

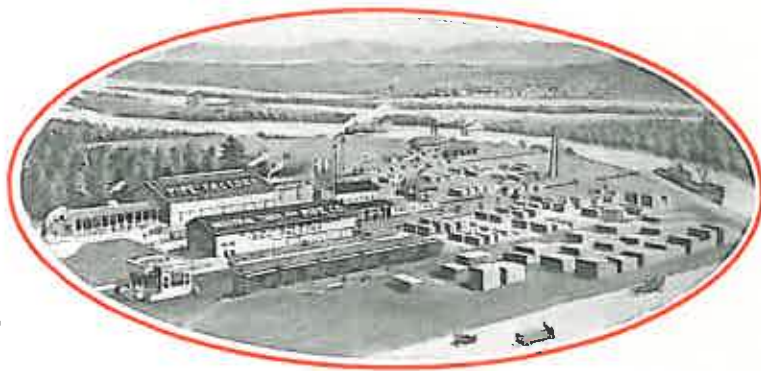


# MAKING SILAGE

BY  
RAY C. HANSEN

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*Birdseye view of our*  
12-ACRE TANK AND SILO FACTORY  
*at*  
KENTON STATION, PORTLAND, OREGON

**National Tank & Pipe Company**  
Portland, Oregon

# Some Facts about our Company

**O**UR ORGANIZATION is built upon integrity, of men that have spent the larger part of their lives for the betterment of our products. We are thoroughly familiar with the needs of the farmer and our silos are built from his point of view, for his greater convenience and to increase his money making ability.

The policy of the National Tank & Pipe Company is to continue to give everybody a good, fair and square deal in the future as we have done in the past, for the fruits of our integrity have paid us well. We have thirty years' experience behind our methods of manufacturing, which means that our products are past the experimental stage—they are thoroughly tried out and are a proven success.

Our factory which is located at Kenton Station, Portland, Oregon, is one of the largest and best equipped tank and silo factories in the United States. We are on the O. W. R. & N. line and have side tracks running right into our loading sheds. These, together with our splendid harbor facilities, enable us to ship anywhere to the best possible advantage of our customers.

We are situated in the heart of the world's largest lumber-producing territory in the Pacific Northwest, which gives us an inexhaustible supply of Douglas Fir—the World's best silo lumber.

We are in business not only for profit, but for the love of the game. Our ambition is to make silos so perfect in material and design that their longer life, greater convenience, and freedom from repair bills will win for them, and for us, the friendship and respect of that group of successful dairymen and stockmen who appreciate the fact that the best is the cheapest in the long run.



## ACKNOWLEDGMENT

**T**HE writer wishes to express his most grateful appreciation to the United States Department of Agriculture, the State College of Washington, the University of California and the Oregon Agricultural College, for the useful information which they have contributed from their experience in making and feeding silage.



# What Is a Silo?

In plain words, a Silo is a store-house and a fireless cooker for silage crops. The Silo is the cheapest building on the farm in which to store feed. Crops can be stored in a Silo cheaper than they can be stored in the barn as hay or dry feeds.

Through the chemical action which takes place inside of the Silo, the fibrous parts of fully matured crops are softened in about the same manner as they would be in a fireless cooker; thus it is possible to raise crops that produce from ten to thirty tons per acre, such as sunflowers and corn, which have large fibrous stalks, and change them into a palatable and succulent feed.

## What Crops Make the BEST Silage?

Silage can be made from almost any green crop, but of course, all silage crops are not adapted to every locality. Where corn does well and matures sufficiently for silage before frost, it should be grown, and where it cannot be grown successfully, some other crop should be substituted, such as sunflowers, oats, vetch, etc. With the information given below and some observation of the crops grown in his particular community, it will be easy for the Silo user, having as he does a knowledge of farming—to decide which is the most suitable crop to grow for silage.

### CORN

Where corn can be grown successfully it is considered the best, all round silage crop. It makes a very palatable silage with a good flavor, and if the corn is matured sufficiently and packed well in the silo, the silage will keep for years in good condition.

In parts of the United States where corn can be grown successfully, more food material can be obtained from an acre of corn than from an acre of any other silage crop that can be grown. However, in spite of these good points, corn silage does not make a perfect ration, as it is low in protein and mineral matter. It is advisable sometimes in filling the silo, to mix clover, alfalfa or cowpeas with the corn as this makes a balanced ration. These crops can be fed with corn silage as dry hay however, and will produce the same results.

### ERECTED HIS SECOND CYCLONE SILO



I wish to say that my Cyclone Silos have given me first-class service. I erected my first 10x32 Cyclone Silo in 1918 and have never had to tighten or loosen the hoops once and I don't expect that I ever will. This silo proved so satisfactory that I erected another one just like it this year.—  
HARRY L. ROBINSON, *Beaumont, Orr*

(5)



WM. E. HAMPTON  
President



F. M. KIRSCH  
Vice President and Manager



L. E. LONG  
Secretary and Sales Manager



RAY C. HANSEN  
Manager Silo Department



J. M. JOHNSON  
Manager Lumber Department

## VARIETY OF CORN TO PLANT

In planting corn select a variety that will mature sufficiently for silage before frost. There is a steady increase in all nutrients of the corn crop up to maturity, therefore, it is obvious that if the corn is well matured, we get a larger amount of food material from the crop. In any locality the variety commonly raised for grain is ordinarily the most satisfactory for a silage crop.

## THE CYCLONE MAKES FIRST-CLASS SILAGE



After a thorough investigation of the different makes of silos I decided to erect a Cyclone and I am mighty glad that I did. I never have had to tighten or loosen the hoops. The doors work as smooth and easily as the doors in my house. My Cyclone Silo makes first-class silage—no sour or spoiled silage.—H. W. HORNBY, Portland, Oregon.

## METHOD OF PLANTING

Where the land is fairly free from weeds and there is considerable moisture, corn for silage can be planted six to eight inches apart in rows about three feet six inches apart. However, this method of planting is not recommended on weedy land, or in localities where there is but a small amount of rain fall. The best method of planting under ordinary circumstances is to plant and cultivate the silage crop the same as if it were for grain. Over sixty percent of the digestible food materials present in the corn plant are found in the ears, less than forty per cent in the stover, therefore, it is advantageous to plant the corn so as to develop large plump ears.

## TIME TO HARVEST

Corn should be well matured before it is cut for silage. Ordinarily corn for silage should be cut about ten days before it would be cut for shocking. When about 75 per cent of the kernels are hardened so that no milk can be squeezed out and about 90 per cent of the kernels are dented, the corn has reached the stage where it contains the full amount of food materials.

Corn should be moist enough so that it will pack well in the silo. If there is not enough moisture in the corn at this state of maturity, water should be added. (See page 9.)

## FROSTED CORN

Frost does not spoil corn when it is to be used for silage, in fact, if the corn is immature it helps to get rid of the surplus juice in the leaves and stalks, which if put in the silo, would make sour silage. However, corn should be cut as soon as possible after it has been frosted; if not, there will be a big loss in the leaves that dry up and fall off in handling.

## SORGHUMS

Sudan grass, Milo Maize, Fetoria, etc., all make good silage crops. These crops should be well matured before they are harvested. Owing to their high sugar content, if they are cut earlier, a silage with a high acid content is produced. There is little difference in feeding value between sorghum and corn silage. Where rainfall is uncertain, it is advisable to raise both corn and sorghum for silage.

## LEGUMES

Legumes include cowpeas, clover, alfalfa, soy beans, vetches, all of such forage crops make a good grade of silage, but they are low in sugar content and for that reason where it is possible it is advisable to mix them with corn or sorghums when filling the silo—thus make a silage that is nearly a perfect ration.

## OATS AND VETCH AS A SILAGE CROP

Oats and vetch justifies special mention here as it has proven to be a very good crop to raise for summer silage. In sections of the country where climatic conditions permit it, this crop should be planted in the fall and harvested in the early summer, so that a crop of corn can be grown on the same ground for winter silage. This provides a succulent feed for the stock when the pastures are dried up in the summer months.

## PEA VINES

Pea vines make about the same quality of silage as corn. They are a little richer in protein, but contain about the same amount of digestible nutrients. Pea vines are usually secured from canning factories at a small cost and therefore make a very profitable silage. Pea vine silage is rather laxative and should be fed with care.

## SUNFLOWERS

Sunflowers have greatly increased in favor during recent years and are now considered one of the leading silage crops, especially in sections where frost comes too early to permit corn to mature. Sunflowers produce a somewhat larger tonnage per acre, but the amount of digestible food materials per acre is practically the same as corn.

Sunflowers are planted and cultivated in about the same manner as corn, and do well on the same soil. However, they will stand more frost and drought and are therefore a very good crop where the season is short and the weather cool. Sunflowers have proven very satisfactory in Eastern Oregon, where sunflower silage is used extensively for fattening steers and wintering beef cattle, and also for dairy cows.

