

The Construction of Equipment for Hilling-up and Taking-out Soil Around Grafted Grapevines¹

by

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Introduction

Grapevine tissues may become severely injured by low winter temperatures. This is problematic in a temperate climate, such as Michigan, when a grower attempts to grow a relatively cold-tender grape variety. One method of avoiding such injury is to protect vine tissues with the insulating quality of soil, which may raise the over wintering winter minimum temperature by as much as 30 degrees F compared to the ambient air temperature at 60" above ground. Over the years several pieces of equipment have been utilized to mound soil around grapevines in the fall and remove it in the spring. Often these efforts are made to protect scion tissues just above the graft union of grafted vines. Less often the soil is mounded under the trellis to protect the fruitfulness of canes that have been placed on or near the ground in an effort to preserve fruiting potential for the following growing season. We have endeavored over a period of several years to develop specialized equipment that will facilitate both the hilling-up and taking-out of mounds of soil under the trellis. This publication is intended to assist those who would like to construct equipment of a design similar to that developed by our efforts.

Hilling-up Equipment

Hilling or ridging of soil under the trellis was routinely performed by growers a half-century or more ago as a means of vineyard floor management to control weeds under the trellis and perhaps to channel soil surface water flow to reduce soil erosion on hillside vineyards. Specialized take-out and hilling-up blades were used to move soil in and out from around vines in the fall and spring, respectively. Mechanized versions of these blades have been commercially available for several decades. Our efforts at hilling-up of soil have concentrated on the concept of using several plow blades rather than one so that soil could be gathered from a wider but shallower pattern than when using a single blade. The rationale has been to minimize the erosion potential during the winter after the hilling has taken place by reducing the depth of the plow furrow. By reducing the depth of plowing we presume that it also reduces the hazard of root pruning of vines. To accomplish this wider, shallower plow pattern, we have used three disc plows with the lead plow feeding the second, and the second in turn, feeding the third, and the third plow actually creating the ridge of soil under the trellis (Fig. 1). The practical concerns about building a unit of this type are that it must be durable and the torque created by this plowing action tends to steer the front of the tractor into the trellis area. Regarding durability, we constructed a heavy-

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duty frame on which we mounted these three disc plows. We have provided a schematic top view to show the dimensions of that framework (Fig. 2). We've also provided a schematic to show a three-dimensional view of this unit (Fig. 3). On this drawing you can see both a guide coulter and an adjustable depth wheel. The coulter helps to reduce the torque created during plowing and the depth wheel gives better control of the overall pattern of plowing. We also added a counter-weight bracket and an adjustable storage leg for this unit when it is not being used. The disc plows themselves were mounted with a very heavy duty set of John Deere disc bearing clamps. A listing of the components of this unit and their John Deere part numbers is provided (Fig. 4). To ensure the smooth operation of each disc plow it is mounted on a rod with a bearing (Fig. 5).

We do not have cost information for the parts involved with fabricating this unit. However, it is a reasonably-costly unit to construct. One grower has taken this design and fabricated a very similar unit using less costly components (Fig. 6) and (Fig. 7).

Take-out Equipment

After investigating several variations of take-out equipment, we have concluded that the commercially available Weed Badger unit has several desirable features for removing the ridge of soil along a row of grapevines. The basic function of the unit and its ability to sense and move around grapevine trunks and trellis posts worked well in our efforts. However, we found it necessary to modify this commercial unit in two ways so that it would perform to our satisfaction. First, the hydraulics of this unit, as we originally used it without modification, were not capable of maintaining a constant rotation of the hydraulic motor in the head of the unit when we were using it to remove the bulk of the soil volume from under the trellis. The unit would begin to lag and slow rotation, when part of the hydraulic capacity of the unit was needed to perform movement functions of the arm. Therefore, we dedicated the hydraulics of the Weed Badger unit to the rotation of the hydraulic motor in the head of the unit. The hydraulics of the tractor were used to perform the movement functions. In this way, we have been able to maintain a constant rotation of the take-out head even in relatively large volumes of heavy soils.

