

PEA WEEVIL AND APHID DUSTING MACHINE

By

Experiment Station Departments of Entomology and Agricultural Engineering

The pea weevil and aphid in the past has caused serious damage and heavy losses to growers in the Willamette Valley. These losses may even be increased in the 1940 season because of increased acreage and the obvious shortage of adequate dusting and harvesting equipment and fumigation facilities.

A method of controlling pea weevil and aphid has been worked out from experiments conducted by the Department of Entomology in cooperation with the U.S. Bureau of Entomology and Plant Quarantine. These agencies, in cooperation with the Department of Agricultural Engineering, have developed a dusting machine suitable for treating large acreages of these crops in a short period of time.

To assist growers in the proper application of the insecticide dusts, the proper timing of application and in determining the portion of the different fields to be dusted, the Agricultural Experiment Station, the Federal Cooperative Extension Service, the Agricultural Adjustment Administration and the U.S. Bureau of Entomology and Plant Quarantine will cooperate with County Agricultural Agents through the dusting season of 1940 so that the maximum control of the weevil and aphid may be obtained.

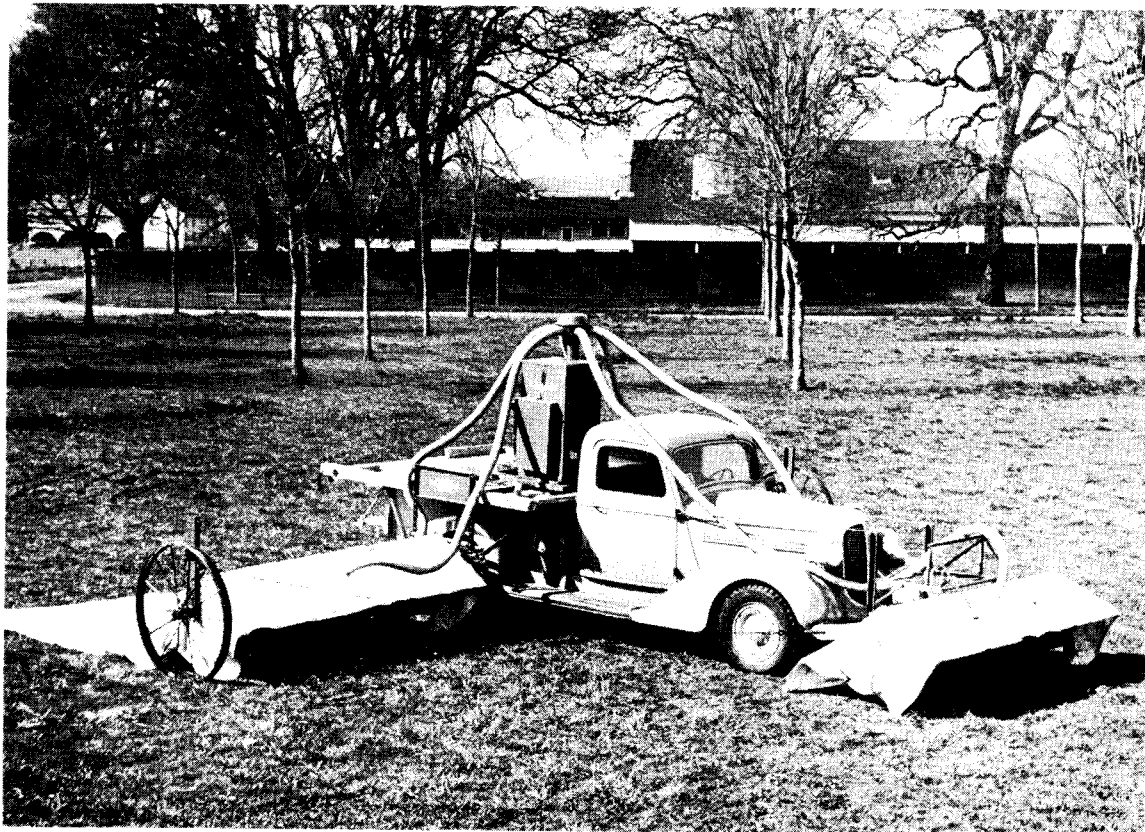
The demonstrational dusting machine described in the following pages was developed from many tests in experimental dusting in Clatsop, Deschutes, Columbia, Umatilla and Polk counties. On an experimental basis, when properly handled, it has been effective in controlling both weevil and aphid.