## RAPE

Rape makes a fair quality of silage if harvested when nearly mature, but still succulent. Rape mixed with corn, legumes, or straw makes good silage. Legumes and Rape mix well together as rape contains sugar which is lacking in legumes.

## IT TAKES A GOOD SIRE AND A GOOD SILO TO GET BIG PROFIT FROM YOUR HERD



I erected my Cyclone Silo in 1920 and it has given me first-class service. I have never had to tighten the hoops and don't believe I ever will. My Cyclone Silo makes first-class silage. I am well pleased with it.

Yours very truly,  
A. J. SCHULTZ, Tigard, Oregon

## AMOUNT OF MOISTURE REQUIRED

The majority of failures in making silage the first time in a good silo, result from the mistaken idea that because silage is green feed or succulent, the greener it is put into the silo the better. This is absolutely wrong. The time to cut any crop for silage—regardless of what it is—is at the stage when it contains its greatest number of feed nutrients; this would mean in any case, with any silage crop, when it has at least approached a stage of ripeness. Corn at the right stage will have the lower leaves dried up, the ears thoroughly glazed and well denting. Allowed to remain standing until this stage is reached may result in some localities in its being caught by early frosts, and in, in any event, liable to result in the crop having insufficient amount of moisture left in the plant to make good silage, or pack well. Do not allow this to worry you. It may be a desirable thing to have this condition exist, because the moisture the plant has become rid of is sap, and too much sap makes an excessively sour, acid silage. In such cases it is necessary to supply the required moisture. Do this preferably by letting about a half-inch stream of water from your hose run right into your cutter so that the moisture will be thoroughly mixed with the cut stuff and blown into the silo with the silage. Running the water directly into the silo is liable to result in its running around large chunks of silage and causing them to fire and mold for lack of moisture and because of not being able to pack the dry mass close and tight. Do not be too sparing with the addition of water. Endeavor to get enough moisture in the silage so that it will pack closely in the silo. The moisture content should not fall below 65 per cent or exceed 75 per cent. A good grade of silage will be produced if you have a first-class wood stave silo and hold the moisture content of your silage to about 70 per cent. In case of ensiling corn fodder that has been dried in the shock, after the first filling has been fed out, the rule is to add as much water by weight as the dry fodder.

In such crops as Clover or Alfalfa it is advisable to let them get fully as ripe or a little ripier, than if you were going to make them into hay, letting them wilt before making into silage, and then adding water to supply the necessary moisture. These crops so handled will make a much better quality of silage than if siloed too green or too soon after harvesting.

Set the cutter so the knives will cut short lengths. The shorter the better. Never longer than one-half inch lengths. Quarter-inch lengths are much better. These short lengths will mean that it will take a little longer time to fill the silo as the machine will put it in a little slower, but this extra time will be well repaid in the better quality of silage produced. It will also pack closer, settle better, and better exclude the air.

## TRAMPING THE SILAGE

The most important job on the place when the silo is being filled is inside the silo, so that one may see that the silage is thoroughly and well tramped and has sufficient moisture in it. Three men inside the silo, even in one no larger than 12 feet in diameter, is none too many if this job is thoroughly, rapidly and well done. By all means use an inside filler pipe. Let one man carry this around on his shoulder, distributing the cut stuff and tramping as he goes. He should be instructed to keep the edges next the wall slightly higher than the center. The other two men should follow tramping thoroughly and constantly next to, and toward, the walls. The center need not be as thoroughly tramped as next the walls, where friction of the wall will tend to prevent settling. This job, if rightly done, is hard disagreeable work and it behooves the owner to see that the men are kept traveling constantly and doing the work right. Regardless of the wisdom of the help inside the silo who may have "filled hundreds of silos and never saw this done before," see that strict attention is paid to having it done this way. You will find it time and money well spent. The inside filler pipe allows the even and perfect distribution of the cut material, and, at whatever point you want it. The work is almost unbearable inside the silo where the wet material is violently blown all over the occupants. This is avoided by use of the inside pipe.

Hollow stem crops require, of course, even more thorough packing than corn in order to get the air out of them.

If you do not have some cheap refuse clove at hand to run through the cutter to top off with, such as weeds, sough grass, barn floor sweepings, chaff or straw, then remove the ears from the last few loads of corn and top off with it. Nothing will then be lost except the fodder. Wet the surface of the top down thoroughly and tramp it well then; also, tramp thoroughly several times later, during the first week or ten days. In this way

## MISCELLANEOUS CROPS

Apple pomace, Russian thistle, beet pulp and corn husks from canning factories all make silage, but not such quality as other crops. However, as they are obtained at a low cost, they are sometimes very profitable.

## How to Fill the Silo

Where running water is available it is advisable to take a hose and thoroughly wash down the inside walls of your silo. This will prevent absorption of the juices by the dry lumber in the walls. Lack of moisture or excessive drying out of silage causes mold and prevents too, its proper settling. It cleanses the walls of any old mold clinging thereto and which, if present, would affect the new silage. Allow the water in the bottom of the saucer shaped concrete foundation to remain there until just before you begin filling, when, bail it all out. Then put a filler of elastic silo seal, pitch, asphaltic cement, or clay inside the silo on top of the concrete foundation at the bottom out excessively between the bottom of the staves and the top of the concrete foundation.

Close your silo doors one or two at a time as your work of filling progresses. Before doing this put a small ribbon of the Elastic Silo Seal (we send a can for this purpose with each silo) entirely around the door where it bears against the jambs and the wood cross bar on the inside, so that if the grain of the wood raises after planing it will not result in a little air channel causing some spoiled silage.

Carbon dioxide, a poisonous gas, heavier than air, may form in the silo at the time of filling, and for a week afterwards. Running the cutter a few minutes before entering the silo together with the falling silage stirs up enough air currents to drive out the gas through the open doors above the silage. Because the gas is heavier than air, and flows out as water would, it is advisable to close the doors one or two at a time as filling progresses and occasion demands. Asphyxiation is said to have occurred in a few isolated cases from this cause in above-ground silos and with some frequency in below-ground or pit silos.

## WELL PLEASED WITH HIS IRONCLAD SILO



I am glad to say that my 10x30 Ironclad Silo is giving first-class service. I am well pleased with it.—GEORGE F. DAVIS, Beaverton, Oregon

## Making Silage

an almost impervious layer of rotted silage will form on top and only a few inches will be spoiled. This crust should not be broken until feeding commences, when the top layer of spoiled silage should be removed and discarded.

When the silo stands empty, if the saucer shaped foundation on the inside happens to be full of juices or water, well and good, if not, and convenient, place water in it. Its gradual evaporation and the humidity inside the empty silo will keep the staves from drying out excessively on the inside.

### MOULDY SILAGE

Do not feed mouldy or sour silage. Cows will eat it, but should never be given an opportunity to do so for it will do them more harm than good. Horses and sheep must never be fed mouldy or frozen silage. There is no necessity of having mouldy silage if you have a good silo and use the proper care in making the silage. Silage that is sour and mouldy is worthless, therefore, be sure that you get a first-class round wood stave silo and you will always have the best grade of silage.

### FEEDING SILAGE

No rough feed is more palatable than good corn silage. Sometimes, however, a dairy cow will not eat a full ration of silage until she has acquired a taste for it which may require a week to ten days. In this case start her on about a half ration and gradually increase it with each feeding until reaching a full ration. Palatability of feed is of great importance as it induces a large consumption and stimulates the secretion of digestive juices.

### SILAGE RATIONS

The following are some good dairy cow rations. The quantities are based on feed for one cow for one day—morning and evening.

Corn Silage	No. 1	No. 2	
Alfalfa or clover hay	40 lbs.	Corn silage	40 lbs.
Rollod oats	9-12 lbs.	Clover or alfalfa hay	9-12 lbs.
Bran	3	Rollod barley	4-5 lbs.
Cottonseed or soy bean meal	1 lb.	Oil meal	1 lb.

### THE BEST PROVES TO BE THE CHEAPEST



After having experience with an inferior make of silo, we decided to erect a Cyclone, and we want to say that it is a money maker. We have never had any trouble with it so far, and don't expect to. We like the Cyclone Silo line.  
—Fred Ross, Pancouver, Washington.

## Making Silage

Vetch silage	No. 3	Alfalfa silage	No. 5
Clover or alfalfa hay	35 lbs.	Oat or vetch hay	9-12 lbs.
Bran or cornmeal	9-12 lbs.	Corn meal	3-4 lbs.
Rollod oats	4-5 lbs.	Molasses beet pulp	2 lbs.
Soy bean or cottonseed meal	1 lb.	Glutin feed	1 lb.
Clover silage	No. 4	Artichoke (tops) silage	No. 6
Oat or vetch hay	35 lbs.	Alfalfa or clover hay	40 lbs.
Rollod oats or barley	9-12 lbs.	Bran or rolled barley	4-5 lbs.
Bran	3-4 lbs.	Oil meal	1 lb.
Soy bean or cottonseed meal	2 lbs.		

