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AGRICULTURAL COLLEGE AND EXPERIMENT STATION

# Hitching Horses to Get the Most Work Done

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### PLOWING WITH A TWO-AND-THREE HITCH

The farmer who lays aside the four-abreast plow evener and tries the two-and-two or two-and-three hitch for a day seldom goes back to the old horse-killing, four-abreast, gang-plow hitch.

URBANA, ILLINOIS

# Hitching Horses to Get the Most Work Done

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Improvements that have been made in farming during the last one hundred years are reflected most strongly in the bigger outputs of individual farmers. This increased production has been brought about largely by more efficient use of both man and horse labor. Despite all that farmers have done to make better use of their own labor and that of their horses, there are other steps that can be taken to get more done with the same amount of labor. In fact, using the right combination of hitches and implements and thereby getting the most out of the man and horse labor that is used is still a means of cutting production costs and increasing the output of the farm.

Many farmers are still plowing with four horses hitched abreast when they could make the plow pull easier and get more work done in a day by splitting the four horses into two pairs and hitching one pair behind the other. Other farmers are handling only two or three horses when they could cover twice as much ground with five or six.

There is a tendency in recent years to farm more acres per man. In order to use teams advantageously it is necessary for each man to combine more horses in the field. This makes it possible in some cases to use larger implements.

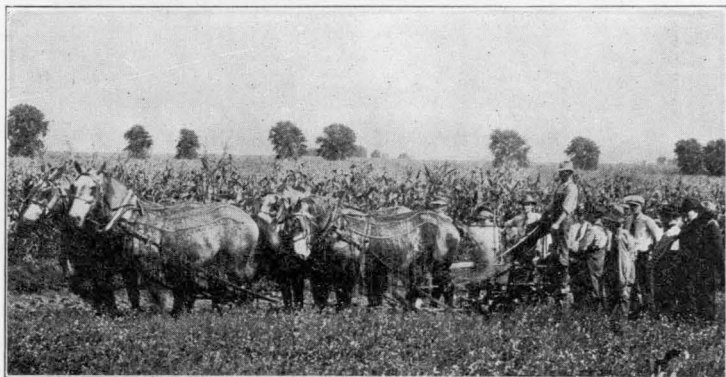


FIG. 1.—SIX HORSES HITCHED THREE-AND-THREE

Some farmers are handling two or three horses when they could cover twice the ground with five or six. This six-horse hitch is simple, convenient, cheap, and compact, and has proved to be both satisfactory and practical.

## Tandem Hitches Eliminate Side Draft

The hitches described and recommended here are in actual use on Illinois farms. Furthermore they have been tried out and found to be practical and satisfactory by members of the Farm Mechanics and Animal Husbandry Departments of this College. These hitches, in order to be

the most efficient, are designed to bring the true line of the team's hitch directly over the true line of the implement's draft, thereby doing away with side draft and making the implement pull easier. Hitching horses in tandem instead of abreast is the chief means of accomplishing this.



FIG. 2.—THE EIGHT-HORSE HITCH IN USE

This eight-horse hitch is especially adapted for use with a heavy tandem disk.

While the exact line of draft varies with different plows and different soil conditions, data have been

worked out which can be used for all practical purposes in making a hitch which will bring the line of hitch directly over the line of draft. The important point to remember in making such a hitch is that the distance from the center of the open furrow or the center of the furrow horse's single-tree to the true line of the whole team's hitch must be the same as the distance between the center of the open furrow and the approximate true line of draft. This latter distance for the different kinds of plows is as follows:

- 19 inches for a 14-inch sulky
- 22 inches for a 16-inch sulky
- 22 inches for a 12-inch two-bottom gang
- 26 inches for a 14-inch two-bottom gang
- 33 inches for a 14-inch three-bottom gang

The line of draft, as determined by these figures, for a 14-inch bottom and a 14-inch, two-bottom gang is shown in Figs. 3 and 4.

The use of a hitch which does not throw the line of hitch over this line of draft results in a side draft, which, in turn, makes the plow pull heavier and thereby reduces the amount of work which the team can do. In Fig. 4, for instance, it can be seen that the use of a 60-inch, four-abreast evener instead of a tandem hitch for a 14-inch, two-bottom gang puts the line of hitch 19 inches to the side of the line of draft.

