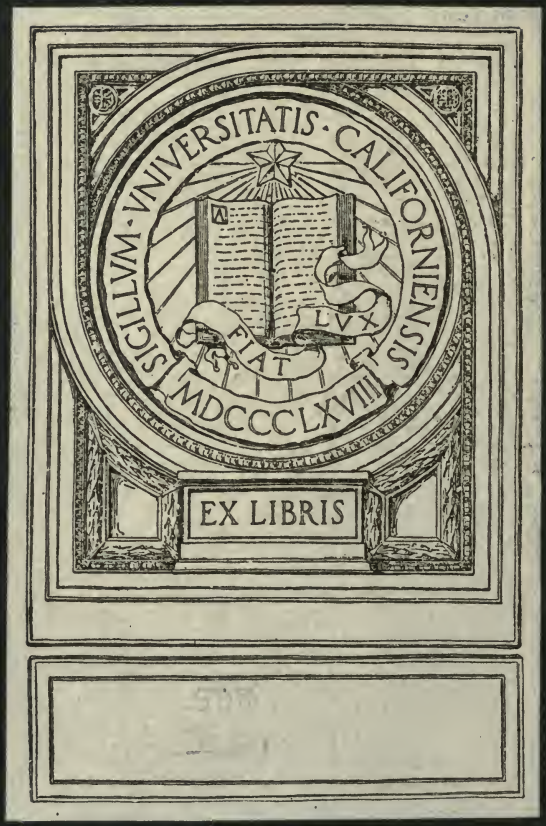
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The DISK HARROW

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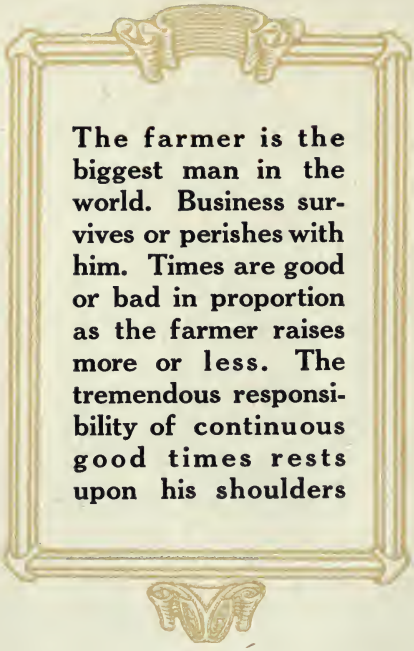
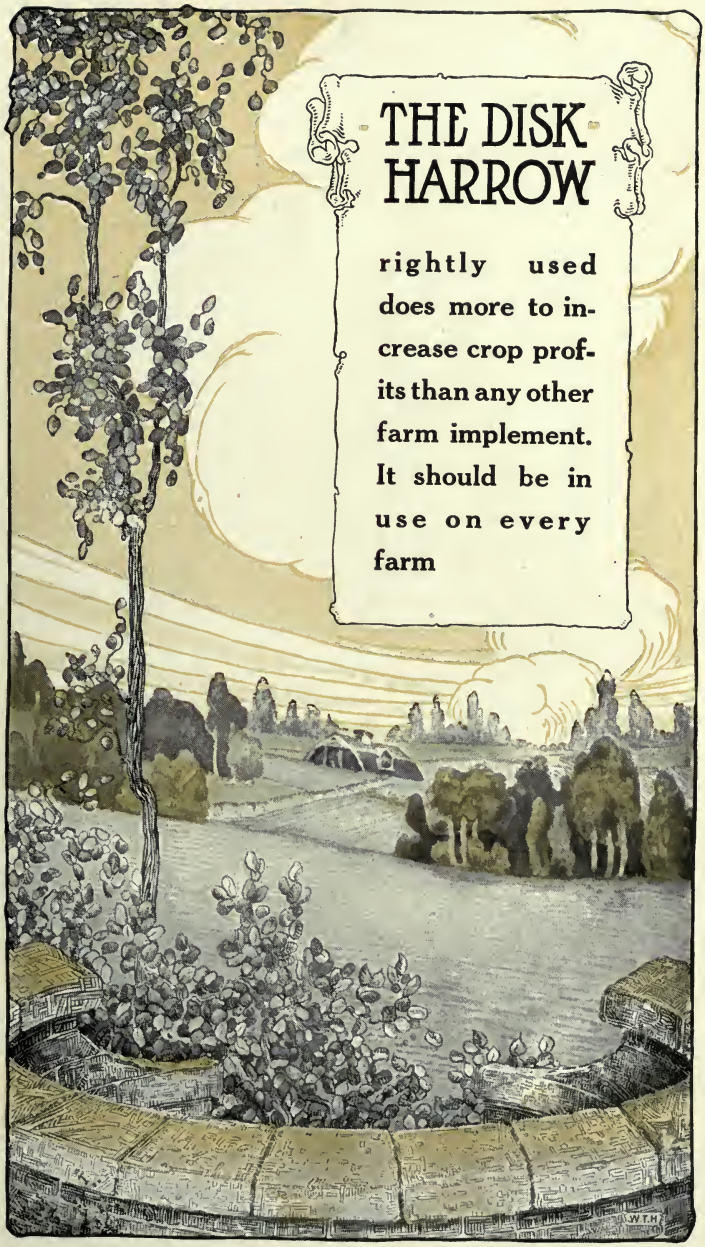

The farmer is the biggest man in the world. Business survives or perishes with him. Times are good or bad in proportion as the farmer raises more or less. The tremendous responsibility of continuous good times rests upon his shoulders


THE DISK HARROW
rightly used does more to increase crop profits than any other farm implement. It should be in use on every farm

INTRODUCTORY

This edition of "The Disk Harrow" is presented to its readers with the hope that its contents will be thoroughly digested, and that part assimilated which will be of special value to each individual reader.

The contributors are situated in different parts of the country. Their statements prove that while the soil conditions are different in each locality, yet the principle underlying the preparation of the seed bed is one and the same all over the universe. It is simply a matter of understanding the fundamental principle and then applying this knowledge to local conditions.

Each contributor is a man of wide experience in the field of agronomy. He has also made special study of the use of the disk harrow in the locality where he is situated. Several of them are fully acquainted with conditions in many different states. For this reason farmers can feel assured that these men have a message of value to them

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The Disk Harrow

By F. B. Linfield

Superintendent of Montana Agricultural Experiment Station

There are some farm implements for the cultivation of the soil which seem almost indispensable on the farms of this Western country. They are the plow, the disk harrow, and the drag harrow. With these tools alone, practically all the farmers can prepare a good seed bed, and control the weeds. Their work may at times be supplemented to advantage by other tools, but these three cannot be replaced.

In our Western agriculture, next to the plow, the disk harrow is the most valuable tool employed on the farm. It is generally the first tool used after the plow, when it performs a two-fold work. First, it pulverizes the turned-over soil; and second, it in a measure packs the subsurface onto the subsoil, and makes a fine but firm seed bed.

The disk is nearly always lapped one-half, so as to leave the ground level. If the soil is quite loose, the disks are set at a slight angle, while if the ground is firm the disks are set at a wider angle so as to cut deeper.

We find that this double disking after the plow, leaves the soil in fine condition for the best action of the drag harrow in further pulverizing the surface soil.

In plowing sod in the dry bench lands in the Western country, a heavy corrugated roller or packer puts the sod down firmly on the subsoil, but if such tools are not available the disk makes a very good substitute. If set so as not to cut too deep, the disk is the best tool we have found to make a good seed bed on this sod.

In the irrigated districts, we do all the plowing we can in the fall. This leaves the soil in good condition to take up the

Disking stubble behind the binder

winter's moisture, and also permits us to get such land cultivated and seeded early in the spring, which is very important if the largest crop yield is to be had. On such fall-plowed land, the disk harrow is generally the first tool used. Set at an angle to cut a good depth, double by lapping the disk half, and the first step in the preparation of the seed bed is well done.

In our dry farm country, the practice is growing of disking the stubble land in the fall soon after the grain is cut. If there is any moisture in the ground this helps to hold it. It may also start weed seeds growing, which are later killed by turning under with the plow. The same practice is sometimes followed in the spring to kill the early growing weeds, and to hold the moisture until the land is plowed.

In most of the dry farm districts the land is cropped only every second year, the resting year being used to prepare the land and store moisture for the next season's crop. Sometimes in the rainy season of May and June, weeds get a strong start on the fallow land. The disk is our best tool for cutting out these large weeds. There is, however, a caution to be given at this point. On fallowed or summer tilled land the disk should not be used, if the weeds can be conquered without it, as it cuts quite deep on our friable soil and makes a very deep soil mulch, thus wasting more of the soil moisture than is necessary. If the weeds get too strong, as sometimes happens, the disk must be used as the weeds will take more moisture out of ground than would the deep tillage. If possible, however, the weeds should be controlled by shallow tillage.

In old alfalfa fields, if the stand is not as thick as desired, nothing better can be done to renovate such fields than to thoroughly disk them in the spring of the year. On irrigated ground, a thorough disking of the alfalfa fields every two or three years is good practice, and will generally improve the quantity and quality of the hay. Weeds will be destroyed, and I have yet to meet the person who has any complaints to make as a result of disking his alfalfa. Remember, however,

this disking must be done in the spring, just as the plant is beginning to grow, not in the fall.

