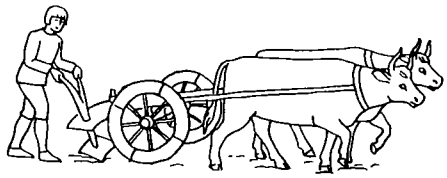
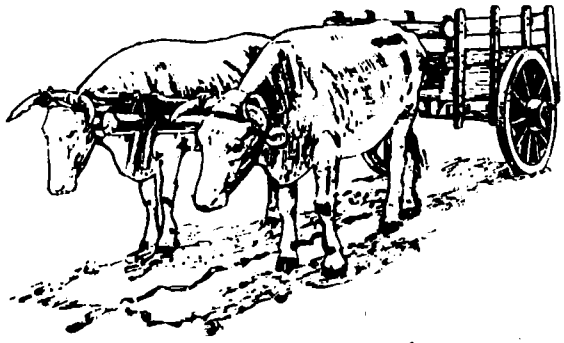
4

CHAPTER 4. FARM MACHINERY

Modern farms have machinery that is beyond the imagination of the early settlers. In settlement times, machinery consisted of levers and wheels, with power supplied by oxen and horses.



Settlers plowed the fields, dragged them to make them smooth, broadcast the seed, and then dragged them again to cover the seed and smooth the fields further. Harvest was accomplished by hand-held sickles, and the grain was hauled in wagons to barns to be threshed with flails.



The farming operations of early settlers impinged relatively little on wildlife habitat, but the density of settlers and the intensity of farming soon reached high enough numbers to cause game populations to be depleted due to loss of habitat. Further, the necessity of subsisting on wild meat to supplement food grown on the farm contributed to declines in wildlife populations, before the passing of laws regulating hunting.

The machines used now to prepare the ground and plant, care for, and harvest crops are described in this CHAPTER, acquainting the wildlife student with the purposes and operations of the basic equipment found on farms. Modifications of the basic machines are found in different areas, depending on farm size, soil types, precipitation patterns, etc.

TOPIC 1. POWER UNITS

Agricultural advances began to accelerate after the mechanical revolution that began with the introduction of steam engines and tractors after World War I. Steam engines were movable power units, but unlike the tractors which followed, they did not pull implements but simply supplied power. Threshing rigs, for example, were powered by steam engines in the early 1900s. The grain was cut and stacked, waiting for the threshing rig to come and set up by the stacks to thresh the grain. Straw was used to fire the steam engine; my father was a straw boy on his grandfather's rig about the time of World War I.

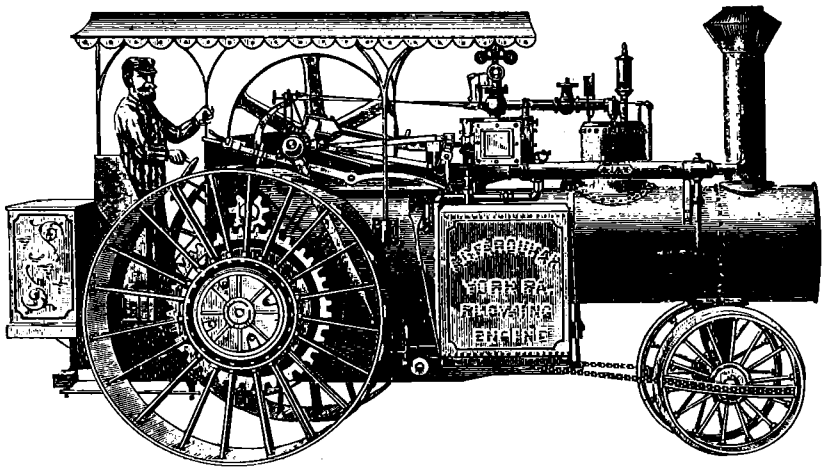
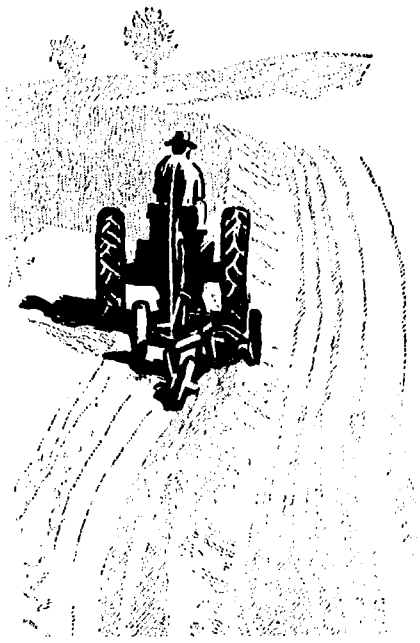


Figure 4.1 A steam engine used to provide power for such jobs as threshing grain.



Early tractors pulled implements to plow, disc, harrow, and cultivate the soil; cut, rake, and haul hay; and harvest small grains, and pick corn. Later,tractors were mounted with hydraulically-controlled implements that made tractor and machine one functional unit. This allowed for better control, greater mobility,and greater ease of operation. The tractor was no longer simply a "pulling machine," and farming became a highly mechanized business operation.

Modern tractors are equipped with such standard equipment as power steering, power brakes, automatic transmissions, optional air conditioned cabs and stereo systems, and hydraulically-operated pulled or mounted implements.

Tractors are rated acording to their "horsepower." One "horsepower" equals 33,000 foot-pounds per minute, or the power required to raise 33,000 pounds one foot in one minute. Very small tractors, used for light work around farm buildings and on truck farms, have ratings of 20 horsepower or less. Small tractors have horsepower ratings of 20-50 hp, medium-sized tractors 50-80, large tractors 80 to more than 100, and very large tractors have ratings of 200 or more horsepower.

Many tractors have 4-wheel drive; pulling power is supplied to both front and back wheels. Many tractors, especially the larger ones, have "dual" wheels, or 2 drive wheels on each side. This provides better flotation, permitting field work when the soil is wetter, without sinking and slipping. The very largest tractors are dual front and back, 4-wheel drive machines (Figure 4-2), and they weigh upto 20 tons. Both power and price of such machines are awesome, but they are becoming standard equipment on many farms in some parts of the country.

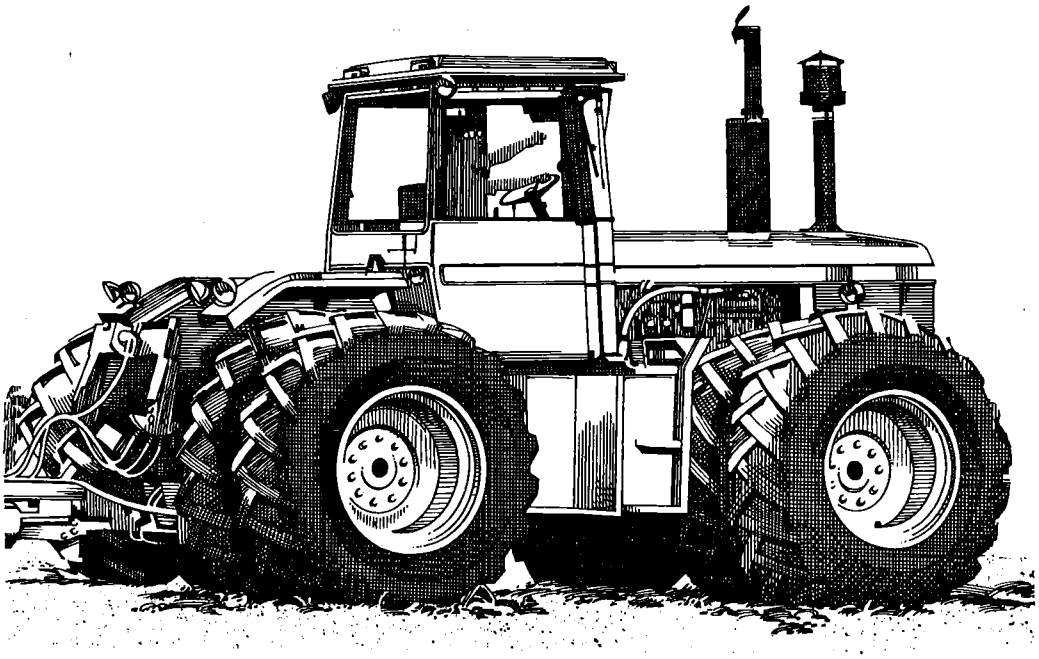


Figure 4-2. A 4-wheel drive, dual-wheel tractor with cab. Such tractors have horsepower ratings of 200 hp or more.

