

A PORTABLE, POWER-DRIVEN SIFTER FOR SOIL INSECT STUDIES¹

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In root weevil studies it is necessary to sift the soil under many strawberry plants to obtain a valid measure of larval abundance. Because hand sifting is extremely laborious the sifter described here was built. As in most models the rocker principle was used. Lange *et al.* (1954) described a large self-propelled, power-driven sifter and reviewed the literature.

Dexion angle iron² was the principal material. It is easily cut with a special cutter or a hack-saw, and fastened together with bolts supplied. Sixty linear feet of angle iron was required. Exact measurements are not given here because the dimensions are not critical and a builder can estimate these or write to the author. (Figs. 1 and 2.)

The wheelbarrow-type frame on a 10-inch rubber-tired wheel allows the sifter to be moved by one man in the field and between rows. The four legs of the wheelbarrow project 1¼ inches below the lower side braces and sink into the soil to prevent the machine from creeping. Above the main frame the legs form the four corners of the rocker frame, from which the rocker bed is suspended. With the handles removed the machine is 74X24X30 inches and can be loaded into a sedan delivery vehicle.

The rocker bed has a rocker rod across each end between the overlapping angle irons at the corners (Fig. 2). Longer steel bolts 1¼ inches with lock washers are needed here. The front end of the rocker bed is reinforced with two extra cross pieces of angle iron to

strengthen the rocker bracket, which is mounted in the center. This bracket is made from two pieces of angle iron with ⅝-inch holes drilled to receive the rocker pin. A cross-piece of angle iron bolted inside the bed at the back end keeps the screens from moving. The bed is suspended at each corner by an iron strap.

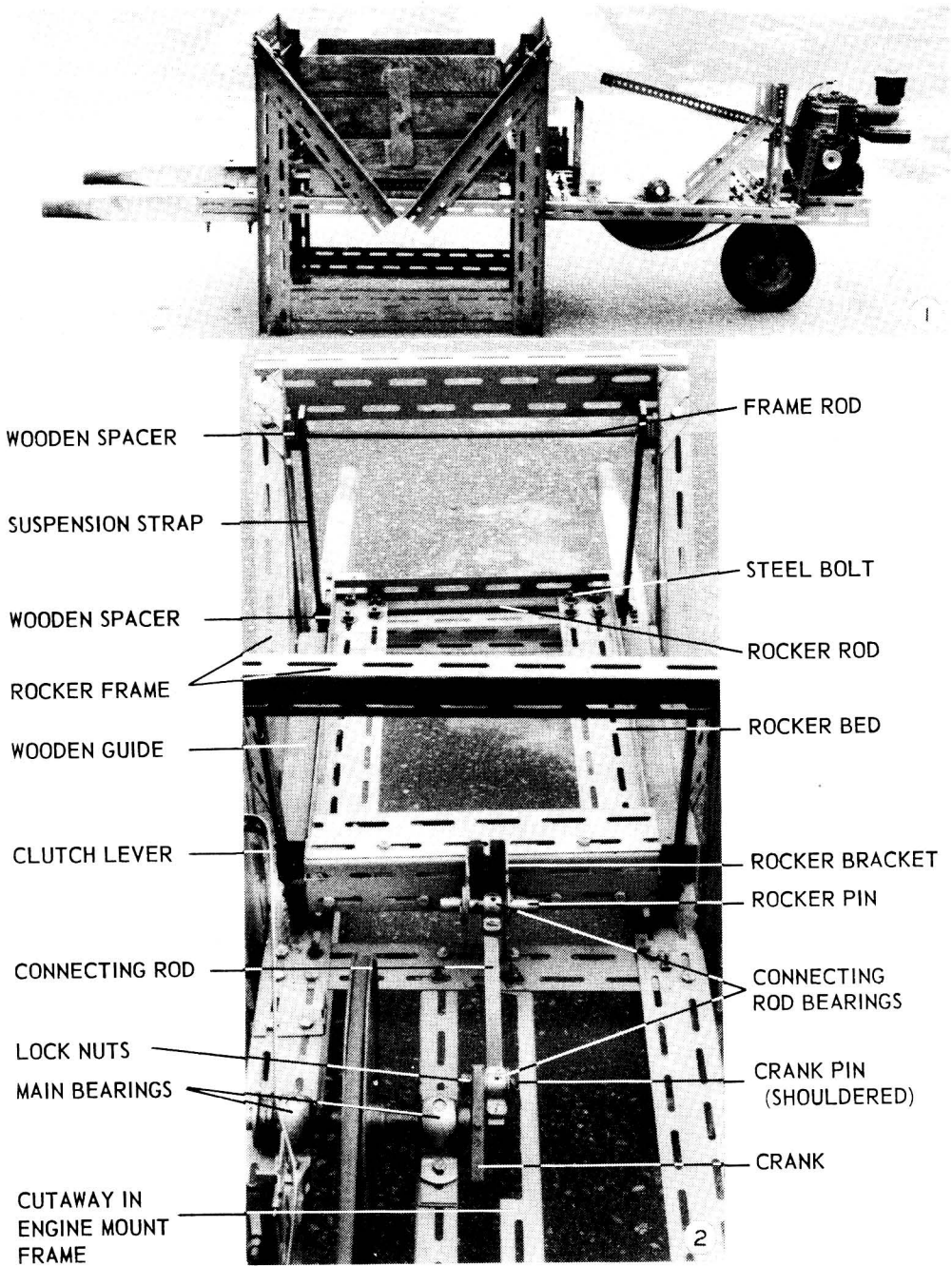
Plywood spacers placed on the rocker rods between the bed and the suspension straps and on the frame rods between the suspension straps and the rocker frame, allow ample clearance between the rocker bed and frame. The rocker rods are secured with washers and cotter pins placed immediately outside the suspension straps. The frame rods are inserted into holes drilled in the rocker frame and secured with washers and cotter pins placed immediately inside the suspension straps. Thus, the bed hangs freely in the angle iron framework and no special bearings are required.