On dry farms I would advise the disking of the alfalfa in the spring, and after the first crop is cut each year. Such disking pulverizes the surface soil, which thus acts as a mulch to preserve the moisture.

Out in this Western country, and particularly on the dry bench farms, we find hired help very expensive, so our practice is to use a four or six-horse disk. This is a factor in economic production, and we find the wide disks do just as good work as the narrower ones. As on much of the soils some packing as well as a cutting effect is desired, we find that the best work is done with the 14-inch or 16-inch disk wheels.

Preparing Seed Bed with Disk Harrow

By L. B. Bassitt

Assistant Professor of Farm Mechanics, Minnesota Experiment Station

In discussing the use of the disk harrow, I have endeavored to give suggestions that if followed will give ideal conditions. It is expected that in following these suggestions, a person will so modify them as to fit his own conditions.

One of the chief reasons why better seed beds are not prepared and the disk harrow used more in their preparation, is the lack of time caused by the farming of too large an area. It is the same old fault—too much ground poorly tilled.

Preparing Land for Corn Crop

If the land has been fall plowed, it should be single disked just as soon as the land can be worked in the spring. For this work, set the disk with slant enough to stir the ground to a depth of two inches. This should be followed immediately with a slant tooth harrow crossing the disk furrows; harrow again after every heavy rain until just before planting time, then double disk with disks set to cut two inches deep; cross harrow at once and plant immediately. A seed bed handled in this way will be firm underneath and free from weeds, with a two-inch dust mulch on top that will readily take water from above and prevent the loss of water from evaporation.

The Use of Disk Harrow for Small Grain

In the driest section of the Mississippi Valley it is found to be very profitable to follow the binder with the disk harrow to conserve the moisture and render the soil fit to hold moisture that may fall during the late summer before ground is plowed in fall. This also cuts up and pulverizes the surface so that when land is plowed the furrow slice makes a better connection with the bottom of the preceding furrow, preventing in a large measure the large air spaces that are so detrimental to a perfect seed bed.

(Fig. 1) The dead furrow is non-productive
(Fig. 2) Dead furrow partially filled
(Fig. 3) Dead furrow filled

In my opinion this practice can be followed with profit by the farmers of the states like Minnesota, Iowa and Wisconsin where rainfall is more abundant. The advantage gained by the sprouting of weed seed, the better seed bed gain and the conservation of moisture is not to be lost sight of even in these states.

On land that is fall plowed for small grain—and one ought not make a practice of growing grain on spring plowing—it is better to double disk early in spring, cross harrow, and sow immediately. It might be that under some conditions single disking will be sufficient. It must be borne in mind that the thing to be accomplished is a finely pulverized seed bed about two inches deep with a solid subsoil contact that will bring moisture up to the dust mulch or within two inches of the surface. For best results, this condition must be established. One of the greatest objections to single disking is the fact that it leaves the ground in an uneven condition covered with ridges.

Filling Dead Furrows and Leveling Ridges

In every field of any size can be found several dead furrows and ridges left by the plow in finishing and laying out lands. These should be leveled before planting corn or sowing grain. It is almost impossible to plant and properly cover a row of corn in a dead furrow and the row planted on the ridge is often covered so deep that much of it never comes up. The yield of corn and small grain in dead furrows is always light.

Figure 1 shows a dead furrow seven inches deep before filling.

Figure 2 shows the same dead furrow partially filled and manner of filling.

Figure 3 shows the same furrow completely filled and ground left in level condition.

A ridge or back furrow may be leveled by driving so that the center of the disk comes on the middle of the ridge—thus throwing the dirt outward on either side of the ridge. Once down and back on the same ridge will leave it in a very level condition.

Disking in manure

Use of Disk Harrow in Covering Manure

The value of drawing manure direct from barn to field is being realized more and more every year by farmers of the Northwest. Until recent years, the practice has been to leave stubble land in the fall and scatter manure on it during the winter and spring months. This is to be plowed under in spring for crop. This practice not only delays plowing until spring, which is a bad thing, but gets much of the manure down so deep that some of the value is lost and in case of a dry seed season, shuts off the water supply at the bottom of the furrow slice.

Much better results are being secured by fall plowing and spreading the manure on top of plowing during winter and spring months. The disk harrow is used in spring for pulverizing the seed bed and mixing the manure with the surface soil. So well does this work out, that with manure applied at the ordinary rate very little trouble is experienced in working harrows, cultivators, and seeding machinery on land so tested. The illustration opposite shows a disk harrow disking in manure as described above.

Use of Disk Harrow in Eradicating Quack Grass

No other tillage implement is so effective in the eradication of quack grass as the disk harrow. When the sod is first turned over, it can be cut up and pulverized with the disk so as to expose the roots to suit wind. This should be followed with a harrow and all roots raked up and burned after the harrow. In about ten days new shoots will be seen coming up on the inverted sod. Now get out the disk and go over the field again, lapping half; repeat the harrowing and burning process. Keep this up as often as any quack stem shows green above the field. It may be found necessary to replow in about six weeks' time, after which the treatment should be the same as described above. One season of this treatment if carefully done, will eradicate the worst fields of quack grass.

Cross disking is one of the best assurances of a good seed bed

The Disk Harrow in North Dakota

By J. H. WORST

President, North Dakota Agricultural College

The disk harrow is used almost universally by the farmers of North Dakota. The disk following a corn crop of the previous year or after potatoes gives better results than any other manner of preparing the land if a thorough job of disking is done. Our people commonly practice double disking and I believe should do so in almost all cases.

It will be seen that on the average it is superior to either spring or fall plowing. When the land is inclined to drift, disking usually prevents that trouble.

In Bulletin No. 75 the following table shows the results of preparing corn ground for wheat:

		1903				1904		1906						
Plot No.	Preparation of Ground	Per Cent. Lodge	Height of Straw, In.	Grade	Yield per Acre Bushel	Grade	Yield per Acre	Length of Heads, In.	Height of Straw, In.	Days Maturing	Per Cent. Lodged	Grade	Yield per Acre	Average Yield per Acre for 3 Years
1	Fall Plowing...	5	40	1n	35.03	No.4	18.6	3	43	114	0	1n	28.6	27.4
2	Spring Plowing	1	39	1n	34.07	No.4	17.4	3	43	114	0	1n	23.1	24.8
3	Spring Disking.	15	42	1h	40.27	No.3	19.2	3	43	114	0	1n	26.9	28.8

It is used in many cases to run over stubble land after the binder so that the sheaves fall on the disked surface. By this practice, a loose mulch is formed over the surface, which is made up of a mixture of dirt and grain stubble. This has a pronounced advantage in keeping moisture in the soil after the crop is through using it until such time as the grain is

Disking the ground—a part of the preparation of the seed bed which grew the bumper crops shown in the harvest scene below

Harvesting a bumper crop of wheat averaging fifty bushels per acre

threshed and the ground is plowed. The disk is used very regularly on fall-plowed land and on fallow land. It is a tool that will do many kinds of work, according to the angle that the disks are set. By putting them almost directly upright, they simply slit the ground, and by setting them at a heavy angle, they almost completely turn the surface.

Our people have learned to use them in loosening up sod-bound meadow lands and alfalfa as a means of bringing new vigor to the old sod.

Every farm in our commonwealth should be provided with at least one disk harrow as a necessary part of its equipment. I believe that in the future our farmers will learn to use them more regularly than they are doing at the present time. And they are now adapted to a large number of uses which they were not put to ten years ago.

Following the plow with the disk harrow makes a mulch that prevents rapid evaporation of moisture

The Value of the Disk Harrow

By T. S. Parsons

Agronomist, University of Wyoming Experiment Station

Few farmers realize the importance of the disk harrow as a labor saver and as an improver of the seed bed, to say nothing of the various other uses to which it can be put upon the farm.

To the farmer of Wyoming, the disk harrow is a valuable implement. In this state where farming is carried on under so many different conditions of climate, altitude and moisture it has an especial value to the farmer who makes use of it intelligently. In Wyoming, farming is carried on at altitudes ranging from a little above 3,000 feet to 8,000 feet or more; and under conditions of rainfall ranging from 6.5 to 15 inches per annum. Under each of these conditions the disk harrow finds its own particular use and adaptability. At the State Experiment Station where the altitude is about 7,200 feet, the disk harrow is considered one of the most valuable pieces of tillage machinery and is put to more different uses upon the farm than any other implement.

I may describe the uses to which the disk harrow is put on the Experiment Farm and on the best farms and ranches in the various sections of Wyoming under the following heads:

1st: Following the plow to pulverize the soil and put it in better tilth for the reception of the seed.

2nd: Disking land in the spring that has been plowed in the fall. This saves replowing and puts the soil in the best possible condition for spring seeding.

3rd: Disking ground that has been cropped to peas, potatoes, or roots the previous year. Some of our best farmers hold that disking is superior to plowing on such land if it has

Disking the stubble before plowing, a Russian scene

been plowed to a sufficient depth in previous years and there is plenty of water for irrigation.