Some tractors have front tires that are close together. These are called "row-crop" tractors; the narrow front end is designed to go between crop rows rather than have a low axle that would bend and damage the crop. Tractors with the front wheels in line with the rear wheels have a "wide front end."

Tractors are available with cabs for operator comfort, heated for cold weather and air-conditioned for warm weather. Radios and stereo players are available too, which may not be mere luxuries considering the many hours a day that the operator may be confined to the cab. The cab also has a large number of controls, including steering wheel, throttle, clutch, brakes, shifts and differential controls, power take-off, and implement controls (Figure 4-3).

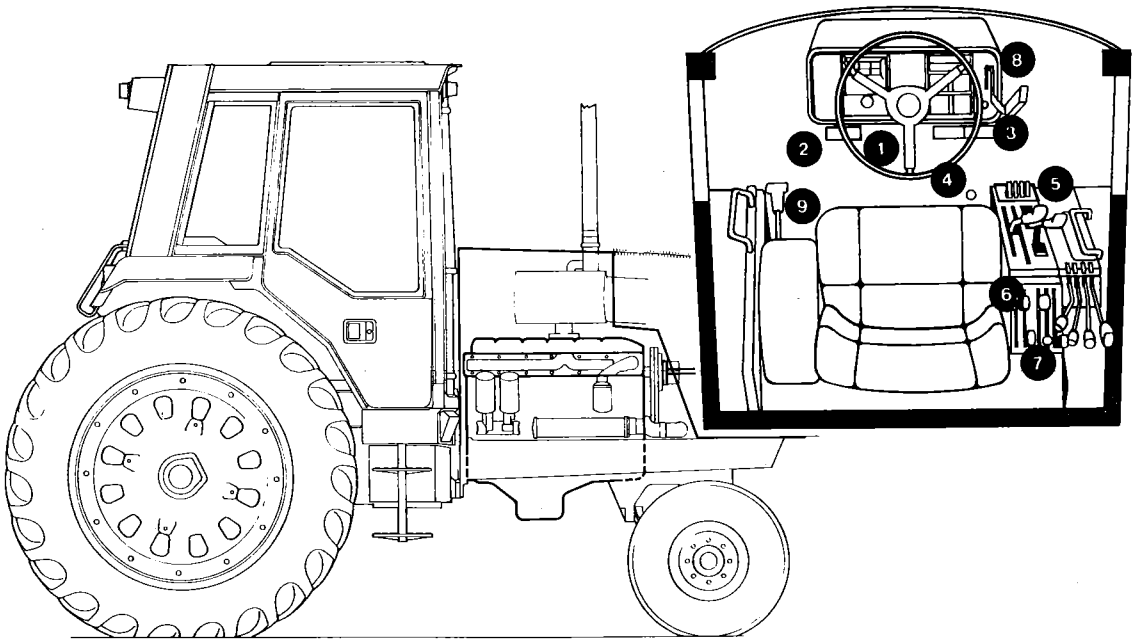


Figure 4-3. Modern tractors have heated and air-conditioned cabs, with a large number of controls (upper right):
1. Power steering 2. Hydraulic powered clutch
3. Left and right power-disc brakes
4. Electric-engaged differential lock
5. Feather-touch shifting 6. Hydraulic-engaged PTO control 7. Hydraulic implement controls
8. Throttle 9. Parking brake.

The tractor is the central power unit of the farm. Modern tractors have up to 20 speeds, some have automatic transmissions, and ground speeds range from less than ½ mph to 20 mph or more. They pull and power machines used for tillage, planting, weed-control,fertilizing, and harvesting a variety of crops. The major kinds of machines in each of these categories are discussed next.

TOPIC 1. TILLAGE EQUIPMENT

Tillage equipment is used to prepare the soil for planting and for the control of weeds. Early tillage machines were limited in size by the amount of power available to pull them. Two horses could pull a small plow; four or more were used to pull larger plows. However, the largest horse-drawn plow would be very small in comparison to today's tractor-drawn plows. Harrows were easier to pull than plows, but they too were small by today's standards.

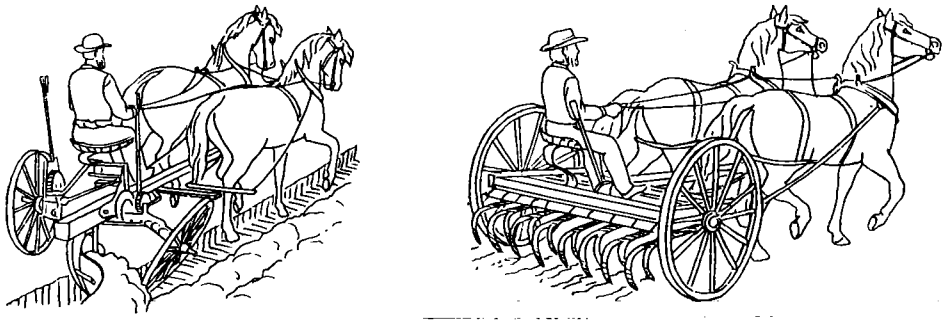


Figure 4-4. Riding sulky plow (left) and spring-tooth harrow used about 100 years ago.

Equipment used to break up and loosen the soil at depths from 6 to 36 inches is called primary tillage equipment, and for working the soil from the surface to about 6 inches, secondary tillage equipment. The former are called plows, and the latter, harrows. These kinds of machines are discussed in the next two UNITS.

UNIT 1.1. PRIMARY TILLAGE EQUIPMENT

Primary tillage equipment includes various types of plows. Wooden plows have been used for many centuries, and are still being used in some parts of the world today. Steel, tractor-drawn plows of various designs are used in North Ameria now. Plows with their own set of wheels are called trailer-type plows, those with a rear wheel to support one end of the plow with the other end attached to the tractor are called semi-mounted plows, and those supported entirely by the tractor, mounted or integral plows. Four main kinds of plows are discussed next.

The moldboard plow. The moldboard plow is designed to turn the "plow layer" of the soil over and cover crop residues. The trench left by the plow is called a furrow and the soil turned, a slice (Figure 4-5). Moldboard plows vary in the number of "bottoms" they have (one to 12 usually), and the size of each (12-16 inches usually). Thus a 6-bottom plow with 16-inch bottoms turns over 8 feet (6 x 16 = 96 inches = 8 feet) of soil at a time.