The following pages present specifications of the demonstrational dusting machine as a guide to farmers in constructing suitable equipment for their own use.

It is not suggested, however, that the type of machine referred to in this manuscript will supplement existing dusting equipment. The specifications contained herein are for use of those growers who may wish to obtain a dusting machine suitable for the control of both pea weevil and pea aphid. Those growers who wish to build a duster for the control of pea weevil only are referred to Oregon Agricultural Experiment Station Circular 126, "Suggestions for the Control of the Pea Weevil in Oregon with Especial Reference to Peas Grown for Processing".

PLANT DUSTING MACHINE

DESIGNED BY DEPT. OF ENTOMOLOGY IN COOPERATION WITH
DEPT. OF AGRICULTURAL ENGINEERING
OREGON STATE COLLEGE CORVALLIS OREGON



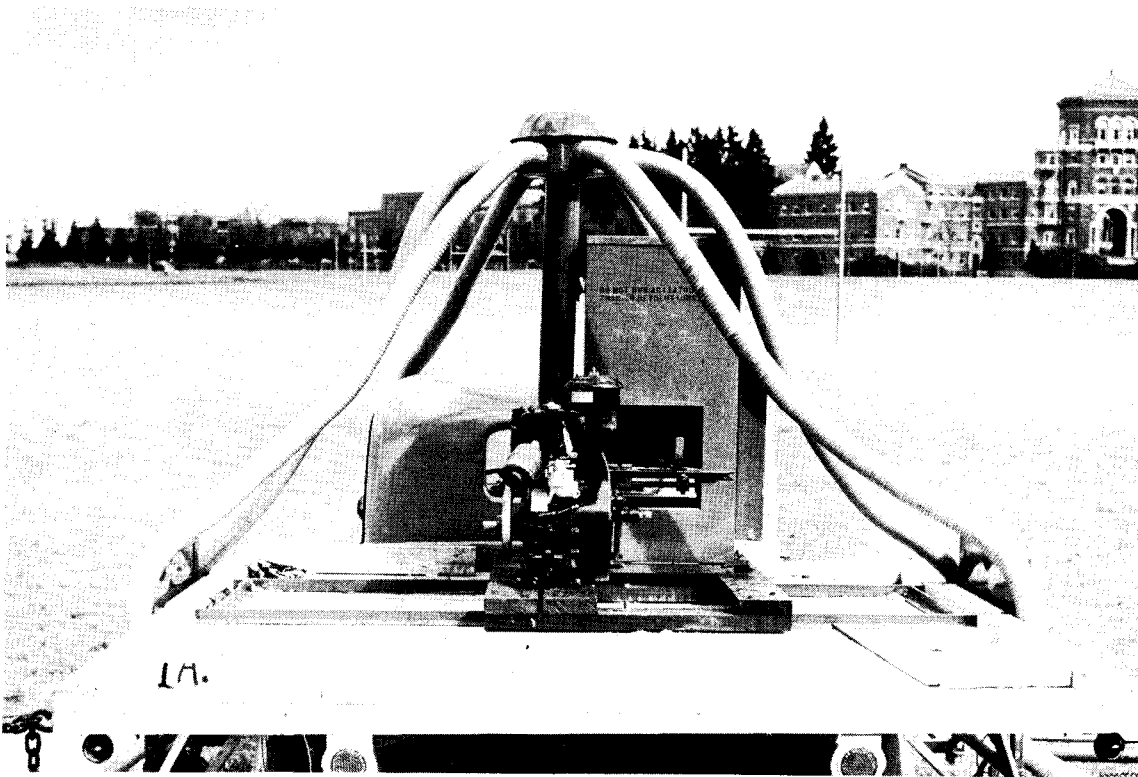
PLANT DUSTING MACHINES

Planned by the Department of Agricultural
Engineering and Entomology

March, 1940

This circular suggests a plan for an engine-driven field dusting unit on a pick-up or truck. It includes detail plans for the dusting booms and supporting structures which are necessary to make the dusting equipment adaptable to the control of pea weevil and aphids.

