

AN EXPERIMENTAL

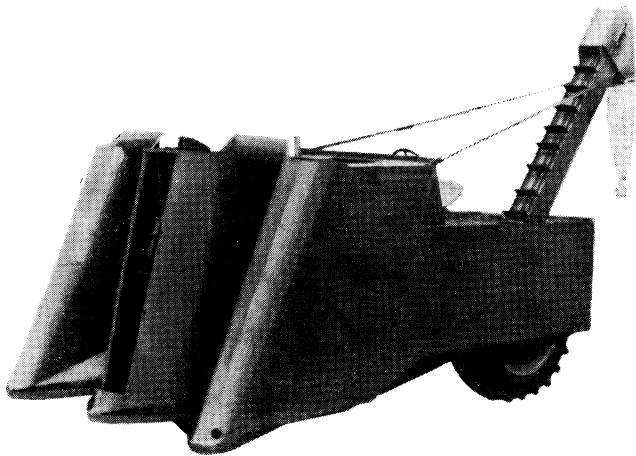
*Castor
Bean
Harvester*

OKLAHOMA AGRICULTURAL
EXPERIMENT STATION

OKLAHOMA A. & M. COLLEGE
STILLWATER

IN COOPERATION WITH
UNITED STATES DEPARTMENT
OF AGRICULTURE

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UNITED STATES DEPARTMENT OF AGRICULTURE

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ON THE COVER

The castor bean harvester shown on the cover is a commercial model, of which the machine described in this publication is a prototype.

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An Experimental

Castor Bean Harvester

By E. D. BAKER and DONALD L. VAN HORN*

Production of castor seed in the United States is increasing rapidly, with portions of Oklahoma and Texas as one of the major producing areas. Up to the present, one of the principal handicaps to production has been lack of satisfactory harvesting equipment.

This bulletin describes a castor bean harvester developed at the Oklahoma Agricultural Experiment Station. This machine is the prototype of a harvester now being built by The Boardman Company, Oklahoma City, Okla., under a contract with the Commodity Credit Corporation.

History of the Machine

M. J. Arms, instructor in agricultural engineering at the University of Nebraska, in 1946 developed a beater mechanism for stripping castor seeds from the plant without pulling the plant from the ground. The

CREDIT FOR DEVELOPMENT, DESIGN AND CONSTRUCTION of the machine described herein is given to Dr. D. L. Van Horn, W. J. Oates, and Phil Myers. Dr. Van Horn conceived the basic principles, Mr. Oates assisted in the design, and Mr. Myers worked out many of the details while building the machine in the Oklahoma Station's Agricultural Engineering Laboratory.

beaters were made of canvas flaps protruding from each side of a two-inch square tubing. They were mounted parallel to each other, one on each side of the row, and at an angle of approximately 45 degrees with

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the ground. Seed removed from the plant by these beaters was conveyed across a slatted conveyor and cleaner to remove leaves and stems.

Ten machines of Mr. Arms' design were produced by the Belle City Manufacturing Company, Racine, Wis. They were single-row, pull-type, power-take-off machines.

The Arms machine was tested in Oklahoma but did not meet requirements for harvesting castor beans under Oklahoma and Texas conditions. Therefore, the Oklahoma Agricultural Experiment Station obtained permission from Mr. Arms to use the beater principle, and set about developing a machine for use in the Southwest.

Description of the Oklahoma Harvester

The following objectives were kept in mind in developing the machine: It must be—

1. Simple in construction, and tractor mounted.
2. Highly maneuverable.
3. Able to recover a high percentage of seeds.
4. Economical to produce and to operate.

With these objectives in mind, the unit shown in Figure 1 was developed. The complete shrouding was necessary to prevent the loss of castor seeds by shattering. The basic machine, as shown in Figures 2 and 3 without the shrouding, consists of the following assemblies:

- (a) A gathering unit that handles the plants gently,
- (b) A single fabric beater for shaking and stripping the castor seeds from the plant,
- (c) Parallel auger conveyors which convey the seeds from the stripping chamber,
- (d) A trough around the perimeter of the gathering unit for collecting shattered seeds,
- (e) A cross auger which conveys the seeds from the parallel augers to a flight-type elevator.

