

*A Plywood*

# **HORSE TRAILER**

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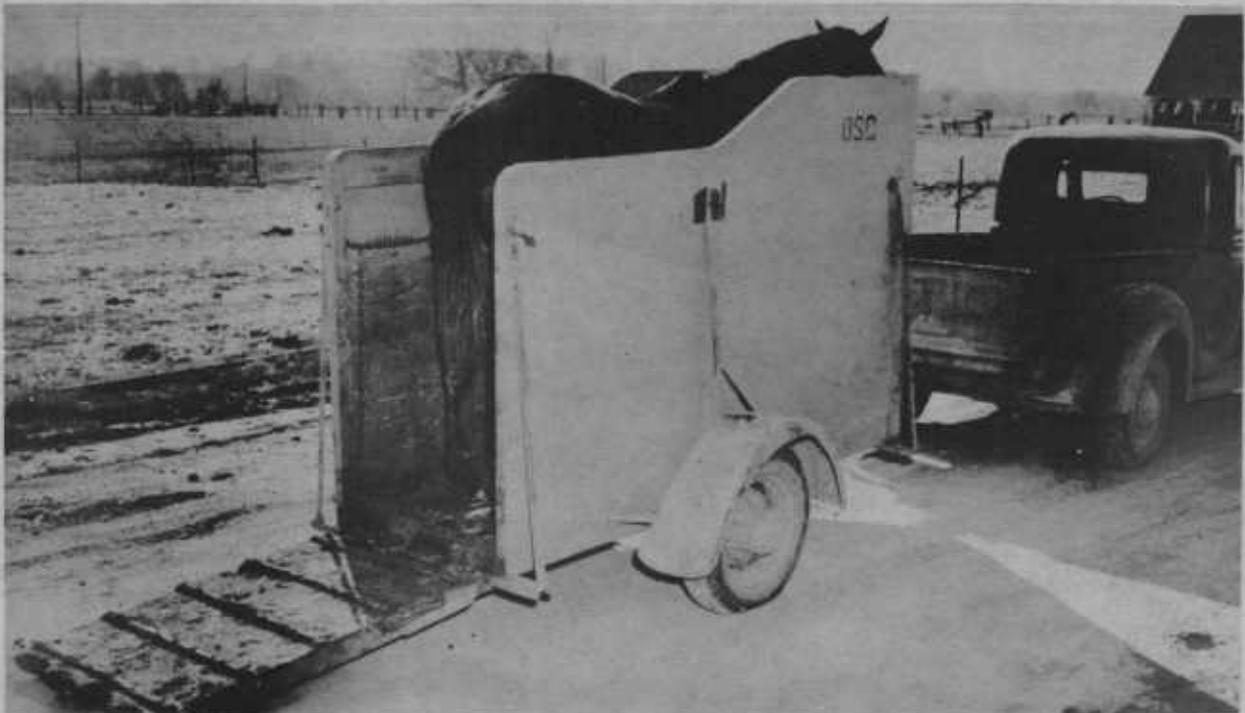
# *A Plywood* **HORSE TRAILER**

By Clyde Walker\*

There are about as many different types of horse trailers as there are horses; but to give satisfactory service, each type must meet certain requirements. The main requirements are strength, rigidity, durability, and light weight. As it is difficult to obtain all these qualities in one unit, few trailers now in use are completely satisfactory.

The trailer described in this circular is designed to transport a single horse. It has considerable strength and rigidity; and since it is constructed of exterior grade plywood, it should be most durable. The completed trailer weighs approximately 850 pounds and is so balanced that when empty it can be maneuvered easily by one man.

Figure 1. The trailer described in this circular was built by Bill Etter, of Pilot Rock, while a student in Agricultural Engineering at Oregon State College.



\*Clyde Walker was formerly with the Department of Agricultural Engineering at Oregon State College. He is now owner-manager of the Walker Tractor Company, Hillsboro, Oregon.

Although designed originally as a horse trailer, it has been found equally useful for hauling dairy bulls, calves, or any other kind of livestock within its capacity. Animals transported in the trailer are sheltered from wind and dust. Care should be taken that animals carried during hot, sunny weather do not become too warm.

