A Two-row Castor Bean Harvester

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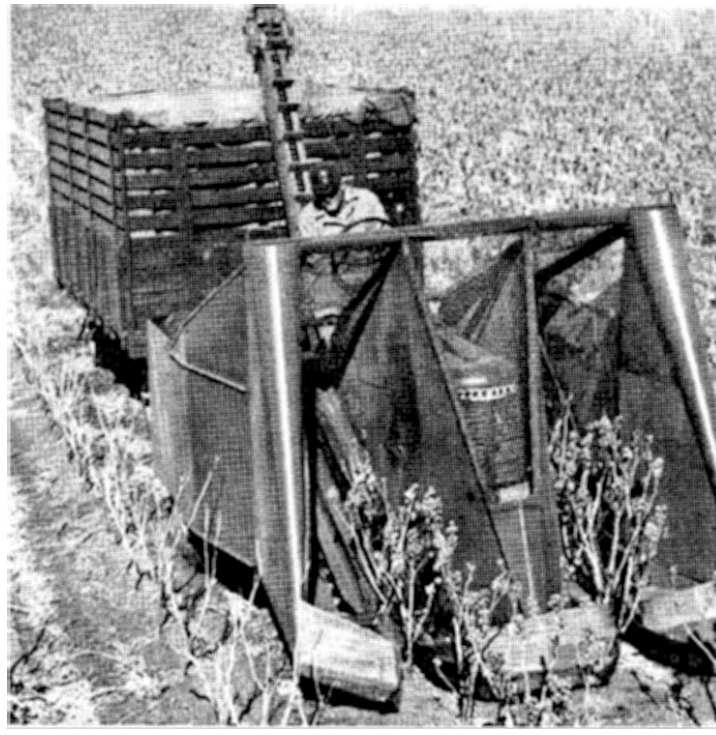

Bulletin No. B-395

April 1953

OKLAHOMA AGRICULTURAL EXPERIMENT STATION

Oklahoma A. and M. College, Stillwater

A. E. Darlow, Director Louis E. Hawkins, Vice Director

in cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Plant Industry, Soils, and Agricultural Engineering

Acknowledgment

Acknowledgment for invaluable assistance in the design, development and construction of the 1952 harvester is made to the following: L. F. Reed, U.S.D.A., U. S. Tillage Machinery Laboratory, Auburn, Ala., formerly in charge of the Castor Bean Mechanization Project; Engineering Section of The Boardman Company, Oklahoma City, Okla.; members of the staff of the Agricultural Engineering Department, Oklahoma Agricultural Experiment Station; D. L. VanHorn and Norvil Cole, of the Bureau of Plant Industry, Soils, and Agricultural Engineering, and Phil Myers, formerly of the Production and Marketing Administration, U.S.D.A.; and Eugene Baker, formerly BPISAE, U.S.D.A.

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By L. G. SCHOENLEBER AND W. E. TAYLOR

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The production of castor beans in the U. S. increased from 25,000 acres in 1950, to 85,000 acres in 1951, to 125,000 acres in 1952. The major producing areas for castor beans at present are located in Oklahoma and Texas.

The need for mechanical harvesters is emphasized because of the shortage and high cost of labor to harvest castor beans, the development of varieties better adapted to mechanical harvesting, the need for early harvest after frost to save the beans, and the growing of large fields and larger acreages.

Development of the 1952 Harvester

The machine described in this bulletin is designated as the 1952 model. It is a further development and improvement of the 1951 model described in Oklahoma Station Bulletin B-376.

Use of the 1951 model during one harvest season showed the need for improvement of design in order to be used widely. The 1952 model harvester incorporates certain features of the previous harvester with many additional features. It includes the following features of improvement over the previous year's machine:

1. Cleaner for removing trash from beans.
2. Simplified driving mechanism and adjustment of machine.
3. Lighter weight machine with better weight distributon and maneuverablity.
4. Simplified mounting and detaching from tractor.
5. Better visibility for operator.
6. Simplified conveying system for moving the beans.