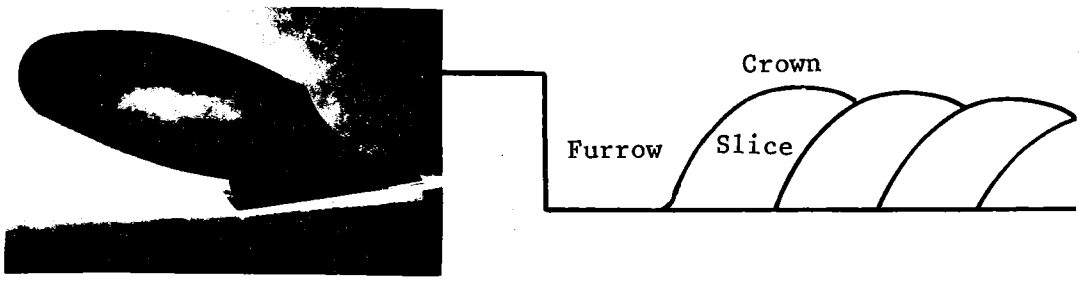


Figure 4-5. The moldboard plow bottom which turns the soil over (left), making furrows (right).

Disk plow. The disk plow has a rolling bottom rather than the sliding bottom of a moldboard plow. The disk is round, concave, and sharpened on the edge. Disks range from 20 to 38 inches in diameter, and 3 to 20 or more in number. Disk plows, commonly used in drier areas, do not turn the soil over as completely as moldboard plows.

Chisel plow. The chisel plow stirs the soil without turning it over as moldboard and disk plows do. Narrow "teeth" penetrate the soil and are pulled through it. Surface residues are not covered, and if the residues are heavy, the plow will act like a rake and "plug up." Chisel plows are good for opening up the soil in drier areas, allowing rainfall to penetrate rather than run off the surface. Chisel plows may vary in width from 5 to 45 feet, and penetrate to 18 inches.Specialized chisel plows, called subsoilers, are used to penetrate to 36 inches or more to loosen up very hard soil.

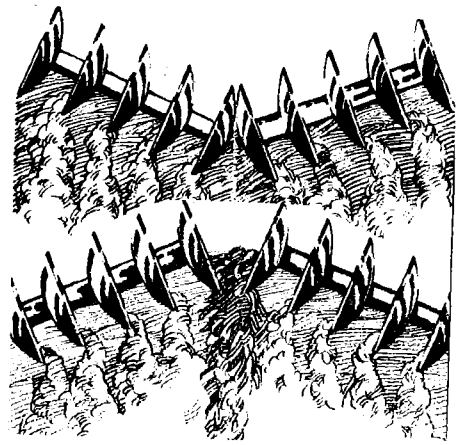
Rotary plow. A rotary plow have tines attached to a power shaft that rotates at about 300 rpm. The tines dig into the soil, loosen it and incorporate plant residues. Rotary plows have high power requirements, and are not common in large-scale farming. The most commonly-used rotary plow is the garden tiller.

UNIT 1.2. SECONDARY TILLAGE EQUIPMENT

Secondary tillage equipment includes disc and tooth harrows which till the soil at depths to 6 inches or so, and rollers and packers. All of these level the plowed soil, improve the seedbed, kill weeds, and reduce evaporation from the soil surface.

HARROWS

Disk harrows. Disk harrows, similar to disk plows in basic design, preceded the disk plow by many years. The concave disks are smaller - up to 18 inches in diameter - than the disc on a disc plow, and they are much closer together. Total width varies, depending on whether it is a single disc, with two gangs end to end, or a double tandem disk with front and rear gangs. The front gangs throw the soil in one direction and the rear gangs in the other direction (see insert).



Spring-tooth harrows. Spring-tooth harrows have teeth of coiled spring steel, with adjustable angles to regulate depth. They can be set to dig deeper and they pull heavier than disk harrows. The deep-penetrating teeth bring roots to the surface. Widths vary as one or more sections each 3-6 feet wide are put together.

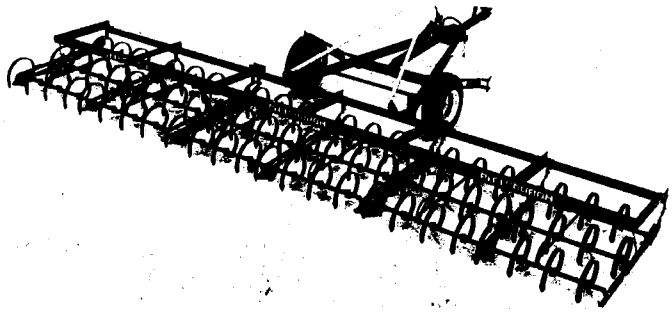
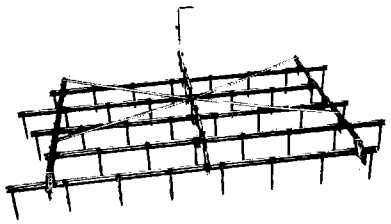


Figure 4-6. A wide spring-tooth harrow (Pittsburgh).

Spike-tooth harrows. Spike-tooth harrows, also called "drags," are used to smooth and level the soil after plowing or disking. They are light, and penetrate the soil only an inch or two. Several sections, each 4 to 6 feet wide, may be attached together to cover swathes of 30 or more feet. The sections are flexible so they undulate over the soil surface. They are light-pulling, and are usually pulled at fairly high speeds for field work.



TOPIC 2. PLANTING EQUIPMENT

Different kinds of planting equipment are made for the wide variety of seeds sown. There are three basic kinds of planters: broadcast planters, drills, and row-crop planters. Each is used for planting different kinds of seeds in different areas. The high-speed, precision planting machines available today are very different from the horse-drawn planters of a hundred years ago.

UNIT 2.1. BROADCAST PLANTERS

Broadcasting is an old method of seeding as man has long walked the fields spreading seeds by hand on the soil. Modern broadcast planters sow more accurately and rapidly than hand-broadcasting, of course. They may be as simple as a knapsack seeder that is carried over the shoulder, or as complex as an airplane seeder. The most common types of broadcast planter on commercial farms are carried on the drawbar of a tractor or the back of a pickup truck, or pulled as trailers (Figure 4-7).

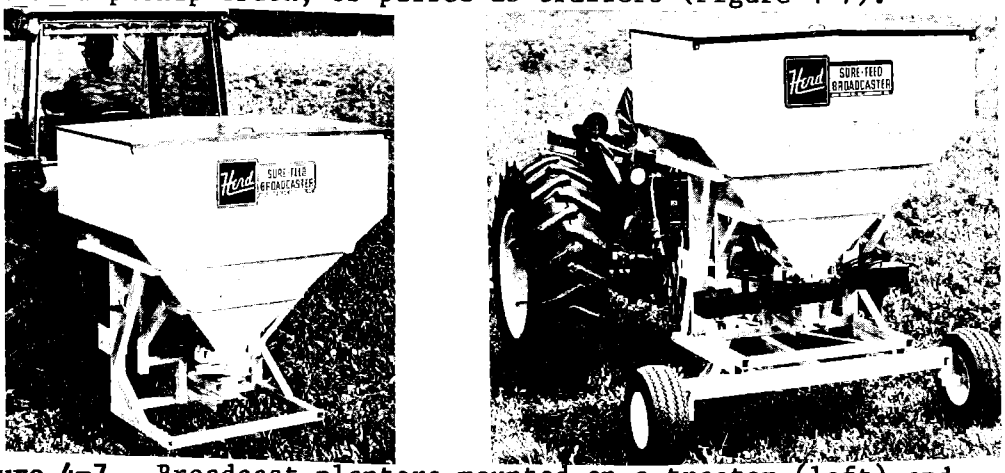


Figure 4-7. Broadcast planters mounted on a tractor (left) and pulled as a trailer (Herd Seeder Co.).

After broadcasting the seed, the soil is harrowed to cover the seeds. Those that are left too near the surface will dry out before germinating and becoming sucessfully established. Since the germination rate is lower for broadcast seed than drilled seed, seeding rates are higher with broadcasters than with drills.

