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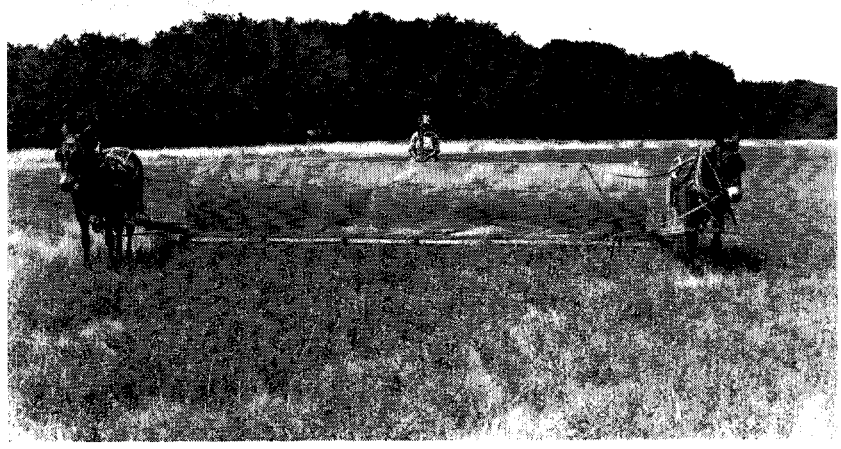

Fig. 64.—Hopper dozer collecting grasshoppers.

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ENTOMOLOGICAL STUDIES

Entomological studies were started at the Station in 1947. During the first three years studies were made of the pollinating activities of various bees on alfalfa flowers, and results published in Technical Bulletin No. 70 of the Kansas Agricultural Experiment Station. In 1950 through 1955 the pollination work was conducted, but emphasis was placed on chemical control and the project broadened to include insects attacking wheat. Since 1956 the work has consisted of host plant resistance to the spotted alfalfa aphid, pea aphid, and greenbug. This work contributed to the release in 1959 of Cody alfalfa, a variety resistant to the spotted alfalfa aphid. The development of Cody is described in Technical Bulletin No. 114 of the Kansas Agricultural Experiment Station. Studies to evaluate systemic insecticides for the control of insects affecting man and animals have been under way since 1956.

The work was under the direction of Dr. W. W. Franklin from May 15, 1948, to November 10, 1953, and of T. L. Harvey since March 15, 1954.

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MACHINERY AND EQUIPMENT

An outstanding contribution of the Station has been the improvement and adaptation of farm machinery to specialized uses on the farm. New pieces of equipment have been invented that saved labor or increased output, and improvements have been made that better adapt farm equipment to the function for which it was manufactured. Up to 1922, the Station had done its work principally with hand-operated or horse - drawn equipment. The change that took place about this time in adapting farm machinery to mechanical power presented an unusual opportunity. Two conditions at the Station contributed to this opportunity: first, the Station operations were sufficiently extensive to justify the use of mechanical power, and second, the volume of work required the service of a skilled mechanic and the operation of a well-equipped farm shop.

The first attempt to use mechanical power in tillage work was in 1907 when a steam plowing outfit was purchased. In 1914 a three-wheeled J. I. Case gasoline tractor was "made available." None of this power equipment proved satisfactory or was in use for field work by the fall of 1921. Immediately thereafter, purchases of power equipment increased rapidly. An Allis-Chalmers 30-hp gasoline tractor and a 30-60 Rumley oil pull tractor that burned kerosene were purchased in 1922 and 1924, respectively. They were put into use for listing, plowing, and belt work. The most important job for the Rumley tractor was to pull a 15-foot sidehill-type Holt combine acquired in 1924 to harvest a big wheat crop. Much other machinery and equip-

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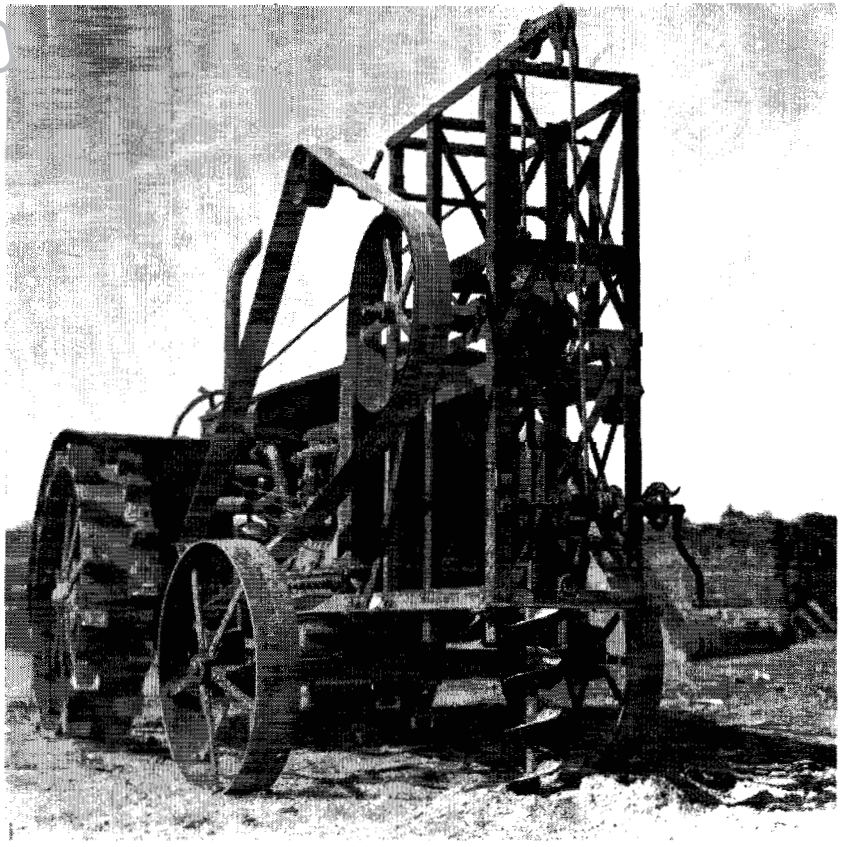