4th: Disking stubble land after the grain is cut to put the soil in better condition for fall plowing. This is a method adopted by the dry farmer to conserve the moisture in the soil and also to put the soil in better condition to catch and retain the rain that falls upon it. The disk harrow is an excellent implement for the formation of the soil mulch.

5th: For summer fallowing. It not only helps the soil retain moisture, but is a killer of weeds, which rob the soil of much moisture.

6th: Disking alfalfa fields and meadows. The fields become sodbound and disking cuts up the crowns of alfalfa, loosens and aerates the surface soil, cuts out foxtail and other injurious weeds, and improves the crop generally.

7th: As a lawn improver. This spring a part of the University campus which had never been broken was disked and seeded to native grasses. Also the court-house lawn was covered with manure during the winter and this spring disked. The lawns are now in excellent condition.

8th: For cultivating the orchard. To give maximum yields in the irrigated orchard regions the orchard should be given clean cultivation. This can be done by the use of the disk harrow. The dry farm orchard is also greatly benefited by disking and clean cultivation to destroy weeds and conserve moisture.

Taking the variety of work, the thoroughness, the horse power required, the ease with which it can be handled and its effect upon the soil, no farm machine ever invented surpasses the disk harrow. And even though the inventor is unknown, his memory is entitled to the blessing of humanity and he is deserving of a monument equal in height and architecture to any of the great benefactors of the race.

Sun-baked soil before disking
Water-baked soil partly disked
Completing the disking

Some Uses of the Disk Harrow in Idaho

By F. D. Farrell

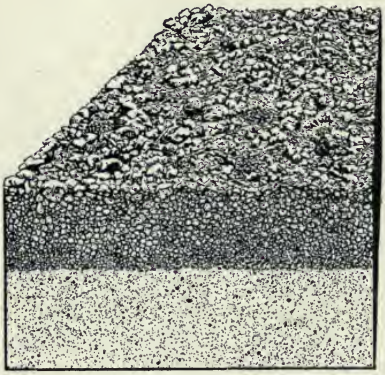
Director in Charge, Southern Idaho Agricultural Extension, University of Idaho

Comparatively few farms in the state of Idaho are without the disk harrow. It is used extensively on the dry lands and on the general irrigated farms, in the orchards, etc. It can be used for a number of purposes where other implements might also serve but it is the most effective implement we have for all the following purposes: (1) Preparation of a seed bed on newly broken sod; (2) Breaking of heavy crusts formed by snow or rain; (3) Eradication of weeds, particularly on dry land summer fallow; (4) General preparation of all seed beds; (5) Loosening of stubble fields after harvest to make them absorb and retain moisture; (6) The cultivation of alfalfa.

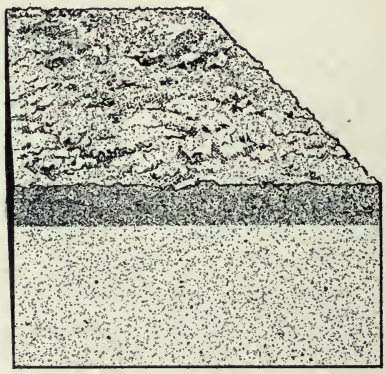
In the brief space allotted us we can call attention to some of the main considerations only, with regard to the above enumerated points.

On a very large area of our virgin soils the first plowing turns over a rather tough, heavy sod. The plowing is ordinarily done to a depth of five inches. Some implement is then necessary to completely pulverize this sod to make it firm, without being too compact, and to establish a connection between the plowed sod and the soil immediately beneath it. We have found that the disk harrow is the most efficient implement in preparing this sod for planting. Where an ordinary spike-toothed harrow is used, it is next to impossible to get all the sod completely pulverized, and the harrow has little or no effect in the way of incorporating the pulverized soil with the unplowed underlying soil. The disk harrow, however, does this very satisfactorily. The firm of Woodmansee & Webster, which operates a 4,800-acre dry farm in Fremont county, employs a very efficient combination of disk harrows. They have a specially constructed frame, behind which they attach ten harrows, each seven feet wide. They are attached in such a way that each harrow overlaps one-half of one of the

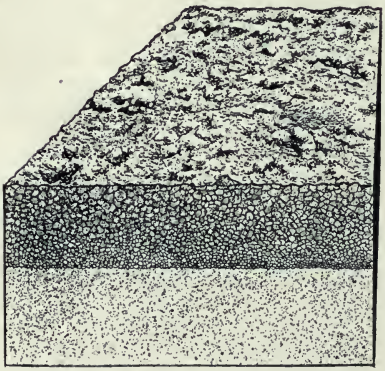
DISK THE HARROW



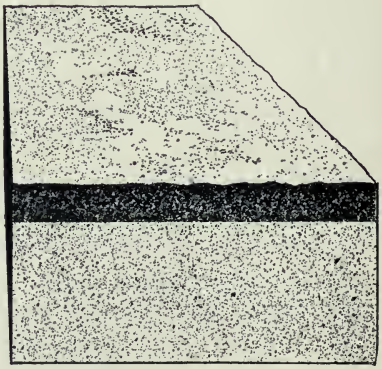
The right kind of a mulch for moisture conservation is granular—that is, the dirt should not be pulverized too finely



The wrong kind of a mulch. The ground is almost dust. Such a mulch blows away easily



The granular mulch rained upon. Notice that a slight crust is formed on the surface. A peg-tooth harrow will break up the crust

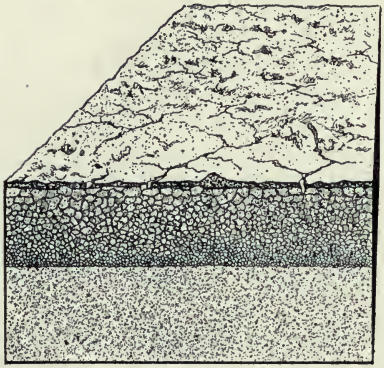


The dust mulch rained upon. The soil particles are compact and close together, forming a deep crust

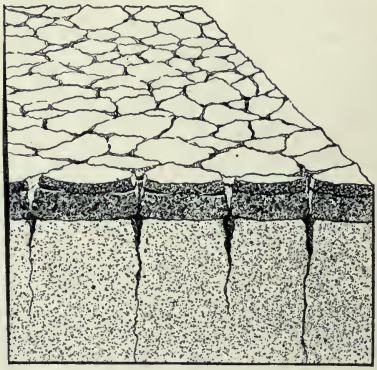
other harrows. The arrangement double-disks a 35-foot strip in one operation. The Woodmansee & Webster farm in its virgin state contained a tough sod of buffalo grass which, when plowed, was very difficult to pulverize. They go over their land shortly after plowing, with their disk harrow arrangement. This double-disks the land once. They then repeat the operation with the addition of a large wooden smoother which is attached so as to follow the disk harrows. This double working amounts to four diskings and one smoothing, and it results in a practically ideal seed bed for winter wheat. The disks completely pulverize the sod, firm it to the desired degree and incorporate it with the underlying soil. The combination of the disks and smoother leaves the soil in a very smooth condition at the surface as well as underneath. This makes their fields easy on all their planting and harvesting machinery. For all work similar to that just described, we know of no other implement in this state which will begin to give the satisfaction that is given by the disk harrow.

A large part of the soils of Idaho, particularly those of the great Snake River Valley, are deficient in humus. This condition makes the soils very susceptible to crusting. After a heavy rain and in the early spring, soils which were plowed the preceding season are found to be very heavily crusted. In a large number of cases this crust cannot be satisfactorily and uniformly broken up by an ordinary spike-toothed harrow. It is too expensive to use a plow for breaking the crust, even if this practice were desirable. Here again the disk harrow is pre-eminent as an efficient implement. By getting onto a field with a disk harrow as early in the spring or as soon after a heavy rain as the soil can be worked without danger of puddling, the crust formed can be completely broken up and left in a very desirable condition. It is best in a case of this kind to double-disk rather than single-disk, and it is frequently desirable to follow the disk harrow with a spike-toothed harrow. This, however, is not always necessary. Frequently, where only the spike-toothed harrow is used for breaking the crust,

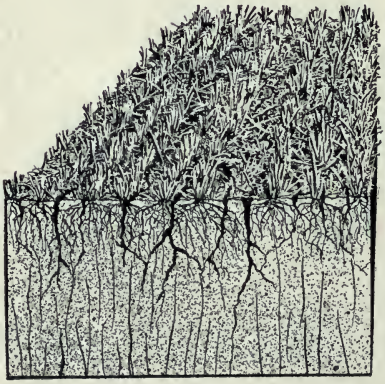
DISK THE HARROW



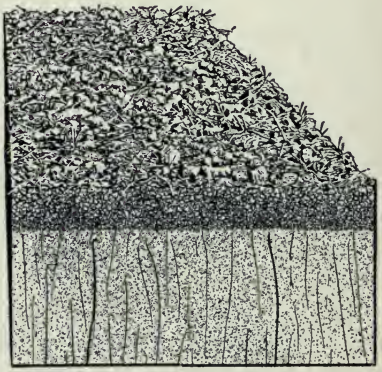
The granular mulch rained upon and left standing for a number of days. Observe that the ground is cracking, and that moisture is escaping through these cracks. The crust can be easily broken



Dust mulch rained upon and left standing in the hot sun. Note that the crust has cracked, and that the moisture is escaping very rapidly. It is impossible to work up this seed bed properly



Stubble left standing after harvesting. Note that the ground is full of cracks, and that it is very hard



Stubble disked immediately behind the binder. Note that there are no cracks in the ground, the stubble is cut up, and a mulch is left on the surface to prevent moisture from escaping

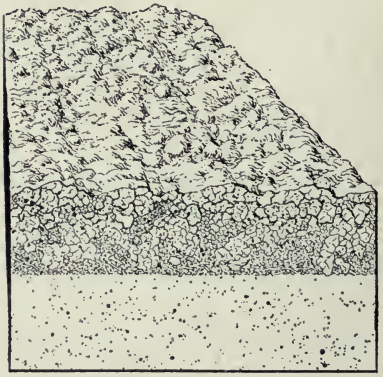
it must be run over the soil so many times that the result is the much talked of "dust mulch." In our volcanic ash and heavy clay soils, this dust mulch is not at all desirable as it too readily encrusts again when more rain falls. The disk harrow, by breaking the crust with a single operation, leaves the surface, not as a dust mulch, but in a well pulverized, well firmed condition.

