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Power Buck Rakes

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POWER BUCK RAKES

AGRICULTURAL EXPERIMENT STATION
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Cover Pictures

FRONT-MOUNTED BUCKER. When a bucker is mounted on the front of a tractor and used for heavy duty, extra wheels should be provided to carry the load. This bucker is carrying nearly a ton of hay.

The advantages of the front-mounted bucker are the greater speed obtainable in loading because the regular forward gears are used, and the convenience of operating the tractor in the usual way.

REAR-MOUNTED BUCKER. Rear mounting has the advantage of putting the load on the drive wheels so that there is no danger of overloading the front wheels, as there is with the front-mounted bucker. It also minimizes tooth breakage by reducing the side motion of the bucker during loading.

Another advantage is that this type of bucker is easy to control on hillsides and on sandy soil. Over rough ground, large drive wheels carry loads better than do small front wheels. Moreover, it is a simple integral unit which is easily attached to the tractor.

Since this type of bucker must be loaded in reverse gear, its greatest disadvantage is the slow reverse speed obtainable with many tractors. However, the tractor can be operated in a forward gear after loading. (For close-up of rear-mounted bucker, see Fig. 5.)

The author wishes to express his appreciation for helpful material furnished in the publications listed on the back of this circular and for drawings published by Ohio State University. Figs. 3, 10, and 11 are modifications of these drawings.

NOTE: There are no additional blueprints or other plans available from this Station than those shown in this Circular.

Power Buck Rakes

By L. F. Larsen, Assistant Agricultural Engineer

For many years the buck rake, also known as the sweep rake, bull rake, hay buck, and hay sweep, has been one of the farmer's main tools for hay making. Originally horses pulled it but tractors are now widely used. Old cars are also converted into buckers. The early types of buckers were usually made to carry light loads since they were mainly intended to move hay the short distance from the windrow to a stacker. These types are illustrated in Figs. 1, 2, and 4.

In more recent years buckers have increased in usefulness because with motor power they can haul much larger loads, travel faster, and make longer hauls. When a heavy-duty bucker is mounted on the front of a tractor as shown on the cover page, extra wheels should be provided to carry the load. Otherwise wheels, tires, or bearings may be damaged when the bucker is traveling over rough ground with heavy loads.

Instructions given here on how to build buckers are general rather than specific because readers will probably find it necessary to adapt these plans to meet their own particular needs.

Uses for heavy-duty buckers. With these buckers it is possible to move hay directly from the field to the farmstead efficiently and economically. The auto bucker has been found to be the most economical method of moving hay to the farmstead (see table on page 4). The total cost per ton of moving hay with the auto bucker was $1.03. The second lowest cost was $1.37 per ton with the tractor buck rake.

Hay moved directly to the mow on buckers may be raised into the barn lofts by means of slings or grapple forks, or rolled onto stacks in feed lots by means of ropes. Because of the larger size and capacity of heavy-duty buckers, they are not so well adapted for use with a stacker as are the smaller buckers.

In addition to hauling hay, the heavy-duty buckers are rapidly becoming popular with threshing crews for hauling bundles of grain to the threshing machine. One good bucker can replace about three racks. When a bucker is used, it is well to have one man stay in the field to gather up missed bundles.

A third use for these large buckers is to haul shocked corn and other shocked roughage from the field to the farmstead.

For heavy-duty use as a bucker, a tractor or a truck is usually better than a light auto, for they can handle heavy loads more efficiently. When a car or truck is used, it is best to mount the bucker on the rear

EFFICIENCY OF DIFFERENT METHODS OF MOVING HAY FROM WINDROW TO MOW*

Method	Number of farms	Tons of hay handled per farm	Number of men in crew	Tons handled per hour	Man hours per ton	Total cost per ton
Auto buck rake	84	41	3.1	1.8	1.7	$1.03
Tractor buck rake	53	35	2.6	1.3	2.0	1.37
Stationary chopper and buck rake	6	57	2.3	1.7	1.4	1.52
Wagon and loader	26	30	3.4	1.1	3.1	1.76
Large field chopper	3	86†	3.6	2.9	1.2	1.96
Stationary chopper, wagon, and loader	4	60	5.4	1.5	3.6	2.45
Pick-up baler‡	23	41†	3.2	1.2	2.7	2.60

* These data are from Ohio Bulletin 636, *A Study of the Newer Hay Harvesting Methods on Ohio Farms*, by F. L. Morison, Ohio State University, Columbus.

† Excludes custom work away from farm.

‡ Includes hauling and storing of bales.

of the chassis because better traction is obtained by putting the load on the drive wheels. With a tractor bucker, as has been mentioned, extra wheels are needed to carry the load when the bucker is mounted on the front.

Suggestions on loading. When it is necessary to get large loads, a speed of 6 to 8 miles an hour is needed in order to help force the hay completely on the teeth. With this speed the hay slides on the teeth easier and also is loaded farther back. This loading far back on the teeth is particularly important where they are long. With slower speeds the hay tends to collect on the ends of the teeth and loading is difficult.

"Double loading" is also recommended. To load double, buck one load of hay together, back away, and load another. Raise the teeth as high as possible with a power lift and place the second load on the top of the first. Then take both loads at once.

