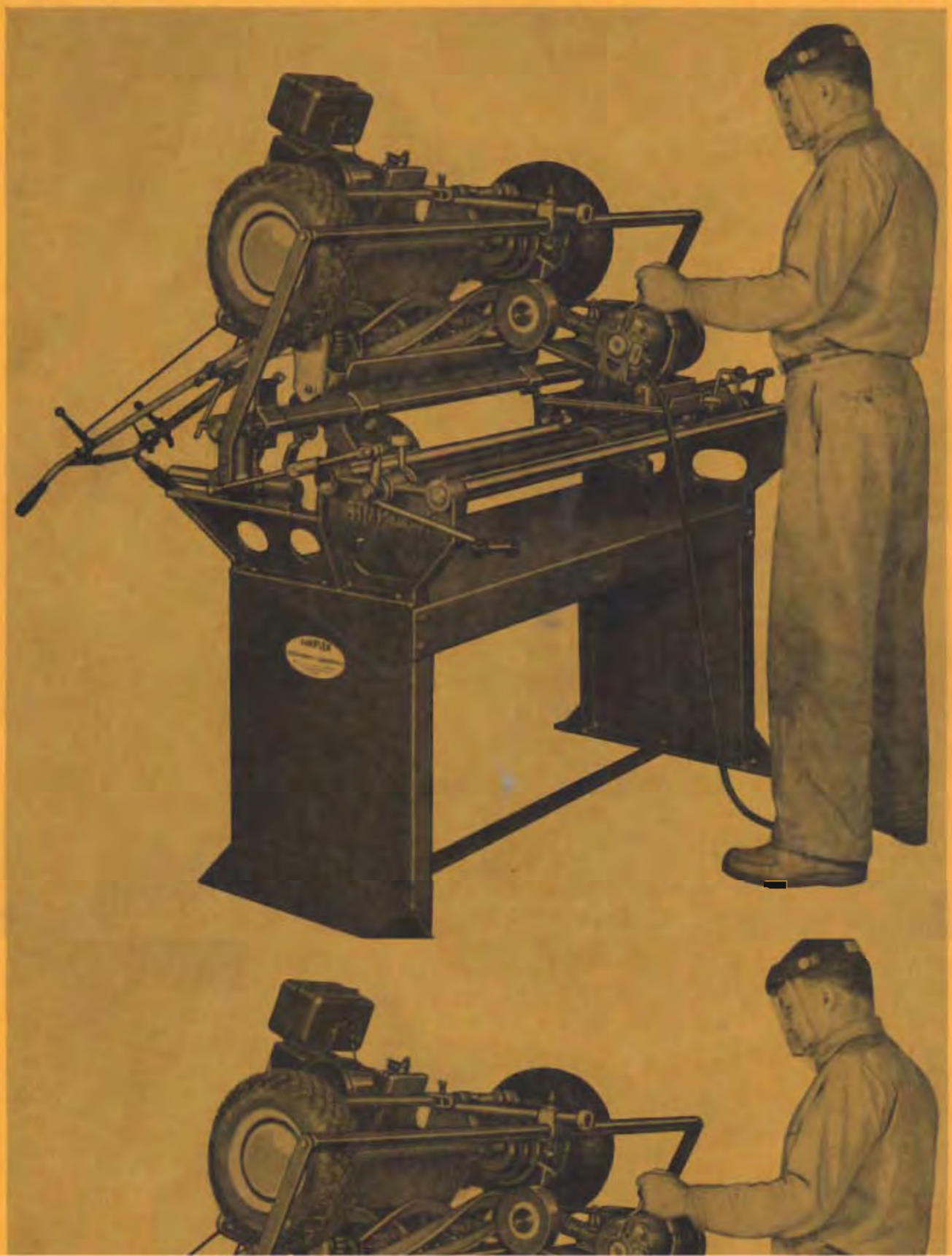
Operating Instructions

FOR THE MODEL 400 and 410

SIMPLEX LAWNMOWER SHARPENER



We Manufacture the Following Equipment For the Lawnmower Shop

THE IDEAL BED KNIFE GRINDERS, MODELS 50 and 75

These are bench-mounted bed knife grinders for fast and accurate sharpening of mower bed knives and other straight edge tools. The Model 50 will also sharpen ice skates.

THE SIMPLEX RECONDITIONER (Model 500D)

This is a separate floor type or bench type reconditioner for busy shops that require a separate "back-lapping" machine.
(We do not manufacture or sell saw filing or grinding machines or key making machines.)

THE SIMPLEX LAPPING MACHINE (Model 150)

This is a portable lapping machine for reconditioning hand or power mowers on the floor or out on the grass. This unit is carried to the mower.

THE PEERLESS ROTARY BLADE GRINDER (Model 20)

For grinding any rotary mower blade, also cutlery knives, scissors, tools etc. Two sizes available, 1/3 H. P. and ½ H. P.

Other Products of

THE FATE-ROOT-HEATH COMPANY

PLYMOUTH LOCOMOTIVES

These are general switching and hauling locomotives ranging in size from 3 to 80 tons.

F-R-H CERAMIC MACHINERY

De-airing Brick and Tile Machines, Cutters, Hydraulic Presses, Pug Mills, Conveyors and special ceramic machinery.

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FOREWORD

The Model 400 Simplex Lawnmower Sharpener is designed for and dedicated to the operators who want to get the most out of their equipment and thereby accomplish their work in the least amount of time. We are proud to offer this machine with so many exclusive features at such a reasonable price.

Fig. 1

Part 1 — Assembling Instructions

1. The Model 400 is shipped complete in one box and it can be assembled in a few minutes without the need of any special tools. (See Figure 1) Remove the machine from all packing and check parts against Figure 2., also the numbered parts illustration.

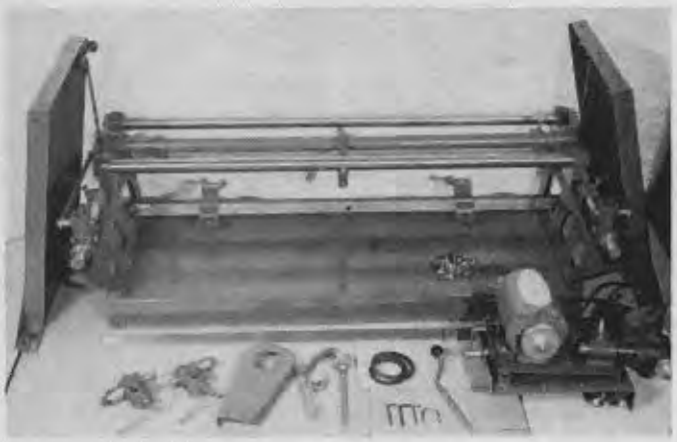

Fig. 2

2. Set up the floor stand assembly by attaching the metal angle R-249 between the two sides as shown in Figure 3. Install the leveling screws in each foot of the base using the four ½"x1¾" machine bolts and ½" jam nuts. Remove the nuts from the six ⅜" x 1¼" capscrews which hold the cast iron end frames to the metal base R-248 leaving the capscrews in place. Place the complete upper structure on the floor stand assembly locating it so that the six capscrews extend through the holes in the top of the lower side frames. Fasten with eight 5/16" x ¾" capscrews, two in corner and replace the nuts on the six ⅜" x 1¼" capscrews.

Fig. 3

3. Secure the upper structure to the base, place grinding head on the tracks and arrange other parts on shelf as shown in Figure 4. Tighten all nuts and bolts assembled so far.

4. To complete machine assembly, install the two P-247A knuckles on each end of the square mower support bar R-233 and place complete assembly into the R-235 support casting at each side of the machine. See Figure 5.

5. The grinding head assembly is as complete as possible for shipment. To complete, install the vertical crank screw R-218 and attach the operating handle R-257 to the motor mount capscrew nearest the switch.

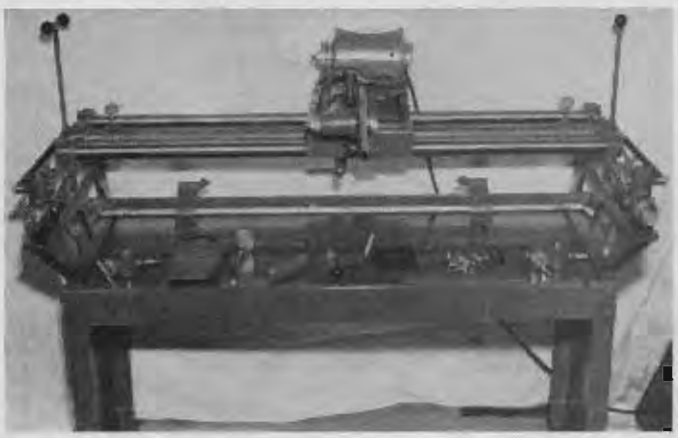

Fig. 4

6. IMPORTANT. Before placing your grinder in operation it should be permanently placed and leveled both ways. Select the location in your shop where you want your machine, leaving at least 25" to 30" from the wall to the front of the grinder. This is the side from which the machine will be operated. Have at least six feet from the back of the machine to the wall. This is the side from which the mowers will be put in. With the ½"x1¾" machine bolts and ½" half nuts in each foot for leveling, place an accurate level across the carriage track shafts at both

