Handy Equipment for Swine Raising

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Handy Equipment for Swine Raising

Abstract
Plans, construction details, bills of material, and estimates of cost for a number of items of handy and efficient equipment for swine raising are presented in this circular. Ideas have been gathered from many and diverse sources, particularly from the farms of progressive swine men. Practically all of the plans submitted have been thoroly tested in actual practice. Many of the items have been constructed by the Iowa Agricultural Experiment Station at Ames where they have demonstrated their worth.

Keywords
Agricultural Engineering; Animal Husbandry

Disciplines
Agriculture | Animal Sciences | Bioresource and Agricultural Engineering

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HANDY EQUIPMENT FOR SWINE RAISING

Investment in the right equipment gives returns in thrifty hogs.

AGRICULTURAL EXPERIMENT STATION
IOWA STATE COLLEGE OF AGRICULTURE
AND MECHANIC ARTS

C. F. CURTISS, Director

AGRICULTURAL ENGINEERING AND ANIMAL HUSBANDRY SECTIONS

AMES, IOWA
HANDY EQUIPMENT FOR SWINE RAISING

By W. G. Kaiser and John M. Evvard

INTRODUCTION

Plans, construction details, bills of material, and estimates of cost for a number of items of handy and efficient equipment for swine raising are presented in this circular. Ideas have been gathered from many and diverse sources, particularly from the farms of progressive swine men. Practically all of the plans submitted have been thoroughly tested in actual practice. Many of the items have been constructed by the Iowa Agricultural Experiment Station at Ames where they have demonstrated their worth.

Some advantages of handy efficient equipment in swine raising:
1. Saves time.
2. Conserves labor.
3. Adds to the convenience.
4. Makes work more efficient; it is really the machinery of handling hogs.
5. Stimulates interest.
6. Paves the way to better methods.
7. Gives the hog a better chance to develop to the maximum; in other words enables him to make the most of abundant opportunities.
8. Sets a good example for others because when they see and appreciate efficient equipment it is but natural for them to follow suit.
9. Commands respect and admiration on the part of others; in reality the advertising value is large.
10. Helps to complete and round out the equipment necessary on the swine farm to get best advantage from the combination community and movable hog housing system.
11. Encourages cleanliness, dispatch in doing things, sanitation of yards and houses, and safety to swine as well as economy in feeds and feeding.
12. Keeps the boy interested in the farm by showing him the interesting possibilities of the business.
13. Promotes farm happiness all along the line.

IOWA COMBINATION SWINE HOUSE, WALLowing POOL AND FEEDING FLOOR

Wallowing is nature's way for swine to cool and bathe themselves in hot summer weather. Unless a tank or pit of some sort is provided for the hog, his wallowing instinct demands that he make a wallow for himself; and too often large, filthy, unsightly mud holes are to be found in the yards in close proximity to the hog house or watering trough.

To provide a wallowing pool without the objectionable features of the mud hole of the animal's own making and to secure a structure that can be used the year round, a combination swine house, (See figs. 1, 2, and 3) wallowing pool and feeding floor is herewith submitted. Skilled labor is not required for the construction of this house; a man with average ability in handling tools should have no trouble in building it. However, the plans and specifications need to be carefully studied before work is commenced.
ESSENTIALS OF AN IDEAL COMBINATION SWINE HOUSE, WALLOWING POOL AND FEEDING FLOOR

1. **Sanitation.** A wallowing pool can easily become a source of disease infection for the whole herd if it is not cleaned and disinfected occasionally. The wallowing pool herein described can easily be kept sanitary. The floors and walls are made of concrete. A simple method of cleaning the pit is to scrub the dirt loose with a broom when it is being emptied; as the pit drains, the dirty water is naturally carried away. Hose flushing is advised when water pressure is available. Self dipping is easy of accomplishment in this wallowing pool. Dip, crude oil, or whatever dipping material is used, can be poured in or on the water and the animals will naturally cover and immerse themselves while wallowing.

2. **Shade.** Shade is indispensable in the hot summer months when the building is used as a wallowing pool. It keeps the water cool and adds much to the comfort of the swine. The small shade doors when opened to the position shown in figs. 1 and 2, together with the roof and walls of the superstructure, furnish considerable shade.

3. **Safety.** The easy concrete approach to and exit from the wallowing pool with its grooved surface is a precaution against injury from slipping. (Fig. 3) The entrance door for the animals is made high and wide to give ample room should several animals try to crowd thru at once. The woven wire fencing which lines the inside of the studs up to the height of the small doors prevents the animals from entering or leaving the pit by crawling over the side walls and injuring themselves when the small shade doors are raised.

4. **Sufficient Size for the Herd.** An over crowded wallowing pool should be avoided; injuries are too often caused by the huddling and piling up of animals in too restricted quarters. Moreover, the largest and strongest animals will use the wallowing pool to the exclusion of the weaker ones. The following table, based on the amount of floor space occupied by animals of different size, will be found helpful in determining the capacity of a given wallowing pool.

<table>
<thead>
<tr>
<th>Weight in pounds</th>
<th>Floor space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100</td>
<td>Up to 3 sq. ft. each</td>
</tr>
<tr>
<td>100 to 200</td>
<td>3 to 6 &quot; &quot; &quot;</td>
</tr>
<tr>
<td>200 to 300</td>
<td>6 to 9 &quot; &quot; &quot;</td>
</tr>
<tr>
<td>300 to 400</td>
<td>9 to 11 &quot; &quot; &quot;</td>
</tr>
<tr>
<td>400 to 500</td>
<td>11 to 13 &quot; &quot; &quot;</td>
</tr>
</tbody>
</table>

5. **Convenience.** The proper arrangement of certain house details will save time and labor as well as lessen the drudgery in caring for the animals. Convenience is secured in this house by having doors and windows that operate readily; shade doors and ventilators that are easily adjusted; a tile drain to empty the pit; water supply or hydrant for filling and flushing the wallowing pool.

6. **Ventilation.** Ventilation is necessary in this house for cooling the wallow in summer and for renewing the supply of fresh air in the winter. The small shade and ventilation doors hinged open as illustrated in figs. 1 and 2 allow the cooling summer breeze to pass over the wallowing pool almost unhindered, except for the wire mesh wall fence. Winter ventilation is secured by opening one of the side wall windows slightly or by opening the small doors under the cornice.