On the unirrigated lands of Idaho it is a common practice to summer fallow every other year. The summer fallow is frequently so infested with weeds and volunteer grain that a great deal of difficulty is met. It is often impossible for a farmer to cultivate his fallow when the weeds are just beginning to emerge from the soil. After the weeds have gained a reasonably good start a spike-toothed harrow is not effective in eradicating them. The disk harrow here is very effective. The object in all the summer cultivation of fallowed soil is to keep the surface pulverized and to keep down weeds. The more shallowly this cultivation can be done the smaller will be the quantity of soil moisture lost through evaporation. It is always desirable, therefore, to be as effective as possible, in accomplishing the desired object and at the same time to avoid going too deeply into the soil. An ordinary plow would eradicate the weeds but the operation would be expensive and large quantities of soil moisture would be unnecessarily lost. The use of a spike-toothed harrow would probably pulverize the surface soil and it would avoid going too deeply, but it would not be effective in most cases in eradicating the weeds. The disk harrow is found in such cases to be the happy medium. It is very widely and very successfully used in Idaho for this purpose.

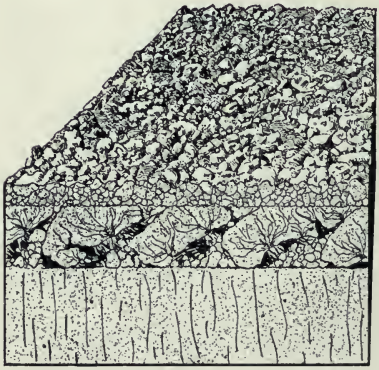
In preparation of seed beds for all field crops in this state, the disk harrow has its uses. The desirable seed bed contains from four to six inches of well pulverized surface soil, reasonably firm, without being too compact. This zone of pulverized soil should be uniform all over the field in depth, moisture content and tilth. Comparatively few fields are prepared for planting on the best farms of this state without the use of a disk

DISK THE HARROW

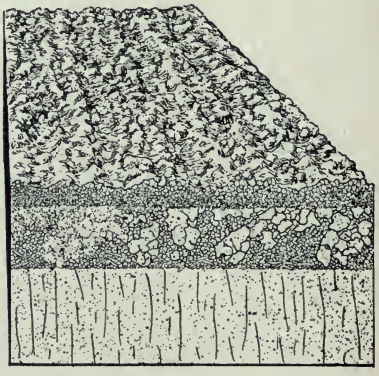
Undisked stubble plowed. Observe that the ground is turned up in lumps, that there are open spaces at the bottom of the furrow which prevent the close compactness of the lower portion of the turned furrow with the soil beneath



Disked stubble plowed. The mulch formed by the disk harrow fills up the open spaces at the bottom of the furrow, thereby forming a close connection with the sub-surface



This illustration represents the field above harrowed with a pegtooth harrow. The air spaces are still at the bottom of the furrow



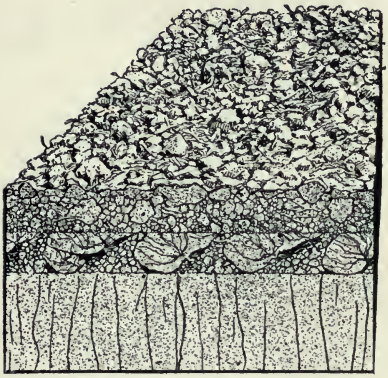
This illustration represents the field above treated with a pegtooth harrow after plowing. The surface is in comparatively good condition, and the bottom is compact

harrow. This implement has been found to produce generally, the most nearly ideal seed bed conditions, because of the manner in which it meets the requirements in the desired preparation of soil.

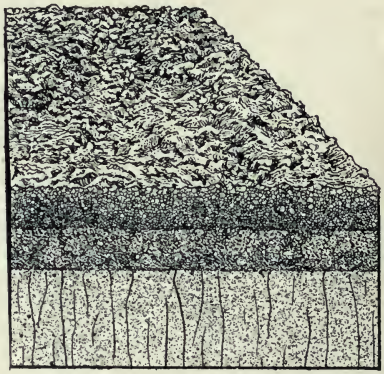
The disk harrow is coming into general use on both the unirrigated and irrigated farms of Idaho in disking grain stubble. The farmers are finding that it pays to disk immediately after harvest in order that the soil will absorb any water which may be precipitated or artificially applied, and in order that when the plowing is done later in the season the soil will be turned over in a mellow, rather than in a lumpy condition. Oftentimes farmers plant alfalfa in their stubble fields shortly after the grain crop is removed and the disk harrow is here used to prepare the seed bed. Where soil has been reasonably well cared for and is not too heavy, naturally, a better seed bed can frequently be secured for alfalfa planting by thoroughly disking the stubble than by plowing the field, and the disking of course is much less expensive than plowing. On some of the sandy soils in the Snake River Valley, it has been found that a stand of alfalfa can be secured by planting in a seed bed prepared by a disk harrow run over a stubble field. Where these sandy soils are inclined to "blow," great care has to be taken not to get too much finely pulverized soil on the surface. In instances of this kind, the disk harrow is run with the disks almost straight over the stubble field. This loosens up the soil sufficiently for the reception of the alfalfa seed, but does not pulverize it to such an extent that it blows undesirably. This use of the disk harrow illustrates its adjustability by varying the angle at which the disks are run. Wide variations in the degree of pulverization of the soil can be secured.

The cultivation of alfalfa on both the dry and irrigated farms of Idaho is done very largely with the disk harrow. The purposes of cultivating alfalfa are many. They include the admission of air to the alfalfa roots and the organisms on the roots, the breaking up of the crust formed by natural precipitation or surface irrigation, the eradication of weeds from the

DISK THE HARROW

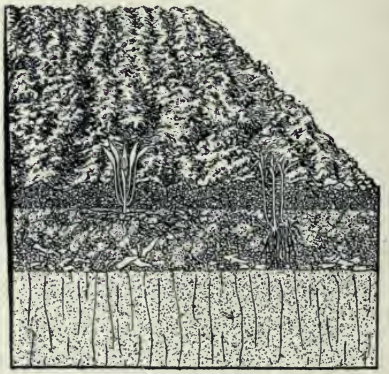


Plowed field, disked and harrowed. There is a deeper seed bed on the surface, but many hard clods and air spaces are in the bottom of the furrow



Disked stubble plowed and disked before harrowing. Observe the compact condition of the soil, that the air spaces are completely filled up, and that the ground is in first-class condition

A plowed and harrowed field with corn and wheat planted upon it, showing that the corn and wheat are too deep in the ground. The runner broke through the clod and deposited the seed deeper than the farmer really intended. Maybe the next hill is too shallow. This sort of a seed bed accounts very largely for the unevenness of the stand of all kinds of crops, and also explains why plants will grow and prosper for a while, then suddenly become weak

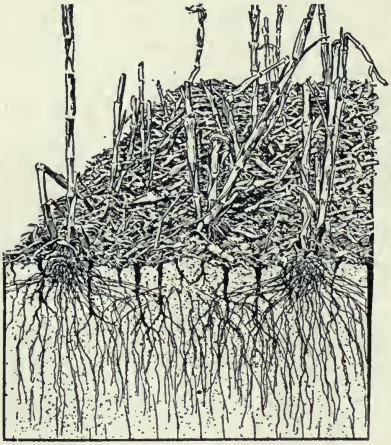


This illustration represents the field in the above scene, showing that in a seed bed of this kind the farmer can regulate his seeding machine to a certain depth and feel assured that the grain is being deposited at that depth. The corn is planted where he wants it, and the soil is compact and fine, so that the rootlets can reach out and assimilate the necessary amount of plant food, thus insuring a vigorous, healthy growth. The same thing is true of the wheat plant

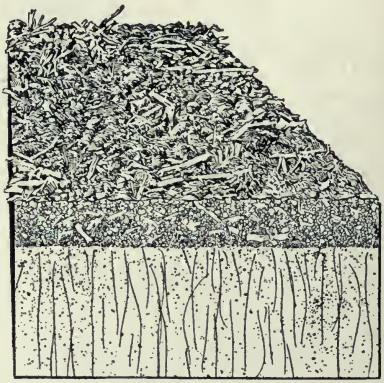
alfalfa fields, the pulverizing of surface soil for the conservation of moisture and the splitting of the crowns of the alfalfa plants so as to prevent the latter from becoming too coarse and woody. The disk harrow meets these requirements very satisfactorily. It is widely used in all parts of Idaho for this purpose. Here again the severity of the cultivation can be adjusted to suit the needs of the particular field. Where the crust is only moderately thick, the disk can be run nearly straight. The same is true where the alfalfa is only one year old. Where the crust is heavy or the field weedy and the alfalfa plants are two or more years old, the disks can be run at a sharp angle, and thus do much more severe cultivating than where they run straight. In this way the crowns of the alfalfa plants are divided and subdivided, weeds are killed, the surface soil is well pulverized and practically all the other purposes for which alfalfa is cultivated are satisfactorily accomplished. Ordinarily, the disk is run over the alfalfa field early in the spring before the plants have made much growth. Where only one cultivation is given the field annually, the early spring cultivation is the most efficient. Some farmers get good results by disking in the fall. This is particularly true on the dry lands where the collection and conservation of water in the soil are the primary factors.

