

Trouble Shooting On Mowing Equipment

By C. K. BRADLEY

Mowing equipment is the finishing tool of the turf management trade. A carpenter cannot work right with a dull saw and a square out of 90 degree angle. A mason cannot put the right finishing touches on his work with a level out of true, or trowels encrusted with set mortar. Good craftsmanship requires that each man not only care for his tools but also know how to use them.

The first step is to read, study and keep the instruction book and part list that comes with the machine. On receiving new equipment have the salesman or the serviceman demonstrate the handling and speak of care on delivery. You may have to pay extra for this service besides the F.O.B. shipping point of the machine, but it is worth it. You may be familiar with an older model of a particular make, but if it is a new model, some changes made may require different handling.

In trouble shooting on mowers, the first step is to make a diagnosis;—a point by point checking to find the trouble AND the cause. (A veterinarian has one up on the medical doctor; he has to find what ails the critter, while a human patient can usually tell the M.D. where he aches.) The sound of a mower in use may be a clue to the trouble.

Outside of broken or missing parts there are 3 main troubles that occur with power mowers: The engine will not start or run right; the machine does not move forward properly when the clutch is engaged; or the cutting mechanism does not produce the right results. Sometimes, or perhaps quite often all conditions exist and you really have troubles.

Trouble can be due to weakness, mechanical failure, wear or improper adjustment. These may be caused by acts of commission or omission on the operator's part. In turn he may not be entirely to blame if his superintendent has not instructed him fully and correctly in mower care and use. Care of the mower should always be part of the mowing job. Care during the operation and care AFTER the mower use has stopped for the day, are both important. Good practice toward the day's end is to clean, adjust, lubricate and refuel your power mowers, so they are ready to go the next time. The next time may be under hurried conditions, or another operator in-

involved. Regard such care as preventive maintenance — maintenance to prevent trouble.

Engine starting trouble may be caused by faulty ignition or timing; incorrect fuel mixture or vaporization; weak compression or sticking valves (in a 4 cycle engine) or carbon-clogged intake and exhaust ports in the 2 cycle type.

Difficult cranking may be due to oil too heavy, or frozen piston for the lack of it; bent connecting rod; damaged wrist pin or crank shaft. Weak compression and lack of power is usually due to wear of cylinder, piston, and rings. It also may be due to thin oil; and, sometimes excessive choking can weaken compression by washing down oil from cylinder walls. By removing spark plugs and squirting some oil in may restore compression enough to start. A rehone cylinder job and oversize piston and rings will put new life in an engine, but there is a limit to the number of times this can be done.

How to Check Ignition

Check ignition by working back from the spark plug. Check the gap and set the outer electrode AFTER cleaning the plug. Again go by the instruction book for proper gap, which frequently is .025" for 4 cycle and .035" for 2 stroke or 2 cycle engines. Check the porcelain insulator for breaks or cracks, and see that a compression gasket is between the plug base and cylinder head. Just because a spark plug will screw into a cylinder head is no reason to assume it is the right one to use. Champion No. 6M, or the equivalent AC No. 83, Leonard 6F or Auto-Lite B-5 are used in several types of Briggs & Stratton, Wisconsin and Jacobsen makes. You may not find this type plug in chain auto supply stores and common automotive service stations; so buy some to have on hand when needed. Color photos of spark plugs used under various conditions are published by the Electric Auto-Lite Co.

If the plug fires while out of the cylinder head, but grounded by the base touching the head, then check the ignition cable for break, or cut insulation. A spark plug should jump from the cable terminal when engine is cranked, when the terminal is held about ¼ inch from the plug terminal. If all this is ok, check the magneto terminal of cable for tight fit—and clean contact.

From there on back the trouble may be from worn or dirty breaker points, defective condenser or magneto. If the latter, it's best to have an expert ignition man attend repairs. The engine instruction book is the guide to go by for ignition timing.

You may have noted that I have mentioned instruction manuals or books a number of times. In my travels on field service calls I carry such reference material with me. In fact I have at least 2 brief cases so full of service information that it is difficult to close the fasteners. Do not be the least bit embarrassed before your men to take out a service book when you have trouble. No one is smart enough to carry all such information in his head. The smart fellow is the one who knows where to get the answer to a question,—and smarter still is the one who has it available and catalogued for quick reference. There are many points which I have skipped in this discussion, and, later if we have time we shall take up particular questions.

Checking Fuel System

The fuel system should be checked from the supply tank, on thru to the intake manifold. The check list for this is a clean and properly oiled air filter, sufficient gasoline in the tank, an open vent in tank cap if it is of vacuum type; or, sealed cap if pressure fed. An open and clear tank shut-off valve or pet cock, clean sediment bowl (free from water), clear fuel line, open and properly adjusted mixture needle valve, free-working choke and throttle butterflies, free float and supply regulating pin, clear mixing jets of proper size, and a tight intake manifold. Sometimes cast intake manifolds have defects caused by "sand holes" from the casting cores, and these may cause a too lean fuel mixture. Four cycle engines may have defective valves caused by improper setting; wear, warp or accumulated carbon. Valve and ignition timing has to be right on single cylinder engines. With 4 or more cylinders, timing may be more out of adjustment, and still start and run—as the cylinders help one another so to speak, like a four footed animal can make better travel speed than two legged man.

It is good practice to have engines overhauled yearly at an authorized service station handling that particular make. Such stations have the tools, equipment, parts, knowledge and ability to do the job right. In my business I "farm out" some of my engine and magneto work. Authorized engine service stations also can advise what parts to keep on hand for emergencies during your work season.