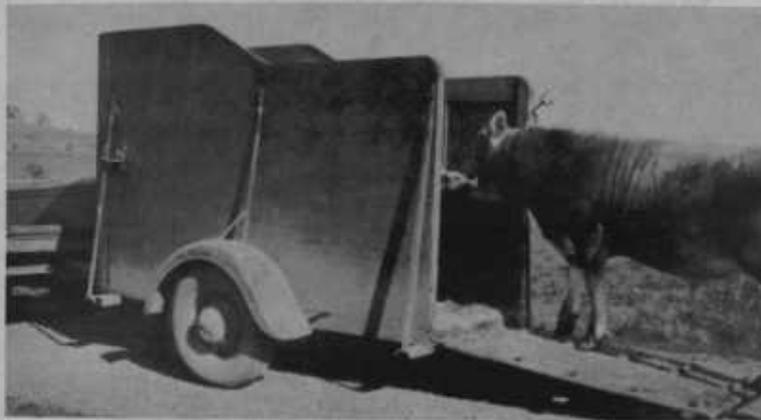


Figure 2. In addition to horses, the trailer is useful for hauling other animals.

### The Axle

The axle used was a Model A Ford front axle, with a clearance of  $7\frac{1}{2}$  inches. To increase the clearance, another axle was welded on top of the ends of the original axle. The middle of the original axle was then cut out, as shown in Figure 3 below. This gave a center clearance of  $10\frac{1}{2}$  inches.

The wheels were lined up perpendicular to the axle and the spindles welded solidly in place. To obtain a level surface on which to fasten the stringers, it was necessary to weld a three-foot length of  $2 \times 2 \times \frac{1}{4}$ -inch angle iron on each side of the axle. The stringers were then bolted to the angle irons. Figure 3 shows the angle irons and the three main stringers in place.



Figure 3. Axle with main floor stringers and angle irons.

## The Floor

One of the faults with many horse trailers is that the floor rots out, allowing the horse to fall through and possibly break its legs. To eliminate this danger in the plywood trailer, heavy stringers were used for a solid 3" subfloor, which later was covered with  $\frac{1}{2}$ " exterior grade plywood. First, three 3 x 8's were spaced evenly to give a width of 34 inches. The two outside ones were 9 feet, 6 inches long and the center one 11 feet long, so it could serve as the tongue. The gaps between stringers were filled with two 3 x 6's eight feet long. The axle was bolted to the stringers 3' 8" from the back end. All stringers but the center one were given a circular cut at the front end, using a 17-inch radius. The center of the 17-inch radius was taken 8 feet from the back end. This gave a body length overall of 8' 17" (9' 5"). To stiffen and support the front ends of the stringers, a four-foot length of 2" channel iron was bolted underneath at the eight-foot point. The channel iron and circular cut on the front of the stringers are shown in Figure 4 at left. When this picture was taken, the two 3" x 6" fillers previously mentioned had not been inserted between the 3 x 8's.



◀ Figure 4. View showing framing of front and side of trailer.

## The Sides

Two strips of  $\frac{1}{2}$ " plywood 18 inches wide were cut from a 4 x 8 panel and securely fastened with wood screws and lag bolts to the sides of the outside stringers. Two 4' x 8' panels were shaped and reinforced to finish the sides. Figure 4 shows one side completed. The drop in the top edge of the sides starts about 2' 6" from the front and drops 10 inches in two feet. The rear section continues straight back the rest of the way, with the back corner rounded off to a 4" radius. The top edge is reinforced with a 1 x 6 fastened with wood screws and  $\frac{1}{4}$ " carriage bolts, which were used throughout the construction. The uprights were fastened to the plywood sheets after the sheets had been fastened to the stringers. The back and the front uprights are 2 x 3's. The back uprights are 4' 2" long and are fastened flush with the rear edge. The front uprights are 5' 3" long and are fastened with half the width exposed. One by six uprights 4' 9" long are attached two feet from the front. The upper panels are fastened to these uprights. Figure 4 shows this construction.