UNIT 2.2. DRILLS

Drills are designed to place seeds of small grains such as oats, wheat, and barley, and grasses in closely-spaced rows at a uniform depth in the soil. Drills have a seed hopper and some have a fertilizer hopper, metering devices for adjusting the sowing rate, and furrow openers. The seeds are placed in the ground as the wheels of the drill or the tractor power-take-off power the metering device, and are covered either by wheels that press the seed into the ground or by drag chains (Figure 4.8).

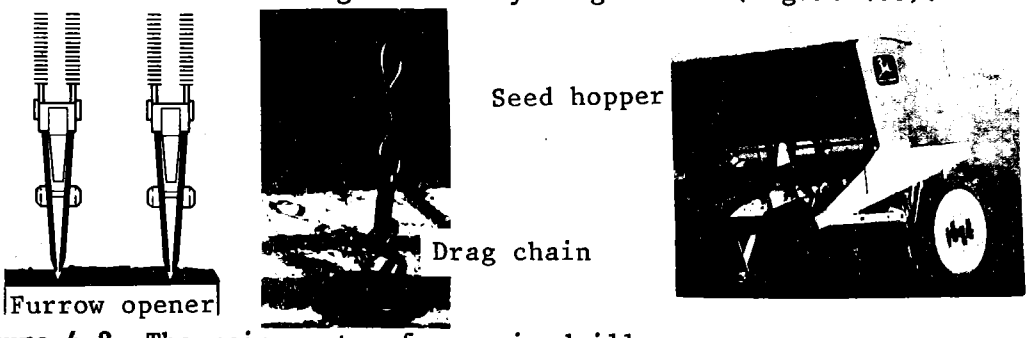


Figure 4-8. The main parts of a grain drill.

UNIT 2.3. ROW-CROP PLANTERS

Row-crop planters place seeds in the soil in rows wide enough to allow tractors to be driven between the rows for cultivation, weed control, and harvesting. There are differences in the widths and numbers of rows, and in the "plates" used for different seeds. The seeds are held in a "seed hopper" for distribution to the furrow opener in the soil (Figure 4-9). Fertilizer hoppers hold inorganic "starter" fertilizers for distribution along the seed row. Corn, soybeans, cotton, and sorghum are commonly-planted row crops on grain and livestock farms, along with vegetable crops on truck farms.

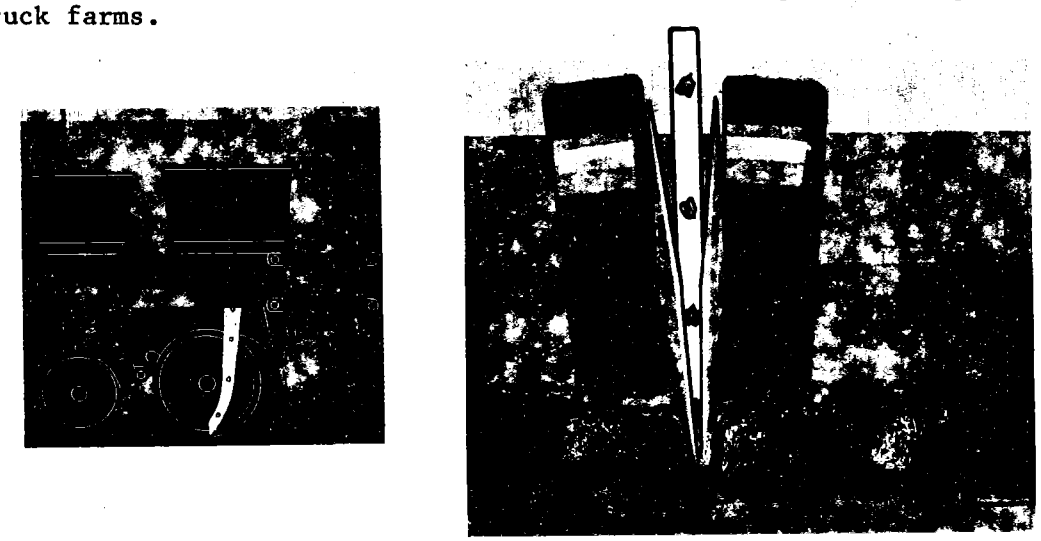
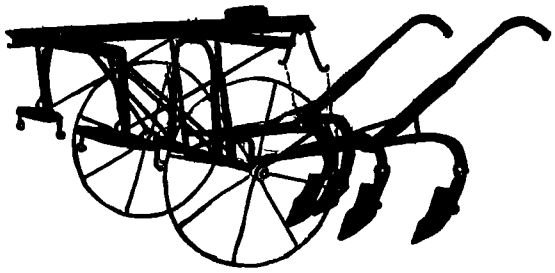


Figure 4-9. Side view of a row-crop planter (left), and seed placement and soil packing wheels (right).

TOPIC 4. WEED-CONTROL EQUIPMENT

The control of weeds which compete with crops is a very important part of crop production. Two kinds of machines are used in weed control: cultivators and chemical applicators. The former is a very old type of machine, the latter a product of the recent technological revolution. The days are gone when the farmer guides a steel-wheeled cultivator being pulled by two horses to eliminate some of the weeds between the corn rows. I will add, however, that I use just such a cultivator for weed control in my corn field. I like its simplicity; practically nothing can go wrong with it.



UNIT 4.1. CULTIVATORS

Cultivating equipment specifically designed for weed control during the growing season may be mounted on a row-crop tractor or pulled as a trailing unit. One to 12-row models are available. There are different kinds of "shovels" in different parts of the cultivator gangs and for different crops. Narrow shovels are used next to the crop row, and wider sweep shovels in the middle of the spaces between rows. The cultivator gangs are raised from the soil with hydraulic power lifts for turning at the ends of the rows and for travel between fields. The depth of the shovels may be adjusted for the age of the crop and soil conditions. Shields are used when the crop is very small, protecting the little plants from being covered with soil stirred up by the cultivator.

Some cultivators have sprayer attachments for spraying herbicide between the plants in the row while the cultivator clears out weeds between the rows (Figure 4-10).

Figure 4-10. An eight-row cultivator with shields to protect the small plants from being covered with soil and herbicide sprayer nozzles for weed control between the plants in the row. (Source: John Deere Company).

UNIT 4.2. SPRAYERS

Weed-controlling chemicals may be applied before or after the crop plants have emerged from the soil. Pre-emergence chemicals are applied during planting with attachments on the planting equipment, and post-emergence chemicals with attachments on the cultivator or a separate unit. Such units include a tank to hold the herbicides, and hoses and nozzles. The tank may be on wheels and pulled as a trailer, or mounted on a tractor or truck with long booms and nozzles set at the proper height and width for the crop being treated (Figure 4-11). Airplanes are also used in some areas, with the booms and nozzles mounted under the wings. Biplanes are often used because two wings provide greater lift than one wing, allowing the plane to be flown at slower speeds.

