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Hitches for Field Machinery: Simple Hitches to Pull Two or Three Implements in the Field

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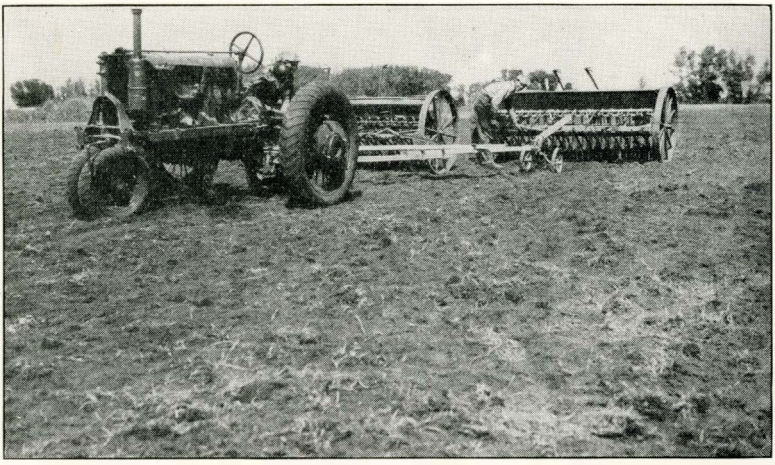

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Explanation of Terms Used

1. **Hitch**—the device connecting the implements to the tractor.

2. **Feet** and **inches** are expressed in the following manner: 6′-7″ is read, six feet seven inches.

3. **Disks**—Single Disk Harrows.

4. **Drills**—Grain drills. Drills with furrow openers spaced 6 inches apart are called by their respective widths of cut. A drill with 20 furrow openers 6 inches apart is called a 10 foot drill. Drills with furrow openers 7 or 8 inches apart are called by the number of furrow openers times the spacing of the furrow openers as 18x7.

5. **Field Cultivators**—Also called field tillers and duckfoot cultivators.

6. The **draft** of an implement is the force or pull necessary to move it when it is doing the work it is designed to do.

7. **Point of Hitch**—The point at which the two outside chains meet. Or in the case of the two-implement hitch the point where the center lines of the legs of the hitch meet. A hitch can be pulled from the point of hitch or at any point directly ahead of the point of hitch.

Explanation of Cover Cut

UPPER—An Experimental Hitch, Pulled with a Tractor
LOWER—A Big Team Pulling Nineteen Feet of Disk Harrow

The hitches in this bulletin can be pulled with horses or tractors. When horses are used it is desirable to use a cart as shown. This cart, made for stacking hay, is wide enough for disking but should be wider if it is to be used when plowing with a big team. The rear gears of a wagon make a good cart, and a box or platform can be mounted on it. Advantages of the cart are that the driver has a comfortable place to ride, is close to the team, and the weight of the heavy rear eveners is carried on the cart. An eight-horse team can be used to pull two implements and a larger team, 10 or 12 head, which is so widely advocated for plowing, will work equally well with the three-implement hitches.

Table of Contents

Hitches For Field Machinery

By

D. E. Wiant and L. W. Minium*

Introduction

This bulletin contains information for building hitches to pull any combinations of widths of two or three grain drills, field cultivators, disks or other similar implements. The information consists of tables of specifications, drawings of designs and actual photographs of hitches in the field together with detailed instruction on how to build various hitches. Where the hitches are made up of more than a few parts, drawings of the different designs without dimensions are included. These drawings are to serve as plans or work sheets. The person building the hitch takes the required dimensions from the table of specifications and puts them on the work sheet in the proper place. This gives him a plan, with detailed instructions, for building his particular hitch. After a study of the requirements of a satisfactory hitch, and a study of all available hitches, a series of experimental hitches was built. The hitches described in this bulletin were developed from the experimental hitches and are the results of two years' trials and tests in the field and laboratory. Some of the hitches developed have had a full year's use by South Dakota farmers.

Purpose of the Bulletin.—This bulletin has been written to supply the information so frequently requested on how to build a simple hitch to pull two or three implements with a tractor or big team. Many farmers have asked this station for such information because they realize that efficient use of power demands that a full load be pulled at all times.

The conclusion, drawn from contact with farmers who have inquired about hitches, is that the hitch most in demand in South Dakota is a simple one—one built to pull a specified combination of widths of two drills, field cultivators, or disks, or three such implements, rather than a

*The authors wish to express their appreciation to Prof. H. B. Blodgett of the Civil Engineering Department for his assistance in designing two-implement hitches, and to Mr. Leland J. Patty for the illustrations.

universal type—that is, a heavy draw bar mounted on wheels and designed to pull combinations of two or three implements of any width. With this idea in mind the objective of the work on implement hitches is to develop a simple and inexpensive hitch which will pull combinations of two and three of the same kind of implements satisfactorily. This study also includes a study of woods and design of single trees and eveners for big team hitches.

Problems Involved.—Grain drills, when turning, require more clearance than disks; field cultivators have greater draft per unit of width than grain drills, and as the widths of the implements vary, the shapes of the hitch vary. For these reasons each combination of each kind of implement demands a different hitch. The problem would be simplified somewhat if the narrower widths of implements were eliminated, for the shape of the hitch and the relative position of the points where the implements are attached, make the use of heavier material necessary for the narrower implements in spite of the fact that the draft is less. Narrower implements should be included, however, for a satisfactory hitch makes it possible to utilize the narrower implements which were discarded when a change was made from horse to power farming. Also, with the development of the big team hitch and the replacing of old power units for larger ones, the smaller units can be utilized to a good advantage in combination hitches to furnish a full load for the available power.

Fig. 1.—An Experimental Hitch Which Was Discarded

This adjustable hitch is set to pull a 10-ft. and 9-ft. drill. The leg leading back to the rear drill is a hardwood 2 in. x 6 in. With this type of hitch hardwood 2 in. x 12 in. is required for some combinations of implements.

PART I

Two-Implement Hitches

Section 1

General Information.—Hitches for combinations of two drills, two field cultivators and two disk harrows are discussed in this part.

An attempt was made to build an adjustable A-hitch (called A-hitch because of its shape) of only three pieces, which could be used to pull a

Fig. 2.—The Two-Implement Hitch For Drills, Field Cultivators or Disks

This hitch for two drills is made of selected fir 2 in. x 4 in. It weighs about ninety pounds including the tractor attachment, and the wood costs less than a dollar. The instruction sheet, which is included in this bulletin, tells how long to cut each piece, where to bore each hole, and how to put the hitch together.

wide variety of combinations of sizes of several kinds of implements. Such a hitch is shown in Fig. 1. This hitch is made up of only three wood members, is simple and is easily adjusted for the various widths, but the size of the members required makes such a hitch impractical. Therefore it seems advisable to have a hitch of proper dimensions for each com-

bination of each kind of implement, and with this idea in mind, the design used for two-implement hitches is recommended in preference to the adjustable type of hitch.

Fig. 2 shows the hitch developed to pull combinations of two drills, two field cultivators or two disk harrows. This hitch is built of Douglas fir because it is cheaper than hard wood and easily obtained, yet is strong enough to make a good hitch. Two-inch by four-inch material is sufficiently strong to build the hitches most in demand in South Dakota for drills and disks. Field cultivators on account of their greater draft require heavier pieces. Most of the "iron" needed can be taken from discarded farm implements.

The advantages of this hitch are, that, although it is a permanent hitch it can be built with such an economy of time and material that it may be built as a temporary hitch to be used for only a few days' work. It is light in weight and economical to build—the one shown in Fig. 2 weighs only 91 pounds, including the tractor attachment, and the wood cost less than $1. It pulls the implements in the proper position, and the short brace from the front implement to the hitch keeps them there without any weaving, regardless of unevenness of the ground. Short turns may be made at the ends of the field without missing and without skidding the implements.

A hitch of simpler design, somewhat like the simple hitch suggested for two disks, in which chain is substituted for some of the wood members, was developed for pulling combination of wide drills and field cultivators. However, it is approximately two feet longer than the all-wood hitch.

Section 2

Stub Tongues and Tongue Trucks.—With the type of hitches dealt with in this bulletin, stub tongues are necessary on both implements used with the two-implement hitch and on at least two implements when the three-implement hitch is used.

Because the frames of different makes of drills are not the same it is impossible to design a stub tongue that will fit every make of drill. Fig. 3 and Fig. 4 show stub tongues for two makes of drills. These pictures are guides to enable the farmer to build a stub tongue for his make of drill. One of the tongue trucks shown is off a disk harrow, the other was taken from a rotary hoe. Fig. 5 shows in detail how a stub tongue was attached to a 9-foot Superior drill. Disk trucks make very satisfactory trucks for drills.

A good hard wood 2″x4″ makes a very satisfactory stub tongue for lengths up to seven feet. **If hard wood is not used, a piece at least 4″x4″ should be used.** Use selected fir 4″x4″ where stub tongue is over 7 feet long.

In all two-drill and two-field cultivator hitches, **the front implement is equipped with a stub tongue 6 feet long—measured from the center of axle to clevis pin,** while the stub tongue on the rear implement varies in length. **These hitches will turn satisfactorily only when the length of the stub tongue is as recommended.** If a drill is to be used in both two and three implement hitches the stub tongue should be made adjustable for length.

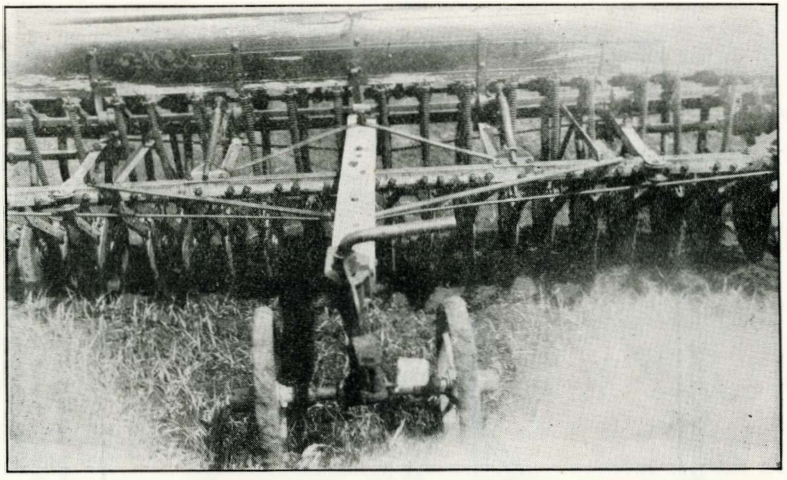


Fig. 3.—A 10-Ft. Drill with Stub Tongue and Disk Truck Attached

In case a drill or field cultivator is equipped with a tractor hitch, it may be necessary to bolt an extension to the tractor hitch in order to get the required length of tongue.

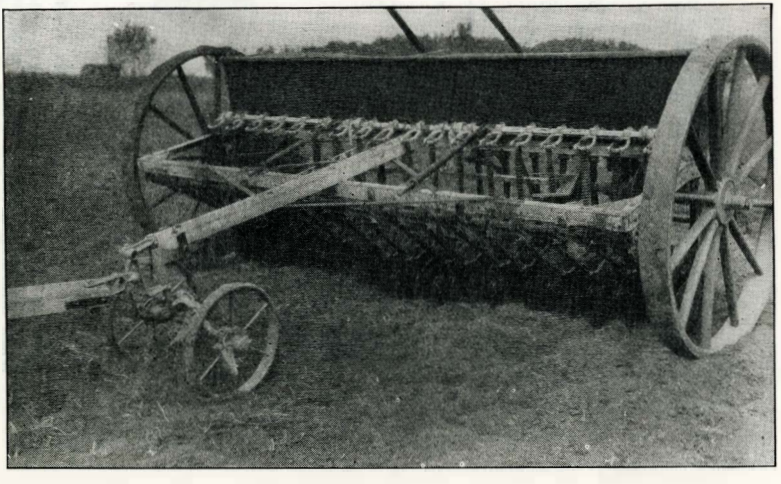


Fig. 4.—A 9-Foot Drill with Stub Tongue and Truck

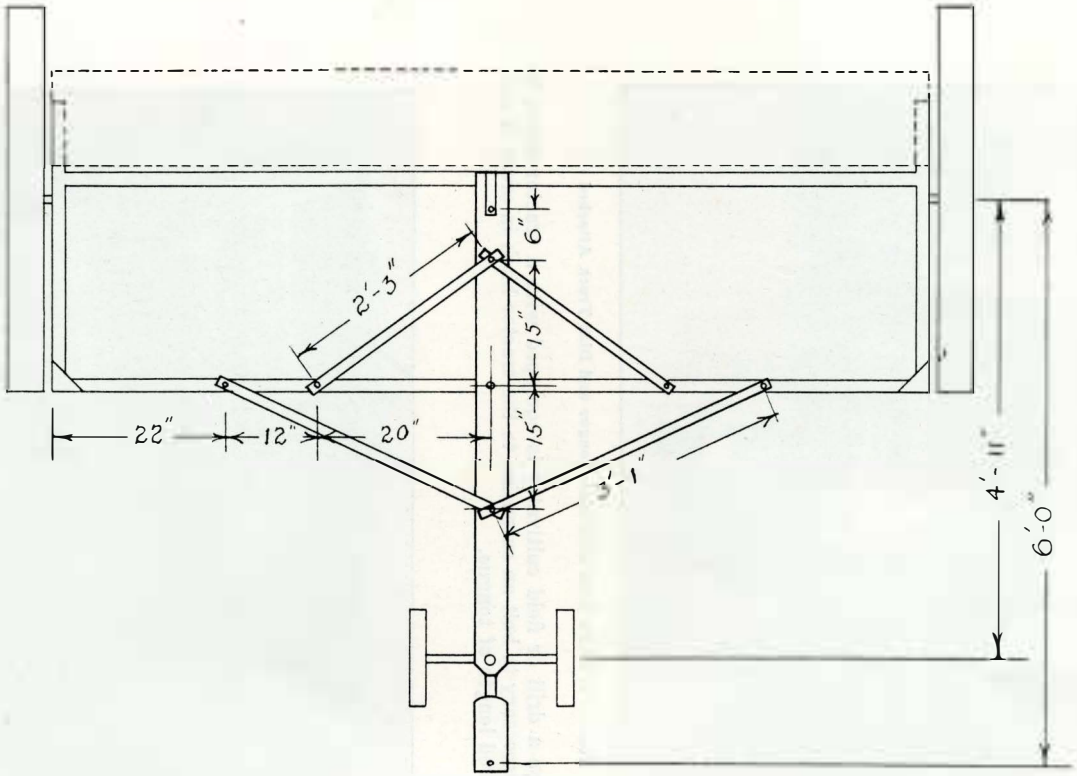


Fig. 5.—Drawing of Drill Shown in Fig. 3

Note the home-made U clamp used to fasten the rear end of the stub tongue to the drill frame. The stub tongue should be fastened to more than one cross member if possible, in order to prevent bending of the drill frame.

When attaching a tongue truck, or stub tongue, to a drill, it is important to attach it so that the frame of the drill, or the hopper, is level. This can be determined by placing a level on top of hopper or frame. If the drill is tipped backward or forward the rate of seeding may be affected.

Section 3

The Brace from the Front Implement to the Hitch; An Important Part of the Two-Implement Hitch.—In order to turn short enough to go back and forth across a field it is necessary to fasten a brace from the front implement to the hitch. Fig. 6 shows the shortest right turn that can be made when pulling two drills, 10′ and 9′, when the brace is not used. Fig 7. and Fig 8 show turns made when the brace is attached. In addition to making short turns possible this brace keeps the implements in the proper position and prevents weaving of the hitch when traveling

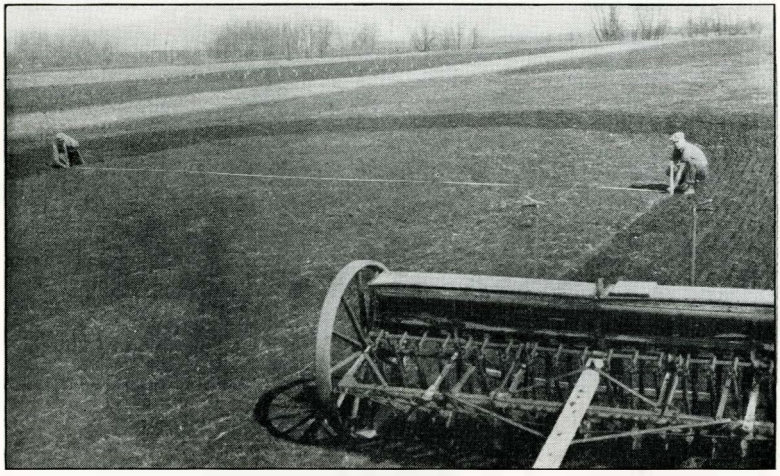


Fig. 6.—The Shortest Turn Possible Without the Brace

A wide turn is necessary because the rear implement tends to drop back when turning. This allows the front implement to strike the hitch when a short turn is attempted. The brace is needed on all two-implement hitches.

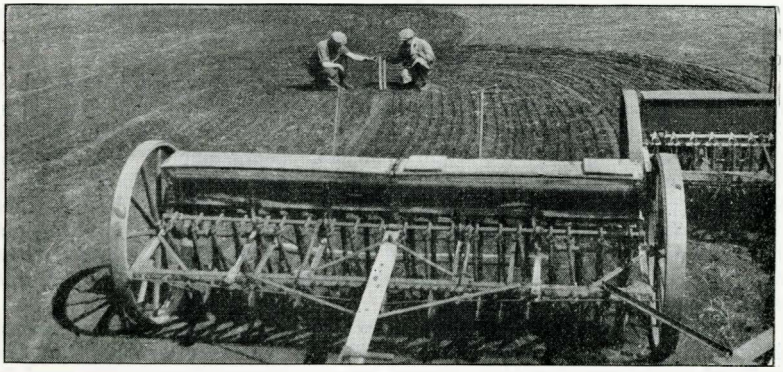


Fig. 7.—A Turn to the Right When the Brace is in Place

across the field. The brace holds the front implement and the hitch in the same relative position at all times, which makes possible a shorter hitch. With the rear implement removed the front implement can be pulled through a gate or pulled from field to field with the hitch attached. This brace is used with all two implement hitches. See Fig. 1, Fig. 2, Fig. 14, Fig. 15, Fig. 16, and Fig. 17.

