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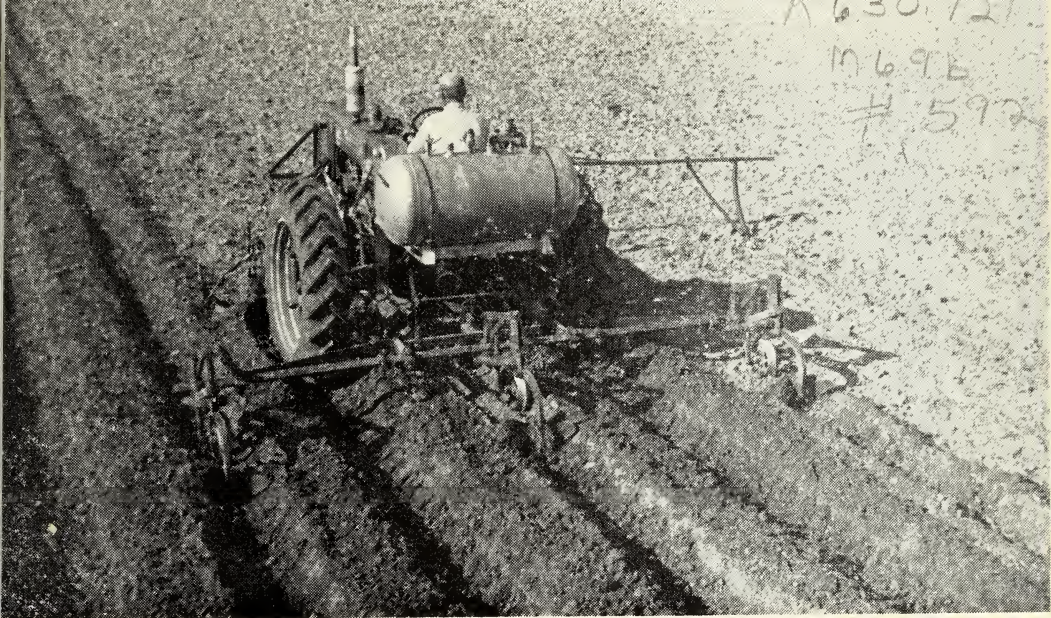
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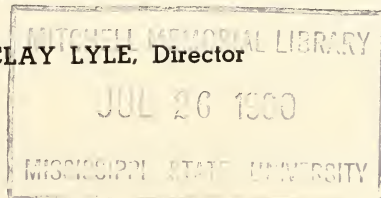
A Combination

Anhydrous Ammonia Applicator and Four-Row Bedder

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AGRICULTURAL EXPERIMENT STATION

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STATE COLLEGE



MISSISSIPPI

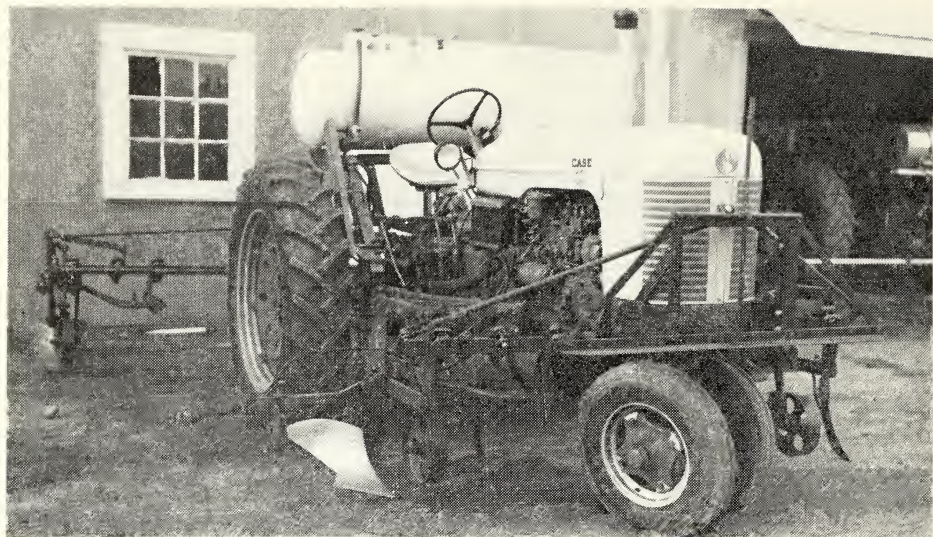


Figure 1. Front view of a 5-row middlebreaker equipped with chemical applicators.