Front-Mounted and Rear-Mounted Buckers

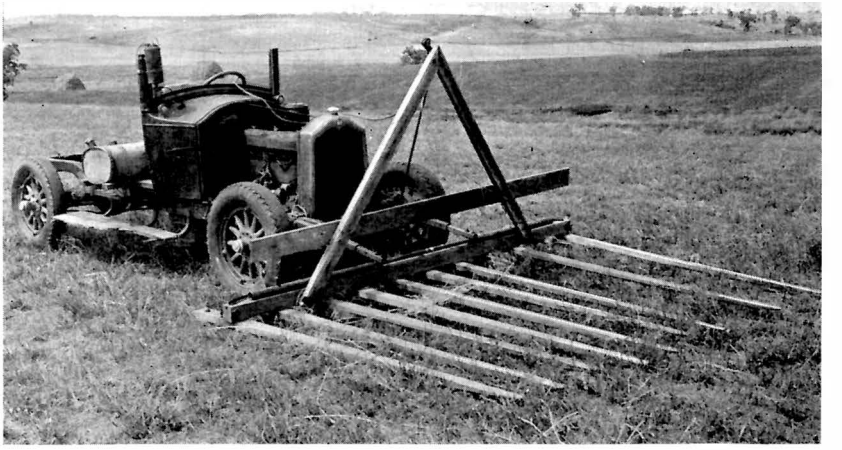


Fig. 1. Simple type of small buck rake for moving hay to the stacker. Such a bucker can easily be made and mounted on a car, pickup, truck, or tractor. To lift the teeth the driver pulls the rope. It is easy to mount a hand winch or an ordinary wire stretcher near the driver for him to use in winding up the rope.

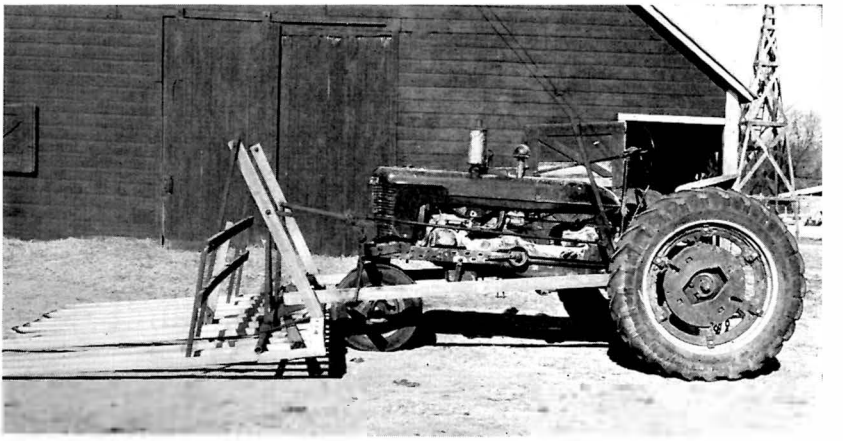


Fig. 2. Horse-type bucker converted for tractor use. This bucker is also suitable for such light-duty work as moving hay to the stacker. The bucker teeth are 9 feet long and the frame is 12 feet wide. For horse-type bucker mounted on the rear of a tractor, see Fig. 5.

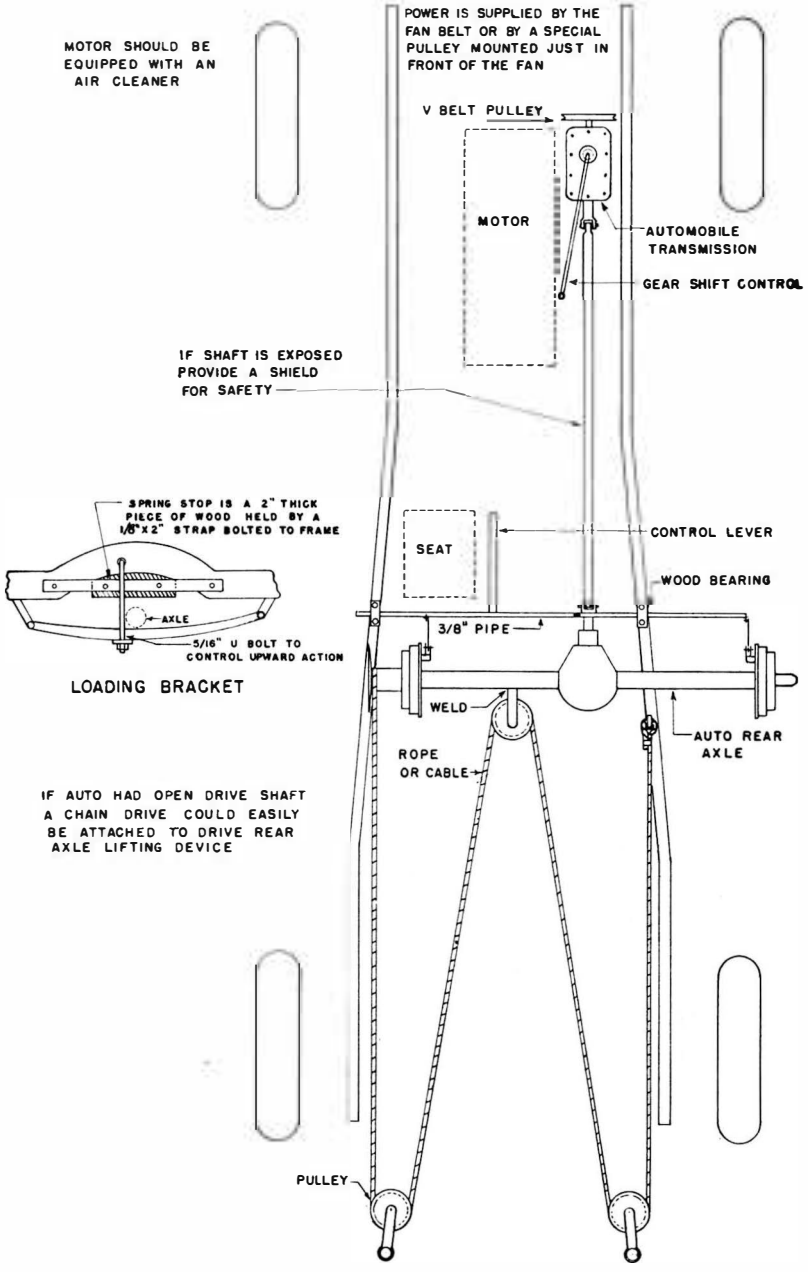
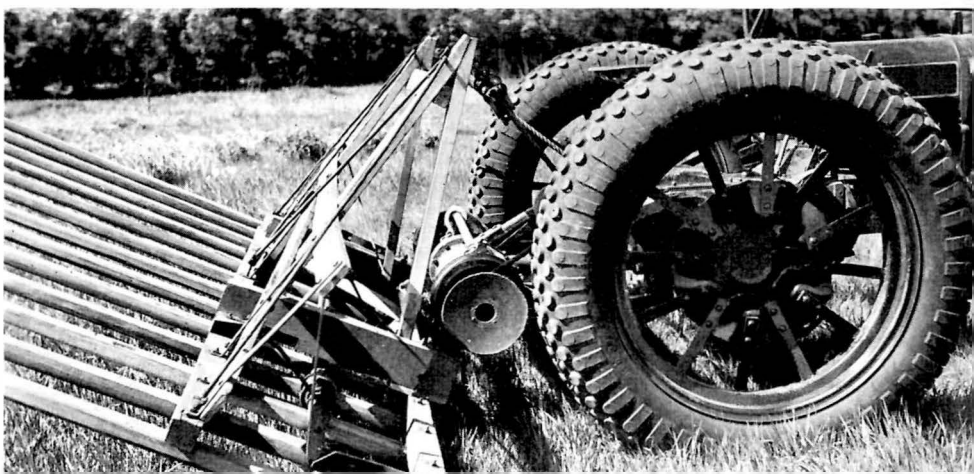