7. **Sunlight.** Quarters used for the housing of swine require an abundance of light and direct sunshine; warmth, dryness, and the general healthiness of the house are largely dependent upon them. The combination house herein described is efficient in this respect. The three windows in the south wall admit a plentiful supply of sunlight. The top section of the large two part door can also be thrown open in mild weather.
8. **Warmth.** A hog house must be warm if best returns are to be expected from the animals housed therein. The combination house described in these pages can be easily and quickly converted from a wallowing pool into warm winter quarters by draining the pit, closing and fastening the small shade doors, and covering the floor with a heavy layer of dry bedding. The floor, walls and roof are built as heat retaining and cold resistant as those of the average hog house. Because of the low walls and the comparatively small volume of air to warm, this hog house is even warmer than the average.

9. **Dryness.** Damp quarters are not conducive to healthy hogs and it is essential that the interior of a hog house be kept dry. The water tight floor and the ample drainage beneath the foundation and floor go far to prevent moisture entering from below. A further precaution against dampness is secured in having the floor slope towards the outlet drain, thus carrying away the liquid wastes.

10. **Ample Depth and Water Tightness.** The pit must have sufficient depth to allow the animal to wallow. Too great a depth should also be guarded against. An average depth of 6 inches with a maximum depth of 8 or 9 inches is the most satisfactory. A sloping floor with varying depths has certain advantages in that it will accommodate hogs of different sizes and ages at the same time. The overflow pipe in the outlet prevents the water from becoming too deep. A wallowing pool is made to hold water, necessitating that the floor and side walls be water tight. Concrete is good for this purpose.

11. **Serviceability.** The farm structure most worth while is the one that is useful the year around. Some of the uses to which the combination house may be put are,—(a) wallowing pool and shade in the hot summer months; (b) feeding floor in the months of fall fattening; (c) winter quarters for swine, sheep and other young stock; and (d) farrowing or lambing pen in the spring months.

12. **Durability.** A farm structure should be stable and last a great many years.

13. **Reasonable First Cost.** This should be consistent with the uses offered.

14. **Low Cost of Upkeep.** This should be consistent with the service rendered.

15. **Pleasing Appearance.** Well built, nicely designed, and well kept buildings add to the attractiveness of the farmstead.

**LOCATION**

The proper location of a building used for so many purposes as the combination swine house—wallowing pool—feeding floor often times
becomes a perplexing problem. The best location as a wallowing pool might not be very practical when used as a feeding floor or hog house. It is clear that for the wallowing pool, the most favorable location is near some water supply and yet accessible from the hog yards and pastures. When the combination structure is used as a feeding floor nearness to the crib or granary is desirable. As a hog house it should be readily reached from the other buildings and should be a unit of the hog house group. A location for this house should be chosen after one has taken into consideration these factors. Preference should be given to a location near the water and food supply.

THE IOWA COMBINATION SWINE HOUSE CONSTRUCTION DETAILS

The essentials and construction details for the feeding floor of this combination structure are discussed under "Concrete Feeding Floor for Swine."

To secure a satisfactory combination swine house, wallowing pool and feeding floor, certain items enter into its construction that must be emphasized. These follow:

**Foundation.** It is of first importance that a swine house and wallowing pool have an adequate foundation, one with sufficient width and depth to withstand the destructive action of frost and settling. To extend the foundation down below the usual frost line, about 3½ feet under average Iowa weather conditions, would be impractical with a building of this type. For this reason the foundation is made but 1½ feet below grade and is made one foot thick, this extra thickness being necessary to secure rigidity.

Concrete is best suited for foundation purposes. A mixture consisting of 1 part cement, 2⅔ parts sand, and 5 parts broken stone or pebbles is excellent. If bank run gravel must be used, it should be screened and 1 part cement added for 2⅔ parts sand. The pebbles which have been screened out may be put back into the mixture, provided that the quantity of pebbles is not more than twice the quantity of sand. Large stones, hard brick or pieces of old concrete can be dropped into the foundation trench to help form that part of the foundation below the floor line. Above this nothing but the regularly mixed concrete should be used in order to insure water tightness.

Forms will not be necessary except above grade and here they should be made rigid, preferably out of 2-inch material, well braced, and with the smooth side next to the concrete.

Some provision must be made for fastening the sill of the swine house to the foundation, as it is a light structure and could easily be displaced by a storm. Anchor bolts ½ inch in diameter and 12 inches long, embedded in the concrete foundation with 2½ inches of the threaded end projecting to receive the sill, make a rigid connection between the foundation and the superstructure; these bolts when spaced not more than 4 feet apart and care being particularly taken to have one in each corner, will usually be found ample.

**Floor.** The success of a wallowing pool is largely dependent upon the floor. Water tight construction is essential, hence concrete is usually used. A richer mixture is required here than in the foundation; 1 part cement, 2 parts of sand, and 4 parts pebbles will answer. If bank run gravel must be used, it should be screened and 1 part cement added for 2 parts sand. The pebbles which have been screened out may then be put back into the mixture, provided that the quantity of pebbles is not more than twice the quantity of sand.
The concrete in the floor is made 5 inches thick and is laid on a well firmed or tamped bed of cinder or gravel 6 inches deep. The surface of the floor is finished rough with a wood or carpet float so that it will not be slippery. The floor is also given a slope of 1/4 inch to the foot towards the outlet drain. A cement wash made by mixing together cement and water to the consistency of thick paint and brushed on the concrete floor 24 hours after it is poured will go far to secure a water tight construction.

Reinforcing. A liberal use of reinforcing will tend to prevent the formation of cracks and hold the wallowing pool together under the action of frost. Woven wire fencing laid in the concrete floor and bent to extend well up into the side walls is recommended (see fig. 2).

Drainage. The success of a wallowing pool depends largely upon whether or not it is properly drained. Provision must be made for removing the water from the pit or it will become filthy and stagnant. In the center of fig. 3 is presented a scheme for an outlet, which shows a 2-inch pipe embedded in the concrete floor and foundation; a coupling is placed on this pipe so that its top edge is flush with the surface of the finished floor. Into this coupling is screwed a 9-inch length of pipe which acts as a plug or stopper, and also as an overflow which prevents the flooding of the wallowing pool and indirectly regulates the depth of the water. To empty the pit, unscrew this piece of pipe. As shown in the figure the water drains from the pit into a small concrete catch basin, the function of which is to facilitate cleaning of the outlet pipe should it become clogged.