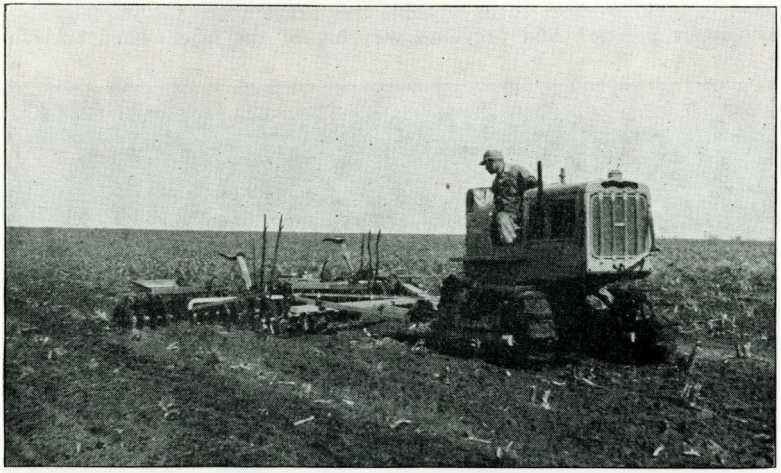


Fig. 8.—A Short Turn to the Right with the Brace in Place

Section 4

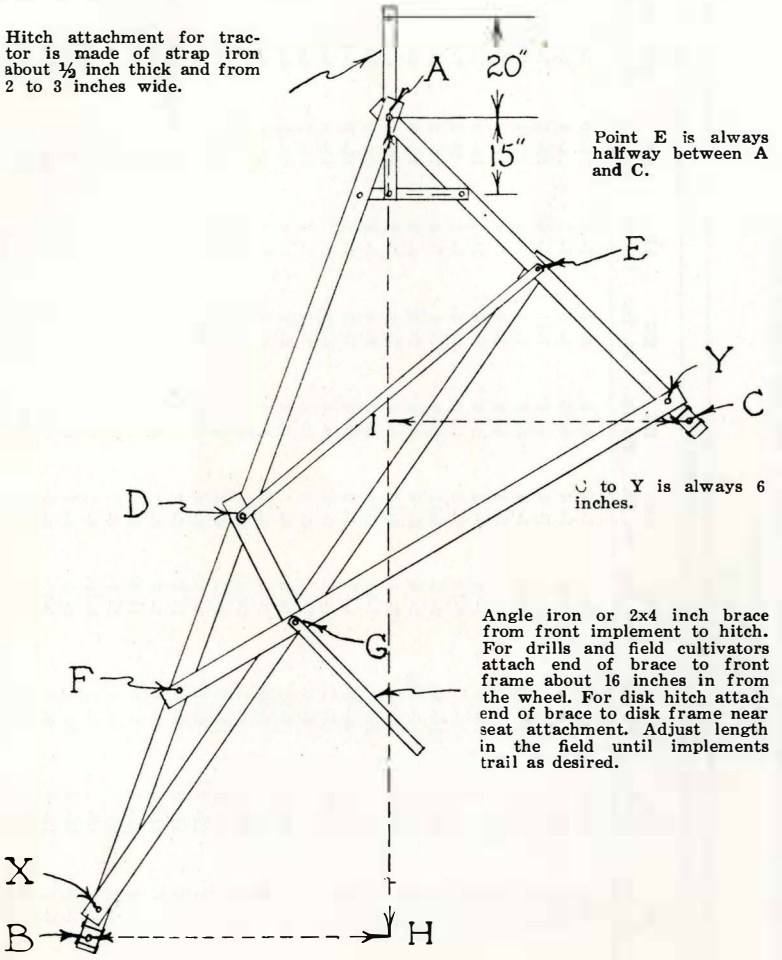
Hitches For Two Drills (Furrow Openers Spaced 6 Inches Apart) Two Field Cultivators and Two Disk Harrows.—This hitch should be built for combinations of two drills or two field cultivators. If a person has two disks of the same width as his two drills or field cultivators, the disks can be pulled with the same hitch, and this type of hitch should be built. **This hitch should not be built for use with disks exclusively.** (The design shown on page 26 or page 29 should be used.)

The specifications for hitches in this group are given in Tables 1 and 2. Table 1 gives the length of the pieces and the distance between holes; Table 2 gives the size of the hitch pieces. The design for hitches in this group is shown in Fig. 2 and Fig. 9. See "Work Sheet," Fig. 10, and "Instruction for Building Two-Implement Hitches. How to Use Work Sheet," Section 4-A. The average farmer can build one of these hitches in two hours or less if he follows the detailed instructions for filling out the table on the work sheet with the required dimensions, laying out the material, cutting the pieces to the proper length, boring the holes, and assembling the hitch.

In the two-implement hitches the wider implement is always placed ahead and to the right. The draft of field cultivators is greater than the draft of drills and for that reason heavier material must be used in field cultivator hitches.

Fig. 9.—Design of Hitch Recommended for Two Implements—Drills, Field Cultivators, Disks

This is the hitch for the 10-ft. and 10-ft. combination and it is used to illustrate the Instruction Sheet.



For 10-Ft. & 10-Ft. Combination

Piece or Distance	Bolt hole to Bolt hole	Length of Material: From table Ft. In.	Length of Material: Past bolt holes Inches	Total Length Of Pieces Ft. In.	Size of Pieces Required Inches
AB	A to B	14- 5	5	14-10	2x4
AC	A to C	7- 1	5	7- 6	2x4
EX	E to X	12-10	5	13- 3	2x4
FY	F to Y	9- 5	5	9-10	2x4
DG	D to G	1-11	5	2- 4	2x4
DE	D to E	6- 4	5	6- 9	½ Inch
BX	B to X	0- 6			rod or
AD	A to D	7- 0			strap or
EG	E to G	6-11			2x4

Length of stub tongue for front drill is 6 feet.
Length of stub tongue for rear drill is 7 feet.

TABLE 1.—Specifications for Two-Drill, Two-Field Cultivator, or Two-Disk Harrow Hitches
Hitch Piece Dimensions
(See Fig. 9.)

Hitch No.	Implement Width* Feet	Length Of Rear Tongue Feet	Length of: AB Ft. In.	AC Ft. In.	EX Ft. In.	FY Ft. In.	DG Ft. In.	DE Ft. In.	BX Ft. In.	EG Ft. In.	AD Ft. In.	AH Ft. In.	HB Ft. In.	AI or IC Ft. In.
1.	14 &14	7	16- 5	9-11	15- 0	12- 3	3- 1	7- 5	0- 6	8- 4	7- 5	14-10	7-0	7-0
2.	14 &12	7	15- 3	8- 6	14- 1	11- 5	2- 4	7- 4	0- 6	8- 0	7- 5	13- 6	7-0	6-0
3.	14 &11	7	14- 7	7- 9	13- 6	11- 0	2- 0	7- 4	0- 6	7-11	7- 5	12- 7	7-0	5-6
4.	14 &10	7	14- 0	7- 1	13- 0	10- 9	1- 9	7- 4	0- 6	7- 9	7- 4	12- 1	7-0	5-0
5.	14 & 9	7	13- 4	6- 4	12- 6	10- 4	1- 6	7- 3	0- 6	7- 8	7- 4	11- 5	7-0	4-6
6.	14 & 8	7	12- 9	5- 8	12- 0	10- 0	1- 3	7- 3	0- 6	7- 6	7- 4	10- 8	7-0	4-0
7.	14 & 7	8	11- 6	5- 0	11- 0	9- 7	0-10	7- 4	0- 6	7- 4	7- 3	9- 2	7-0	3-6
8.	12 &12	7	15- 4	8- 6	13-10	10- 9	2- 5	6-11	0- 6	7- 8	7- 3	14- 2	6-0	6-0
9.	12 &11½	7	14-11	8- 2	13- 6	10- 5½	2- 6	6- 6	0- 6	7- 3	6- 9	13- 9	6-0	5-9
10.	12 &11	7	14- 8	7- 9	13- 3	10- 4	2- 1	6-10	0- 6	7- 6	7- 2	13- 4	6-0	5-6
11.	12 &10	7	14- 0	7- 1	12- 9	10- 0	1-10	6-10	0- 6	7- 4	7- 2	12- 9	6-0	5-0
12.	12 & 9	7	13- 5	6- 4	12- 3	9- 8	1- 7	6- 9	0- 6	7- 2	7- 1	12- 0	6-0	4-6
13.	12 & 8½	7	12- 6	6- 0	11- 6	9- 3	1- 6	6- 5	0- 6	6-10	6- 7	11- 0	6-0	4-3
14.	12 & 8	7	12- 9	5- 8	11- 8	9- 4	1- 4	6- 9	0- 6	7- 1	7- 0	11- 2	6-0	4-0
15.	12 & 7½	7	12- 1	5- 4	11- 2	8-11	1- 3	6- 5	0- 6	6- 8	6- 6	10- 6	6-0	3-9
16.	12 & 7	8	11- 6	5- 0	10- 8	8-10	1- 0	6- 6	0- 6	6- 9	6- 8	9-10	6-0	3-6
17.	12 & 6	8	10-10	4- 3	10- 2	8- 5	0-10	6- 4	0- 6	6- 6	6- 5	9- 0	6-0	3-0
18.	11½&11½	7	15- 0	8- 2	13- 6	10- 3	2- 5	6- 6	0- 6	7- 2	6- 9	13-10	5-9	5-9
19.	11½&10	7	14- 0	7- 1	12- 8	9- 7	2- 0	6- 4	0- 6	6-11	6- 8	12- 9	5-9	5-0
20.	11½& 9	7	13- 4	6- 4	12- 2	9- 3	1- 8	6- 3	0- 6	6- 9	6- 7	12- 1	5-9	4-6
21.	11½& 8½	7	13- 0	6- 0	11-10	9- 1	1- 6	6- 3	0- 6	6- 8	6- 6	11- 8	5-9	4-3
22.	11½& 7½	7	12- 5	5- 4	11- 5	8- 9	1- 3	6- 3	0- 6	6- 6	6- 5	11- 0	5-9	3-9
23.	11½& 7	8	11- 6	4-11	10- 7	8- 6	1- 1	6- 2	0- 6	6- 5	6- 4	9-11	5-9	3-6
24.	11½& 6	8	10- 9	4- 3	10- 1	8- 3	0-11	6- 2	0- 6	6- 4	6- 3	9- 2	5-9	3-0
25.	11 &11	7	14-10	7- 9	13- 4	10- 1	2- 3	6- 7	0- 6	7- 3	7- 1	13- 9	5-6	5-6
26.	11 &10	7	14- 2	7- 1	12- 9	9- 8	1-11	6- 7	0- 6	7- 2	7- 0	13- 1	5-6	5-0
27.	11 & 9	7	13- 6	6- 4	12- 3	9- 5	1- 8	6- 6	0- 6	7- 0	6-11	12- 4	5-6	4-6
28.	11 & 8	7	12-10	5- 8	11- 8	9- 0	1- 4	6- 5	0- 6	6- 9	6-10	11- 7	5-6	4-0

TABLE 1. (Con't.)—Specifications for Two-Drill, Two-Field Cultivator, or Two-Disk Harrow Hitches
Hitch Piece Dimensions
(See Fig. 9.)

Hitch No.	Implement Width* Feet	Length Of Rear Tongue Feet	Length of: AB Ft. In.	AC Ft. In.	EX Ft. In.	FY Ft. In.	DG Ft. In.	DE Ft. In.	BX Ft. In.	EG Ft. In.	AD Ft. In.	AH Ft. In.	HB Ft. In.	AI or IC Ft. In.
29.	11 & 7	8	11- 8	5- 0	10- 9	8- 8	1- 1	6- 5	0- 6	6- 8	6- 8	10- 4	5-6	3-6
30.	10 &10	7	14- 5	7- 1	12-10	9- 5	1-11	6- 4	0- 6	6-11	7- 0	13- 6	5-0	5-0
31.	10 & 9	7	13- 9	6- 4	12- 4	9- 0	1- 8	6- 3	0- 6	6- 9	6-10	12- 9	5-0	4-6
32,	10 & 8½	7	13- 3	6- 0	11-11	8- 8	1- 7	5-11	0- 6	6- 5	6- 5	12- 3	5-0	4-3
33.	10 & 8	7	13- 0	5- 8	11- 9	8- 9	1- 5	6- 3	0- 6	6- 7	6- 9	12- 0	5-0	4-0
34.	10 & 7½	7	12- 8	5- 4	11- 5	8- 4	1- 4	5-11	0- 6	6- 3	6- 4	11- 7	5-0	3-9
35.	10 & 7	8	12- 1	5- 0	10-10	8- 4	1- 1	6- 2	0- 6	6- 5	6- 7	10-11	5-0	3-6
36.	10 & 6	7	11- 7	4- 3	8- 6	7- 5	0- 7	6- 2	2- 7	6- 3	6- 6	10- 6	5-0	3-0
37.	9 & 9	7	14- 2	6- 4	12- 7	8- 9	1- 8	6- 1	0- 6	6- 7	6-10	13- 5	4-6	4-6
38.	9 & 8½	7	13- 7	6- 0	12- 2	8- 5	1- 8	5- 9	0- 6	6- 3	6- 5	12-10	4-6	4-3
39.	9 & 8	7	13- 5	5- 8	12- 0	8- 5	1- 5	6- 0	0- 6	6- 5	6- 8	12- 8	4-6	4-0
40.	9 & 7½	7	13- 0	5- 4	11- 8	8- 1	1- 4	5- 9	0- 6	6- 1	6- 4	12- 2	4-6	3-9
41.	9 & 7	8	12- 7	5- 0	9- 6	7- 8	0-11	6- 1	2- 4	6- 3	6- 7	11- 9	4-6	3-6
42.	9 & 6	7	11-11	4- 3	8- 5	7- 0	0- 8	5- 8	3- 0	5-10	6- 2	11- 1	4-6	3-0
43.	8½& 8½	7	13-11	6- 0	12- 4	8- 4	1- 8	5- 9	0- 6	6- 2	6- 5	13- 3	4-3	4-3
44.	8½& 7½	7	13- 2	5- 4	11-10	8- 0	1- 5	5- 7	0- 6	6- 0	6- 3	12- 6	4-3	3-9
45.	8½& 7	7	12-10	4-11	11- 6	7- 9	1- 3	5- 7	0- 6	5-11	6- 2	12- 2	4-3	3-6
46.	8½& 6	6	12- 5	4- 3	7- 6	6- 7	0- 7	5- 8	4- 4	5-10	6- 3	11- 8	4-3	3-0
47.	8 & 8	7	13-11	5- 8	12- 4	8- 3	1- 6	5-10	0- 6	6- 3	6- 7	13- 4	4-0	4-0
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50.	7½& 7	6	13- 7	4-11	12- 1	7- 8	1- 4	5- 5	0- 6	5- 9	6- 2	13- 1	3-9	3-6
51.	7½& 6	6	12- 9	4- 3	8- 7	6- 9	0-10	5- 5	3- 5	5- 7	6- 2	12- 3	3-9	3-0
52.	7 & 7	6	13-11	5- 0	10- 1	7- 4	1- 0	5- 8	2-10	6- 0	6- 7	13- 5	3-6	3-6
53.	7 & 6	6	13- 1	4- 3	8- 6	6- 8	0-10	5- 3	3- 8	5- 6	6- 0	12- 6	3-6	3-0
54.	6 & 6	6	13- 7	4- 3	9- 1	6- 8	0-10	5- 4	3- 7	5- 6	6- 1	13- 3	3-0	3-0

NOTE: CY is always 6 inches. E is always halfway between A & C.
*** Note that the wider implement is always ahead and to the right.**

TABLE 2.—Specifications for Two Drill, Two Field Cultivator, or Two Disk Harrow Hitches

Size of Hitch Pieces

(Selected Fir or Wood of Equivalent Strength Must Be Used.)

For Field Cultivators pieces must be two inches wider than dimensions given in table. DG is a 2x4 inch piece. DE may be a 5/8 inch rod, a strap iron of equal strength, or a 2x4 inch.

