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A Grapple Fork for Baled Hay

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Introduction

TRANSFERRING baled hay from a truck or wagon to the mow in a barn involves considerable labor when ordinary forks or slings designed for long hay are used. If the bales are lifted with slings, each bale must be picked up and placed on the slings by hand unless sufficient sets of slings are available to permit placing them as the bales are loaded in the field. If a regular grapple fork is used to pick up the bales, they must be piled in pairs which involves moving at least half of the total number of bales. The ordinary grapple fork as designed for long hay, furthermore, does not have capacity for holding more than three or four bales of hay at a time.

Special Fork for Baled Hay

The fork, illustrated in Figure 1 as developed by the Agricultural Engineering Department at Oregon State College, will pick up eight small or six large bales at a time. Eight tines or hooks, four on each side of the main frame, are inserted in the bales as they rest end to end on the load. No moving or piling of the bales is necessary.

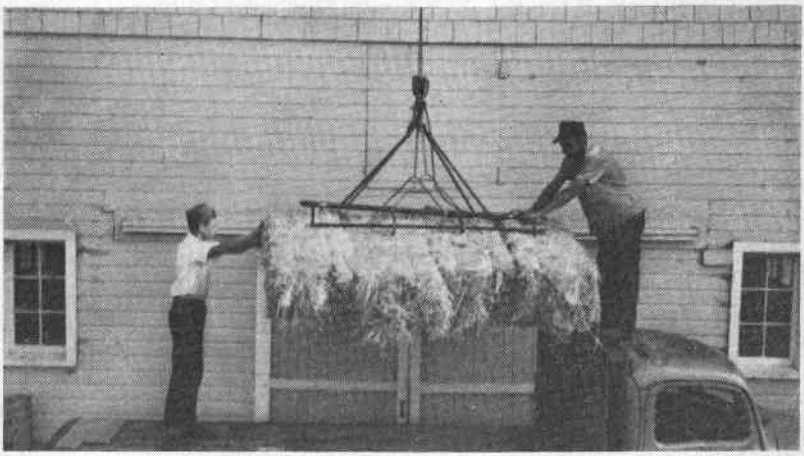

Figure 1. Special grapple fork lifting eight bales into the mow at one time.

Operation

Figure 2 shows the principal parts of the fork. The tines are welded to pipe sleeves that pivot on the main frame, also made of iron pipe.

Dimensions of the frame and tines are such that each tine enters the bale slightly inside of center. This causes the outer end of each bale to hang downward slightly when the load is lifted, and push against the bale on the opposite side. (See Figure 1.)

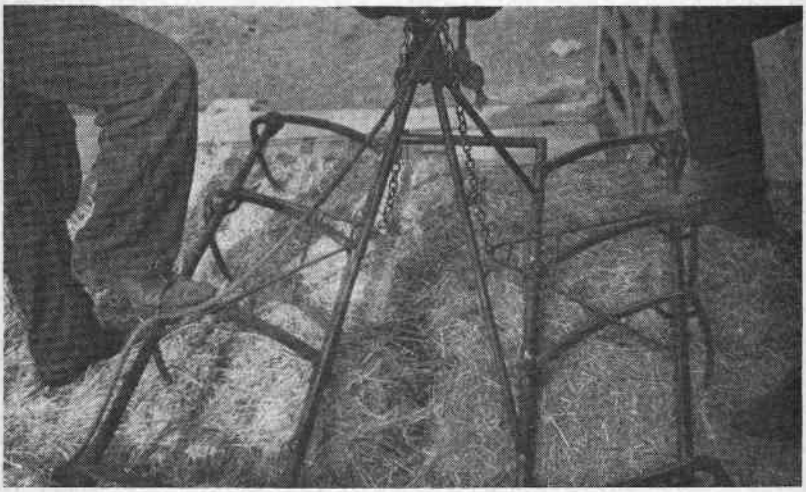

Figure 2. Inserting tines in bales. This can be accomplished rapidly by stepping on each tine.

The trip mechanism, the same as is used on an ordinary grapple fork, is attached to a short length of $\frac{3}{4}$-inch round iron which is welded to four pieces of $\frac{3}{4}$-inch round iron that extend diagonally down to the main pipe frame. After the load enters the mow, the trip rope is pulled releasing the main frame and transferring the weight to the short lengths of chain on either side. These chains are connected with $\frac{3}{8}$-inch round iron to the $\frac{3}{4}$-inch iron pipes passing through the bend or elbow of each tine. When the weight of the load is transferred to the tines, they are withdrawn from the bales allowing the bales to drop into the mow.

In Figure 3 the gang of tines at the left is in the elevated position in which they return from the mow for another load, while the tines at the right have been inserted in the bales.