The floor of the wallowing pool is made with a fall toward the drain of one inch in 4 feet. This slope insures quick and complete drainage of the wallowing pool.

Second in importance is the drainage of the foundation. Ofttimes, even with the best of care in making the concrete, there may be some seepage thru the wallowing pool floor. This water must be carried away by under-drainage, otherwise it may soak out sufficiently to cause mud holes around the building in the summer, or it may collect beneath the floor and foundation so as to freeze disastrously in winter. A simple preventive treatment is to place a 4-inch drain tile around the outside of and somewhat lower than the foundation; also place another drain beneath the floor as shown in fig. 2. These drains empty into the main tile leading from the wallowing pool.
Framing. The framing of this house is made rigid and substantial. The sills, studs, and plates are made of 2 x 4 inch material and the rafters out of 2 x 6 inch stuff. The method of framing is clearly shown in the accompanying drawings. (See figs. 2 and 3.)

Siding and Roof. Drop siding or shiplap is commonly used to cover the side walls. Fir flooring is splendid for making tight, weather proof, durable walls and roof. White pine and fir are preferred because of their weather resistant qualities. Shiplap or some matched lumber is used for sheathing. Because of the flatness of the roof a good grade of prepared or metal roof is preferable to shingles. If cedar shingles are desired the pitch of the roof must be steeper, at least 1/4 pitch, and the sheathing must not be laid tight as where prepared roofing is used. A shingle roof requires an open type of sheathing so that the shingles will dry out thoroughly after being soaked. Shingles laid on tight sheathing or paper are usually short lived.

Doors and Windows.

(a) Entrance Doors. The large “man” door can be located any place on the front or south side of the building, determined by the relative location of yards and other buildings on the farmstead. It should be placed where it will be most convenient. This door is made in two parts so that the top section can be opened up for light and ventilation. The small “hog” door as specified is 42 inches wide by 32 inches high, this being good for summer use. However, in the cold weather it may be advisable to reduce the size of the opening by providing a double door, one hung within the other, or a reducing frame can be inserted. It is advisable to have this winter door as small as possible, the size depending upon the animals housed, in order to keep out the cold winds and weather. An overhung self closing door may be in order. At any rate, build so as to be able to close completely the hog door when desired.

![Diagram](image-url)

Fig. 3. Plan, combination hog house and wallowing pool.
(b) Shade Doors. Every available portion of the lower part of the walls of this structure is made into shade doors. They are hung with 6-inch heavy wrought iron strap hinges. When open they are suspended by a wire or chain. (See figs. 1 and 2). These doors when closed can either be hooked from the outside as shown in fig. 1, or from the inside.

Windows. The windows are all placed in the south side. They should be arranged so that they will open either by sliding to one side or by swinging from hinges at the top.

Wall Wire Mesh Fence. The inside of the studs to the height of the shade doors is often lined with woven wire fencing. Any reliable hog tight fencing material can be used. This open fence idea insures freely flowing air currents in the hog wallowing pool.

Ventilation. It is hardly practical to have a cupola or metal ventilator on a building of this type. The small ventilator doors under the cornice are adequate for removing foul air and renewing the fresh air supply.

Painting. Two coats of pure lead and linseed oil paint will not only make this house more attractive but will prolong the life of the lumber. The color should harmonize with the surrounding buildings.

BILL OF MATERIAL AND ESTIMATE OF COST* OF HOG HOUSE AND WALLAWING POOL

The Iowa Combination Hog House and Wallowing Pool. (Figs. 1, 2, and 3)

Masonry:
12 bbls. Portland cement @ $2.60 ........................................ 31.20
12 cu. yds. sand and gravel @ $2 ........................................ 24.00
55.20

Lumber:
6 pcs. 2" x 4" x 18' No. 1 Y. P. sills and plates @ $42 per M. .... 3.02
8 " 2" x 4" x 14' " " " sills, studs, plates @ $40 per M. ......... 3.00
8 " 2" x 4" x 12' " " " studs @ $40 per M. ...................... 2.56
10 " 2" x 6" x 16' " " " rafters @ $40 per M. ............... 6.40
27 " 1" x 8" x 12' No. 2 W. P. shiplap for sheathing @ $55 per M. ........................................ 11.88
14 " 1" x 8" x 16' " " " shiplap for sheathing @ $55 per M. ...................... 8.25
20 " 1" x 8" x 14' " " " shiplap or fir flooring for siding @ $50 per M. ............... 9.35
20 " 1" x 8" x 16' " " " shiplap or fir flooring for siding @ $50 per M. ............... 10.65
14 " 1" x 4" x 16' " " " shiplap or fir flooring for siding @ $50 per M. ............... 3.75
58.86

Hardware
11 pr. 6" strap hinges @ 25c .................................................. 2.75
2 pr. 6" T hinges @ 30c ...................................................... .60
18# 8d common nails @ 6c ................................................... 1.08
10# 20d common nails @ 6c ................................................... .60
8 pcs. 1/4" x 12' sq. twisted reinforcing @ 6c per lb. ........... 1.26
1 doz. size 1 spring snaps ................................................. 1.20
2 doz. door staples .......................................................... .60
7 pr. 3" steel buttes @ 20c .................................................... 1.40
2 doz. wrought hooks and staples ........................................ .80
No. 12 wire ................................................................. .75
11.04

* On basis of approximate prices 1918. The bill of material is the constant basal guide — figure from it.
FEEDING FLOOR OF CONCRETE

A feeding floor is an essential part of the swine raiser's equipment. Some advantages of a feeding floor as compared to the practice of feeding on the ground follow:

1. **Saves feed**. During a rainy spell feeding on the ground soon produces a mire wherein feed is lost.
2. **Keeps feed clean, dry and palatable**.
3. **Promotes sanitation**. A feeding floor is much cleaner and easier to keep clean.
4. **Saves time and labor**. With a feeding floor, the feeding place is permanent and when located near the food supply expedites and facilitates the feeding operation.
5. **Adds to the attractiveness of the swine production plant**. Muddy yards, the mire, and mud covered animals are unattractive.
6. **Encourages contentment of both man and swine**. It is highly satisfactory to both man and beast for both to know that there is a dependable feeding spot, where feed may be conveniently placed and greatly relished. It is some satisfaction to feel that the feed is being given and consumed under very acceptable conditions.