Figure 2. This tractor is equipped for applying anhydrous ammonia and preparing four uniform seedbeds in 1 operation.

Front Cover. —The combination applicator and bedder is preparing 4 uniform beds and applying anhydrous ammonia in the same operation.

A Combination Anhydrous Ammonia Applicator and Four-Row Bedder

By O. B. WOOTEN, F. E. FULGHAM
and E. B. WILLIAMSON¹

Planting with four-row equipment on beds formed with a three-row middle-breaker is a problem that has confronted row-crop farmers for many years. This is understandable since a four-row planter must straddle a "guess row" on each trip across the field. The "guess row" is an outside row which is partially formed by the middlebreaker during one trip across the field and is completed on the return trip. It generally varies in shape and width, even when a row marker is used in laying out the rows.

Uneven row spacing usually results in a poor job of planting with four-row equipment. One or more of the planter units will tend to run to the side of wide or narrow beds. Under conditions of extreme row variation, at least one of the planting units may end up depositing seed in the row middle. This often results in skippy or uneven stands and adversely affects later cultural practices.

The recent development of a combination chemical applicator and four-row bedder by the mechanization project at Stoneville provides a practical solution to the problem of off-center planting. This work was begun in 1949, when agricultural engineers mounted four anhydrous ammonia applicator knives on the front beams of a three-row middlebreaker. This arrangement was not entirely satisfactory since it was necessary to split the liquid ammonia to be distributed by the two outside knives.

Later investigations consisted of attaching four applicator knives to a rear-mounted toolbar which could be operated in conjunction with a standard front-mounted cultivator equipped with middlebreaker shapes. This setup was not acceptable since the four applicator knives

could not be operated at a uniform depth in the beds.

A new approach to the problem in 1954 resulted in the development of a combination four-row chemical applicator and bedder (front cover). Standard farm machinery items used in the first successful model included the two front units of a conventional three-row middlebreaker, a rear-mounted toolbar, and anhydrous ammonia application equipment. Four applicator knives were mounted on specially-designed crossbeams attached to the main beams supporting the two inside front middlebreaker bottoms (Fig. 1).

Three additional middlebreaker plows were mounted on the rear toolbar to permit the formation of either four or five beds simultaneously. Each plow was equipped with a separate gauge wheel and was suspended from the toolbar by parallel-acting linkage. This provided a positive means of getting all bottoms to operate at a predetermined depth. The outside bottoms were designed to operate at half the normal plowing depth since they would travel twice in the same furrow. This was necessary in order to form four uniform beds with the five-bottom middlebreaker.

Several farm equipment companies are currently manufacturing new types of five-row middlebreakers. These machines fully utilize the increased horsepower which is available in late-model tractors.

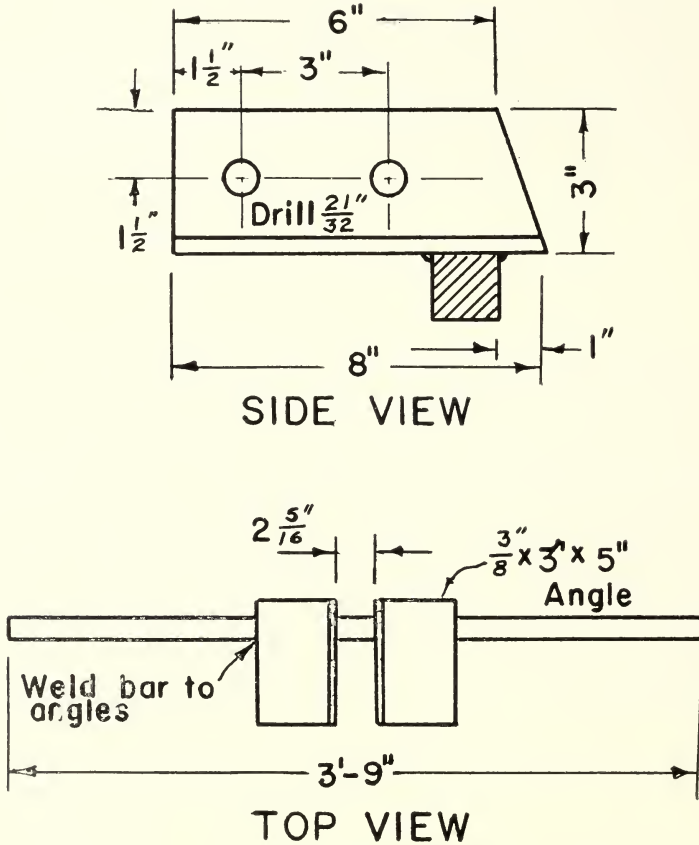
¹Agricultural Engineers, Agricultural Engineering Research Division, Agricultural Research Service, United States Department of Agriculture, and the Mississippi Agricultural Experiment Station. The work described was done in cooperation with the Delta Branch, Mississippi Agricultural Experiment Station, Stoneville, Mississippi.