Checking the Mower

Care and adjustment of traction clutches varies with makes of mowers. Again I

suggest you refer to your service books. This also applies to the cutting mechanism. There is a certain "feel" to these adjustments which can be shown by the mower serviceman, and the operator can acquire by practice and experience. Too often trouble is caused by uneven or too tight setting, and a real type mower will become dull if the adjustment is too loose.

Bed knives adjusted by hand knobs may be set too tight on the right side, if the operator is right handed, and vice-versa if he is left handed. If anything, the adjustment should be just a little looser on the side where reel blades make first contact with the bed knife. Knives set by screw-driver or wrenches are a greater problem than knob type adjusters. Supply your men with smooth handle, and the shortest practical length screw-drivers, and the shortest wrenches, and avoid not only too tight setting, but also stripped threads and broken castings.

Before removing any mower part it is well to clean it thoroughly and inspect how it is attached. This especially applies to gears, sprockets and pulleys on shafts. Look for keyways, turn the shaft a complete revolution, to search for set or lock screws. You either will break the part being removed, or badly cut the shaft by pulling off a part locked on. Service work requires proper and a good assortment of tools. Modern machinery has "Allen" and "Phillips" type screws which are difficult to turn with plain screw-drivers, altho it has been done. Hammer, screw-driver, pliers and monkey wrench—and a piece of hay baling wire got us by in the days of the Model T Ford, but engineering design and mechanics have advanced to special tools for special jobs today. Finding the trouble and cause is but part of the job—to rectify—or avoid trouble, let's touch on various matters pertaining to mower service.

Sharpening Mowers

Honing, lapping-in, or back grinding mower knives if frequently done will help keep cutting edges sharp. I have seen mowers in use for 10 or more years that never have been placed on a mechanical grinder, and still they cut well. These, admittedly are rare instances, but it proves that a grinding job is not always needed. Carborundum grit is preferred to common emery powder. For mower work consider Carborundum No. 40 as "coarse," No. 60 to No. 100 as "medium," and up to No. 210 as "fine." This mixed with light oil, or, preferably a medium soap paste or diluted syrup such as molasses can be used. The soap or syrup mix will wash off easily with water hose after the honing job is completed. It is important to remove all the grit after back-grinding, else when the mower is used the grit may spoil the new cutting edges.

Use a round "sash" or "stencil" brush to apply the compound; rotate the brush as it is passed over the full length of reel. Dip brush in compound, apply full rotated stroke, dip again and go back to assure even distribution. Knives should be adjusted lightly and when sound of the grit action stops, apply more compound. As edges are honed in, it will be necessary to make further adjustment of knives until sharp edges result. A hand crank, electric drill, or motor flexible shaft with proper arbor to fit the shaft or nut on reel end may be used, or a V-belt pulley attached, driven by a motor. Turning backwards, the reel should not spin too fast, or the compound will be thrown off. A speed of 400 to 900 r.p.m. is suggested. To slow the speed of an electric motor, a lamp bulb in socket in series with the motor will act as a resistor, and the lamp wattage used will determine the speed.

Test for sharpness with strips of newspaper, each reel blade should cut paper the full contact length of the bottom knife. If it cuts most places and pinches in some, this is satisfactory in many cases. Carborundum No. 80 is commonly used on hand and power mowers, but a first honing of coarser grit may speed up the work on gang mower units, and finished off with finer grit.

On badly nicked or worn blades, a power grinding job may be needed. If you attempt this work the first time, practice on an old hand mower, as an inexperienced man can wear a lot of good steel off learning the job. Methods vary with the type of grinder, and these are described in operation manuals. Both the bed knife and reel should be sharpened, each separately, on a power grinder.

Worn or loose bed knife screws, studs, or bushings may cause wavy bed knives, and also loose reel bearings. All end play and up and down play should be eliminated before lapping or grinding work starts.

Watch Lubrication Carefully

Lubrication, at proper intervals with correct grade oils and greases will prevent considerable wear. A painted spot different than the general color of the mower, at each lubrication point helps draw it to attention. Some manufacturers now follow this practice. Exposed roller chains, "Oilite"—oil impregnated metal alloys (usually bronze) should not be lubricated unless instructions say so. Sealed bearings with shields on both sides should not be washed in kerosene, gasoline, degreasing fluids or solvents. Rinse them and wipe clean in light grade motor oil. A bulletin "Service Procedure for Ball Bearings" No. ND-A57, compiled and published by the New Departure Division of General Motors Corp., Bristol, Conn., is well worth

reading, and can be obtained free on request.

Standard Hardware, Bolts, Nuts, etcetra

A good rainy-day job, or anytime for that matter, is to check over all fastenings. Even then, a bolt may be lost, or a nut fall off. To put back any bolt is better than none at all, but the right one is the size that was lost. Therefore, a wise thing to do is to go to a hardware store and buy a dozen of each standard size nut, bolt, lock and flat washer, and cotter pins, of variety that you may need. From $\frac{1}{4}$ to $\frac{1}{2}$ inch diameter, and up to 2 inches long, is a good average, with nuts and washers to fit. Get both types thread, USS (or National Coarse "NC") and SAE, (or National Fine "NF") as each is used for a different purpose. All bolts or studs that screw into castings are coarse thread. Those fastened by nuts may be either coarse or fine. A kit of tools comprising box, open end and socket wrenches, various size screwdrivers, both common and "Phillips", assorted "Allen" wrenches, good pliers, and at least two sizes of machinist hammers will enable you to do most servicing jobs. A can or bottle of graphite or penetrating oil will help loosen tight fittings that may have rusted.

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