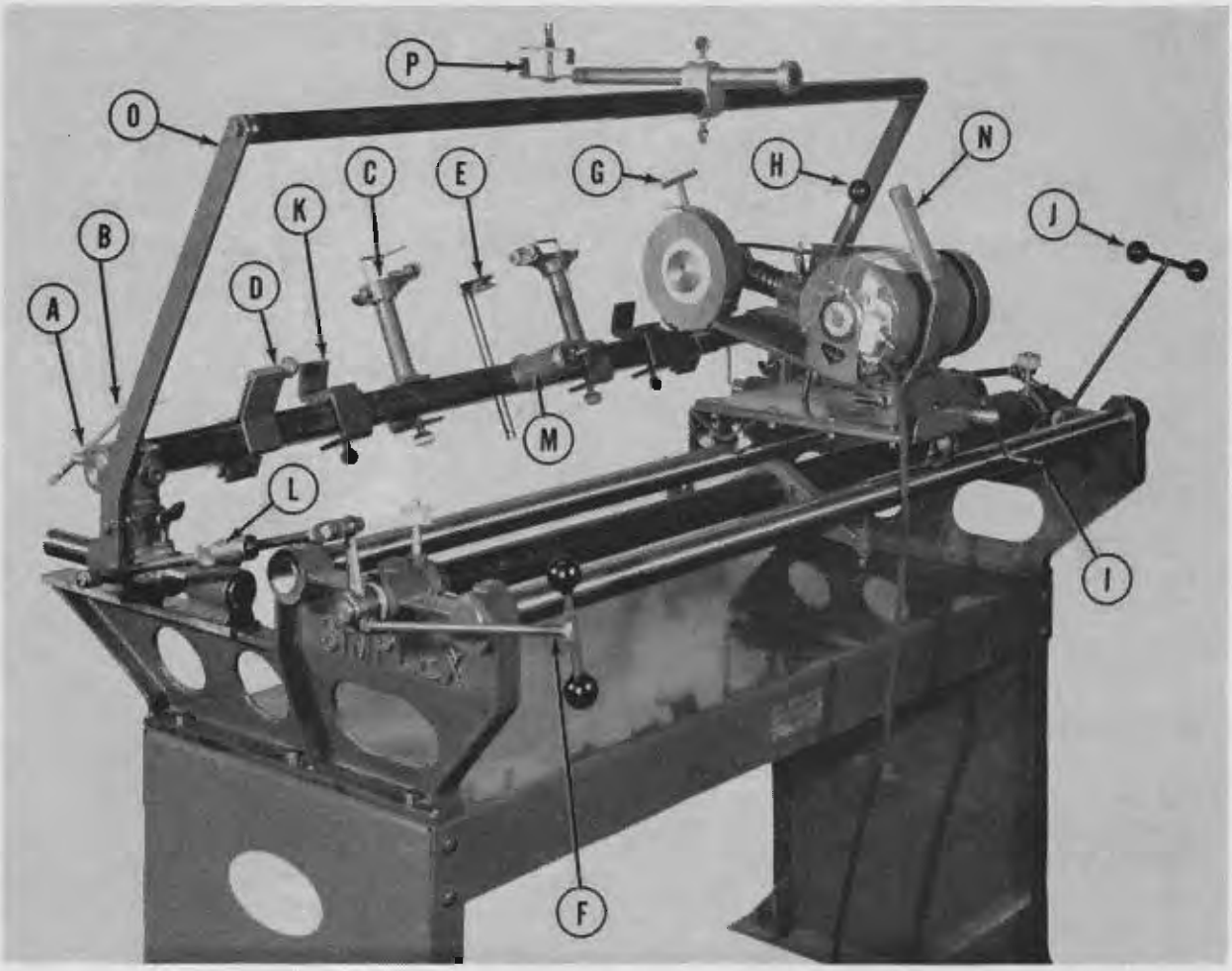

Fig. 5

Completed assembly of Models 400 or 410 with operating controls and accessories indexed. Overhead bar raises into position and is secured by lower bolts through the control arms (L)).

"A" — Locking handle (one on each side) for rotating mower support bar.

"B" — Vertical adjusting screw (each side) for mower support bar, used mainly for aligning bed knives with grinding wheel.

"C" — Reel holding attachment (Optional equipment, two supplied) in position on support bar for grinding reels while out of the mower frame.

"D" — Mower and Bed Knife Support Center, one on each side.

"E" — Bed Knife Support Cam, in position in the bar. Holes holding Rotary Blade Holder (M) provide for 90 degree positioning of the cam.

"F" — (Also J) Adjusting arm "T" handles for moving and aligning of either side of the mower support frame. These work independently of each other.

"G" — Reel Guide Finger adjusting "T" handle.

"H" — Vertical Adjusting Screw for the grinding wheel.

"I" — Horizontal Adjusting and Feed Screw for the grinding wheel.

"J" — (See F)

"K" — Bed Knife Mower Supports for holding mowers with bed knives in. Centers "D" not used when these supports are used.

"L" — Threaded Turnbuckles (each side) for fine alignment of the reel or bed knife with the grinding wheel.

"M" — Rotary Blade Holder (Optional) used on earlier models for rotary blade grinding. See back of book for new rotary blade grinding plate.

"N" — Handle for convenience in traveling the grinding wheel while grinding.

"O" — Overhead Support Bar for holding mowers in position with solid three-point support.

"P" — Clamp for securing mower shrub bars or spacing bars.

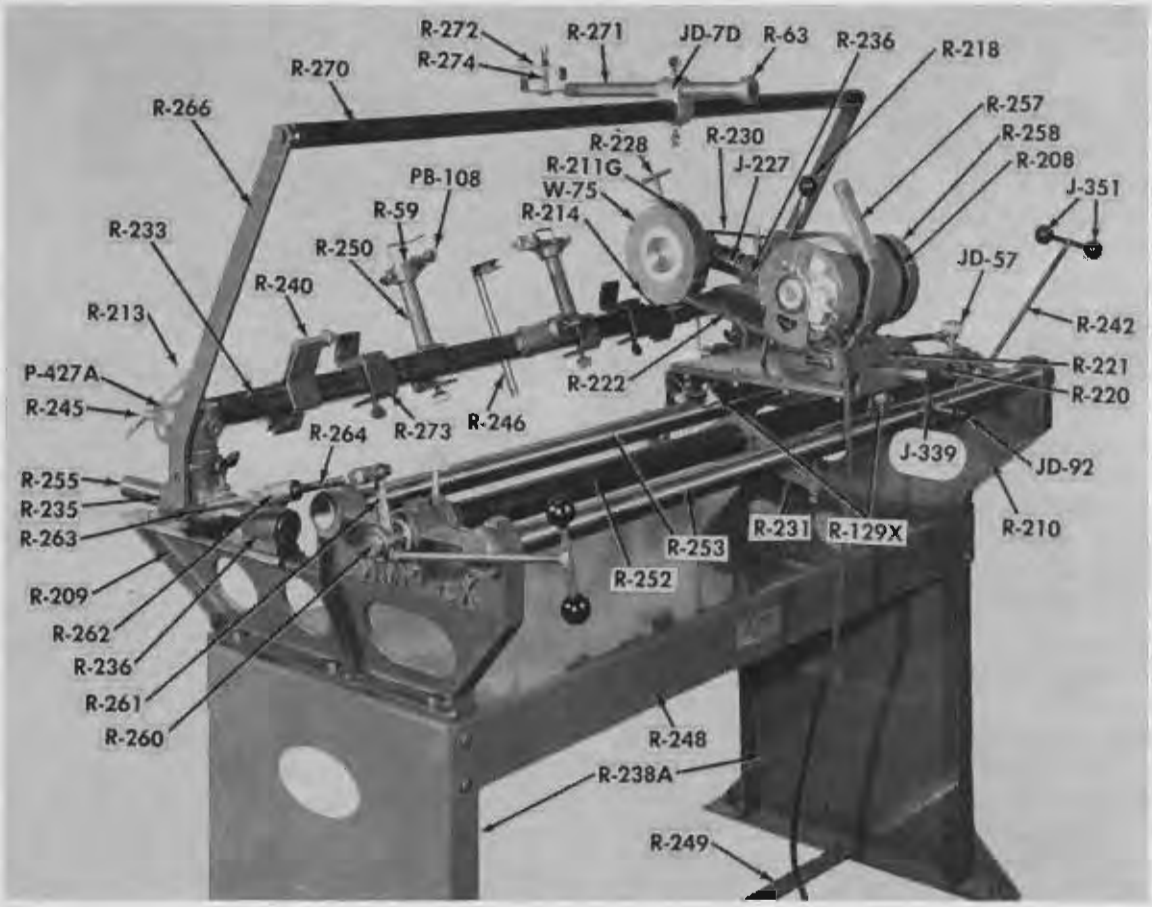

Fig. 5A

ends of the machine, adjust leveling screws until machine is level. Repeat adjustment lengthwise of the shafts until machine is level both ways. Only in this way will your carriage track shafts be properly set, as they were adjusted at the factory with your machine dead level and all twist and distortion removed.

7. Make arrangements for your motor cord to plug into an outlet so located that the cord will not interfere with the travel of the grinding carriage to either end of the machine. If it is necessary to use an extension cord or lamp socket, be sure the wire leading to the socket or cord is at least No. 12 so the motor will receive sufficient power.

8. **Parts Check.** Check against Figure 5 and 5A to be sure you have received all the parts for your machine. Figure 5 shows the No. 402 Reel Supports (C) and the old style Rotary Blade Holder (M) which are optional equipment and would not be included unless you ordered them with your machine. All other parts are now standard equipment with the No. 400 or No. 410 Simplex.

9. **Damage In Shipment.** Your simplex is covered by our guarantee which is printed on the back of this book. It does not cover anything damaged, broken or missing as a result of improper handling in shipment. Inspect the shipment, if damaged or loss is discovered, notify the agent for the carrier at once. Make out a claim and then order from us the parts needed to repair or replace the damage or loss. We charge you for these parts and you will be reimbursed for the amount of your claim by the carrier. The shipment, by law, becomes your property when it leaves our factory, only you can file a claim. Shipments by Express, Railroad or Truck are insured by the carrier and any damage or loss is covered, all you have to do is file a claim.

10. **Lubrication.** The necessity of lubrication has been minimized on your model No. 400 Simplex Grinder. All bearings used are of the anti-friction type life sealed, lubrication not required. The motor is sleeve bearing and requires no lubrication for the first two years, then ½ teaspoon light motor oil annually to each bearing. Instructions are on the motor cover plate. Oil other frictional points lightly, such as screw shafts, pivit joints, etc. Remember that a mixture of emery dust and oil forms a cutting compound which will damage your machine. Excess oil should be removed when machine is in operation.

11. **Machine Operation.** The grinding head has a travel of 39 inches and stops are provided with rubber bumpers that can be set to limit the travel at any desired point. The grinding wheel can be adjusted in or out on a horizontal plane by using the crank J-339 at the front of the carriage. The vertical crank R-218 adjusts the grinding wheel up or down in the vertical plane. The grinding wheel can also be turned 90 degrees for "Flat" grinding with the side of the wheel, see figure 12. The finger point is adjustable around the wheel by loosening and turning R-228 T handle locking screw.