In addition, they can be fitted with application equipment for injecting anhydrous ammonia, liquid fertilizers, fungicides, and other liquid chemicals in the soil (Figure 2).

In order to fully utilize all of the improvements included in the design of the combination anhydrous ammonia applicator and bedder, and to provide maxi-

imum uniformity for planting with four-row planters, the five-row middlebreaker should be used to bed only four rows.

The first step in mounting the applicators consists of attaching square toolbars of high-carbon steel to the inside middlebreaker beams. The toolbars can be fabricated from 1-1/4, 1-3/8, or 1-7/16-inch square stock, or a square cultivator



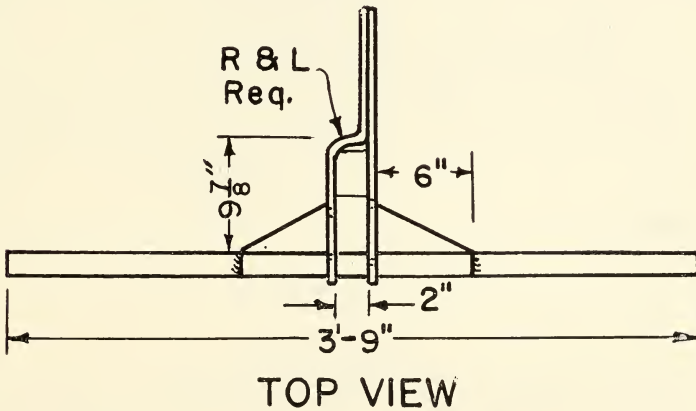
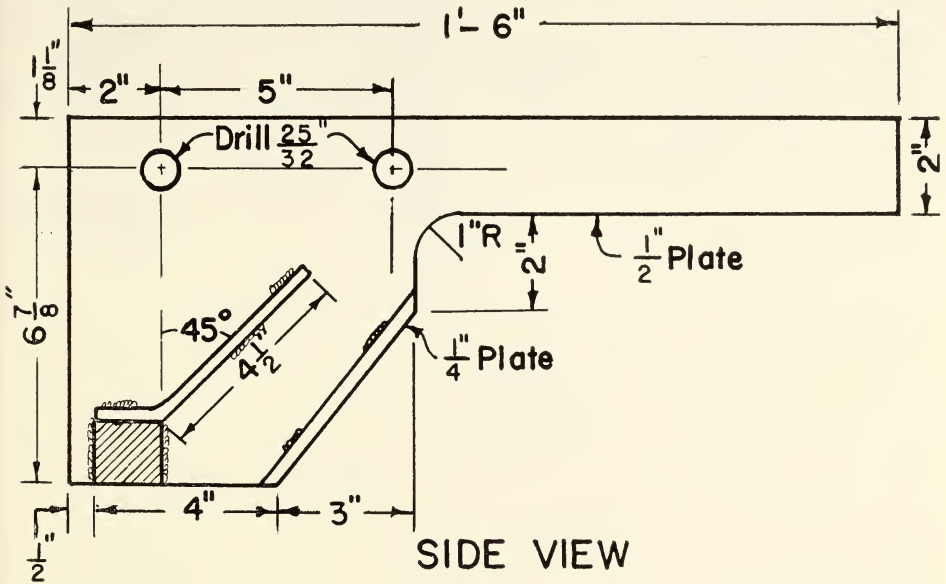
JOHN DEERE 350

Figure 3. Special toolbar for mounting applicator knives on a John Deere 350 5-row middlebreaker. On this middlebreaker 4 bottoms are mounted in front of the rear axle and 1 behind.