Hitch No.	Implement Width in Ft.	Size of AB In.xIn.	Size of AC In.xIn.	Size of EX In.xIn.	Size of FY In.xIn.
1	&14	2x6	2x6	2x6	2x6
2	14 &12	2x6	2x6	2x6	2x6
3	14 &11	2x6	2x6	2x6	2x6
4	14 &10	2x4	2x4	2x4	2x4
5	14 & 9	2x4	2x4	2x4	2x4
6	14 & 8	2x4	2x4	2x4	2x4
7	14 & 7	2x4	2x4	2x4	2x4
8	12 &12	2x6	2x6	2x6	2x6
9	12 &11½	2x6	2x6	2x6	2x6
10	12 &11	2x6	2x6	2x6	2x6
11	12 &10	2x4	2x4	2x4	2x4
12	12 & 9	2x4	2x4	2x4	2x4
13	12 & 8½	2x4	2x4	2x4	2x4
14	12 & 8	2x4	2x4	2x4	2x4
15	12 & 7½	2x4	2x4	2x4	2x4
16	12 & 7	2x4	2x4	2x4	2x4
17	12 & 6	2x4	2x4	2x4	2x4
18	11½&11½	2x6	2x6	2x6	2x6
19	11½&10	2x6	2x6	2x6	2x6
20	11½& 9	2x4	2x4	2x4	2x4
21	11½& 8½	2x4	2x4	2x4	2x4
22	11½& 7½	2x4	2x4	2x4	2x4
23	11½& 7	2x4	2x4	2x4	2x4
24	11½& 6	2x4	2x4	2x4	2x4
25	11 &11	2x6	2x6	2x6	2x6
26	11 &10	2x4	2x4	2x4	2x4
27	11 & 9	2x4	2x4	2x4	2x4
28	11 & 8	2x4	2x4	2x4	2x4
29	11 & 7	2x4	2x4	2x4	2x4
30	10 &10	2x4	2x4	2x4	2x4
31	10 & 9	2x4	2x4	2x4	2x4
32	10 & 8½	2x4	2x4	2x4	2x4
33	10 & 8	2x4	2x4	2x4	2x4
34	10 & 7½	2x4	2x4	2x4	2x4
35	10 & 7	2x4	2x4	2x4	2x4
36	10 & 6	2x6	2x4	2x6	2x4
37	9 & 9	2x4	2x4	2x4	2x4
38	9 & 8½	2x4	2x4	2x4	2x4
39	9 & 8	2x4	2x4	2x4	2x4
40	9 & 7½	2x4	2x4	2x4	2x4
41	9 & 7	2x6	2x4	2x6	2x4
42	9 & 6	2x6	2x4	2x6	2x4
43	8½& 8½	2x4	2x4	2x4	2x4
44	8½& 7½	2x4	2x4	2x4	2x4
45	8½& 7	2x4	2x4	2x4	2x4
46	8½& 6	2x8*	2x4	2x8*	2x4
47	8 & 8	2x4	2x4	2x4	2x4
48	8 & 7	2x8*	2x4	2x6	2x4
49	7½& 7½	2x4	2x4	2x4	2x4
50	7½& 7	2x4	2x4	2x4	2x4
51	7½& 6	2x8*	2x4	2x6	2x4
52	7 & 7	2x8*	2x4	2x6	2x4
53	7 & 6	2x8*	2x4	2x6	2x4
54	6 & 6	2x8*	2x4	2x6	2x4

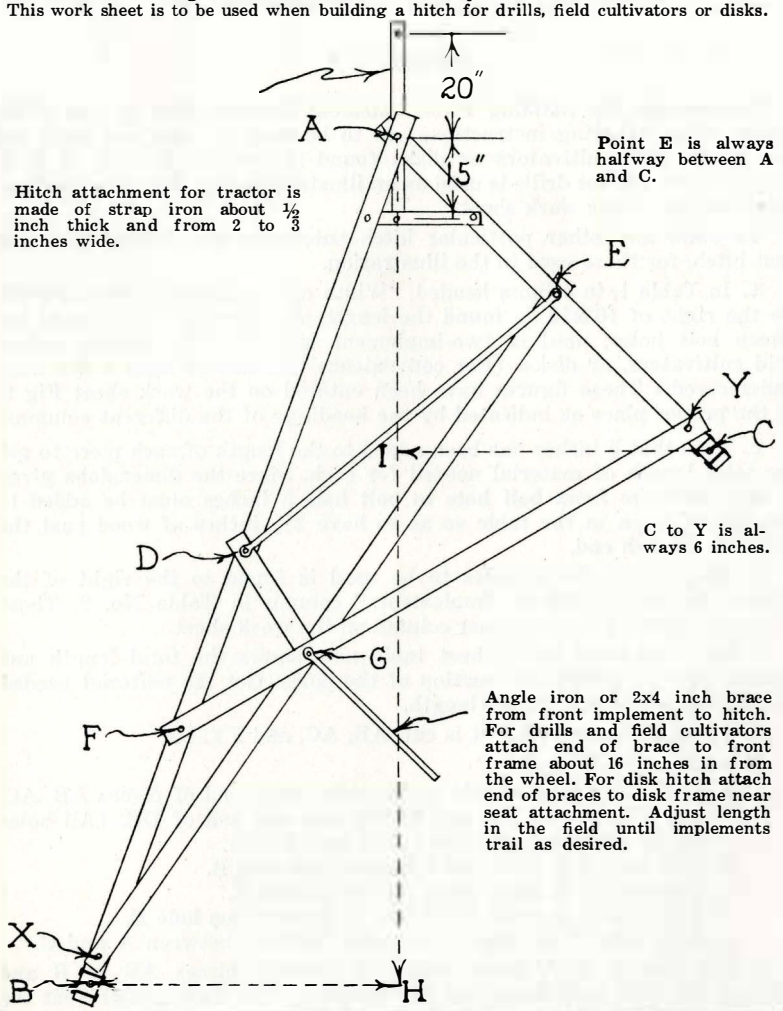
* Instead of using a 2x8 for AB use a 2x6 and bolt a 2x6 on the underside of AB. This should reach from D to B and be bolted at D, F, X, and B.

Where a 2x8 is specified for EX a 2x6 may be used and a 2x4 bolted on top of it. Bolt this 2x4 on top of AC on top of AG and on top of X with a 2 inch block as a spacer at X.

WORK SHEET FOR DRILL OR FIELD CULTIVATOR OR DISK

Fig. 10.—Work Sheet for Two-Implement Hitches

This work sheet is to be used when building a hitch for drills, field cultivators or disks.



Piece or Distance	Bolt hole to Bolt hole	Length of Material: From table Ft. In.	Length of Material: Past bolt holes Inches	Total Length Of Pieces Ft. In.	Size of Pieces Required Inches
AB	A to B				
AC	A to C				
EX	E to X				
FY	F to Y				
DG	D to G				
DE	D to E				
BX	B to X				
AD	A to D				
EG	E to G				

Length of stub tongue for front drill or field cultivator is 6 feet.
Length of stub tongue for rear drill or field cultivator is ___ feet.

Section 4-A

Instructions for Building Two-Implement Hitches; How to Use Work Sheet.—The following instructions are to be used to build any hitch for two drills, field cultivators or disks found in sections 4, 5, 6, or 7. A hitch for two 10-foot drills is used as an illustration. Fig. 9 is used to illustrate the use of the work sheet.

To build any other particular hitch substitute the specifications for that hitch, for those used in the illustration.

1. In Table 1, in column headed, "Width of Implements," find 10′&10′. To the right of 10′&10′ is found the length of pieces, or the distance between bolt holes, used in two-implement hitch for two 10-foot drills, field cultivators, or disks. (For convenience this line of figures has been underscored.) These figures have been entered on the work sheet Fig 9, in the proper place as indicated by the headings of the different columns.

2. Note that 5 inches has been added to the length of each piece to get the total length of material needed for each. **Since the dimensions given in the table are from bolt hole to bolt hole 5 inches must be added to the length given in the table so as to have 2½ inches of wood past the bolt hole at each end.**

3. The size of the timbers to be used is found to the right of the 10′&10′ in the "Width of Implements" column in Table No. 2. These sizes are recorded in the proper column on the work sheet.

4. The completed work sheet table now shows the total length and size of each piece and the location of the holes. Get the material needed and cut the pieces the proper length.

5. Label each piece after it is cut, AB, AC, and FY, etc.

6. Location of holes.

   a. Bore ½ inch holes, 2½ inches from each end of pieces AB, AC, and EX, and in **one end** of FY and **one end** of DE. (All holes unless otherwise specified are ½ inch holes).
   b. Bore hole X in piece AB **6 inches from hole** B.
   c. Bore hole D in piece AD **7 feet from hole** A.
   d. Bore hole G in piece EX **6 feet 11 inches from hole E.**
   e. Bore hole E in piece AC exactly halfway between A and C.

7. Put two ⅜ inch bolts crosswise through pieces AB at B and through AC at C as indicated on the drawing, at C. This will prevent the holes where the implements attach from splitting out. A light strap iron, as wide as the piece is thick, will strengthen and protect the ends of the pieces.

8. To assemble the hitch.

   a. Lay out the pieces as shown on the work sheet. KEEP THE WORK SHEET BEFORE YOU AT ALL TIMES. Refer to the drawing **in order to determine which piece goes on top of the other when assembling the hitch.** Be sure to use large washers at each end of all bolts.
   b. Bolt pieces AB and AC together at A (Do not tighten nuts).
   c. Bolt EX in place.
   d. Bolt FY to AC at Y.

e. Move F end of FY until center of the piece comes over hole G in piece EX. Bore a hole in FY to match hole G.

f. Bore hole F through pieces FY and AB and bolt together (be sure to have the holes in the center of both pieces).

g. Lay short piece GD in place, the G end on top of EX and butting up against FY with the D end lying over hole D in AB; bore hole in GD to match hole D; put bolt D in place (without nut).

h. Bolt DE on at D end and bore hole in E end to match hole E.

i. Toe-nail G end of GD to pieces FY and EX.

j. Tighten all nuts. Be **sure that large washers are in place at each end of all bolts.**

9. Hitch attachment for tractor.

This attachment prevents hole A from tearing out and assists in turning, especially where the tractor is equipped with a short drawbar, but the hitch can be used without it.

In order to get the hitch attachment for the tractor in the correct position draw lines on the ground, or floor, as represented by the broken lines on the drawing.

a. Draw a straight line AH. See Table No. 1 for length.

b. Place bolt A directly over the line at A.

c. Find the distance HB in the Table No. 1 and measure out from H this distance perpendicular to AH; place B directly over this point being sure that bolt A is still in the proper place.

d. Locate the hitch piece so that it lines up perfectly with the line AH, and bolt it in place.

10. The front drill is attached at point C and the rear drill at point B. The brace from point G on the hitch to the frame of the front drill can best be installed in the field. **This brace must be used or else the drills will not turn satisfactorily and will weave.** Use a piece of 1¼"x1¼" angle iron or a piece of 2"x4" for this brace. Attach the brace to the drill frame about 16" in from the wheel and adjust the length until the back drill trails correctly.

11. To insure long service:

Give the hitch a coat of linseed oil and at least one coat of paint.

Use large washers at each end of bolts. (Pieces of strap iron one to two inches square make good washers).

Keep all nuts tight.

When hitch is not in use, it should be hung up on the side of a building to prevent warping.

Section 5

Two Drills, Furrow Openers Spaced 7 Inches Apart.—A separate series of hitches is not made up for drills with furrow openers spaced 7 inches apart because of the comparatively limited use of these drills. The hitch that is to be used is shown in Fig. 9. This is the same hitch that is used for drills with furrow openers spaced 6 inches apart, and the same work sheet, Fig. 10, is used. The specifications are given in Table 3. For some combinations of widths, the holes where the drills are attach-

ed are located in,* or out, from the center of the hitch member. For combinations where the implements must be moved in more than 1½ inches, extensions, as shown in Fig. 11, must be added.

When holes are bored near the edge of the hitch member, it is essential that the end of the hitch member be bound with a piece of strap iron as suggested in the instructions for building a hitch.

TABLE 3.—Specifications for Two-Drill Hitches, Furrow Openers Spaced 7 Inches Apart.

(See Fig. 2 and Fig. 11)

Hitch No.	Combination Of Implements	Drill or Field Cultivator Hitch to Use	Adjustments to Make
55	24x7&24x7	14 &14	None
56	24x7&18x7	14 &11	Set front drill in 3 inches†
57	24x7&16x7	14 & 9	Set both out 1 inch
58	24x7&14x7	14 & 8	Set both out ½ inch or adjust with brace
59	24x7&13x7	14 & 8	Set front drill in 2½ inches†
60	24x7&12x7	14 & 7	None
61	18x7&18x7	11 &10	None
62	18x7&16x7	11 & 9	Set rear drill in 1 inch
63	18x7&14x7	11 & 8	Set rear drill in 2 inches
64	18x7&13x7	11 & 7	Adjust with brace
65	18x7&12x7	10 & 7½	Adjust with brace
66	16x7&16x7	10 & 9	Set rear drill in 2 inches
67	16x7&14x7	9 & 8½	Adjust with brace
68	16x7&13x7	10 & 7	Set rear drill in ½ inch
69	16x7&12x7	9 & 8	Set front drill in 4 inches†
70	14x7&14x7	8 & 8	Set both out 1 inch
71	14x7&13x7	8½& 7½	Set rear drill in 1½ inches
72	14x7&12x7	8 & 7	Set rear drill out 1 inch
73	13x7&13x7	7½& 7½	Set both out ½ inch
74	13x7&12x7	7½& 7	Set rear drill out ½ inch
75	12x7&12x7	7 & 7	None

† See Fig. 11 for details of extensions.

Section 6

Two Drills, Furrow Openers Spaced 8 Inches Apart.—A separate series of hitches is not made up for drills with furrow openers spaced 8 inches apart because of the comparatively limited use of these drills. The hitch that is to be used is shown in Fig. 9. This is the same hitch that is

* "In" means toward the other implement.

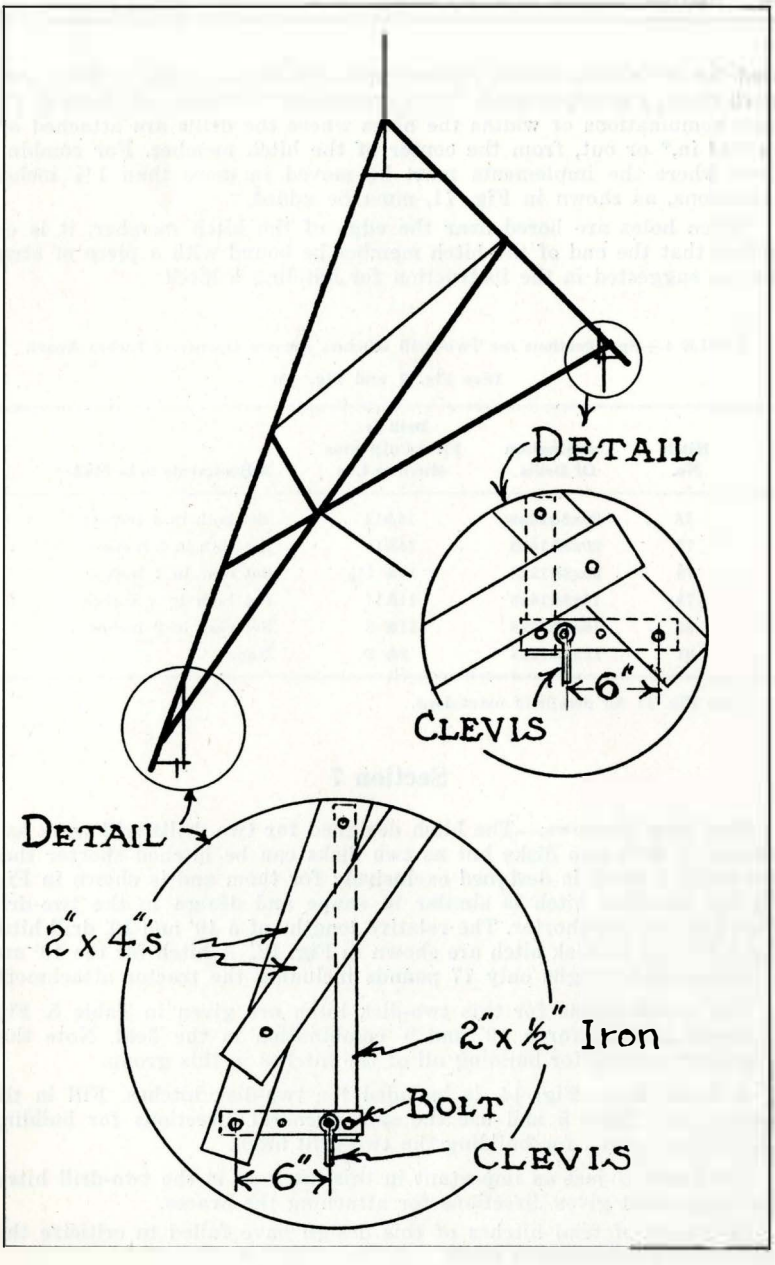


Fig. 11.—The Two-Implement Hitch Equipped with Extensions
These extensions make it possible to use many of the hitches designed for one certain combination of width, for several other combinations. See table 7.

used for drills with furrow openers spaced 6 inches apart, and the same work sheet, Fig. 10, is used. The specifications are given in Table 4. For some combinations of widths the holes where the drills are attached are located in,* or out, from the center of the hitch member. For combinations where the implements must be moved in more than 1½ inches, extensions, as shown in Fig. 11, must be added.

When holes are bored near the edge of the hitch member, it is essential that the end of the hitch member be bound with a piece of strap iron as suggested in the instruction for building a hitch.

TABLE 4.—Specifications for Two-Drill Hitches, Furrow Openers 8 Inches Apart.

(See Fig. 2 and Fig. 11)

Hitch No.	Combination Of Drills	Drill or Field Cultivator Hitch to Use	Adjustments to be Made
76	20x8&20x8	14&14	Set both in 4 inches†
77	20x8&16x8	14&11	Set both in 3 inches†
78	20x8&12x8	14& 7½	Set rear in 1 inch
79	16x8&16x8	11&11	Set both in 2 inches
80	16x8&12x8	11& 8	Set rear in 2 inches
81	12x8&12x8	8& 8	None

† See Fig. 11 for details of extensions.

Section 7

Two Disk Harrows.—The hitch designed for two drills will work satisfactorily with two disks but as two disks can be hitched shorter than two drills, a hitch is designed exclusively for them and is shown in Fig. 13. The two-disk hitch is similar in shape and design to the two-drill hitch but is much shorter. The relative lengths of a 10′ and 10′ drill hitch and a 10′ and 10′ disk hitch are shown in Fig. 12. A hitch for the 10′ and 9′ combination weighs only 77 pounds including the tractor attachment.

The specifications for this two-disk hitch are given in Table 5. Fig. 15 shows a hitch for a 10′ and 9′ combination in the field. Note that 2″ x 4″ fir is used for building all of the hitches in this group.

A work sheet, Fig. 14, is included for two-disk hitches. Fill in the blanks from Table 5 and use the same general directions for building this hitch as given for building the two-drill hitch.

The brace is just as important in this hitch as in the two-drill hitch. The work sheet gives directions for attaching the braces.

Operators of trial hitches of this design have failed to criticize this hitch after a full season's work.

* "In" means toward the other implement.