Fig. 3. How to attach a power lift to a used auto. A rake similar to the one shown in Fig. 10 can be mounted on the rear of the auto frame. For power lift, see Fig. 12.

Fig. 4. Auto chassis bucker. Hand lever is used for raising the teeth. The rear axle was inverted so that the auto would travel backward when driven by the regular forward gears. The front axle was reversed to retain good steering qualities. Some operators leave the rear axle and front axle as they are and load in reverse gear. After loading, the teeth are raised and the auto driven forward. This plan is especially desirable when a power lift is used and where long hauls are necessary.

Fig. 5. A horse-type bucker remodeled at the South Dakota Station to mount on the rear of a tractor with a power lift. It is important to have the rear end of the teeth as near the rear wheels as possible. For advantages of rear mounting, see page 2. Many farmers have changed their tractors to make possible more speedy reverse travel.



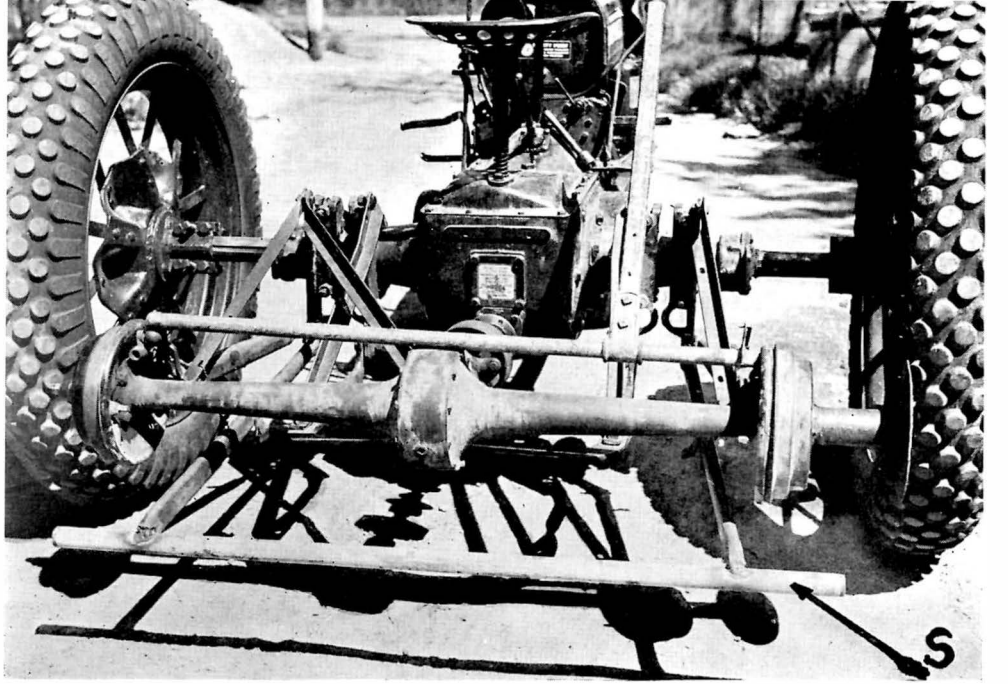
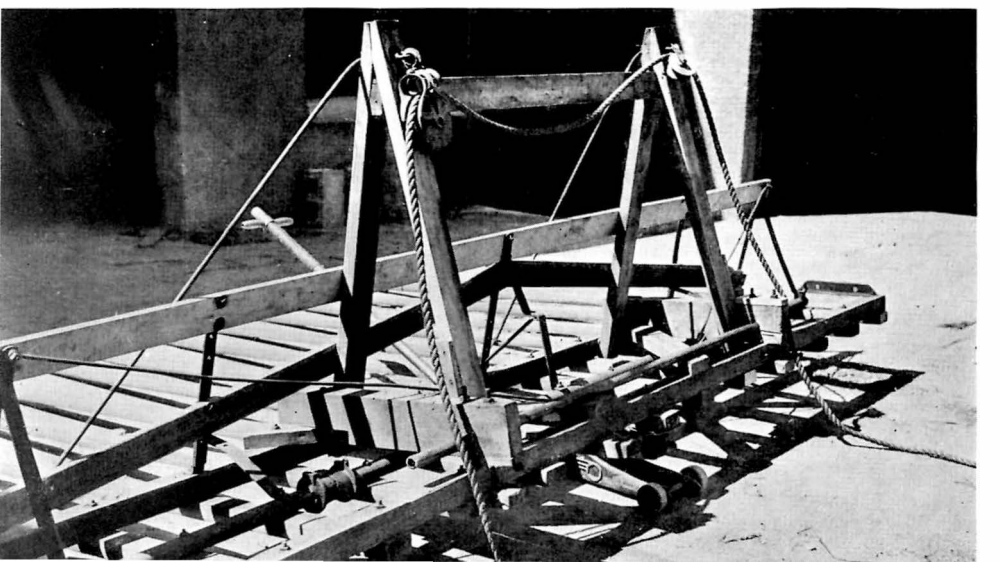