Fig. 65.—Mechanical posthole digger.

ment was purchased during the period 1921 to 1927. This equipment consisted of grain wagons, binders, headers, manure spreaders, plows, harrows, rakes, press grain drills, seed-cleaning machinery, cultivators, listers, ridge busters, corn binders, bundle toppers, pumps, hay loaders, feed grinders, concrete mixer, small gasoline engines, tree digger, electric motors, and a freight elevator for the seed-house. Much of this equipment needed to be modified to adapt it better to the purpose for which it was to be used. For other types of work no equipment was available that was well adapted for the purpose.

In 1924, a full-time shop mechanic was employed. A machine shop was built and equipped.

While the machine shop was used primarily to care for routine repair work of a 3600-acre experimental farm, much rebuilding and remodeling of machinery was undertaken and many new pieces of equipment were built. A few of the most outstanding accomplishments were the following:

Mechanical Posthole Digger, The need for a mechanical posthole digger became almost a necessity about 1925 when several miles of fence had to be rebuilt. The digger that was constructed consisted of an 8-inch auger rolled on special order by a machine shop in Chicago. It was made

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of ¼-inch steel. The auger was welded to a 1½-inch shaft and fitted into the rear end of an auto differential to power the auger. This unit was fitted into a frame and mounted on the front end of an Allis-Chalmers tractor and was driven by a belt from the flywheel of the tractor. The equipment was used to dig thousands of postholes for fences on the Station, and many farmers used the plan to build similar equipment for their own farms.

Remodeling of J. I. Case Thresher. The J. I. Case separator in use at the Station did satisfactory work but was difficult to clean preparatory to threshing different varieties and kinds of pure seed stocks. Several changes were made to facilitate cleaning. The rear end of the separator that included the heavy straw blower was unbolted, and large hinges attached. This permitted the rear end to be swung out of the way so that the separator could be thoroughly cleaned quickly and with ease. This change not only facilitated cleaning but insured that mixtures would be avoided when pure seed stocks of different kinds were threshed.

Automatic Hay Baler. Making alfalfa hay was time consuming and laborious. Stacking the hay in the field with buck rakes and baling the hay

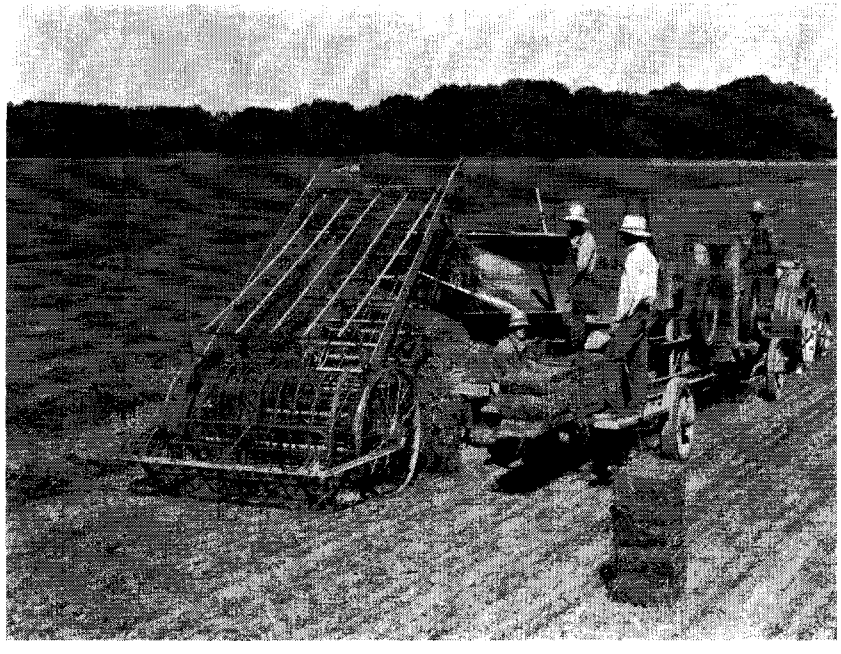

Fig. 66.—Automatic hay baler in operation in 1931. Because the making of alfalfa hay was a time-consuming and laborious operation, it was decided to build a portable hay baler.