This field crop duster will treat a 25-foot strip at a rate of about 5 miles per hour. It has three dusting chambers, one of which is carried in front of the vehicle and one on either side supported by pipe booms. The mixing and blower unit consists of an engine, a pressure fan, and a dust-feeding device. Because of the difficulties involved in the construction of a dust-feeder and fan, it is recommended that a grower purchase this unit from a reliable equipment manufacturer.* The manufacturer's recommendations should be followed on the minimum size engine required by the dusting unit. Automobile engines may be used, although they ordinarily develop more power than would be required for a 25-foot boom.



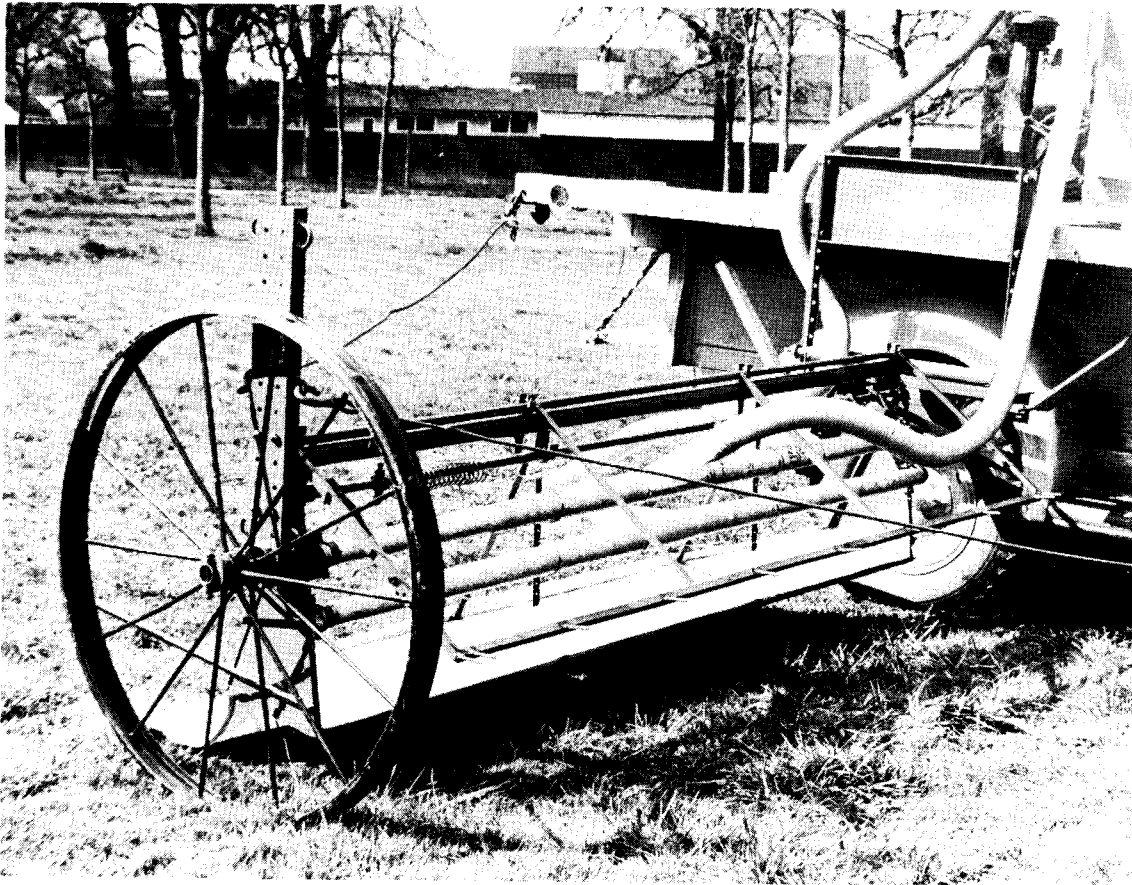
Dust Mixing Unit. Blower and Three Horsepower Air-cooled Engine

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- * Hardy Spray Company, Portland. "Dry Fog" duster with 3 hp engine was used on the 25-foot duster described here.
 - * John Bean Mfg. Co., Portland, No. 4 duster will handle up to 35 feet of width.

