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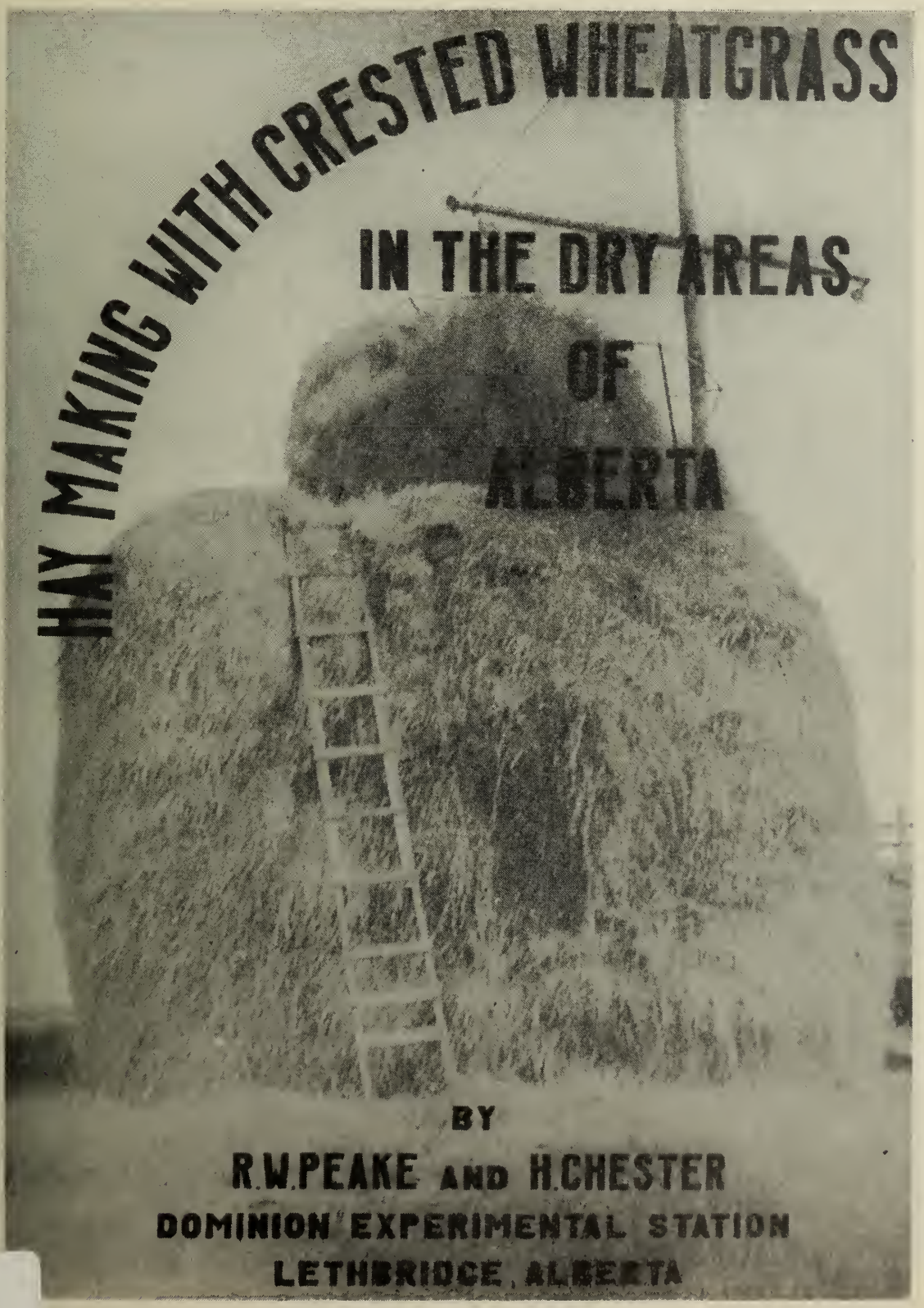