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out of the stacks was customary. Many leaves and much hay were lost due to weathering in the stack and excessive handling. It was decided to build a portable pick-up hay baler. A hay loader, used for loading loose hay on wagons from the windrow, was purchased. It was attached to the side of an old truck chassis on which a stationary hay baler had been mounted. A metal chute was added to guide the hay from the loader to the platform of the baler. Seats were provided for two men, one on each side of the baler, to push bale ties through the bale blocks and twist the bale ties. The 1922-1927 report says: "This outfit bales hay out of the windrow as it is pulled along with either a tractor or horses. This device works fine when competent help can be secured to tie the bales as fast as the machine is ready to make them. If automatic tying equipment can be successfully installed on balers, one of the greatest steps forward in automatic hay baling will have been taken. Automatic tying will eliminate two men, which should reduce the cost of baling hay in the field. The Station will make considerably more effort along the line of improving upon this hay baling equipment, as the quality of the hay is greatly improved by this method." (43)

Experimental Plot Combine. In 1928, a small self-propelled combine was constructed to harvest small experimental plots of 1/10 acre

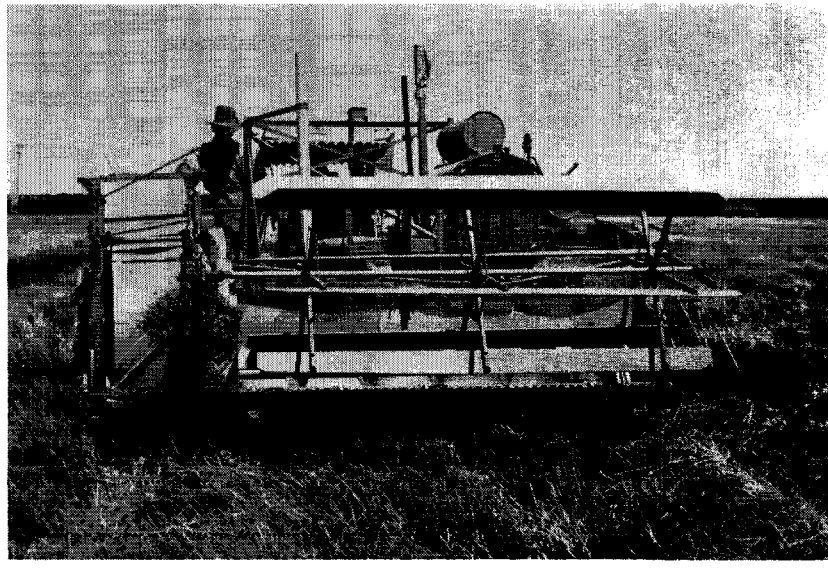

Fig. 67.—Experimental plot combine. In 1928 a small self-propelled combine was constructed to harvest experimental plots, which greatly reduced the cost of harvesting.

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or less. A small rebuilt Gleaner combine was mounted on a small 2-ton Caterpillar tractor. The machine was especially valuable because of its mobility. It could be turned around in its own length. It could be manipulated to do work that was impossible with other equipment. It reduced greatly the cost of harvesting experimental plots. The combine worked so successfully that requests were received from other experiment stations for similar outfits. Four additional plot combines were built at cost, one for the Colby Branch Experiment Station delivered for the 1931 harvest, and others completed in the fall of 1931 for the Garden City Branch Experiment Station, the U.S.D.A. Field Station at Woodward, Oklahoma, and the U.S.D.A. Soil Erosion Project at Hays. The combine built for the Soil Erosion Project was mounted on a McCormick-Deering wheel tractor since a tractor of this make was available. It worked satisfactorily for harvesting irregular plots of wheat and sorghum but was not as mobile as the combines mounted on crawler-type tractors. Since that time a smaller self-propelled combine has been designed and is now in use.

Sweetclover Seed Scarifier.

Newly harvested sweetclover seed is low in germination because many of the seeds are so hard that they will not absorb moisture. This condition can be overcome by passing the seed through a scarifier that scratches or chips the surface of the seed. A satisfactory machine of this type with a large capacity was designed and constructed in the Station shops in 1935. The scarifying unit consisted of two metal perforated cones, one inside the other. The seed to be scarified was introduced between the cones, one stationary and the other rotating. The sharp edges of the perforated metal scratched the surface of the seed. The degree of scratching was determined by adjusting the space between the cones and by the speed of the rotating cone. The machine was powered with a small electric motor. A blower recleaned the seed as it came out of the scarifier.