Fig. 6. (Above) Power lift arrangement for the rear-mounted bucker. Below the old automobile axle is the support pipe "S," a 1¼-inch pipe welded to the push arms. They in turn are chained up to the lift frame at the proper height. Fig. 7 (Below) Slight change made in a horse-type bucker for mounting on the rear of a tractor. The 1-inch pipe passing through the 4″x6″ hinge arms also passes through the pipe "S," shown in Fig. 6.



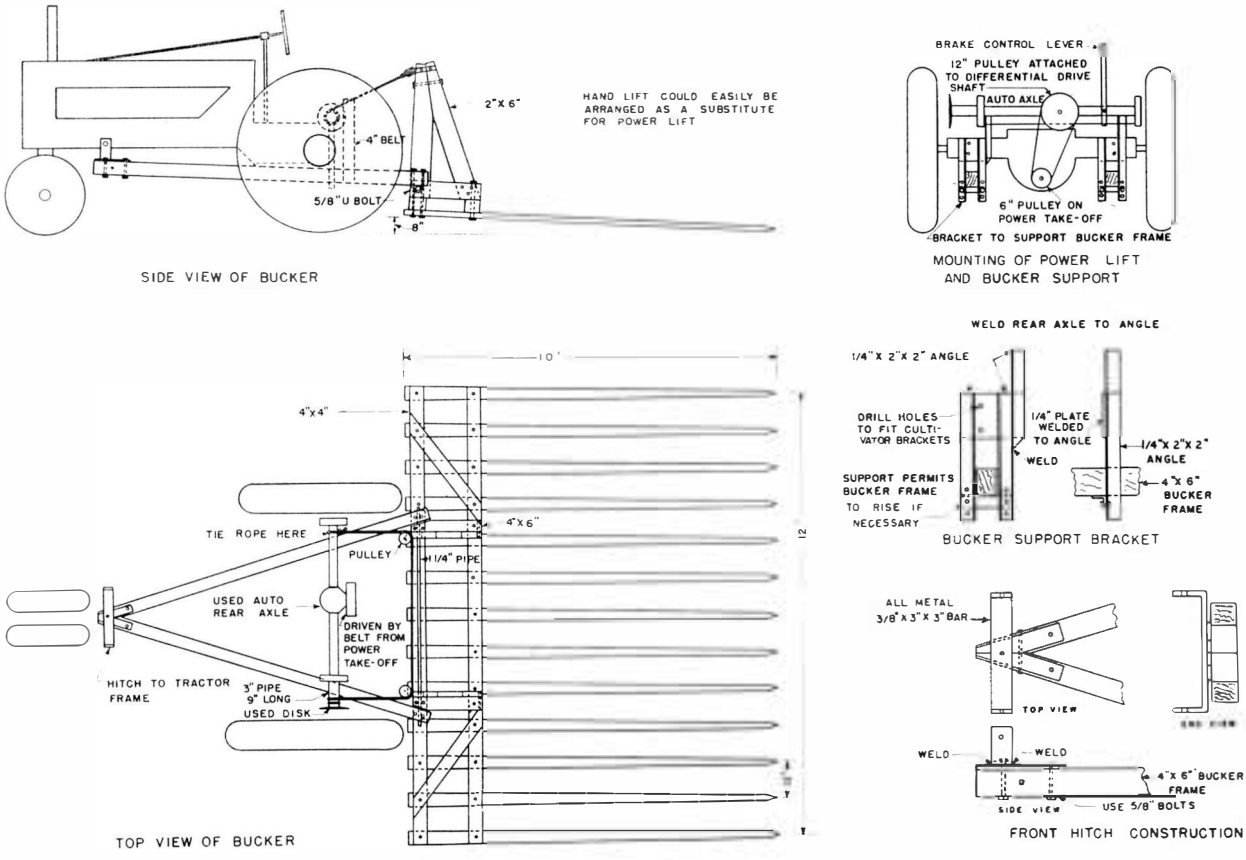


Fig. 8. This bucker, designed at the South Dakota Station, is sturdier than the rear-mounted bucker on the cover and can operate the large rake in Fig. 10.