Operation and Description of Harvester

This harvester operates on the principle of stripping the seed from the plants. As the machine moves forward on the rows, the plants pass between two rotating beaters and the beans are stripped from the plant. The stalks pass on between the beaters and out under the machine. The castor beans drop into a screw conveyor and are moved back onto a slat-type cleaner which separates the beans from

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the trash. The beans drop between the slats and are conveyed up into a trailing wagon as unhulled castor beans. The trash rides on over the slat conveyor and is dropped onto the ground.

The front and rear units of the machine's frame members, positioned on the tractor are shown in Figs. 1 and 2. The rigidity and strength of the framing proved adequate under field use. The beater and auger arrangement for stripping the castor beans from the plants and conveying them onto the slat cleaners is shown in Fig 3. The change in construction of the beater flaps on the right side of the machine was found to improve the machine's performance in saving beans. The cleaners, elevator and mounting for attaching trailing wagons, Fig 4, illustrates the compact arrangement of the cleaning mechanism and clearance for trailing wagon during turning. The screen on the bottom of the elevator was added to eliminate weed seed and fine trash from being blown into the operator's face. Figs. 5, 6, and 7 show the machine in operation harvesting castor beans, and the cleaned beans delivered from the harvester to the trailing wagon.

It should be noted that the harvester is adapted for mounting on one size and make tractor. To adapt it to other tractors will require alterations which cannot be readily made. Fig. 8 shows the rear section of the harvester mounted onto a Farmall H tractor. The rear wheel of the tractor has been removed to show the mounting attachment. Fig. 9 shows the driving mechanism for the beaters and conveyors as designed for the front section of the harvester. The view shows the rear of that portion of the harvester that mounts on the front of the tractor. Figs. 10 and 11 show the mounting brackets on the tractor and front section of the harvester ready to be attached to the machine.

Performance of Harvester

Extensive field tests were made in the fall of 1952, using one of the production model machines on castor beans of different varieties and growth conditions under widely different soil conditions in Oklahoma, Texas, and Arkansas. The machine was used to harvest castor beans on 38-inch and 40-inch row spacing. The field harvesting losses were found to be greater on 38-inch row spacing, and should be expected, because the machine was designed for use on 40-inch rows.

Harvesting losses varied widely, depending upon variety, condition of beans, skill in operation of machine, yield, etc.

Castor beans of the Cimarron variety with medium growth were harvested in many cases with losses less than 10 percent. With certain modifications of the machine, field losses under best conditions were 5 percent or less. This included pre-harvest loss which was considered negligible.

The machine harvested castor beans yielding 1,000 pounds per acre without difficulty at 3 to 4 miles per hour. The machine should be operated at slower

speeds for beans of higher yield, or when an excessive amount of trash must be handled. A skillful operator can readily determine the best speed at which the losses of beans are at a minimum.

Operation of the machine showed that 20 to 25 feet of turn row is required when turning must be done within the field.

Weedy fields were found to be very undesirable and reduced the effectiveness of good harvesting.

The foregoing tests showed that certain modifications improved the machine's performance. Some of these changes as shown in Figs. 3, 4, and 5 and also on the cover are: Elevator screen for removing fine trash; shields on the gathering arms of the machine; re-design of one beater. Plans are under way to have these improvements incorporated into all the 1952 model machines. The machine pictured in this bulletin, which is the one used in the tests, includes some of these modifications.

Production of Machine, and Availability

One hundred thirty-five machines of the 1952 model have been produced by The Boardman Company of Oklahoma City, Okla., under contract with the Commodity Credit Corporation and the Production and Marketing Administration, U. S. Department of Agriculture. These government-owned machines are being made available to users by the PMA. Information can be obtained from local PMA offices.