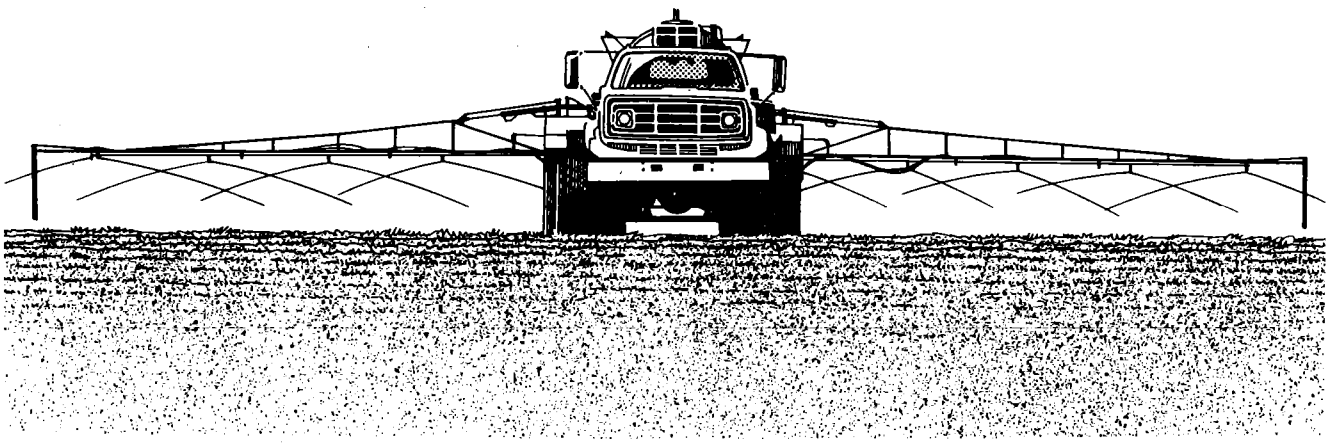


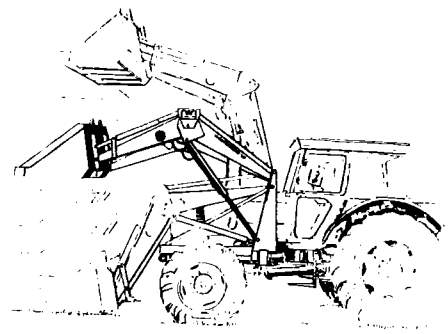
Figure 4-11. A truck mounted with spray booms for herbicide application.

TOPIC 5. FERTILIZING EQUIPMENT

Fertilizing equipment is designed to spread manure, granular or pelleted inorganic fertilizers, and liquid fertilizers. Each of these kinds of fertilizers requires special equipment, of course. The first of these - manure spreaders - is an old device; forks and wheel barrows were used in early agriculture before any of the revolutions. The last two are products of the technological and mechanical revolutions.

UNIT 5.1. ORGANIC FERTILIZERS

The handling of animal wastes has always been a labor-requiring part of livestock raising. Feed lots and barns need to be cleaned regularly, and machines are now used for most of the work. Tractor-mounted loaders scoop manure into manure spreaders. Barn-cleavers move manure out of the gutters into the spreaders. Cleaning is a chore that must be done daily in some livestock operations, such as dairy farming.



Manure spreaders. Manure spreaders are designed to carry barnyard manure and spread it rather uniformly over fields at selected rates of coverage. They usually consist of a box for holding the manure, an apron to move it to the beaters in the rear end of the spreader, and one or more sets of beaters that shred and spread the manure (Figure 4-12). Manure spreaders are pulled by tractors, and the apron and beaters may be driven by ground power from the spreader wheels or by the power take-off on the tractor. The latter is preferable, especially if manure is spread in a variety of weather, soil, and snow conditions. Some specialized manure spreaders have recently appeared, being designed to handle liquid manures, or to spread the manure with flails on the side rather than the end of the spreader.

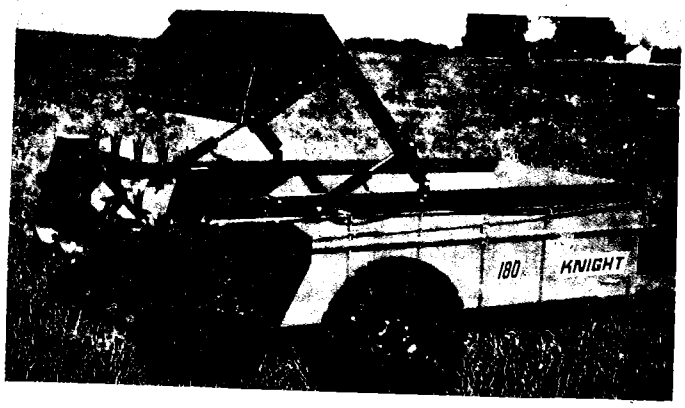


Figure 4-12. A tractor-drawn manure spreader. Note the beaters at the end.(Source: Knight).

UNIT 5.2. INORGANIC FERTILIZERS

Granular fertilizer spreaders. Granular fertilizer may be spread with a fertilizer distributor that looks like a grain drill, with fertilizer attachments on row-crop planters and drills, or with broadcast fertilizer spreaders. They can be adjusted for the rate of flow and amounts applied per acre.

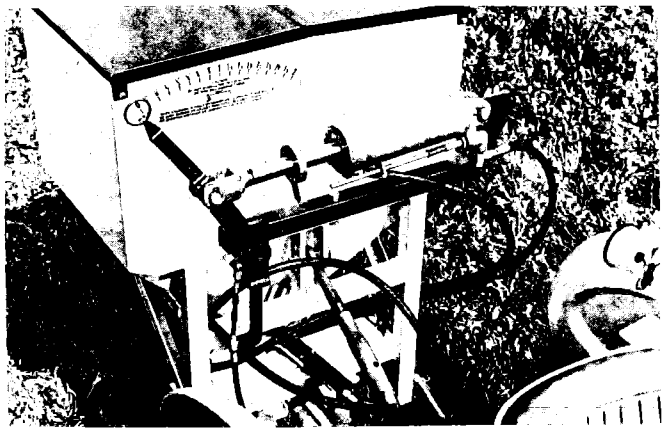


Figure 4-13. The spreading fertilizer is monitored carefully and may be regulated from the tractor seat. (Source: (Herd Seeder Co.)

Liquid fertilizer applicators. Liquid fertilizer applicators are designed to spread the chemicals, such as anhydrous ammonia, below the soil surface or on the plant and soil surfaces. Liquid fertilizers are corrosive and toxic, so they are stored and transported in trailer- or tractor-mounted tanks, and spread by nozzles on applicator knives which cut into the soil for controlled below-ground applications. Amounts are carefully metered so known quantities are applied. Too much fertilizer is a waste of money and potentially toxic to the plants.

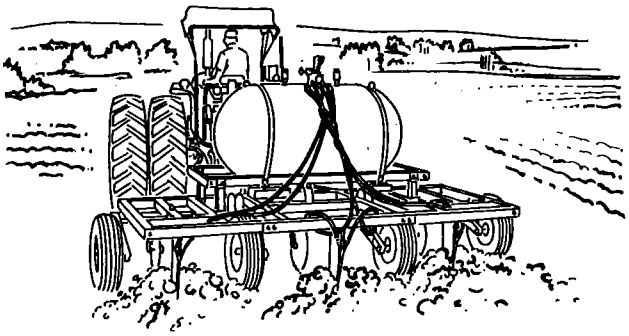
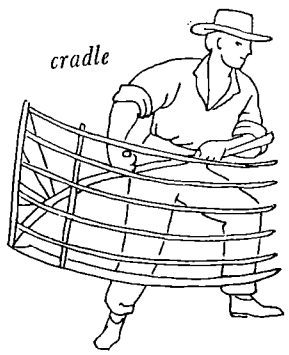


Figure 4-14. A tractor-drawn liquid fertilizer applicator.

