THE USE AND CONSTRUCTION

HOME MADE IMPLEMENTS

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Construction and Use of Home
Made Implements
For Summer Tillage

by

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This circular has been prepared to answer the ever increasing inquiries received regarding the construction and use of homemade tillage implements, designed for effective summer tillage. The breakdown of the continuous cropping system on the dry farms of Montana has created a timely although somewhat belated interest in summer tillage and intertilled crops. There is a demand and an urgent need for the dissemination of information with reference to the principles underlying successful summer tillage as well as some definite suggestions as to their application. The discussion presented regarding tillage practices is far from complete. Where the soil, climate and other factors vary to such an extent, it is difficult to make anything but rather general suggestions, leaving the details to the judgment and experience of the farmer himself.

The tillage requirements for the successful handling of summer fallowing, demanded the use of implements designed especially for the work. While the disk and the spike tooth harrows have their place, their use in summer tillage is often open to considerable objection from the standpoints of effective weed eradication and the control of soil blowing. Implement manufacturers are meeting the
demands for a specialized implement with machines of merit. It is now possible to purchase a make of machine to suit almost any condition if the money is available. There is no doubt that eventually they will be quite generally used. However, the dry farmers are at present hard pressed financially and in many instances the purchase of very much machinery is out of the question. For the man of small means or limited acreage, a homemade implement may be utilized at least temporarily. This circular presents a description of a few of the types of such machines which can be constructed in the farm shop or by the local blacksmith at a nominal cost.

Some Principles:—The successful dry farmer must keep the purposes for which he is cultivating definitely in mind, while choosing or using any particular implement. The blind following of rules has no place on the dry farm. The problem may be considered from any or all of the four angles:

1. Seed bed preparation.
2. Moisture conservation.
3. Weed eradication.
4. Soil blowing control.

Seed Bed Preparation:—While an ideal seed bed is not always attainable it is well to keep in mind what would constitute a reasonably good seed bed. There is ample opportunity for the capitalization of good judgment in its preparation. For small grains, it is important that there be provided proper conditions for germination of the seed and subsequent growth, before seeding, because very little can be done to correct a poor seed bed thereafter. This is not as important with intertilled crops like corn or potatoes for with them subsequent cultivation is possible. Even then the substitution of cultivation for seed bed preparation is generally poor economy. While other considerations like soil blowing may modify the kind of seed bed desirable, it is generally agreed that the ideal condition is a firm and mellow soil, which is crumby. The connection between the plowed layer and the subsoil should be close. Air spaces should be reduced to a minimum. The soil should be as free as possible from weed seeds. In any event, the grain should be given an equal chance by the killing of all weed growth immediately before seeding. Moisture should be available for ger-
mination at the best seeding depth and this condition should continue into the subsoil.

**Moisture Conservation**—It is important that as much of the precipitation be absorbed by the soil as is possible. The reduction of losses by "runoff" is essential. The so-called "dust mulch" is not generally efficient in this respect, especially on the heavier clay soils. A rigid, slightly lumpy surface will tend to hold the moisture sufficiently to allow the subsurface to absorb it, while a finely pulverized surface is apt to "puddle" and become almost waterproof.

Aside from the use of moisture by growing crops and weeds, we are concerned with the direct losses from the surface of the soil itself. The farmer probably overestimates the losses from the subsurface through direct evaporation. There is no question that a soil mulch does aid in preventing losses of water but ordinarily cultivation for the sole and only purpose of maintaining a mulch, dissipates as much moisture as is saved. (This statement applies to average dry land conditions.) An exception to this must be made on heavy soils which upon drying are apt to check badly. On our gumbo lands, deep cracks are invariably the rule as the soil dries. The inevitable losses of moisture through circulation of air within these cracks, should be controlled by cultivation. Ordinarily, however, it has been found that under dry land conditions, where there is an absence of free water table within a reasonable depth, the control of weeds is a more important function of cultivation than the maintenance of a mulch.

**Weed Control**—The greatest losses of soil moisture are due to growing vegetation and it is therefore evident that the elimination of weeds, the prime dissipators of soil moisture, should be of first importance. The time to kill weeds is when they are young and tender. A stitch in time saves nine in weed control. The job should also be thorough. It is important that implements be used that do not allow the weeds to slip or escape destruction in any other way. Shallow cultivation is generally recommended. Stirring the soil deeply causes direct losses of soil moisture without any advantage in weed control in spite of the fact that the draft of the implement is increased. Some of the special machines are a big improvement over the ordinary implements used.

**Soil Blowing**—Some methods are out of the question on light soils that are apt to blow. As the organic matter in our soils be-
comes exhausted, more trouble along this line may be expected. Ordinarily it is deemed best to cover stubble, straw and trash, but on soils apt to blow, the trash and lumps should be brought to the surface. Many of the newer types of tillage implements tend to sift the fine soil below the clod mulch so desirable on top. Ridging the soil at right angles to the prevailing winds is also an aid in keeping the surface soil in place. To obtain the clod surface, it is necessary to use the proper machine when the soil is moist. Working the soil while dry has a pulverizing effect. Implements vary in this regard, however. Some types will pulverize very little as they do not disturb the top soil to any marked degree.

Bearing these principles in mind, we are ready to look over the available machines. It is not our aim to make any specific recommendations, for the final choice will depend on local conditions and individual preference.