Remember that each animal is an individual, and the rations given above will probably not meet the requirements of every cow in the herd. Some may have to be fed according to their individual needs. The rations given above are for rather large cows giving low per cent milk; smaller cows giving high per cent milk will probably require less dry matter and a narrower ration.

### THE FARM IS NOT COMPLETE WITHOUT GOOD SILOS

Modern farming is on a competitive basis. The farmer whose cost of production is the lowest, makes the profit and fixes the market prices to a great extent. In order to market farm products we must compete in price and quality of products with farmers who are producing on a modern basis and unless we have up-to-the-minute equipment there will not be a difference enough between our cost of production and selling price to make a decent profit, if any at all.

The Silo is a part of the equipment of the Modern Dairy Farm of today and the most important part. If the one-half million Silos in use today, were taken off from the Dairy Farms in the United States, the price of the butter fat would raise from twenty-five to fifty per cent immediately. The Silo reduces the cost of producing butter fat and meat to such an extent that it will be impossible for any farmer to stay in the business very long, unless his farm is equipped with first-class Silo equipment.

A dairy or stock farm today looks lost without a Silo, because it is not complete and in the near future, the few farmers who do not believe in silage, will be crowded out of the field entirely.

### WHY THE WOOD STAVE SILO IS THE CORRECT TYPE

The Wood Stave Silo is universally accepted by leading authorities on silo construction as being the best. There are other types of Silos on the market, many of them being square or six and eight-cornered. These have all been tried out, some producing fair results, others poor results and several of them failing entirely.

A Silo must have a smooth perpendicular wall, and must be rigid enough so that it will stand straight and true. Unless the Silo is perfectly round, these features—which are necessary in making first-class silage—cannot be obtained to any degree of satisfaction.

Wood stave silos, are considered the standard type of construction today and it will be only a matter of a short time until they will be used exclusively throughout the United States.

### WHAT WILL A SILO DO?

The Silo will solve your feeding problems. When it is possible to raise crops for Silage which produce four or five times as much per acre as the crops grown for hay, it is obvious that more stock can be kept on the farm and the costs per pound of butter fat and meat will be greatly reduced.

The Silo will provide succulent feed for your stock throughout the year, in the summer as well as in the winter.

## HOW MUCH MONEY WILL THE SILO MAKE FOR ITS OWNER?

A Silo will increase the net profit of your farm from twenty-five to fifty per cent. This increase in profit is due to the fact that you can produce four to five times as much tonnage of crops per acre for silage as can be produced for hay. This silage will increase the milk yield of your cows and keep them in better condition physically. This brings your cost of production down to where it leaves a good margin of profit.

An acre of corn put in the Silo will produce feed equal in value to about five acres of good pasture, and will do your cows more good as they can be fed a balanced ration of good succulent feed the year round.

## HOW A SILO IMPROVES THE VALUE OF A FARM

The value of a farm is usually judged by its general appearance, the money it makes for its owner and its location.

We agree that a silo has nothing to do with the location of the farm, but it is a known fact that a silo will increase the earning capacity of the farm and it is also agreed that a good wood stave silo is usually the most attractive structure on the farm, and adds a business touch to its general appearance.

A silo makes your farm look modern and proves that it is modern by the money it earns. A silo will increase the selling value of your farm several times the amount of its investment.

## LOCATION OF THE SILO

Where it is possible the silo should be located just a few feet from the barn, and as near as possible in line with the feeding space in front of the mangers. The space between the silo and the barn should be inclosed so as to make a place to take care of the silage when it is thrown out of the silo. A door should be provided for the entrance to this silage room so that it can be closed at milking time, keeping the silage odors out of the barn.

A little forethought in planning the arrangement of your dairy will save many unnecessary steps when making and feeding the silage.

## Foundations for Silos —How to Build Them

The foundation carries the entire weight of the silo and its contents, therefore, the construction of it should receive careful attention. This is not a complicated task, in fact it is usually done by the regular farm hands.

### MARKING OFF THE FOUNDATION

Clear off and smooth the surface of the ground where the silo is to stand. Drive a stake firmly in the ground at the center of the foundation site. Saw off this stake at the height desired for the foundation wall, this should be about one foot above the surface of the ground.

The foundation wall should be one foot thick, therefore, make two circles on the ground, one marking the inside and one the outside of the foundation wall. In making the marker shown in Figure No. 1, take a piece of 2x4, nail one end to the stake with a 40-penny spike, this marks the exact center for the foundation. Measure out on the 2x4

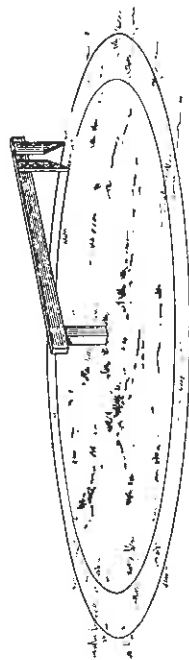


Figure No. 1

one-half the diameter of the silo, this will be the center of the foundation wall. From this point measure six inches each way to get the point where the foundation marks should be. Nail two pieces of 1x4 on the 2x4 as shown in Figure No. 1 and the marker is complete.

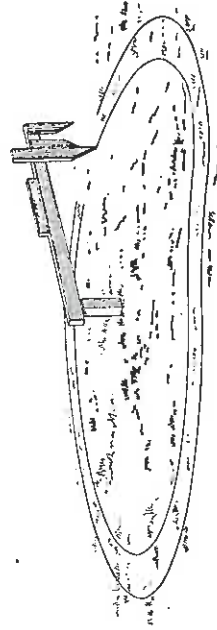


Figure No. 2

Where the ground is sloping the markers can be lengthened by holding a longer piece of 1x4 against either marker, moving it up and down to keep it touching the ground, but care must be taken that the 2x4 is held level. Use a spirit level as shown in Figure No. 2.

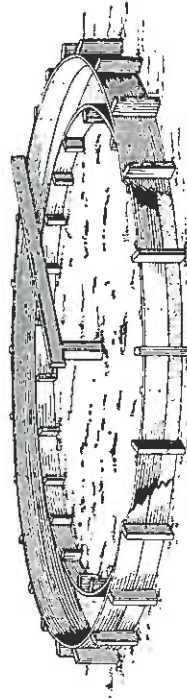


Figure No. 3

### FORMS

The forms for the foundation walls should be built before any excavating is done. The inside form should be four inches lower than the outside. These forms should be made of green or wet lumber  $\frac{1}{2}$ -inch or not more than  $\frac{1}{2}$ -inch thick. The stakes should be 2x4, or any size which you have on hand—these should be driven firmly in the ground and the outside stakes should be sawed off flush with the bottom of the 2x4 marker when held level. The inside stakes should be sawed off four inches below the bottom of the 2x4 marker, as shown in Figure 3.



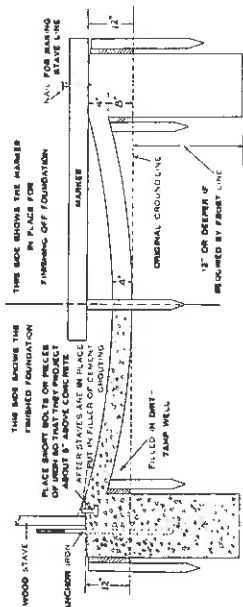


Figure No. 4

After the forms are in place dig out the trench between them down to hard ground and below the frost line. (It is important to get below the frost line; if not, the freezing of the soil will let the foundation settle and throw the silo out of line.) Fill in the center of the foundation from the center stake to the top of the inside form board with loose dirt, soak down with water and pack well. See Figure No. 4.

**ANCHOR IRONS FOR BRACING SYSTEM**

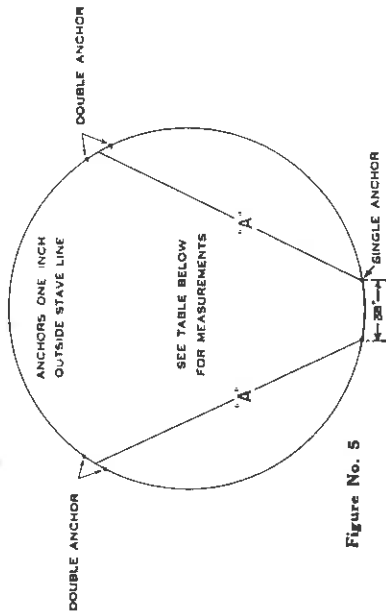


Figure No. 5

The forms are now ready for the concrete, but before pouring the concrete the anchor irons for the bracing system are to be set in place. These anchors should be just outside of the stave line, that is, about one-inch outside the center of the foundation wall. The two single anchors are placed one on each side of the door frame, and the two double anchors placed as shown in Figure No. 5. The distance at which these double anchors are to be set apart are given in the table below. An inch or two variation in these distances does not matter provided the anchors are set outside of the stave line.