TOPIC 6. HARVESTING EQUIPMENT

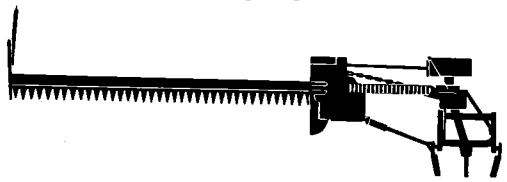
A large variety of harvesting equipment is used for the different kinds and forms of crops and seeds harvested. The hay, forage, grain, corn, cotton, and root harvesting equipment that is described in the next several UNITS is big and expensive, and getting bigger and more expensive each year. Further, the new machines are controlled more and more by electronics, resulting in more precision in the completion of the critical job of harvesting. Farming has come a long ways from the cradle, McCormick's reaper, binders, and steam-powered threshers.



UNIT 6.1. HAY HARVESTING

Hay harvesting equipment includes mowers for cutting the hay, conditioning it, windrowers for making rows, and pick-up equipment for hauling it to storage.

Mowers. Sickle-bar mowers are commonly-used to cut hay. These may be pulled, tractor-mounted, or self-propelled units. The cutting bar includes guards which protect the sickle and also provides a flat surface for the cutting action of the sharp triangular sections that cut the hay. The speed of the tractor causes the cut hay to fall behind the cutting bar and lay flat in the field.



Conditioners. Conditioners are machines that crush the stems of the hay, squeezing water out and increasing the surface area for water loss during drying. These machines reduce drying time of the hay, thereby lessening the potential for weather damage, loss of leaves (shattering), and reduction in nutrient value. Conditioners are often pulled behind mowers, cutting and conditioning the hay in the operation. The conditioner may also deposit the hay in rows for pick-up.

Windrowers. Machines, usually self-propelled ones, that cut, condition, and windrow the hay in one operation are now used on many farms. If windrows are not made, then side-deliver rakes are used to move the hay from field swathes into loose fluffy windrows to be picked up by hay loaders and balers. The hay is moved by spring teeth attached to a rapidly rotating wheel. Another type of side-delivery rake is the finger wheel rake, with several angled wheels with tines or teeth protruding out from the edge that move the hay to the side.

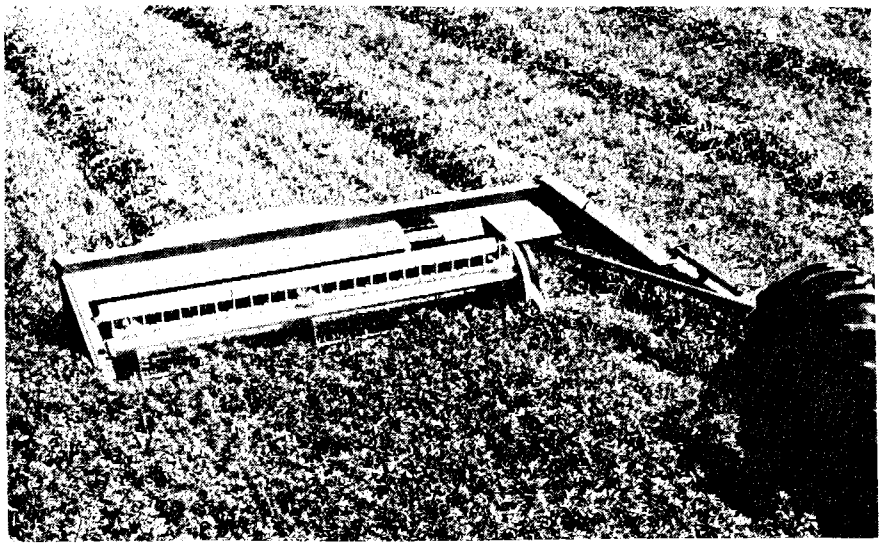
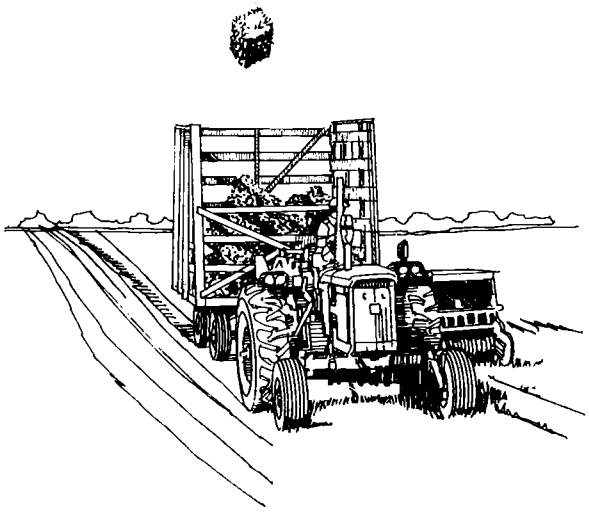


Figure 4-15. Hay conditioner pulled behind a tractor, leaving the hay in windrows. (Source: Owattana Manufacturing Co.)

Hay balers. Most of the hay harvested and stored as dry hay is baled. Bales are convenient to handle, and the compact bales conserve storage space. Hay balers pick up field-dried hay and compress it into rectangular or cylinder-shaped bales. The bales are tied with wire or twine by twisters or knotters on the baler. The bales are then either dropped on the ground for later pick-up, slid and loaded on to a trailer, or ejected into a trailing wagon. The use of a baler with an ejector or bale-thrower makes the task of hay harvesting a one-man operation.



A new type of baler is now available that makes very large round bales about 5 feet in diameter and weighing up to half a ton. These heavy bales are handled with a specially-designed lift on a tractor. They make bale handling simple with the proper equipment, but the large bales are harder to feed, with more waste.

Figure 4-16. Making large round bales weighing up to one-half ton (left). A bale being placed in a circular feeder with a hydraulic tractor lift (right).

Hay stackers. Hay stackers are used in some farming operations where it is convenient to store hay in loose stacks in the field rather than in the barn. Early machines were mounted on tractors,and consisted of a sweep rake that gathered the hay which was then lifted up and dumped in a stack. Now, high-density stacks are made by compressig the hay in a wagon and then leaving it in place in the field (Figure 4-17).

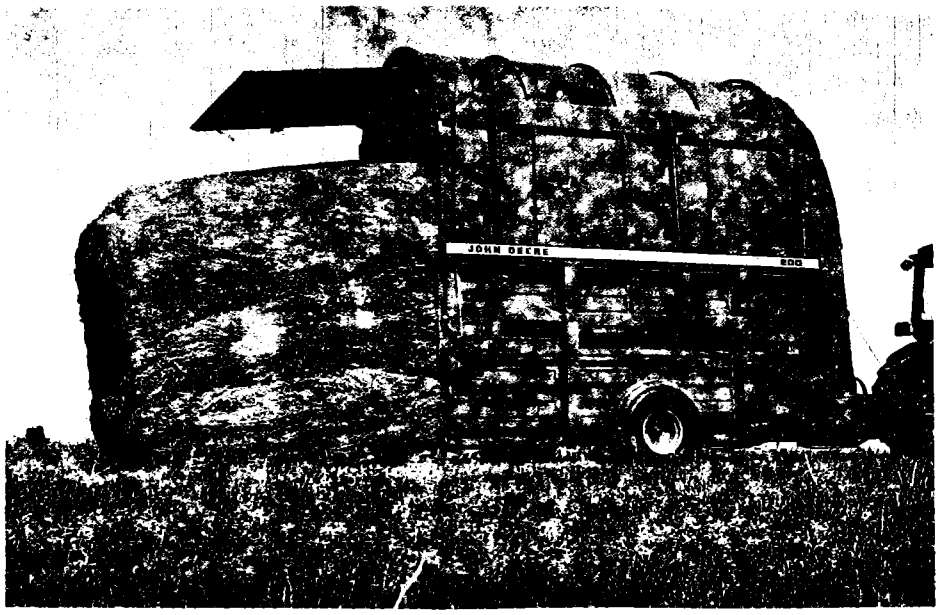


Figure 4-17. A high-density hay stacker (Source: John Deere Company.)