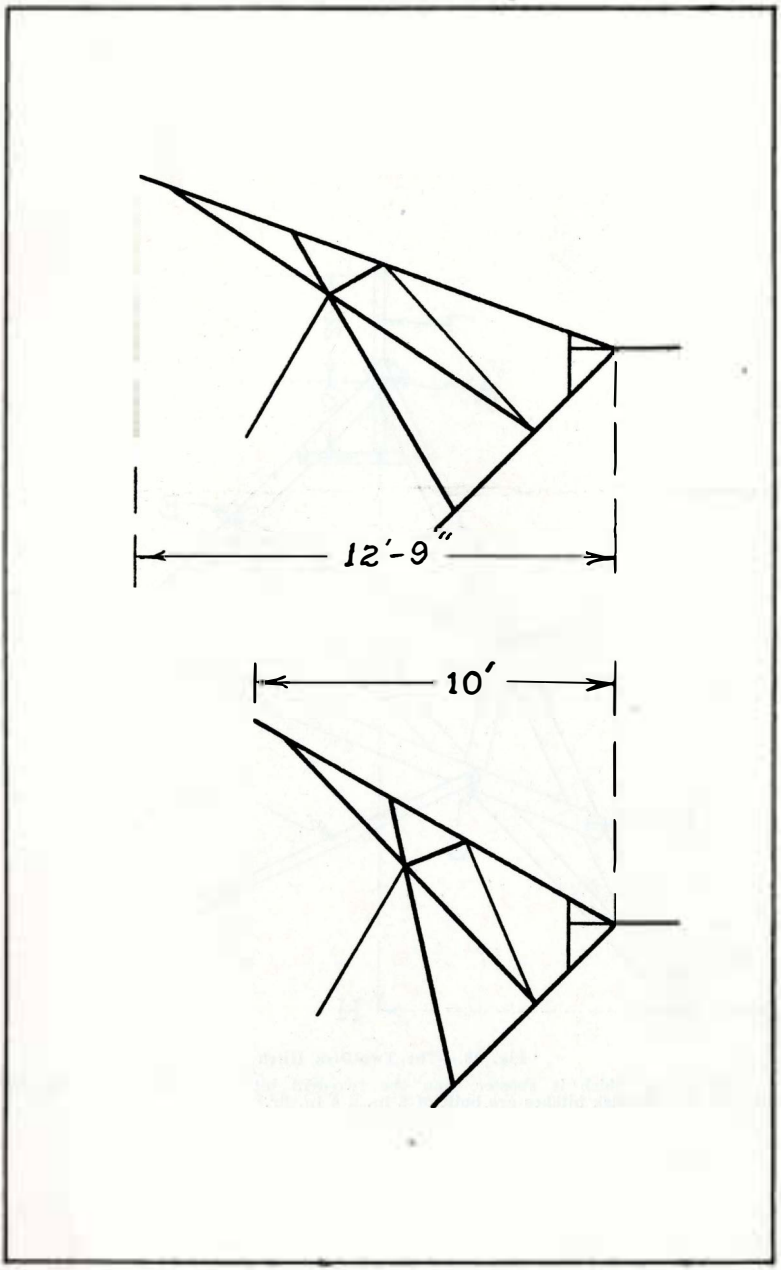


Fig. 12.—The Relative Length of the 10 & 9-Ft. Drill Hitch and the 10 & 9-Ft. Disk Hitch

The upper one is the drill hitch. The drill hitch can be used with disks, but the disk hitch is too short to be used with drills.

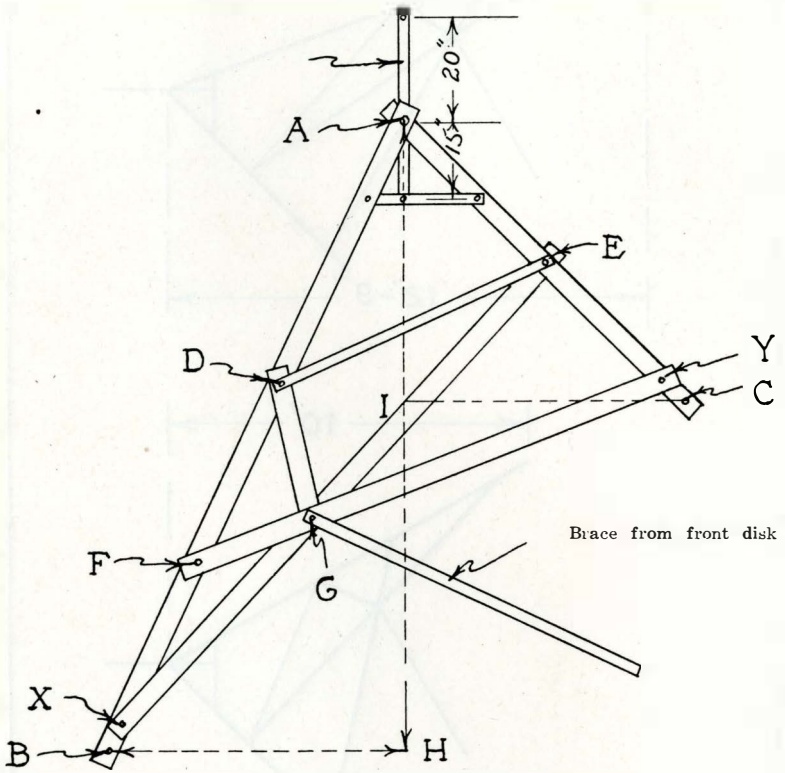


Fig. 13.—The Two-Disk Hitch

This hitch, which is shorter than the two-drill hitch, is used exclusively for disks. All the two-disk hitches are built of 2 in. x 4 in. fir.

TABLE 5.—Specifications for Two-Disk Hitches, Hitch Piece Dimensions
(See Fig. 13)

These Dimensions Are Hole To Hole. Cut Each Piece 5 Inches Longer Than The Length Specified
Use 2x4 inch selected Douglas Fir for building these hitches.

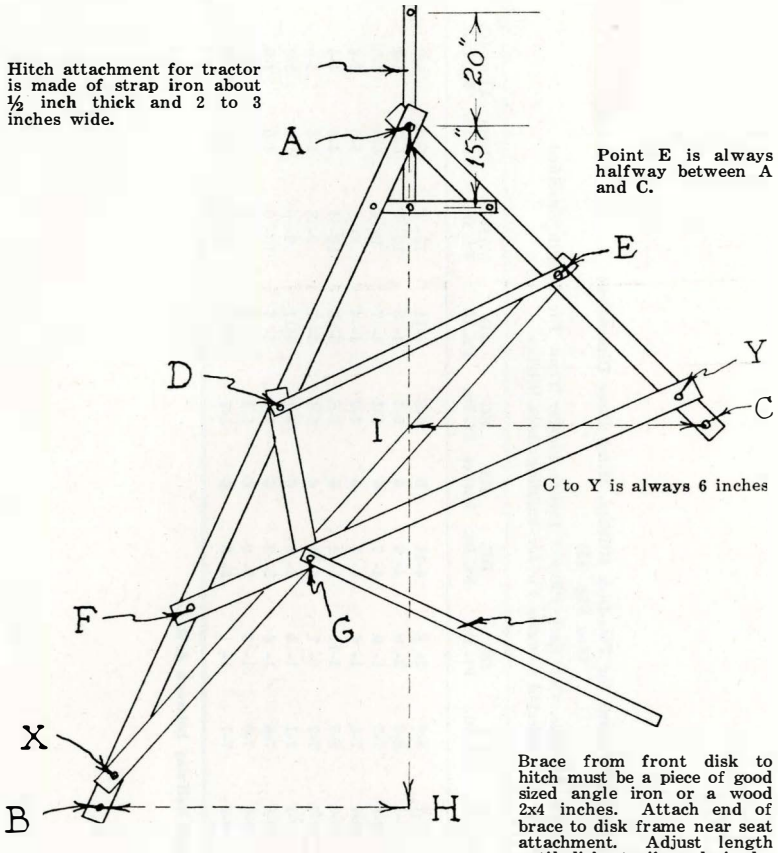
Hitch No.	Widths Of Disks	AB Ft. In.	AC Ft. In.	EX Ft. In.	FY Ft. In.	DG Ft. In.	DE Ft. In.	BX Inches	EG Ft. In.	AD Ft. In	AH Ft. In.	HB Ft. In.	AI or IC Ft. In.
82	10&10	11-9	7-1	10-7	8-6	2- 3	4-11	6	5-8	4-11	10- 8	5-0	5-0
83	10& 9	11-2	6-4	10-1	8-0	2- 0	4- 9	6	5-4	4- 8	10- 0	5-0	4-6
84	10& 8	10-7	5-8	9-8	7-7	1- 9	4- 7	6	5-1	4- 7	9- 4	5-0	4-0
85	10& 7	10-0	5-0	9-1	7-1	1- 6	4- 5	6	4-9	4- 4	8- 8	5-0	3-6
86	9& 9	11-3	6-4	10-0	8-1	1-11	5- 1	6	5-8	5- 3	10- 4	4-6	4-6
87	9& 8	10-8	5-8	9-7	7-7	1- 7	4-11	6	5-4	5- 1	9- 8	4-6	4-0
88	9& 7	10-1	5-0	9-1	7-1	1- 4	4- 9	6	5-1	4-11	9- 0	4-6	3-6
89	8& 8	10-9	5-8	9-6	7-6	1- 6	5- 2	6	5-8	5- 7	10- 0	4-0	4-0
90	8& 7	10-2	5-0	9-0	7-0	1- 3	5- 0	6	5-4	5- 4	9- 4	4-0	3-6
91	7& 7	10-6	5-0	9-2	7-1	1- 1	5- 3	6	5-7	5-10	9-11	3-6	3-6

NOTE: CY is always 6 inches. E is always halfway between A & C.

WORK SHEET FOR DISK HARROWS

Fig. 14.—Work Sheet for Two-Disk Hitches

When the dimensions are filled in from table 5 this sheet serves as a plan for the hitch to be built.



Piece or Distance	Bolt hole to Bolt hole	Length of Material from table Ft. In.	Length of Material Past bolt holes Inches	Total Length Of Pieces Ft. In.	Size of Pieces Required Inches
AB	A to B				2x4
AC	A to C				2x4
EX	E to X				2x4
FY	F to Y				2x4
DG	D to G				2x4
DE	D to E				2x4
BX	B to X				
AD	A to D				
EG	E to G				

Section 8

Two Disks—A Very Simple Hitch.—The hitch shown in Fig. 16 is a simple hitch for two disks. It consists of a fir 2″ x 6″, two chains of suitable size, a short piece of 2″ x 4″ or angle iron for a brace and two short pieces of strap iron.

The specifications are given in Table 6. The design of this hitch is shown in Fig. 17. The pieces of strap iron to which the rear end of the chains are bolted are a convenience, rather than a necessity, as the chains may be fastened directly to the clevis pin. Any suitable chain, cable, or rods can be used.

This hitch works quite as satisfactorily as the two-disk hitch shown in Fig. 13 and it can be termed an adjustable hitch, for, by boring other holes in the 2″ x 6″, and by making the chains the length called for in the table of specifications, any combination of widths of disks can be used. The type of disk hitch shown in Fig. 13 is included in this bulletin because it may appeal to some as a more permanent hitch. However, as long as the chains are not removed from this simple hitch, it, too, represents a permanent hitch. Others may prefer the all-wood hitch, especially if chain or a substitute for chain is not readily available.

The specifications given allow for only small clearance between the piece BC and the front disk, and between the two disks. If more clearance is needed, either disk or both disks can be dropped back by using a ring or a short piece of chain.

TABLE 6.—Specifications for Simple Two-Disk Hitches.

(See Fig. 16 and Fig. 17)

Hitch No.	Widths of Implements Feet	Length of BC Ft. In.	Length of AB Ft. In.	Length of AC Ft. In.
92	12&12	12- 4	10-10	8- 9
93	12&10	11- 3	9- 7	7- 0
94	12& 9	10- 9	9- 0	6- 4
95	12& 8	10- 3	8- 8	5- 8
96	12& 7	9- 9	8- 2	4-11
97	10&10	10- 7	9- 9	7- 0
98	10& 9	10- 1	9- 3	6- 4
99	10& 8	9- 6	8- 8	5- 8
100	10& 7	9- 0	8- 2	4-11
101	9& 9	9- 9	9- 4	6- 4
102	9& 8	9- 2½	8-10	5- 8
103	9& 7	8- 8	8- 2	4-11
104	8& 8	8-11½	9- 0	5- 8
105	8& 7	8- 5	8- 4	4-11
106	7& 7	8- 3½	8- 8	4-11

For BC use 2x6 inch fir.

AB and AC are chain, rod or cable.

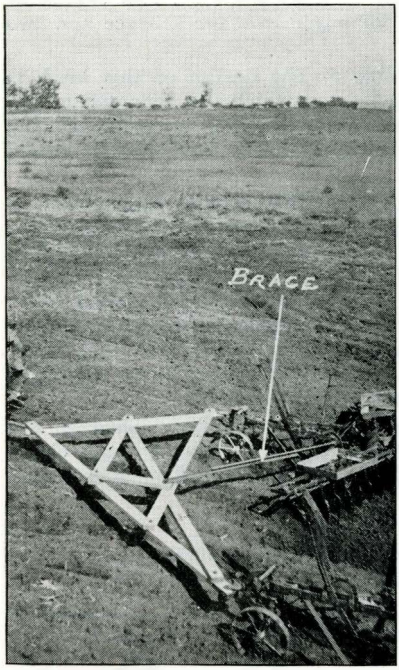


Fig. 15.—The Two-Disk Hitch

This particular hitch, built to pull a 10-ft. and 9-ft. disk, has had a year's service on a large farm. The user expressed complete satisfaction with the hitch.

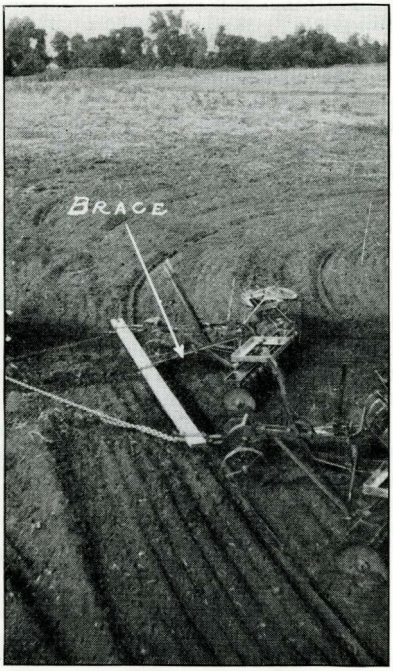


Fig. 16.—The Simple Disk Hitch Pulling A 10-Ft. and 9-Ft. Combination in the Field

Note that the brace from the front disk to BC is attached almost directly ahead of the inner end of the front disk.

The brace from the front disk to the brace, or spacer, BC, is more important in this hitch than in the other disk hitch. Attach the brace to the disk frame near the seat and attach the other end to BC directly ahead of the inner edge of the disk. Adjust the length in the field until the disks trail as desired.

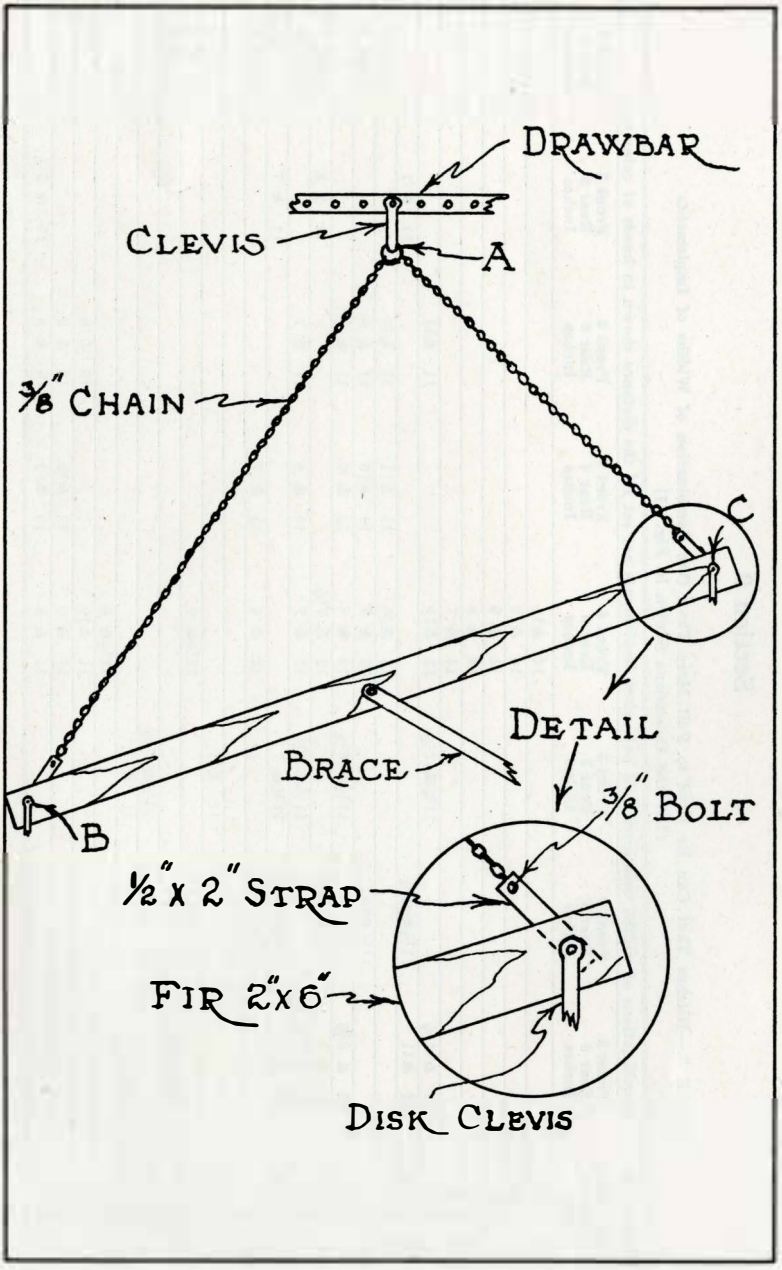


Fig. 17.—The Simple Two-Disk Hitch

The materials needed to build this hitch are: chain, a fir 2 in. x 6 in. and a short 2 in. x 4 in. or rod, for a brace. The detailed drawing shows one way of attaching chains. This same method for attaching the outside implements and the chains to the braces is used in three-implement hitches. No work sheet is needed for this simple hitch.