Practices Recommended for Mechanical Harvesting

In order to obtain satisfactory use of the harvester, the following practices should be followed:

1. Plant castor bean seed to obtain uniform spacing of plants.
2. Plant to obtain medium growth plants (5 to 6 feet tall).
3. Select varieties with first spike not less than 10 to 12 inches from the ground and which do not drop beans readily before harvesting.
4. Keep the field of castor beans free of weeds and grass.
5. Last cultivation should be such that easy steering using two close front wheels is had. Make land level between rows or two furrows where two front heels of tractor run.
6. Row spacing should be 40 inches.
7. Harvest only when the castor beans are dry in order that beans will be in condition for hulling.
8. Complete harvest early in season after frost to prevent undue field losses.
9. Keep harvester in adjustment.

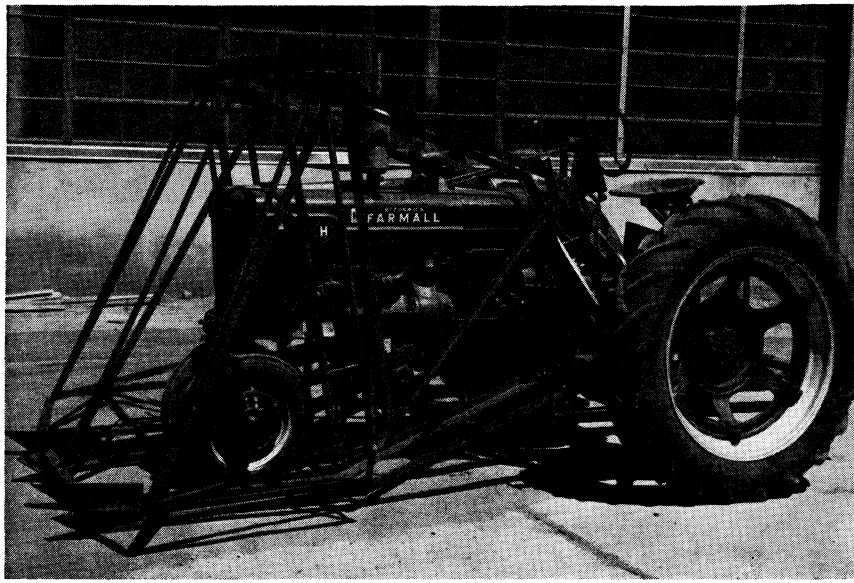

Fig. 1.—Frame assembly of harvester attached to tractor.

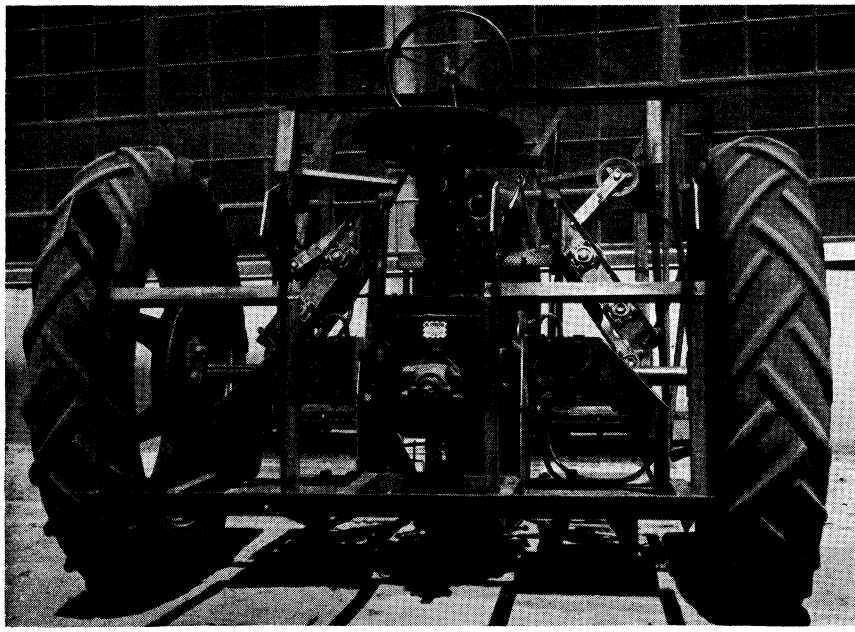

Fig. 2.—Rear view of harvester frame assembly attached to tractor.