Three scarifiers were built: one for the Station, one for U.S.D.A., and one for the Agronomy Department of the College. A fourth machine with capacity four times that of the original machine was made for the Russell County Farm Bureau.

Power Hitches. The Caterpillar tractor owned by the Station was used to propel a number of implements such as listers, plows, ridge busters, planters, weeders, etc. Different types of hitches were required to accommodate the length of tongue, turning radius, and lever control. Several hitches were designed and built at the Station shops in 1933 to accommodate the different implements. For example, the Station was the first to use 6-row listing, planting, and weeding equipment. Since special hitches for

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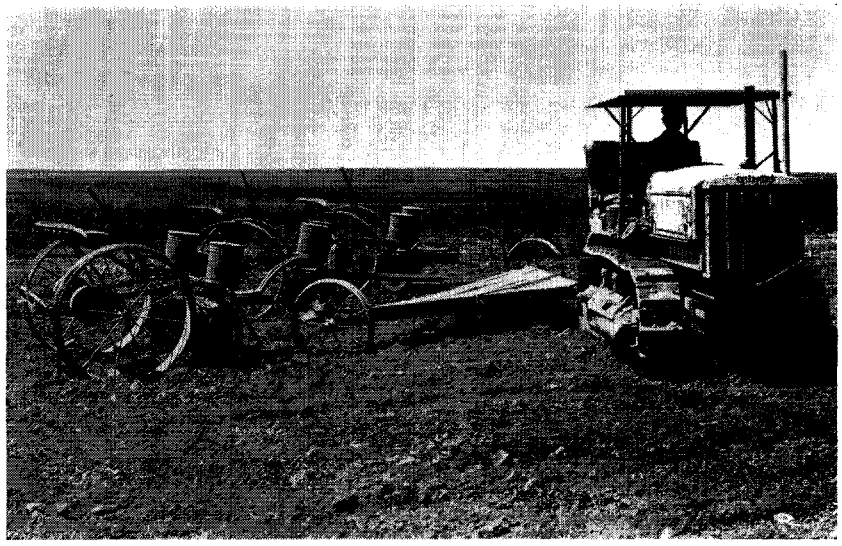

Fig. 68.—Hitch developed for attaching three 2-row lister planters. Such special hitches were developed to facilitate large tillage operations. The Caterpillar Tractor Company requested and was furnished with blueprints of all hitches designed at the Station.

such use were not being manufactured, 2-row, and in some cases 3-row equipment, was purchased and remodeled into 6-row equipment. The Caterpillar Tractor Company of Peoria, Illinois, requested and was furnished with blueprints of all the hitches designed at the Station. Working plan prints were supplied to many Caterpillar tractor owners over the United States and much favorable comment resulted.

Basin Lister. A successful basin lister to catch and retain moisture on listed land by mechanically placing small dams in the lister furrows was constructed at the Station in the fall of 1935 after a number of unsuccessful attempts. The machine was built by mounting the equipment that made the dam on a rebuilt Chase 2-row lister. New 38-inch wheels were substituted for the lower planter-type wheels. Auxiliary cam rollers were mounted in each wheel to lift the dammers at proper intervals to make the dams about 10 feet apart. The damming equipment was attached to the lister frame with angle irons mounted at the rear end of the lister beam. This provided a hinge so that the damming attachments could be raised and lowered. Mounted this way the dammer attachment became a part of the lister, and the entire machine became as portable as the lister itself.

The blade forming the dams was made to conform to the furrows made by the lister so that the blade moved only soil that had been loosened. The

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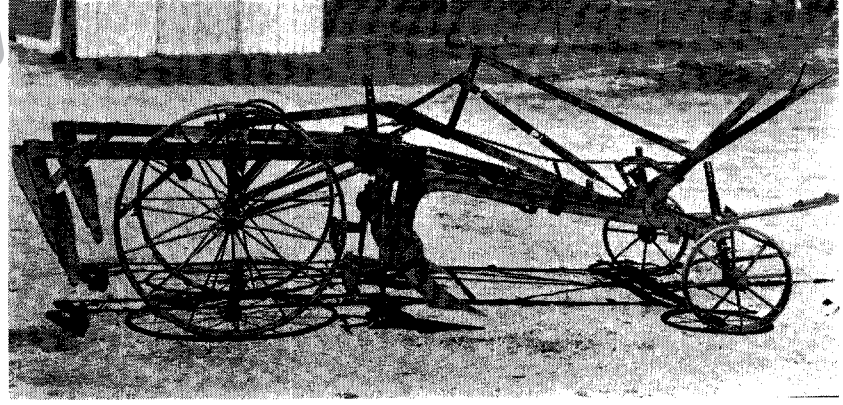

Fig. 69.—In the fall of 1935 a successful basin lister was constructed at the Station. It placed small dams in the lister furrows to catch and retain moisture on listed land.

height of the dam in the lister furrows could be varied by the depth at which the lister ran and speed at which it was pulled. A speed not exceeding 3 miles an hour proved best. In 1936 this machine was used to basin list a field with a 4 percent slope. A photograph taken 12 hours after a 2 1/2-inch rain, 1 inch of which fell in 30 minutes, showed that the basins held all of the water without run-off.

