Safety Modifications for Operations and Transportation of the Rangeland Drill

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Abstract

The drill-arm assemblies of rangeland drills modified to make furrows are difficult and dangerous for one person to raise and secure. A simple modification for safe lifting of these drill arms is described. For transporting rangeland drills on equipment trailers, loading ramps, wheel chocks, and tie-downs were developed and tested. All of these modifications make the use of rangeland drills safer and easier.

The operation of a rangeland drill is an important part of the success or failure of any seeding job. The rangeland drill is a well-engineered, time-tested piece of equipment (Anon. 1970). The addition of modified arms to the rangeland drill increases the versatility of this implement (Asher and Eckert 1973). In the operation of any piece of heavy equipment, safety is of prime importance. Our purpose in this technical note is to report on simple modifications for the rangeland drill that enable it to be operated and transported more safely.

Lifting Drill-arm Assembly

The standard drill-arm assembly can be lifted by one person, if care is taken. The modified drill-arm assembly weighs about 160 lb (73 kg) with weights removed. This assembly is very difficult for one person to lift because the chain that secures the drill arm must be drawn through the slotted keeper as the arm is being lifted. There is danger of (a) back strain; (b) hand injury, if the arm slips while the chain is being taken up; and (c) loss of a foot, if the arm assembly drops. Lowering the arm is equally dangerous.

To alleviate this safety problem, we tried raising and lowering the arms with a heavy-duty axle jack. This technique proved unsatisfactory because of difficulty in maintaining jack contact on the back of the arm as it rose in an arc as the arm swung up and out. Besides being dangerous because of the slipping, this procedure was slow, and operator acceptance was poor.

We devised a simple method by which one person can safely lift the drill-arm assembly with a cable ratchet hoist. A 9-inch (23-cm) angle-iron post and a loop of 0.5-inch-diameter (12-mm) rod were welded above each arm assembly (Fig. 1); the post was welded to the drill frame. A corresponding loop was welded to the drill arm. The post was made so that its length equalled the minimum length of the cable ratchet hoist when the arm was completely raised. The minimum length of the hoist we used was 20 inches (51 cm). For hoists with a longer minimum length, the height of the post would have to be raised accordingly.

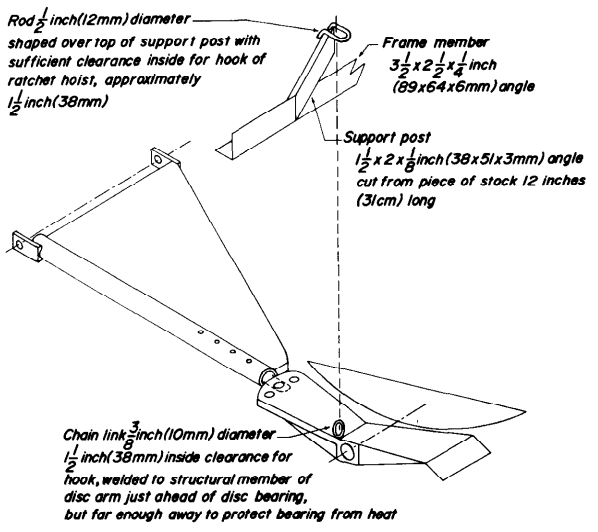

Fig. 1. *Pictorial sketch of certain elements of rangeland drill, showing position of one set of modification parts for lifting drill-arm assembly.*

One person can easily operate the hoist lever-arm to lift the drill-arm assembly while standing clear of the arc of travel of the disc. Even in the unlikely event of ratchet-hoist or welding failure, the operator would not be exposed to the falling arm. The capacity of commercially available hoists ranges from 1 to 2.5 tons, far more than the weight of the arms. The commercially available ratcheted cable hoist we used can be reversed for lowering.

The cost of materials for the modification is about $16.00 per drill-arm assembly. The welding should be attempted only by an expert, whose skill is required to insure that the welds can withstand the load and to avoid damage to the assembly during the welding.

While the rangeland drill is being used for seeding, the bolt securing the disc vertical adjustment can loosen and shear, allowing the disc to twist over flat to the ground. The operator, usually along, must get the disc up off the ground before resuming work or even returning to a farm shop. The ratchet hoist is small enough to be carried handily on the rangeland drill during seeding. With the hoist it is easy for the operator to lift and secure the disc. It is also much easier to reestablish the vertical adjustment if the disc-arm assembly is suspended where it can be rotated.

Ramps for Loading Drill on Equipment Trailer

For transporting the rangeland drill relatively short distances on highways, an equipment trailer is often used. In the field it is necessary to construct ramps of planks and blocks so that the drill can be rolled up the side of the trailer. To avoid the time-consuming construction of ramps and transportation of the materials for them, we designed portable steel ramps with nonskid surfaces (Fig. 2).