The blower must supply 650 cubic feet of air per minute against a total static pressure of 4 inches of water. The pressure in the distribution pipes must not be less than 3.5 inches of water. In securing a fan for longer or shorter dusting booms, 26 cubic feet of air per minute against a static pressure of 4 inches of water should be supplied for each foot of swath that the machine is designed to cover.

An angle iron body frame is constructed as indicated in the upper left-hand corner of Plan Sheet 1. It must be mounted so that the pipe booms protrude in line with the rear axle of the vehicle. The body frame must be braced to the bed of the vehicle where the wing frame is bolted to the body frame.

The dusting unit may be placed in any convenient location on the bed of the vehicle. One consideration is to keep the amount of flexible tubing to a minimum. The length of the flexible tubing to the various dusting units should be kept approximately equal to keep the static pressure in the dusting tubes uniform.

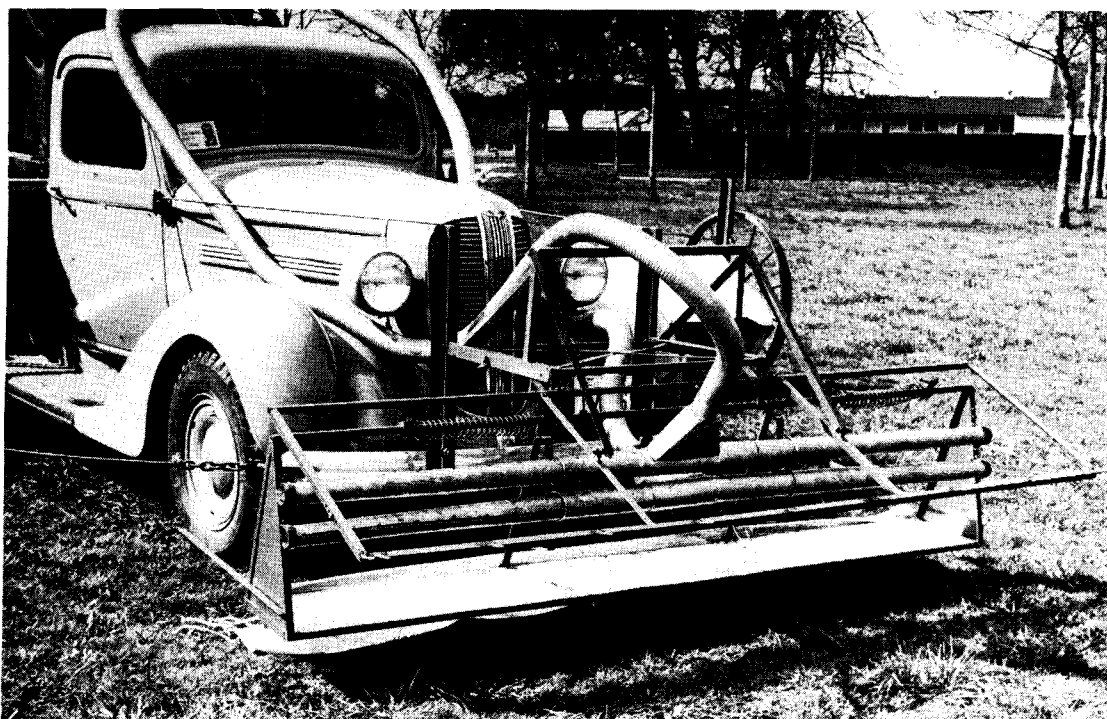


Side Wing Dusting Unit with Trailing canvas and Canvas Back Removed.

The wing frames which carry the dusting units are held forward with a 5/16-inch cable between the end of the frame and an attachment point on the forward end of the vehicle. A 5/16-inch cable is used between the rear end of the truck bed and the wing frame to keep the lead cable taut and to prevent sudden strains on the junction between the wing frame and the body frame. Turnbuckles may be used to tighten the cables.

The dusting chambers can be raised or lowered to any desired position. For any particular setting, a 42-inch wheel on the outer end of the wing frame maintains the blade of the duster at a constant distance above the ground. (See Sheet 1, wing frame details.) The adjustment of the wing frame is necessary in order to have the blade of the dust chamber at the proper height for crop in various stages of growth.