A number of other uses for the disk harrow in Idaho can be enumerated and discussed, but those above are probably the most important. Any one of those named is a sufficient reason why a disk harrow should form a part of every Idaho farmer's equipment.

DISK THE HARROW

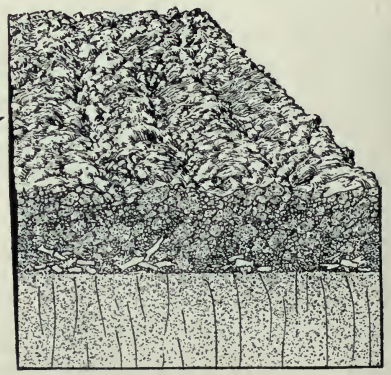


A corn field in the spring, after the stock have fed and trampled through it all winter. This is about the condition ground is in when the farmer starts to sow his oats or plow for another crop of corn



The cornstalk field after a thorough disking, showing the stalks cut in small pieces and the mulch of earth which prevents moisture from escaping

The field shown in the above picture plowed. Observe that the cornstalks are only half buried, and that the roots and stalks form air spaces which prevent the furrowed slice from coming in compact union with the sub-surface



Field showing the above disked cornstalk ground plowed. Note the disked surface and that the short lengths of stalks do not interfere with the compact union of the furrowed slice with the sub-surface

Farming with the Disk Harrow

By F. H. Demaree

Acting Agronomist, University of Missouri Agricultural Experiment Station

In my opinion and that of everybody connected with the crop and soils work of this institution, the disk harrow is one of the best implements which can be used on any farm.

It lends itself to a variety of uses. It should always be used before land is plowed in the spring for corn. Most of the corn roots are found at a depth of six to eight inches below the surface of the ground. When land is simply plowed without disking, it can easily be seen that the corn roots are lodged in the most poorly prepared part of the seed bed. This is not logical nor practical. So, in my opinion, all spring-plowed land should be disked before it is plowed. There is no piece of machinery which will take the place of the disk harrow for this purpose.

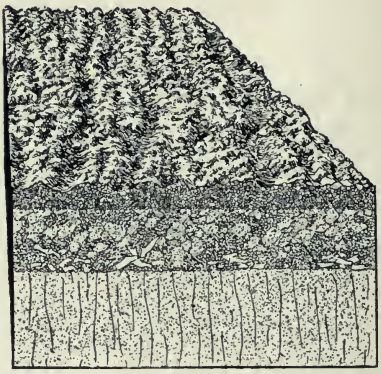
The disk may also be used to a good advantage in preparing the top seed bed for corn. In early-plowed land and fall-plowed land, there is generally a crust and many clods form before corn planting time. One of the best implements which we have found so far in pulverizing these, is the disk harrow. On sod land, it is nearly impossible to make a good seed bed without the use of the disk.

In Missouri where we often grow two crops in one season, the disk harrow lends itself admirably to the second preparation of the soil. For instance, it is becoming quite common to sow cowpeas after oats or wheat when clover has not been sown in the spring. If the disk is used here as soon as the wheat is cut, such lands can be prepared nicely for cowpeas and will produce a good crop before frost.

In preparing land for oats, it has been found at other

DISK THE HARROW

Field plowed and harrowed with an ordinary peg-tooth harrow. The stalks interfere with cultivation. Note also the clods and air spaces that stop the upward trend of moisture



Field showing disked stubble plowed, disked and harrowed. Can you imagine a better seed bed for the planting of corn or any grain

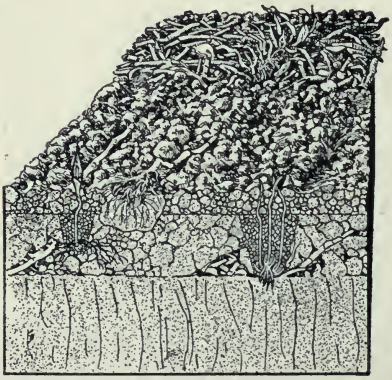
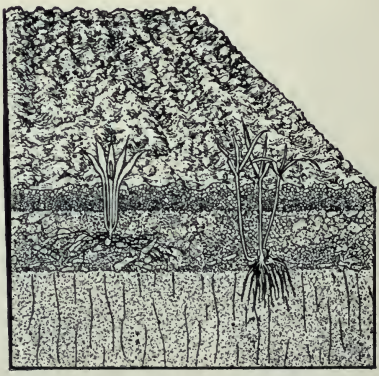


Illustration showing the field above planted with corn and small grain. The farmer is never certain of his crop. The cornstalks bother in the cultivation, and are of no service as fertilizer when left in this condition



This field is the same as that shown in the illustration above, with corn and small grain planted. The ground is in perfect condition for the reception of the seed, and the farmer has good assurance that he will grow a crop

Stations that a good double disking of the soil is just as efficient as plowing and much easier and quicker so that our recommendations for the preparation of oat land is to double-disk the soil, then harrow down and drill the seed in. Such a preparation would, if consistently followed, give excellent results.

From the foregoing, it can be easily seen, that the disk harrow plays a very important part in modern farm operations. In my estimation no farmer can do without one as they insure thorough preparation of the soil and decrease the cost of crop production.

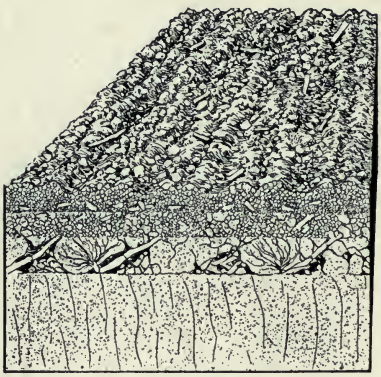
The Most Useful Farm Implement

By J. N. Harper

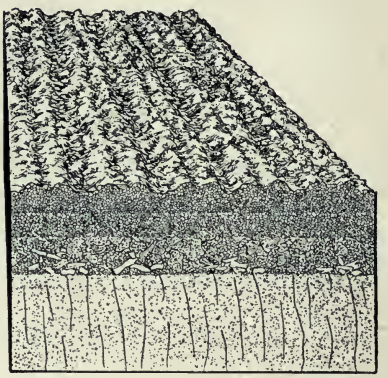
Director, South Carolina Agricultural Experiment Station

I consider the disk harrow the most useful farm implement the farmers of this region can own. It is invaluable in putting land in shape in early spring after the land has been thoroughly plowed with a disk plow during the previous fall. Much time and labor is saved if the disk harrow is run over corn land previous to the laying off of the land just before planting. I have also found the disk harrow valuable in listing land for cotton. One time to the row is sufficient to make a bed on which the bottom can be planted, whereas by the old method it takes four to five furrows with Dixie plow to do the same work.

DISK THE HARROW



Field disked after plowing. This is a common practice among farmers. It does not remedy the bad condition at the bottom of the seed bed



Disked cornstalk field disked and harrowed after plowing. This leaves the ground in perfect condition for whatever kind of crop the farmer desires to plant

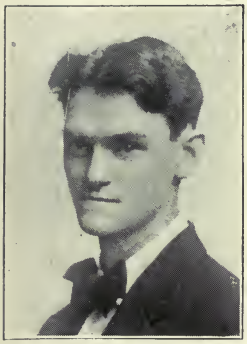
Field illustrated above with corn and wheat planted. Observe that the growth of the plant is somewhat better than that shown in the illustration on page 34, but that the same poor condition exists at the bottom of the seed bed

This illustration shows the field above planted to wheat and corn. Observe the healthy growth of plants, that there is abundant root system, that the rootlets can assimilate all the plant food necessary

The Disk Harrow

By Daniel Scoates

Professor of Agricultural Engineering, Mississippi Agricultural and Mechanical College



If the plow can be called the king of farm implements, then surely the disk harrow is properly named the queen of the same family. As Longfellow said about man and woman, so can it be said of the plow and the disk harrow—"useless each without the other." The disk harrow rules from the plains of Montana where disking means saving crops by saving moisture, to the hills of Mississippi where disking means death to erosion.