The effect of this failure to have the line of hitch over the line of draft is brought out further in a striking way in the results of tests made by the Farm Mechanics Department with a two-bottom, 14-inch

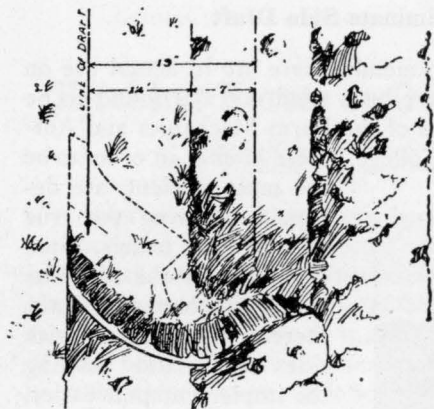


FIG. 3.—LINE OF DRAFT OF A 14-INCH PLOW

The line of draft of a 14-inch plow bottom is approximately 19 inches from the center of the open furrow.

When the hitch attachment was 35 inches from the furrow edge, the line of hitch was 16 inches to the side of the line of draft and the draft of the plow mounted to 1,412 pounds, or 116 percent.

The draft of the plow was further increased to 1,475 pounds, or 121 percent, when the hitch attachment was 47 inches from the furrow edge. In this case the line of hitch was 28 inches to one side of the line of draft.

### Improved Hitches Easily Made

Side draft similar to that in these last three cases can be practically eliminated by using tandem hitches made with just ordinary plow eveners and wagon double-trees, a draft chain for the lead team and an extra pulley or short evener next to the plow. Such hitches can be arranged for four-horse teams hitched two-and-two; five-horse teams hitched two-and-three, and six-horse teams hitched three-and-three. Likewise an eight-horse team can be hitched four-and-four to a light, three-bottom gang plow or a tandem disk, thereby increasing the efficiency of the man in the field. With reins on the outside horses of each team, any capable farm hand can drive such an outfit without difficulty. Men in the Northwest, where fields are large, drive 12, 16, and 30 horses to large implements.

The following descriptions of the hitches for various sized teams give the special equipment necessary for making them and directions for arranging them.

gang plowing a little more than seven and a half inches deep in prairie land. The ideal arrangement was to have the hitch attachment to the plow 19 inches from the furrow edge, or 26 inches from the center of the furrow. This put the line of hitch on the line of draft, in which case the draft of the plow amounted to 1,217 pounds, represented by 100 percent.

Having the hitch attachment 24 inches from the furrow edge threw the line of hitch five inches off the line of draft and increased the draft of the plow to 1,226 pounds, or 101 percent on the basis of 100 percent for

### Four Horses Hitched Two in Front and Two Behind

This hitch, which is illustrated in Fig. 5, is suited to either sulky or gang plows. Among its advantages is the fact that it produces little or no side draft, or 20 percent less draft than when four horses are hitched abreast; the horses do not jostle and crowd; their feet and shoulders keep sounder, and they can walk 20 miles a day and plow five acres easier than four horses hitched abreast can walk 16 miles and plow four acres.

Special equipment needed for this hitch includes only a four- or five-inch steel pulley carrying a twisted chain, a wire cable, or a new, large rope from two to three feet long, including a ring or loop in each end.

This pulley is hooked to the plow clevis at or near the center of draft and the draft chain or rod for the lead team attached to the lower end of the short pulley chain and supported at the end of the tongue with a one-foot chain hanger. The rear team evener is attached to the upper end of the short pulley chain. Two pairs of ordinary wagon double-trees are satisfactory. Reins are used from all four horses.

Instead of the pulley, a vertical steel evener measuring ten inches between the end holes can be used, provided it is attached with a rigid clevis to insure its remaining perpendicular. However, the pulley is more satisfactory, as it enables the average driver to keep the teams pulling much more evenly.

With this hitch the plow clevis will be near the center of draft on a 16-inch plow and just on the furrow side of the center on a 14-inch gang. Such attachments give the lightest draft.