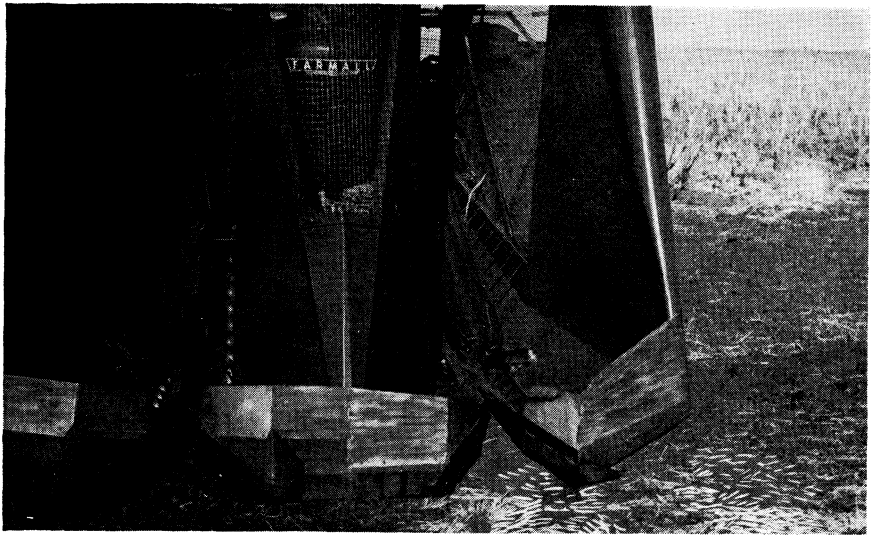

Fig. 3.—Front view of machine ready for field use. This shows the two different types of stripper rolls which were tested. The metal shielding on the front of the machine was added to save beans.

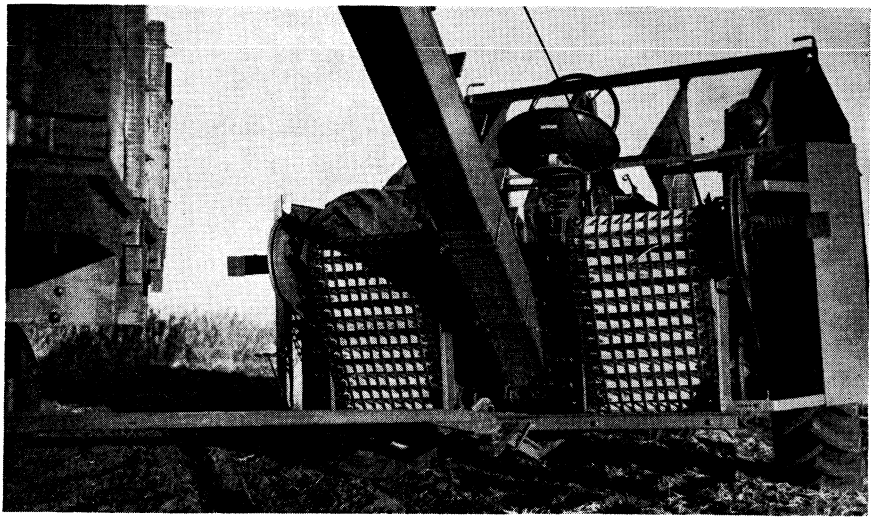

Fig. 4.—Rear view of machine showing arrangement of elevator cleaners and trailing wagon. The compact arrangement of the machine permits sharp turns with the wagon.

Fig. 5.—Harvester in operation stripping Cimarron variety castor beans which were about four feet tall and yielded approximately 900 pounds of seed per acre. The absence of leaves and weeds helps get clean beans in machine harvesting.