The location of the dust-distributing tubes in the dust chamber can be varied so that the bottom manifold is either 8, 9, or 10 inches above the blade. This adjustment is shown in Section A, Plan Sheet 1. Results with a small experimental duster having this hood design indicate that the blade of the dusting chamber should strike the top 10 to 12 inches of the plants. For plants under 12 inches tall, the blade of the dusting chamber should be operated as close to the ground as possible. This will be about 4 inches above the ground level. The dusting chamber height should be adjusted to the shortest plants, since they are the ones which have the heaviest aphid infestation and would otherwise be passed over and affected least. The adjustment for aphid or weevil control is the same, because a thorough dusting is important in either case.



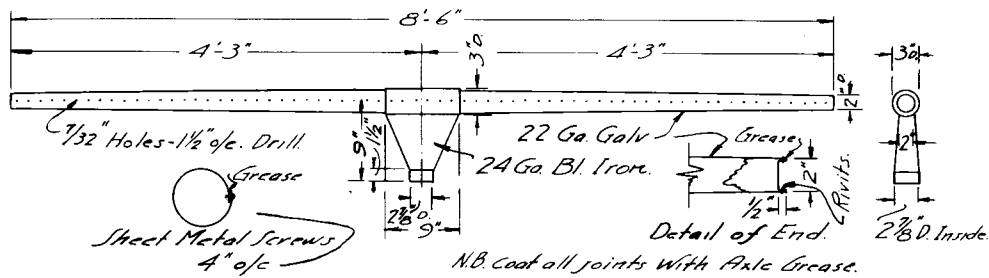
Front End Dusting Unit with Canvas Removed.

To avoid damage by striking hidden objects during dusting operations, the dusting chamber is constructed so that it can swing back when struck with sufficient force. For normal operations, the dusting chambers are held in position with suitable weights bolted to angle iron lever arms 21 inches long. These arms extend backward from the dusting chamber and are fastened to the ends of the dusting chamber as close to the bottom as possible.

Two 42-inch wheels are required, one on the outer end of each wing frame. The wheels may be Hardie Manufacturing Company, Estate Sprayer wheels, 42 inches in diameter, 1 11/16-inch bore, plain bearing, 3 inches by 1/4-inch rolled rim, Catalog Number 325A34, or equivalent.

Eight-ounce canvas is used to form a back for the dusting chambers. The canvas is attached to the back of the dusting chamber blade with screws, and fastened to the supporting rod at the top with 1/4-inch sash cord. Number 2 grommets are spaced at 6-inch intervals along the top of this canvas.

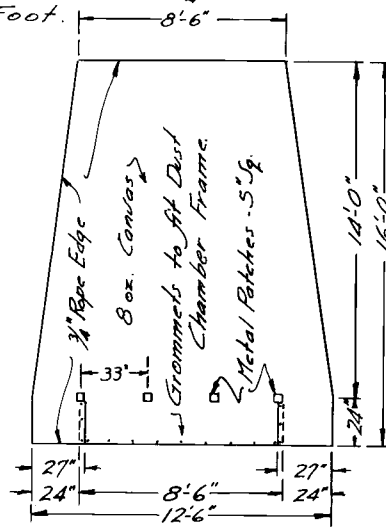
A diagram of the trailing apron used on the wings is shown on Plan Sheet 2. The front apron is made in the same manner; however, it should be short enough to clear the front wheels at least 6 inches. The sides and ends of the trailing apron should be weighted with 3/4-inch rope or its equivalent.



N.B. Coat all joints with Axle Grease.