12. The mower support can be rotated around 360 degrees and can be adjusted vertically up or down 5/8 of an inch. Also it can be placed in front of the knuckle casting P-427A or behind it, by turning the casting around, thus bringing it closer to the grinding wheel when the slide support casting R-235 is moved forward to its maximum travel. These castings are moved in or out by the R-242 "T" handles on either side of the machine. Each side moves independently of the other, the handles are not interconnected. The "T" handle turns to lock each side once positioned and fine adjustment is then made by using the R-262 Turnbuckles. The mower is positioned to the grinding wheel by using both "T" handles together. With one "T" handle locked, the other can be used for rough alignment of the mower reel with the grinding wheel. With both "T" handles locked, the turnbuckles provide fine alignment for grinding.

13. The grinding carriage track shafts are supported in the center by the center support casting R-231. This support is adjusted at the factory while your machine was level so the grinding wheel will grind both the bed knife and reel of a lawnmower .002 of an inch high in the center. This assures good contact between reel blades and bed knives in the middle where there is a tendency for them to spring away from each other. No attempt to change this adjustment should be made as it requires a dial indicator and straight edge to reset the machine.

14. **Principle of Sharpening.** Slow motion movies have revealed the fact that lawnmowers using the principle of a stationary bed knife and a rotating reel cut grass by a combination of the motion of a scythe and a pair of shears. Emphasis therefor is on the "attitude" of the stationary bed knife to a stand of grass and the relation of the rotating reel blades to the bed knife. Remember that on a five bladed reel, the bed knife does five times the work of any one reel blade with all reel blades shearing against it. If the reel blades are in need of sharpening, the bed knife will certainly be in need of it also.

There are a great many shapes of bed knives in use and they are mounted in the frames in many different ways but they all have one thing in common: Their typical relationship to the rotary or reel blades with which they are matched. This relationship of the cutting edges may have been destroyed by one or more of the following causes.

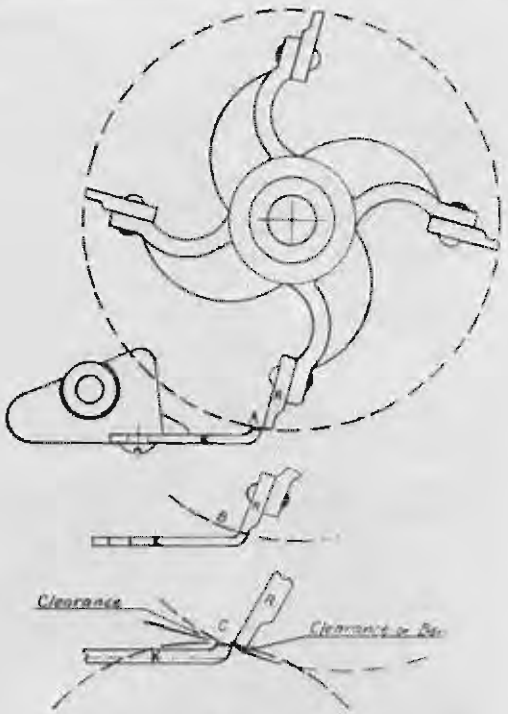

Fig. 6

(a) The frame of the lawnmower supporting the stationary (adjustable) bed knife and the reel may be loose or may have been sprung in rough usage.

(b) The reel bearing may be worn through lack of lubrication, dirt, or faulty adjustment causing the reel to lose contact with the bed knife.

(c) The cutting edges may have been nicked or bent by stones and other objects or excessive adjustments of the stationary bed knife.

(d) The metal parts may have rusted or corroded.

The usual symptons of one or more of these conditions are that the mower does not operate freely and that the grass is mashed or pulled out by the roots instead of being sheared or cut properly.

15. It is of the utmost importance that the cause of faulty or unsatisfactory mower operation be determined before sharpening. Occasionally cleaning, lubricating, tightening and proper alignment, and adjustment of the reel bearings and the bed knife will restore a mower to satisfactory operating condition. If the cutting edges are not too badly worn or nicked a small amount of "lapping" after the above adjustments are made will restore the mower to satisfactory cutting condition.

16. The process of sharpening a lawnmower is really one of reshaping the cutting edge of the bed knife and the rotary reel blades by grinding, to restore their ability to cut grass.

For a mower to run easily and cut freely, it is important that proper bevel or relief angle be ground on both the bed knife cutting edge and the reel blades cutting edges. This gives clearance or relief behind the contacting edges and reduces drag and friction. Too little relief angle would leave more metal in contact causing the mower to run hard. Too much clearance or angle would weaken the cutting edges and they would nick easily and would not hold their adjustment.

17. For production reasons most manufacturers spin or cylinder grind their reels. With this method the reel is revolved on centers or on its bearings while a large grinding wheel pases back and forth grinding the reel to a true cylinder. No bevel or clearance is given to the reel blades and the entire thickness of each blade makes a rubbling contact with the bed knife. The manufactures do put clearance or bevel on the bed knife, otherwise the mower would run too hard to sell even as new.

18. This is why a new lawnmower, especially a hand mower, can be improved by grinding the reel blades. Only when the reel blades are ground one at a time can each blade be given a bevel and thus a desirable clearance behind the cutting edge (See Fig. 6). A power mower does not need as much clearance as a hand lawnmower as they need not be pushed and the cutting edges need extra strength which results by decreasing the clearance angle.

19. The foregoing has explained why a new lawnmower will soon be in need of sharpening. The wide contact of each reel blade soon wears off the clearance ground in the bed knife making the area of contact excessive. This causes harder pushing or running as the bed knife is adjusted tighter and tighter against the reel blades to maintain some semblance of cutting action. Actually the cutting edges become rounded and the grass is no longer sheared off but pinched off if not pulled entirely out of the ground. Many lawnmower shops that sell new mowers grind the reel blades and readjust a new mower before delivery to assure customer satisfaction. Some manufacturers have resorted to a thinner reel blade, however this is not entirely satisfactory as a blade thin enough to push easily would not have the strength to withstand the service to which it would be submitted.

20. **Checking Lawnmower Before Sharpening.** A typical customer claim check and mower identification tag is shown in Figure (7) as a guide for lawnmower repairmen and service shops that want to establish or revise an accounting system. The customer's claim stub should be left blank for his protection in case he should lose it, however you can stamp or print your name and address on it if you wish. These tags, properly filled in and filed, provide you with a complete record and accounting system, list of customers with addresses and phone numbers, record of work done and date of last sharpening, and any other information you may wish to record. You can use this customer list to your advantage in the fall and winter by offering to pick up their mowers, provide winter storage and sharpening, and spring delivery. This will increase your off-season business and leave you free to go after new business in the spring.

THE FATE-ROOT-HEATH CO.

Mower Parts Div. **Plymouth, Ohio**

Date_____

Name _____

Address_____

City_____ Phone_____

Promised by_____

INSTRUCTIONS

☐ Sharpen_____

☐ Recondition _____

☐ Repair_____

Labor _____

_____

76950 Total $_____

76950

Handle or Motor Identification Stub

CLAIM CHECK 76950

Thank You

Fig. 7

When a lawnmower is brought to you for sharpening or winter storage, the following checks should be made, in the presence of the customer if possible, and the condition of the mower recorded.

21. **Condition Check List.** This provides a sound basis for charges to be made as well as a record for future reference. Notes on the condition of the mower and work customer wants done should be written on the large part of the identification tag to guide you when the mower is being serviced.

22. **Handle.** Check for broken welds on steel handles. Note if cross arm is loose. Make a note on the tag if the handle was not brought to the shop with the mower.

23. **Roller.** Check for split or worn (undersized) rollers and loose pins. Also check the roller hangers for excessive wear or breakage.

24. **Pinions and Pawls.** Turn the wheels vigorously by hand to see if the reel is positively driven. If there is slippage, the customer should be advised that new pinion gears and pawls may be needed and the approximate cost of the repairs.

25. **Frame.** Check that the front spacer bar and the bed knife are fastened securely and that the frame in general is not loose. If the frame is loose, it is probably out of alignment. Examine the side plates for cracks and look for stripped threads on the bed knife adjusting screws.

26. **Bed Knife.** Check and determine if the bed knife has enough body left to grind or if it should be replaced with a new blade. Also check general condition of the cast back and pivot points.

27. **Reel.** Check the reel for proper (free) rotation on its axis (bearing races) and examine the reel blades for bad nicks that might indicate a twisted or sprung spider. Check to see that reel blades are securely fastened to the spiders and that the spiders are secure on the reel shaft. A sprung reel blade can be forced back into place rather than resorting to excessive grinding to restore it.

28. **Wheels and Tires.** Check for excessive end play or wobble. Wheels may be broken or cracked and tires may need replacing due to wear. Cleaning grease and grass out of the ring gear of the wheel may make the drive more noisy but should result in easier operation. You can take your choice on cleaning the ring gear, however when new pinions are installed, the ring gears should definitely be cleaned.

29. **Reel Bearings.** Check for vertical or end play of the reel due to wear or improper adjustment of the reel bearings or pitted cups and cones. If the bearings are loose or worn and are of the non-adjustable type, new ones will be needed and their cost should be taken into consideration.

30. **Clean and Touch Up.** Most owners appreciate machinery and will gladly pay to have their mower thoroughly cleaned and exposed metal parts painted.

NOTE. (the following applies only to power lawnmowers.)

Discuss and check its operation. If you do not work on engines yourself and it is in need of attention, offer to remove the engine and have the necessary work done by a garage or authorized service station for that make of engine. A working agreement should be established allowing you a percentage for work you bring in.

31. **Starter.** Examine the starter for broken or bent parts that indicate the need for repairs or adjustments. Note if starter rope was brought in with the mower. If a new starter rope is needed, supply one free of charge for good will.

32. **Ignition System.** Ask how engine has been starting. If service is indicated, check spark plug, wiring, and magneto points.

33. **Fuel System.** If the gasoline tank is removed or drained, as is recommended, it offers a good opportunity to inspect and check the fuel system. The air cleaner and muffler should also be inspected for satisfactory condition.

