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Clyde Walker

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POWER BUCK RAKES

by

Clyde Walker, Extension Agricultural Engineer

Power buck rakes can be divided into two general types, based upon whether the load is lifted for transport, or pushed ahead of the rake. Push-type rakes are usually mounted on a truck or auto chassis that has been permanently "reversed," by inverting the rear axle, reversing

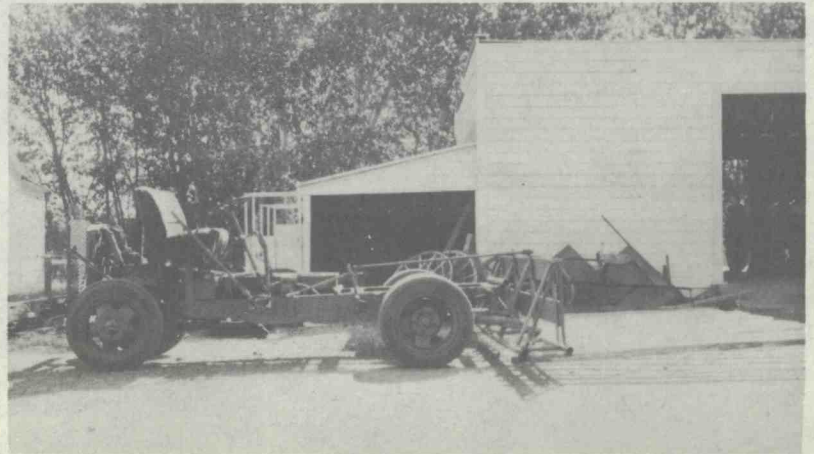
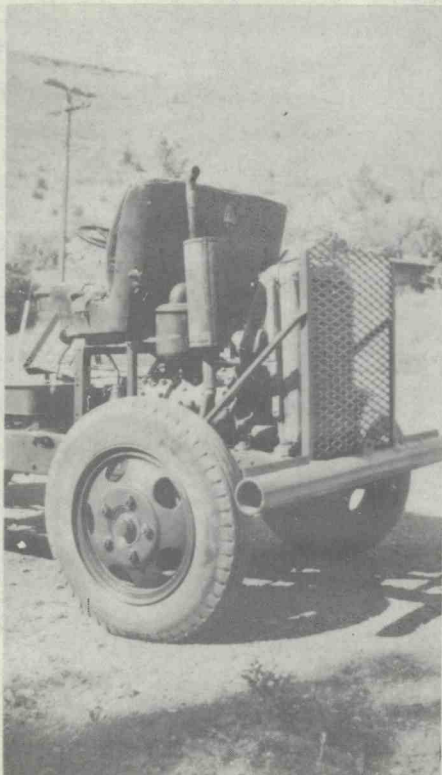


Figure 1. Push-type buck rake on reversed truck chassis.



the steering gear, clutch and brake controls, and facing the driver's seat in the opposite direction. (See figures 1 and 3.) They may also be mounted on a tractor. The result is a machine which is driven in the same direction both when loading and transporting the hay, but on which the elevation of the load for transport is limited by the possibility of interference with the driver's vision. This can be offset to some extent by raising the driver's seat.

Figure 2. Radiator guard and bumper on rake chassis shown in figure 1. Also note muffler arrangement, and air cleaner.



The push-type rake is most popular in areas where hay is stacked in the field. For a detailed drawing of a push-type truck buck rake see Extension Circular 402.

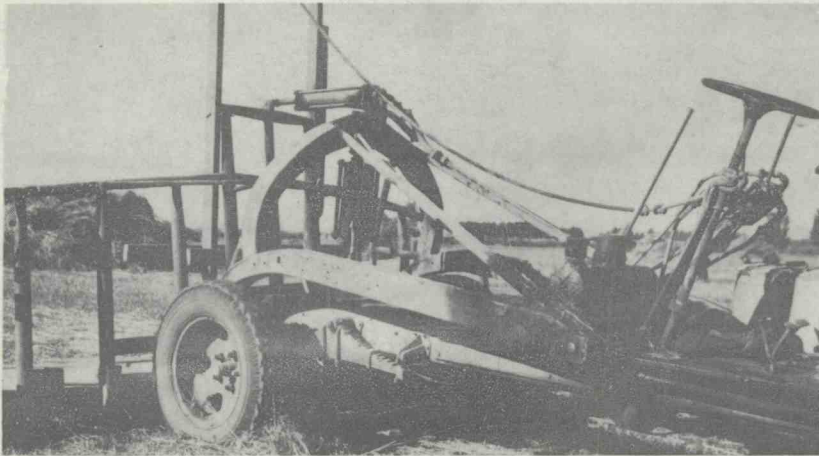


Figure 3. Hydraulically controlled buck rake. Teeth are tilted by horizontal cylinder at top of arch. Entire rake is lifted by a large vertical cylinder beneath arch.