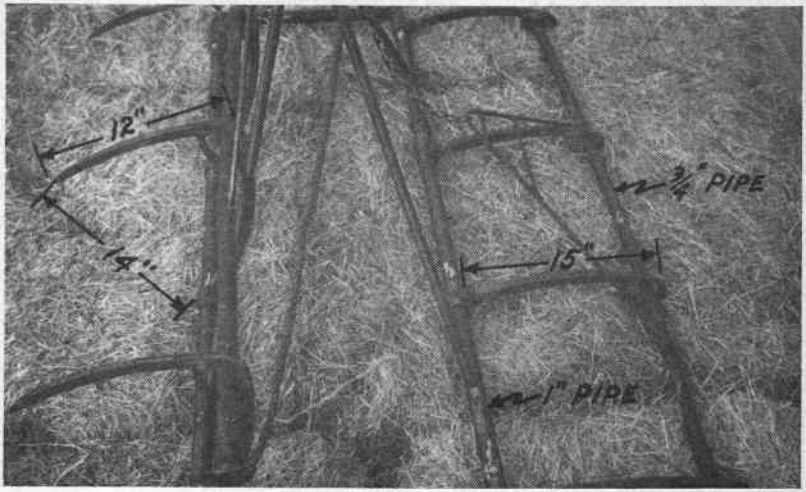

Figure 3. Dimensions of certain parts of fork.

Materials and Construction

Dimensions of the tines are shown in Figure 3. They were made from the tines of an old Jackson fork that were ideal for this purpose as they were already tapered. Tines made of $\frac{1}{2}$-inch round iron were tried at first, but proved to be too light, frequently bending and giving trouble by failing to withdraw from the bale when tripped. The tapered tines are approximately $\frac{3}{4}$-inch square at the ends which are welded to the sleeves on the main frame. The main frame is made of 1-inch black iron pipe. It is 64 inches long and 19 inches wide, outside measurements. Sections of $1\frac{1}{4}$-inch pipe about 2 inches long are used for the sleeves to which the tines are welded. The $\frac{3}{4}$-inch pipes passing through the elbow of each tine are 62 inches long and are retained in place by a curved piece of $\frac{3}{8}$-inch square iron welded inside the elbow. A large flat washer welded on at each end of these pipes prevents their sliding endwise out of the tine eyes. Figure 4 shows construction details.

The trip mechanism was taken from an ordinary grapple fork used on long hay. The carriage, track, etc., were the same as those used with regular forks or slings.

Adjustment

Bales made with a pickup baler are usually smaller than those made with a stationary baler. The grapple fork as shown can handle eight small or six large bales. When elevating large bales the two

middle tines are placed close together and inserted in the same bale. Note that the tines are free to slide along the main frame to permit this adjustment. Holes, 3/16-inch, in the main frame are provided for large cotter keys to hold the tines in the position desired along the frame.

Broken Bales

It was thought at first that an excessive number of bales would be broken when they were dropped from the fork in the mow, but such did not prove to be the case. The first bales unloaded were piled directly under the track and before long the pile was high enough to reduce considerably the distance the bales fell. This practice also had the advantage of enabling workers to move the bales "downhill" as they took them to the sides of the mow, rather than having to elevate them toward the top of a pile as they would when starting with the bales at mow floor level under conventional methods of handling.

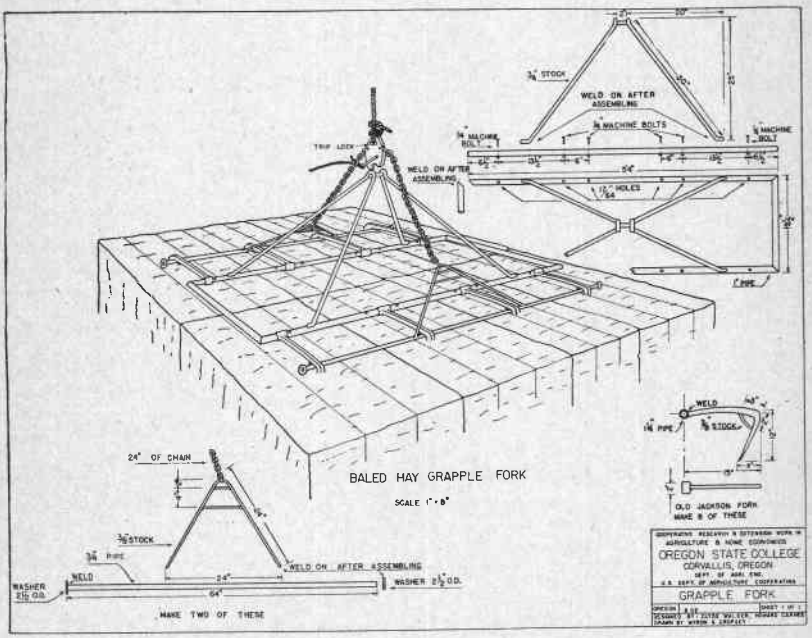

Figure 4.

Saving in Time

Use of the special grapple fork for baled hay effects a considerable saving in time as compared with the use of an ordinary grapple fork.

For example, to unload 48 bales, 12 trips of the carrier would be required with a regular grapple fork, while only six trips of the carrier would be necessary with the special fork described herein. Also, the special fork can be "loaded" more quickly than the conventional type of fork, as no additional handling or lifting of the bales is necessary. Thus, use of the special fork should result in a saving of well over 50 per cent in the time required to place a load of bales in the barn.