### Five Horses Hitched Two in Front and Three Behind

A five-horse, well-seasoned, horizontal hickory or oak evener is needed next to the plow with this hitch, which is shown in Fig. 6. The distance between the end holes in this evener should be half the distance between the

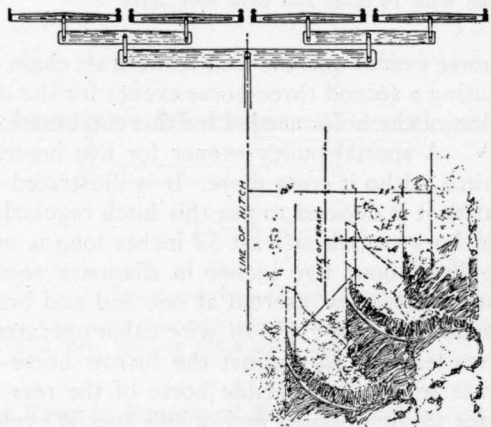


FIG. 4.—SIDE DRAFT WITH A FOUR-ABREAST HITCH

Power is not being used effectively when four horses are working abreast. One reason is that in the case of a 14-inch, two-bottom gang, for instance, the line of hitch is 19 inches to the side of the line of draft, thereby causing a side draft.

centers of adjacent single-trees on the three-horse evener that is used. When the common 28-inch single-trees are used there usually should be from 15 to 16 inches between the end holes in the five-horse evener. When this distance is 15 inches, the middle hole for the plow attachment should be nine inches from one end hole and six inches from the other.

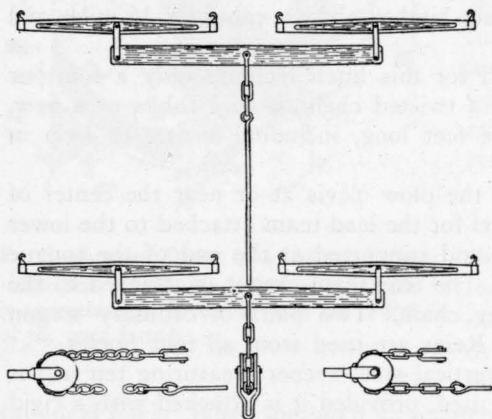


FIG. 5.—THE FOUR-HORSE HITCH

Four horses hitched this way can walk 20 miles a day and plow five acres easier than four abreast can walk 16 miles and plow four acres.

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The three-horse evener for the rear team is attached to the six-inch end and the lead team draft chain to the nine-inch end, the chain being passed between the middle horse and the furrow horse. The chain should be kept below the three-horse evener to get the best angle of hitch for each team.

The five-horse evener used next to the plow in this hitch can be changed to one for six horses by making it 28 inches long, boring a hole 12 inches from its center in either end, moving the three-

horse evener and the lead team draft chain out to these holes and substituting a second three-horse evener for the double-tree in front. The position of the holes needed for this combination is shown in the illustration.

A special pulley evener for five horses is more convenient for this hitch, altho it costs more. It is illustrated in Fig. 7 and might be made after it is decided to use this hitch regularly. A piece of two-by-six-inch hickory or oak at least 52 inches long is used for an evener and a steel pulley about five inches in diameter securely pivoted on a large lag screw which is inserted at one end and braced with an iron strap. The usual two-foot chain or wire cable operates on this pulley, balancing the two lead horses against the furrow horse and the middle horse of the rear team. The outside horse of the rear three is hitched by a single-tree to the opposite end of this special evener, 50 inches from the center of the pulley. The plow attachment is made ten inches from the center of the pulley.

Five horses make a good team for a 14-inch, two-bottom gang under ordinary conditions, but when the ground is hard and the weather hot six horses hitched in tandem make a better team for this load.

### Six Horses Hitched Three in Front and Three Behind

Special equipment for this hitch includes a strong horizontal hickory or oak evener next to the plow, the same as the one used for five horses with the exception that the hole for the plow hitch is in the center. If 28-inch single-trees are used, the end holes in the evener should be 24 inches apart, or, in general, the distance between the end holes should be about four inches less than the length of the single-trees.

A three-horse evener for the rear team is attached to the land end of this six-horse evener and the lead team's draft chain to the furrow end, the chain passing between the middle horse and the furrow horse of the rear team. The chain should be kept below the rear three-horse evener in order to get the best angle of hitch for each team.

This hitch is simple, convenient, cheap, and compact and has proved to be both satisfactory and practical, altho it does throw some side draft on both the front and the rear team. The front team pulls to the left and the rear team to the right, but this side draft does not appreciably lessen the effective pull. However, it does cause all the horses to work at a slight disadvantage by making them pull at an angle to the direction of motion.