UNIT 6.2. FORAGE HARVESTING

Forage harvesting equipment is used to cut and chop hay, corn, and sorghum into short lengths for direct feeding or for storage and fermentation in silos. The crop is stored at field-wilted moistures, reducing the chances of weather damage during 1-3 days of field drying.

Field choppers. Field choppers pick up hay from windows and cut standing corn and sorghum, chop it into ½ to 2 inch lengths by knives whirling at very high speeds and blow it into a trailing wagon. It is then hauled to the feed bunk or silo. Choppers are pulled by a tractor, or are self-propelled units. They cut from one to four or more rows at a time. Blowers are used to elevate the field-chopped forage from the wagon into upright silos. High speed fans literally blow the forage up to 60 or more feet through the blower pipes into the silo.

Silos. The upright silos mentioned above are one of several kinds used for storing and fermenting chopped forages (Figure 4-18). Upright silos are large wood, concrete or metal storage tanks, ranging from 10 to 30 feet in diameter and 20 to 60 or more feet high. Bunk silos are walled long and narrow above-ground containers. The walls may be made of concrete. Trench silos are excavations into the ground, often on hillsides, into which chopped forage is dumped. Bunk and trench silos should be sealed with plastic to reduce spoilage of the fermenting silage on the top surfaces where it is in contact with the air. Recently, "bag" silos have come into use. They are simply large air-tight polyethylene bags on the ground in which anaerobic fermentation occurs. The fermented silage is a high-quality forage for cattle.

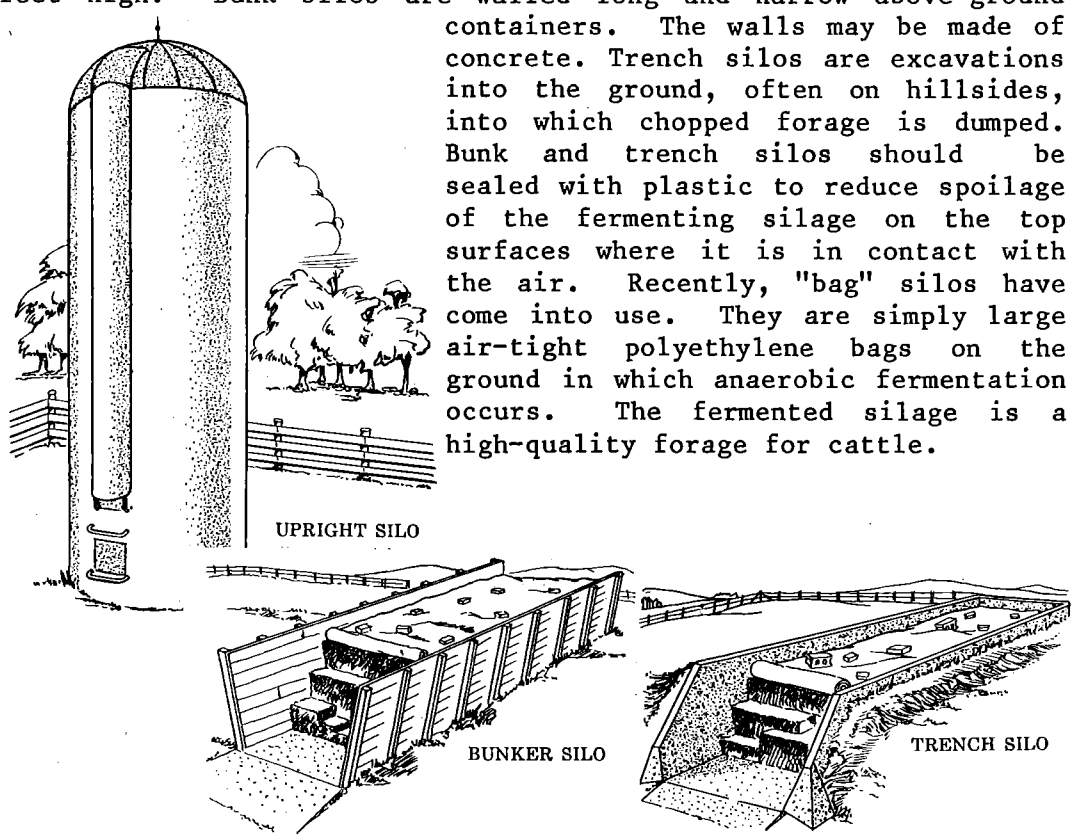


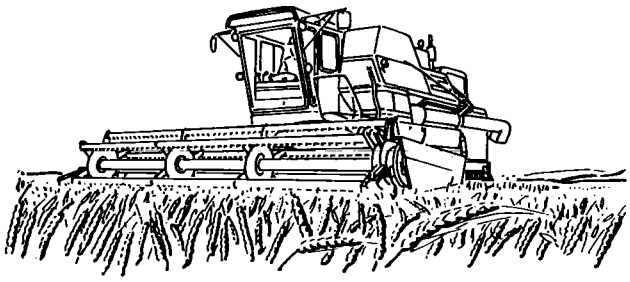
Figure 4-18. Upright (left), bunk (middle), and trench silos (right).

UNIT 6.3. GRAIN HARVESTING

Harvesting of grain is very different today from what it was just 30-40 years ago. Before, the crop was hauled to a stationary thresher to be threshed, separating the grain from the straw. Now, almost all grain is threshed in the field with a combine, either being cut directly by the combine or cut by a swather, windrowed, and picked up by the combine.

Swathers. Swathers cut the grain and place it in windrows for drying, to be picked up by the combine. Swathers have a cutting bar like those in hay mowers, a reel to lay the cut grain on a moving platform, and a moving platform of canvas that deposits the grain in a windrow on the stubble. When the heads have reached about 12 to 14% moisture, the grain may be combined.

Combines. Combines pick up the swath of grain or cut the grain directly and then separate the seeds from the straw. Pull-type combines are drawn by tractors, with the smaller ones using the tractor PTO and the larger ones having their own engine for powering the threshing mechanism. The larger combines are self-propelled, with a single large engine that supplies power to the wheels and to the threshing mechanism. Combines are large and rather complex machines which separate the grain from the straw, passing the grain to the tank or hopper of the combine where it is stored until full, and the straw is left in the field to be incorporated into the soil, or to be baled for use as bedding for the livestock. The combine is stopped to unload the grain into a wagon or truck whenever the hopper is full.



Self-propelled combines may be equipped with cabs, and the cabs may be air-conditioned and have radio and tape sound systems. There are computer-controlled dashboards, warning lights, and speed controls. Adjustments in ground speed, cutting heights, and other operational features are easily made from the operator's seat. The combine is a good example of complex modern technology; the cut-away view of the interior mechanism in Figure 4-18 gives one an idea of why they are expensive.