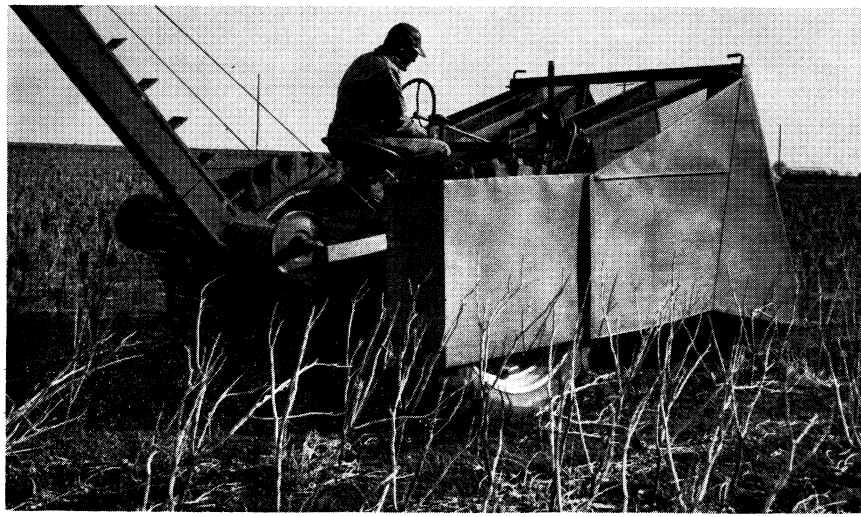

Fig. 6.—Side view of harvester in operation. The castor bean stalks in the foreground have already been stripped by the machine.

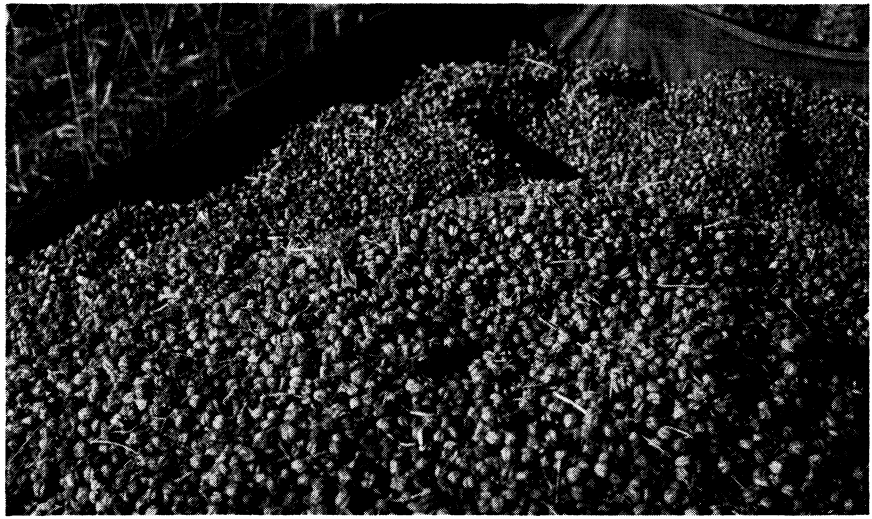

Fig. 7.—Trailer load of Cimarron castor beans stripped with the harvester. Only a few small stems remain in with the beans.