Following the successful operation and use of the basin lister on the Station, a small trailer was built on which the basin lister was mounted in order that it might be transported for demonstrations. Demonstrations were put on in 30 counties in western Kansas with an attendance of

Fig. 70.—Basin-listed land holding water 12 hours after a 2.57-inch rain which fell in one-half hour.

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Fig. 71.—An elevating grader was used to construct some 10 miles of terraces to conserve water and to control soil erosion on the cultivated land of the Station.

over 3,000 farmers. The equipment was also demonstrated in Colorado and at the soil and water conservation conference at Stillwater, Oklahoma. Following these demonstrations the Station was deluged with inquiries. Blueprints of the machine were made and sold at cost to 500 individuals in 1936 and more in 1937. Machinery manufacturers recognized the value of this type of equipment and were quick to capitalize on the interest created by the work of the Station in water conservation. During the dry period of the 1930's many types of damming and basin-making attachments for listers were manufactured and sold by commercial interests.

Elevating Grader. To conserve water and control soil erosion on the cultivated land of the Station, it became necessary to construct at least 10 miles of terraces. Properly designed labor-saving equipment was needed urgently for this purpose. An old elevating road grader borrowed from Ellis county and remodeled was used first. When this machine was sold by the county and became unavailable for Station use, it was decided to build a grader designed especially for terrace construction. An old wheel-driven elevating grader was purchased from the Lincoln County Highway Department for $300 and remodeled in the Station shop. The terraces built with this machine had a 60-foot base and a height of 18 inches. These terraces could be crossed readily with all types of farm equipment, including a 20-foot combine harvester. In addition to constructing over 10 miles of terraces on the Station and on some of the Fort Hays State College land, the equipment was used to construct several miles of road on the Station, much of it to divert flood waters from crossing cropland.

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Fig. 72.—A self-propelled field silage cutter designed and built at the Station was used first to harvest the 1947 silage crop.

Self-propelled Field Sllage Cutter. A self-propelled field silage cutter designed and built in the Station shop was first used to harvest the 1947 silage crop. This was conceived following the construction and successful operation of a 2-row tractor-pulled field silage cutter built in 1945. The first machine did a good job of cutting silage but knocked down considerable feed when opening up new lands. To avoid this loss and to economize on labor, the machine was converted into a self-propelled unit. The cutter assembly was mounted on a heavy frame carried by two home-made wheels fitted with 12" x 24" tractor tires. A 72-hp Continental motor to power the cutting and transport unit, with necessary forward and reverse driving mechanism, completed the outfit. A Thomas varidraulic drive was installed to permit speeds of from 1 to 14 miles per hour, Field cutting speed usually varied from 3 to 5 miles an hour, depending on tonnage of the crop. Hydraulic brakes operating independently on each wheel enabled the machine to turn in a small radius. The machine easily cut 30 tons of silage an hour.

Silage making was one of the most laborious jobs on the farm before field cutters were available. A 14-man crew was required by the old method. The new method used a crew of 6 and eliminated entirely the back-breaking labor of handling the heavy bundle feed. The introduction of the self-propelled unit reduced by 62 percent the cost of putting up silage. It also made it possible to secure farm labor for the work, since the job was now entirely mechanized and had become a simple tractor-and-truck operation. This ma-

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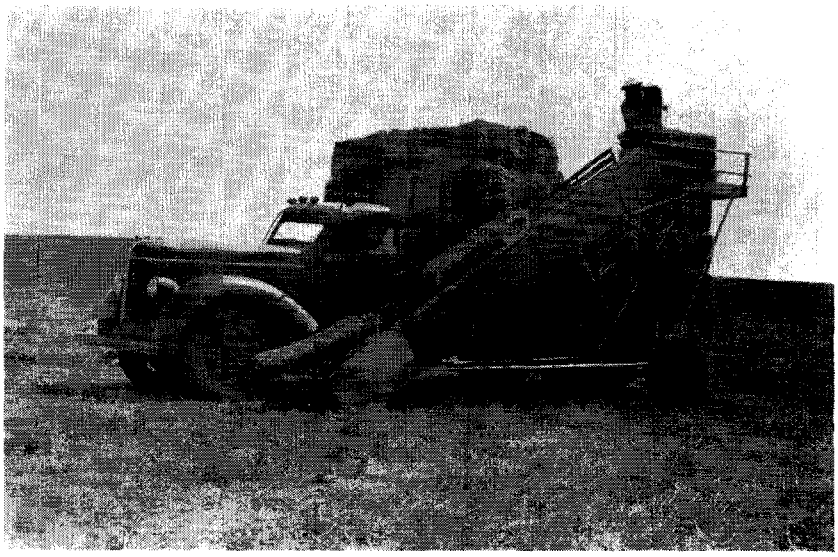

Fig. 73.—An automatic bale pickup and loader was designed and built at the Station in 1946.

chine is still (1962) in use on the Station. It has been demonstrated many times, twice at the Kansas State Fair at Hutchinson where it was closely observed by many farmers and machine manufacturers. The success with the machine immediately stimulated farmer interest, and the demand for it encouraged manufacturers to build self-propelled field silage cutters. They became available commercially in 1950 and 1951.