Wipers, Figure 2 (A), were placed on the gathering chain flights to move the seeds from the shattering trough into the augers. Belting was used for the wipers to reduce seed injury. Gathering fingers on the chain flights aided in keeping plants erect as they passed into the stripping chamber.

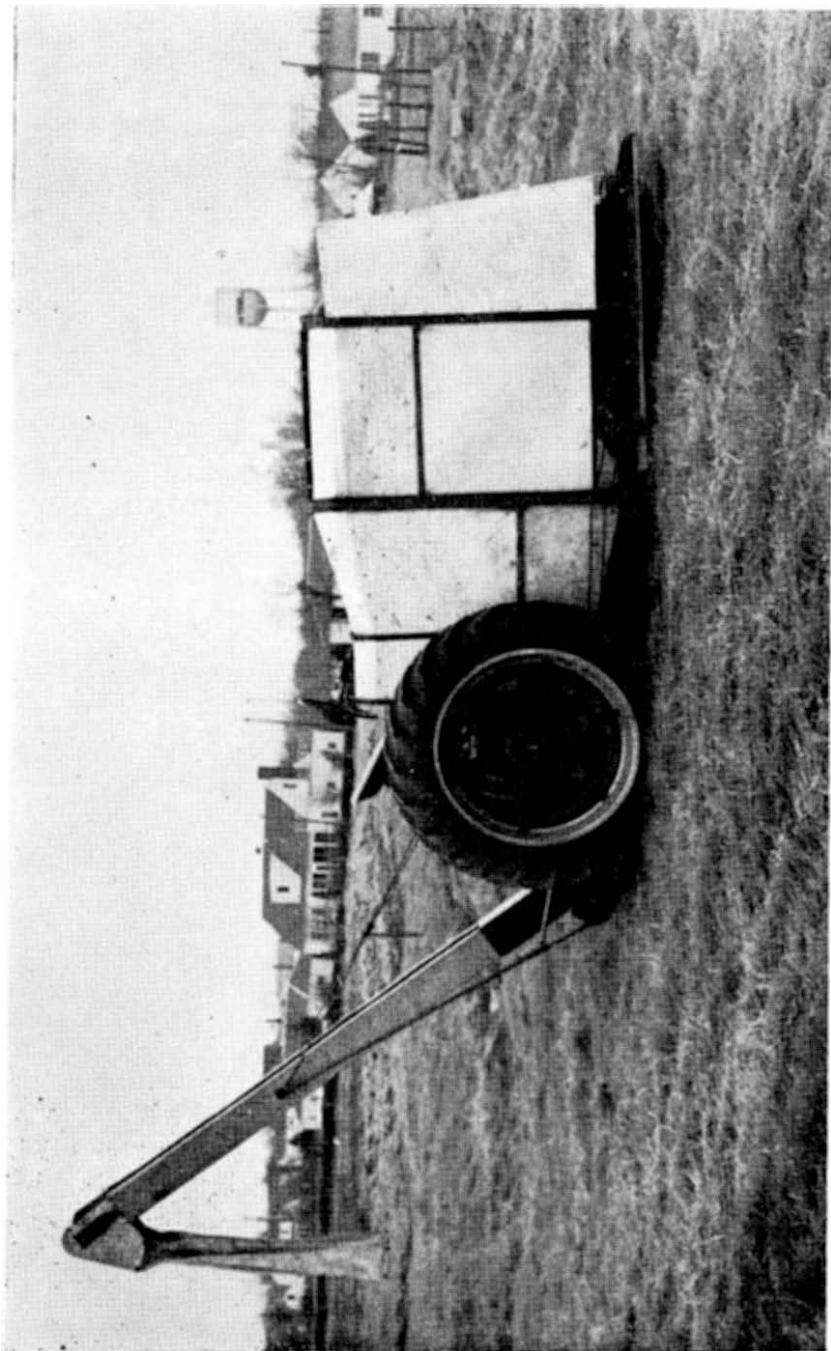


Fig. 1.—Right side view of the completed machine.