### Seven Horses Hitched Three in Front and Four Behind

The only difference between this hitch and the six-horse one just described is that the short evener is longer. The end holes in it should be 35 or 42 inches apart and the hole for the plow attachment drilled so that it is 15 inches from one end hole and 20 from the other or 18 inches from one end hole and 24 from the other, depending on the width between the end holes.

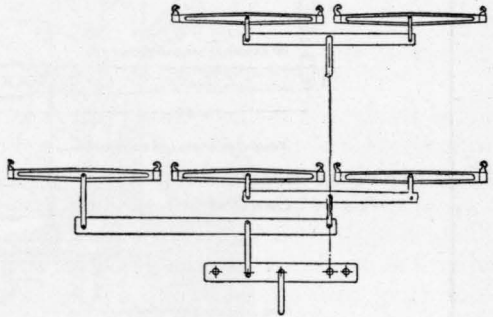


FIG. 6.—A FIVE-HORSE HITCH

This hitch can be made up with little difficulty as a five-, six-, or seven-horse combination.

### Eight Horses Hitched Four in Front and Four Behind

A large pulley carrying a twisted chain or wire cable from two to three feet long with a ring in each end is needed for this hitch and is used the same as in hitching four horses two and two, as shown in Fig. 5. Reins are used from the middle pair of the lead team and the outside horses of the rear team. The outside lead horses are tied back and jockeyed, if necessary.

This hitch is adapted to a three-bottom gang with a harrow attached and to a heavy tandem disk. It also has been used on two-bottom gangs for extra hard plowing in very hot weather. On plows, however, this may not entirely eliminate side draft.

More elaborate eveners in sets for four, six, eight, twelve, and more horses are used on some farms in the Northwest, but there are few farms in Illinois where more than six or eight horses can be handled on a practical basis. However, blue-print plans of special hitches for a large number of horses can be secured from the Farm Mechanics Department, College of Agriculture, University of Illinois, Urbana, at a cost of ten cents a sheet. In addition, many manufacturers have designed special hitches to help farmers utilize horse power more effectively and most of these are satisfactory.

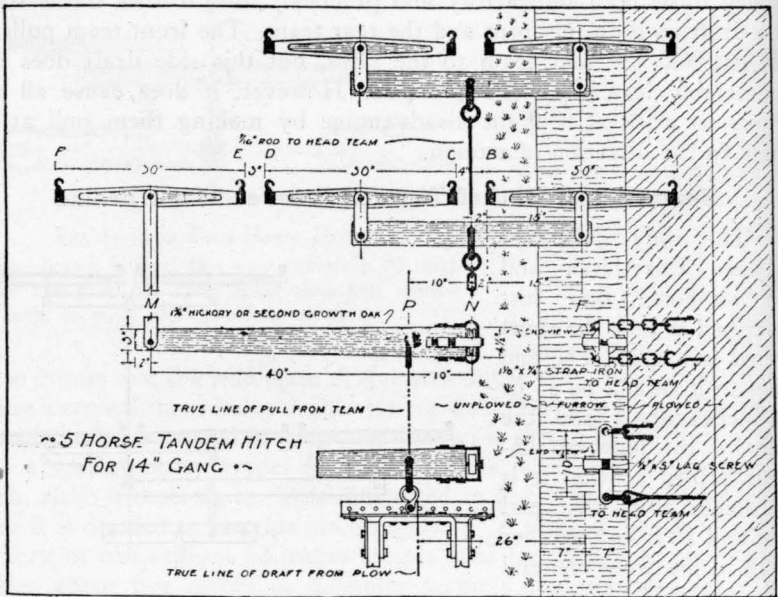


FIG. 7.—ANOTHER TYPE OF FIVE-HORSE HITCH

Adding a special pulley evener and another single tree makes a five-horse hitch out of the four-horse hitch shown in Fig. 5.

While it is true that only a few farmers may adopt the larger hitches, the four- and five-horse combinations just described, with one pair in front and a pair or three behind, should be adopted as standard in the corn belt for use with the common two-bottom gang plows. Power is not being used effectively when four horses are hitched abreast. The farmer who doubtfully lays aside the four-abreast plow evener and tries the two-and-two or two-and-three hitch for a day seldom returns to the old horse-killing, four-abreast, gang-plow hitch.