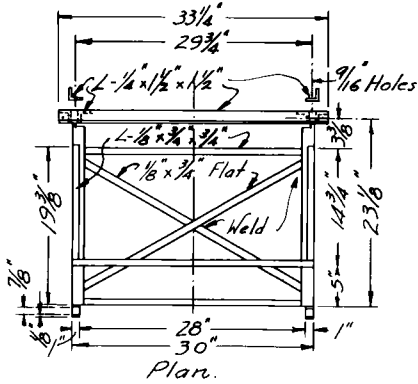
Dust Manifold

4 Req'd as Shown - 2 Req'd 8'-0" Lg.
 Scale - 1/2" = 1 Foot.

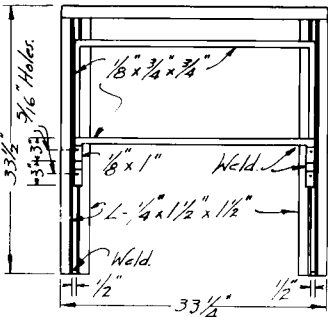


Canvas Wing Cover

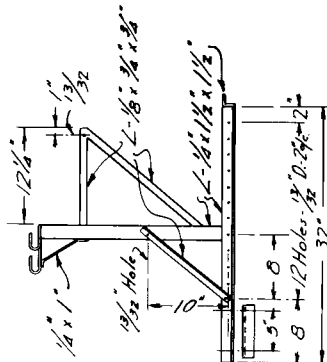
2 Req'd.
 Scale - 1/8" = 1 Foot.



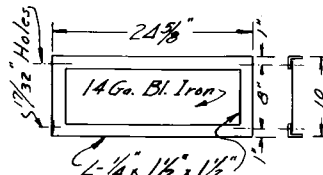
Plan.



Elevation

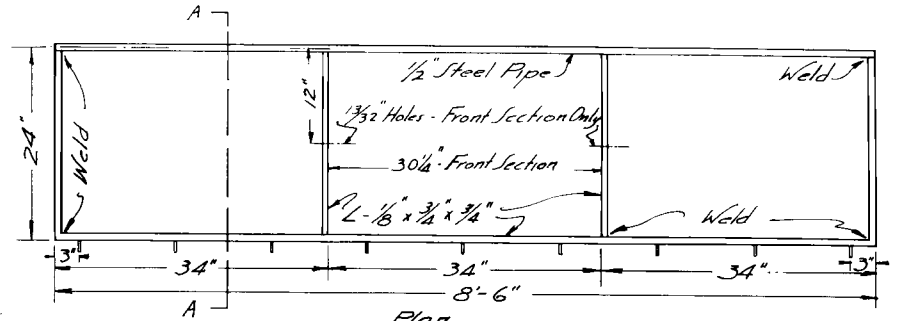


End View



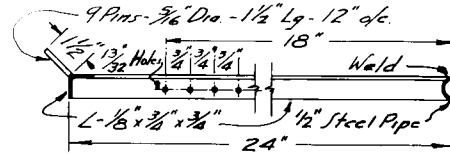
Body Frame Brace

2 Req'd.
 Scale - 1/2" = 1 Foot.



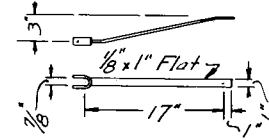
Plan

Scale - 1/2" = 1 Foot.



Section AA

Scale - 1/2" = 1 Foot.

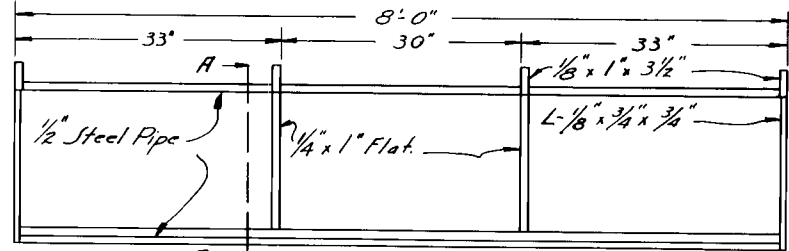


Dust Cover Adjusting Bar

2 Req'd.
 Scale - 1/2" = 1 Foot.

Dust Cover Frame For Wings

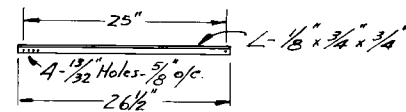
2 Req'd as Shown - 1 Req'd - 8'-0" Lg.



N.B. See Sheet 1 for Section A.A.

Front Dust Chamber

1 Req'd.
 Scale - 1/2" = 1 Foot.



Dust Cover Adjusting Bar - For Front Section

2 Req'd.
 Scale - 1/2" = 1 Foot.

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