## The Front

The curved front is the most difficult part to construct. A 2 x 2 upright 5' 3" long is fastened in the center of the tongue at the edge of the curve. At the top curve, 2 x 4's are fastened to the 2 x 2 and the sides. (See Figure 5.) These are cut to a 17-inch radius before fastening in place. Two by eights cut to shape are placed at a height of 42 inches from the floor. (See Figure 6.) These pieces project backward 12 inches on the inside. These members are reinforced with 2 x 3's and angle iron as they will serve as a manger and tie-rope support. (See Figure 6.) Underneath is storage space for feed and riding equipment.



Figure 5. View from side showing ► framing of semi-circular front with one piece of plywood in place.



The frame is covered with  $\frac{1}{4}$ " plywood placed with the face grain vertical to facilitate bending around the framework. Two pieces must be used as the total width around the front is over four feet. These must be measured on the curve and cut to fit. First, they are fastened to the half exposed 2 x 3 uprights and are slowly pulled around by clamps and fastened with wood screws as the bending progresses. The two pieces meet at the center 2 x 2 and are fastened to it. A thin metal strip is bolted over the seam where the edges of the pieces come together.

◀ Figure 6. View of framing above storage compartment, looking forward from inside trailer.



Figure 7. Framing and angle iron brace above storage compartment.

Figure 8. Two by three vertical studs on endgate, with flat iron hinges bearing on horizontal pipe member.



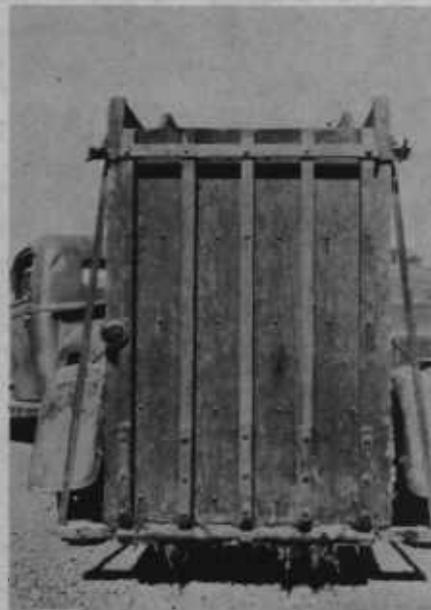
## Braces

The front and back corners and the middle are stiffened and braced with 1-1/8" x 1-1/8" x 1/8" angle iron which is welded to the iron channels and the axle. The angles are bolted to the sides 50" from the floor as shown in Figures 5 and 10.

## Endgate

The endgate is made of a 1/2" sheet of plywood attached to five 2 x 3 evenly spaced studs. This gives a sturdy and solid endgate. Hinges made of 3/8 x 1 1/2-inch iron are fitted to each stud and curved around a two-inch horizontal pipe. The pipe is bolted to short pieces of channel iron which are welded to the bottom of a 4' piece of 3" channel. This channel iron in turn is bolted to the 3" x 8" stringers beneath the floor of the trailer. The outside channels used to support the pipe are of 3" channel and are 5 1/2" long. These are so placed that they are just inside the outside hinges. The center support is composed of two pieces of 2" channel iron 5 1/2" long welded in place to the long 3" channel on each side of the middle hinge.

Figure 9. Endgate in transport position.



The other two hinges do not need to go completely around the pipe, but just far enough so that they contact the pipe when the gate is down. The whole gate can easily be removed by taking out the two bolts holding the pipe to the channel iron supports. (See Figure 8, page 5.)