TABLE 7.—Hitches That Can Be Used to Pull More Than One Combination of Widths of Implements
(Use the Extensions Shown in Fig. 11)

Widths For Which Hitch Is Designed Feet	Combinations of widths that hitch will pull when implements are set IN the distance shown in heads of columns.							
	Front 3 Rear 0 Inches	Front 0 Rear 3 Inches	Front 3 Rear 3 Inches	Front 6 Rear 0 Inches	Front 0 Rear 6 Inches	Front 6 Rear 6 Inches	Front 3 Rear 6 Inches	Front 6 Rear 3 Inches
14 &12				14 &11				
14 &11				14 &10				
14 &10				14 & 9				
14 & 9				14 & 8				
14 & 8				14 & 7				
12 &12	12 &11½		11½&11½	12 &11		11 &11		
12 &11½	12 &11	11½&11½					11 &11	
12 &11				12 &10	11 &11	11 &10		11½&10
12 &10		11½&10		12 & 9	11 &10	11 & 9		11½& 9
12 & 9	12 & 8½	11½& 9	11½& 8½	12 & 8	11 & 9	11 & 8		
12 & 8½	12 & 8	11½& 8½		12 & 7½			11 & 8	11½& 7½
12 & 8	12 & 7½		11½& 7½	12 & 7	11 & 8	11 & 7		11½& 7
12 & 7½	12 & 7	11½& 7½	11½& 7				11 & 7	
12 & 7		11½& 7		12 & 6	11 & 7			11½& 6
12 & 6		11½& 6						
11½&11½			11 &11					
11½&10		11 &10		11½& 9				11 & 9
11½& 9	11½& 8½	11 & 9						11 & 8
11½& 8½		11 & 8	11½& 7½					
11½& 7½	11½& 7		11 & 7					
11½& 7		11 & 7		11½& 6				
11 &11				11 &10		10 &10		
11 &10				11 & 9	10 &10	10 & 9		
11 & 9				11 & 8	10 & 9	10 & 8	10 & 8½	

TABLE 7. (Con't)—Hitches That Can Be Used to Pull More Than One Combination of Widths of Implements (Use the Extensions Shown in Fig. 11)

Widths For Which Hitch Is Designed Feet	Combinations of widths that hitch will pull when implements are set IN the distance shown in heads of columns.							
	Front 3 Rear 0 Inches	Front 0 Rear 3 Inches	Front 3 Rear 3 Inches	Front 6 Rear 0 Inches	Front 0 Rear 6 Inches	Front 6 Rear 6 Inches	Front 3 Rear 6 Inches	Front 6 Rear 3 Inches
11 & 8				11 & 7	10 & 8	10 & 7	10 & 7½	
11 & 7					10 & 7	10 & 6		
10 &10				10 & 9		9 & 9		
10 & 9	10 & 8½			10 & 8	9 & 9	9 & 8	9 & 8½	
10 & 8½	10 & 8			10 & 7½	9 & 8½	9 & 7½	9 & 8	
10 & 8	10 & 7½			10 & 7	9 & 8	9 & 7	9 & 7½	
10 & 7½	10 & 7				9 & 7½		9 & 7	
10 & 7				10 & 6	9 & 7	9 & 6		
10 & 6					9 & 6			
9 & 9	9 & 8½		8½& 8½	9 & 8		8 & 8		
9 & 8½	9 & 8	8½& 8½		9 & 7½			8 & 8	8½& 7½
9 & 8	9 & 7½		8½& 7½	9 & 7	8 & 8	8 & 7		8½& 7
9 & 7½	9 & 7	8½& 7½	8½& 7				8 & 7	
9 & 7		8½& 7		9 & 6	8 & 7			8½& 6
9 & 6		8½& 6						
8½& 8½			8 & 8	8½& 7½		7½& 7½		
8½& 7½	8½& 7		8 & 7		7½& 7½		7½& 7	
8½& 7		8 & 7		8½& 6	7½& 7	7½& 6		
8½& 6					7½& 6			
8 & 8			7½& 7½	8 & 7		7 & 7		7½& 7
8 & 7		7½& 7			7 & 7	7 & 6		7½& 6
7½& 7½	7½& 7		7 & 7					
7½& 7		7 & 7		7½& 6				7 & 6
7½& 6		7 & 6						
7 & 7			7 & 6			6 & 6		
7 & 6					6 & 6			

PART II

Hitches for Three Implements

Section 10

Hitches for all combinations of three drills, three field cultivators, and three single disk harrows are presented in this part.

Description Of The Three-Implement Hitch And Instructions For Building It.—The three-implement hitch is very simple and is made up of material available on every farm.

The two outside implements are pulled by chains, rods, or cables and are held in place by 2″ x 6″ fir braces extending from the clevis of the outside implement to the tongue or frame of the middle one. This type of brace makes the hitch flexible. The chains or cables make an angle of 45 degrees with the line of travel. This angle is sufficient to practically eliminate wobbling of the implements and gives room to pull the middle implement ahead of the outside implements. This makes a hitch so compact that a tongue can be used on the middle implement without having it excessively long.

The middle implement, in other than disk hitches, is pulled six feet ahead of the outside implements. This allows two feet clearance between the wheels of the front and rear implements when they are equipped with four-foot wheels.

The outside implements are equipped with stub tongues and tongue trucks. The stub tongues are made of fir 4″ x 4″ and are 8½ feet long, measured from the axle to the clevis pin. An 8 foot 4″ x 4″ is required for each stub tongue. When three drills are hitched together the middle one is equipped with a long tongue. Field cultivators are hitched the same way. On the three-disk hitch, tongue trucks may be used on all three disks, or the middle disk may be equipped with a tongue.

When the three drills, field cultivators, or disks are of different widths, an equalizer is used to pull the middle implement in the correct position. Two types of equalizers are recommended and either may be used. One has the advantage of simplicity, while the rigidity of the other holds the implements steadier.

Any chain, rod or cable of sufficient size may be used to pull the implements. The hooks and rings on the chain may be used or the chain may be fastened by bolting through the links. A piece of half inch strap iron 6 or 8 inches long with a hole in one end to take the clevis pin and a hole in the other end to which the chain is bolted, is very convenient if the chain is not equipped with a ring or hook. Where the two outside implements are the same width or when the bar equalizer is used, a similar piece may be used on the front end of the chain, or both chains may be bolted to the same piece. When the two outside implements are the same width, and a tongue is used on the middle implement, the chains may be bolted to the tongue, one on either side, directly ahead of the hole through the tongue. There should be a 3/8 or 7/16 inch bolt through the tongue at this point whether the chains are attached to the tongue or not. If the A equalizer is used, the chains are bolted to the legs of the equalizer. When bolting through the links as large a bolt as possible should be used.

The Advantages of This Type of Hitch.—The advantages of these hitches lie in their simplicity, light weight, and in their ability to keep the implements in place and to turn easily without skidding the implements. It is possible to make a complete turn and go back and forth across the field.

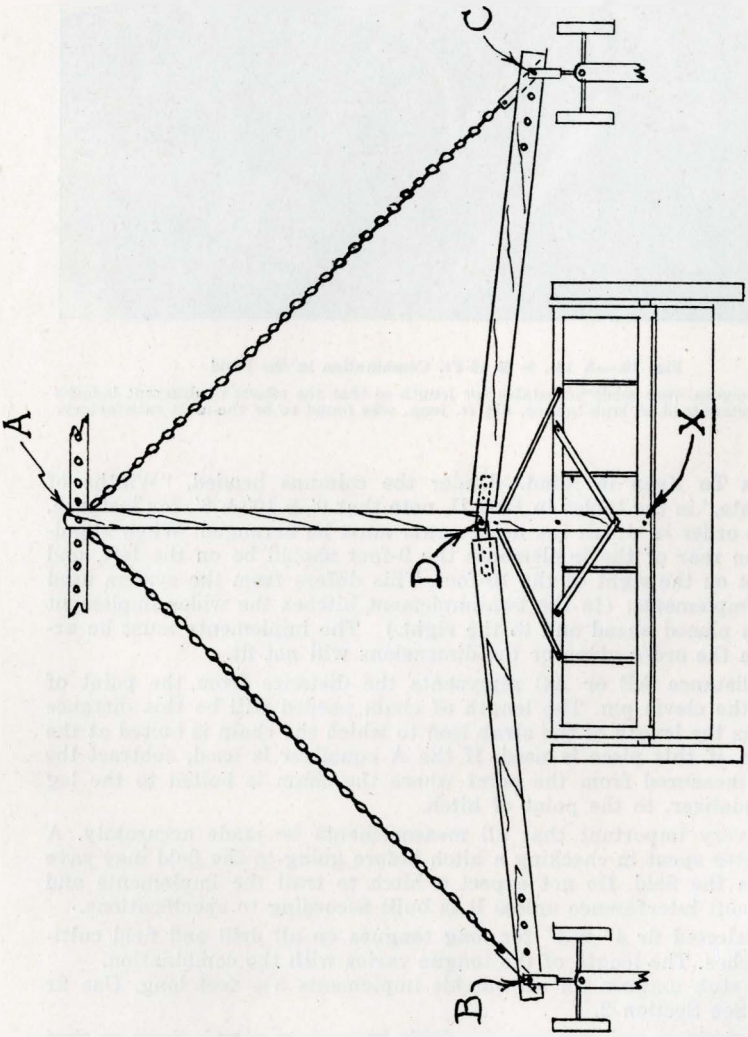


Fig. 18.—The Hitch For Three Drills or Three Field Cultivators Where Two or Three of the Implements Are of the Same Width

This hitch is made up of so few parts that a special work sheet is not included. However this figure may be used as a work sheet. Note that the middle implement is pulled from the point A.

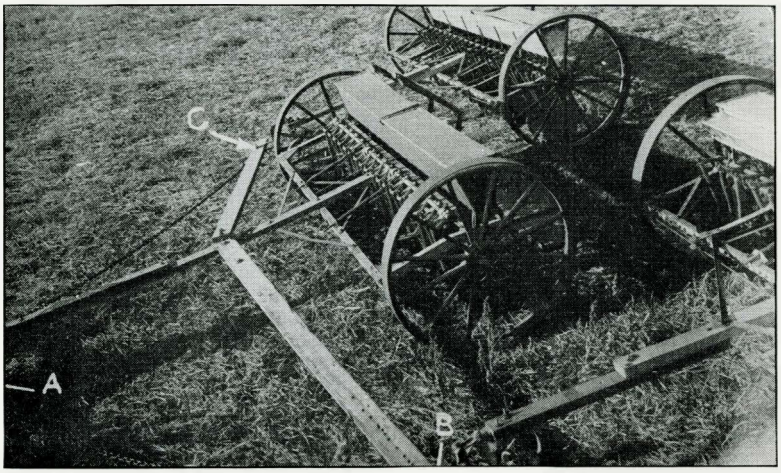


Fig. 19.—A 10-, 9- & 10-Ft. Combination in the Field

The tongues were made adjustable for length so that the effects of different lengths could be determined. A stub tongue, 8½ ft. long, was found to be the most satisfactory.

Points To Keep in Mind.—Under the columns headed, "Widths of Implements," in the tables in Part II, note that 9′ & 10′ & 8′, for instance, gives the order in which the implements must be arranged. When standing at the rear of the implements the 9-foot should be on the left, and the 8-foot on the right of the 10-foot. This differs from the system used for two implements. (In the two-implement hitches the wider implement is always placed ahead and to the right.) The implements must be arranged in the order given or the dimensions will not fit.

The distance AB or AC represents the distance from the point of hitch to the clevis pin. The length of chain needed will be this distance AB, minus the length of the strap iron to which the chain is bolted at the clevis pin, if this piece is used. If the A equalizer is used, subtract the distance measured from the point where the chain is bolted to the leg of the equalizer, to the point of hitch.

It is very important that all measurements be made accurately. A few minutes spent in checking a hitch before going to the field may save trouble in the field. Do not expect a hitch to trail the implements and turn without interference unless it is built according to specifications.

Use selected fir 4″ x 4″ for long tongues on all drill and field cultivator hitches. The length of the tongue varies with the combination.

Make stub tongues for all outside implements 8½ feet long. Use fir 4″ x 4″. See Section 2.

When making stub tongues for drills be sure to attach them so that the frame or hopper of the drill is level. If the drill is tipped backward or forward the rate of seeding may be affected.

Section 11

Three-Drill Hitches, Where Two or Three Are of the Same Width.—The specifications for hitches for three drills, where two or three are of the same width are divided into groups as follows:

Drills with furrow openers spaced 6 inches apart—Table 8.

Drills with furrow openers spaced 7 inches apart—Table 9.

Drills with furrow openers spaced 8 inches apart—Table 10.

The design used for these hitches is shown in Fig. 18 and Fig. 19. Study these figures and read Section 10, "Description of the Three-Implement Hitch and Instructions for Building It."

The braces BD and CD can be fastened to the tongue as shown in Fig. 18 or as in Fig. 20.

TABLE 8.—Specifications for Three-Drill Hitches, Furrow Openers Spaced 6 Inches Apart Where Two or Three Implements Are of the Same Width.

(See Fig. 18 and Fig. 19)

Hitch No.	Widths of Implements Feet	Length of AB * Ft. In.	Length of BD † Ft. In.	Length of Tongue ‡ Ft. In.	Distance DX Ft. In.
107	11&11&11	15- 6	11-1	13-6	3- 7
108	11&10&11	14-10	10-6½	13-0	3- 6
109	11& 9&11	14- 1	10- ½	12-6	3- 6
110	11& 8&11	13- 5	9-6½	12-0	3- 5
111	11& 7&11	12- 8	9- ½	11-6	3- 5
112	10&11&10	14-10	10-6½	13-0	3- 7
113	10&10&10	14- 1	10- ½	12-6	3- 6½
114	10& 9&10	13- 5	9-6½	12-0	3- 6
115	10& 8&10	12- 8	9- ½	11-6	3- 5
116	10& 7&10	12- 0	8-6½	11-0	3- 4
117	9&11& 9	14- 1	10- ½	12-6	3- 8
118	9&10& 9	13- 5	9-7	12-0	3- 7
119	9& 9& 9	12- 8	9- ½	11-6	3- 7
120	9& 8& 9	12- 0	8-6½	11-0	3- 6
121	9& 7& 9	11- 4	8- ½	10-6	3- 5
122	8&11& 8	13- 5	9-6½	12-0	3- 9
123	8&10& 8	12- 8	9-1	11-6	3- 8
124	8& 9& 8	12- 0	8-7	11-0	3- 8
125	8& 8& 8	11- 3	8-1	10-6	3- 7
126	8& 7& 8	10- 7	7-6½	10-0	3- 6
127	7&11& 7	12- 8	9-1	11-6	3-10
128	7&10& 7	12- 0	8-7	11-0	3- 9
129	7& 9& 7	11- 3	8-1	10-6	3- 8½
130	7& 8& 7	10- 7	7-7	10-0	3- 7
131	7& 7& 7	9-11	7-1	9-6	3- 6

* AC is the same length as AB. Use chain, rod or cable.

† CD is the same length as BD. BD and CD are fir 2x6 inches.

‡ Tongue for middle implement. Use selected fir 4x4 inches. **Cut tongue long enough so that it will extend at least 3 inches past point where it is bolted to drawbar.**

Stub tongues are 4x4 inch fir 8½ feet long, measured from axle to clevis pin.

TABLE 9.—Specifications for Three-Drill Hitches, Furrow Openers Spaced 7 Inches Apart Where Two or Three Implements Are of the Same Width.

(See Fig. 18 and Fig. 19)

Hitch No.	Combination Of Implements	Length of AB * Ft. In.	Length of BD † Ft. In.	Length of Tongue ‡ Ft. In.	Distance DX Ft. In.
132	18x7&18x7&18x7	14-10	10- 6½	13- 0	3- 6½
133	18x7&16x7&18x7	14- 0	9-11½	12- 5	3- 5½
134	18x7&14x7&18x7	13- 2	9- 4½	11-10	3- 5
135	18x7&13x7&18x7	12- 9	9- 1	11- 6½	3- 4½
136	18x7&12x7&18x7	12- 4	8- 9½	11- 3	3- 4
137	16x7&18x7&16x7	14- 0	9-11½	12- 5	3- 7
138	16x7&16x7&16x7	13- 2	9- 4½	11-10	3- 6½
139	16x7&14x7&16x7	12- 4	8- 9½	11- 3	3- 6
140	16x7&13x7&16x7	12- 0	8- 6	10-11½	3- 5½
141	16x7&12x7&16x7	11- 6	8- 2½	10- 8	3- 5
142	14x7&18x7&14x7	13- 2	9- 5	11-10	3- 8½
143	14x7&16x7&14x7	12- 4	8-10	11- 3	3- 7½
144	14x7&14x7&14x7	11- 6	8- 3	10- 8	3- 7
145	14x7&13x7&14x7	11- 1	7-11	10- 4½	3- 6
146	14x7&12x7&14x7	10- 8	7- 8	10- 1	3- 6
147	13x7&18x7&13x7	12- 9	9- 1½	11- 6½	3- 9
148	13x7&16x7&13x7	12- 0	8- 6	10-11½	3- 8
149	13x7&14x7&13x7	11- 1	7-11½	10- 4½	3- 7
150	13x7&13x7&13x7	10- 8	7- 8	10- 1	3- 7
151	13x7&12x7&13x7	10- 3	7- 4	9- 9½	3- 6
152	12x7&18x7&12x7	12- 4	8-10	11- 3	3-10
153	12x7&16x7&12x7	11- 6	8- 3	10- 8	3- 9
154	12x7&14x7&12x7	10- 8	7- 8	10- 1	3- 8
155	12x7&13x7&12x7	10- 3	7- 4½	9- 9½	3- 7
156	12x7&12x7&12x7	9-11	7- 1	9- 6	3- 7

TABLE 10.—Specifications for Three-Drill Hitches, Furrow Openers Spaced 8 Inches Apart, Where Two or Three Implements Are of the Same Width

(See Fig. 18 and Fig. 19)

Hitch No.	Combination Of Implements	Length of AB * Ft. In.	Length of BD † Ft. In.	Length of Tongue ‡ Ft. In.	Distance DX Ft. In.
157	12x8&12x8&12x8	11-3	8-1	10- 6	3-7
158	12x8&16x8&12x8	13-2	9-5	11-10	3-8½
159	16x8&12x8&16x8	13-2	9-4½	11-10	3-4½
160	16x8&16x8&16x8	15-1	10-8½	13- 2	3-5½

***** AC is the same length as AB. Use chain, rod or cable.

† CD is the same length as BD. BD and CD are fir 2x6 inches.