**ESSENTIALS OF FEEDING FLOOR FOR SWINE**

A satisfactory feeding floor for swine is one that meets the following requirements as to location and construction:

1. **Good Drainage**. Dry surroundings are essential to a feeding floor. To keep the feed out of the mud and water where it will remain dry, clean and sweet are the chief arguments for a feeding floor. To do this it is necessary that the floor be designed to carry away any water or liquid matter that may accumulate there. The sloping floor does this. In addition, the grounds around the floor must have drainage to carry away the water that runs off of the floor as well as that which collects on the ground itself, or the hungry hogs will soon track mud all over the floor. A sloping yard with natural drainage is ideal. When location is such that there is little fall, tile drains will be found helpful.
2. **Serviceability**. To be useful in continuous service, the floor should be as adaptable to the self-feeder system of swine feeding as to the broadcast system. The floor may even be used finally as the floor of some future building.
3. **Durability**. The floor must be made to withstand the wear of actual service as well as the action of rain, wind, frost, etc. The longer it will resist these agents, the more satisfactory it will be.
4. **Sanitation**. A large percentage of the deadly disease germs which make such ravages in the swine industry gain entrance into the animal's system along with the food. For this reason the eating place of a hog should be clean and free from the dust, dirt and filth that harbor the
disease germs. A masonry floor without corners, cracks or place of lodgment of the filth is superior for this purpose.

5. *Easily Cleaned.* Cracks and corners that collect and hold dirt are to be guarded against. Rounded corners make cleaning easier. A hard masonry surface, fairly smooth and with uniform slope to carry away the wash water facilitates cleaning in that the dirt can be removed by flushing.

6. *Easily Accessible.* Swine should experience no difficulty in getting on or off of the feeding floor. An easy incline or approach is in some cases needed.

7. *Safe to all animals.* Injurious accidents are prevented by having, (a) easy and roomy approaches to the floor; (b) ample size floor to avoid over crowding; and (c) a curb and fence inclosing the floor to guard against falling off.

8. *Sunshine.* Exposure to the direct rays of the sun is essential. Sunlight is one of the greatest germ destroying agents and when allowed to sweep across the feeding floor will go far towards producing sanitary conditions and dry wholesome surroundings.

9. *Protection.* A shivering animal will eat only so much as is required to perform the bodily functions. Gains if made at all will be slow. Swine feeding will then be at a loss. The feeding place requires protection from the icy winter winds. The south or east side of the crib or hog house is a desirable location. An ideal place is in the southeast corner of an L shaped building. When no other shelter can be secured, a high tight fence built on the north and west sides will offer much protection.

10. *Sufficient Size for the Herd.* Overcrowding is to be guarded against. It predisposes to fighting, which often results in injury and loss of flesh. Moreover, the weaker animals will be deprived of their due share, resulting in unequal gains and a herd lacking in uniformity. The following table gives the amount of feeding floor space required by different sized swine.

<table>
<thead>
<tr>
<th>Weight Range</th>
<th>Space Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100 lbs.</td>
<td>0 - 5 sq. ft. each</td>
</tr>
<tr>
<td>100 - 200</td>
<td>5 - 10 sq. ft. each</td>
</tr>
<tr>
<td>200 - 300</td>
<td>10 - 13 sq. ft. each</td>
</tr>
<tr>
<td>300 - 400</td>
<td>13 - 15 sq. ft. each</td>
</tr>
</tbody>
</table>


13. *Pleasing in Appearance.* A feeding floor is a mark or indication of a successful and progressive swine man and as such it should stand out as an object to command attention. A first class job will be evidenced by smooth uniform floor, well shaped curb and approaches and a neat and accurately made fence.

**LOCATION OF THE FEEDING FLOOR**

Because of its permanent character, making a change of location impractical, the proper place for a feeding floor requires considerable foresight. Its location should be such as to fit in with the future scheme of building arrangement. Some of the factors to be kept in mind in selecting a site for the floor are:

1. Nearness to the crib or granary, to lessen the time and labor required in feeding.

2. Protection from the chilly winds, a location on the south or east side of a crib or hog house being ideal.

3. Nearness to the hog house and hog pasture.

4. Connection with the hog house group to save time and labor in the feeding and management of the herd and to reduce the amount of fencing and maintenance expenses incident to a scattered arrangement.
CONSTRUCTION DETAILS

A thorough understanding of the following details of construction will be found helpful in building a concrete feeding floor. (See figs. 4, 5, and 6.)

Drainage. The durability of a feeding floor is largely dependent upon the adequacy of the drainage. Water allowed to collect and freeze under the floor will soon cause its destruction. Two strings of ordinary 4-inch drain tile, one placed around the outside and one under the center of the floor, each at a depth of 2½ to 3 feet, will usually be ample. Moreover, the floor should be built above the ground and there should be a slope of the ground away from the floor. A layer of gravel or cinders is placed under the floor to keep the floor from getting wet from any water which might rise into it from the ground.

Foundation. The floor must have a solid and unyielding footing to prevent settlement resulting in cracks and fissures. A firm foundation is secured by having a layer of cinders upon coarse gravel well packed and tamped for the floor to rest upon. (See figs. 4 and 6). The gravel should be brought to the same grade as the finished floor before the concrete is placed. When a well drained site is available the gravel underlay is often omitted. Then the soft surface earth is removed, the prepared area is thoroughly packed and the concrete poured directly upon the ground for a foundation.

Apron. A necessary part of every concrete feeding floor is the apron or retaining wall built around the outside. At first sight it looks like a foundation around the floor (see figs. 4, 5, and 6), but its functions are otherwise. It prevents the swine from undermining and also keeps rats, mice, and other pestiferous animals from using it as a harbor.

The apron is usually made by filling a trench 6 inches wide and 12 inches deep with concrete. It is advisable to pour this at the same time as the floor, using the same mixture as for the floor.

Floor. Feeding floors are commonly made out of concrete, but many successful floors have been made by laying paving brick in cement mortar. The concrete floor is discussed in this circular. A fairly rich mixture
of concrete is required; a mixture of 1-2-4, which is 1 part cement, 2 parts sand, and 4 parts pebbles or crushed stone will ordinarily be satisfactory. If bank run gravel must be used, it should be screened and 1 part cement added for 2 parts sand. The pebbles which have been screened out may then be put back into the mixture, provided that the quantity of pebbles is not more than twice the quantity of sand. In most natural bank run gravels there is an excess of fine materials, which necessitate that much more cement in proportion be used than ordinarily recommended; otherwise there results a thin mixture which hardens into a porous, inferior concrete.