There are several kinds of disk harrows, for instance the cutaway, spading, full disk, etc. But let us pay our attention to the full disk, for this harrow is really the mother of all the rest, which at best are only special tools to be used under certain conditions. This implement should be on every farm, whether the farm be of small acreage, such as that worked by a truck gardener, or of large areas as that of the wheat grower. It has a mission to fulfill that is essential to all farmers no matter what the size. It fulfills more places on the farm of today than any other implement known. It is truly the farmer's general utility implement.

To the farmer with limited or unlimited capital it should be the second tool for him to purchase, next only to the plow. The former farmer finds this tool able to do the work of many that the latter can afford to buy. For example, it will cut up corn or cotton stalks, act as a surface packer, cover grain that has been broadcasted, grind up clods and pulverize the soil, etc. Then when the capital of the farmer increases and allows him to buy the other tools to help do this work, the disk harrow just falls for its own special duty.

The disk harrow's special duty is to take the soil after the

Starting in to disk a cloddy field
Completion of the disking. The clods are well pulverized

plow has done its work and put on the finishing touches. The result of these touches acts in different ways under as many circumstances; if the land receives a heavy rainfall the disking allows the soil to take up larger quantities of this moisture than could be obtained under the former condition. Then the absorption of this water has not only the benefit of storing up moisture for the future use of the plants, but by allowing the water to soak into the ground it prevents, to a certain extent, surface washing of the land. This last benefit is one that is of great importance to Southern farmers. Then the disking of the surface gives still another advantage in that the breaking up of the surface of the ground establishes what is known as a mulch. This mulch breaks up the effect of capillarity, thus causing rapid evaporation to cease and saving the moisture stored in the soil for the use of the plants. This fact is of vital importance to the farmer of the West and Northwest and should be appreciated by the farmers of other sections.

It can be readily seen then that no matter whether you are farming in Maine or Mississippi, in Alaska or Alabama, the disk harrow is an essential farm tool; that the benefits are such that an over-indulgence in its use does no harm while a lack of its application spells failure.

The Disk Harrow in Texas

By H. H. Harrington

Director, Texas Experiment Station

The disk harrow is one of the most useful implements on the farm. Before breaking sod with the plow, if the ground is in just the right condition, it is sometimes desirable to run the disk harrow both ways over the land, or if time will not permit running both ways, run it one way, at least. This is especially true in the spring when the sod may not have time to decay before the coming crop. After breaking up cultivated fields that are somewhat dry, the disk harrow will break down the clods and put the soil in the best condition possible, if followed by a smoothing harrow when necessary. In late plowing, when the ground has become somewhat foul, the disk harrow will give most satisfactory results toward killing weeds and grass; the ground to be planted later. In the fall, the disk harrow is frequently extremely useful in breaking up the land for wheat, it sometimes being the case that no other preparation is necessary before planting. But the most beneficial effect of the harrow, perhaps, is on alfalfa meadows. It not only opens up the soil so that the air can get to it, cuts the crown of the alfalfa, and improves the stand, but it mulches the soil in such a way that the young stubble grows off more rapidly and produces a crop of hay quicker than on meadows left uncultivated. In some instances, where the alfalfa is irrigated and the land becomes severely baked, the renovator rather than the disk harrow may be required, but in most instances the harrow will be found a most efficient implement on alfalfa meadows, after they are one year old.

The Disk Harrow

By G. H. Alford

Manager of Southern Branch Office, I H C Service Bureau

The Indiana, Illinois and Iowa farmer uses three times as many farm implements and more than three times as much horse power as the average farmer in the cotton belt; and after all is said, this is unquestionably the main reason why he earns more than three times as much as we do.

We must use more and better implements; there can be no argument here. The only question is as to which are worth most and which will pay best. We call your attention to the disk harrow, an implement that can be purchased at half the cost of a good riding cultivator and an implement that can be used for twelve months every year.

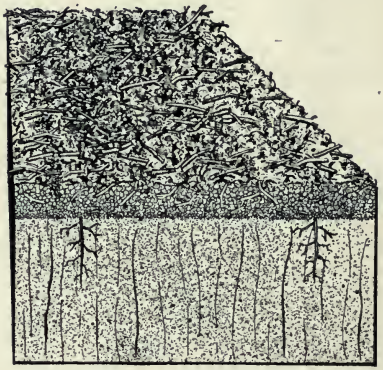
There was a time when the few farmers who owned disk harrows used them to prepare new land and to destroy clods. The intensive methods of farming have brought to light many new uses for the disk harrow. A reversible disk harrow can be used as a stalk cutter, as an implement for preparing the seed bed on sandy land and preparing the seed bed after breaking on all kinds of land, and then used to cultivate the crop.

A sharp disk does a fine job of cutting cotton and corn stalks when they are dry. It is the best possible implement to use in preparing a cotton stalk and corn stalk field for the plow. Of course, it is best to use the stalk cutter first, but after the stalk cutter has been used to cut the stalks into pieces, the sharp disks do a fine job of cutting the stalks into smaller pieces, level the ridges, and form a fine mulch. To get the land ready for the plow, the gangs should be set close and run lengthwise over the rows to cut the stalks into very short pieces and pulverize the top of the soil.

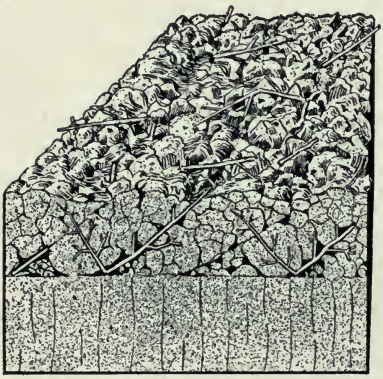
The disk is used on unplowed land for the following purposes: First, to prepare mellow land for grain and other crops where deep plowing is seldom necessary; second, to cut and mix barnyard manure, grass and trash so that when it is turned

DISK THE HARROW

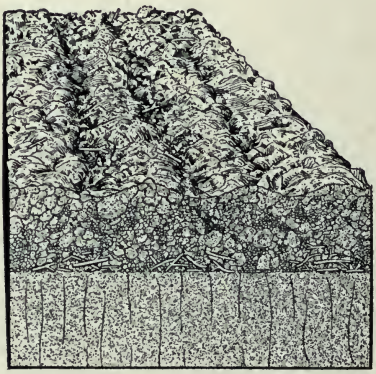
The condition of a cotton stalk field just before starting to prepare the seed bed



Cotton stalk field treated with a cotton stalk cutter and disked thoroughly



The cotton stalk field shown above after plowing. Observe that the stalks and roots leave air spaces at the bottom of the furrow



The field shown above after plowing. Observe that there are no air spaces, and that the ground can be soon worked into a good seed bed

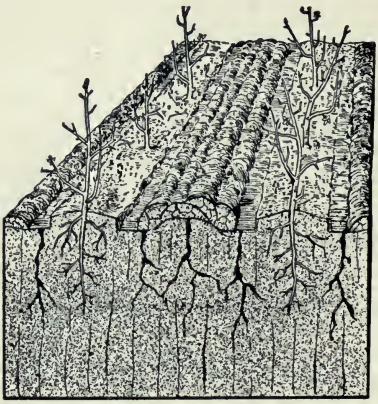
under, the surface soil will not be separated from the subsoil to stop the rise of water; third, to produce a soil mulch on dry land so that after a week or ten days, it can be easily plowed, the moisture by this time having accumulated below the mulch and softened up the land; fourth, to form a mulch of fine dirt which fills up the spaces usually left between the furrowed slice and the ground beneath, thus making the foundation for a fine compact seed bed.

In the spring we are all in a rush to get our crops planted. Our plow teams are overworked and even the best farmers often fail to thoroughly prepare their land. It is much better to take time by the forelock and disk the land and then break it deep during the fall and winter. The plow stock are rested and the weather is cool. When the land has been broken during the fall and winter and for some time prior to planting, the cotton seed bed can be quickly and easily made by arranging the disk harrow for an inthrow and by adjusting the inner ends of the gangs higher than the outer. With the harrow so arranged, a man and two good animals can make much better seed beds and do the work more quickly than several men in the old fashioned way.

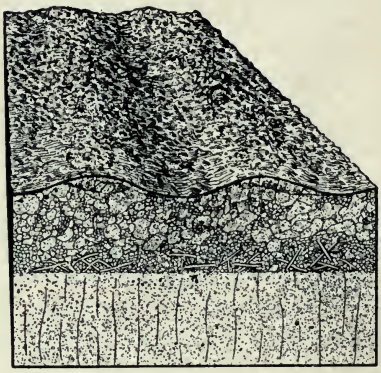
Cotton comes up quicker, grows faster and begins bearing sooner on a well-settled, firm seed bed, consequently it is not wise to plant cotton or other crops on freshly plowed land. When the beds have been made by the use of the middle burster or turning plow for some time before planting, it is usually necessary to remake them and destroy the little grass and weeds by arranging the disk harrow for an inthrow and adjusting the inner ends of the gangs considerably higher than the outer.