On transport-type rakes the chassis is not reversed. The machine is driven backward while loading, and forward when transporting the load. Thus the load may be

elevated as high as desired for transport without interfering with the driver's vision. The transport-type rake is best for use when it is necessary to move the hay over roads or lanes, or from field to field. For this reason it is probably best adapted to most farms in western Oregon.

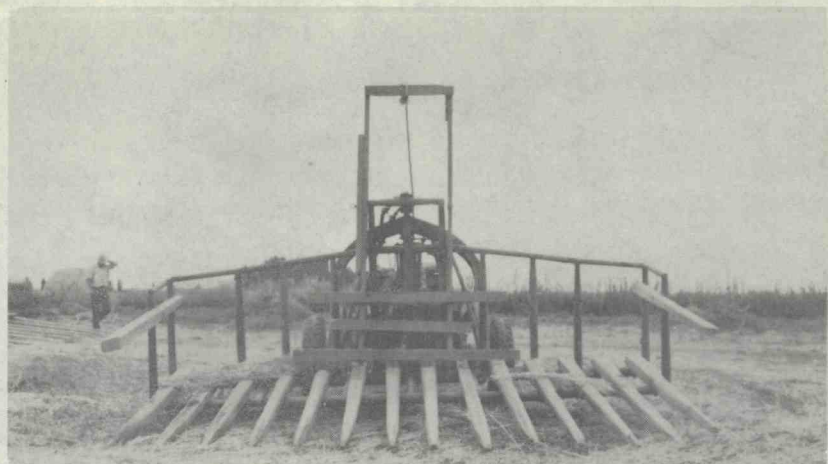


Figure 4. Front view of rake shown in figure 3.

The auto buck rake illustrated in figure 5 is of the transport type. In the picture the load has been lifted entirely clear of the ground for transporting. The rake is driven backwards to load, and forward after the load is in place and elevated to the transport position



On the buck rake illustrated in figure 5 the load is lifted by a winch constructed from a car rear axle and powered by a back-gearred automobile starting motor connected to the drive shaft of the car axle with a V-belt. (See figure 6.)



Figure 5. Auto buck rake with load in transport position.

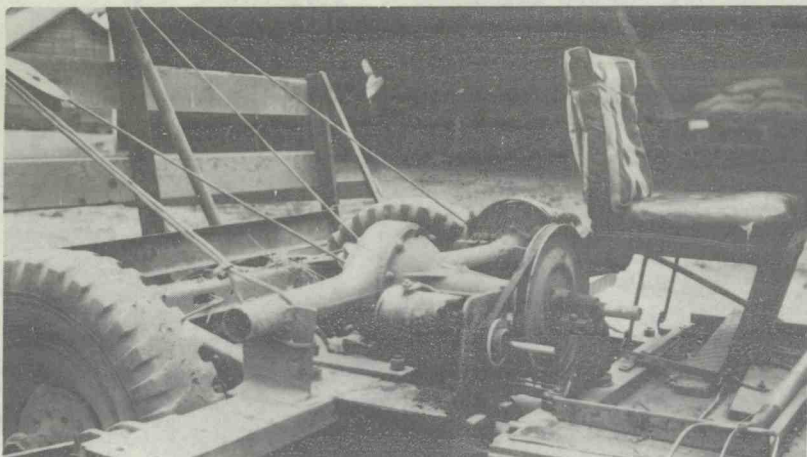


Figure 6. Power lift driven by car starting motor.

The differential gears have been welded in place, so the ring gear and pinion merely serve to reduce the speed and change direction of the power. The load is held in the raised position by applying the brake on the drum to which the winch is attached. The cable that lifts the buck rake

passes through a system of four sheaves to the winding drum welded to the hub on the car axle. This drum can be seen in figure 7, just ahead of the rear wheel.

Since the starting motor used to lift the load operates for only a few seconds at a time, it does not cause an excessive drain on the storage battery. If the generator is set to charge 20 amperes or more and the battery is in good condition, no difficulty should be encountered in keeping the battery fully charged.



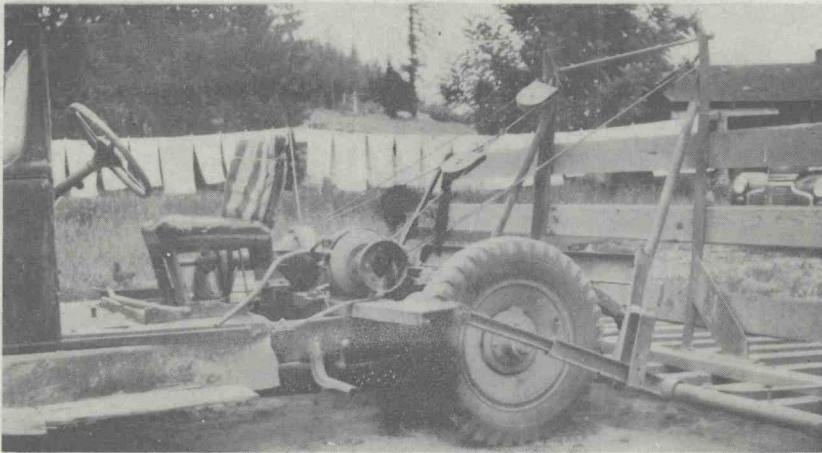


Figure 7. Side view showing push arm attachment.