MACHINES AND EQUIPMENT DEVELOPED OR IMPROVED AT THE STATION

	Type of Equipment	Year Produced
1.	Power posthole digger	1927
2.	Automatic field hay baler	1927
3.	Tractor duckfoot with 28-inch sweeps for heavy tillage, especially for bindweed	1927
4.	Power metal saw for shop	1928
5.	Homemade triphammer for shop	1928
6.	Two-row corn binder bundle-loading attachment	1930
7.	Windrow header dump box	1931
8.	Buffalograss sod cutter	1934
9.	Road roller (made with tractor wheels filled with concrete)	1934
10.	Vacuum-type buffalograss seed harvester	1935
11.	Sweetclover seed scarifier	1935
12.	Power cross cut log saw	1935
13.	Basin lister	1935
14.	Dam-busting attachment for ridge buster	1937
15.	Nursery thresher	1937
16.	Motorized hopper dozer	1937
17.	Six-row flexible automatic lift tractor lister	1937

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18.	Rebuilt press grain drills	1937
19.	Tractor hitches	1937
20.	Elevating grader rebuilt for terracing machine	1938
21.	Automatic grain seed-treating machine	1938
22.	Duckfoot corn cultivator	1938
23.	Calf dehorning chute	1938
24.	Buffalograss seed-harvesting attachment	1938
25.	Tree-digging attachment for tractor	1938
26.	Blade weeder for terrace cultivation	1938
27.	Grasshopper poison spreader	1939
28.	Buffalograss seed combine	1941
29.	Drill for sowing grass seed	1942
30.	Improved buffalograss combine with pick-up attachment	1943
31.	Buffalograss seed drier	1944
32.	Motorized hay buck	1944
33.	Two-row field silage cutter	1945
34.	Pick-up bale loader	1946
35.	Self-propelled field silage cutter	1947

GERMAN WAR PRISONERS

Labor for farm work became difficult to obtain during World War II, both at the Station and on other farms throughout the country. In August, 1943, it was learned that arrangements were being made by the Army to make available German prisoners of war for farm work. It also developed that German prisoners were available for such work at a war prison camp in Nebraska, providing the requirements of the Army for use of the prisoners could be met. Among the requirements were the following:

1. Satisfactory housing and mess facilities, the housing to be such as to make difficult the escape of the prisoners,

2. Facilities for housing and feeding the detail of soldiers who could guard the prisoners.

3. Work available either on the Station farm or on farms within a driving distance of 50 miles that would occupy the time of the prisoners.

4. Assurance that all precautions would be taken by those employing war prisoners to comply with the requirements of the Army for the use of such labor.

These conditions were met by establishing at the Station a prison war camp and arranging with farmers in Ellis and the four surrounding counties for the use of prison labor. The camp for the prisoners was built by utilizing the old feed barn and the utility building. The compound was surrounded by a barbed-wire barricade. The guard detail was housed in comfortable quarters in the new brick and concrete seed-house. The facilities provided passed the inspection of both the Medical Department of the Army and the commandant of the Prisoner of War Camp in Nebraska. The first contingent of 100 war prisoners was received early in September, 1943.

A maximum of 150 prisoners was available for work on the Station and on farms in the five counties. The farmers using the prisoners came to the Station, signed up for the number of workers desired, re-

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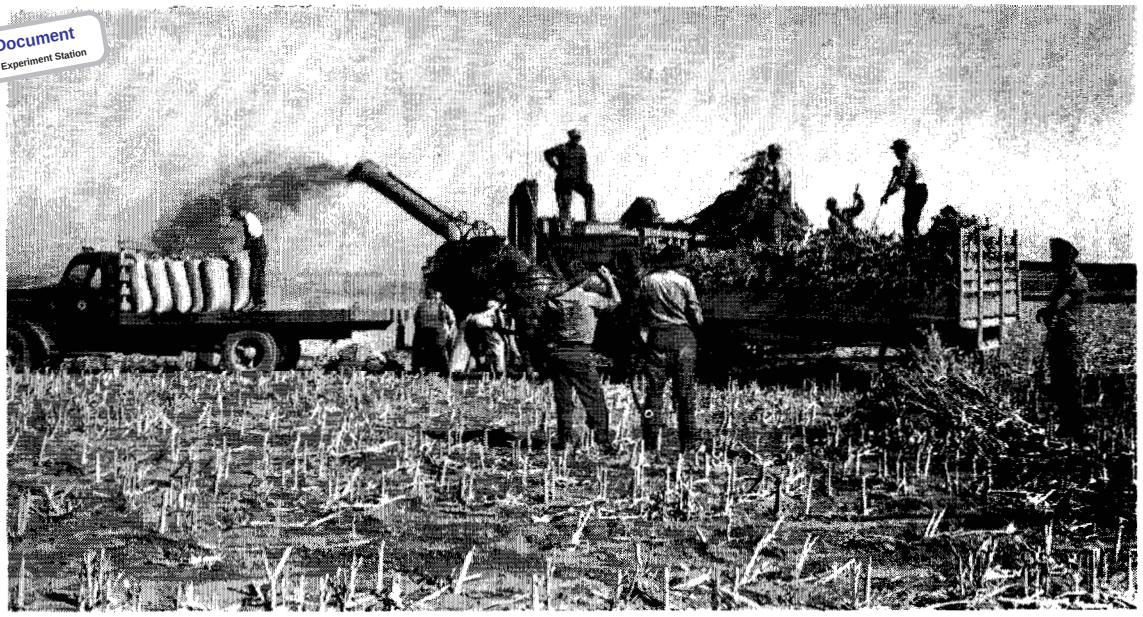