If the land has been flat broken and has been compacted by heavy rains, the disk harrow is the most effective tool for the preparation of the seed bed. When the ground has been plowed for some time and is covered with grass and weeds, the disk harrow will destroy the weeds and make a most excellent seed bed for all kinds of crops. The soil that is in clods when

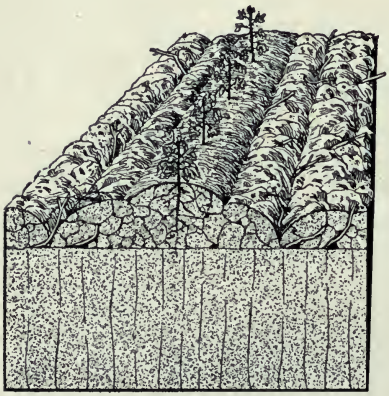
DISK THE HARROW



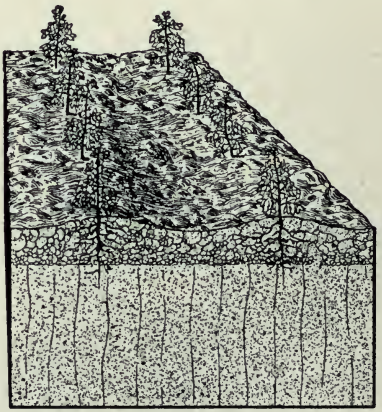
A common method of preparing the cotton seed bed. Note that the ground under the plowed furrow is hard and cracked



A cotton seed bed prepared on plowed ground with a reversible disk harrow. Note the mellowness of the ground, its compactness, and the regularity of the seed bed



Young cotton growing on a seed bed prepared by the "Middlebuster" method. Observe that the ground is hard beneath, and that there is every opportunity for moisture to escape



Cotton growing on ground properly disked, plowed, and again disked. Observe the compactness, that the moisture will not escape unduly, and that the roots can assimilate the necessary plant food

you plant cotton, corn and other crops will seldom be of use to you during the season unless you pulverize the clods. When the soil breaks up into clods, by all means follow the plow with the disk harrow and thus destroy the clods while moist. The disk harrow pulverizes the soil thoroughly and if each round is lapped no ridges of any consequence will be left. Your field may be cloddy and weedy but a double disking with a disk harrow or a single disking with a double disk harrow will make a perfect seed bed of it. In the preparation of land for any crop, no tool can be used to better advantage than the disk harrow.

The disk harrow has special advantages over smoothing harrows in ground with loose trash or growing weeds because the disk cuts through the trash instead of dragging it along.

Where seed is sown broadcast, there is no more desirable tool than the disk harrow for the purpose of putting the seed into the ground. In the absence of the grain drill, the disk harrow is the best possible implement to use to put in oats, rye, wheat, cowpeas, soy beans, and others crops broadcast.

The disk harrow should follow the mower to pulverize the soil for conserving the moisture and making plowing easier. It is usually unnecessary to use the plow in cowpeas, soy beans or sorghum after oats and the disk harrow is the implement to use to do the work in a hurry at this busy season of the year.

A tongue and forecarriage should be purchased with every disk harrow. The forecarriage is to be preferred when preparing the seed bed. It is a great aid in turning corners and at the end of the row. It is also a decided advantage for the team to have relief from the weight and lashing of the tongue of the harrow. When cultivating crops and when using the harrow on hilly land, the tongue is necessary to guide the harrow.

The depth to which the disk cuts and the amount of dirt thrown varies with the angle given the disk, the kind of soil, and the weight of the man on the harrow. The draft of the disk harrow as generally used is considerable for it moves much

A field before starting to prepare a cotton seed bed
The first step in the preparation of the cotton seed bed
The seed bed completed

dirt, and often cuts to a depth of several inches. Its best work is generally done with three or more animals, though two animals may do well on a harrow with no more than 8, 16 or 18-inch disks. When cultivating crops there is no necessity for more than two good animals.

As a cultivator, the reversible extension head disk harrow cannot be excelled. The gangs can be used close together or wide apart; the gangs can be arranged to throw the dirt towards or away from the plants and to work higher or lower on the inner than the outer ends and vice versa; they can be set to throw ridges to the plants or set to "bar off;" they can be set to cut shallow close to the plants and deeper near the center of the row.

The action of the disks upon the soil makes the disk harrow a most excellent cultivator. The disks thoroughly pulverize the surface of the soil, destroy the grass and weeds, leave the under soil compact and a fine soil mulch spread all over the land. The roots of the growing plants are undisturbed, especially when the inner ends of the gangs are set higher than the outer ends in cultivating plants on beds.

For cultivating cotton, potatoes, peanuts and other crops that have to be hilled, the disk harrow is especially valuable because it can be set to ridge the hills at the right height and the dirt which is hilled around the plants is thoroughly pulverized and cultivated, so that only fine soil makes the hills. A fender may be used when cultivating small crops. The disk harrow is probably the best implement to use in hilling cotton and other crops grown on ridges.

A turning plow is out of place in a crop. If the soil is devoid of vegetable matter and runs together after a heavy rain or if it rains for two or three weeks and it becomes necessary to bury grass, we can give a large angle to the disks and set the gangs to outthrow and "bar off" the little cotton or other small plants or we can set the gangs to inthrow and give the disks the necessary angle to cover the grass and weeds and thoroughly pulverize the soil. One man with two horses and a disk harrow

Cultivating cotton with a reversible disk harrow throwing dirt away from the plant
Throwing dirt toward the plant
A cotton field after cultivation

can take a row of cotton or corn at one time and destroy the grass and weeds and make a fine soil mulch out of the hardest, sun-baked soil. An extension standard is furnished with the latest reversible extension head harrow which raises the frame high enough so that cotton, corn or other crops can be "laid by" with this implement.

The gangs can be set at different angles for hillside cultivation. This is a very important point to the man whose farm is in a rolling country, as he will appreciate the fact that a disk harrow, particularly in loose soil, will tend to work down the hillside. This can be obviated by setting the uphill gang to work with a little greater cutting angle than the other gang; thus causing the harrow to work in a straight line on the hillside.

The double disk harrow is desirable for farmers who wish to do two diskings at the same time. It has four sections, two of which throw the dirt out, followed by two more which throw the dirt in, leaving the land level and smooth after its use. The land is generally left somewhat ridged with the single disk even though half, as nearly as possible, is lapped on the land already worked. The double disk requires more horse power than the single disk, but the ground is double-disked in the quickest possible time and left in a very fine level condition. The main advantage of the double disk other than saving labor is that you can remove the rear attachment very quickly and easily, and convert it into a single disk harrow.

The cutaway harrow is a disk harrow with the edges of the disk notched or with portions of the disks cut out. This lets the remaining portions cut deeper into the soil. It is useful in cutting up sod and also in hard and rocky ground as it penetrates better and gets down between the rocks where the plain disks would roll over the rocks. It does not pulverize as well as the solid disk and hence should seldom be used when the other will do good work.

The double disk harrow leaves the ground level with one disking, and where the soil is right for its use, will enable the farmer to make a good seed bed with one disking

Important Uses of the Disk Harrow

By H. D. Scudder

Professor of Agronomy, Oregon Agricultural College

While we consider the disk harrow one of the most valuable all-around tools upon any farm, it is as yet very little used in Oregon, owing, perhaps, to the lack of intensive tillage methods. While Western Oregon is adapted to the most intensive forms of agriculture, it is just beginning to become developed for this purpose, hence there will be, no doubt, a very greatly increased demand for the disk harrow. This Station has carried out no experiments with the specific object in view to determine the exact value of the disk harrow, but the machine is used in practically all of our Station farm work and from continued use we know something of its especial value in farm work. In Western Oregon its greatest value is in preparing a seed bed; following the plow in the spring we nearly always use the common drag harrow and after this the disk harrow, lapping as we go round with this machine, making it a double disking. This generally is sufficient to prepare the grain land for the drill or, where a more finely pulverized seed bed is required for the sowing of small seed, perhaps one or two harrowings with the common drag harrow will complete the work. Often on very tough, soddy and cloddy ground the disk harrow is used more than once and some form of clod crusher also.

Another excellent use of the disk harrow is in disking up stubble in the fall and carrying the ground through the winter in good shape. The cutting of the stubble with the disk and working up of the surface causes the decay of the organic matter and also a greater absorption of the winter's precipitation, preventing to a considerable extent surface washing and aiding in holding the snow. The ground disked in the fall is always, as a rule, better prepared for plowing in the spring, no crust having been formed and thus fewer clods being turned under in plowing, so that a better union between the seed bed and the ground underneath is effected.

