STUDIES have been in progress in Iowa since 1939 to determine the effect of different tillage practices on crop yields and soil and water conservation. The results from some of these studies have been reported previously (2, 3, 4, 6). It is the purpose of this paper to summarize the yields by years for different soils studied. It includes comparison of fertilized and unfertilized areas. There also is included the effect of tillage practices on weight of ears and on stand. Yields of corn on hard-ground and loose-ground listed areas have been compared as well as on seedbeds prepared with the TNT plow and the moldboard plow.

PROCEDURE

The procedure used in carrying on these experiments has been described previously (2, 3, 4). Briefly, the studies carried out on cooperator farmer fields include a comparison of (A) plowing, (B) hard-ground listing, (C) sub-surface tillage, and (D) disking. All treatments include a comparison of no fertilizer with 167 pounds per acre of 3-12-12 fertilizer applied with a planter attachment.

A randomized replicated block design was used for all studies. Triplicate or quadruplicate plots were used in all cases. The data were analyzed statistically using analysis of variance (7). In addition to the four standard treatments, comparisons have been made using the Oliver TNT plow and the moldboard plow, bush and bog harrow and the loose-ground lister at certain locations throughout the state, on the Agricultural Engineering Farm near Ames, and on the Soil Conservation Experimental Farm in Page County, Iowa. A planter was developed especially for the work as shown in Fig. 1.

The past management of the fields varied widely. Included were first-year corn following two or more years of brome and alfalfa sod, first-year corn after one year of timothy and alfalfa, first-year corn after a catch crop of red clover or sweetclover, and second or more years of corn following a meadow crop. On fields that had a heavy grass sod, satisfactory seedbeds could not be prepared with ordinary sub-surface tillage machines and it was necessary to use a combination of subsurface tillage and disking to subdue the sod. Even then the seedbed was not entirely satisfactory.

EXPERIMENTAL RESULTS

EFFECT OF TILLAGE PRACTICES ON YIELDS OF CORN FOR DIFFERENT YEARS AND BY SOIL TYPES

The effect of plowing, hard-ground listing, subsurface tillage, and disking on yield of corn for 11 different soil types on 52 fields for the period 1944-46 is shown in Table I. This table does not show the results for individual fields for a particular soil type.

A number of factors influence the yield of corn under different tillage practices. It is not surprising, therefore, to find considerable variation between yields of corn for individual fields. Several fields included on a few soil types and should represent average conditions for these soils. There is also a seasonal variation in the effect of different tillage practices on yields. For example, in 1944 the yield on the hard-ground listed plots was 1.2 bushels higher than plowed plots on Marshall silt loam. In 1945 yields of corn on plowed plots were 4.2 bushels higher than hard-ground listed and in 1946 plots yielded hard-ground listing by 4.8 bushels. Similar comparisons can be made for different soils and different years. On the average, plots consistently produced somewhat higher yields than any of the other tillage practices. Yields from hard-ground listing are usually somewhat less than those from plowing but higher than from either subsurface tillage or disking. For the over-all average of different soil types, including 52 fields for 3 years, the yield of corn on plowed land was 70.8 bushels per acre, hard-ground listed 65.6, subsurface tillage 63.6, and disked 63.2.

Fig. 1.—This planter was used for listing and planting on all tillage treatments.