Note: 2 required per middlebreaker.

toolbar can be used, if available. Standard cultivator clamps which are used for attaching round shank standards to square

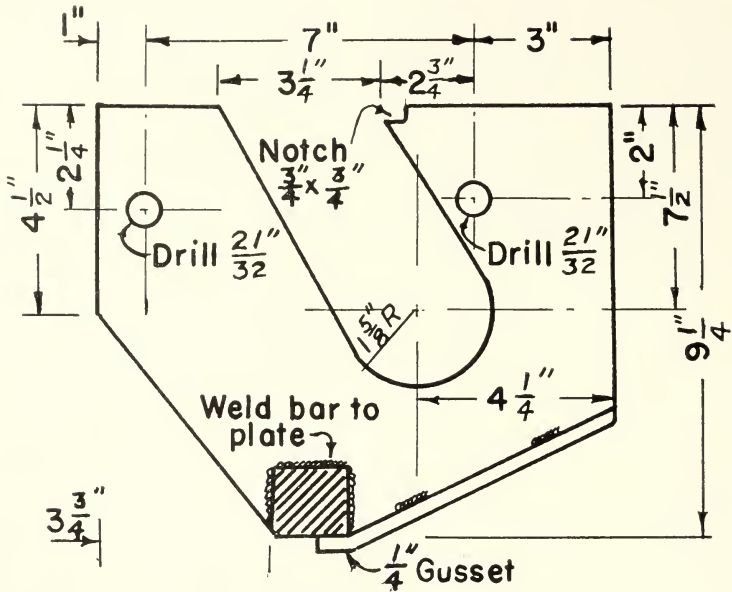
toolbars can be used satisfactorily. Toolbars for three late-model middlebreakers are shown in Figures 3-5. Bars for other



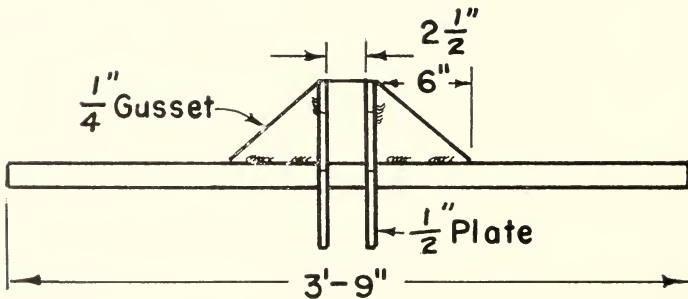
CASE M5

Figure 4. Special toolbar for mounting applicator knives on a Case M5 5-row middlebreaker. This toolbar has the gauge wheel standard built on to replace the one on the beam. One lefthand, and 1 righthand bend required. This rig carries 2 bottoms in front of rear tractor wheels and 3 behind.

Note: 2 required per middlebreaker.



SIDE VIEW



TOP VIEW

IHC 50

Figure 5. Special toolbar for mounting applicator knives on an International Harvester model 50 5-row middlebreaker. This model has 4 bottoms ahead of rear wheels and 1 behind.

Note: 2 required per middlebreaker.

makes and models can be made easily.

In the application of anhydrous ammonia, the applicator knives should be offset approximately 6 inches from the

center line of the row (Figure 6). Each knife should be set equidistant from the middlebreaker beam to eliminate side draft. Hoses of equal length should be

used in connecting the knives to the distributor manifold. If a tank mount is available it may have to be modified to

clear the rear-mounted plow when it is in the raised position.

A line diagram is helpful in adjusting equipment of this type (Figure 7). Vertical as well as horizontal settings can be easily accomplished with this diagram. It consists of a series of parallel lines on a concrete shop floor or on an open slab. A center line is provided to facilitate placement of the tractor on the diagram and lines to each side represent rows and middles (Figure 8).

The advantages which have resulted from this development include the following: (1) labor and machinery requirements were sharply reduced, (2) elimination of the "guess row" improved the planting efficiency of four-row planters. (3) better coverage was obtained with volatile liquids such as anhydrous ammonia (Figure 9), and (4) easier steering resulted from a balanced arrangement of the equipment load on the tractor.

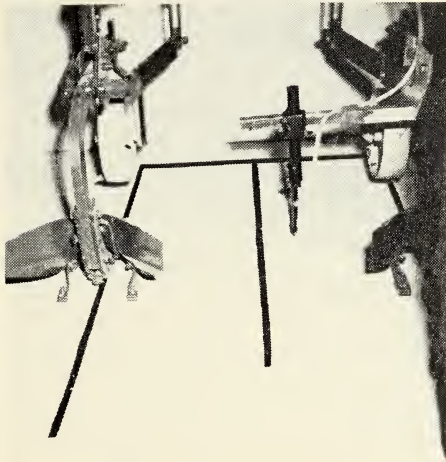


Figure 6. Adjusting middlebreaker bottoms and applicator knives on a line diagram in the shop.