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HAY MAKING WITH CRESTED WHEATGRASS IN THE DRY AREAS OF ALBERTA

R. W. Peake and H. Chester

The production and maintenance of adequate feed reserves in the dry areas of Alberta will assist greatly in preventing losses of live stock such as have been all too frequent and often disastrous in the past. Severe drought conditions that existed during the past ten years created a non-productive state on much of the range and farm land. Thousands of acres of farm land were abandoned. Serious feed shortages periodically confronted ranch-farmers with the result they were occasionally forced to sacrifice their herds on glutted markets. Before restocking their depleted herds, these men should ensure themselves against a recurrence of their losses by building and maintaining a large feed reserve. The value of feed reserves has been demonstrated by stockmen now in the business. Many who did not have feed reserves during the last dry period either went out of business or were carried over by government relief feed at the expense of the taxpayer. Reserve feed consists of stacked feed or winter range, only the stacked feed can be depended upon during a severe winter as a heavy cover of snow may render the winter pasture useless. That such feed can be grown during the good years and stored to carry over the lean years has been demonstrated on six Regrassing Stations conducted by the Lethbridge Experimental Station.

On the Regrassing Stations, which are located throughout the dry area of Alberta, crested wheatgrass is the most suitable of the cultivated grasses. This plant has remarkable adaptability for reclaiming abandoned lands that are covered with annual and perennial weeds. This is fully illustrated in Fig. 1, which shows a change of cover from pasture sage to a productive hay field of crested wheatgrass.

Hay yield data obtained from the regrassing experiments show possibilities of producing forage from crested wheatgrass in southeastern Alberta. Yields of one ton or more of cured hay per acre are considered very good on these depleted lands with the existing low moisture supply. It must not

FIG. 1.—For twelve years prior to seeding crested wheatgrass, this field was abandoned and unproductive. Three years after seeding the grass the pasture sage was replaced by this valuable crop of hay.

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be assumed that high yields will be maintained year after year as the growth is definitely limited by the moisture supply in the spring and fall. When this moisture is lacking the growth is severely curtailed. However, when the total production of the good years is properly stored, there should be ample feed to carry over the droughty years. For example, the average yield of crested wheatgrass on the 200-acre Reclamation Area at Youngstown was 1·70 tons of cured hay per acre in 1939 and 1·64 tons per acre in 1940 to make a total of 668 tons of cured hay in two years. Such a quantity of hay properly stored would make a valuable long-time feed reserve. The purpose of this publication, based on seven years regrassing studies, is to make recommendations on the seeding and management of crested wheatgrass for hay and stacking it for feed reserve.

SEEDING

Many farmers have experienced costly failures in attempting to establish stands of grass in southeastern Alberta. By seeding at a time most favourable for the establishment of the grass and by using cultural practices which have been found most suitable, success is not difficult to obtain. After seeding, patience is the most important factor. When the seedlings first appear they are usually so small that they are difficult to see and often a good stand is considered a failure and ploughed up. Even thin stands of grass the first year after seeding will produce excellent hay fields eventually and should not be destroyed. Sometimes there is delayed germination and a stand may not be established for two or three years. Unless land is of high value it is suggested that fields be given two years after seeding in which to become established.

Place and Method of Seeding.—Crested wheatgrass grows well on a wide range of soils from very light to medium heavy in texture. It does not grow to best advantage on low-lying heavy soils. Even in the presence of a fair moisture supply, minute grass seedlings require protection from the hot burning effects of the sun. In choosing the place of seeding, the soil cover is very important and an area covered by grain stubble or annual weeds is ideal. Seeding directly into undisturbed stubble has proved most satisfactory. Even in the presence of most perennial weeds there is little to be gained by cultivating prior to seeding as excellent stands can be obtained by seeding directly into the weeds. This is well illustrated in Fig. 1 which shows an excellent stand of crested wheatgrass obtained by drilling the seed directly into a field of pasture sage.

In seeding crested wheatgrass in a dry area it is essential that the seed be covered with soil. Depth-of-seeding tests show that this covering must be light or the small seedlings may perish before reaching the soil surface. It is, however, important that some covering be made as it is estimated that about 75 per cent of the seed is lost when broadcast. Drilling is the best method of placing the seed in the soil and a regular farm drill with the seed placed in the grain box is ideal. If a grain drill is not available the seed may be broadcast and then covered with a disk harrow.