Diameter of Silo	Distance Between Door Front	"A" Distance Between Anchor Centers
6 feet	38 inches	5 feet 3 inches
8 feet	38 inches	6 feet 3 inches
10 feet	38 inches	8 feet 0 inches
12 feet	38 inches	9 feet 9 inches
14 feet	38 inches	11 feet 6 inches
16 feet	38 inches	13 feet 3 inches
18 feet	38 inches	15 feet 0 inches
20 feet	38 inches	16 feet 9 inches

These anchor irons should be held firmly in place while the concrete is being poured. This can be accomplished by nailing a cleat across the form as shown in Figure No. 6. These anchors are the same on all three of our silos, the "Cyclone," "Iron Clad" and "Atlas."

**CONCRETE**

The following table gives the quantity of sand, gravel and cement required for the foundation of each diameter of silo.

Diameter of Silo	Barrels Cement 4 Sacks to Barrel	Cubic Yards Sand or Gravel	Cubic Yards Sand
6 feet	1 3/4	1 1/2	3/5
8 feet	2 1/4	2	3/4
10 feet	3	2 1/2	1-
12 feet	3 1/2	3	1-1/2
14 feet	4 1/4	4	1-3/4
16 feet	5 1/4	5	2-
18 feet	6 1/2	6 1/2	2-1/4
20 feet	7 1/2	7 1/2	2-3/4

These quantities are based on a mixture of one part cement, 2 1/2 parts sand, 5 parts stone or clean gravel, for a foundation 24 inches deep. Great care should be taken to see that the sand and gravel is clean, if it is not clean, it should be washed, so that it will be free from foreign matter that will prevent the cement from sticking to it.

The concrete should be mixed on a platform made of a few pieces of lumber laid closely together so that they will be as near water tight as possible. This platform should be close to the foundation so that the concrete can be shoveled directly into the forms.

**POURING THE CONCRETE**

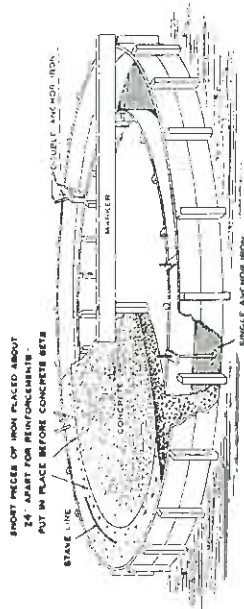


Figure No. 6

The concrete should be placed in the forms as soon as it has been properly mixed. It should be distributed around the form equally, tamping well so the water will work to the top. When the forms are filled up to the top, fill in the center, making a saucer shaped floor about four inches thick, as shown in Figure 6.

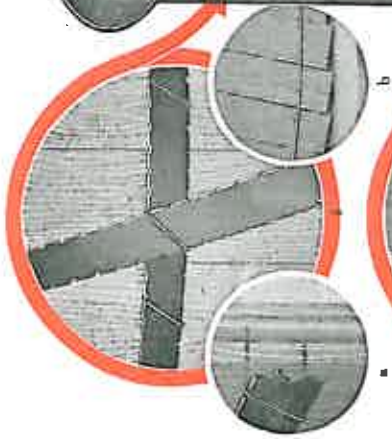
In erecting the staves in the silo it will be well to place them about one-half inch outside of this stave line, as this line marks the outside of the silo after the staves are drawn in place by the hoops. See Figure No. 4.

After pouring the concrete and before it becomes set, and at intervals of two feet around the inside circumference of the silo, at a distance of three inches inside the stave line (See Figure No. 4); place short bolts or pieces of iron about six inches long so that they extend not over two or three inches above the concrete foundation. Old horseshoes can be used, but place the prongs or heels up.

Finish off the last inch of the foundation with a mixture of one part of cement and three parts of sand and make it level with the 2x4 marker used in laying off the founda-

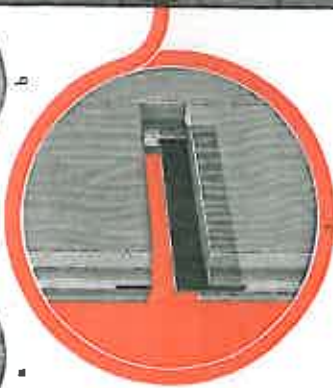
### Hoops and Braces

1. Showing how Cyclone hoops, braces and staples permit neatly maintain staves in position. (a) Staples go almost, but not quite, through staves. (b) Cyclone staves cannot lean, consequently this does not happen to them.



### Stave Joints

2. The metal spline is embedded in all two-piece staves. It makes an airtight joint. Note how the joints "break."



### Anchors

3. How it is scientifically anchored to its concrete base. It cannot be pushed or blown over without taking the concrete base with it.



### Door Locks

4. The lock is adjustable, giving individual tension at each of the four corners. (a) Lock closed.



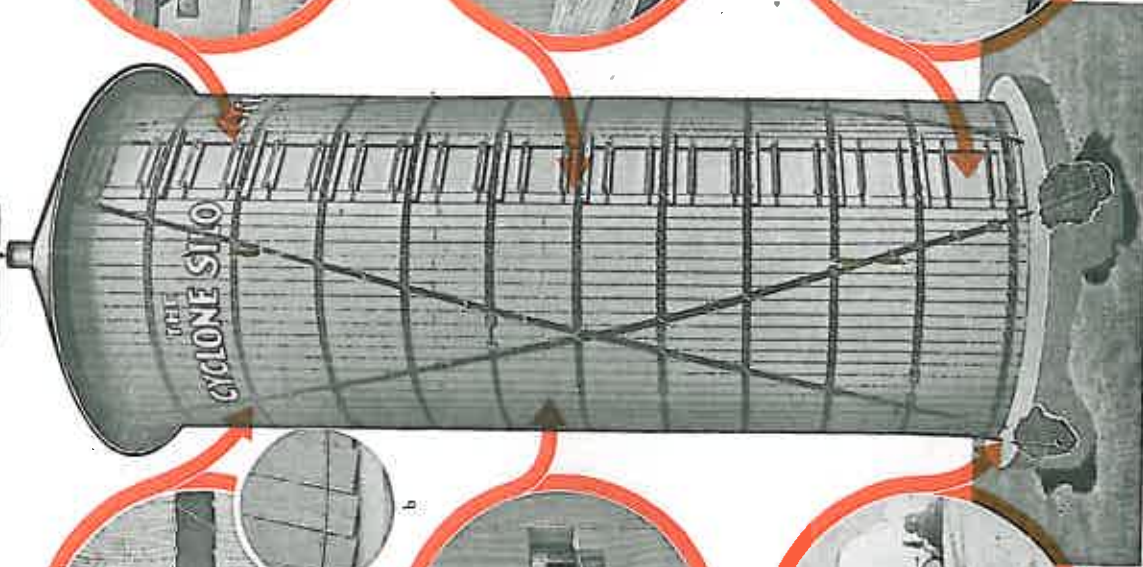
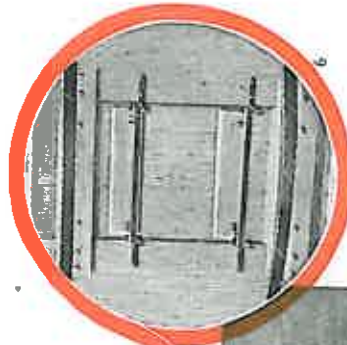
### Door Hinges

5. Showing the strong, simple Cyclone hinges. No complicated parts.



### Doors

6. Cyclone doors are easy to open and close. The lock bar also forms the step of the ladder.



tion. After the concrete has set, but is not quite dry, drive a spike through the 2x4 marker, at the center of the foundation wall and make a mark around the top of the foundation. This will be the stave line.

After the staves are in place and the hoops tightened, place a filler of cement grouting, or a rich mixture of cement and sand, around the inside of the silo, covering the short pieces of bolts, iron or horseshoes and taper the cement filler towards the inside edge of the concrete foundation. This filler serves as a seal to fill the uneven parts of the foundation next to the bottom of the staves, and also prevents the staves from being pushed inwardly. The filler and bolt arrangement also holds the base of the silo more rigidly to the foundation.

**ERECTING A 'NATIONAL' SILO**

Erecting a "National" silo is a very simple task, as every piece of lumber is milled to a perfect form so that it slips together with ease. We have prepared a full set of instructions for erecting silos which we furnish to every purchaser of a "National" silo. These instructions cover the subject thoroughly and are so complete that you will need no further instructions in order to erect your "National" silo complete.

Farmers have been erecting their own "National" silos for years and we rarely have a request for information other than that contained in our set of instructions, but when we do, we give the necessary information to the farmer immediately and we stay with him until his silo is up in first class condition and is earning money for him. We are never satisfied with a sale until the silo is erected complete and the user is satisfied and really feels that he has made a good, profitable investment.