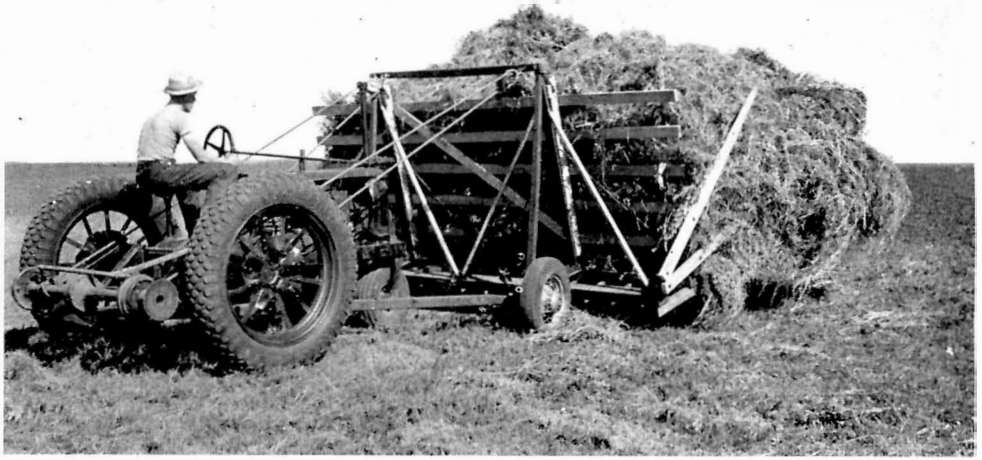


Fig. 9. A bucker large enough to haul hay directly to the farmstead. It can also be used to haul grain shocks to the thresher, move shocked corn and other feeds, and gather combined straw.

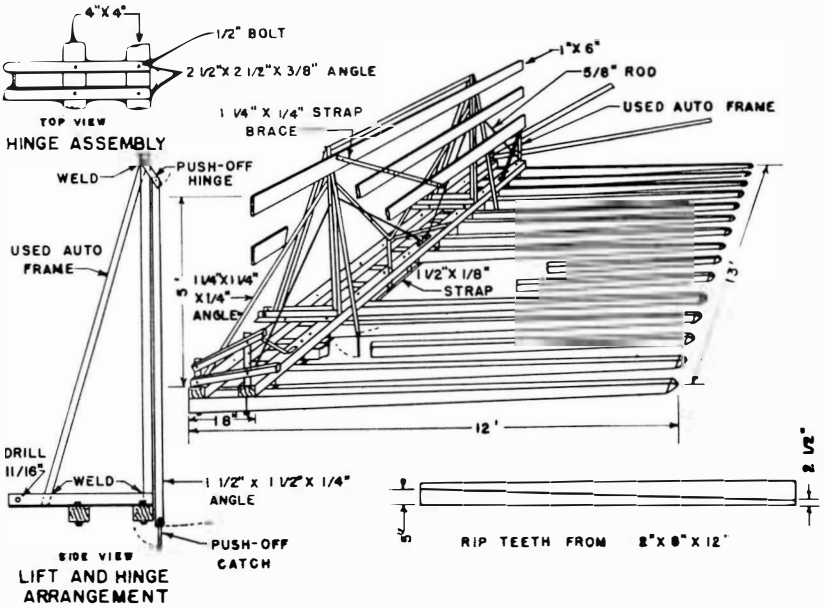


Fig. 10. Wood is used for most of this bucker. The center of the load is placed nearer the tractor and the danger of tooth breakage is reduced by using shorter teeth (10 feet) and a wider frame (up to 14 feet). The width can be made to meet individual needs. Clear fir is used throughout. Oak or yellow pine is best for cross pieces but fir is probably the best wood available now. A 3″x6″ piece of ash ripped diagonally makes good teeth, but if not available use 2″x6″10′ or 2″x8″12′ depending on the length of teeth desired. For heavy loads the teeth should be placed on edge.