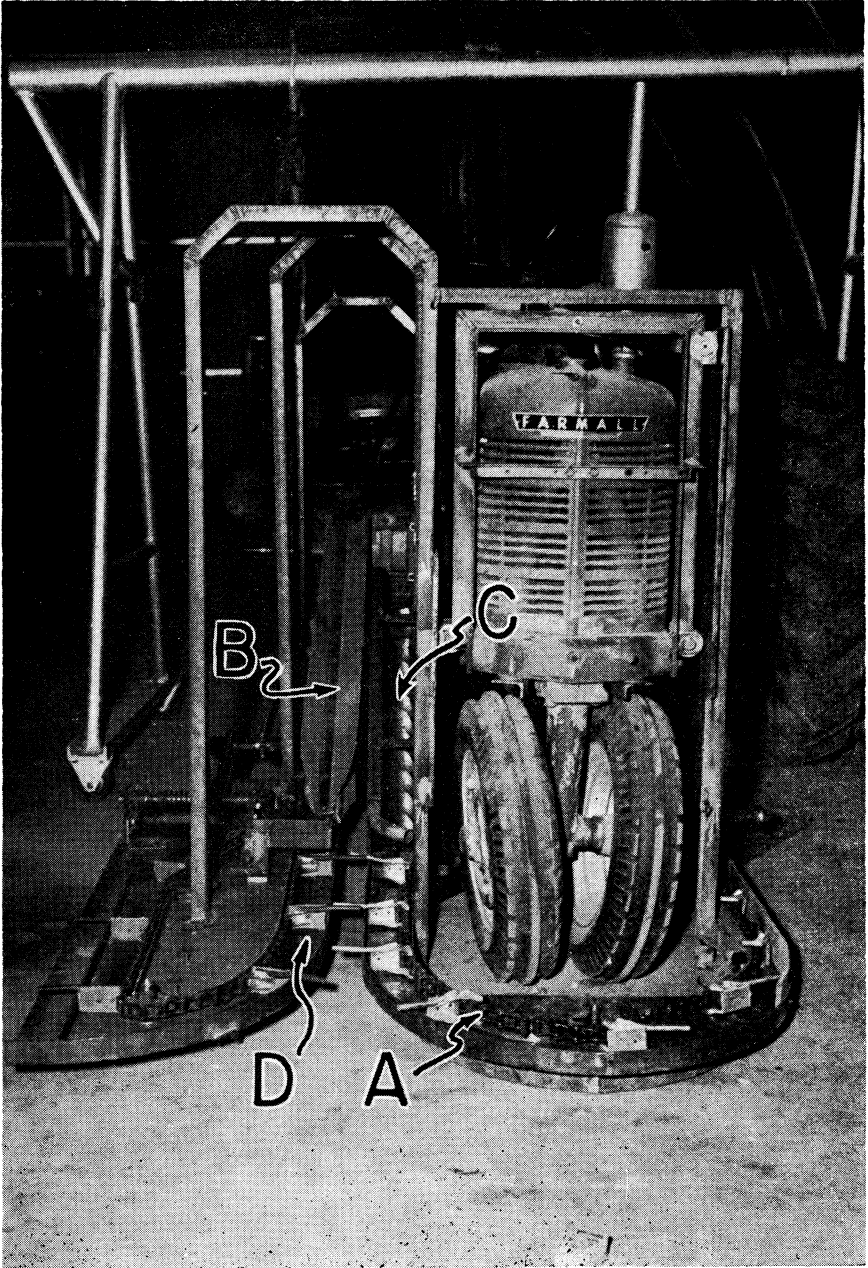


Fig. 2.—Basic machine from the front, showing (A) gathering unit, (B) beater, (C) augers, and (D) trough.