To accomplish take-out of soil from around vines and trellis with this Weed Badger unit, we constructed two custom implements. The first of these was a paddle wheel. The strategy used with this paddle wheel was to undercut the ridge of soil so that soil above the rotating blades of this paddle would then fall down into the paddles and also be removed. A picture and the dimensions of this paddle wheel can be found at (Fig. 8). After this paddle wheel has performed its operation on both sides of the trellis row, mounds of soil will remain around vines and trellis posts (Fig. 9). To complete the task of taking out the soil, a second implement was constructed consisting of 32" diameter brushes (Fig. 10). Typically, two 1" thick brushes are sandwiched between two 10" diameter metal plates. Brushing just below the graft unions of grafted vines (Fig. 11), on both sides of the trellis, results in a 100% mechanical removal of the mound of soil (Fig.12).

We hope this information is helpful to those who have a need to protect portions of their grapevines from injury caused by low winter temperatures.

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Fig. 1

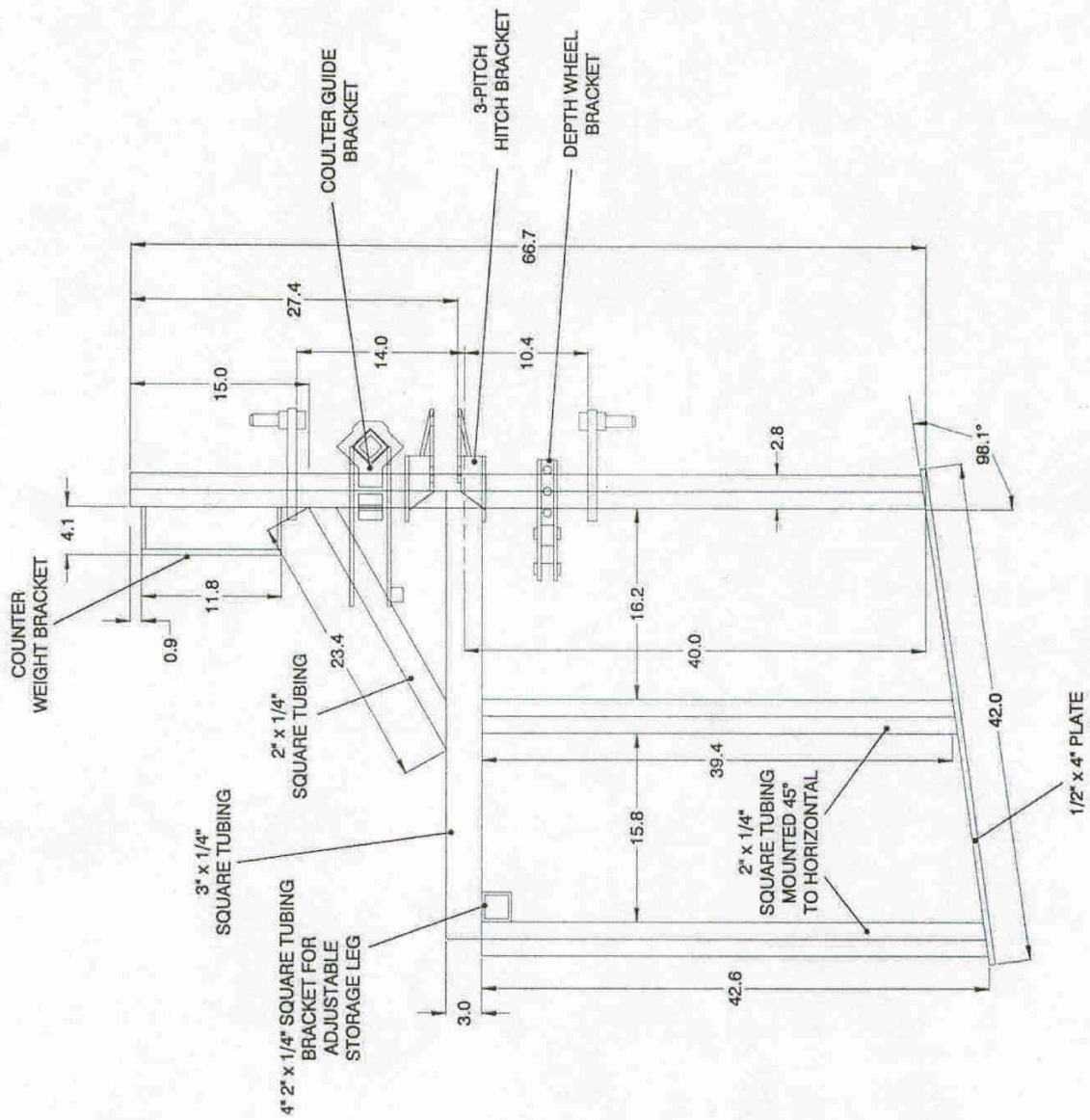


Fig. 2

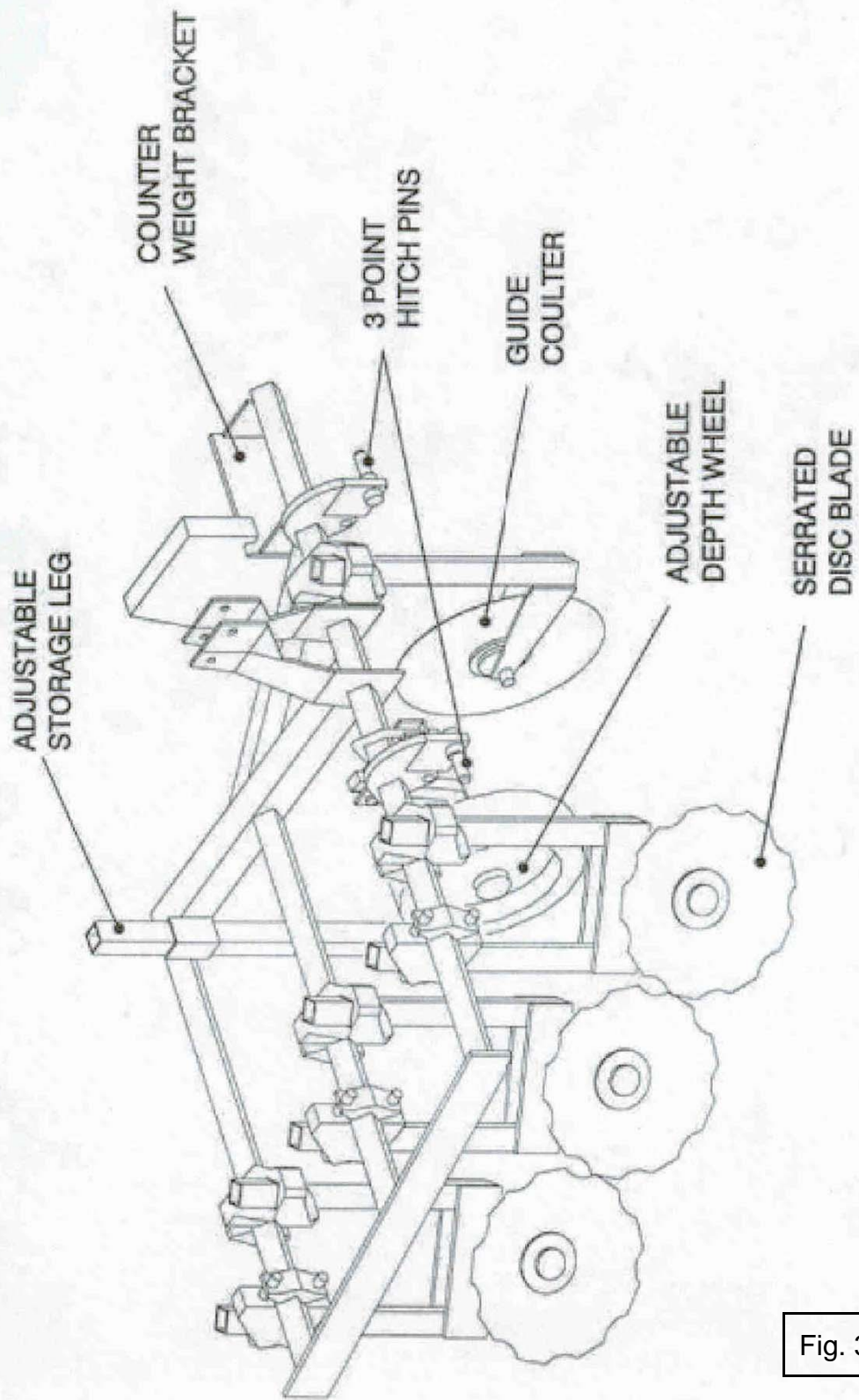


Fig. 3

DESCRIPTION	QUANTITY	J.D. PART NUMBER
Tool bar clamp inner	7	K37200
Tool bar clamp outer	7	K35708
Tool bar clamp bolts	14	K35688
Tool bar (with 3 pt. hitch) 84"	1	AN180269
Coulter bracket	1	AN131843
Coulter hub	1	AN212394
Coulter blade (18")	1	N130051
Gauge wheel hub	1	AA20702
Gauge wheel cap	1	C2213E
Gauge wheel tire (16")	1	C1231N
Gauge wheel halves	2	C1232N
Gauge wheel spindle	1	B14262
Disc bearings	6	A20175
Disc bearing clamp inner	6	E50822
Disc bearing clamp outer	6	AE31317
Inner spool	3	A20621D
Outer spool	3	A20622
18" Serrated disc blade	3	B31342