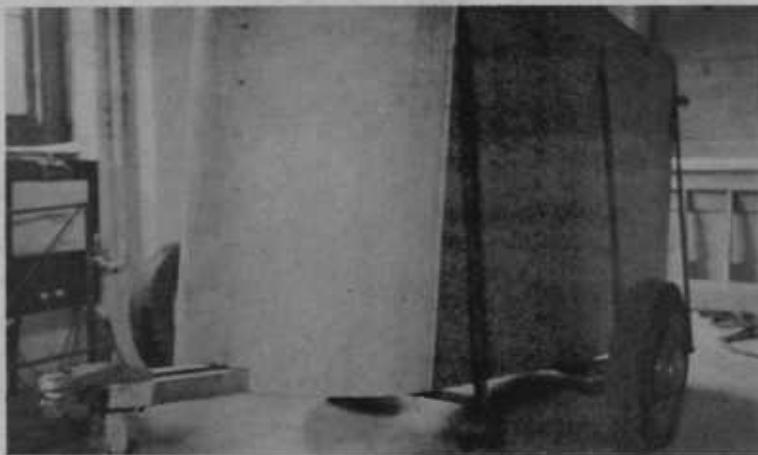
### Endgate Fastener

To obtain a fastener that will hold the endgate tight and still be quick and easy to fasten, a bolt and slotted strap iron arrangement is used. A piece of  $\frac{1}{2}$ " x  $1\frac{1}{2}$ " iron is bolted to the endgate studs and bent down to the plywood at the edges, projecting 3" past the edge of the endgate. A notch is cut in the top of the iron one inch from each end and large enough to admit a  $\frac{1}{2}$ " rod. To one of the bolts in the rear corner braces a  $\frac{1}{2}$ " threaded rod is fitted. These rods drop into the notches and are quickly tightened with a winged nut. Raised beads are welded on the iron just above the washers to keep the rods from bouncing out. These rods are equipped with flat lock washers so they will not work loose when once securely tightened. To prevent animals from slipping, cleats made of discarded garden hose reinforced internally with  $\frac{1}{4}$ " round steel were placed on the endgate. They are spaced 12 inches apart and are securely fastened with  $\frac{1}{4}$ " bolts. (See Figure 1.)

### The Hitch

The hitch can be any commercial type of ball and socket hitch. This type is better than the common U and pin type as it takes care of all twisting action and does not tend to twist the tongue. On this trailer the hitch is bolted to the tongue, and a piece of  $\frac{3}{8}$ " x  $1\frac{1}{2}$ " iron that extends from the back of the hitch to the front of the body is welded to the hitch. On the bottom of the tongue a piece of  $\frac{1}{8}$ " x 4" strap iron 3' 2" long is bolted in place. It extends from the front channel support to the end of the tongue and is bent up over the end to protect the timber. This arrangement keeps the hitch bolts from pulling through the wood and reduces the strain on the 3 x 8 timber. (See Figure 10 below.) To conform with State Regulations, a sturdy safety chain must also be fastened to the tongue.

Figure 10. Hitch and side braces in place.



## Storage Space

The space under the manger is boxed up 20 inches with  $1\frac{1}{2}$  x 4 tongue and groove flooring. The remaining 22 inches are covered with a  $\frac{1}{2}$ " plywood door that hinges from the top. (See Figure 11, right.) Details of the framing about the storage space are shown in Figures 5, 6, and 7.

A 2-inch eye bolt is inserted through the manger at its rear edge. The tie ropes pass through this eye and out 2" holes cut in the sides at the manger level. The ropes are tied in 2" rings welded to the front side braces. On either side, steps can be fastened so the person who leads the animal in can get out easily. (See Figure 2.)



Figure 11. Inside trailer, looking toward ► storage compartment. Door is hinged at top.

## Fenders

Fenders can be made out of old car fenders. It must be remembered that because people may stand on them to inspect an animal in the trailer they should be braced to withstand the expected load.

## Interior of Trailer

If a smooth interior wall is desired, it can be lined with  $\frac{1}{4}$ " plywood. This gives a smooth wall surface inside as well as out. Exterior grade plywood should be used throughout the trailer.

## Finish

The trailer can be finished in a number of ways, but in all cases the wood members should first be treated with hot linseed oil, which acts mainly as a preservative and also as a base for paint. If desired, the trailer can then be stained and varnished, or painted. Stain and varnish give a nice finish but are harder to apply. If painted, a good deck or porch paint should be used. It can be applied rapidly with a spray gun.

## Service

As stated in the introduction, this trailer has proved very satisfactory for hauling bulls and other animals, as well as saddle horses.

It should give many years of satisfactory service if given proper care. It is best to keep the trailer in a shed to prevent excessive weather damage. Even the best of trailers will not last long under continual neglect or abuse.