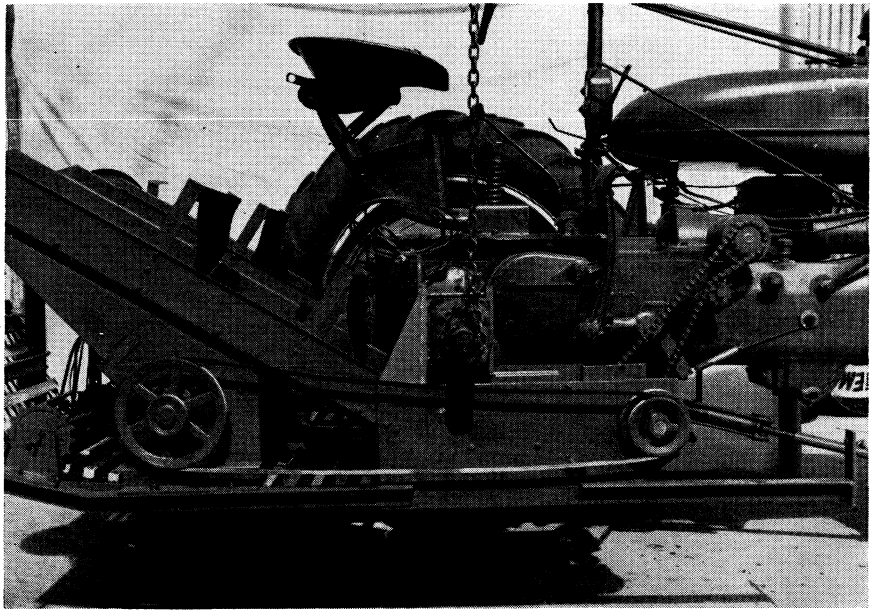

Fig. 8.—View shows rear unit of harvester and method of attachment to rear axle frame of tractor.

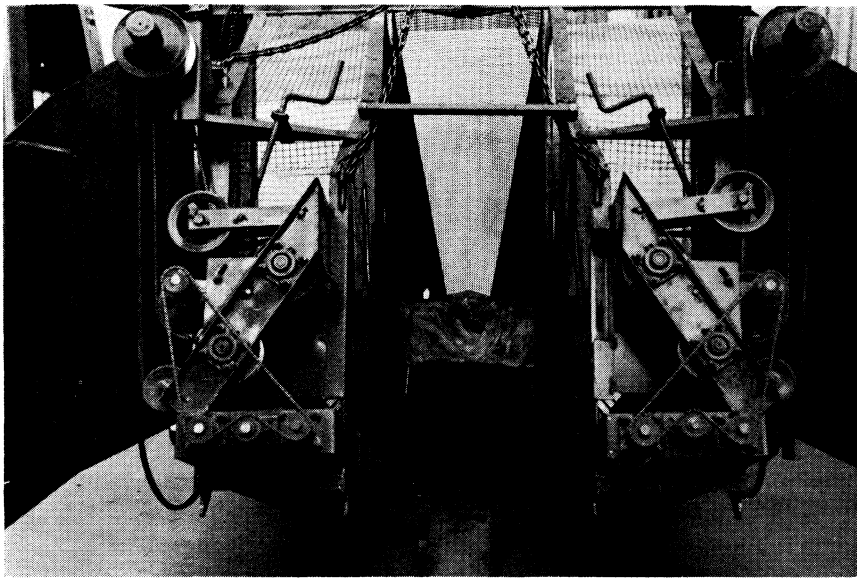

Fig. 9.—Rear view of front section of harvester, showing drive mechanism for conveyors and beaters.

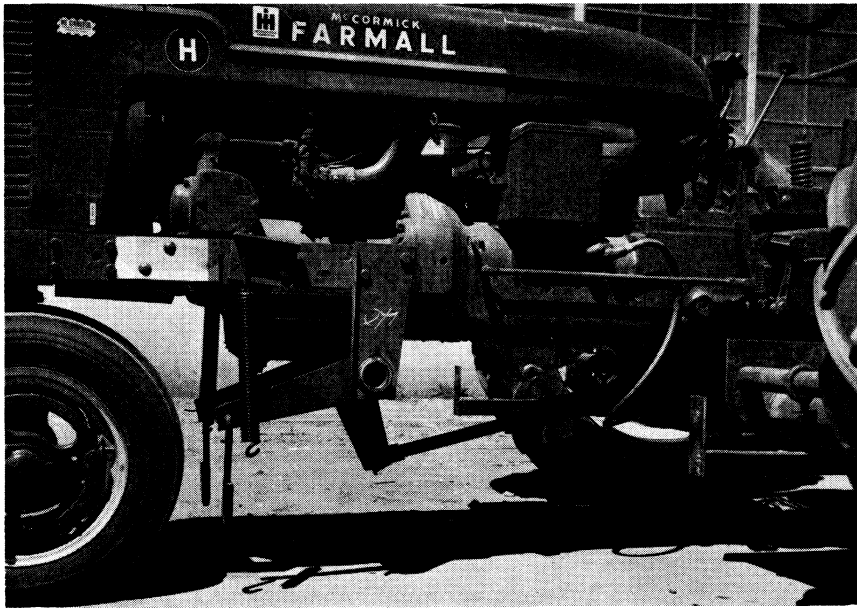

Fig. 10.—View shows the left mechanism attached to the tractor.