The concrete should be thoroughly mixed by hand or a rotary type of batch mixer. The mixed concrete should be poured immediately after mixing and should be tamped and agitated so as to have a dense concrete.

The floor is laid in sections 8 feet square. (See fig. 5.) This allows for expansion and contraction joints in the floor for temperature changes. Common practice is to build one section at a time and then go to the adjoining one. For rapid work it is sometimes necessary to pour every other section and then return and fill the sections in between after the forms are removed. Work should begin at the lower side of the floor so that in case of rain the water will not run over the green concrete.

The floor is customarily made from 4 to 6 inches thick. (See fig. 4). If there is any probability of its being driven over with loads, 6 inches in preferable. One course work is recommended as it is generally more satisfactory than two course work.

Care must be taken in finishing the floor to secure the proper slope.

Fig. 5. Plan, concrete feeding floor.
A fall of 1 inch in 4 feet is common practice. A slope as steep as 1 inch in 2 feet is not uncommon.

The surface of the floor should be finished with a wood or carpet float to give it roughness. A metal trowel will make a floor too smooth and one that will become slippery.

Curb. A wall or curb is often built around the feeding-floor as shown in figs. 4 and 6. The functions of a curb are these: (a) It retains feed on the floor that would otherwise be shoved off, possibly into the mire. (b) It is a factor of safety, preventing the eating animals from stepping or slipping off of the floor with possible injury. (c) Trash, food refuse, cobs, etc., that might be scattered on all sides of the floor are collected and delivered at the entrance where such debris can be easily removed or burned. (d) In the event of a fence being used around the floor, the curb prevents the accumulation of filth between the fence and the floor, where it can be removed only with difficulty. (e) The curb furnishes a good dry place for the attachment of brackets and anchors in case a pipe rail fence is used like the one illustrated in fig. 4.

The curb need not be made very high, four inches above the floor is regarded as sufficient. A 6-inch curb has some advantages in that ear corn and worked over cobs are more likely to be kept within bounds, and not rooted over the sides around about. The width is standard at six inches. The curb is usually poured at the same time, or just previous to the floor, using the same quality of concrete. The top corners should be rounded so as not to present any sharp edges that are easily broken off. Where the curb joins the floor, the corners should also be rounded so dirt can not find lodgment.

Approach. Where the feeding floor is built higher than the surrounding grade, which is the practice followed in the best type of construction, it is necessary to have some sort of approach. (See figs. 4 and 5). The requirements of such an approach are (a) it must be easy and gradual so that the floor will be readily accessible to swine of all sizes, (b) it must be wide and roomy, overcrowding is to be avoided, (c) the surface must be roughened or grooved so the animals will have a firm foothold, and (d) the number of approaches must be in accordance with the size of the herd and the floor. These essentials have been carefully considered in the design of the feeding floor shown in figs. 4, 5, and 6.
A concrete approach is most commonly used in connection with a concrete feeding floor. Concrete of the same specifications as was used in the floor is advised. An apron is necessary here for the same reasons as given for the floor itself.

**Fence.** Many times a fence around all or part of the feeding floor is a necessity for the safety of the animals. This is the case when it happens that the floor is considerably higher than the yard around of to one side of it.

Specifications are clearly outlined in the drawings and the attached bill of materials for a gas pipe railing, which is entirely optional. It is seen that the pipe railing fence, altho more attractive and durable than the board fence, is also much more expensive. (See fig. 4). Under average conditions it is questionable whether a gas pipe rail fence is justifiable altho it is very ornamental. However, a solid board or an ordinary woven wire fence can be used. The solid board fence is preferred in locations requiring a windbreak. In case the gas pipe railing is used it is of advantage in that temporary hurdles or a low fence can be fastened solidly thereon. In the cold windy days of winter the feeding floor is best protected by use of solid fence panels on north and west, and even on east in order to make the feeding place acceptable to the pigs,—a cold floor unprotected from the wind is very uninviting to pigs; they prefer to remain in their warm beds rather than brave the "narrow chilling" weather. Thousands of feeding floors, however, are built without any fence or rail protection and are all right in suitable season.

**BILL OF MATERIAL AND ESTIMATE OF COST**

*Feeding Floor 28' 6" x 32' 6". (Figs. 4, 5, and 6)*

**Feeding Floor.**

- 90 sacks Portland cement @ 65c .......................................................... 58.50
- 26 cu. yds. sand and gravel @ $2 .......................................................... 52.00

**Cost of material** .......................................................... 110.50

**Labor estimate** .......................................................... 35.00

**Completed floor** .......................................................... 145.50

**Extra for pipe railing (all fittings and pipe galvanized):**

- 15 pcs. 1\(\frac{1}{2}\)" pipe 6" long threaded both ends @ 25c ........................................ 3.75
- 15 " 8" " 30c .......................................................... 4.50
- 20 " 9" " 30c .......................................................... 3.10
- 20 " 9' 0" " .......................................................... 10.08
- 13 malleable tees (rail fittings) @ 45c ........................................ 5.85
- 15 " 76 flanges @ 45c .......................................................... 6.75
- 7 " 6 crosses @ 60c .......................................................... 4.20
- 6 " elbows @ 45c .......................................................... 2.70
- 2 " elbows with side outlets @ 60c ........................................ 1.20
- 60 \(\frac{3}{8}\)" x 6" bolts @ 35c doz ........................................ 1.75
- 2 tees side outlet @ 60c .......................................................... 1.20

**Total** .......................................................... 73.18

**Extra for wood fence:**

- 5 pcs. 4" x 4" x 16' No. 1 Fir posts @ 42c ........................................ 4.45
- 4 " 1" x 4" x 10' No. 2 W. P. boards @ $55 ........................................ 3.69
- Nails .......................................................... 0.15

**Total** .......................................................... 8.29

---

*On basis of approximate prices 1918. The bill of material is the constant basal guide—figure from it.
DIPPING VAT OF CONCRETE

The eradication of lice and mange from the herd is prerequisite to profitable swine raising. Scabby, lousy hogs make slow gains and generally have a scrappy, emaciated look in contrast to the sleek, thrifty appearance of the animals free from parasites and skin diseases.