34. **Lubrication.** Although the lawnmower remains upright and the oil need not be drained from the crankcase, most shops include this service in the price of sharpening the mower. The average engine holds less than a pint of oil and when your customer is advised your charge includes an oil change, they will be pleased with the additional service.

35. **General Condition of Mower.** In conversation with the owner you can learn a lot about condition of the mower and its serviceability. Perhaps it has had unusually hard use and lacks power which might indicate a complete overhaul. Perhaps a hand mower should be replaced by a power mower or a power mower should be replaced by a larger or later model. If you are in a position to sell new mowers, this is your golden opportunity to do so.

36. On most mowers it is not necessary to remove the handles, they can be left in place during the sharpening operation. However a mower in bad condition can be worked on with more convenience if the handle is removed since it can be turned over and up on end for repairs and adjustments. Loose

bearings, misalignment, sticking wheels, wire or grass tangled reel shaft, and exceptionally dirty condition are a few of the things that must be remedied before a mower can be ground. You can decide if these conditions can be most conveniently remedied with the handle on or off. As far as the operation of the Simplex is concerned, it makes no difference.

37. The same is true for power mowers. They can be sharpened on your Simplex Sharpener while completely assembled, engine, handle and all. However if there is any amount of repair work necessary, it will be more convenient to dis-assemble them. If possible, we recommend that the deckplate, which holds the engine and sometimes the handle, be removed from the mower with the other parts intact. If the handle fastens to the side plates of the mower, remove the throttle and other controls from it and leave these controls attached to the engine. By removing the deck plates and engine with the controls attached, you will have no trouble in re-assembling the mower.

38. You will find it much easier to prepare a mower for sharpening if it is placed on a work bench. We recommend that all mowers be placed on a bench for preparation and for the final assembly and adjustment. A special wide work bench in the center of the room is convenient for this work since you can work on the mower from any side.

Fig. 8

39. **Removing and Grinding The Bed Knife.** It would be next to impossible to cover the exact steps necessary to sharpen every different make and model of hand and power mower. You will find that you have the theory and understand the principles of grinding a lawnmower from these instructions. With this background and your own mechanical ability you should have no difficulty in accommodating any mowers that come in your shop.

40. The first step in the sharpening procedure is to remove the bed knife (sometimes called the straight blade, cutter bar, stationary blade and other names, we shall refer to it as the bed knife) from the mower. Most bed knives are held in the mowers by cap screws or nuts and bolts through the ends of the bed knife cast-back and the side frames of the mower. Relieve the pressure or tension on the bed knife adjusting screws before removing the end bolts. Put a few drops of oil on all screws or bolts removed or loosened, this will help in reassembling and adjusting and will prevent rust. This practice will also make mowers easier to work on when brought to you for future sharpening jobs. After the cap screws or bolts are removed, use a large screwdriver or pinch bar to spring the side frames of the mower apart so that the bed knife can be removed (see figure 8). Some mowers are constructed differently and the above procedure would not fully apply. However after you have worked on a few mowers, you will be able to remove any bed knife, no matter how it is constructed, in a very short time. When the bed knife supports are used, the bed knife must be in the mower when the reel is ground. It is optional whether you grind the bed knife before or after the reel is ground, either way will give the same result. See fig. 25.

41. After the bed knife assembly is removed it should be cleaned and inspected. A screw driver or putty knife and wire brush will effectively remove the dirt and grass that accumulates behind the lip of the bed knife. Check the bed knife to be sure it is tight on the cast back. Tighten screws or rivets if necessary.

42. It should be noted if there is a wavy appearance along the top face of the bed knife. This would indicate the bed knife has been adjusted to the reel with excessive pressure, or loose reel bearings. Also the contacting area of the top face edge made by the reel blades should be noted. If the mower is quite dull, this area will probably cover the entire thickness of the lip. Improper adjustment may result in having more lip at one end of the bed knife than at the other. It is advisable to compensate for this by removing more metal at the thick end bringing the bed knife back to an even thickness after sharpening. The roundness of the front cutting edge should be noted as an equal amount from both the front edge and top face will have to be ground away to arrive at a sharp, shearing corner. If the edge is extemely rounded and dull, it is advisable to remove more metal from the front edge. See fig. 9.

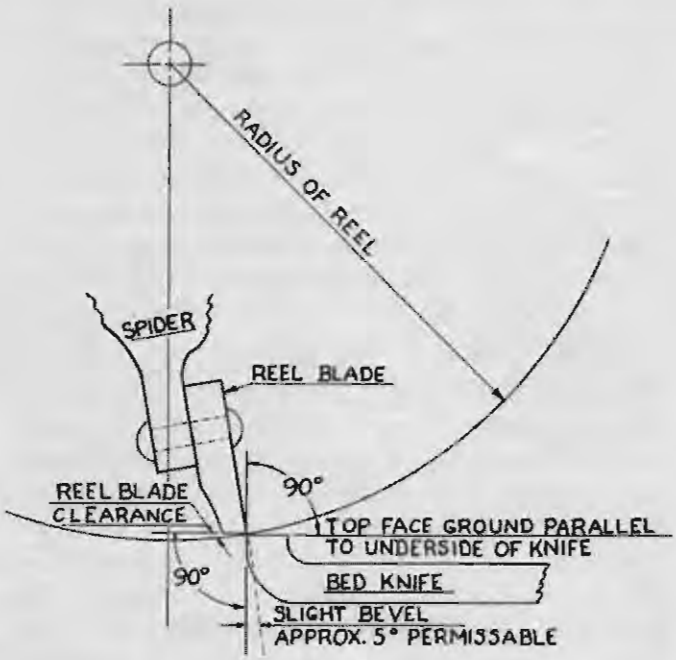

Fig. 9

43. Figure (9) illustrates the angles and relationship of a bed knife to the ground and to the diameter of the reel blades. There are exceptions to this illustration but this is the more general type that will be found. In all cases the front edge of the bed knife should be ground first. The wire edge left from this grinding will be removed when the top face of the bed knife is ground. The front edge can be ground perfectly square, however, as the illustration in fig. (9) shows, an angle of 5 to 10 degrees is desirable. After the front edge has been ground, the top face edge is ready to be ground and, referring again to figure (9), a perfectly level surface would provide clearance. However an angle of 3 to 5 degrees is preferable to assure clearance or relief behind the cutting edge.

Fig. 10

44. The following is but one of several methods which can be used to grind the bed knife.

1. Place the bed knife upside down between mower-holding centers on square mower support bar, see figure (10). Holding centers should be adjusted so bed knife is in approximate center of the machine.

2. Rotate bed knife so the front edge of blade faces grinding wheel and blade is level crossways and lock in this position, using the R-246 cam locking device. See figure (10). The square bar now has two holes drilled 90 degrees apart for the cam lock. The cam can be inserted either way in either of the two holes to find a locking position for any type of bed knife.

3. With elevating crank, set center line of grinding wheel slightly above upper edge of bed knife, this will give front edge the angle, see figure (10).

4. Align the bed knife for grinding by positioning it to the grinding wheel with the R-242 levers. Lock both levers and make fine alignment using the R-262 Turnbuckles until grinding wheel contacts both ends alike. Lock alignment by tightening thumbscrews in the R-235 castings.

5. For added support the R-214 Finger Point can be rotated around until it is making contact with underside of the bed knife. In doing this it may be necessary to use the vertical adjustments of the mower support bar R-213 to assure equal contact of the finger point at each end of the bed knife.

6. Grind until straight true edge has been produced, feeding wheel in a small amount after each pass with the J-339 horizontal feed crank.

Fig. 11

7. To grind top face, rotate bed knife up to position in Figure 11, or with grinding wheel turned on side to Figure 12 position. Hold bed knife in position with the R-246 cam.

8. Move bed knife up to grinding wheel with positioning levers R-242 and, with elevating crank, adjust height of grinding wheel until center line is below the top front edge of the bed knife or until grinding wheel is just missing casting of the bed knife cast back.

9. Square up bed knife with R-262 Turnbuckles and lock thumb screws again in R-235 support castings. Feed the grinding wheel a small amount after each pass and continue to grind until a good true sharp shearing edge is produced.

Fig. 12

45. If the bed knife is of the type shown in figure (12) with adjusting lugs or ears that interfere with grinding to the ends with the above procedure, the following can be done.

1. Place the bed knife between centers right side up, see figure (12) proceed same as above with exception that center line of grinding should be slightly below the top front edge to assure proper front angle.

2. After front edge is ground, the grinding wheel can be rotated 90 degrees and the flat side of the wheel used to grind the face edge or surface. The square bar holding the bed knife can be rotated bringing the bed knife into proper relationship with the grinding wheel. The vertical adjustments of the mower support bar R-213 are used to adjust bed knife for equal contact with the grinding wheel at each end, see figure (12).

46. We have available as optional equipment a cup wheel grinding arbor and a "C" clamp type of bed knife holding bar. These are listed in the back of this book with instructions for their use. Figure 13 shows the cup wheel arbor in use with the conventional bed knife holding method using the center supports.

47. **Bed Knife Support Method.** With the new overhead support bar and the bed knife supporting clamps, we recommend that mowers be sharpened with the bed knife in place using the three point support system as on the cover photo. Heavy power mowers can most easily be held for grinding by this method. In addition, the bed knife controls the spacing of the side frames and thus the reel bearing

Fig. 13

adjustment. With the bed knife out it is necessary to force the side frames together with the mower support centers until the reel bearings are at proper tension. With the bed knife in place, the mower is properly spaced and can be easily lowered onto the bed knife support clamps, then clamped to the overhead support bar. The illustrations used in this section show a hand mower for simplicity and the center support method is used, however this same mower could be supported with the bed knife in place using the three point method.

Fig. 14

48. **Note:** We recommend that all mowers be ground with the bed knife in place and that the bed knife or roller be used to support the mower whenever possible. These illustrations show the center supports used to support the mower with the bed knife out. If this support method is used, we recommend that the overhead support bar be used also instead of allowing the mower to tip back against the square bar. (Refer to cover photo or Figure 25). Place the mower in the Simplex using the bed knife or roller support method. If the center supports are used with the bed knife out, tap one of them with a hammer after tightening to apply sufficient pressure for proper bearing adjustment.