‡ Tongue for middle implement. Use selected fir 4x4 inches. Cut tongue long enough so that it will extend at least 3 inches past point where it is bolted to drawbar.

Stub tongues are 4x4 inch fir 8½ feet long, measured from axle to clevis pin.

Section 12

Three Drills, Where Each Drill is of a Different Width.—The specifications for hitches for three drills, where each is a different width, are divided into two groups as follows:

Drills with furrow openers spaced 6 inches apart—Table 11.

Drills with furrow openers spaced 7 inches apart—Table 12.

Drills, whether hitched singly or in combinations of two or more, should be pulled from a point in line with the center of cut of the combined implements. When three implements each of a different width are used, the tongue of the middle implement does not fall on the center of cut and therefore some provision must be made for pulling the middle implement in the correct position. This applies to field cultivators and disks, as well.

Fig. 20 and Fig. 21 show the hitch designed to handle all combinations of three drills ranging from 7′ to 11′ in width, where each is of a different width. The small A-shaped device to which the chains and the tongue are attached is called an equalizer. This will be called the A equalizer, in order to distinguish it from the bar equalizer. For details of the A equalizer, see Fig. 23. Instructions for building the equalizer are given further on in this section.

A more simple but less satisfactory method, that can be used to pull the middle drill in the correct position, is shown in Fig. 22. This is a bar equalizer and consists of a bar or 2″x4″ bolted across chains AB and AC one foot back of the point of hitch. The bar equalizer does not hold the drills as steady as the A equalizer although the bar is very satisfactory for the three-disk hitches.

When building this hitch note that the tongue extends the distance given in column headed HP, past the point where the tongue is attached to the cross bar, in order that the end of the tongue may rest on the equalizer or on the chains if the bar equalizer is used. Be sure that the drills are hitched in the order indicated in the column headed "Widths of Implements." The implements are arranged with the narrower of the two outside implements on the right hand side so that in all hitches where the implements are of different widths, the middle implement is hitched to the right of the point of hitch and at a distance equal to one half of the difference in widths of the outside implements.

Before building one of these hitches, read section 10, "Description of the Three-Implement Hitch and Instructions for Building It."

Instructions for Building the A Equalizer.—Do not build the A equalizer by bolting one piece on top of the other. Use the bar equalizer rather than use such a makeshift.

Use hardwood 2″ x 4″ material. The pieces should be at least 28½″ long. A steel plate or a piece of heavy sheet iron is desirable to hold the front ends of the legs, and is convenient to hitch to.

Two methods of building the A equalizer are suggested. Refer to Fig. 23 while reading these suggestions. One method is to cut the right leg of the equalizer at an angle of 45 degrees, and the left one at a slightly greater angle (47 degrees). Set the legs in position but do not bolt them. Bore the necessary holes in the cross bar according to Fig. 23 and bolt the right end of the cross bar to the right leg, at a point exactly 17 inches from the point where the center lines of the two legs meet (point A). Swing the cross bar into place so that the center hole of the cross

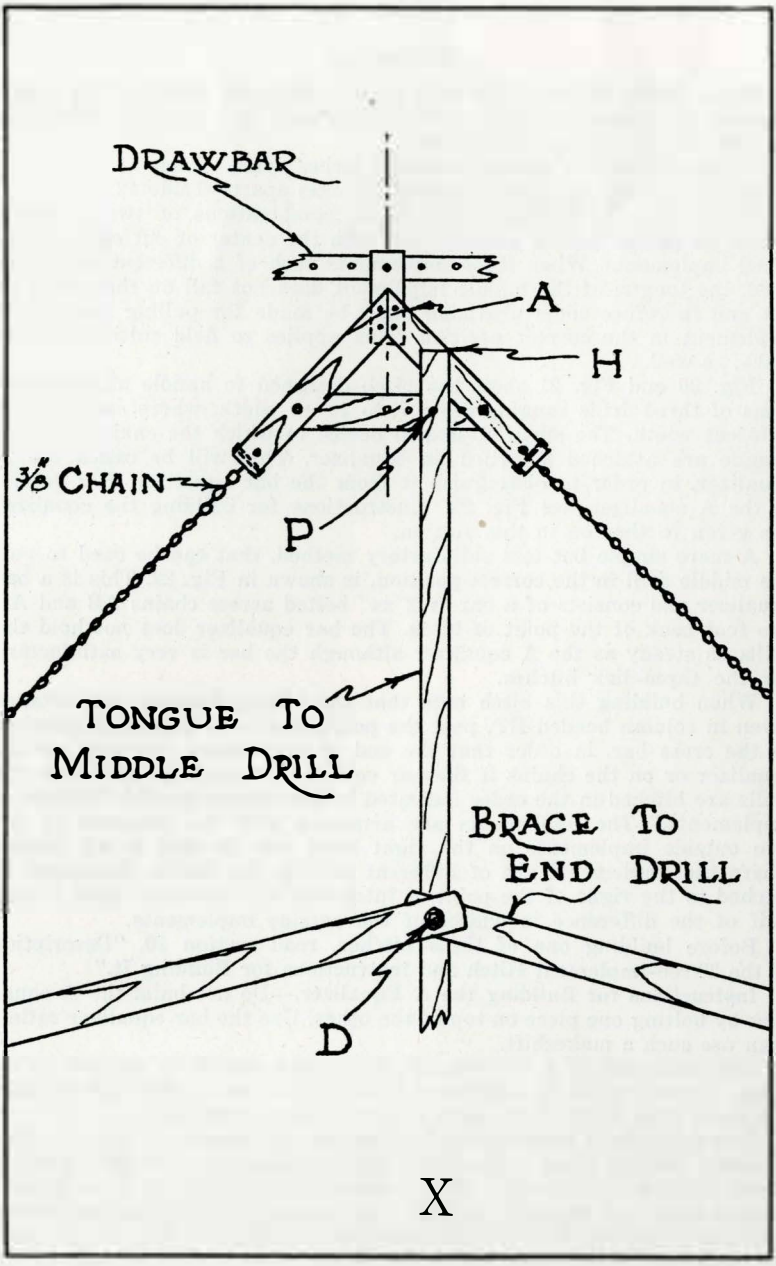


Fig. 20.—The A Equalizer as Used with Three Drills When Each is a Different Width

Where all the implements are of different widths, the middle one cannot be pulled from the point A. The tongue of the middle implement is pulled from the cross bar and the end of the tongue rests on the leg of the equalizer. This same equalizer may be used for three field cultivators or three disks.

bar is exactly 12 inches back of point A and bolt the left end of the cross bar to the left leg. Then bolt the front ends of the legs to the plate. Bolt the cross bar underneath the legs and fit a piece on top of the cross bar so that the bar is flush with the legs. This makes a good place for the tongue to rest.

Attach chains AB and AC as shown in Fig. 23. Keep in mind that the lengths given for AB and AC are measured from point A, not from the point where the chain is attached to the leg of the equalizer, and not from the point at which the hitch is attached to the drawbar, unless it is attached at point A. The second method differs from the first only in that both legs are cut at an angle of 45 degrees and fastened together so that they form a right angle. The left end of the cross bar should be 12 inches long (from center hole to left hand hole) and should be bolted at the center line of the left leg. **The chain AB is bolted one inch in,** (to the right, when standing behind the equalizer) **from the center line of the left leg.** The chain AC is attached at the center line of the right leg. Build up the cross bar so that it is flush with the legs.

If the A equalizer is to be used to pull drills having furrow openers spaced 7 inches apart, holes should be bored in the cross bar 3½ inches and 7 inches respectively to the right of the center hole in the cross bar.

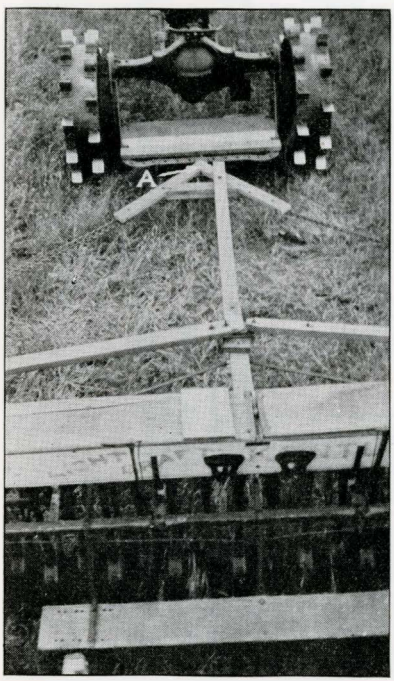


Fig. 21.—The A Equalizer in Use
There is no weaving of the implements when the A equalizer is used.

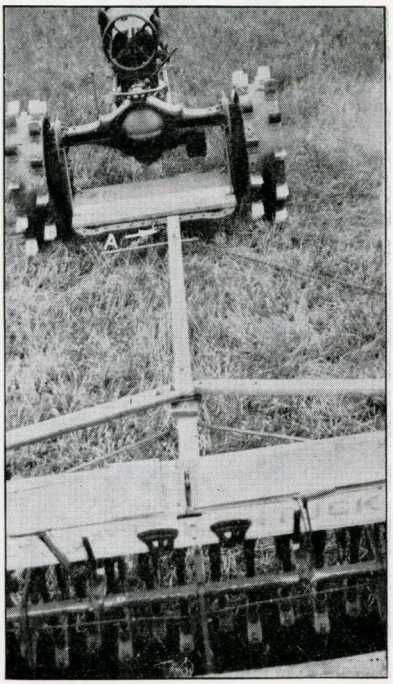


Fig. 22.—The Bar Equalizer Used With Drills
The bar equalizer does not hold the drills as steady as the A equalizer does.

TABLE 11.—Specifications for Three-Drill Hitches, Furrow Openers Spaced 6 Inches Apart, Where Each Implement Is of a Different Width.

(See Fig. 20)

Hitch No.	Widths Of Implements Feet	Length Of AB Ft. In.	Length Of AC Ft. In.	Length Of BD Ft. In.	Length Of CD Ft. In	Length of tongue * Ft. In.	Distance DX Ft. In.	Distance HP Inches	Implement Is Hitched Off Center Inches
161	10&11& 9	14- 6	14-11	10-7	10-1	12-6	3- 8	6	6
162	11& 8&10	13- 1	13- 5	9-7	9-0	11-6	3- 5	6	6
163	9&11& 8	13-10	14- 2	10-1	9-7	12-0	3- 8½	6	6
164	9&10& 8	13- 1	13- 6	9-7	9-1	11-6	3- 8	6	6
165	11& 7&10	12- 5	12- 9	9-1	8-7	11-0	3- 4	6	6
166	9&11& 7	13- 5	14- 1	10-1	9-1	11-9	3- 9½	3	12
167	10& 7& 9	11- 8	12- 0	8-6½	8- ½	10-6	3- 4½	6	6
168	8&11& 7	13- 1	13- 5	9-7½	9-1½	11-6	3-10½	6	6
169	8&10& 7	12- 5	12- 9	9-1	8-7	11-0	3- 9½	6	6
170	8& 9& 7	11- 8	12- 1	8-7	8-1	10-6	3- 8	6	6

*** Tongue for middle implement. Use selected fir 4x4 inches. This distance is the actual length of the tongue. To find the point on the tongue where it is attached to the crossbar of the equalizer measure back from the front end of the tongue the distance found in column headed "Distance HP."**

AB and AC are chain, rod, or cable.

BD and CD are fir 2x6 inches.

Stub tongues are 4x4 inch fir 8½ feet long, measured from axle to clevis pin.

TABLE 12.—Specifications for Three-Drill Hitches, Furrow Openers Spaced 7 Inches Apart, Where Each Implement Is of a Different Width.

(See Fig. 20)

Hitch No.	Combination Of Implements	Length of AB Ft. In.	Length of AC Ft. In.	Length of BD Ft. In.	Length of CD Ft. In.	Length of Tongue * Ft. In.	Distance DX Ft. In.	Distance HP Inches	Implement Is Hitched Off Center Inches
171	14x7&12x7&13x7	10- 6	10-9	7- 7½	7- 4	9- 9	3-5½	8½	3½
172	13x7&16x7&12x7	11- 9	12-0	8- 6	8- 3	10- 8	3-8	8½	3½
173	13x7&18x7&12x7	12- 7	12-9	9-1½	8-10	11- 3	3-9	8½	3½
174	14x7&16x7&12x7	11-10	12-4	8-10	8- 3	10- 8	3-8	5	7
175	14x7&18x7&12x7	12- 9	13-2	9- 5	8-10	11- 2	3-9	5	7
176	18x7&12x7&16x7	11-11	12-4	8- 9½	8- 2½	10- 7	3-4½	5	7
177	14x7&16x7&13x7	12- 1	12-4	8-10	8- 6	10-11	3-7½	8½	3½
178	14x7&18x7&13x7	12-11	13-2	9- 5	9- 1½	11- 6	3-9	8½	3½
179	18x7&13x7&16x7	12- 4	12-9	9- 1	8- 6	10-11	3-5	5	7
180	16x7&18x7&14x7	13- 8	14-0	10- 0	9- 5	11-11	3-8	5	7

* Tongue for middle implement. Use selected fir 4x4 inches. This distance is the actual length of the tongue. To find the point on the tongue where it is attached to the crossbar of the equalizer measure back from the front end of the tongue the distance found in column headed "Distance HP."

AB and AC are chain, rod, or cable.

BD and CD are fir 2x6 inches.

Stub tongues are 4x4 inch fir 8½ feet long, measured from axle to clevis pin.

For drills with furrow openers spaced 7 inches apart, holes in crossbar of equalizer should be bored 3½ inches and 7 inches respectively to the right of the center hole in the crossbar.

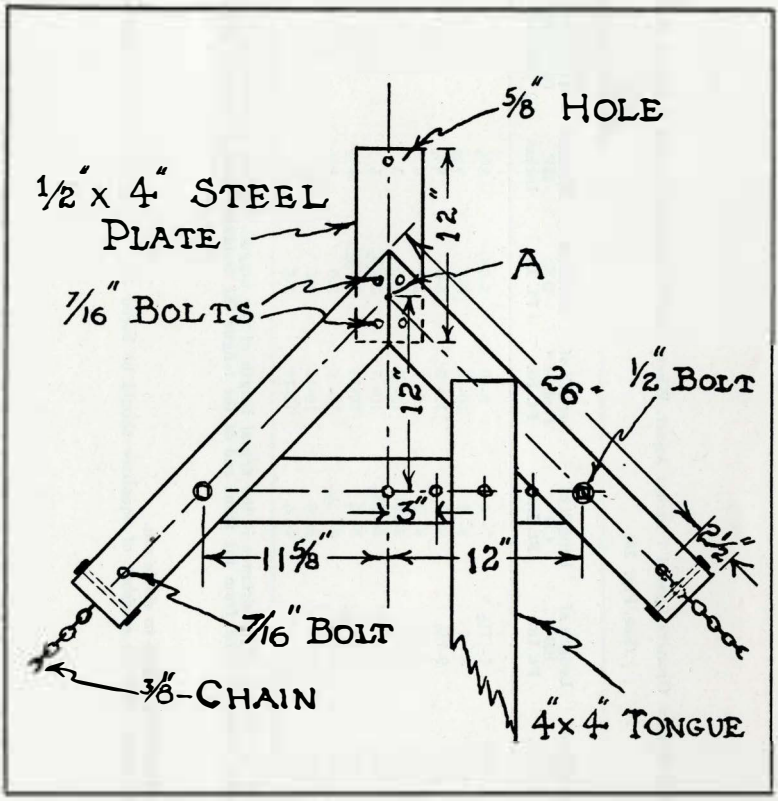


Fig. 23.—The A Equalizer

This is made up of hardwood 2 in. x 4 in. and a steel plate. Note that the point A, from which the length of the chains is measured, is the point at which the chains would meet if extended, not the point where the hitch is attached to the drawbar of the tractor.

Section 13

Three Field Cultivators, Where Two or Three Are of The Same Width.—The specifications for hitches for three field cultivators, where two or three are of the same width are found in Table 13. A separate table is made up for field cultivators only because of the fact that field cultivators are made in some widths in which drills are not made.

The design for hitches in this group is the same as is shown for drills in Fig. 18 and Fig. 19.

These hitches are designed to be used with 8½ foot stub tongues on the outside implements. On some field cultivators it may be necessary to bolt an extension to the tongue in order to get a distance of 8½ feet from the center of axle to the clevis pin. It is very important to have not only the length of the tongue, but all dimensions, as specified.

TABLE 13.—Specifications for Three-Field Cultivator Hitches, Where Two or Three Implements Are of the Same Width.