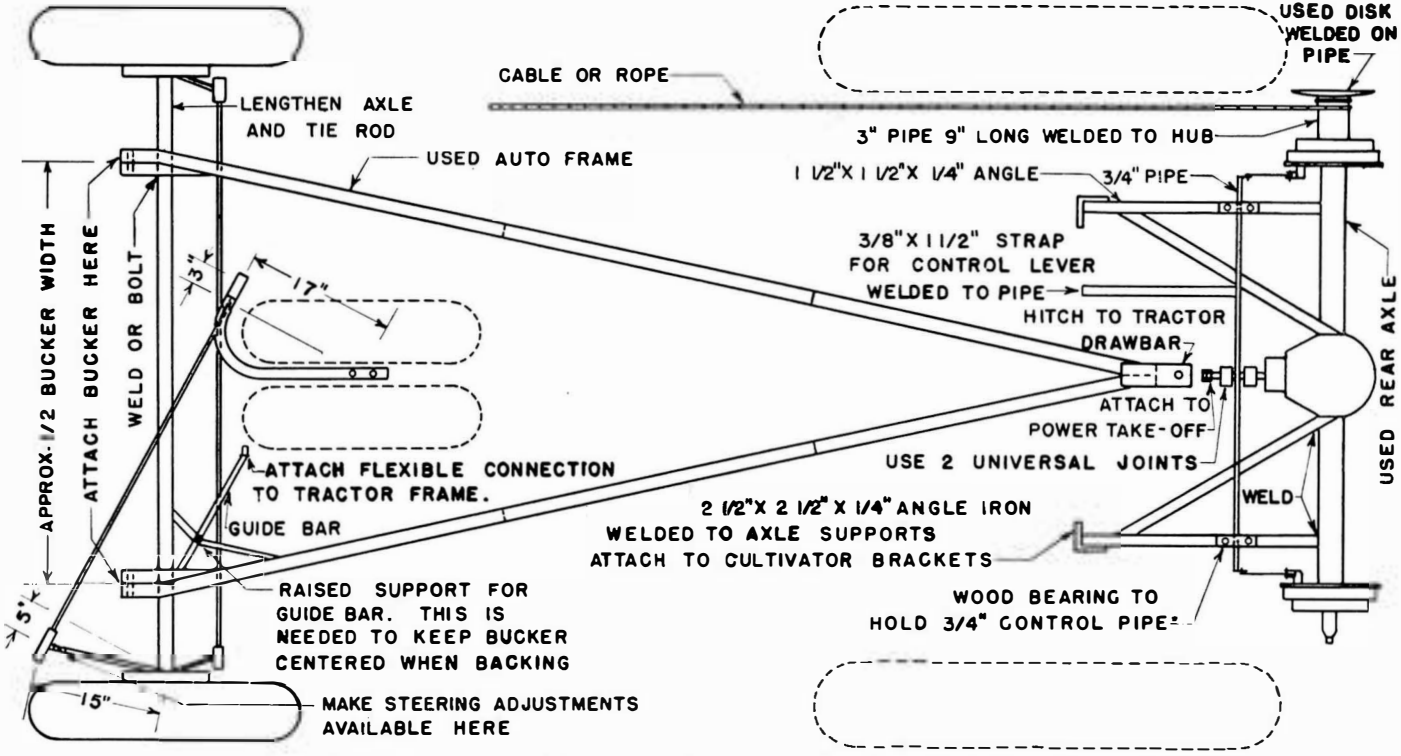


Fig. 11. Construction of the carrier frame for buckers in Figs. 9 and 10 and the front-mounted bucker on the cover. For power lift, see Fig. 12.

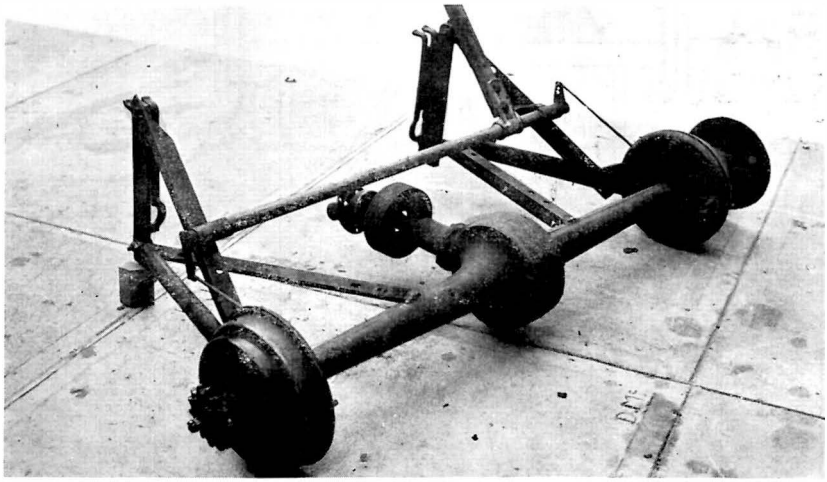


Fig. 12. (Above) Power lift made mainly from used auto parts. Power is obtained from power take off. With the control lever back, the left-hand brake is applied, causing the right hub to rotate and wind up the rope (Fig. 13). With the lever forward, the brake is released, allowing the left hub to rotate and checking the right hub. Both can rotate with lever at mid-position. Fig. 13 (Below) A simple power lift makes a large bucker easy to operate. The lifting mechanism is mounted on cultivator supports independent of quick detachable drawbar. This lift is attached in exactly the same way as the drawbar.

Fig. 14. (Above) Bucker constructed from lumber and old auto frames. This material is generally available to farmers and many will have it in their own shops. A large type of bucker such as this will be subjected to severe usage and strong diagonal bracing is important. Fig. 15. (Below) Suggested arrangement of brace bar and drag link. The brace bar is needed when backing in order to keep the bucker wheels in line with the front wheels of the tractor. When driving forward the brace bar is not needed as the bucker wheels and tractor wheels can easily be made to work together.

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Push-Type Power Buckers

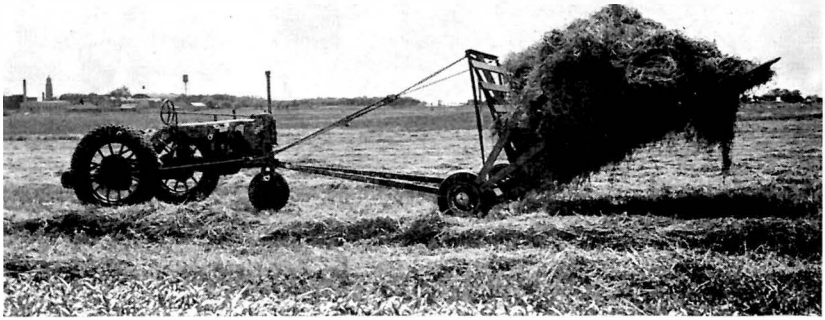

Fig. 16. (Above) Heavy-duty bucker pushed ahead of tractor and hitched at only one point. This arrangement eliminates the need for steering apparatus on the carrier and so the construction is simplified. The bucker is easily attached and detached from the tractor and is easily operated after a little practice. Fig. 17 (Below) Simple way to attach a bucker to a tractor. Some farmers slightly change horse buckers to use in this same manner and control the raising and lowering of the teeth with a rope from the lever control to the operator.