**PAINTING THE SILO**

Paint is a wood preservative and therefore adds to the life of a silo. Every silo should be painted on the outside and it is better to do this before the silo is erected, so that you will have a coat of paint on the wood under the steel bands. All metal parts on the cyclone silo are painted by us before they are packed for shipment at our factory. These metal parts are painted with a specially prepared black paint that will adhere to steel and if the staves are painted a different color it will give the silo a finished appearance.

**TO ASCERTAIN SIZE OF SILO REQUIRED**

Multiply the daily quantity of silage each animal will require by the number of head you will feed and add all these amounts together, which give you the total number of pounds required for one day's feed. Multiply this amount by the number of days you will feed. This will give you the total number of pounds required for your entire feeding period. Divide this by two thousand (one ton), and the result will be the size silo you require in tons to feed your stock the number of days you will desire to feed silage.

Example: 20 cows, average, say 40 lbs. daily ..... 800 lbs.  
 6 steers " " 30 " " ..... 180 " "  
 6 calves " " 20 " " ..... 120 " "  
 4 horses " " 10 " " ..... 40 " "  
 12 hogs " " 5 " " ..... 60 " "  
 15 sheep " " 4 " " ..... 60 " "  
 22 lambs " " 2 1/2 " " ..... 55 " "  
 120 chickens, 15 lbs., per 100 fowls ..... 18 " "  
 Average daily feed ..... 1,333 lbs.  
 Times days you will feed (say) ..... 180  
 Total feed for period ..... 240,000 lbs.  
 Divided by 2000 lbs. (1 ton) size silo required, in tons.....120

Refer to table of sizes and capacities on next page, which will indicate 14x24 to be the proper size in this case, and one of excellent proportions. If it is intended, however, to increase the herd at a later date, then a larger size should be selected.

**SILLO SIZES AND OTHER USEFUL INFORMATION**

The silo should be just large enough in diameter so the stock to be fed will use at least two inches from the entire surface each day and tall enough so that it will hold enough silage to last through the period which you wish to feed. (This is usually six months).

Taking everything into consideration we consider the first group of sizes the most practical for herds shown:

Diameter feet	Height feet	*No. of Cows	Estimated Tons Capacity	Approximate acres to fill, based on 10 tons per acre	Approximate Weight
8	24	5	22 to 23	2 1/2	3867 lbs.
8	26	6	24 to 25	2 3/4	4170 lbs.
8	28	7	25 to 28	3	4467 lbs.
10	26	8 to 11	38 to 40	4	5125 lbs.
10	28	9 to 12	42 to 44	4 1/2	5489 lbs.
10	30	10 to 13	46 to 48	5	5851 lbs.
12	30	13 to 20	67 to 75	7 1/2	7028 lbs.
12	32	16 to 23	74 to 84	8 1/2	7464 lbs.
12	34	19 to 26	80 to 94	9 1/2	7852 lbs.
12	36	21 to 28	87 to 105	10 1/2	8285 lbs.
14	32	22 to 31	100 to 110	11	8546 lbs.
14	34	24 to 33	109 to 120	12	8984 lbs.
14	36	27 to 36	119 to 130	13	9479 lbs.
16	34	28 to 39	137 to 142	14 1/2	10189 lbs.
16	36	31 to 43	150 to 155	15 1/2	10738 lbs.
16	38	34 to 47	165 to 169	17	11296 lbs.
18	36	36 to 53	190 to 196	20	12141 lbs.
18	38	40 to 59	205 to 212	21 1/2	12759 lbs.
18	40	42 to 64	224 to 229	23	13309 lbs.

\*The larger number of stock shown will feed out the contents in 180 days based on feeding 40 lbs. per animal per day and highest rated capacity.

Minimum number of cows required to feed a sufficient amount of silage off the surface of different size diameters to prevent spoilage. Based on 40 pounds per day, per animal, and well packed good silage.

Diameter, feet..... 8 10 12 14 16 18 20  
 No. Cows..... 4 6 11 15 20 30 46

We also supply the following sizes:

Diameter feet	Height feet	*No. of Cows	Estimated Tons Capacity	Approximate acres to fill, based on 10 tons per acre	Approximate Weight
8	20	4 to 5	18 to 19	2	3292 lbs.
10	24	7 to 10	34 to 36	3 3/4	4781 lbs.
10	32	10 to 14	51 to 53	5 1/4	6217 lbs.
12	24	11 to 15	49 to 55	5 1/2	5747 lbs.
12	26	12 to 16	55 to 60	6	6160 lbs.
12	28	13 to 18	61 to 66	6 3/4	6594 lbs.
14	28	17 to 25	82 to 90	9	7562 lbs.
14	30	20 to 28	92 to 100	10	8054 lbs.
16	30	22 to 33	115 to 120	12	9138 lbs.
16	32	24 to 36	125 to 130	13	9694 lbs.
18	32	31 to 45	157 to 162	16 1/4	10968 lbs.
18	34	34 to 49	170 to 175	17 1/2	11518 lbs.

Other sizes, if required, furnished on special orders.

## WHY WOOD STAVE SILOS MAKE BETTER SILAGE

Wood—and preferably Douglas Fir—is the best, if not the only material of which to make a Silo that will produce first class silage. Wood is a non-conductor of heat and Silo walls made of this material, unlike concrete or stone, hold a more even temperature through the silo.

The inside of a first-class wood stave silo is perfectly smooth, which insures an even settling of the silage—this together with the even temperature in the silo is very essential to the fermentation of lactic and acetic acids of the silage in the proper proportions.

The temperature of silage must be kept up to 75 or 80 degrees Fahrenheit to get the best results and if the walls of the silo are made of a material which is a conductor of heat, the silage next to the wall will get chilled and spoil. This is the reason why wood stave silos are so highly recommended by agricultural authorities.

## THE IMPORTANCE OF SELECTING THE RIGHT SILO

It is very important to get a first-class silo to start in with. Many farmers are carried away by the statement made by some unexperienced person that "One Silo is just as good as another," and that "any Silo that will stand up will make good silage." These statements are misleading and have caused many farmers to say they do not believe in silage, just because they had some poorly constructed silo that made sour silage and failed to stand up.

A first-class silo should be ROUND with perpendicular walls to permit the silage to settle properly. The walls should be air-tight and capable of retaining the heat and moisture in the silage. And most of all, the silo should be so hooped and braced that it will stand up under all climatic conditions without undue cost of repairs to the owner.

## FIRST COST ONLY ONE POINT TO CONSIDER

The first cost of your silo should not be given too much consideration, for it is impossible to get something for nothing. The cost of a silo is small compared with the service that it gives you, and if the silo is for a permanent installation, the best is the cheapest in the long run because it will last longer. Furthermore, here is another pure dollars and cents reason for buying the best silo: Spoiled silage is worthless except for fertilizer—good sweet silage is worth at least \$2.00 more per ton than sour or partly spoiled silage made in a defective silo; now on a 100-ton silo this would amount to about \$200, which is more than the difference in cost of a first class wood stave silo and one of the cheaper makes.

Every dollar spent in a first-class silo adds several dollars to the value of your farm.

## THE IRONCLAD IS THE BEST ROUND HOOP SILO ON THE MARKET

I erected my 14x30 Ironclad Silo in 1921 and it is standing up perfectly straight and is making mighty good silage. I have never had any trouble with my Ironclad Silo. I can honestly recommend the Ironclad to any of my friends wanting a moderate price silo.

—LAWRENCE CATTLE CO., Poloma, Oregon.



# NATIONALS SILOS

**THE CYCLONE**  
The Finest Silo Built

**THE IRONCLAD**  
The Best Silo in its Class

**THE ATLAS**  
The Cheapest Factory Made Silo and a Mighty Good one

**"A National Silo is a Sign of Prosperity"**

## THE "NATIONAL" LINE OF WOOD STAVE SILOS

We are proud of the "National" line of silos as they have made themselves famous by performance, and have won the respect of agricultural authorities and feeders. They have received the O. K. of engineers as being scientifically correct in design and the O. K. of the dairymen and stock feeders as being capable of producing first-class silage and having the ability to stand up straight and true through any climatic conditions, which exist in the Western United States.

These silos have proven their worth through actual tests. They have given years of satisfactory service to dairymen and stock feeders throughout the west from Mexico to Canada.

The "Cyclone" is without a doubt the best silo on the market today. It is so scientifically hooped and braced that it is practically impossible for it to twist or get out of shape.

The "Ironclad" is the best round hoop silo on the market. It is moderate in price and is built of first-class materials.

The "Atlas" is the lowest priced factory made silo in its class on the market. It is made of good materials and will make good silage.

The construction of each one of these silos will be described separately on the following pages.

## The Cyclone Silo

The Cyclone is a proven silo, having stood the most rigid tests of climate in all parts of the Western United States. It has the permanency of steel or masonry and is vastly superior to them in the quality of silage which it makes. It is safe to say that the Cyclone makes a better quality of silage than any other silo in use today. A close study of the following pages will explain why we can make the statements we do about the Cyclone and stand back of them.