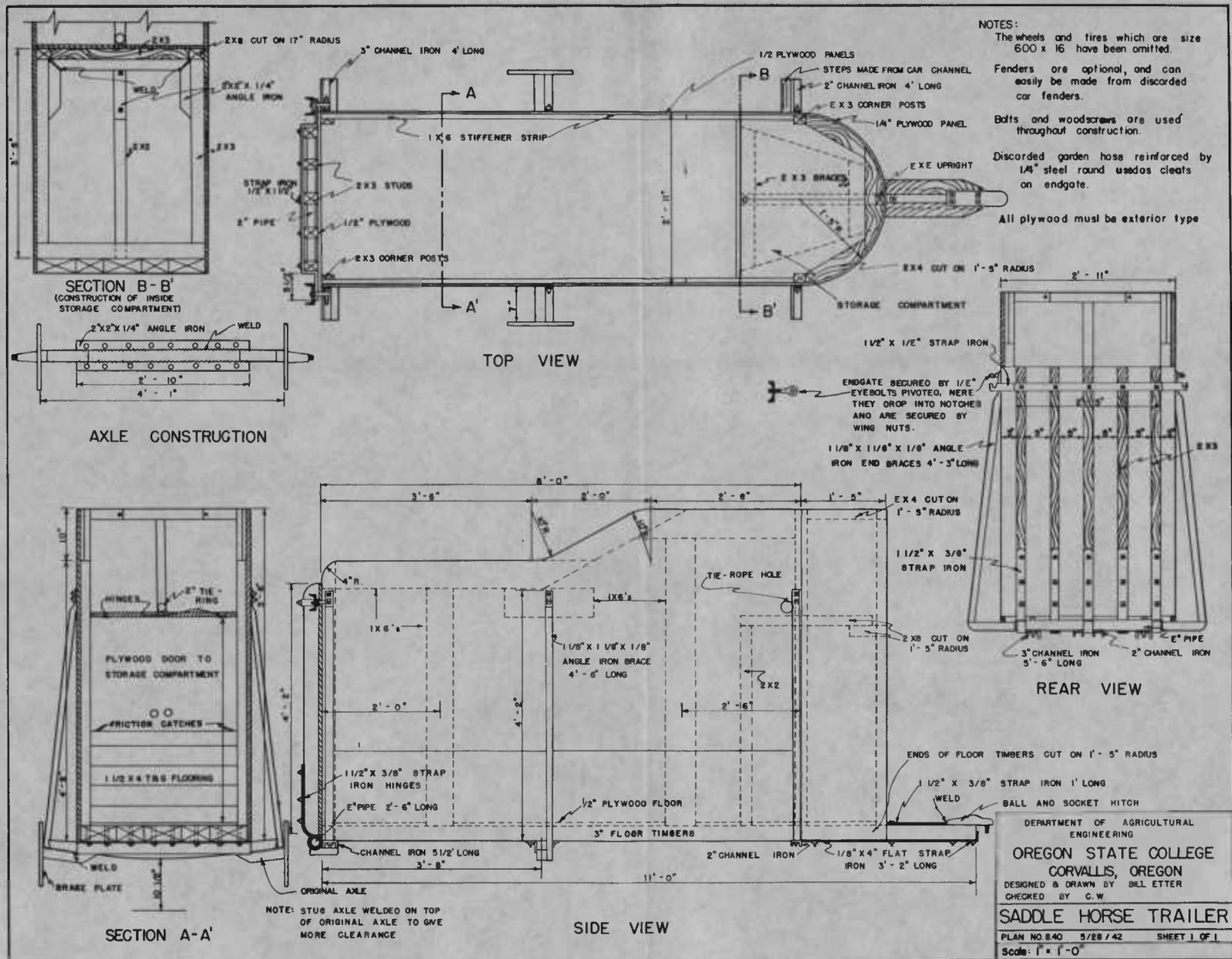


Figure 12. A full-scale blueprint (17 x 22 inches) of the drawing reproduced here is available on request from the Farm Building Plan Service, Oregon State College, for 60 cents, the cost of printing and mailing.