The buck rake is supported by a heavy push arm on either side of the auto chassis. The push arm passes through a rectangular slot made from heavy bar iron, which is attached to a heavy channel iron placed across the rear of the car frame. The lower end of the push arm is

welded to a steel sleeve on the pipe buck rake frame. The upper end is attached to a heavy channel iron placed across the car frame just ahead of the rear wheels by a pin connecting the arm to two steel lugs welded to the channel iron. Since the push arm is not rigidly attached at either end the connection of the buck rake to the auto chassis is quite flexible. The buck rake can rise or fall to conform to irregularities in the surface of the ground regardless of the movement of the chassis, up to the limits of the rectangular slot through which the push arm passes. This is a desirable construction feature for two reasons: (1) The buck rake does not tend to raise the rear wheels whenever the rake strikes a high point on the ground, and (2) The force or resistance thrust from the rake is transmitted to the chassis at a point ahead of the rear wheels, where the weight of the front of the chassis and motor aids in resisting this thrust, and providing traction for the rear wheels. If anything, it would be desirable to have the channel iron to which the push arms are attached placed still farther forward, directly below the driver's seat.

The rake used on transport buck rakes will have teeth ten to twelve feet long, with a backstop four or five feet high. The teeth are usually placed about 12 inches apart, and the rake is made ten to twelve feet wide.



The buck rake illustrated in figure 7 is 12 feet wide. The teeth are 9 feet long ahead of the backstop, which is about 4 feet high.

The pipe at the back of the rake is  $2\frac{1}{2}$ " in diameter. The 2" x 4" teeth are bolted flatwise to flat steel plates welded along the under side of the pipe. The slot through which the push arm passes is wide enough to permit the push arm to move up and down without binding, and is 12" high. It is made of  $\frac{1}{2}$ " x 3" flat iron, welded to a  $\frac{3}{4}$ " x 3" flat iron upright. The upright is welded to the end of a 5" channel iron, which is attached to the car frame behind the rear wheels.

The upper end of the push arm is attached to steel lugs  $\frac{3}{4}$ " thick with a pin 1" in diameter. The lugs are welded to a 6" channel iron, which is attached to the car frame ahead of the rear wheels. This channel iron is 7 feet long, which allows plenty of clearance between the push arms and the sides of the rear wheels. The push arms consist of heavy tractor connecting rods welded to a 3" I beam.

The winding drum for the hoist cable should be at least 4" in diameter. Five or 6" in diameter is still better.

Figure 8 illustrates an unusually large transport rake mounted on a  $1\frac{1}{2}$  ton truck chassis. This rake is fourteen feet wide, with teeth twelve feet long and a backstop nine feet high. It can haul from 1500 to 2000 pounds of hay in a load. The load is lifted for transport by a car axle winch driven from the power take-off in the truck transmission.

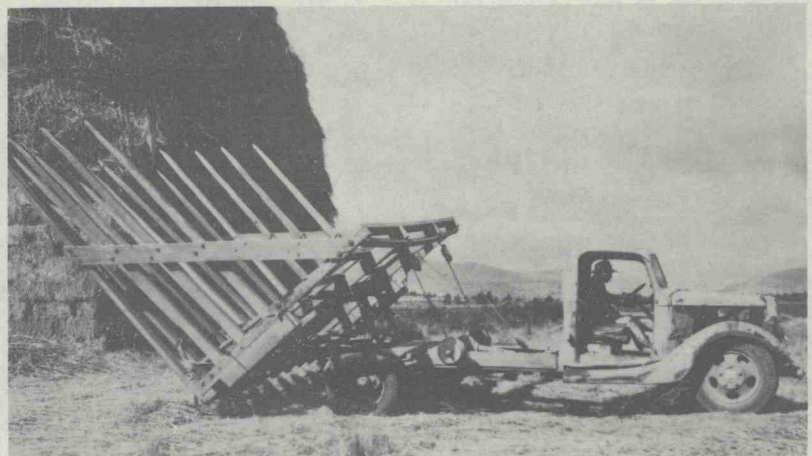


Figure 8. A large transport-type rake.



The chassis used on any type of buck rake should be in good operating condition. The clutch, transmission and brakes will all receive considerable use and must be in good shape. The motor must also be reliable and in reasonably good condition. The cooling system must be adequate, and a very efficient air cleaner on the carburetor is very desirable. Tires must be strong, and lug-type treads on the rear wheels will give best results under most conditions.