**TYPES OF COMMERCIAL MACHINES**

Machines having a place in the proper handling of summer tilled land may be classified into the following types:

1. Spike tooth harrow.
2. Spring tooth harrow.
3. Disk harrow.
4. Acme weeders.
5. Rod weeder.
8. Duckfoot cultivators.
9. Combinations of above.

**The Sled Knife Weeder or “Slicker:**—The principles of this weeder, (Fig. 1), is to have a broad, flat blade sharpened on one edge to be pulled through the soil at the proper depth to cut off and kill the weeds. The knife weeders are used on the heavier and medium soils. They work well when the weeds and trash are well turned in plowing, but clog badly when they are not well covered, and bother by clogging up with roots. The depth of the blade is from two to four inches. The runners (a) are made of two-inch by 10-inch material, four feet long. The platform (b) is made of two-inch by eight-inch or two-inch by ten-inch material. Half-inch by six-inch inch by eighteen-inch bolts are used to secure the cutting blade to
The Sled Knife Weeder.

The runners. A piece of three-quarter-inch gas pipe, (c) two inches to four inches long is used between the blade and the runners. The cutter bar graces, (f) are made of three-eighths-inch by one and one-half-inch bars. For depths of cut to three inches it may not be necessary to use the braces indicated. The runners, (e) on top are made of two-inch by four-inch or two-inch by six-inch lumber and are used for transporting the weeder. The length of the weeder is eight feet. The blade can be made of three-eighths-inch by two and three-quarters-inch or one-half-inch by three-inch steel.

The "Gooseneck "Slicker."—This weeder (Fig. 2), uses the same principle of weed eradication as the sled weeder, but is an improved form. It is adaptable to the same types of soil, and has the same objections as the sled weeder. The driver rides on the tailboard, (b) and by shifting his position the depth of cut is regulated. The hitch is made to the heavy beam.

To make this weeder will require a blacksmith or farm shop. The goosenecks, (c) and the runners, (e) are all attached to the large
beam, (a) to which the hitch is also attached. Some difficulty may be experienced in getting the proper slant and curvature of the goose neck. A beam of six-inch by eight-inch material will usually be sufficiently strong. When the knife clogs, the team is stopped, and the knife is raised out of the ground sufficiently to clean the knife by lifting up on the tailboard.

The Rod Weeder:—Knife weeders are troublesome in getting clogged up with roots and trash and to partly overcome this difficulty, a rod may be used as a cutting edge, and if the rod is made to rotate, the cleaning will be positive. The pressure coming onto the rod cleans the weeds and roots off as it passed through the soil. The rod weeder cuts off the weeds without pulverizing the surface. More power is usually needed, however, to operate the rod type compared with the knife weeder. This weeder should not be used in wet soil. The best time for its use is when the surface soil is dry to a depth of a few inches and requires cultivation. The ordinary cultivator or disk would pulverize the surface too much, while the rod weeder will kill the weeds without forming a dust mulch, tending rather to sift the clods to the surface.

The frame, (a) (Fig. 3), is made of two-inch by eight-inch pieces of lumber, eight feet long. The rod, (j) is made of five-eighths-inch
to one-inch tool steel and is fastened to the frame by the arms, (i) made of iron about half-inch by two and one-half-inch and eighteen inches or twenty inches long, which are bolted between the frame parts, (a). The braces, (h) may be made of the same material. Two-inch by six-inch material is used for the part, (b) of the frame. These are six feet long, extending back and serving as runners when the weeder is being used. The runners, (g) are made of four-inch by four-inch material two and one-half feet long. These are used for transporting the weeder when not in use by tipping up the back end. The brace, (d) is two-inch by six-inch and twenty-eight inches long. (C) is the seat board, two-inch by six-inch, and six feet long. The position of the seat can be adjusted to suit the conditions. (F) is two inch by six-inch and two feet long, used to support the seat board, and is fastened to (e), which is two-inch by four-inch material and sixteen inches long, fastened one foot from the end of the runners, (b).

The Double Rod Weeder:—In Figure 4, is shown the rear view of a double rod weeder, twelve feet long. The purpose of the extra rod is for cleaning. The driver usually rides near the rear of the tailboard and the rear rod is in the ground. When the rod becomes clogged he will move forward and dump it by raising the rear rod out of the ground and at the same time forcing the front rod into the ground. This shifting can be done quickly and the implement cleaned without stopping or skipping.

![Double Rod Weeder Diagram]

4. Double Rod Weeder

The runners are made of two-inch by twelve-inch material, four feet long. The frame to which the runners are bolted is made of two-inch by ten-inch lumber. The rods are attached to the frame through iron bars which are bolted to the runners. No skids are shown on top of the weeder for use in transporting, but these can be provided the same as for the sled knife weeder, (Fig. 1).
Power Required:—The power needed for these weeder will vary greatly with the nature and condition of the soil and with the condition of the weeder if of the knife type. The cutting edges of the knives should always be kept sharp so as to reduce draft and increase their effectiveness. For average conditions it may be stated that for the homemade weeder described in this circular, one horse will be able to pull about two feet of length if of the rod type and three feet if of the knife type. Thus, the eight-foot knife weeder will require two or three horses, the eight-foot rod weeder four, and the twelve-foot rod weeder, six horses.