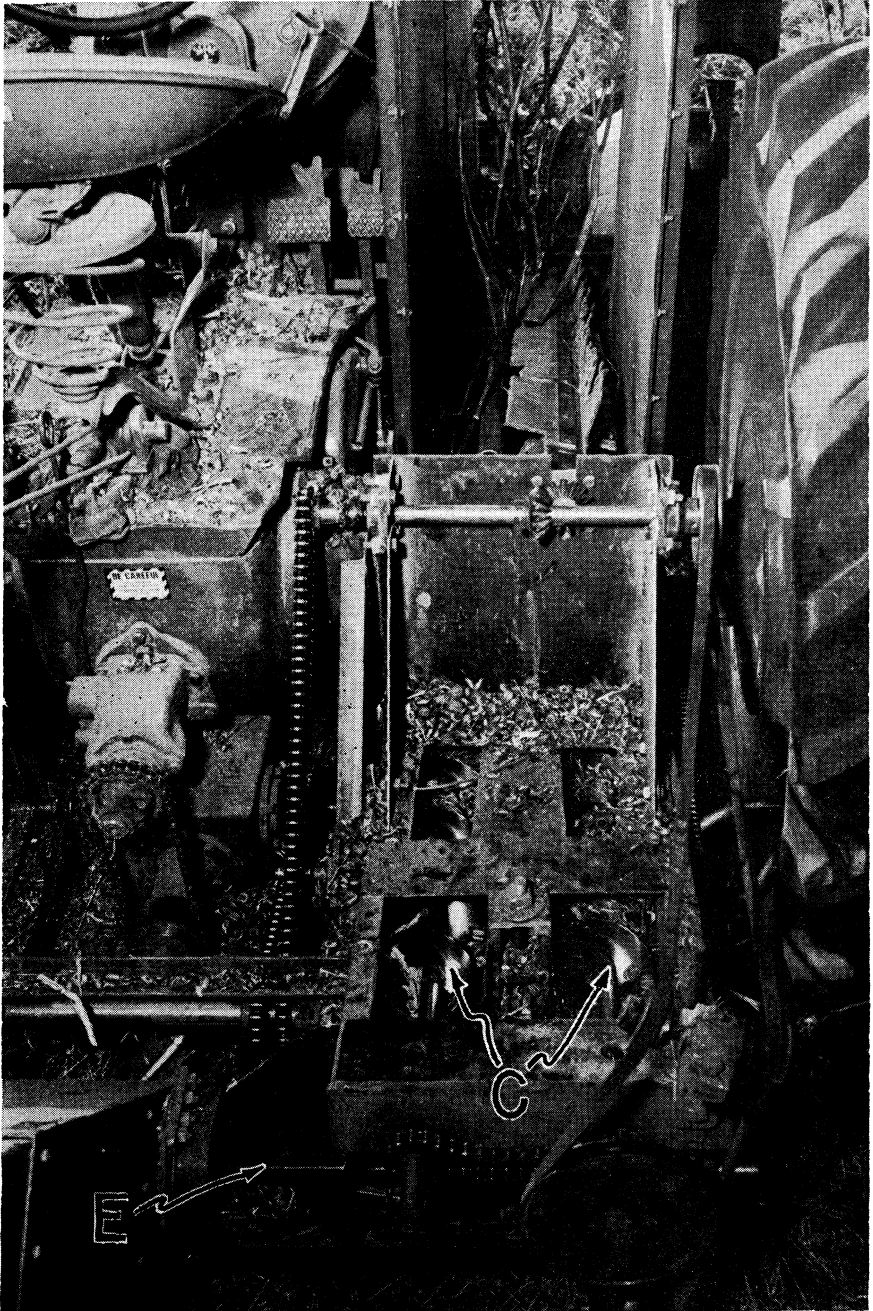


Fig. 3—Basic machine from the rear, showing (C) augers, and (E) cross auger. The power train is also well illustrated.

All auger conveyors were made without clearance to help reduce seed injury. The relative positions of the augers are shown in Figure 3.

Power transmission to the various assemblies is illustrated in Figures 2 and 3. Spring-loaded slip-clutches were used on the gathering chains, as they are roller-chain driven. The augers, being belt driven, required no slip clutches.