The usual treatment for ridding the hog of his skin and vermin troubles is the application of some disinfectant or vermin killer, commonly called dip. This is accomplished usually in these ways:

1. By patent oilers and devices so designed that they offer a tempting rubbing surface for the hog seeking relief for his irritation, and at the same time apply oil or coal tar dip, or other preparation, to the irritated and infected spot that is rubbed.

2. By scrubbing and coating the animal's skin with the disinfectant by means of a brush or broom.

3. By spraying and immersing the animal in a solution of the material.

Complete eradication can be secured only by thorough medication, that is, the disinfectant must reach and come in contact with every infected portion of the animal's skin. For this reason total immersion of the animal gives the most satisfactory results in severe cases and a dipping vat excels all other devices for thoroughly applying the remedial solution.

ESSENTIALS OF A DIPPING VAT

(See figs. 7, 8, and 9)

A satisfactory dipping vat is one that meets the following requirements:

1. *Adequate size:* The vat must be of sufficient size for the complete submersion and consequently the thorough medication of the animals to be treated. The length, width and depth of the vat are determined by the size of the animal. As one vat is usually used for the entire herd it must be made to accommodate the largest animal. A vat of the dimensions given in figs. 7, 8, and 9 has been found satisfactory to accommodate swine of all sizes. The dipping staff shown to the left in fig. 9 will be found helpful to push the animal that persists in swimming beneath the surface and to hold up those that may sink beneath the surface.

2. *Safe operation:* The vat should be designed so that the treated animal will not be injured during the dipping process. Two steps in the dipping proceedings, attended with more or less danger to the animals, are first, getting them into the vat and, second, getting them out again. Quite frequently a hog will fight rather than approach the pit and after he has been pushed to the edge he will attempt to jump across rather than go into the vat. A dumping platform and swinging blind, see figs. 7, 8, and 9, provide an easy and safe delivery into the vat. The hog will mount the platform the first time without being aware of what is going to happen. The tilted platform provides a sliding chute into the pit that lets the hog in without possible injury to himself. The swinging blind looks like a barrier to him and he will not attempt to jump when the platform swings. The pit must be narrow enough so that the dipped animal can not turn around in it or he is very apt to get fast. The hog that has been put thru the dipping vat once usually knows what is coming when he is started vatward again. A word to the wise is unnecessary, but to the inexperienced quite in order: Have plenty of men on hand at the second dipping and have the fences hog tight and conveniently arranged so as to have alleys lead toward the vat entrance. The exits should be made easy with cleats or grooves so that the emerging animal can secure a firm foothold. In the event that the animal does not come up to the surface out of the vat within a reasonable time, the attendant will find the staff, see fig. 9, very useful in recovering the animal.
A fence on each side of the vat prevents the animal from trying to scramble over the side and eliminates possible injury from that source. Enough room should be left on each side of the vat so that an attendant can stand there on guard to see that the animals are completely submerged and to give assistance to those that require help in getting out of the pit.

3. **Saving of dip**: The vat should be economical in the use of the dipping solution. Cautions to be observed in preserving dip are: (a) to have the side walls and floors of the vat water tight; (b) to make the vat no larger than is actually necessary; (c) to build a dripping platform (see fig. 8) sloping toward the pit to carry back the solution that drains off of the emerging animals, and (d) to provide a cover for the vat when not in use, which will reduce the losses due to evaporation and to possible overflow in case of rain. However, should evaporation occur there will be very little loss as far as the disinfectant is concerned; it simply results in a stronger solution and before it can be used again water will have to be added to replace that evaporated. This is true, providing, of course, that the active ingredients in the dipping solution do not evaporate.

4. **Convenience**: Much time and hard labor can be saved in the dipping process by the proper arrangement of certain details. The following suggestions demand attention: (a) A dumping platform facilitates getting a refractory animal into the vat; (b) carefully placed fences make the animal more easily manageable; (c) a sloping exit incline makes it possible for the treated animal to get out thru his own efforts; (d) a ledge or foothold on each side of the pit will be found useful to the attendant who sees that the animals secure the proper treatment; (e) a dipping staff simplifies and makes the work more agreeable for the attendant.

5. **Durability**: A successful vat needs to be made strong and enduring. Ordinarily a vat is subject to severe usage because the animals struggle more or less in the dipping operation. The location of the vat is usually such that it is exposed to the destructive action of the elements, wind, rain, snow, ice and temperature changes. For rigidity and permanency of construction, concrete commends itself.

6. **Serviceability**: It is desirable to have the vat so that it can be used for dipping sheep as well as swine.

7. **Reasonably low first cost**: Considering the amount and quality of service rendered, the cheapest vat is to be preferred.

8. **Minimum cost of upkeep**: Taking into account the amount of service to be secured it is advisable to have a vat that will require the least expenditure for repairs.
LOCATION OF A DIPPING VAT

Often times the dipping vat is placed in the alley-way or a special pen provided for it in the hog house, but most often outdoors.

Suggestions helpful in the determination of the location are:
1. It should be readily accessible from the hog house and yards.
2. It should be provided with drainage away from the pit so as to carry away storm water and to provide dry surroundings.
3. It is best situated in the open sunshine, thus assisting in securing dry and sanitary conditions about the vat.

DETAILS OF CONSTRUCTION

**Vat:** The side walls and floors of this dipping vat, figs. 7, 8, and 9, are made of concrete mixed in the proportions 1 part cement, 2 parts sand and 4 parts pebbles. In the event bank run of a natural mixture of sand and gravel must be used, it should be screened and 1 part of cement added for 2 parts of sand. The pebbles which have been screened out may then be put back into the mixture, provided that the quantity of pebbles is not more than twice the quantity of sand. The walls and floor are usually made from 4 to 6 inches thick.

If care is taken in excavating for the vat the earth can often be used for the outside forms. To secure a good job the forms used on the inside should be tight and rigid; 2-inch lumber finished on the side coming in contact with the concrete is recommended. The inside form should be built so that it can be easily removed after the concrete has set.

The addition of reinforcement will make the vat more durable and will tend to prevent the formation of cracks that might occur thru settlement or freezing. Ordinary woven wire fencing in the floor and walls has been found ample for reinforcing purposes. However, care should be taken that the floor and side walls are securely tied together with the reinforcing. This is accomplished by carrying the fencing down one side of the vat, across the floor and up the other side.