### HOOPS

There are three very important features of the Cyclone Silo, the hoops, braces and doors. The most important of these features is the hoops. The purpose of the hoops is to draw the staves of the silo together and then keep them there without any further attention or adjustment, regardless of whether the silo is full or empty, wet or dry. When a silo is empty the greatest difficulty is experienced in holding it to its true shape. Staves dry out and shrink in all silos and unless they are held in their original position while dry they will have a tendency to stick together in bunches of five or six leaving a large opening between each bunch of staves and when a strong wind arises these staves will begin to tip over against one another at the top in the direction the wind is blowing and cause the silo to twist and eventually fall over or become so badly deformed that the silage cannot settle properly, which will result in a spoiled crop.

Under our system of hooping we keep each stave plumb and perpendicular, in its original position without the least bit of attention, after the silo has once been erected. We do this in any part of the country regardless of how hot, cold, dry or wet the climate is. We have patented a flat hoop having notches pressed in both edges. (These notches are pressed instead of cut so that it will not weaken the hoop). After these hoops are placed around the silo they are drawn tight by our special designed lug (See Figure No. 1). This lug has a channel through which the hoop passes, and there are several small projections on the inside of the lug that engage the notches in the hoop, and a wedge that fits inside the lug, thus properly holding the hoop fast in the lug.

After the hoops are drawn tight around the silo they are stapled to every stave with a staple made of the same stock as a 30-penny spike. As there are about 15 hoops on a large silo it is just the same as having each stave held in place with thirty 30-penny spikes. Therefore, it is plain to see that it would take a greater strain than the stave could stand to move it out of place even a fraction of an inch.

Through this system of hooping we overcome the only serious drawback to all wood stave silos. First—we eliminate all tightening and loosening of hoops after the silo has once been erected. Second—we prevent the silo from becoming smaller at the top than at the bottom owing to the fact that the hoops are never tightened but once and that is when the silo is erected. Third—we make it practically impossible for the silo to get out of plumb as the staves are not only held together by the hoops, but each stave is fastened to every hoop on the silo.

One of the greatest faults of the wood stave silo has been their becoming smaller at the top each year since it was necessary to tighten the hoops each time the silo was emptied.

As it usually takes about six months to empty a silo and the silage being fed out from the top, the upper part of the silo has a greater tendency to dry out and naturally the staves shrink more at the top than the bottom. This necessitates tightening the hoops at the top of the silo to keep the silo from blowing over. Now, when the silo is filled again in the fall the moisture in the silage causes the staves to swell and as the hoops will not give, the fiber of the wood will be compressed causing the staves to become narrower each year, as there is no room for them to expand to their original width. A repetition of this, year after year, soon causes the silo to become from 12 to 36 inches narrower in circumference at the top than at the bottom. A silo that is much smaller at the top than at the bottom is practically worthless because after the silo is filled the silage usually settles five or six feet thus making an air space around the inside of the silo between the wall and the silage. This will cause spoiled silage.

This is entirely overcome by the Cyclone hooping system as each stave is held in its original position and you never have to tighten the hoops. By the time all of the air which enters the silo at the time that it is being filled, is expelled by packing and the settling of the silage, the staves are swollen up to their original width so that the silo is as tight as when it was first erected.

You may ask yourself, "Will the staves continue to swell back to their original width year after year?" The answer is: Yes, they will. We have tested this carefully in all parts of the country over a period of many years. Read what the users say about it.

### THE BRACING SYSTEM

While driving through the country we see many poorly constructed silos, some of them twisted out of shape, others having to be tied up to the barn or a tree with guy wires. These silos are worthless. They are not only an unsightly contraction on the farm, but they are a liability to the farmer because of the chance of them blowing over injuring the persons or cattle near them. All of this makes us think more about a real bracing system—one that will hold your silo perfectly straight and prevent it from blowing down unless it takes the concrete foundation with it. We have a bracing system on the Cyclone Silo that will do every bit of this. If a silo cannot twist it cannot blow over even in a storm where the wind reaches a velocity of 40 miles an hour. We prevent the silo from twisting by our flat hoops which we have stapled to the staves of the silo and also by our flat braces made the same as the hoops. There are six of these braces, three running around the silo one way and three around the other way. This is just twice the number of guy wires used on the average silo, and it gives better results than all of the guy wires that you could possibly have room for on the silo.

Our flat braces are anchored to the concrete with a 5/8-inch steel anchor rod which is embedded in the concrete 18 inches at the time the concrete is poured. The brace is fastened to this anchor rod with the same sort of lug as we use on the hoops. This brace is then drawn one-third of the way around the silo and is stapled to the staves in the same manner as the hoops. This forms the entire wall into a solid tube making it impossible for the wall to give even in the slightest degree.

The bottom is held round by the foundation and the top is held round by the roof. The braces and hoops prevent it from twisting in either direction and the flat stapled hoops prevent the top from becoming smaller than the bottom.

Therefore, the Cyclone Silo is in accord with all engineering principles. It MUST and it DOES retain its original shape. The Cyclone has proven its ability to stand up and make first-class silage. Why experiment with an inferior make of silo?

### DOORS

Hinged doors are just as essential on your silo as they are on your barn and when we stop to consider that the top door of the silo is sometimes thirty to forty feet from the ground, it makes us wonder if they are not more essential.

A silo door weighs from thirty-five to forty pounds and when you are forty feet from the ground with only one hand free to move the door to the space above, or take it down

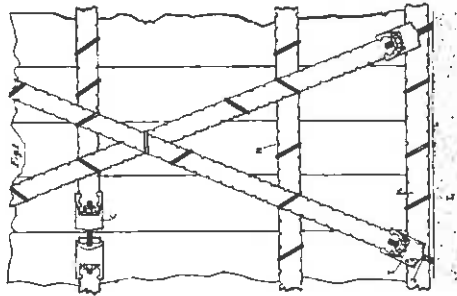


Figure No. 1

to the ground, it is a strenuous and dangerous task. You could take the doors of your barn and use them without hinges, moving them to one side every time you entered the barn and put them in place when you were through; but the saving in the cost of the hinges would not pay you for disposing with the convenience of a good hinged door.

There is another side of the question to be considered—that is the efficiency of the door; if the door is not air-tight and smooth inside of the silo, it is no good—it will cause spoiled silage, which will amount to (in dollars and cents), much more than the difference in cost of a good door system and a poor one.

The doors used on the Cyclone Silo are six feet after the silo has been filled. They are smooth on the inside of the silo and are hinged so that they work just as freely as the doors in your house.

The Cyclone Silo door opening is held rigidly in place by 4x6 wood cross bars, one-half of which is shaped to the circle of the silo and around this the hoops pass across the door front. This enables us to shift the hoop so that no two lugs ever rest on the same stave, as this has a tendency to make a flat place on the staves. The other half of the cross bar extends across the door jambs and is securely bolted to them by four carriage bolts each. This construction holds the door frame absolutely square and in its original position.

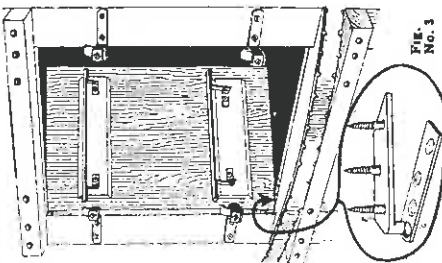


Fig. No. 2

The tendency of any silo door is to warp when drying out, and one lock in the center on each side is not enough to prevent this. Therefore, we put a special lock on each corner of the door so that it is practically impossible for the door to warp even in the most severe climate. When each one of these locks is fastened, it is possible to close the door tight enough to prevent the air from coming into the silo. These locks are adjustable so that the pressure can be increased or decreased on any corner of the door where adjustment is required.

Figure 2 illustrates the Cyclone door when closed. Note the detail of our patented door lock at the bottom and also the steel bars that extend across the door from the lock to the other, serving as a strong, safe ladder. This system of door locks is without a peer—and it lasts for a lifetime. There is nothing to get out of shape and the doors are always square and can be opened and closed with perfect ease.

Figure 3 illustrates the Cyclone door when open, showing the hinges in the detail below. The Cyclone door hinge requires special mention here, as it has proven to be one of the best silo door hinges ever de-

vised. It is so simple and yet so strong and effective that it has received praise from every Cyclone Silo user.

Plate "F." Figure 3, shown in cut is cast and is the same shape as the bottom of the door except it is not as wide as the door is thick, so it does not extend into the silo. It is mortised into the bottom and top of the door and fastened with screws. Plate "G." is soft steel and the same width as Plate "F." and is mortised into the cross bar running across the door frame between the doors.