2. Allow the mower to tip back to approximately a 45 degree angle and clamp to the overhead support bar to hold in this position. (Figure 14 shows the mower tipped back to position and resting against its roller, the new overhead bar makes this unnecessary). On mowers having a third wheel in place of a roller, use the bed knife clamp supports and the overhead bar method. (See figure 25.) Slip the bed knife support clamps on the square bar so that they will just catch the extreme ends of the bed knife. Lift the mower into the machine and let the back edge of the bed knife slide into these clamps. Then attach the overhead support bar clamp to the shrub bar or some firm point high on the mower. Using either method of supporting the mower, the following instructions will apply.

Fig. 15

3. Pull mower to grinding wheel with side positioning levers and elevate grinding wheel until wheel center is level with reel axle or slightly below. Move grinding wheel into contact with one of the reel blades, then move grinding head to right side of mower to determine if grinding wheel arbor and belt pulley clears mower wheel or tire. If not mower can be tilted back more or grinding wheel lowered. See figure 15.

Fig. 16

4. Move grinding wheel to center of mower and adjust in until contact is made with one of the reel blades as it is rotated back and forth past the grinding wheel. When blade is just touching the wheel, adjust wheel in 1/4 to 1/3 of a turn on the J-339 horizontal feed crank. With this adjustment the reel blade when rotated up will contact the wheel and not pass. At this point of contact, hold the reel blade and rotate the R-214 finger by loosening and moving the R-228 T-handle until the finger is holding the reel blade at this point of contact with the wheel, lock the finger at this position and your proper bevel is set for grinding the reel blades.

Fig. 17

5. Move grinding wheel to either side of mower and square mower up for equal contact with the grinding wheel at each end of the reel by using side positioning levers. When both sides are scratching the same, go back and check each side again as when one side is moved the other will also move slightly. This adjustment should be accomplished using the same reel blades at each end. Figure 17.

6. Number the reel blades on the back side at the starting end. Grinding can be done from either direction but is recommended that direction be used that will cause the finger point to rotate the reel. On a left hand spiral reel this would be from right to left and v i c e versa for right hand spiral reel. A mower is known to have a right or left hand spiral reel by the direction it throws the cut grass to one side or the other as the operator stands behind the mower. Cut grass windrow to right of the operator, right hand spiral and vice versa.

7. Set grinding head travel limit stops so grinding wheel just passes the ends of the reel blades and start to grind. Increase the feed a small amount after each complete circle of the reel, or before starting on blade number one each time around, until a new sharp edge is produced the entire length of each blade. On the last time around a lighter cut should be used and when the circle is completed, without

changing the feed, grind the last blade again. Then, proceeding backwards, grind the next to the last etc. until the reel has been ground in reverse order back to and including blade No. 1. This counteracts the wear of the grinding wheel and assures that each reel blade has been ground alike.

8. As stated in number 6 above grinding can be accomplished in either direction regardless of the spiral of the reel blades. Some operators perfer to grind both directions during the roughing cuts, this can be done if reel rotates freely enough but the last two finish cuts should follow the procedure as outlined in number 7 above. It is recommended that the reel blades be de-burred with a small metal scraper or file before removing the mower from the grinding machine.

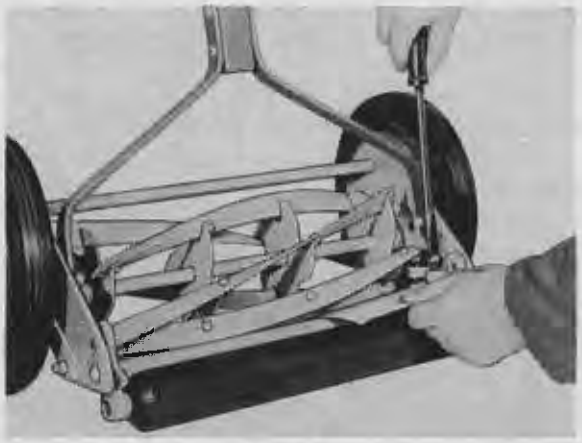

Fig. 18

9. Final adjustment can be made on the mower without removing it from the Simplex. We recommend that it be done in the machine, however you may remove the mower to a workbench or the floor if you prefer. Replace the bed knife if the center support method was used, do not tighten the bed knife bolts too firmly until after final adjustment. While making this adjustment of the bed knife to the reel blades, turn the reel backward, never forward, until you are sure the two will not catch and injure one another. Put sufficient pressure on the adjusting screws to hold the bed knife securely, but do not see how tight you can set them. After adjustment tighten the end bolts through the frame and recheck the adjustment to see if it has changed. If center of bed knife is not making good contact with the reel blades, try easing the pressure on the adjusting screws as they may be too tight, and causing the bed knife to spring away in the middle.

49. Figure 19 shows the optional reel-holding attachment in position on the Simplex with a reel in grinding position. To use this attachment, slide the mower support centers to the extreme ends of the mower support bar and attach the two reel-holder bars (according to the length of the reel) in a position that will approximately center the reel in the machine. The roller bearings should support the reel on the bearing surfaces of the reel shaft if possible. If these surfaces are tapered, support the reel as closely as possible to them to eliminate any end play. These supports have a hold-down rod which hold the reel firmly on the bearings. Once in position, grinding procedure is the same as though the reel were in the mower and you can refer to section 48 for the grinding steps to follow. This attachment is not included as standard equipment

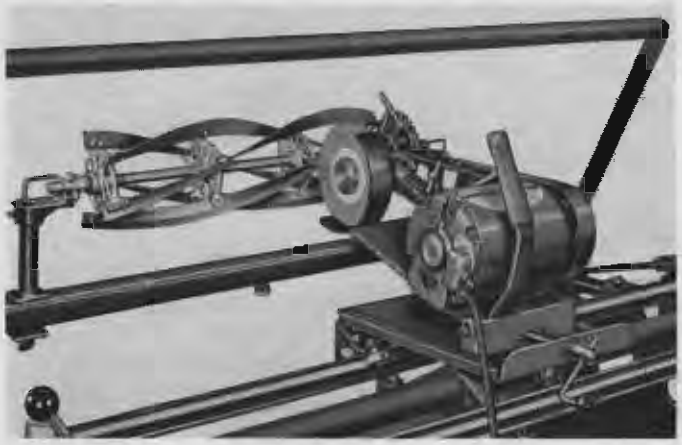

Fig. 19

since it is of value only to those shops which tear a mower completely down and have occasion to grind the reel separately.

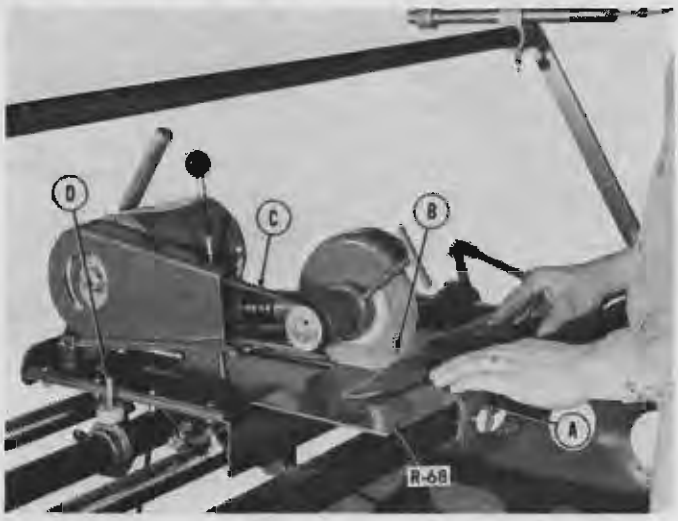

Fig. 20

ROTARY BLADE SHARPENING

50. The Rotary Blade Grinding Plate shown in Figure 20 now replaces the arbor-type holder formerly supplied for rotary blade sharpening. The R-68 plate is clamped to the square bar about in the center and the grinding wheel carriage is centered with the slot in the plate. Use the grinding limit stops (D) with the rubber bumpers pushed down so that the grinding carriage is firmly locked in position. The V-belt (C) can be used in the conventional manner as

changing the feed, grind the last blade again. Then, proceeding backwards, grind the next to the last etc. until the reel has been ground in reverse order back to and including blade No. 1. This counteracts the wear of the grinding wheel and assures that each reel blade has been ground alike.

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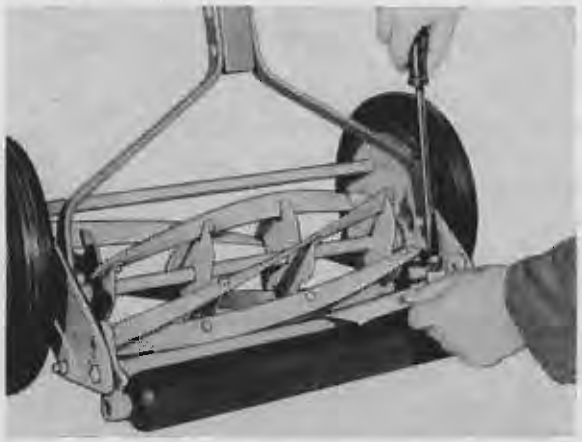

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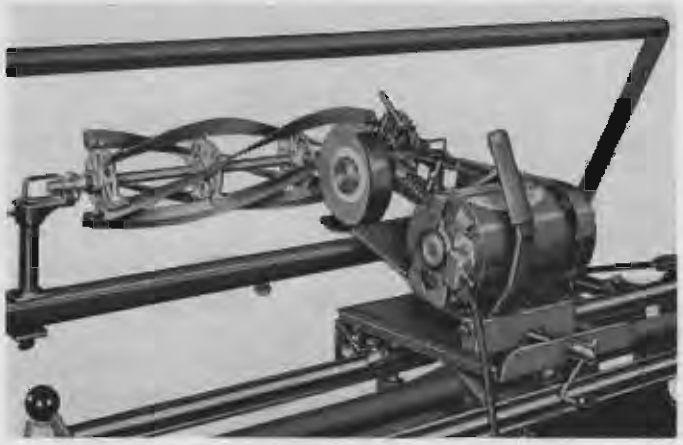

Fig. 19

since it is of value only to those shops which tear a mower completely down and have occasion to grind the reel separately.