Time of Seeding.—One of the most serious problems of establishing a stand of grass in this area is the intermittent periods of severe drought during the growing season. Unless time of seeding is arranged so that the grass seedlings are well established in advance of the hot, dry, summer months, there is a fair chance that the seeding will be a failure. The most desirable time of seeding is in the early fall between September 1 and 15. Usually seedings made at this time result in stands of grass two to three inches high by freeze-up. Such stands make excellent growth the following season. When grasshoppers are present in large numbers or if the soil is very dry, it is advisable to withhold seeding until late fall, just prior to freeze-up. Grass seed placed in the soil in the late fall usually germinates early the following spring. As

crested wheatgrass germinates under cool conditions, this late fall seeded grass as well as early fall seeded grass generally gets full benefit from the early spring moisture. This is very important for the development of strong healthy seedlings before the midsummer drought. Seeding in the late fall is usually a successful practice, but if conditions are favourable for early fall seeding it is much preferable to seed at that time as nearly a year of growth is gained over late fall seeding. If for any reason seeding is not done in the fall, it is possible to secure good stands of grass by seeding in the early spring provided such seedings are completed by April 15.

Rate of Seeding.—The amount of seed to sow depends to some extent on the cover into which the grass is seeded. When seeding into grain stubble or annual weeds four to six pounds per acre in rows 12 inches apart produces a medium fine hay with fairly high yields. Somewhat higher yields are obtained from seedings of three pounds per acre in rows 24 inches to 36 inches apart, but the foliage is not so fine and desirable (Fig. 2). When seeding into perennial weeds, as shown in Fig. 1, it is necessary to seed heavier, usually ten pounds per acre, with every spout open.

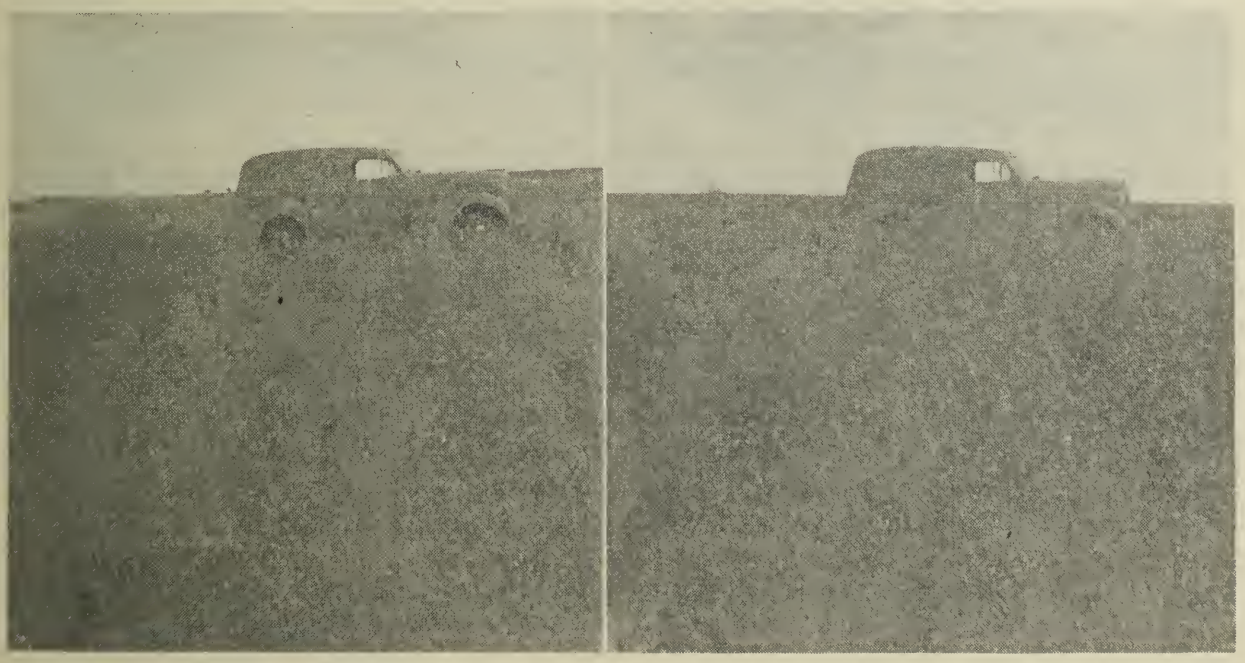

Fig. 2.—The highest yields of hay are obtained from the thinner stands of grass. Solid seedings at twelve pounds per acre result in stands that are thick and low growing, making ideal pasture. The recommended rate of seeding of five pounds per acre in rows 12 inches apart gives additional height and yield per acre.