This makes a silo door that will always open and close freely, always be tight and so smooth on the inside of the silo that the silage will settle as evenly as it does next to the staves. The Cyclone hinged doors make it possible and convenient to close the doors tight as soon as the silo is empty, thus retaining the moisture which is caused by the evaporation of water left in the bottom of the silo—this moisture will prevent the drying out of the staves to a great extent. If there is no water in the bottom of the silo when you have taken out all of the silage, put some in. If this water does not all evaporate before filling time, bail it out. This is well worth the time it takes as it will keep your silo in better condition.

### THE LADDER ON THE CYCLONE SILO

Figure 2 shows steel bars extending across the door from one lock to the other, these are the ladder rungs. These rungs are very substantial, are just 17 inches apart and stand out from the silo about four inches so that it gives ample foot room to prevent slipping. This makes a first-class ladder and as it is a part of the door lock you are sure to have access to every door in the silo.

A good strong ladder, such as we have on the Cyclone, is of great importance to the silo as it is not only a convenience, but a time and money saver when filling the silo and throwing out the silage.

### THE CYCLONE ROOF

No silo, where it is to be erected outside and exposed to the weather, is complete without a roof. A roof is necessary in order to make good silage as it keeps the rain and snow from cooling the silage at the top while it is cooking. There will always be a thin layer of silage on top that is spoiled and if the silo is not equipped with a roof this layer of spoiled silage will be much thicker and the loss in dollars and cents will amount to more than the price of the roof each year.

The Cyclone roof also holds the top of the silo perfectly round, thus making the silo more rigid.

Every Cyclone Silo is equipped with a 30-degree conical roof, practically the same as we have been using on our high class tank installations for the past twenty-five years. Each roof is fitted with two trap doors, one to be placed over silo doors and the other to be located at the user's convenience for filling the silo.

### TWO-PIECE SILO STAVES

We are prepared to furnish both one and two-piece staves, but we recommend the two-piece stave, as it is just as good as a one-piece stave when our method of splicing is used. They are easier to handle, easier to erect and they can be obtained at a lower cost. After a thorough investigation we have found that the two-piece stave Cyclone Silo stand up just as well as those having one-piece staves. This is due largely to the fact that our braces pull down and not outward on the silo, having a tendency to hold the silo perfectly straight.

Figure 2, page 16, shows our method of splicing two piece staves. The metal splin is made a little longer than the width of the stave so that it is embedded in the wood of each adjoining stave, making a perfectly air tight joint.

The joints in the staves are broken so that no two adjoining staves are spliced in the same place, this makes a continuous stave wall. After the staves are spliced in this manner and our flat hoops and braces are stapled to them, it is impossible for the joints to open and leak.

Two-piece staves are just as good, will last just as long, and are cheaper. It is good business to use them.

### ORDER YOUR CYCLONE SILO NOW

From the foregoing description of the Cyclone and positive proof of its efficiency which our Cyclone users offer in their letters reproduced in this book, you will surely agree with us that the Cyclone Silo is a real silo, the best silo on the market, and if you want a permanent and attractive improvement on your farm, that it is the best for you.

The Cyclone Silo is the cheapest silo in the long run and it will pay for itself the first year that it is used, so why not order your Cyclone now, and have the best and get your silo worries off of your mind?

In the back of this book you will find an order blank. Fill out this form today and mail it to us and your silo troubles will be over. You will have a silo that will increase the profits of your herd, increase the selling value of your farm, decrease your cost of production, and will save you many hours of hard work in feeding time.

### Two Cyclone Silos On The Sundial Ranch, Troutdale, Oregon



### THE CYCLONE IS THE BEST SILO ON THE MARKET

Redmond, Oregon, November 29, 1922.

NATIONAL TANK & PIPE COMPANY

Portland, Oregon.

Dear Sirs—We would like to say that when we were in the market for a silo we took our time and made a thorough investigation of all makes, and did quite a lot of letter writing to owners of silos whom we happened to know, asking them what their idea was concerning silos and what they considered the best, etc.

After it was all threshed out to our own satisfaction we decided upon a "Cyclone." We expect to erect another one next summer, probably the same size as the one which we just erected, a 12x36. There are so many good food values which would go to waste on a farm and which could be saved in this manner.

The silos in our district are mostly made out of flooring and look cheap, and are cheap. The silos that have been erected only two years are now twisting and turning out of shape.

The hooping and bracing system of the Cyclone is beyond any doubt as near perfect as mechanical skill could possibly make it. The doors are a great success. The door when closed makes a continuous wall without a break and silage keeps just as well around the door as it does in any other place in the silo. Taking everything into consideration, we think the Cyclone is the best silo on the market barring none. You have our permission to use our name or this letter if you so desire.

Yours very truly,

SCOBEE AND KEIR,

By E. L. SCOBEE.

## The Ironclad Silo

We have produced the Ironclad Silo for the man of limited means who must hold his investment down to the point where he still does not overstep the bounds of safety by incurring the risk of having his feed spoil through faulty construction.

The Ironclad is not the highest priced, and it is not the lowest priced, but it is the best round hoop silo on the market. We invite the strictest comparison between the Ironclad and other round hoop silos. The Ironclad will stand the closest inspection and the most rigid comparison.

The Ironclad is made on the same machines as our famous Cyclone Silos. The woodwork of the two silos is made exactly the same.

The Ironclad has given satisfactory service to hundreds of farmers under practically every climatic condition in Western United States.

### IRONCLAD HOOPS

The Ironclad Silo is equipped with round steel hoops, made in sections so that the slack can be taken up in two or more places around the silo. These sections are joined together with our special malleable iron straight pull lug. The Ironclad hoops have cold rolled threads that are raised up instead of cut so that the threaded part is equal in strength with the rest of the hoop.

### IRONCLAD BRACES

The Ironclad bracing system is similar to that used on the Cyclone, except that the braces are made from round instead of flat steel. The illustration shows the Ironclad bracing system. Note that the rods are anchored in the concrete foundation and bolted to the top of the silo. This holds the silo straight and true.

This silo will stand up and give you mighty good service. Of course, it will not last as long as the Cyclone and it will require more attention, but it will give better service than any other round hoop silo on the market.

### IRONCLAD DOORS

The Ironclad Silo has hinged doors. The woodwork of these doors is made exactly the same as the Cyclone doors. The hinges and locks are simple, yet very serviceable and will last a lifetime. The Ironclad, like the Cyclone doors, always work free and easy. They are smooth on the inside of the silo and are tight.

### IRONCLAD LADDER

The Ironclad has a steel ladder rung bolted on the center of each door, making a good strong ladder to the top of the silo. This rung projects out from the door far enough to give a foot-hold to prevent slipping.

### IRONCLAD ROOF

The Ironclad Silo is equipped with the same kind of a roof as is used on the Cyclone Silo. It is a "National Quality" product throughout.

### THE IRONCLAD A MODERATE PRICED SILO

If you want a moderate priced silo, the Ironclad is just the silo for you. We have made it a first-class round hoop, wood stave silo. You can depend on it to give you good service and if given proper care, it will continue to make first-class silage indefinitely.

## The Atlas Silo

We produce the Atlas Silo for farmers who wish to erect a silo inside of their barn, or have it protected in some other way from the weather. We do not advise erecting the Atlas Silo outside unless it is equipped with braces, however, we can furnish braces for the Atlas at any time—the same as those used on the Ironclad Silo. As this silo is intended to be used inside of the barn, our list prices do not include braces or roof, as they are unnecessary under these conditions.

The Atlas Silo gives you first-class silo equipment at the lowest possible cost. It is made on the same machinery and by the same workmen as our other silos. It is a "National Quality" silo all the way through.

The Atlas Silo is equipped with the same kind and number of hoops as on our Ironclad Silo. They are all round steel and have up-set threads and malleable iron straight pull lugs.

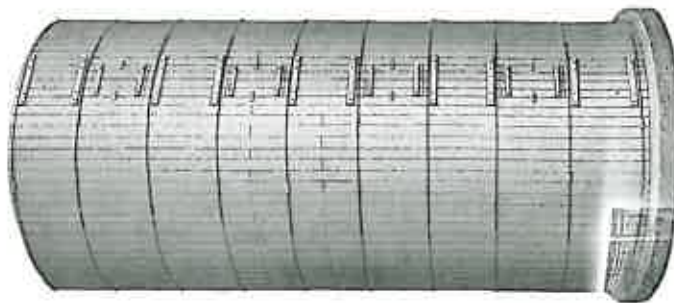
### DOORS

The Atlas Silo does not have hinged doors; however, the doors are tight and smooth on the inside of the silo, which insures an even settling of the silage.

Figure 7, on opposite page, shows the construction of the Atlas doors, they are very strong and durable and if given the proper care, they will last indefinitely.

### BRACES AND ROOF

Roof and braces are not included in the list price on the Atlas Silo, however, we are prepared to furnish them in case the Atlas Silo is to be erected outside.