(See Fig. 18)

Hitch No.	Widths of Implements Feet	Length of AB * Ft. In	Length of BD † Ft. In.	Length of Tongue ‡ Ft. In.	Distance DX Ft. In.
181	12 &12 &12	16-11	12- ½	14-6	3- 6½
182	12 &11½&12	16- 7	11- 9½	14-3	3- 6
183	12 &10 &12	15- 6	11- ½	13-6	3- 5½
184	12 & 9 &12	14-10	10- 6½	13-0	3- 5
185	12 & 8½&12	14- 6	10- 3½	12-9	3- 4½
186	12 & 7½&12	13- 9	9- 9½	12-3	3- 4
187	12 & 7 &12	13- 5	9- 6½	12-0	3- 3½
188	11½&12 &11½	16- 7	11- 9½	14-3	3- 6½
189	11½&11½&11½	16- 3	11- 6½	14-0	3- 7
190	11½&10 &11½	15- 2	10- 9½	13-3	3- 5½
191	11½& 9 &11½	14- 6	10- 3½	12-9	3- 5
192	11½& 8½&11½	14- 1	10- ½	12-6	3- 5
193	11½& 7½&11½	13- 5	9- 6½	12-0	3- 4
194	11½& 7 &11½	13- 1	9- 3½	11-9	3- 4
195	10 &12 &10	15- 6	11- 1	13-6	3- 7½
196	10 &11½&10	15- 2½	10- 9½	13-3	3- 7
197	10 &10 &10	14- 1	10- ½	12-6	3- 6½
198	10 & 9 &10	13- 5	9- 6½	12-0	3- 6
199	10 & 8½&10	13- 1	9- 3½	11-9	3- 5½
200	10 & 7½&10	12- 4	8- 9½	11-3	3- 5
201	10 & 7 &10	12- 0	8- 6½	11-0	3- 4
202	9 &12 & 9	14-10	10- 7	13-0	3- 8
203	9 &11½& 9	14- 6	10- 3½	12-9	3- 8
204	9 &10 & 9	13- 5	9- 6½	12-0	3- 7
205	9 & 9 & 9	12- 8	9- 1	11-6	3- 7
206	9 & 8½& 9	12- 4	8- 9½	11-3	3- 6
207	9 & 7½& 9	11- 8	8- 3½	10-9	3- 5
208	9 & 7 & 9	11- 4	8- ½	10-6	3- 5
209	8½&12 & 8½	14- 6	10- 4	12-9	3- 8½
210	8½&11½& 8½	14- 1	10- 1	12-6	3- 8
211	8½&10 & 8½	13- 1	9- 4	11-9	3- 7
212	8½& 9 & 8½	12- 4	8-10	11-3	3- 7
213	8½& 8½& 8½	12- 0	8- 7	11-0	3- 6½
214	8½& 7½& 8½	11- 3	8- ½	10-6	3- 5½
215	8½& 7 & 8½	10-11	7-10	10-3	3- 5
216	7½&12 & 7½	13- 9	9-10	12-3	3-10
217	7½&11½& 7½	13- 5	9- 7	12-0	3- 9
218	7½&10 & 7½	12- 4	8-10	11-3	3- 8½
219	7½& 9 & 7½	11- 8	8- 4	10-9	3- 8
220	7½& 8½& 7½	11- 3	8- 1	10-6	3- 7½
221	7½& 7½& 7½	10- 7	7- 7	10-0	3- 6
222	7½& 7 & 7½	10- 3	7- 4	9-9	3- 6
223	7 &12 & 7	13- 5	9- 7	12-0	3-10½
224	7 &11½& 7	13- 1	9- 4	11-9	3-10
225	7 &10 & 7	12- 0	8- 7	11-0	3- 9
226	7 & 9 & 7	11- 3	8- 1	10-6	3- 8½
227	7 & 8½& 7	10-11	7-10	10-3	3- 8
228	7 & 7½& 7	10- 3	7- 4	9-9	3- 6½
229	7 & 7 & 7	9-11	7- 1	9-6	3- 6

* AC is the same length as AB. Use chain, rod or cable.

† CD is the same length as BD. BD and CD are fir 2x6 inches.

‡ Tongue for middle implement. Use selected fir 4x4 inches. **Cut tongue long enough so that it will extend at least 3 inches past point where it is bolted to drawbar.**

Stub tongues are 4x4 inch fir 8½ feet long, measured from axle to clevis pin.

TABLE 14.—Specifications for Three-Field Cultivator Hitches, Where Each Implement Is of a Different Width. (See Fig. 20)

Hitch No.	Widths of Implements Feet	Length Of AB Ft. In.	Length Of AC Ft. In.	Length Of BD Ft. In.	Length Of CD Ft. In	Length of Tongue * Ft. In.	Distance DX Ft. In.	Distance HP Inches	Inches Middle Implement Is Hitched Off Center
230	11½&12 &10	16- 1	16- 7	11-10	11- 0	13-6	3- 6½	3	9
231	12 & 9 &11½	14- 8	14-10	10- 6	10- 4	12-9	3- 5	9	3
232	12 & 8½&11½	14- 4	14- 6	10- 4	10- ½	12-6	3- 4½	9	3
233	12 & 7½&11½	13- 7	13- 9	9- 9	9- 6½	12-0	3- 4	9	3
234	12 & 7 &11½	13- 3	13- 5	9- 6	9- 4	11-9	3- 4	9	3
235	10 &12 & 9	15- 3	15- 7	11- 1	10- 7	13-0	3- 8½	6	6
236	10 &12 & 8½	15- 1	15- 6	11- 1	10- 4	12-9	3- 9	3	9
237	12 & 7½&10	13- 2	13-10	9-10	8-10	11-3	3- 5	3	12
238	12 & 7 &10	12- 9	13- 5	9- 6	8- 7	11-0	3- 4	3	12
239	9 &12 & 8½	14- 8	14-10	10- 6½	10- 4	12-9	3- 9	9	3
240	9 &12 & 7½	14- 4	14-11	10- 7	9-10	12-3	3-10	3	9
241	9 &12 & 7	14- 2	14-10	10- 7	9- 7	12-0	3-10	3	12
242	8½&12 & 7½	14- 1	14- 6	10- 4	9-10	12-3	3-10	6	6
243	8½&12 & 7	13-11	14- 7	10- 4	9- 7	12-0	3-10	3	9
244	7½&12 & 7	13- 7	13-10	9-10	9- 7	12-0	3- 9	9	3
245	10 &11½& 9	14-10	15- 3	10-10	10- 4	12-9	3- 8	6	6
246	10 &11½& 8½	14- 8	15- 2	10-10	10- 1	12-6	3- 8½	3	9
247	11½& 7½&10	12-11	13- 5	9- 7	8-10	11-3	3- 5	3	9
248	11½& 7 &10	12- 6	13- 1	9- 4	8- 7	11-0	3- 4½	3	9
249	9 &11½& 8½	14- 3	14- 6	10- 4	10- 1	12-6	3- 9½	9	3

Section 14

Three Field Cultivators, Where Each Implement is of a Different Width.—The specifications for hitches for three field cultivators, where

each is of a different width are found in Table 14. The design of the hitch to be used is shown in Figures 20, 21, 22, and 23. Refer to the descriptions of hitches for similar combinations of three drills, Section 12.

TABLE 14. (Con't.)—Specifications for Three-Field Cultivator Hitches, Where Each Implement Is of a Different Width.
(See Fig. 20)

Hitch No.	Widths of Implements Feet	Length Of AB Ft. In.	Length Of AC Ft. In.	Length Of BD Ft. In.	Length Of CD Ft. In	Length of Tongue * Ft. In.	Distance DX Ft. In.	Distance HP Inches	Inches Middle Implement Is Hitched Off Center
250	9 &11½& 7½	14- 0	14- 7	10- 4	9- 7	12-0	3-10	3	9
251	9 &11½& 7	13-10	14- 6	10- 4	9- 4	11-9	3-10	3	12
252	8½&11½& 7½	13-10	14- 2	10- 1	9- 7	12-0	3- 9½	6	6
253	8½&11½& 7	13- 8	14- 2	10- 1	9- 4	11-9	3-10	3	9
254	7½&11½& 7	13- 3	13- 5	9- 7	9- 4½	11-9	3-10	9	3
255	9 &10 & 8½	13- 3	13- 6	9- 7	9- 4	11-9	3- 7½	9	3
256	10 & 7½& 9	12- 0	12- 3	8-10	8- 4	10-9	3- 6	6	6
257	10 & 7 & 9	11- 8	12- 0	8- 7	8- 1	10-6	3- 5	6	6
258	8½&10 & 7½	12- 9	13- 0	9- 4	8-10	11-3	3- 9	6	6
259	8½&10 & 7	12- 7	13- 0	9- 4	8- 7	11-0	3- 9	3	9
260	7½&10 & 7	12- 3	12- 4	8-10	8- 7	11-0	3- 9	9	3
261	9 & 7½& 8½	11- 6	11- 7	8- 3	8- 1	10-6	3- 5½	9	3
262	9 & 7 & 8½	11- 1	11- 3	8- ½	7-10	10-3	3- 5	9	3
263	7½& 8½& 7	11- 2	11- 4	8- ½	7-10	10-3	3- 7	9	3
264	7½& 9 & 7	11- 6	11- 8	8- 4	8- 1	10-6	3- 8	9	3

* Tongue for middle implement. Use selected fir 4x4 inches. **This distance is the actual length of the tongue. To find the point on the tongue where it is attached to the crossbar of the equalizer measure back from the front end of the tongue the distance found in column headed "Distance HP."**

AB and AC are chain, rod or cable.
BD and CD are fir 2x6 inches.
Stub tongues are 4x4 inch fir 8½ feet long, measured from axle to clevis pin.

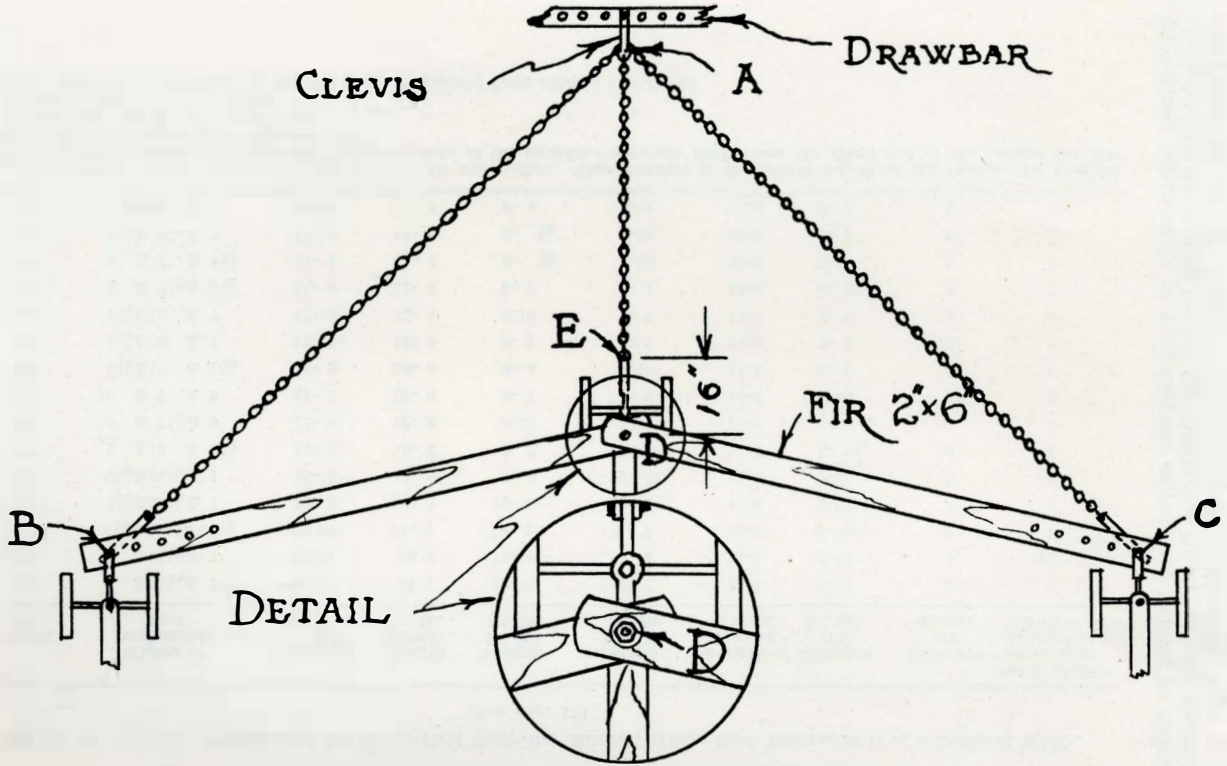


Fig. 24.—The Three-Disk Hitch For Combinations Having At Least Two Implements Of The Same Width. All three disks are equipped with tongue trucks. A tongue instead of the truck and chain may be used on the middle disk.

Section 15

Three Disks, Where Two or Three Are of The Same Width.—

A. Where All Disks Are Equipped With Tongue Trucks. The specifications for hitches for three disks where two or three are of the same width are given in Table 15. The design of the hitch is shown in Fig. 24. Fig. 25 shows a 9′ & 10′ & 9′ combination in the field.

B. Where One Disk Is Not Equipped With A Tongue Truck. When one of the disks is not equipped with a tongue truck, a tongue must be used on the middle disk. Do not change the arrangement of the disks,

TABLE 15—Specifications for Three-Disk Harrow Hitches, Where Two or Three Implements Are of Same Width

(See Fig. 24)

Hitch No.	Widths of Implements Feet	Length of AB * Ft. In.	Length of BD † Ft. In.	Length of AE Ft. In.	Distance DE Inches
265	12&12&12	16-11	12- 2	8- 6	16
266	12&10&12	15- 7	11- 2	7- 8	16
267	12& 9&12	14-10	10- 8	7- 3	16
268	12& 8&12	14- 2	10- 2	6-11	16
269	12& 7&12	13- 5	9- 8	6- 6	16
270	10&12&10	15- 7	11- 3	7- 4	16
271	10&10&10	14- 2	10- 2	6- 6	16
272	10& 9&10	13- 5	9- 9	6- 2	16
173	10& 8&10	12- 8	9- 2	5- 9	16
274	10& 7&10	12- 0	8- 8	5- 4	16
275	9&12& 9	14-10	10- 9	6- 8	16
276	9&10& 9	13- 5	9- 9	5-11	16
277	9& 9& 9	12- 8	9- 3	5- 6	16
278	9& 8& 9	12- 0	8- 9	5- 2	16
279	9& 7& 9	11- 4	8- 3	4-10	16
280	8&12& 8	14- 2	10- 4	6- 1	16
281	8&10& 8	12- 8	9- 3	5- 3	16
282	8& 9& 8	12- 0	8- 9	4-11	16
283	8& 8& 8	11- 4	8- 3	4- 7	16
284	8& 7& 8	10- 7	7- 9	4- 2	16
285	7&12& 7	13- 5	9-11	5- 5	16
286	7&10& 7	12- 0	8-10	4- 8	16
287	7& 9& 7	11- 4	8- 4	4- 4	16
288	7& 8& 7	10- 7	7-10	4- 0	16
289	7& 7& 7	9-11	7- 4	3- 7	16

* AC is the same length as AB. Use chain, rod or cable, preferably chain.

† CD is the same length as BD. Use fir 2x6 inches. Chain is preferred for AE.

The braces are bolted at a point the distance DE back of the clevis pin. It is not always possible to bolt the braces exactly at this point; but two or three inches either way will not affect the hitch perceptibly.

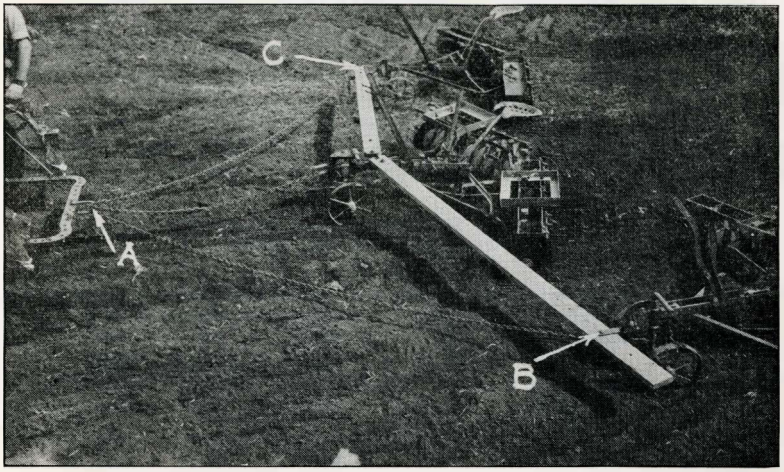


Fig. 25.—A 9-Ft. and 10-Ft. and 9-Ft. Combination in the Field

change the tongue truck to another disk if necessary so that the middle disk is the one without a truck. Fig. 26 shows a 9′ & 7′ & 9′ combination with the middle disk equipped with a tongue instead of a tongue truck. Refer to Fig. 24 for making this hitch. **When attaching the tongue to the disk, keep in mind the fact that AE is the distance from the clevis pin to the point of hitch, and make the tongue of such length that the middle disk will be pulled in the correct position.** Note that braces BD and CD are not bolted to the tongue directly but are bolted to a short compensating arm. This arm is 8½ inches long from center of hole to center of hole. The braces BD and CD are bolted to the front end of the compensating arm and the rear end of the arm is bolted to the tongue at a point 8½ inches back of the point D. This locates the braces in the correct position. The compensating arm prevents breaking of the tongue when turning. It is necessary to use this arm on the disk but not on the drill hitch. The three-disk hitch, with the middle disk equipped with a tongue, handles so satisfactorily that one is inclined to substitute a tongue for the tongue truck on the middle disk even if a tongue truck is available. See Fig. 31 for details of the compensating arm.

In case two disks are not equipped with tongue trucks, a hitch equipped with wheels should be used. Hitches equipped with wheels are not discussed in this bulletin.

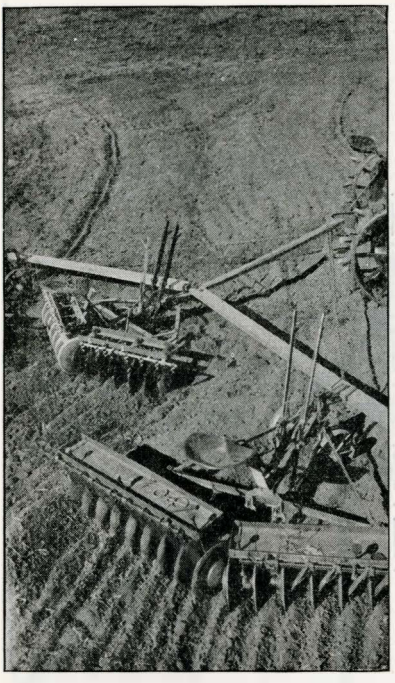


Fig. 26.—A 9-Ft. and 7-Ft. and 9-Ft. Combination in the Field

The middle disk is equipped with a tongue instead of a tongue truck. After using this hitch a person will be inclined to equip the middle disk with a tongue for all three-disk hitches.