MANAGEMENT

In the first year stand of crested wheatgrass, weed growth is often excessive, completely hiding the small grass seedlings. If left alone, the grass eventually develops sufficiently to crowd out the weeds. This process may be speeded up somewhat by clipping the weeds with a mower during the summer. By clipping high, sufficient weed stubble will be left to hold snow during the winter. To ensure the best quality hay the weed stubble should be removed from the field the following spring. This can best be done by raking.

A field of crested wheatgrass that is being maintained primarily for hay production should be protected from grazing at all times. The reason this is necessary is that this grass has an overwinter growth habit and that the yield of foliage is the cumulative growth since the previous cutting. Consequently the removal of the growth in the fall or spring is in reality the removal of part of the following hay crop. A good example of reduction of hay yield by

winter grazing was found on the Stanmore Regrassing Station. One-half of a 250-acre field at Stanmore was grazed during the winter of 1939-40 between December 9 and April 29. Although the grass showed no noticeable growth prior to April 29, grazing reduced the hay yield approximately 40 per cent.

Results of experiments on rates of seeding crested wheatgrass show that higher yields of hay are obtained from thinner stands (Fig. 2). In the past seeding has been much too heavy and as a result there are many fields that would yield a higher tonnage of hay if the stands were thinned. Any practice, such as a stroke with the one-way disk, to destroy about half of the stand tends to increase the yields.

CUTTING AND CURING

With very few grasses does time of cutting have so much effect on the quality of hay as it does with crested wheatgrass. This is due to the fact that crested wheatgrass matures very rapidly. To obtain hay of the highest quality, it is necessary to cut this grass between time of heading and flowering. Failure to cut at the proper stage results in hay of inferior quality. If cutting is delayed even a few days the hay becomes wiry and unpalatable. Many farmers have not appreciated this fact and are often dissatisfied with the quality of their crested wheatgrass hay. It is preferable to cut prematurely rather than to allow the hay to go past flowering. Therefore, on large acreages it is desirable to start cutting shortly after heading in order to have all of the grass cut by the time full flowering is reached.

Crested wheatgrass cures rapidly after cutting and to maintain high quality it should be stacked as soon as possible. To avoid bleaching it may be desirable to rake the grass into wind-rows to cure. During hot, dry summer weather crested wheatgrass can be stacked usually 24 to 36 hours after cutting.

STACKING

One of the most important considerations in the development of a feed reserve is proper stacking. For this reason a great deal of attention has been given to this phase of the program and the following remarks are presented as a guide to improve stacking on the prairies. The most essential feature in building a stack is to develop height. This is clearly illustrated in Fig. 3.

FIG. 3.—Rain and snow soaks into poorly made hay stacks, causing excessive rotting. In eight months there was a 40 to 50 per cent weather loss in the low narrow stack shown on the left, while there was no loss in the properly built stack on the right even after two years. Hay in well made stacks retains its feeding value for many years. Note how the layers in the stack at the right slope downward toward the outside, preventing water from entering the stack.

The stack at the left built about ten feet high shows weathering damage of 40 to 50 per cent of the total tonnage after eight months. The stack on the right, built about 30 feet high, shows no measurable loss from weathering after two years.

The stack illustrated in Fig. 3, right, was built with the aid of an inexpensive pole stacker and centre trip hay slings. In building it the following steps were followed:—

The stack was started 16 feet wide, the length of the hay rack used. This width was maintained to a height of 6 feet and then widened gradually to a maximum width of 19 feet at a height of 18 feet. The maximum width was maintained for another 6 feet and the stack was then rounded off to a finished height of about 30 feet. For convenience in topping, smaller sling loads were used. During the course of stacking the centre was always kept high and well packed. The cross section diagram of a hay stack shown in Fig. 4 illustrates the steps followed in building. The dotted line indicates the shape of the stack after settling. It will be noticed that after settling the overlap does not reach the ground.