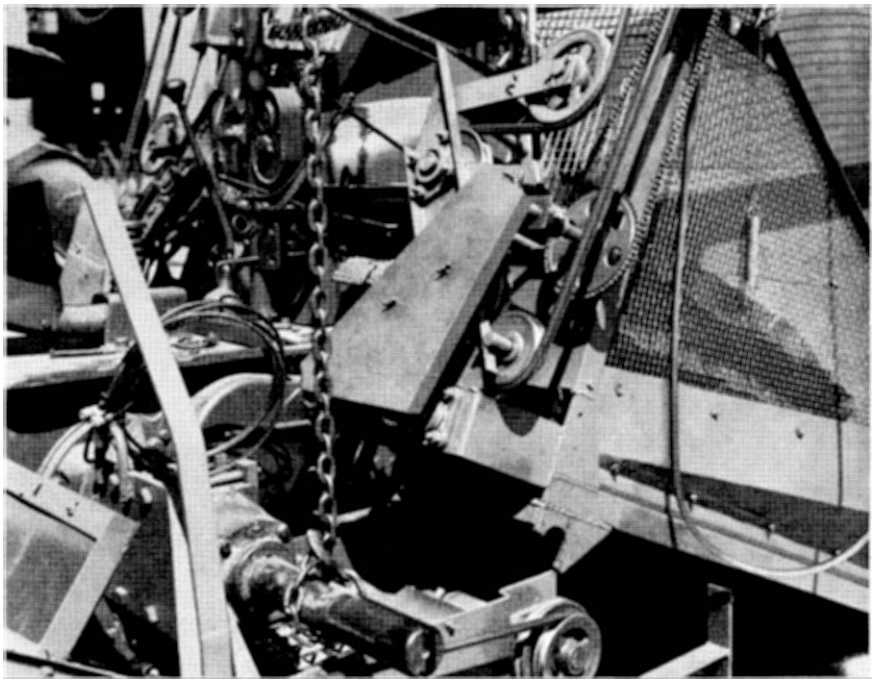

Fig. 11.—View shows front section of harvester being moved into position for attachment to the tractor.

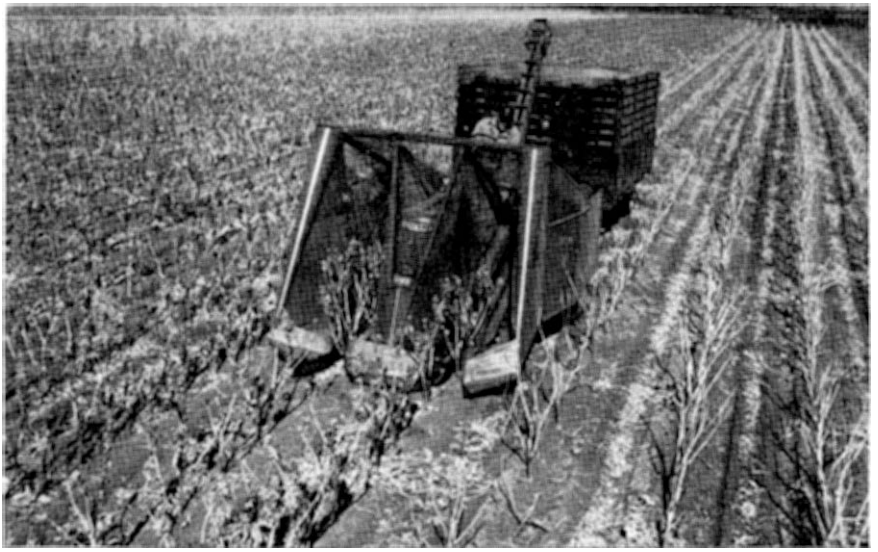

Fig. 12.—The two-row castor bean harvester in field operation.