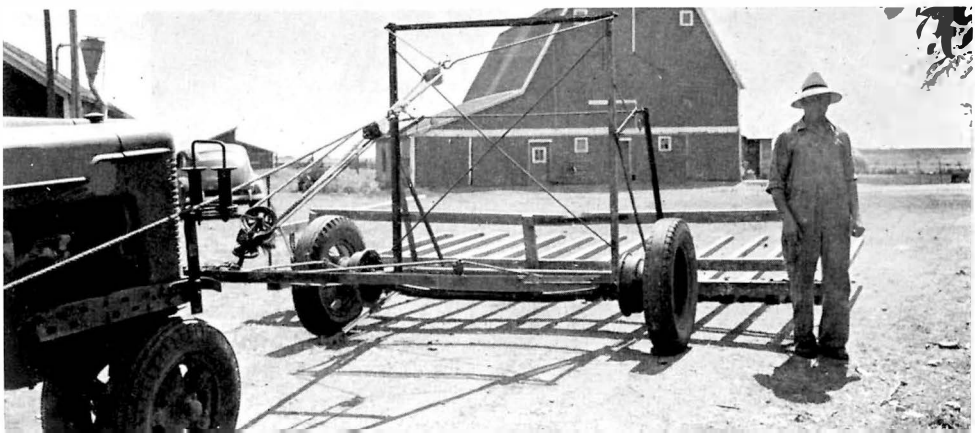

Fig. 18(Above) Pulley arrangement. Because large loads can be hauled with this type of bucker, it is advisable to use a power lift. This pulley arrangement was used at the South Dakota Station. Fig. 19. (Below) Turning with the push-type bucker. One advantage of this bucker is that it does not swing the teeth so much in turning as does the front-mounted bucker. It is easy to turn this machine.

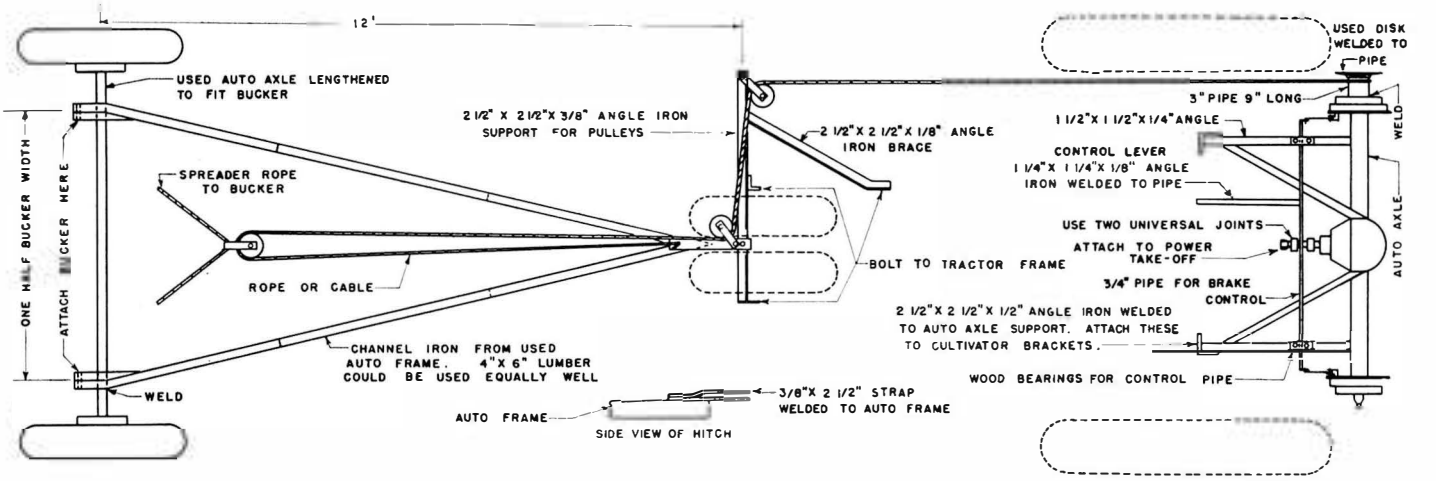

Fig. 20. Suggested arrangement for power lift and hitch assembly for the push-type power bucker. For details of power lift, see Fig. 12. Some farmers have made good use of this hitch arrangement and wheels as a 2-wheel trailer when it was not used as a bucker.

Stacker-Buckers

Many requests have been received at the South Dakota Station for information regarding plans for a stacker-bucker combination. During the summer of 1943 a simple stacker-bucker was constructed and used at this Station.

The machine built here worked quite satisfactorily for an initial trial and with minor adjustments it can be developed into a very satis-

Fig. 21. Overshot stacker-bucker unloading hay near Brookings. It was made mainly out of lumber. Clear fir was used throughout.

factory home-made stacker-bucker.[1] Only one complete stack of hay was built with it owing to the lateness in the season. Although the pull on the ropes in starting to raise the load up onto the stack is made at a disadvantage, the tractor seemed to have no difficulty in starting it. Intentions were to place a pair of brackets on the frame with pulleys in order to increase the mechanical advantage in starting to raise the load, but with the power available these brackets were not necessary.

[1] The author has left this Station and work on this machine has been discontinued for the present.