Disking summer fallow to form a mulch for protecting the moisture and to kill weeds

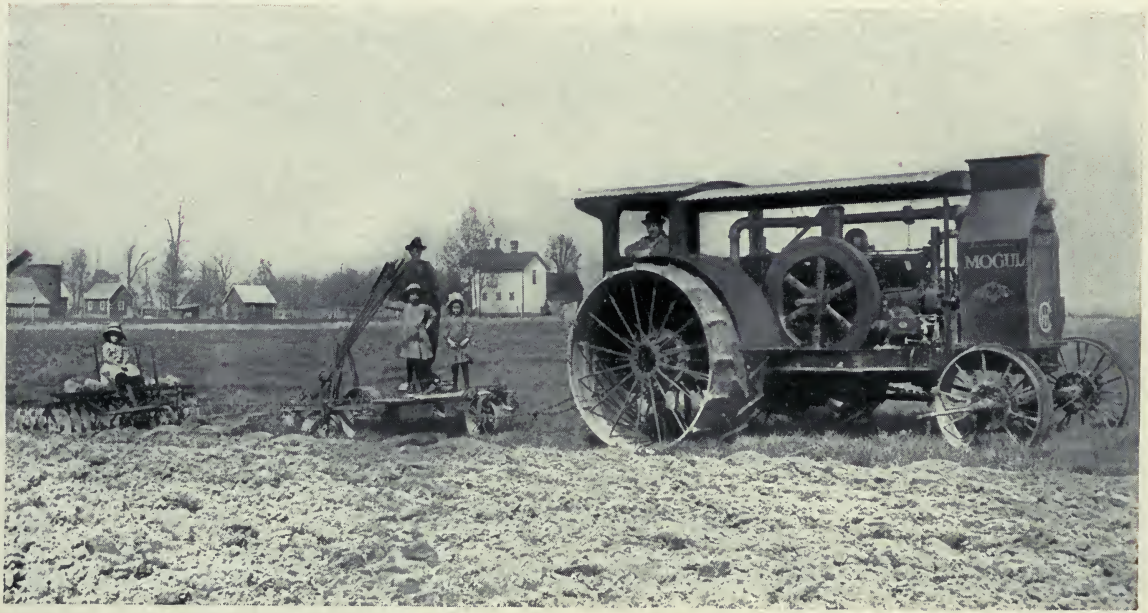
The use of the disk harrow on stubble land early in the spring before spring plowing starts, we also find very advantageous for much the same reasons as the fall disking. In addition, however, it aids greatly in foul land in germinating all the weed seed on the surface of the ground which later will be turned under with the spring plowing.

Again, on the land which for several years has been deeply plowed and which has been plowed in the spring of the last season, we find that by using a disk harrow thoroughly and setting it deep, we can prepare a good seed bed for fall seeding and use fall sown wheat, oats, barley, and our great hay crop, vetch and oats, or vetch and rye. Where the disk harrow is used to prepare ground for fall seeding, it should always be land that has been deeply plowed in the spring of the same year.

We also find that the disk harrow is of great use in preparing a deep mulch on bare, fallowed land which is set either to orchard or any other crop. The disking prepares a deep mulch for the retention of moisture and also is very effective in getting rid of persistent weeds.

A lesser use of the disk harrow is in the disking of the alfalfa fields early in the spring. Setting the disk straight and weighting the machine and running it crosswise cuts up the surface of the alfalfa field and, when followed by a spring tooth or common drag harrow, effectively prepares the loosened surface and mulch and does away with grass and other sod-forming weeds that injure the alfalfa, and, in fact, greatly benefits it by splitting the crowns and thickening the stand. The loosened surface we find especially effective in promoting an expansion of the root crowns, as well as in furnishing a mulch which aids in conserving moisture and increasing beneficial activities.

Another use of the disk harrow which we find of especial value in Oregon, is in connection with the plowing under of cover crops as green manures—a very common practice not only in orchard lands but in other kinds of farming as well.



Hitching the harrow behind the plow pays big dividends

Sometimes we run the disk over the green cover crops before plowing, crushing them down and cutting so that where they are heavy they will turn under better. And more important still, however, after the cover crop is plowed under we follow immediately with a drag harrow, then with a disk harrow. The disk compresses and cuts in the plowed soil through the layer of green material, thus preventing its drying out and causing it to decay much more rapidly, becoming incorporated with the soil as humus. We often use the disk harrow in the same way with the barn yard manure, running over the manured land with the machine before plowing under the manure.

While there are many other uses of this valuable machine which I have not mentioned, to my mind, these are the most important, making the machine, in my estimation, one of paramount importance for all such intensive forms of agriculture as require thorough tillage for the highest successful production.

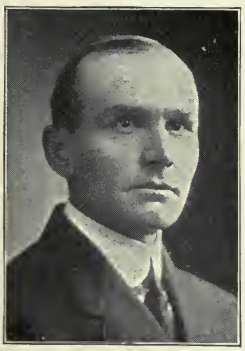
Starting to disk a cornstalk field

Note the short stalks and pulverized condition of the ground upon completion of the disking

The Disk Harrow

By W. M. JARDINE

Professor of Agronomy, Kansas State Agricultural College



According to experiments now under way at the Kansas State Agricultural College and at various sub-stations in different parts of the state, the disk harrow may be profitably employed in the preparation of a seed bed for almost every farm crop grown in the state. While special experiments have not been running sufficiently long to give definite comparative yields, indications are that when the disk harrow is intelligently used, with respect to time, depth and thoroughness, yields can be substantially increased, often doubled, as a result. This statement is also borne out by observations made among progressive farmers over the state who are making good use of the disk harrow. Within the last six years, its use among farmers has become almost as universal as that of the plow.

Kansas farmers are coming to realize that the disk harrow has a broader application than simply as an efficient implement with which to subdue raw soils, firm and pulverize plowed land for seeding, and eradicate weeds under certain conditions. This wider application comes as a result of the gradual development of a more perfect type of harrow and its more intelligent use by the farmer.

The following are some of the special purposes to which the disk is now devoted in this state: Disking stubble land in July after a crop of wheat, oats or barley has been taken from the field, in preparation for summer or autumn planting of such crops as cowpeas, alfalfa or grasses; disking stubble lands immediately after removing a crop, to facilitate summer or early autumn plowing in preparation for the planting of winter

The tractor is fast becoming motive power for disking

wheat; disking corn-stalk ground in early spring for planting to oats, barley, spring wheat, alfalfa, etc. We find that in the eastern two-thirds of the state alfalfa can be started to better advantage when planted in autumn than when planted in the spring, provided a thoroughly firmed seed bed can be established. A common practice, therefore, is to grow some early spring-planted and early maturing crop, such as wheat, oats or barley, after which the ground is prepared with the disk and seeded to alfalfa in late August. If the land is plowed, the time elapsing between harvesting and planting is too short to allow the soil to become thoroughly firmed into an ideal seed bed, even with considerable disking. On the other hand, however, disking without plowing has become recognized as the efficient method of placing such lands in condition for alfalfa—hence its general use. Both money and time are saved in this way and a crop often established where otherwise it would have been impossible. Likewise, a firm seed bed is necessary in which to plant cowpeas in July after small grains have been removed from the field. Cowpeas are becoming recognized as a valuable crop to grow after a small grain crop, the same season. A considerable acreage is planted in this way each year, with the area constantly increasing. The seed bed is usually prepared by disking rather than by plowing, because it can be done more effectively and more economically.

The rainy season of Kansas usually terminates in early August. That is to say, very little rain falls, ordinarily, between the 15th of August and the first of October. Autumn plowing, therefore, is made rather difficult unless the moisture precipitated earlier in the season is retained in the soil. Disking immediately behind the header or binder (to establish a soil mulch and thereby retain moisture) is widely practiced among good farmers. In this way July plowing is made possible with a consequent larger yield of wheat, usually double what it is on land equally as good but not disked or plowed until late August.

We find that cornstalk ground will produce more oats to

An orchard disk harrow in a California orange grove

The extension orchard disk harrow enables the driver to cultivate all the ground under the trees without injury to the fruit

the acre if it is simply thoroughly disked and harrowed before planting in early spring than if it is spring plowed, disked and harrowed. In fact we find that the yield is as large and sometimes larger, from simply disking early in the spring, than when the same kind of land is fall plowed, then disked and harrowed in the spring. In other words, cornstalk land plowed in the fall and disked and harrowed in the spring versus cornstalk land simply disked and harrowed early in the spring and planted to oats gives about equally good results, except that the disking alone is much the cheaper practice.

In the western part of the state, where dry farming is practiced, the disk harrow is used to firm and pack the subsoil by running the disks straight and weighting them. By such use the farmer is able to do the work of a sub-surface packer and thereby save the price of another implement. In dry farming where the conservation of moisture is of prime importance, the disk harrow is indispensable. By the use of the plow the water precipitated is allowed to sink deep into the soil, while the disk is used to surface-mulch the soil, thereby holding the soil moisture from evaporating. In accomplishing this an ideal seed bed is established as well.

He who would till the soil best in Kansas today, whether he be located in eastern, central or western Kansas, must make full use of the disk harrow.

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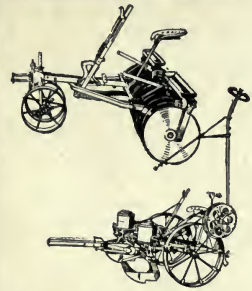

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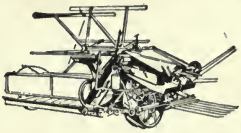

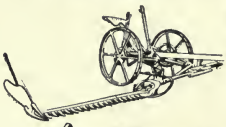

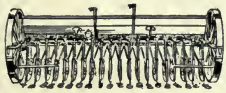

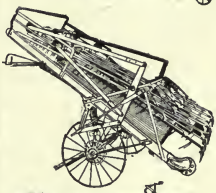

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