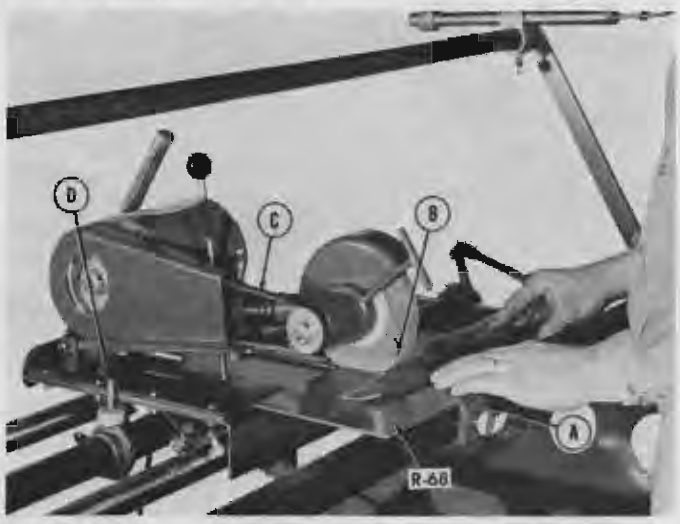

Fig. 20

ROTARY BLADE SHARPENING

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shown, however to grind away from the cutting edge and to prevent the grinding wheel from pulling the blade in under, the V-belt should be given a half twist (See Figure 21). To grind a rotary mower blade, place the blade on the slotted plate as in Figure 20. Adjust the grinding wheel up or down (or raise or lower the plate turning the square support bar) until the old bevel, or the desired new bevel, is obtained. Turn the grinding wheel by hand against the blade to determine the area of contact on the cutting surface. The higher the wheel is elevated, the more the blade can move in under the wheel increasing the amount of bevel. If the wheel is lowered, the bevel angle becomes much steeper.

51. Start the motor and draw the rotary blade through under the grinding wheel beginning at the inside of the cutting edge and ending at the tip. Rest the blade firmly on the R-68 plate and draw the blade through as many times as needed to restore the bevel and a sharp cutting edge. Occasionally you may find it necessary to hold the underside of the blade against the upper part of the grinding wheel to remove the wire edge that builds up. This prepares a good straight surface on the new cutting edge. If the cutting edge is not straight, holding the blade against the side of the wheel will square up the area you are sharpening. After one end is sharpened, repeat the process on the opposite end. Check the blade for balance after sharpening both ends and remove extra metal to restore balance if necessary. We offer several types of rotary blade balancers for this purpose. The rotary grinding plate described here is extra optional equipment and would not have been included with your Simplex unless ordered.

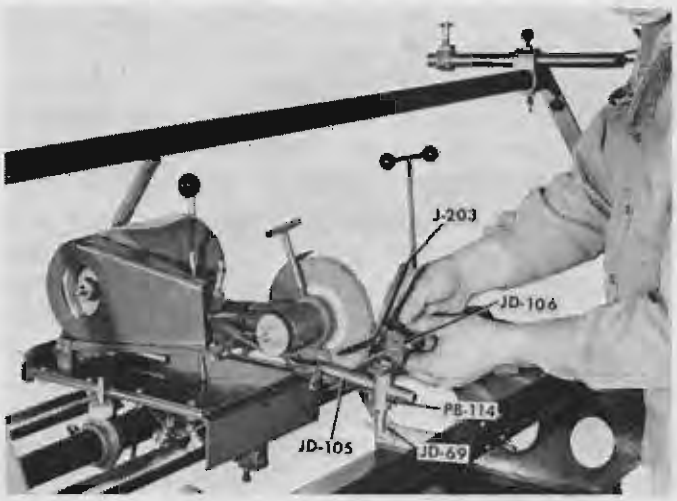


Fig. 21

CUTLERY KNIFE SHARPENING

52. Figure 21 shows the Cutlery Knife Sharpening Attachment in position. The carriage is locked with the end stops, the V-belt is given a half twist to reverse wheel rotation, the special cutlery knife grinding wheel is installed on the arbor, and the attachment is fastened to the wheel guard using the large thumbscrew. The adjustable guide (J203) may be preset to the exact bevel required on any knife. This is checked by turning the wheel by hand against the knife edge and noting the scratch marks. Once set with the lower end just clearing the grinding wheel, the knife is sharpened by drawing it through as many times as necessary to reach a new cutting edge. The opposite edge is sharpened by drawing the knife through from the other side. Cutlery edges should be honed after grinding to remove the slight wire edge and to whet a keen cutting edge. This attachment can also be used to sharpen scissors, shears, and other tools by reversing the position of the guide to provide a flat surface against the grinding wheel.

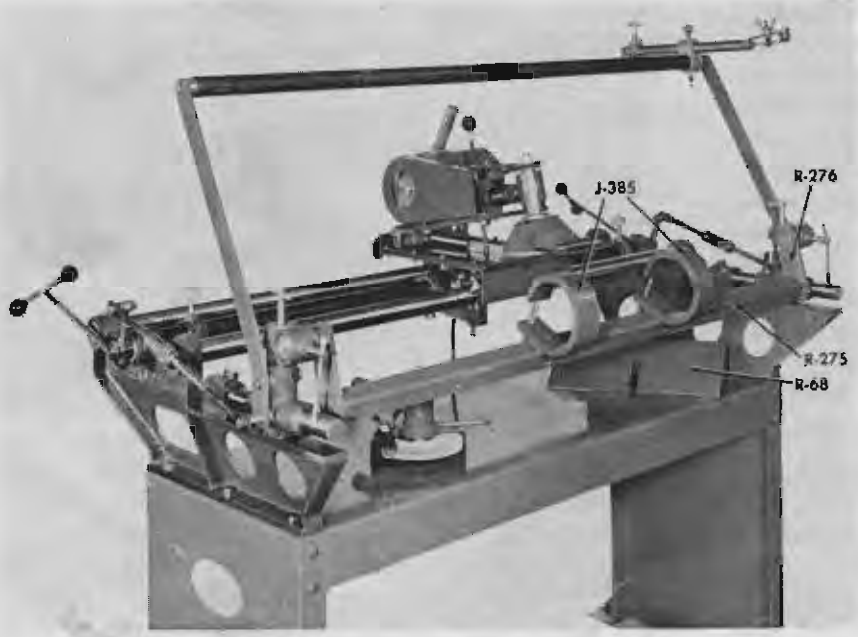


Fig. 22

OPTIONAL ATTACHMENTS TO SPEED PRODUCTION

Figure 22 shows three optional attachments to speed your work. The R-68 plate is for grinding rotary blades and is covered in section No. 50. To make your Simplex a fast precision bed knife grinder, we offer the cup-wheel arbor shown in grinding position and the offset bed knife support bar (R-275). This bar slips into place of the regular mower support bar. The offset ends permit the bed knife to be turned on the centerline of its cutting edge thereby bringing both top face and front edge into grinding position with little, if any, change in adjustment of the bar or grinding wheel. It also has "C" clamps which will hold any bed knife regardless of length or end construction.

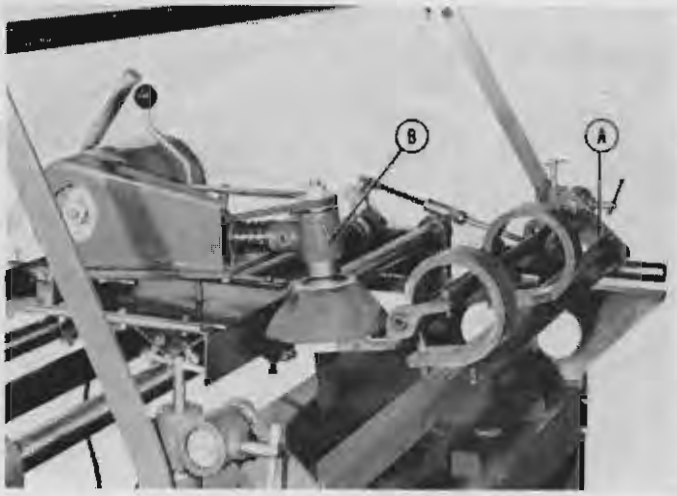


Fig. 23

USE OF OFFSET BED KNIFE SUPPORT BAR AND CUP GRINDING WHEEL

53. With the offset bed knife support bar in position, clamp the bed knife in the "C" clamps on the steel knife itself if possible. On some bed knives it may be necessary to clamp to the cast back, either method is satisfactory as long as the bed knife is held firmly. This attachment may be used with the round wheel as illustrated in Figure 12, however it works best with the Cup-Wheel Arbor (B) as shown in Figure 23. Position the bed knife to the grinding wheel using the side levers and align using the turnbuckles. Align vertically using the screw adjustments at each end of the support bar. Grind the front edge first by swinging the support bar approximately 90 degrees forward from the position shown in Figure 23. After grinding the front edge, swing the support bar back as shown in Figure 23 and grind the top face. The cup grinding wheel should extend over the lip of the bed knife about 1/8" and should tip slightly toward the motor side so that only one side of the wheel contacts the bed knife. With these variations, the bed knife grinding instructions given in Sections 42 to 47 can be followed.

Fig. 24

GRINDING WHEEL DRESSING

54. The grinding wheel should be dressed periodically or as needed to maintain a true round wheel with a crown in the center. We offer the threaded diamond dresser and holder shown in Figure 24 for this purpose. This is an extra, optional item as many shops have wheel dressers which can be used, however the dresser and holder have been engineered expressly for the Simplex. To dress the grinding wheel, attach the holder to the wheel guard as shown in the picture. The dresser can be centered with the grinding wheel by moving the threaded shaft in the holder or it may be adjusted to one side or the other if a crown is preferred off center. The radius of the crown is controlled by the distance the diamond dresser extends through the holder. You can vary this to suit yourself, however the distance shown in the picture is about average. Make all adjustments with the grinding wheel stationary, set the dresser to take a very light cut, then start the motor. Swing the dresser back and forth taking light cuts until the wheel is dressed true and the desired crown is obtained. On certain types of steel, the wheel may load up with fine particles of metal. Dressing will remove these and restore the wheel to its original grinding characteristics.