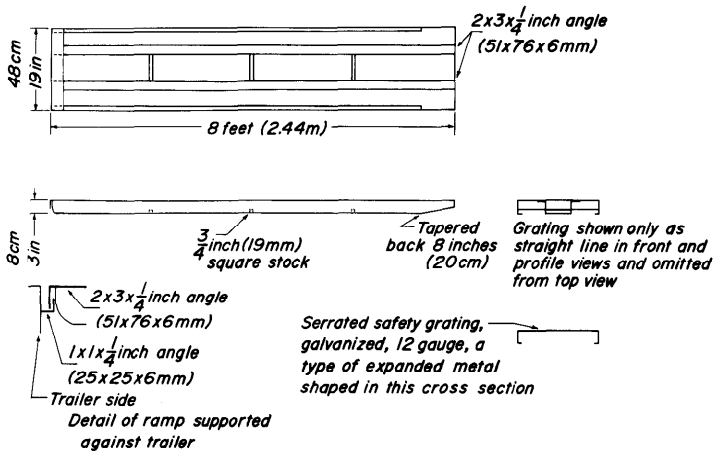

Fig. 2. *Ramps for loading rangeland drill.*

The ramps were constructed of serrated safety grating. For an equipment trailer with a deck 25 inches (64 cm) high, the ramps were 8 feet (2.44 m) long. For an extra margin of safety, the grating was reinforced with two pieces of 2-x 3-x 0.25-inch (51-x 76-x6-mm) angle iron. The ramps are attached to the trailer by resting them on lips of 1-x 1- x 0.25-inch (25- x-25- 6-mm) angle iron, welded to the trailer

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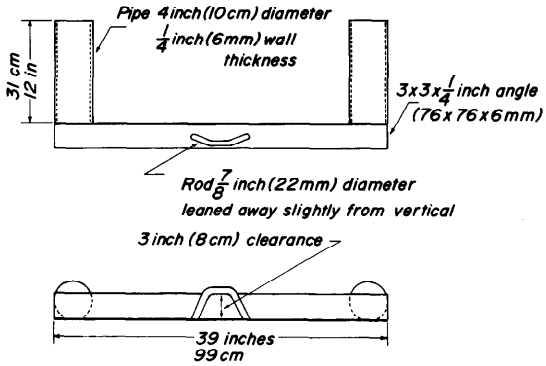

Fig. 3. *Wheel chocks for securing rangeland drill.*

frame. One of the attachment lips on the trailer is fixed and the other is adjustable, so both the half- and full-sized rangeland drills can be loaded with the same ramps.

These 19-inch-wide (48-cm) ramps with nonskid surfaces make it easy to back the drill onto the trailer. They weight 133 lb (60 kg) each and must be handled by two persons, but this is not a problem because the drill should never be loaded without two people being present. Cost of the two ramps is about $232.00 for materials and $96.00 for fabrication. These ramps are suitable for low trailers only. For high trailers or trucks, a fixed dock or suitable lift truck or crane should be used for loading and unloading the rangeland drill.

Wheel Chocks

We have had difficulty in keeping the rangeland drill from shifting on the trailer bed during transportation on rough roads. Wooden chocks were used to block the wheels, but they had to be spiked to the trailer bed and often were lost in the field.

A simple set of wheel chocks was constructed from pipe 4 inches (10 cm) in diameter and angle iron 3 × 3 × 0.25-inches (76 × 76 × 6 mm) (Fig. 3). A loop on the outside of the chocks provides a means for chaining them down so they will not shift. This permits attachment without splitting the planking by repeated nailing. Although designed

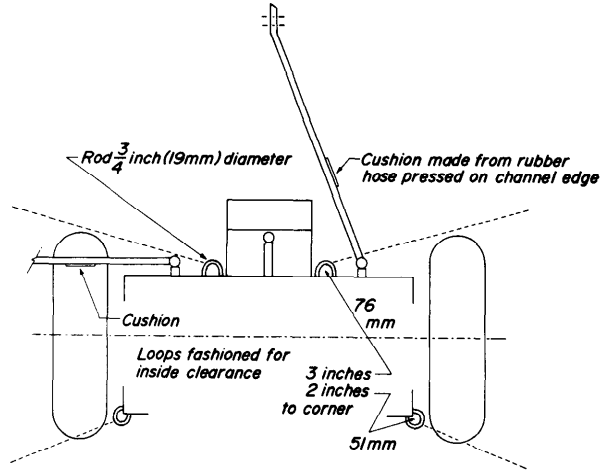

Fig. 4. *Schematic sketch of rangeland drill, showing tie-down loops positioned to secure implement on trailer with maximum front-to-back stability during transport. Drill rests sideways on trailer.*

for use in transporting the drill, the chocks are a good safety device for blocking the wheels when the drill is parked or being serviced.

Tie Downs

For convenience in securing the rangeland drill in transport, we have added to it four tie-down points (Fig. 4). These ties are constructed of 0.75-inch (19-mm) rod and welded to the frame. When they have been used with the previously described wheel chocks, transportation of the rangeland drill on an equipment trailer over rough roads has proven simple and safe.

Literature Cited

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