Fig. 4

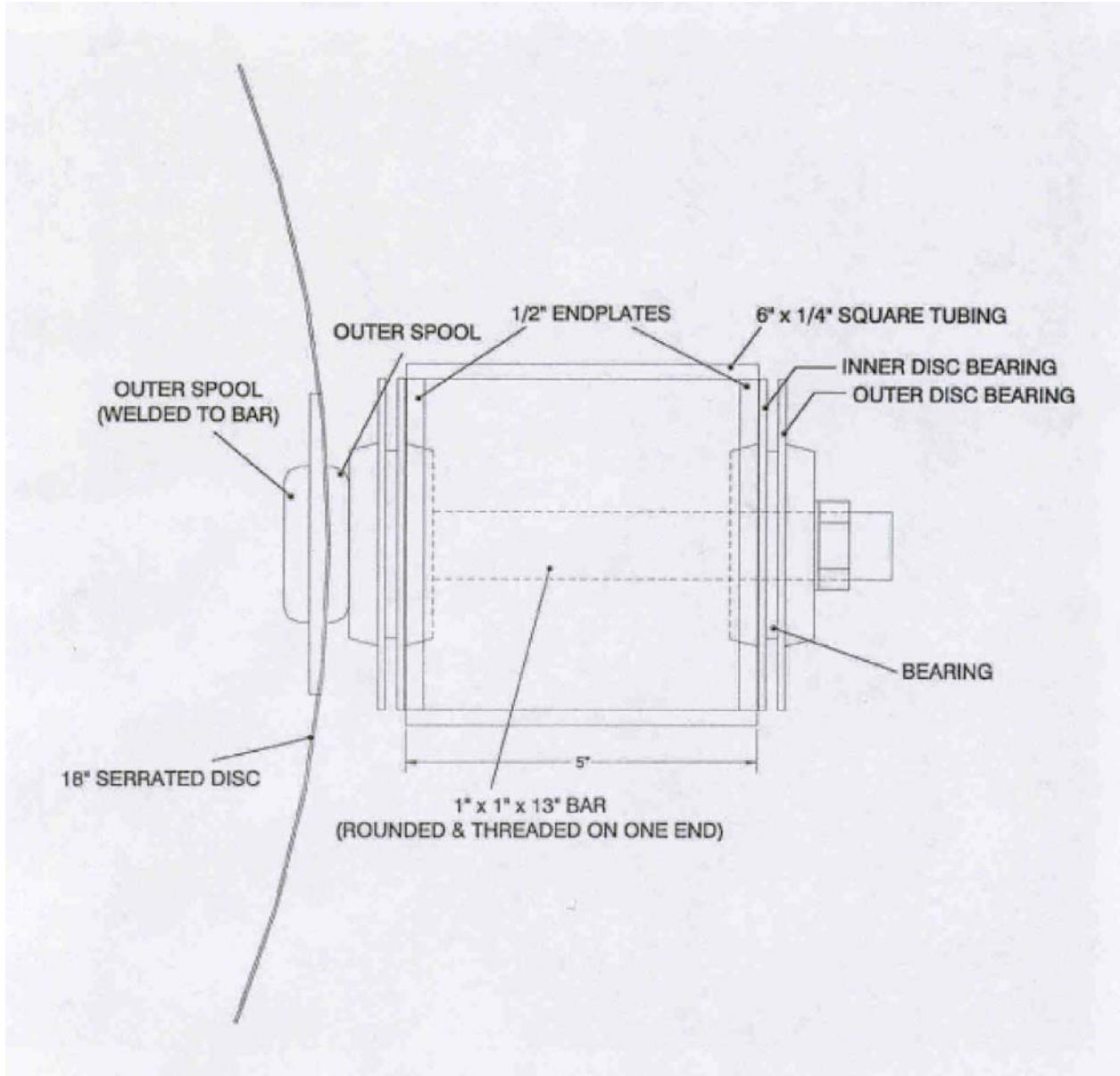


Fig. 5



Fig. 6



Fig. 7



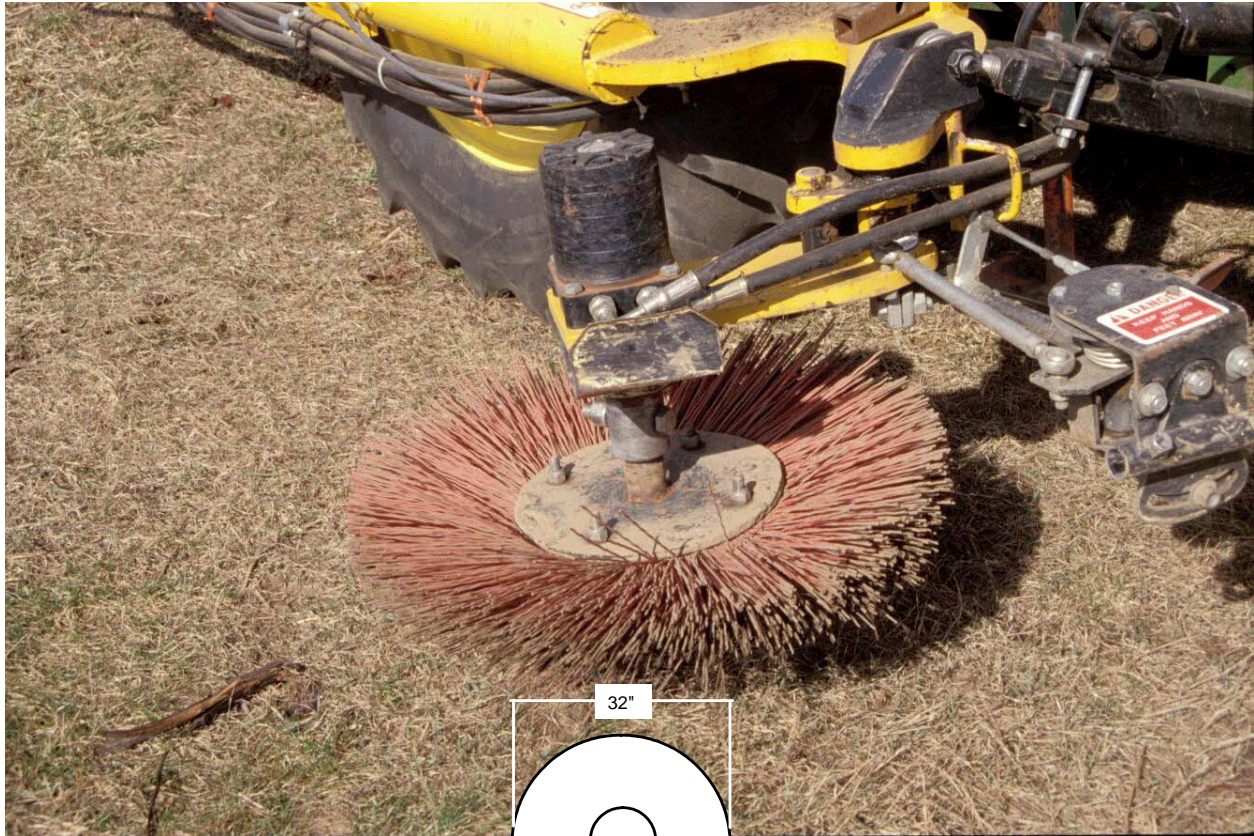
Overall diameter = 19 1/2"
Height of a paddle = 4"

Number of paddles = 8
Thickness of metal for paddle = 3/8"

Fig. 8



Fig. 9



Diameter of brushes = 32"

Brush disc segments = 2

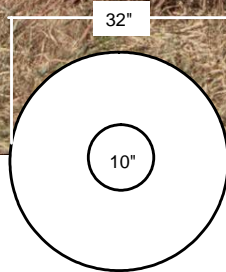


Fig. 10



Fig. 11



Fig. 12