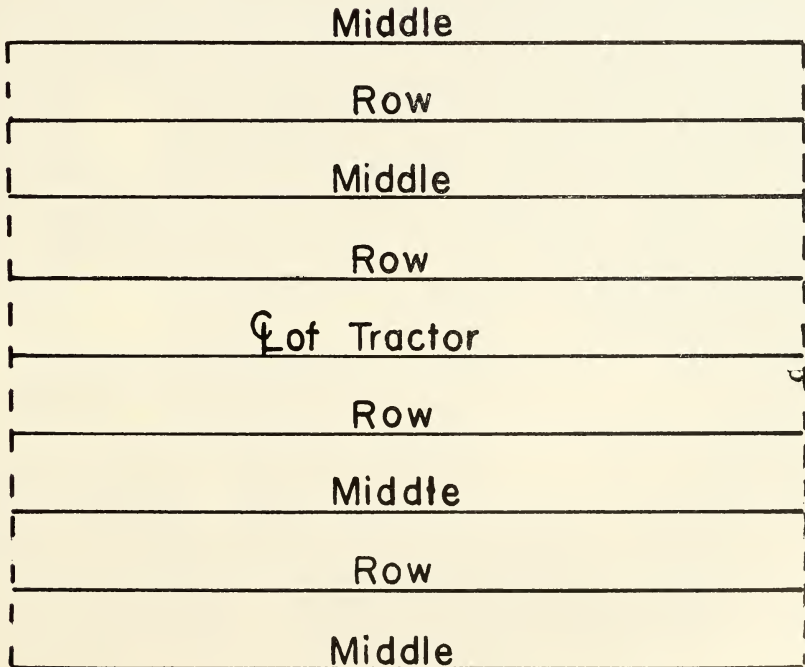


Figure 7. Line diagram for setting farm implements.



Figure 8. Checking the setting of a middlebreaker on the line diagram.

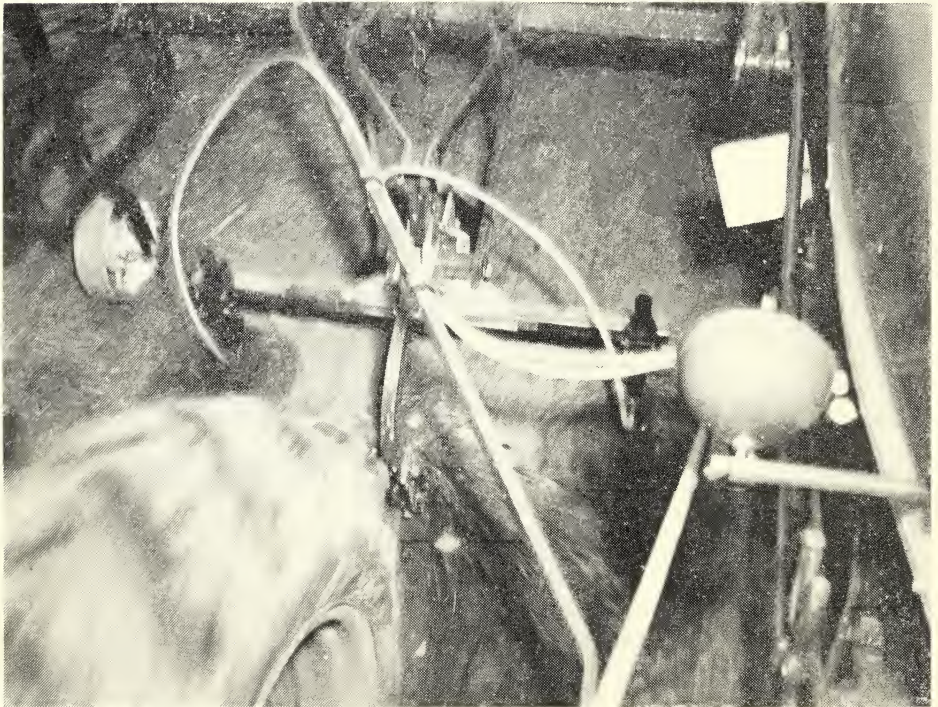


Figure 9. Top view of a front-mounted middlebreaker bottom moving soil in behind two anhydrous ammonia applicators.