Fig. 74.—German prisoners of war were used in threshing certified seed sorghum in 1943. As many as 150 prisoners were available for work on the Station and surrounding farms, proving an invaluable source of labor in a time of manpower shortage.

turned with the prisoners to the farm, fed them at noon, and returned them at a specified time to the camp in the evening. One or more guards accompanied each contingent of prisoners.

The work performed varied. Many were used in construction work such as erecting a garage, laying a concrete floor in a large feedlot, constructing foundations for a farm building, and digging a well. The labor performed by the prisoners proved on the whole satisfactory. The labor permitted much Station work to be done that otherwise would have been impossible during the war years. Some technically trained prisoners were used in the Station laboratories. The service of the prisoners ended shortly after the close of the war with Germany. The first contingent left in November, 1945, and the other shortly thereafter.

OIL AND GAS LEASES

The oil and gas development which has been extensive in central Kansas had reached an area near the Station by 1942. Some very good wells had been obtained in Ellis county, though none was discovered close to the Station land. Geological formations appeared favorable, and great pressure was placed upon the Station administration to lease the land for oil and gas development. This pressure at first was resisted, but the Board of Regents decided that bids would be accepted with the stipulation that certain lands, the least valuable for experimental work, should be designated for development areas; other lands, the most valuable for experimental work, should be designated as non-development areas.

Bids were received June 22, 1942, and a lease awarded to the Darby Petroleum Corpora-

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tion of Kansas City, Mo., for a bonus of $18,267.20 plus $1 an acre a year delayed rental. The lease covered the entire 3,260 acres of the Station, both the development and the non-development areas. The lease was renewed June 22, 1943, for one year upon the payment of $2,740. The lease was discontinued by the Darby Corporation on June 20, 1944, after a dry well had been drilled in the center of the southeast pasture area.

A second lease was awarded June 26, 1948, to the Union Oil Company of Wichita on a bonus of $1,428, covering 560 acres, of which 252 acres were designated as drilling area and 308 acres non-drilling area. Annual rental of $1 an acre per year was also stipulated.

From 1948 to the present, portions of the Station land have been under lease to various corporations and individuals more or less continuously, with total income from all rentals and leases amounting to about $31,000. No producing wells have been drilled under any of these leases.

MAKING THE RESULTS KNOWN

The Station has been active in bringing the results of its research to the attention of the public. This has been done through numerous publications, by inviting the public to visit the Station, and by the technical staff attending public gatherings where the work of the Station was explained and the results presented.

In the first 60 years about 170 formal publications were issued. These reports were in

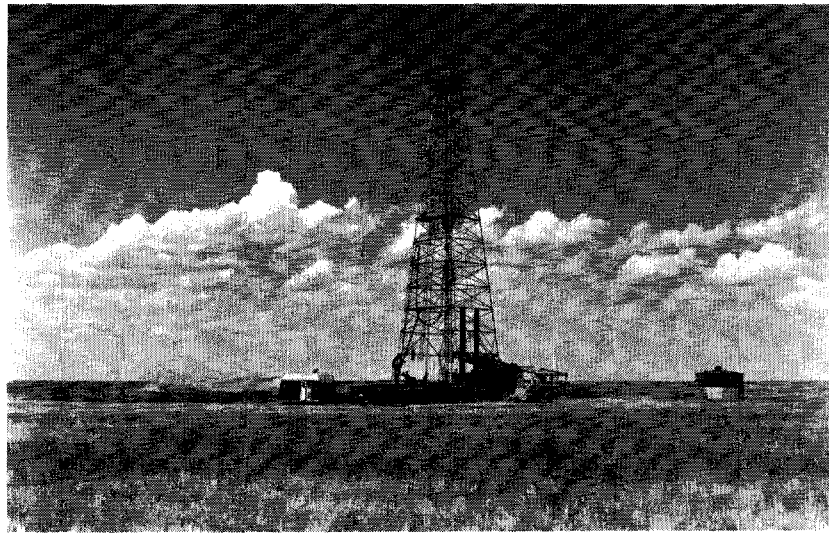

Fig. 75.—A well was drilled for oil under a lease by the Darby Corporation. The lease was discontinued on June 20, 1924, after a dry hole had been drilled in the center of the southeast pasture.