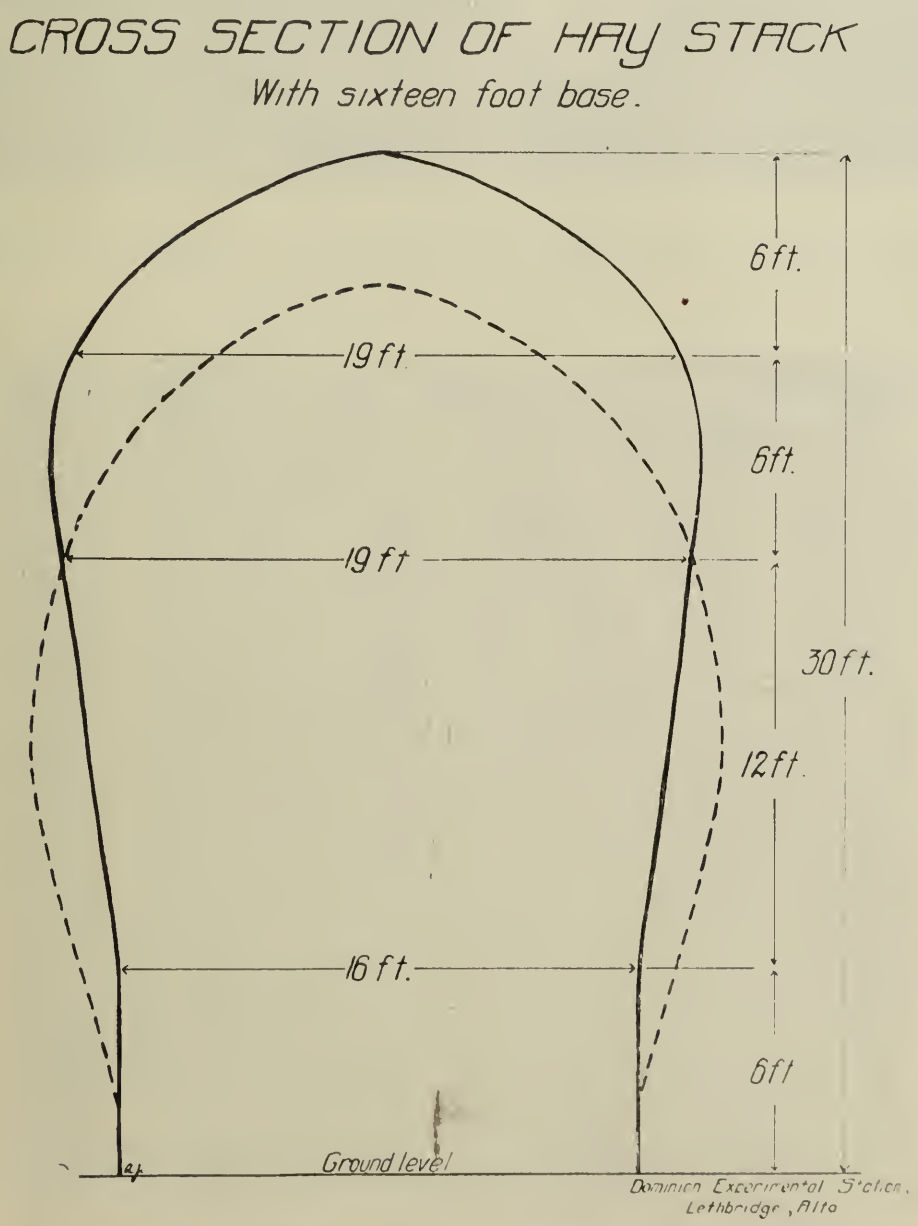

FIG. 4.—Diagram showing the shape of a stack built to withstand weathering. By keeping the centre of the stack high and well packed during building most of the settling is confined to the sides, resulting in a water-shedding thatch.