**Dripping Platform:** Concrete of the same quality and specifications is used here as for the vat itself. This platform is made with a fall of 1 inch to the foot toward the vat. It should be grooved so the animals will have a firm foothold. The grooves are utilized to carry the runoff liquid back to the pit.

**Dumping Platform:** Planks are used for making the dumping platform, which swings on a pipe or shaft attached to it with U-bolts. The bolts for holding the bearings are embedded in the concrete at the time of pouring. The cleats on the platform are placed on the under side so there will be no obstruction to arrest the sliding animal.
Swinging Blind: The blind is made in a manner similar to the dumping platform.

Fences: A board fence made with common posts and fence boards will be found satisfactory. A strong, small mesh woven wire fence may be used.

BILL OF MATERIAL AND ESTIMATE OF COST**
(Figs. 7, 8, and 9)

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** On basis of approximate prices 1918. The bill of material is the constant basal guide—figure from it.

(*) Estimate does not include lumber for forms or fencing material, nor labor for fence.
The movable fence shown in figs. 10, 11, and 12 has been for a number of years successfully used at the Iowa Agricultural Experiment Station. It is easily and quickly constructed and costs no more than an ordinary board fence.

Some of the special useful features of such a fence are:

1. It can be taken down, moved to a new location and set up in a short time.
2. It can be packed away when not in use, and thus be protected from the weather, thus prolonging its period of usefulness.
3. It is specially adapted for use in connection with movable hog houses and farrowing pens, making the erection of an exercise yard adjacent to the pen for each sow and her litter a simple matter.
4. It can be erected on frozen ground.
5. It may be made into a swine or sheep creep thru use of special panels in the fence. (See fig. 13).
6. Its panels make handy emergency gates, pen partitions, racks, hurdles, shade roof forms for straw covering, and so forth.

CONSTRUCTION DETAILS

Durability and economy and simplicity in construction are desirable features in a movable fence. Setting up, taking down and moving the fence, as well as the wear and tear of actual service, demand that the fence be firm and rigid. As shown in figs. 10, 11, and 12 the hurdles
and standards are made of 1 x 6 inch boards throughout. White pine, yellow pine, fir and cypress are the woods commonly used for this purpose; of these yellow pine is the least permanent when exposed to weather conditions. Fir and cypress are the most substantial but are somewhat more expensive. White pine is light, and handy for this reason; the white pine also stands the weather quite well.

Figs. 11 and 12 show a quick and easy method of making the hurdle and standard. Wooden blocks are nailed to the barn or driveway floor and all the pieces, cut to specified length, are laid in place and then nailed together. An easy way to determine the proper spacing of the guide block is to place them after the first standard or hurdle has been made by laying the completed sample on the floor and then nailing the blocks in the positions indicated.

Fig. 11. Pattern for making hurdles.

Fig. 12. Details of hurdle standards.
BILL OF MATERIAL AND ESTIMATE OF COST **
(Figs. 10, 11, and 12)

One Hurdle:
4 pcs. 1” x 6” x 12’ ± 2 W. P. boards for cross bars @ $52 per M. 1.15
1 pc. 1” x 6” x 10’ ± 2 W. P. boards for cleats @ $52 per M.…… 0.26

*One Standard:
1 pc. 1” x 6” x 16’ ± 2 W. P. boards for legs and braces @ $52 per M. .42
1 # 8d nails @ 6c............................................. .06

Cost of material............................................ 1.89
Labor estimate 2 hrs. @ 60c.............................. 1.20

Total ....................................................... 3.09

* In making a number of standards there will be a saving of lumber if a number of the diagonally cut reinforcing pieces are sawed from the same board.

** On basis of approximate prices 1918. The bill of material is the constant basal guide—figure from it.

CREEP FOR SHEEP AND SWINE

A sheep and hog creep can be readily constructed out of the hurdle by sawing out the second board and filling the space with 1 x 4 inch vertical feed guards, as shown in fig. 13. Rollers used in place of the vertical strips will save wool on the animal’s neck and shoulders when the creep is used for sheep feeding. The method of attaching the rollers is illustrated in figs. 14 and 15. Two methods are here shown, one employing eye bolts for holding the roller and the other having holes bored in the top and bottom cross bars to receive the ends of the roller. Similar rollers can be provided at the top and bottom of the opening and the wool loss reduced to a minimum.

BILL OF MATERIAL AND ESTIMATE OF COST * (fig. 13)

One 12-foot creep for sheep:
3 pcs. 1” x 6” x 12’ ± 2 W. P. boards for cross bars at $52 per M. .94
1 pc. 1” x 6” x 12’ ± 2 W. P. boards for cleats @ $52 per M. .31
1 pc. 1” x 4” x 12’ ± 2 W. P. boards for guards @ $52 per M. .21
1 # 8d nails @ 6c............................................. .06

Cost of material............................................ 1.52
Labor estimate 2 hrs. at 60c.............................. 1.20

Total cost................................................ 2.72

* On basis of approximate prices 1918. The bill of material is the constant basal guide—figure from it.

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Fig. 13. Elevation, creep for sheep and swine.
HOG TURN

A device for turning hogs back and yet allowing horses, cattle, and other stock to pass over is shown in fig. 15. It is nothing more than a log pivoted between two fence posts at such a height that horses and cattle can pass over and yet high enough so that if a hog tries to climb over the log revolves and he falls back. A smooth round log from 8 to 12 inches in diameter is the best suited for this purpose. A log of that description will revolve readily turning the hogs back and assisting the other animals to pass over.

The iron pivots placed in each end of the log can be made from piping or shafting one inch or more in diameter. They should extend well into the log to insure stability. Holes of a size to suit the pivot are bored in the posts for the pivot to turn in.

The portion below the log is built up of 2-inch material to withstand the kicks and prods of the feet of the animals crossing over. Yellow pine or fir should be used in preference to the softer woods for this purpose.

CREEP CONTROL

A feeding pen that will exclude the larger and stronger pigs and yet permit the entrance of the smaller and weaker ones had better be provided if the best and most uniform development of the herd is to be encouraged.
(See fig. 16). There are numerous ways of securing this separation, perhaps the most common of which is the raising of a gate or partition of a pen at such a height that only the smaller pigs can enter.