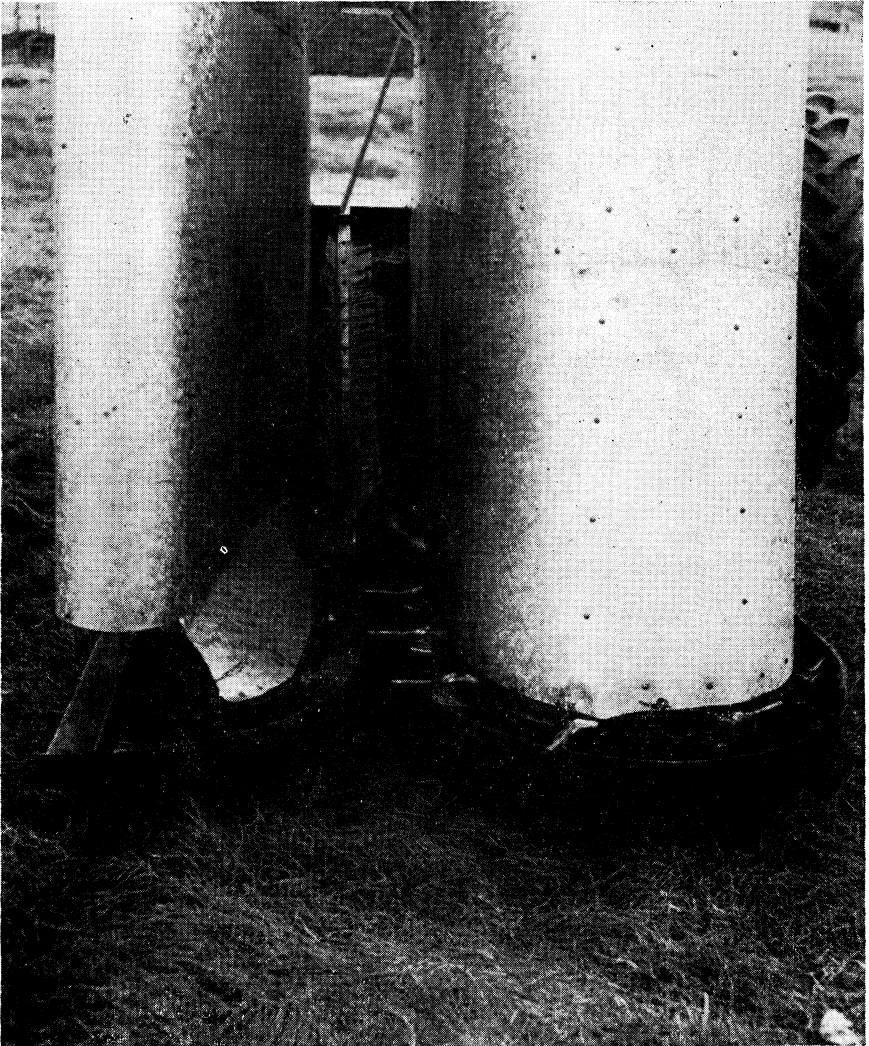


Fig. 4.—Front view of machine ready for testing.