The frames for the sieves are made of ⅝-inch, 5-ply plywood. The corners are reinforced with strips of plumber's medium-weight hanger iron. Wire screens of 14, 4, and 2 meshes per inch are fastened to the bottom of the frames with screws driven first through plywood strips. The middle screen has a plywood cleat at the center of each end and side to secure the three screens and facilitate lifting them off. The coarsest screen is placed on top.

The crank is driven by a shaft running through two grease-filled bearings mounted on the right side of the main frame and on the extension of the engine-mount frame just to the right of the center of the machine (Fig. 2). A collar is fastened on the outer end of the shaft and a 13-inch pulley carrying a V-belt is mounted between the

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² Available from FTS Ltd., 1240 Seymour St., Vancouver 2, B.C.



Figs. 1-2.—Portable power-driven soil sifter. 1, side view. 2, top view of crank and rocker assembly with hood and screens removed.

bearings. A steel spacer is placed on the shaft between the inside bearing and the crank. The crank of cold rolled steel is drilled at the center to fit the shaft snugly and at $1\frac{1}{2}$ inches from center to fit the threaded end of the shouldered crank pin. The crank is rigidly fastened on the inside end of the shaft with a standard tapered pin. The crank pin is bolted to the crank with lock nuts. A washer and babbitt bearing are placed on the free end of the crank pin, secured with a washer and cotter pin and bolted to one end of the steel connecting rod. A babbitt bearing for the rocker pin is bolted to the other end of the connecting rod after marking the holes when the crank is vertical and the rocker bed at rest. The connecting rod and the crank are centered and aligned by adjusting the main bearings on the frame so that the rocker bed has a 3-inch stroke when the large pulley is rotated. Side sway is prevented by screwing wooden guides to the inside of the base of the rocker frame. These well-oiled guides are adjusted by placing washers between the guides and the frame.

The large pulley is aligned with the 2-inch drive pulley of a $\frac{3}{4}$ h.p., 4-cycle, air-cooled engine (Fig. 1), which is mounted so that the V-belt is slack. The belt tightener or clutch (Fig. 1), made from plumber's medium-weight hanger iron, allows the sifter to rock at any speed up to about 300 strokes per minutes. For

safety a sheet metal hood is bolted to the frame to cover the crank and large pulley.

Some advantages of this machine over others are its lightness and portability, low cost (about \$75.00, without engine and labour), ease of construction (about 12 hours for two men) and variable speed control. As with all machines that sift soil without using water, the condition of the soil is of utmost importance. The machine is most effective in fairly dry sandy upland soils and is not recommended for clays.

The machine can sift a soil sample 12 inches in diameter by 6 inches deep (678 cu. inches) in one filling. When the soil is not too wet, a sample can be sifted in a few seconds. Most of the operator's time is spent searching in the lower trays for larvae. These can best be found if the machine is operated at low speed so that the remaining soil is merely disturbed and the larvae exposed. In effect, the efficiency of the operation is dependent on the searching ability of the operator especially for small larvae.

This machine has been used for sifting soil under hundreds of strawberry plants and for preparing sifted soil for pot experiments. No repairs or changes have been necessary.

Acknowledgement

I wish to thank Mr. T. L. Theaker, Assistant Technician at the Victoria Fruit Insect Laboratory where this work was done, for his assistance and valuable suggestions.

Reference

- Lange, W. H., N. B. Akesson, and W. C. Carlson, 1954. A power-driven self-propelled soil sifter for subterranean insects. *J. Econ. Ent.* 47:1006-1008.