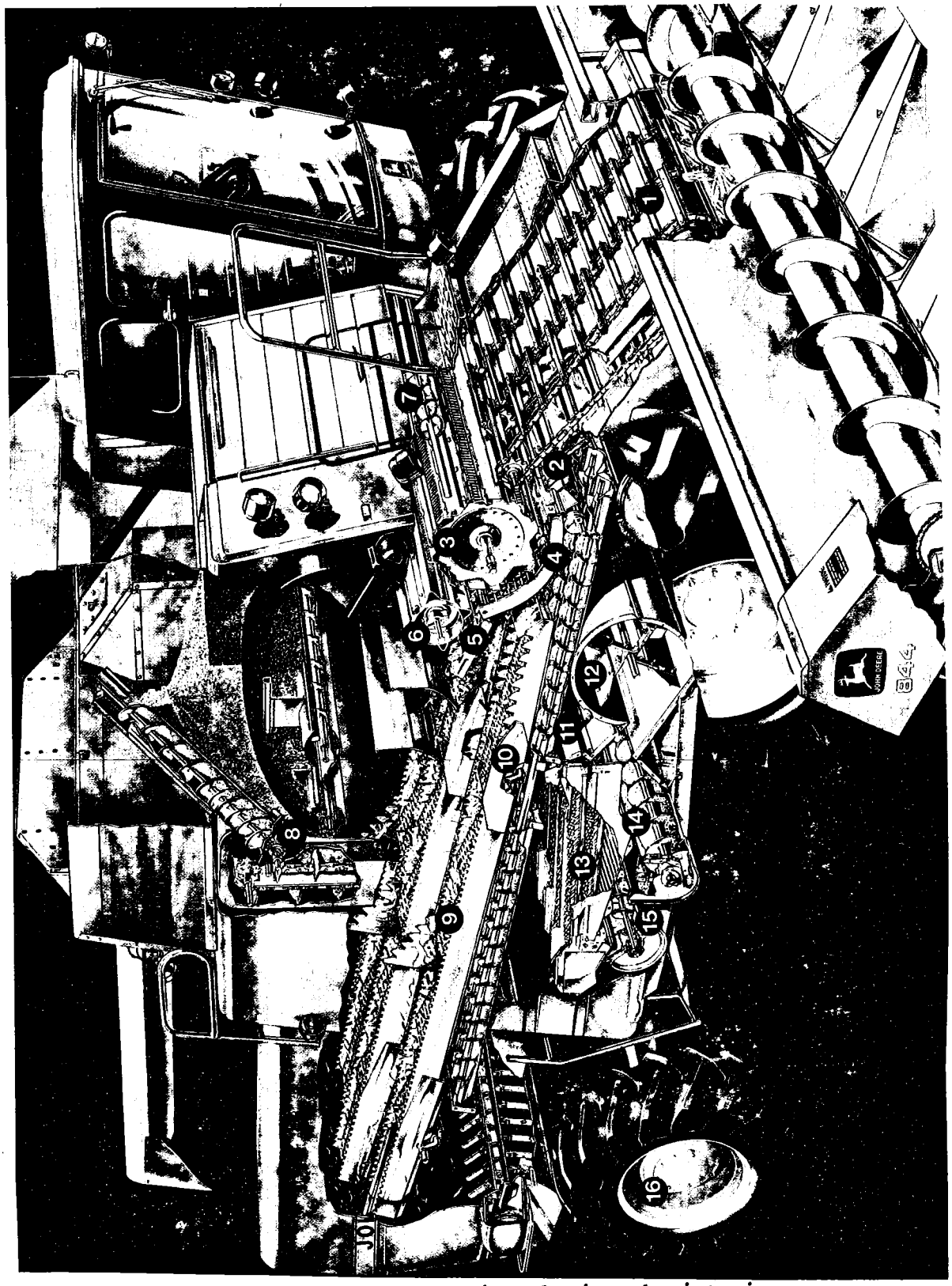


Figure 4-18. Cutaway view of a combine showing the interior mechanisms which separate the grain from the straw (Source: John Deere Company).

The parts of the combine illustrated in Figure 4-18 and brief descriptions of their functions are given below:

1. The Feeder transports the crop from the cutting or pick-up head into the combine.

2. The crop is delivered to the cylinder.

3. The revolving cylinder begins the process of separating grain from straw.

4. The stationary concave works with the cylinder to separate grain from straw.

5. A finger bar provides delivery of the straw from the cylinder to the straw walkers.

6. The beater helps move the straw to the walkers.

7. The upper tailings auger returns unthreshed grain to the cylinder for another pass.

8. A tank-loading auger system that moves the threshed grain to the tank or hopper.

9. Straw walkers, which shake the straw and move it through the combine, allow the grain to fall through to the clean-grain auger.

10. Another part of the walker system.

11. Auger conveyor system which delivers grain to the cleaning shoe.

12. Fan which blows the chaff from the grain.

13. Cleaning shoe, where the grain is cleaned for the last time before going to the clean-grain auger.

14. The clean- grain auger, where the grain is delivered to the elevator which brings the grain to the tank-loading auger.

15. The lower tailings auger which returns unthreshed grain to the upper tailings auger for another pass through.

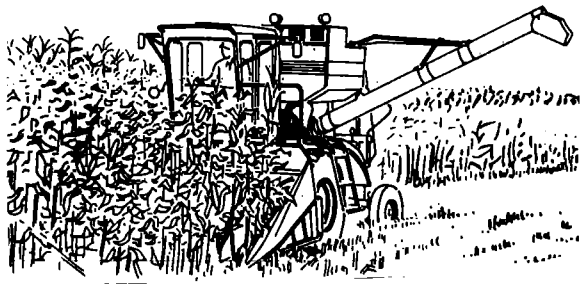
16. The steering wheels, also power-driven on some models.

UNIT 6.4. CORN HARVESTING

Corn harvesting equipment includes, in addition to the field-chopping equipment already discussed, corn pickers and corn combines. Pickers harvest the entire cob, while combines separate the grain from the cob.

Corn pickers. The corn picker is a machine that guides the corn stalks into pairs of rollers that pinch and snap the ears from the stalks. The ears go into an elevator system which conveys them into a wagon pulled by the picker. The husks are often removed during the picking operation as well. Corn pickers may be drawn by a tractor, mounted on a tractor, or self-propelled. Small corn pickers pick one row at a time; larger ones, pick 2, 4, or more rows. The broken-down stalks are left in the field.

Corn combines. Corn combines are pickers with a shelling unit, so the cobs are run through a cylinder and concave where the kernels are removed as described for grain combines. In fact, the same combine may be used for both small grains and corn, using different heads for picking up the grain. Corn-combine heads usually harvest 4 or more rows at a time.



UNIT 6.5. COTTON HARVESTING

Two types of cotton harvesters-the cotton stripper and the cotton picker-are mentioned here. Both are relatively new machines as the mechanical picking of cotton was not common until after World War II.

Cotton Strippers. A cotton stripper uses stripping rolls and bars that remove the cotton from the plant without pulling the plant from the ground. Plant lifters raise the plant up before entering the stripper. The stripped cotton is then conveyed or blown to a trailer or basket.

Cotton picker. The cotton picker removes only the locks of seed cotton from the plant. The cotton is removed by spindles and dropped into the conveying system which moves the cotton to the basket where it is kept until full. The full basket is then tilted and dumped into a trailer.

UNIT 6.6. ROOT-HARVESTING

Root-harvesting equipment digs and separates potatoes, beets, and peanuts from the soil. Potatoes and beets are dug and separated from the soil in one operation. The diggers remove the potatoes or beets from the soil and elevate them to a trailer, separating rocks and dirt from the potatoes or beets in the process. Peanuts are harvested with a peanut combine that picks up windrows of peanuts that have been elevated to the soil surface by peanut diggers.

TOPIC 7. SUMMARY

This concludes a brief introduction to major kinds of machinery used on farms. Many smaller items of equipment, such as fans, augers, feed carts, etc., have not been discussed, but will be mentioned in later discussions of different kinds of management. A visit or two to the farms in your area will help considerably in visualizing these machines, especially if they are in operation. It would also be worthwhile to visit implement dealers, farm expositions, and fairs to see the different kinds of machines available to farmers. Think of their operation in relation to crop habitats and wildlife, noting especially how drastically habitats are changed by their use.

LITERATURE CITED

Smith, H.P. 1965. Farm machinery and equipment. McGraw-Hill Book Company, New York. 519 pgs.