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the form of popular bulletins and circulars as well as technical bulletins and journal articles. Fifty of these publications presented results of winter feeding experiments with cattle. The first reports on experimental feeding were mimeographed circulars, but starting with 1947 they have been issued as formal circulars and bulletins of the Kansas Agricultural Experiment Station. About 45 publications relate to cereal and forage crop work, while others relate to weed control, trees and shrubs, orchards and gardens, soil management, soil moisture, tillage operations, restoring native grasses, new farm implements, insect control, and other subjects relating to work of the Station.

These publications have been distributed both to individuals and to such agencies as newspapers, farm journals, agricultural extension workers, and vocational agriculture teachers. These agencies have made the information available to many thousands of citizens. Also, many popular news articles have been prepared each year by the technical staff and distributed to the press. A daily radio program has emanated from the Station since 1953.

A second method of acquainting the public with the work has been through public events at the Station, when the results of the work of the Station have been presented through demonstrations, exhibits, and oral reports. These have included annual roundups, field days, judging contests, and informal visits by groups and individual farmers.

Annual round-ups have been held each year since 1913, usually the last week in April. These events have placed special emphasis on work with cattle, especially the presentation of results with winter feeding, although on these occasions the results of other work have been presented. Attendance at the round-ups has varied with the condition of the weather, ranging from fewer than 100 when the weather was especially bad to more than 1,500 when conditions were favorable. Visitors came each year from many of the counties in the state and from a number of adjoining states.

Judging contests have been held as a feature of the round-ups. 4-H group boys and girls and vocational agriculture students have participated each year in the judging of livestock, crops, clothing, and foods.

Attendance at these contests has varied over the years, from 13 teams of four individuals each the first year, 1922 to 494 teams in 1956 with more than 1,500 individuals in competition. Of these teams 241 judged livestock, 66 judged grain, and 187 judged clothing and foods. While the students attending were concerned chiefly with judging, they also became acquainted with general work of the Station.

Field days have been another method of acquainting the public with the work of the Station. On such occasions

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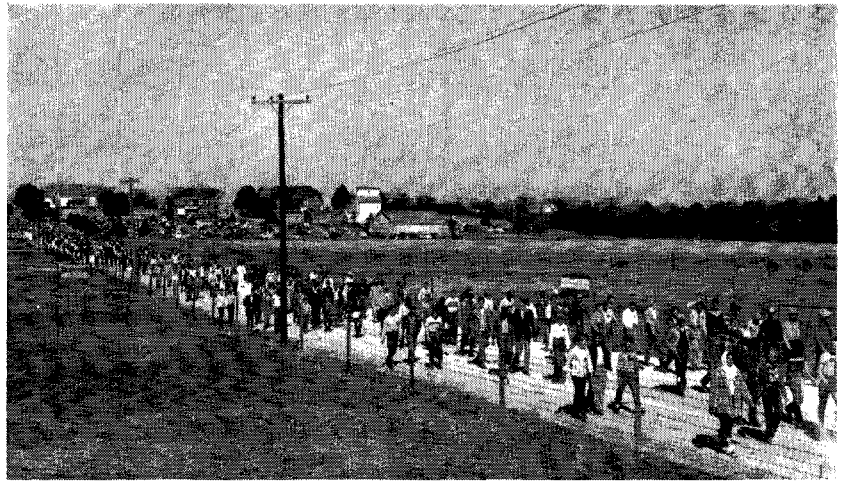

Fig. 76.—4-H and Vocational Agriculture contestants enroute to the stockyards for a livestock judging contest. Judging contests have been held each year since 1922 as a feature of the Annual Roundup.

visitors were invited to study some particular phase of work at a time when results were most evident. The first meeting of this kind was in June, 1910, when the annual assembly of the Kansas Dry Farm Association convened at the Station. A number of other meetings of this group were held in subsequent years, some in the spring and others in the fall. More typical field days came later. Since that time numerous wheat, sorghum, soil conservation, and other field days have been held. Schools have been held for weed supervisors, county agents, and grain graders, with attendance ranging from a few to several hundred. Many other visitors came to the Station individually or in small groups, usually led by county agricultural agents or vocational agriculture teachers. Recently numerous representatives of foreign countries have visited the Station.

Superintendents and other members of the technical staff have spoken at public gatherings and held demonstrations at agricultural fairs and other gatherings of farmers.

These methods of acquainting the public with the work of the Station have been effective. Farmers have accepted the findings of the Station to a gratifying extent, and reasonable financial support for the work of the Station has been provided by the State Legislature.

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