Hints On Maintenance And Operation Of Model 400 Simplex.

1. Do not grind a good mower until you are familiar with the sharpener, practice on an old one.

2. Use plenty of kerosene oil in pinion gears, clutches, dogs or ratchets of a mower. This makes slipping clutches grab and hold fast. It also saves installing new ratchets or pawls when not actually needed.

3. Do not force set screws, adjusting screws, or bolts. Use a rust-removing penetrating oil on them or heat them quite hot with a torch to loosen them.

4. Do not forget that by forcing adjusting screws or bolts, you can easily break a lawnmower frame casting.

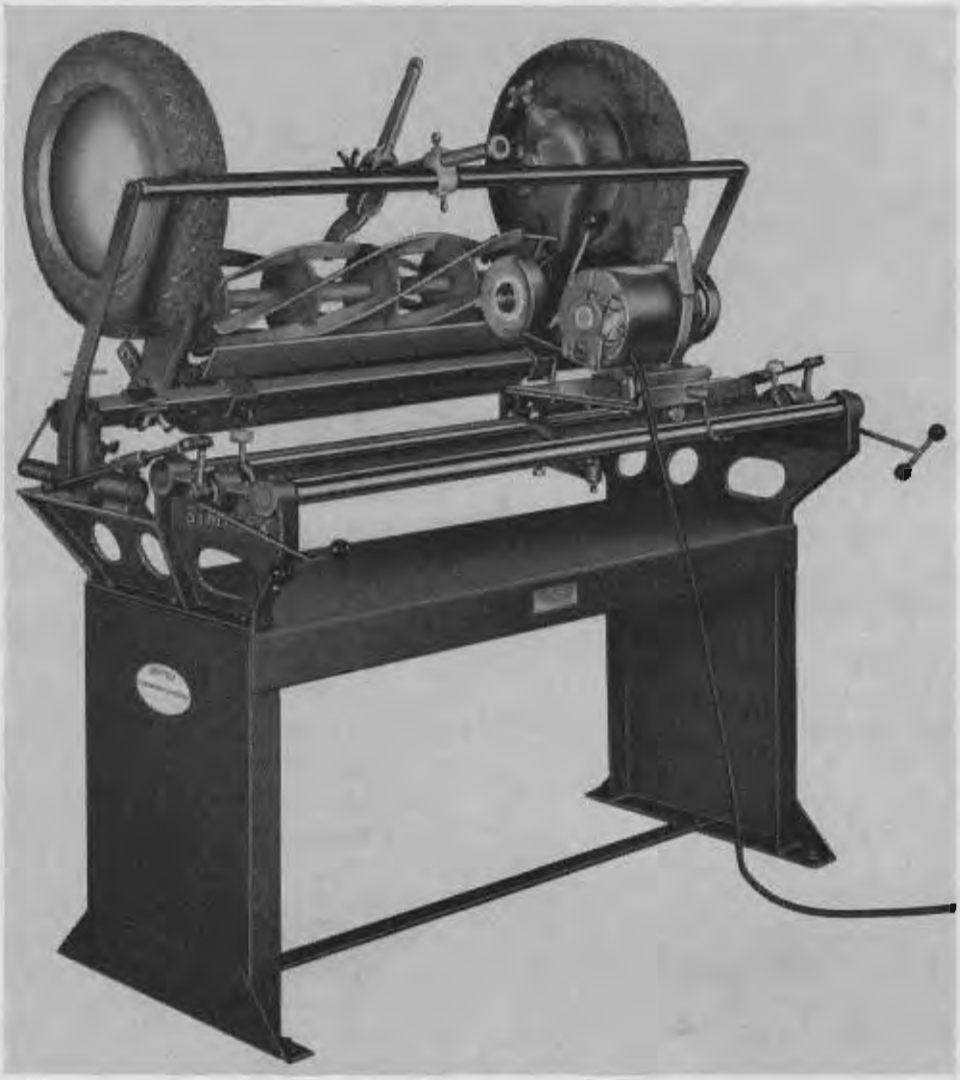


Fig. 25

SERVICE ITEM: ADJUSTING GRINDING WHEEL CARRIAGE TENSION

55. Referring to Figure 25, should the horizontal feed on the grinding wheel carriage operate too freely or tend to creep, tension may be increased by loosening the allen set screw in collar behind the R-220 plate. Hold the allen wrench in the set screw and crank the carriage back tight against the collar pressing the collar against the R-220 plate. With this pressure against the collar, tighten the set screw and crank the carriage back to grinding position. The tension results from the pressure of the collar against a fibre washer and the J-339 crank assembly. Make this adjustment whenever required.

56. Figure 25 shows a large fairway mower mounted in the Simplex. This type of mower is most suitably supported by using the bed knife support method and the overhead bar. Grinding is accomplished in exactly the same way as described earlier in this book. We recommend that the overhead bar support be used with all mowers whether the bed knife support clamps are used or the support centers. Use of this overhead bar gives solid, 3 point support and will result in highly accurate grinding jobs.

We have pawls, pinion gears, bearings, etc. in stock at our factory for practically any make of mower. Write us for a parts catalog if you did not receive one with this instruction book.

Mower Parts Service. Remember that our Mower Parts Division is ready to serve you on lawnmower repair parts and supplies. We are expanding this division every year to include more and more parts and expect to eventually have parts available for every make of mower.

PARTS PRICE LIST . . . . . ➧

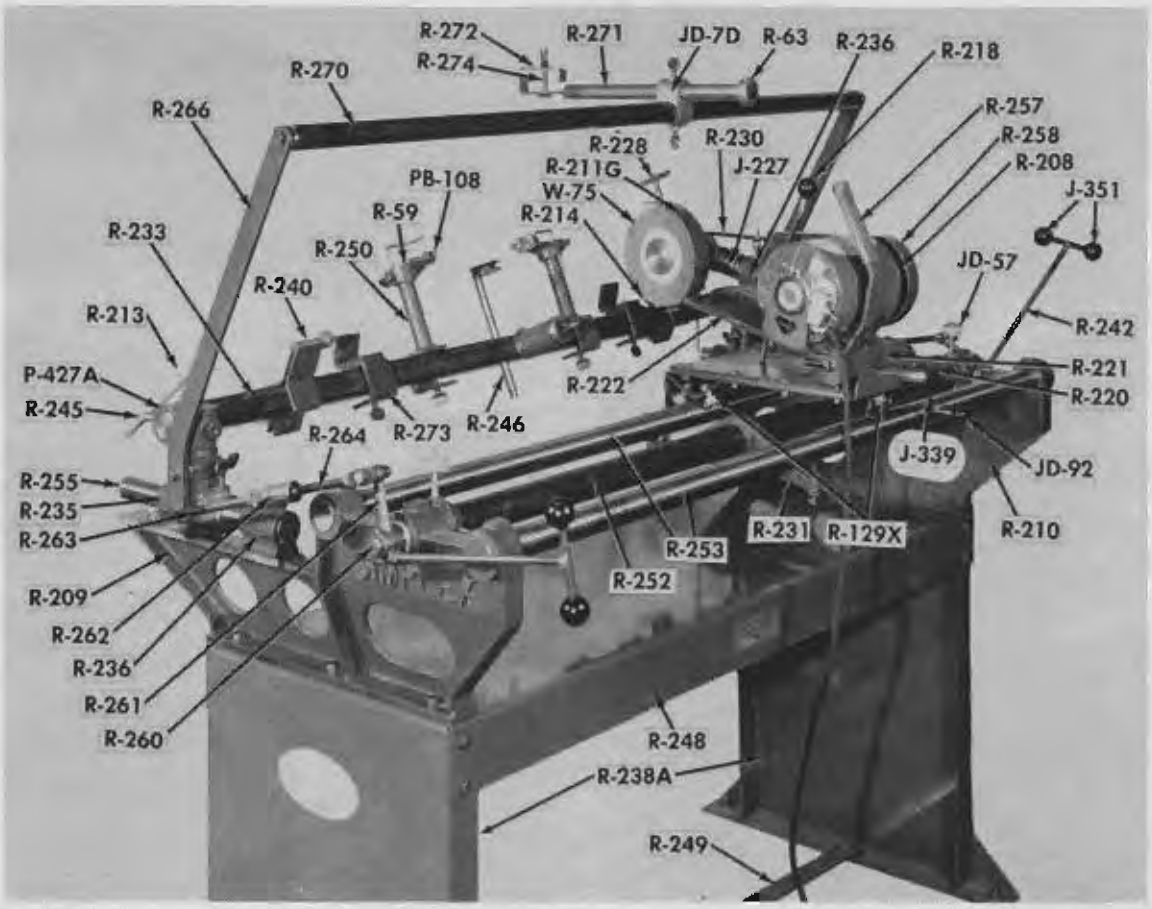
The parts price list printed on the opposite page is in effect from January 1, 1958 to January 1, 1960. Since instruction books are usually preserved for many years, please do not use the prices printed here after January 1, 1960. Request a new parts list after that date.