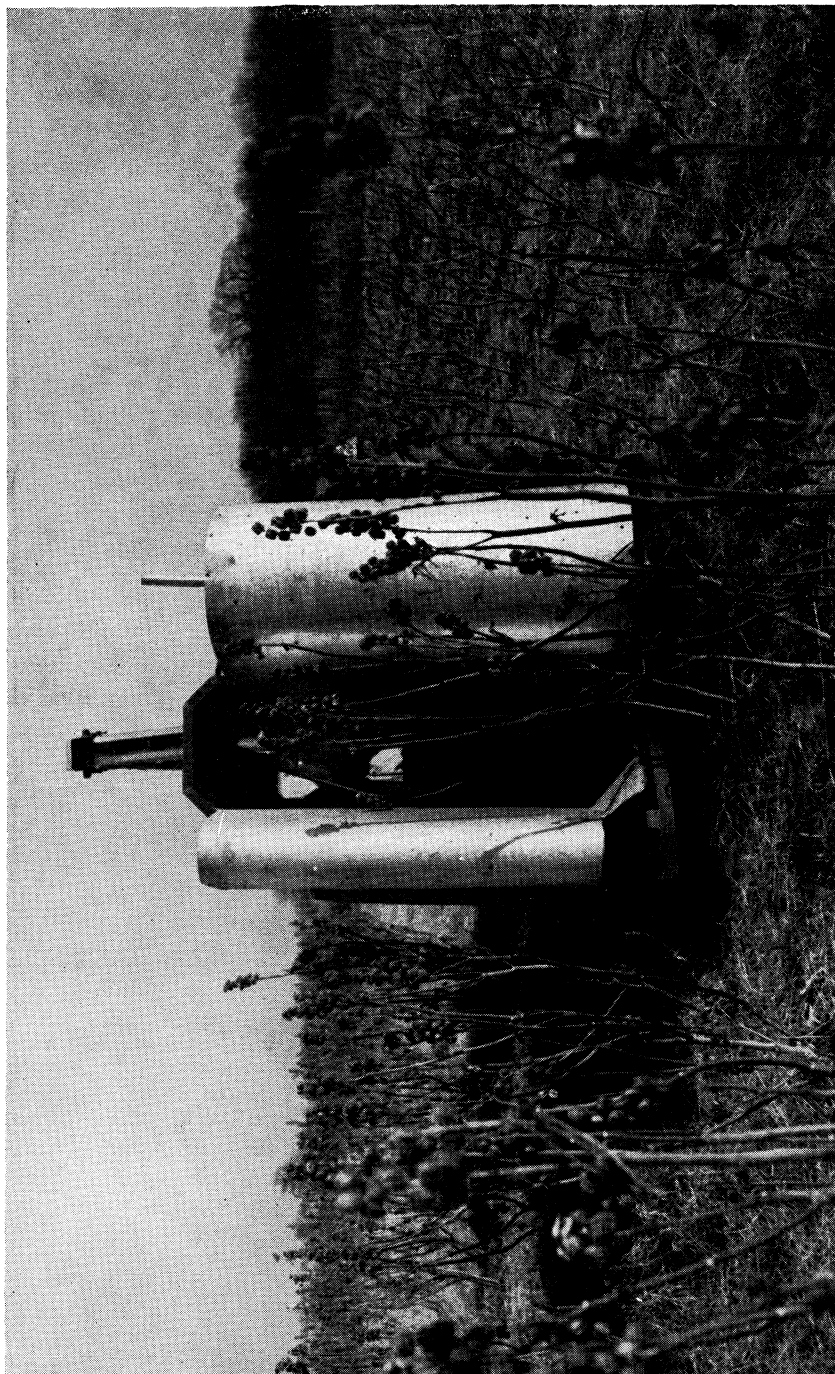


Fig. 5.—Completed machine in operation. Note harvested area on the right.

A front view of the machine, ready for field testing, is shown in Figure 4.

Field Tests of the Machine

The machine was ready for testing in late November of 1950. By this time the castor plants in Oklahoma had been killed by frost and were extremely brittle. Removal of the castor seeds was relatively easy and considerable shattering was experienced. Many broken limbs were obtained with the harvested material, and a screen was placed over the auger troughs to help eliminate this fault. Figure 5 shows the machine in operation.

Further test work was performed in California in plants which had not been killed by frost. Difficulty was experienced in removing all the seeds and a second beater was added above the first. Thereafter, the machine performed satisfactorily.

Commercial Production

Because of the military need for castor oil, immediate thought was given to reproducing this experimental harvester as a two-row, mounted unit to be ready for the 1951 harvesting season. To expedite this production, the Commodity Credit Corporation entered into a contract with The Boardman Company of Oklahoma City, authorizing the latter to produce 60 machines. Plans for these machines were made by Mr. I. F. Reed* of the United States Department of Agriculture in cooperation with agricultural engineers of the Oklahoma Station. These machines are now in production.

Research is being continued on one of these commercially-produced machines.

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