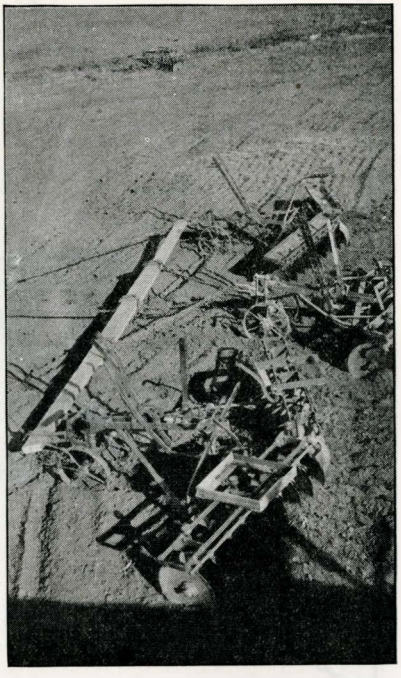


Fig. 27.—A Type For Comparison Only

A hitch of this type requires a long heavy piece of timber, more chain, and more time to build, and the resulting hitch is longer and does not turn as satisfactorily as the type recommended in this bulletin. Compare this hitch with the one in Fig. 26.

TABLE 16—Specifications for Three-Disk Hitches, Where Each Implement Is of a Different Width

(See Fig. 28 and Fig. 31)

Hitch No.	Widths of Implements Feet	Length of AB Ft. In.	Length of AC Ft. In.	Length of BD Ft. In.	Length of CD Ft. In.	Length of PE Ft. In.	Distance DE Inches
290	8& 9&7	11-8	12-0	8-10	8- 4	3-11	16
291	9&10&8	13-1	13-5	9- 9	9- 3	4- 9	16
292	8&10&7	12-5	12-8	9- 4	8-10	4- 3	16
293	10& 7&9	11-8	12-0	8- 7	8- 1	4- 4	26

In hitches No. 290-293 inclusive, the middle implement is hitched 6 inches to the right of the point of hitch.

Use chain, rod or cable, preferably chain, for AB and AC.

Use fir 2x6 inches for BD and CD.

PE is chain or cable.

The braces are bolted at a point the distance DE back of the clevis pin. It is not always possible to bolt the braces exactly at this point; but two or three inches either way will not affect the hitch perceptibly.

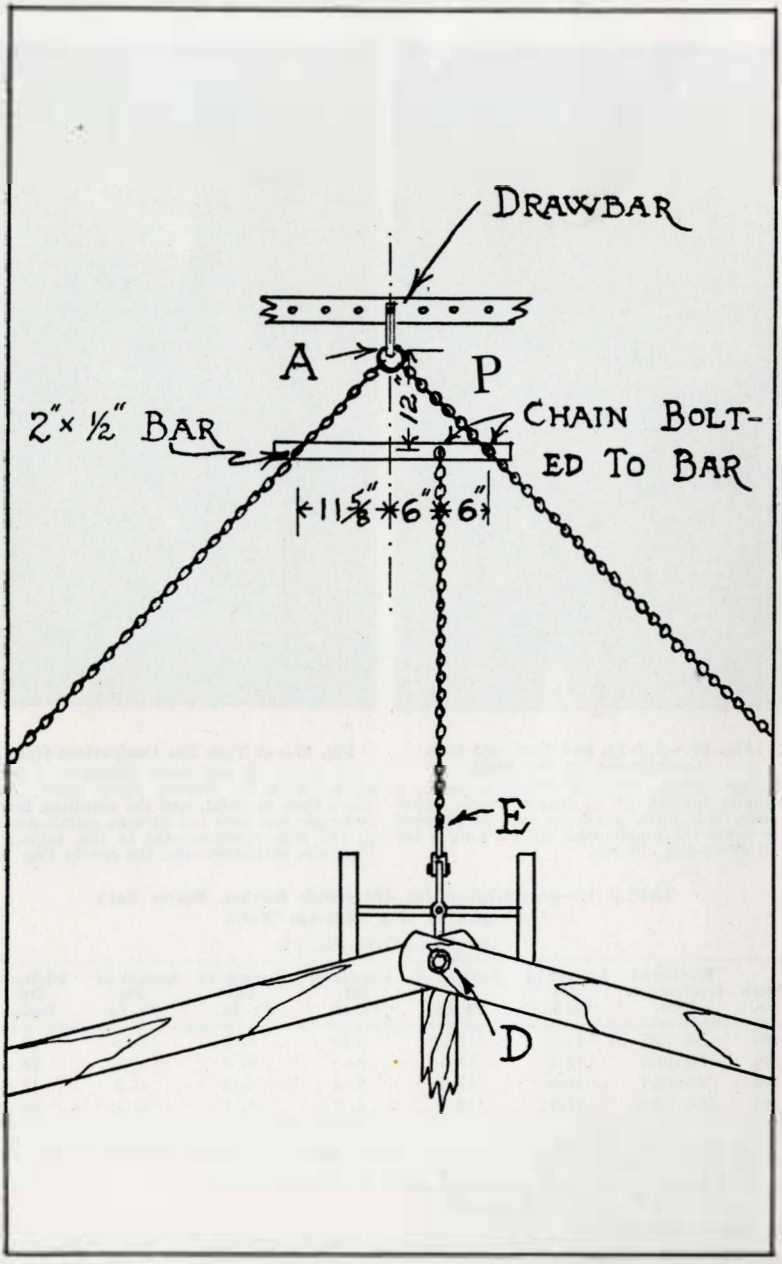


Fig. 28.—The Three-Disk Hitch for Combinations Having all the Implements of Different Widths

The middle disk as well as the outside ones is equipped with a tongue truck. A bar equalizer is used to pull the middle disk in the proper position.

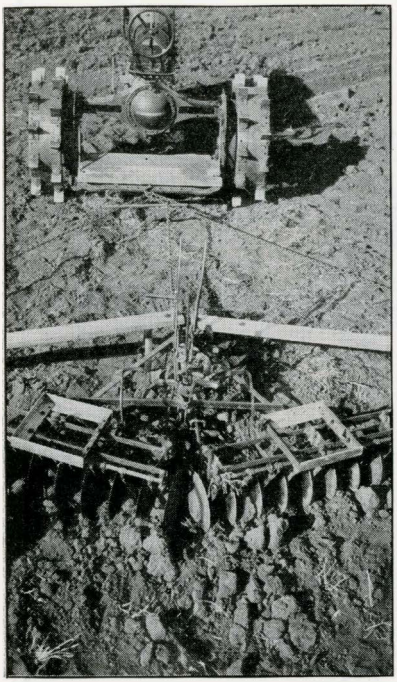


Fig. 29.—Three Disks All of Different Widths

Note that the middle disk is pulled to the right of the point of hitch. This is necessary in every case where the three implements are of different widths.

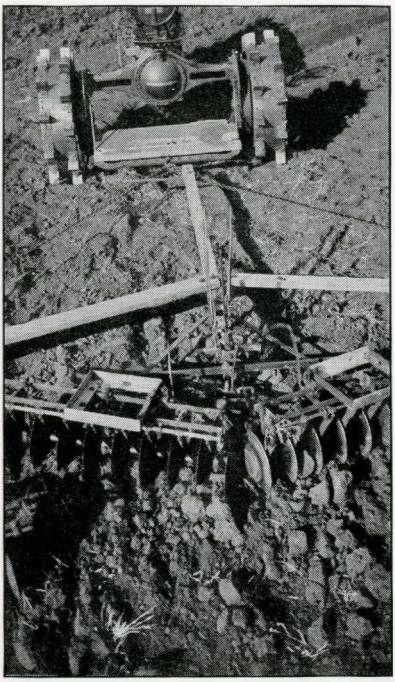


Fig. 30.—Three Disks in the Field

The same disks as shown in Fig. 29 but here the middle disk is equipped with a tongue instead of a tongue truck.

Section 16

Three Disks, Where Each Implement Is of a Different Width.—When three disks, each of a different width, are pulled together, the middle disk must be pulled from a point other than the center of cut, just as in the case with drills and field cultivators.

A. Where All Three Disks Are Equipped With Tongue Trucks.—The specifications for hitches for three disks where each implement is of a different width are given in Table 16. The design of the hitch to be used is shown in Fig. 28. A bar equalizer, which is either a ½″ x 2″ iron bar or a 2″ x 4″, fastened as shown in Fig. 28, is used, or the A equalizer which is recommended for drills and field cultivators can be used. Fig. 29 shows the bar equalizer used on three disks in the field.

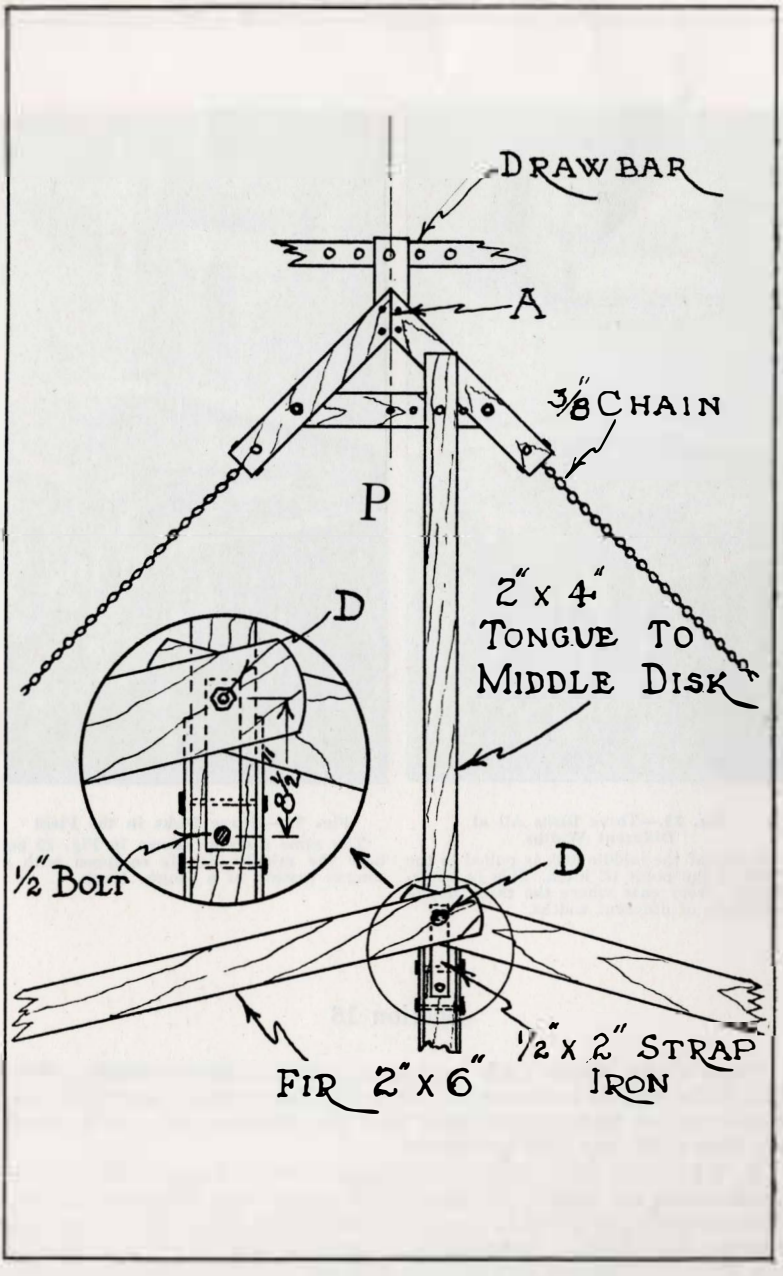


Fig. 31.—The Three-Disk Hitch for Combinations Having all the Implements of Different Widths

Do not make the A equalizer for disks alone—use the bar equalizer instead.

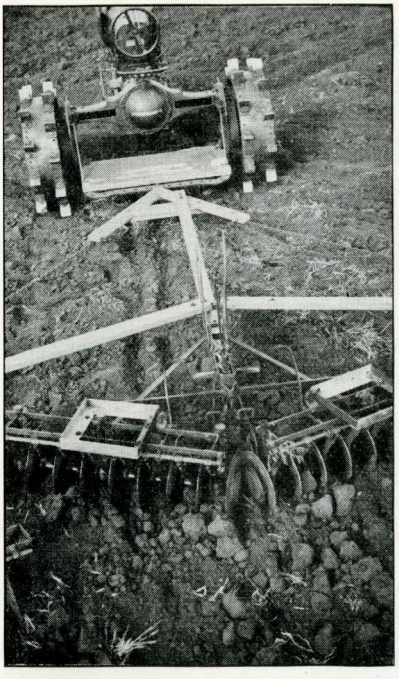


Fig. 32.—The A Equalizer Used With Three Disks Where All the Disks Are of a Different Width

The middle disk is without a tongue truck. The point where the tongue is bolted to the cross bar is at a distance equal to ½ the difference in widths of the outside disks, to the right of the center.

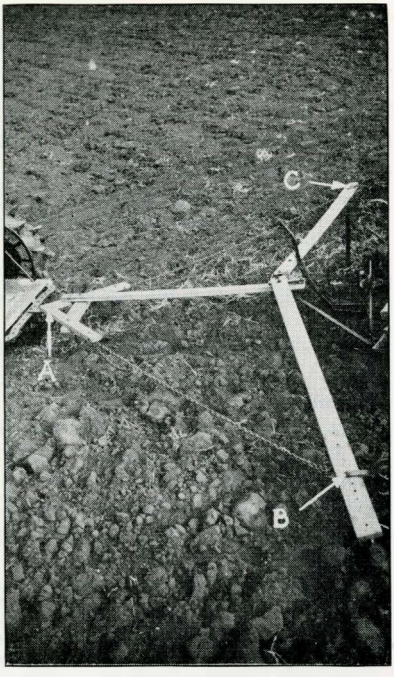


Fig. 33.—Three Disks, All Different Widths, No Tongue Truck On Middle Disk

This figure shows the short compensating arm to which the braces are fastened.

B. One Disk Not Equipped With A Tongue Truck.—Fig. 30 shows the middle disk of a three disk hitch equipped with a tongue instead of a tongue truck. Shift the tongue truck if necessary so that the middle disk is the one without a tongue truck. Use a tongue on the middle implement and use either the A equalizer or the bar equalizer. See Fig. 31.

The lengths of the chains and braces are given in Table 16. **The length of the tongue should be such that the disk is held in the same relative position it would occupy if it were equipped with a tongue truck.** Either measure 4′-6″ from the gang bolt when the disks are straight to locate the point where the clevis pin would be, or get the approximate position from another disk. Then extend the tongue the distance PE, Table 16, from this point.

If the A equalizer is used the tongue should extend as far ahead of point P as it does in the same width drill hitch. If the bar equalizer is used the tongue should extend at least four inches past point P. Use a short compensating arm. Do not bolt the braces directly to the tongue.

Questions and Answers

These questions and answers are included as an aid in explaining some of the important points concerning hitches.

Q.—What precaution must I take when attaching a tongue to a drill, a field cultivator or a disk?

A.—Keep three things in mind. Make tongue the right length, attach it firmly, and attach it so that the hopper is not tipped forward or backward.

Q.—I have two 10′ disks and two 10′ drills. What hitch shall I build?

A.—Build hitch No. 30. The same hitch can be used for both disks and drills.

Q.—What hitch shall I build for two 10′ disks? I have no chain or cable.

A.—Build hitch number 82 rather than to buy chain for a simple disk hitch.

Q.—I have two 10′ drills and two 9′ disks. What hitch shall I build?

A.—Build hitch number 30 for the drills and either add the extensions as shown in Fig. 11 or build the number 101 hitch for the disks—according to the material you have available.

Q.—How can I find out what other combinations of widths I can use with my 12′ & 12′ drill hitch?

A.—Find 12′ & 12′ in column headed "Widths For Which Hitch is Designed" in Table 7 and read to the right of 12′ & 12′. If you use a 12′ & 11½′ or 11½′ & 11½′ field cultivator combination with this hitch, bolt a 2″x4″ piece on top of AB from D to B.

Q.—I have two 9′ drills and two 8½′ field cultivators. Can I build a hitch to pull both drills and field cultivators?

A.—Yes, build hitch number 37 for the 9′ & 9′ combination of field cultivators. Use 2″ x 6″ as specified. Add extensions as shown in Fig. 11 and hitch the field cultivators as directed in Table 7.

Q.—I have three disks, 8′ & 9′ &10′. The 9′ has no tongue truck. What hitch shall I make?

A.—In Section 16, "Three Disks, Each of a Different Width," in column headed "Width of Disks" find 9′ & 10′ & 8′, hitch No. 291. Shift tongue truck from 10′ to 9′ disk and put a tongue in the 10′.

Q.—What part of the two implement hitch can be used in the three implement hitch?

A.—The stub tongues can be lengthened and used, but no other part of the two-implement hitch can be used with the exception of the simple disk hitch. The chains and the 2″x6″ used for the simple two-disk hitch can be used in the three implement hitch.

Q.—Should a marker be used with these hitches?

A.—A marker is very convenient, especially when using drills. Parts of a corn planter marker can be utilized in making a marker.

Q.—Why is it important to have a full load for the tractor in the field?

A.—It requires a certain amount of power to move a tractor across a

field. If a full load of implements is pulled, fewer trips are required. A full load saves trips as well as time.

Q.—Can I turn either right or left with these hitches without leaving space?

A.—Either a right or left turn can be made without leaving space. The three-implement hitch will turn as easily as the two-implement hitch.

Q.—How is a short turn made when these hitches are used?

A.—The driver watches the inside implement. The inside implement turns the same as if it were pulled alone. It is not necessary to pay any attention to the other implements when turning.