### ATLAS CHEAPER THAN A HOMEMADE SILO

The Atlas is much cheaper and better than a homemade silo. It will last much longer and can be moved easily from one place to another if desired. Besides this, you have a silo that is absolutely smooth on the inside, which enables the silage to settle evenly, which is very important in making first-class silage. All lumber in the Atlas Silo is milled to a perfect form so that when the silo is erected, every joint is true and tight.

The Atlas is the lowest priced factory-made silo on the market, and it is a mighty good one. If you want a low priced silo, buy the Atlas and you will be well pleased with it.

The Atlas is much better than many of the fairly high-priced silos advertised today, for our volume of business permits us to produce the Atlas at a very low cost.

### FEED CHUTES

Where silos are erected out in the open they should be equipped with a chute built around the doors to prevent the silage from being blown away or scattered around the silo.

We are prepared to furnish you with a good substantial chute, such as shown in the picture below (picture of Henry Ranch). The chute is shipped knocked down. It consists of several pieces of 1x4 Fir steamed and bent to a semi-circle, one placed over each cross bar and sufficient  $\frac{3}{4}$  inch flooring to line the inside, making a very attractive and serviceable chute. We will be pleased to quote you prices on request.

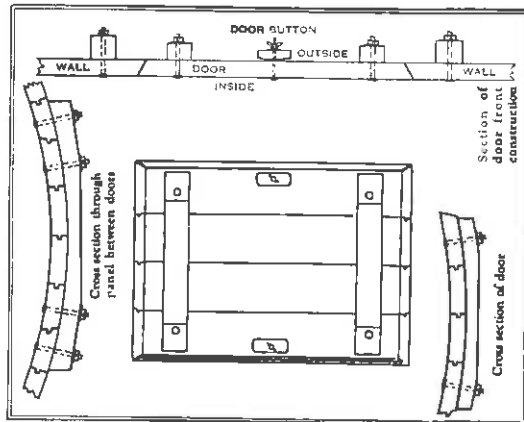
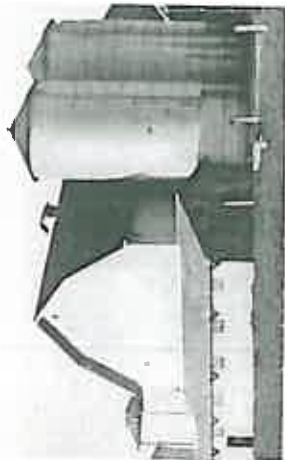


Figure No. 7—Atlas Silo Door

### ERECTED FOUR 18x40 CYCLONES

We are pleased to say that we have found the four 18x40 feet Cyclone Silos we erected several years ago, entirely satisfactory. We have filled the silos with various feeds—corn, oats and vetch, some sunflower, and late barley—and have always had good results in the curing and keeping of the ensilage.

While expressing our satisfaction with the silos we wish to add that your policy of co-operation and your interest in the silos after they are the property of the ranchers are factors sure to contribute to the satisfaction of the silo owner. Wishing you continued and increasing success—HARRY ROSEN COMPANY, BY C. E. Grille, President.





## How Your "National" Silo Will Be Shipped

Your "National" Silo will be shipped to you complete, in one shipment, and all parts cut to fit so that it can be assembled with perfect ease.

On the Cyclone and Ironclad Silos the doors and crossbars have the hinges fitted in place so that there is no carpenter work to be done on the silo when it is being erected. All of the metal parts of the silo are painted at our factory and packed in the most convenient way from your standpoint. The doors, crossbars, and cover are crated to protect them from damage in delivery.

Your name is stenciled on every package so that there is no possibility of them becoming mixed with other silos, tanks or lumber, being shipped in the same car.

We have over thirty years experience behind our system of manufacturing and shipping silos and tanks. That is why our products invariably reach our customers in first-class condition and give the service we claim for them.

A complete set of instructions for erecting silos and also the Anchor Irons for the bracing system will be mailed to you as soon as your order is received at our Portland office, so that you can prepare the foundations and be ready to erect the silo as soon as it arrives.

We are prepared to make very quick delivery of your silo as we keep a large stock of silo material on hand, but we greatly appreciate receiving orders early so that we can combine the silos into carload shipments, thereby making a large saving in the freight charges for you and giving us a more even flow of work in our factory.

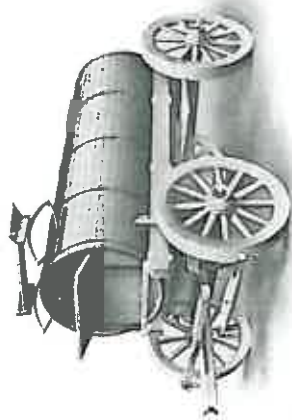
Our aim is to serve you as we have served all of our customers in the past. We consider each one of our "National" Silo users a real friend of ours and they are, for we have given every one of them a good fair and square deal. Let us ship you a "National" Silo and count you among our many friends. You will be more than pleased with the silos and the service we give you.



CYCLONE SILO AT NATIONAL TANK & PIPE COMPANY OFFICE  
*This silo has been standing empty for six years and is still in perfect condition*

## A Few of Our Specialties

We manufacture tanks for all purposes, silos, crossbars and lumber products. We can furnish you flooring, ceiling, moulding, finish or in fact any thing that you need in the lumber line. Let us quote you prices on your requirements. We can ship lumber, tanks and silos in the same car. This gives you an opportunity to make up a minimum carload for yourself or your neighbors.



Wagon Tanks—With or Without Mountings



Water Tanks



Round and Half Round Watering Tanks



Round Stock Watering Tanks



Lumber for All Purposes

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# Gestation Table for Farm Animals

Time of Service	MARES 340 Days	COWS 283 Days	EWES 150 Days	SOWS 112 Days
Jan. 1	Dec. 6	Oct. 10	May 30	April 22
" 8	" 13	" 17	June 6	" 29
" 15	" 20	" 24	" 13	May 6
" 22	" 27	" 31	" 20	" 13
" 29	Jan. 3	Nov. 7	" 27	" 20
Feb. 5	" 10	" 14	July 4	" 27
" 12	" 17	" 21	" 11	June 3
" 19	" 24	" 28	" 18	" 10
" 26	" 31	Dec. 5	" 25	" 17
March 5	Feb. 7	" 12	Aug. 1	" 24
" 12	" 14	" 19	Sept. 8	July 1
" 19	" 21	" 26	" 15	" 8
" 26	" 28	Jan. 2	" 22	" 15
April 2	March 7	Jan. 9	" 29	" 22
" 9	" 14	" 16	Sept. 5	" 29
" 16	" 21	" 23	Oct. 12	Aug. 5
" 23	" 28	" 30	" 19	" 12
" 30	April 4	Feb. 6	" 26	" 19
May 7	" 11	" 13	Oct. 2	" 26
" 14	" 18	" 20	" 9	Sept. 2
" 21	" 25	" 27	" 16	" 9
" 28	May 2	March 6	" 23	" 16
June 4	" 9	March 13	" 30	" 23
" 11	" 16	" 20	Nov. 7	" 30
" 18	" 23	" 27	" 14	Oct. 7
" 25	" 30	April 3	" 21	" 14
July 2	June 6	" 10	" 28	" 21
" 9	" 13	" 17	Dec. 5	" 28
" 16	" 20	" 24	" 12	Nov. 4
" 23	" 27	May 1	" 19	" 11
" 30	July 4	" 8	" 26	" 18
Aug. 6	" 11	" 15	Jan. 2	" 25
" 13	" 18	" 22	Jan. 9	Dec. 2
" 20	" 25	" 29	" 16	" 9
" 27	Aug. 1	" 5	" 23	" 16
Sept. 3	" 8	Jan. 5	" 30	" 23
" 10	" 15	" 19	Feb. 6	" 30
" 17	" 22	" 26	" 13	Jan. 6
" 24	" 29	July 3	" 20	" 13
Oct. 1	Sept. 5	" 10	" 27	" 20
" 8	" 12	" 17	March 6	" 27
" 15	" 19	" 24	" 13	Feb. 3
" 22	" 26	" 31	" 20	" 10
" 29	Oct. 3	Aug. 7	" 27	" 17
Nov. 5	" 10	" 14	April 3	" 24
" 12	" 17	" 21	" 10	March 3
" 19	" 24	" 28	" 17	" 10
" 26	" 31	Sept. 4	" 24	" 17
Dec. 3	Nov. 7	" 11	May 1	" 24
" 10	" 14	" 18	" 8	" 31
" 17	" 21	" 25	" 15	April 7
" 24	" 28	Oct. 2	" 22	" 14
" 31	Dec. 5	" 9	" 29	" 21

FOOTNOTES: THIS TABLE—First in the "Time of Service" column the date of service, then back to the right in a straight line to the column representing calving, and the number opposite service date is the day of parturition. Example: A cow bred April 15th is due to calve January 23rd.  
Compiled by H. W. Dillman, Fort Atkinson, Wisconsin.