REPAIR PARTS PRICE LIST
SIMPLEX LAWNMOWER SHARPENER

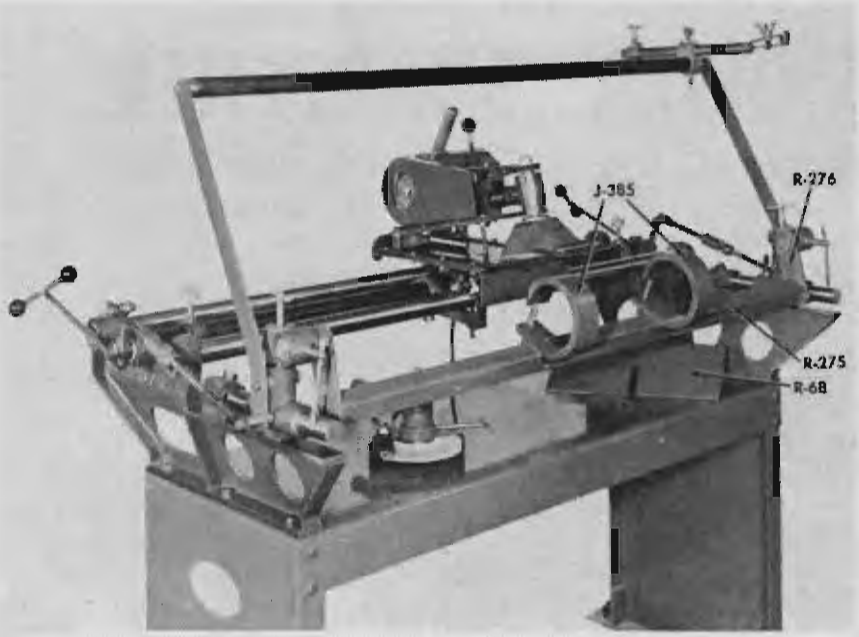
SERIAL NUMBERS 400 and UP — MODEL 400 — MODEL 410 **EFFECTIVE JANUARY 1, 1958**

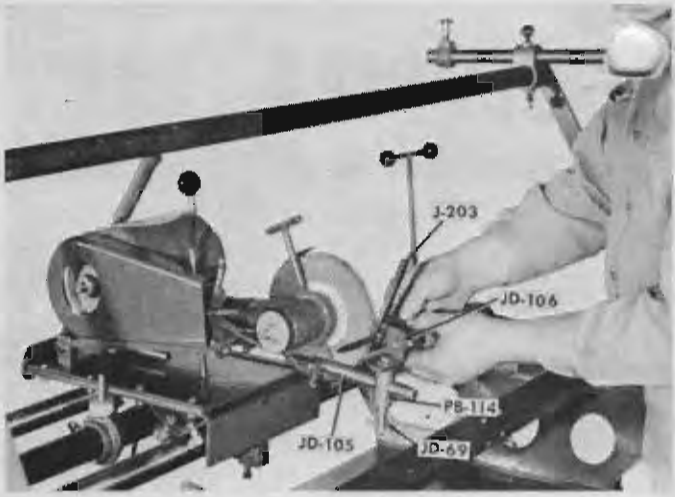
Please send sufficient remittance with order to cover cost of parts, postage and insurance. Any overpayment will be promptly refunded. Orders without remittance will be shipped C.O.D.

NOTE: All prices Quoted are F.O.B., Plymouth, Ohio, Subject to Change without Notice



Order Number	Description	Price Each	Shipping Weight
J-80	Wing Nut	$ .20	2 oz.
J-203	Guide Bar	.75	12 oz.
J-259	Arbor for R-226	1.60	3 lbs.
J-316X	Ball Bearing, N. D. #87013, for R-226	1.65	3 oz.
J-338	Crank Collar	.40	3 oz.
J-339	Crank	.20	5 oz.
J-340	Set Collar, 1" hole	.20	6 oz.
J-351	Plastic Knob	.15	2 oz.
J-385	Bed Knife Holding Clamp on offset support bar, ea.	4.95	4 lbs.
JD-7D	Knuckle	1.65	6 oz.
JD-57	Rubber Bumper	.20	2 oz.
JD-67	V-Pulley, 2" Diameter	.75	1 lb.
JD-68	Ball Bearing, N. D. #87016	1.75	4 oz.
JD-69	Clamp Screw, with P-389 pin	.25	4 oz.
JD-92	Plastic Knob	.15	2 oz.
JD-105	Shaft	1.95	1 lb.
JD-106	Bracket	1.00	3 oz.
PB-10	Nut, right hand thread	.75	6 oz.





Above — Cutlery Knife Attachment

Left — Bed Knife Bar - Cup Wheel Arbor - Rotary Blade Grinding Plate

Order Number	Description	Price Each	Shipping Weight
PB-11	Wrench for PB-10	.15	3 oz.
PB-21	Fibre Washer, ½" hole	.05	1 oz.
PB-80	Hub, right hand thread	1.95	1 lb.
PB-108	Ball Bearing for reel grinding holder	1.50	2 oz.
PB-114	Guide Holder	2.95	1 lb.
P-27	Set Collar, ⅜" hole	.25	4 oz.
P-426	Stop Collar, with pin	1.00	1 lb.
P-427A	Knuckle	2.95	2 lbs.
R-59	Reel Holder casting complete with bearings	6.95	1 lb.
R-60	Hold Down Clips in R-59 Reel Holder	.25	2 oz.
R-63	Set Collar	2.50	6 oz.
R-68	Plate for rotary blade grinding	6.50	5 lbs.
R-129X	Ball Bearing N. D. #87501	1.70	3 oz.
R-208	Motor Pulley, V type, 3½" O.D.	.85	6 oz.
R-209	Main Frame, left side	27.50	25 lbs.
R-210	Main Frame, right side	27.50	25 lbs.
R-211G	Wheel Guard, complete with R-211H Hub	6.65	2 lbs.
R-212	⅓ H.P. Electric Motor complete	19.95	25 lbs.
R-73	½ H.P. Electric Motor complete	29.50	35 lbs.
R-213	Vertical Adjusting Screw	.65	12 oz.
R-214	Finger Point complete with carbide tip	.95	8 oz.
R-215	Horizontal Feed Nut	1.60	8 oz.
R-216	Horizontal Feed Screw complete with J-339	.75	1 lb.
R-217	Vertical Feed Nut	1.60	4 oz.
R-218	Vertical Feed Screw	.95	8 oz.
R-219	Shaft	2.25	4 lbs.
R-220	Lower Carriage Plate, steel	5.95	10 lbs.
R-221	Sliding Plate, steel	4.50	6 lbs.
R-222	Motor Base, steel	5.50	10 lbs.
R-223	Guide Strip	.65	1 lb.
R-224	Retainer Strip	.25	1 lb.
R-225	Axle Stud for R-129X	.65	5 oz.
R-226	Cast Iron Housing for J-259 Arbor	6.25	3 lbs.
R-227	Spring (Numbered J-227 on photo)	.25	3 oz.
R-228	"T" Screw for R-211-G	.75	6 oz.
R-230	"V" Belt 3L-240	1.25	6 oz.

Order Number	Description	Price Each	Shipping Weight
R-231	Center Shaft Support	5.50	4 lbs.
R-232	Adjusting Bar for R-231	.75	3 oz.
R-233	Support Bar, 1½" square	8.50	16 lbs.
R-234	Plug for R-235	.10	1 oz.
R-235	Sliding Bar Holder	8.95	5 lbs.
R-236	Shaft Support	4.95	2 lbs.
R-237	Carriage Hold Down	.35	1 oz.
R-238A	Main Frame Base Assembly	12.95	25 lbs.
R-240	Mower Support Center	2.75	2 lbs.
R-242	Lever with "T" Handle	.90	1 lb.
R-244	Adjusting Post	1.95	2 lbs.
R-245	Sliding Handle with JD-69	.45	6 oz.
R-246	Bed Knife Holder Cam	1.45	1 lb.
R-248	Shelf for Main Base	11.00	39 lbs.
R-249	Spacing Angle for Main Frame	1.35	2 lbs.
R-250	Reel Holder Post	2.50	2 lbs.
R-252	Center Support Pipe	3.95	10 lbs.
R-253	Track Shaft 1⅞" x 52"	9.95	28 lbs.
R-255	Guide Shaft 1½" x 11⅞"	1.85	6 lbs.
R-257	Carriage Handle, Steel with Flex Grip	.75	1 lb.
R-258	Belt Guard for motor	2.75	2 lbs.
R-259	Spacer for Belt Guard	.10	1 oz.
R-260	Plugs for ends of pipe	3.85	1 lb.
R-261	Crank	2.60	8 oz.
R-262	Turnbuckles	3.85	9 oz.
R-263	Adjusting Rod Ends, left hand threads	.90	6 oz.
R-264	Adjusting Rod Ends, right hand threads	.90	5 oz.
R-266	Side arm for overhead support bar	1.00	3 lbs.
R-267	Bushings for 1" pipe	2.75	8 oz.
R-270	Overhead pipe	2.25	8 lbs.
R-271X	Positioner Holder	1.75	3 lbs.
R-272	Positioner Clamp	.25	2 oz.
R-273	Support Clamp	1.15	1 lb.
R-274	Spring	.10	2 oz.
R-275	Offset Bed Knife Support ass'y, with R-276	14.95	16 lbs.
555	Flex Grip for R-257	.20	4 oz.

Grinding Wheel — Wheel Dresser — See Current Wheel List

THE FATE-ROOT-HEATH CO. - *Grinder Div.* - Plymouth, Ohio, U.S.A.

INSTRUCTIONS FOR ORDERING

1. Give the serial number of your machine with each order for parts. This serial number is stamped on the name plate which is fastened to the left hand main frame. This is very important to assure that you will receive the proper parts for your machine.

2. Order by part number from the Parts and Price List which covers your machine. Give all the information you can.

3. Please observe the terms stated on the Parts and Price List. We cannot open ledger accounts for parts orders.

4. Be sure your name and address is on your order, we do not save the envelopes so your address on the envelope is not enough.

5. If at all possible, anticipate your needs and order early. Our busy season lasts from February to May and we may be several days behind on shipments during this period. Parts orders at any other time are assured of prompt shipment.

FOR ORDERING

1. Give the serial number of your machine with each order for parts. This serial number is stamped on the name plate which is fastened to the left hand main frame. This is very important to assure that you will receive the proper parts for your machine.

Guarantee

We, The Fate-Root-Heath Company, fully guarantee the Model 400 Simplex Lawnmower Sharpener, Accessories and Equipment to be honestly constructed of only high grade materials by skilled mechanics. If, within one year from date of purchase, any part should prove defective, we will replace them free of charge.

THE FATE-ROOT-HEATH CO.

John A. Root

PRESIDENT

FOR LAWNMOWER REPAIR PARTS

INCLUDING PINIONS, PAWLS, BEARINGS, BED KNIFE STEEL, ROLLERS, HANDLES, SPRINGS, ETC., WRITE

THE FATE-ROOT-HEATH CO.

LAWNMOWER SHARPENER DIVISION

We, The Fate-Root-Heath Company, fully guarantee the Model 400 Simplex Lawnmower Sharpener, Accessories and Equipment to be honestly constructed of only high grade materials by skilled mechanics. If, within one year from date of purchase, any part should prove defective, we will replace them free of charge.

THE FATE-ROOT-HEATH CO.