The stack shown in Fig. 5 was built in two sections each about 30 feet long, a convenient length when a pole stacker is used. After the first section was completed the stacker was moved 30 feet and the second section added. To prevent rain and snow entering the joint, the two sections were solidly butted together. This was facilitated by making the end of the first section slope slightly back from the bottom so that when that section was completed the base was about 6 feet longer than the top.

FIG. 5.—One man and his son using a pole stacker built this stack of 65 tons. The pole stacker will lift hay on slings from a hay rack, or when used with a buck rake or sweep it will pick up the sling loads from the ground.

FIG. 6.—Hay slings may be made of rope or light cable. The centre lock and end hooks can be purchased from local hardware merchants or they can be made in the farm blacksmith shop.

Often there is a lapse of time between the time of building the first and second sections resulting in unequal settling. If the first section has settled before the second one is added, the second is built to the original height of the first so that the top of the combined stack when fully settled will be level.

In choosing the location of the stack it is important to avoid water-courses and low places. Convenience in feeding and protection from fire by a suitable fire guard are other considerations. From the point of view of fire protection, it is not good policy to have all stacks crowded together in one group. Stacks should be protected from cattle by a good fence.

THE POLE STACKER

In choosing stacking equipment, of which there are several types capable of building a good stack, cheapness of construction is often of first importance. The pole stacker mentioned above is illustrated in Fig. 5 and a detailed plan is shown in Fig. 7. It can be constructed at a small cost by any farmer. The following is a list of materials used with suggestions for building this stacker.

1. The main pole is preferably a single pole, but two poles may be spliced to make a minimum height of 45 feet. The top of the pole should be not less than 5 inches in diameter.