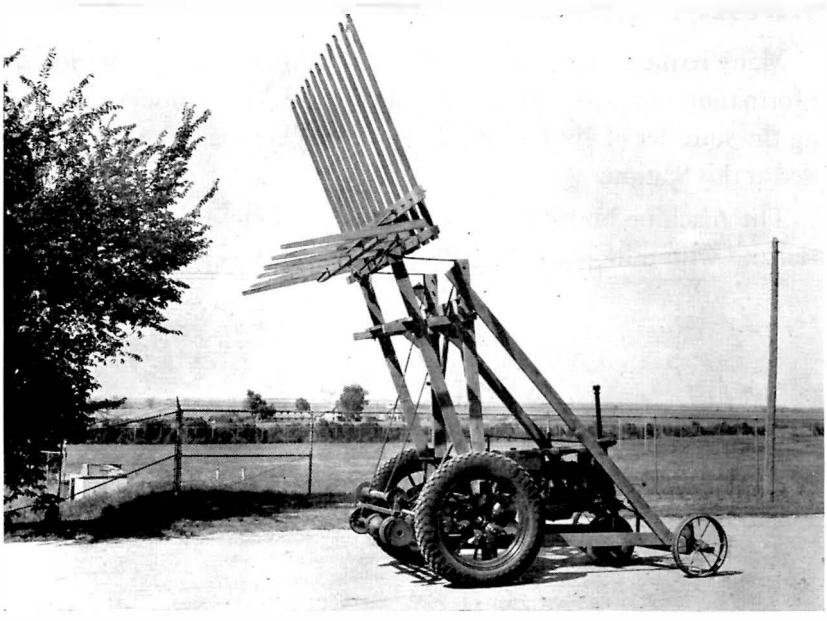

Fig. 22. Stacker fork is pulled forward and over center by engaging power lift for an instant.

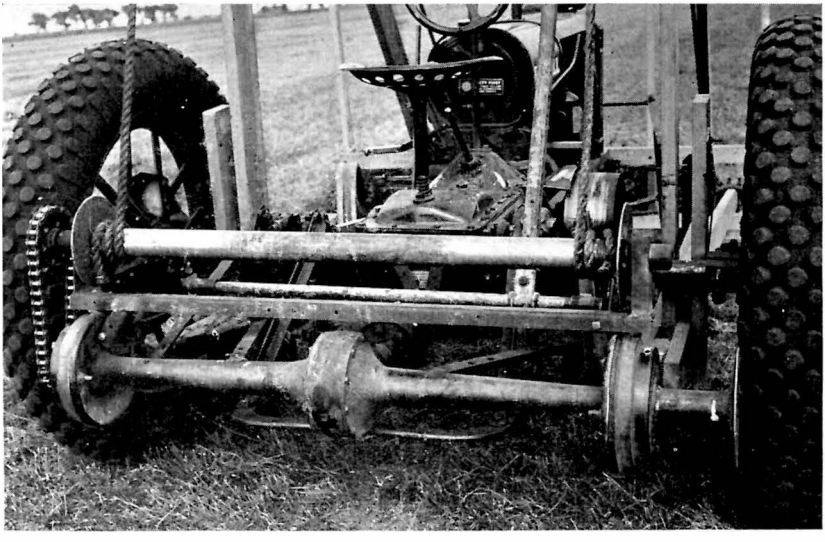

Fig. 23. Lifting power is provided by windlass driven by chain from the same rear-axle assembly as shown in Fig. 12.

Fig. 24. Brace bar and steering linkage for the stacker-bucker.

HOW IT WORKS

These three pictures show how the stacker-bucker works. When the brake is slipped, the fork (Fig. 22) is lowered. The teeth shown here are 9 feet long and the cross pieces are 12 feet long.

The windlass shown in Fig. 23 should be at least 5 inches in diameter. Hinge point of stacker arms can be raised 2 feet when higher lift is desired. The rear part of the stacker-bucker is supported by only two large bolts so it can be easily unhooked from the tractor.

The brace bar pictured above is needed in order to keep the wheels of the tractor and the stacker-bucker coordinated when backing.

Fig. 25. Loading hay on rack with a stacker-bucker. Extra front wheels carry most of the weight of the stacker-bucker and hay, eliminating any danger of damaging front-end assembly of tractor. For these wheels, rubber-tired auto wheels are much better than those shown above. Steering plans are like those in Fig. 11.

More Information on Buckers

The following publications can be obtained from the sources given.

Buck Rakes (Bulletin) by C. B. Richey and R. D. Barden, Ohio State University, Columbus.

Effective Haying Equipment and Practices (U.S.D.A. Farmers' Bulletin No. 1525).

Homemade Auto Buck Rake (Circular 172) by O. W. Monson, Montana State College, Bozeman.

Homemade Farm Equipment (Bulletin 443) by William P. Kintzley, Colorado Experiment Station, Fort Collins.

Homemade Sweep for Tricycle-Type Tractor (Mimeographed Sheet-Information Series 4) by Carlton L. Zink, University of Nebraska, Lincoln.

Sweep Rakes (Mimeographed Extension Circular) by R. C. Shipman, Purdue University, Lafayette, Indiana.

Transport Buck Rake (Circular) by C. E. Barbee and C. Lorenzen, Jr., University of California, Berkeley 4.

Transport Sweep Rake (Mimeographed Circular) published by Michigan State College, East Lansing.

Agriculture Extension Service—Plan Sheet M-109 (contains information on sweep rakes) by John Strait and Norton Ives, University of Minnesota, St. Paul.

10M—1-44—6108
3.5M—5-44—6215