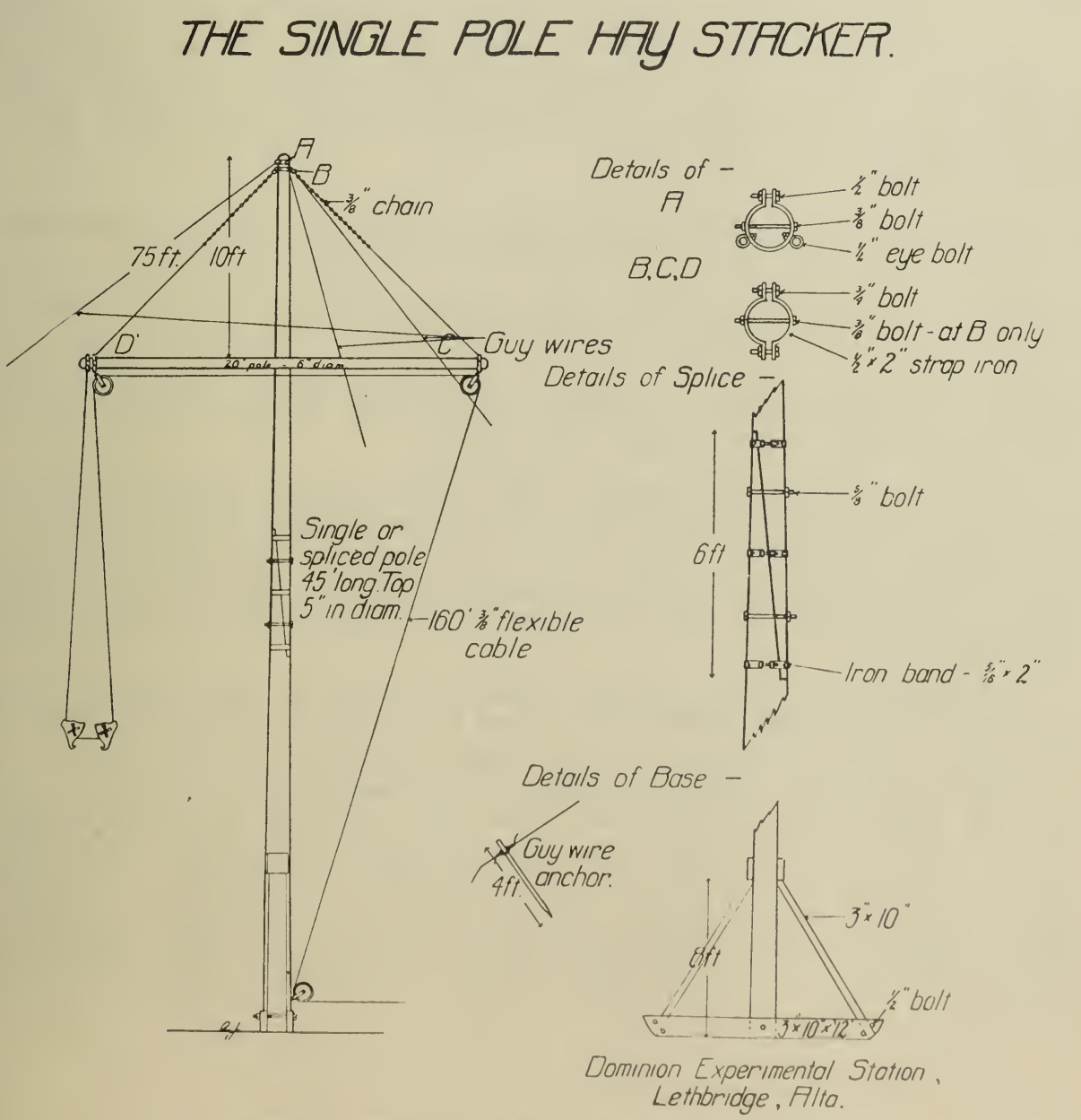

FIG. 7.—Diagram of the single pole stacker.

If two poles are spliced, a splice 6 feet long is necessary to give the required strength and rigidity. Care must be taken to match the ends as uniformly as possible. A recommended splice is described on the plan in Fig. 7.

2. The cross-arm is a 20-foot pole with an average diameter of about 6 inches and is suspended about 10 feet from the top of the main pole. In the diagram the cross-arm is shown in its normal position which is at right angles to the base. In this position hay is delivered on the stack. Because the cross-arm must make a half turn to take hay from a wagon or the ground it is suspended by two chains that wind around the top of the pole. As the sling load of hay is raised clear of the stack the chains unwind, the cross-arm returns to its normal position and the sling load is carried immediately over the stack. As shown on the diagram, the lower half of the suspending chains may be replaced by light cable or twisted wire of the same strength as the chain.

3. Three guy wires keep the pole upright. For a 45-foot pole guy wires are about 75 feet long. They must clear the chains suspending the cross-arm so that the cross-arm can operate freely under them. Three or four strands of No. 12 gauge galvanized wire twisted together make a good guy wire and ordinary two-strand smooth fencing wire is also satisfactory. One guy wire passes over the stack and at right angles to it. A substantial iron stake driven through a ring attached to the end of the guy wire makes a convenient anchor.

A truck or car is very helpful in making guy wires. The rear of the truck is jacked up and the wires are attached to spokes equidistant from each other. The other ends of the wires are attached to an object heavy enough to keep the wires taut. The truck is run in low gear and the wires twist into an excellent cable.

4. The base is made of 3-inch plank or stout poles. It may be necessary to drive iron stakes in the ground to keep the base from turning.

5. Three 8-inch heavy-duty cable pulleys and two binding pulleys are required, the latter being used in connection with the hay slings.

6. The top of the main pole and the ends of the cross-arm are fitted with iron clamps as shown. Wherever possible the tightening bolts are used for attaching guy wires, chains, and pulleys.

7. A three-eighth inch flexible cable 160 feet long is used to pull up the hay. This is long enough to pick up a loaded sling from the ground.

The cost of building a pole stacker varies greatly according to the availability of the materials required. Discarded telephone poles may be used if they are sound. Suitable chains and guy wires generally can be found around the farm.

The pulleys and cable can be bought through the local hardware store at a cost of about $25 to $30. The slings cost about $11 each, but necessary hardware can be bought or made and slings made up at a lower cost.

There are several ways of raising a pole stacker. The one that involves the least labour requires the use of a gin pole. If a pole is not available an extra high load of hay can be used. The principle is the same. The pull-up cable is passed over the load of hay, whereas with a gin pole the cable passes through a pulley at the top of the gin pole. To avoid strain at the splice on the stacker, the cable should be attached at or near the splice rather than the top of the pole. A truck, tractor, or team of horses can pull up the stacker.