This method of division is not entirely satisfactory because the size of the pig is apt to increase materially during his stay in the specially provided pen, and when he attempts to return by the way he came, the space he slid thru with ease when he was hungry is liable to be uncomfortably tight after he has filled himself. The squeals of the unfortunate pig brings the whole herd to his rescue, the larger hogs often severely wounding him in the following panic.

In addition to the possible injury to the unlucky pig, the whole herd will be aroused, and made uncomfortable.

A simple device that eliminates the objectionable features of the ordinary creep is shown in fig. 16. As illustrated, it is made to be used as a pen partition or gate, and the side shown is outside of the creep proper. Openings are provided on each end for the passage of the pigs. The width of this opening is adjusted by shifting the board member marked "opening adjuster" on the plan. (See fig. 16). After the pig has had a hearty meal he will experience no difficulty in getting back, as the spring board or valve will yield enough to permit his passage.

The large pigs are effectively excluded from the special creep pen because the compression spring holds the relief valve firmly in place and thus discourages animals from trying to enter the pen.
A small gate is provided in this design that can be opened, allowing entrance of the grown animals into the special pen in order that they may clean up left over feed.

A different arrangement of the relief valve is secured by placing it in a horizontal position rather than in the vertical position as indicated in the submitted plan. A horizontal placing has the advantage that it provides passage for a number of animals at the same time, but yet is not so positive in its results as the plan described. A rather large pig in returning may so hold the horizontal valve open as to allow the entrance of pigs not wished within the confines of the creep.

**DETAILS OF CONSTRUCTION**

A study of the following specifications and bill of material makes the construction of the creep control an easy process.

**Framing:** A substantial frame is needed, as this creep is subject to severe usage. A frame made out of 2 x 4 material securely bolted together has been found satisfactory. Yellow pine, fir and the harder woods are preferable to the softer ones.

**Opening adjuster:** It is well to use oak or maple or some similar hard and tough wood for this member. A winged nut used in place of the square nuts shown in the plan will facilitate and expedite the adjustments of the width of opening. (See fig. 17.)

**Spring door or valve:** Like the opening adjuster, this detail is preferably made out of oak or maple. The compression spring that controls the valve can very often be found in the scrap heap about the machine shed or shop of the average farmstead. Instead of using a compression spring for closing the door a tension spring or a wagon or buggy spring may be utilized for this purpose.

**BILL OF MATERIAL AND ESTIMATE OF COST**

(Figs. 16 and 17)

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<th>Item</th>
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<td><strong>Cost of material</strong></td>
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</table>
HANDY HOG HURDLE

A small, handy, individual panel of some sort furnishes one of the most effective means for driving or turning hogs. The hog is not a very tall animal and sees things mostly near the ground. A hurdle held near the ground looks more like a barrier to him than a pair of waving arms. Such a hurdle should be light in weight and not too large so that it can be easily and quickly handled. (See fig. 18).

BILL OF MATERIAL AND ESTIMATE OF COST* OF THE HANDY HOG HURDLE. (Fig. 18)

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* On basis of approximate prices 1918. The bill of material is the constant basal guide—figure from it.

BARREL HOG WATERER

A hog waterer made out of a barrel and a few planks is shown in fig. 19. The planks are fitted together so as to form a box or trough, in which the barrel is placed. This trough is usually made square and of such size that there will be a 5-inch drinking space between the barrel and the side of the trough. The trough corners are filled so that the pigs cannot lie in the trough. Sometimes the trough is made out of concrete. A circular trough can then be readily constructed by making the trough forms out of sheet iron or metal.

The barrel used for this purpose must be air tight or the trough will be flooded. A hole is bored in the barrel about 3 inches from the bottom which forms an outlet from the water supply in the barrel to the drinking trough. This hole is left open at all times except when the barrel is being filled, when it should be tightly stoppered. When the water level goes below this hole the barrel takes air and the water comes out from said hole until the water level is above it, when the flow ceases. This is therefore an automatic waterer—practically fool proof if the barrel is kept tight.

In the top of the barrel is a hole for filling. The barrel must be filled to running over when this hole is stoppered. The plug must be inserted in the water entrance inlet before the stopper is taken out of the water feed hole.

TANK HOG WATERER

A hog waterer suitable for use in connection with a tank is herewith shown, (see fig. 20). It consists of a float chamber where the water supply is regulated and a trough with drinking holes.
Fig. 19. Plan and elevation, barrel hog waterer.

Fig. 20. Plan and section, tank hog waterer for summer use.
The advantages of this type of waterer are:
1. It can be made almost frost proof. By placing the top of the trough flush with the ground the chances of freezing are much reduced. In very cold weather the float chamber and all but one of the drinking holes can be covered with earth, straw or manure and the cold will be excluded.
2. This waterer can be made to have a capacity according to the size of the herd, since the length of the trough and consequently the number of drinking holes is optional with the builder. One drinking hole will accommodate from 20 to 50 shots under ordinary conditions.

DETAILS OF CONSTRUCTION

A tank hog waterer can be made either out of concrete or plank at the owner's convenience. If lumber is used, fir or cypress is advised because of their decay resisting qualities.

Float Chamber: A valve float is employed to regulate the water supply. (See fig. 21). It should be adjusted so that the water comes up about half way in the drinking holes. The inlet hole in which the rubber stopper fits must be smooth and should be tapering to conform to the shape of the stopper. The cover to the float chamber is hinged to make the parts readily accessible.

Trough: The pipe connection between the float chamber and the trough is placed several inches above the floor in order that it will not be clogged because of the dirt and rubbish that is bound to accumulate on the trough floor. The drinking holes are cut bevelled 5 inches in diameter on top and 4 inches on the bottom. The hole is made small enough to prevent small pigs from falling in the trough. A cover is placed on the trough for convenience in cleaning.

HOG WATERER FOR PRESSURE SYSTEM

A hog waterer that is suitable for use in connection with a water system where there is some pressure is illustrated in fig. 22. It is made up of a float chamber and a drinking trough.

DETAILS OF CONSTRUCTION

Float Chamber: The float chamber is made roomy enough so that a man can work handily at it. The walls, floor and top are made out of concrete mixed in the proportions 1 part cement preferably to 2 parts clear sand and 4 parts clean broken stone or clean pebbles. If bank run gravel must be used, it should be screened and 1 part of cement added.
for 2 parts of sand. The pebbles which have been screened out may then be put back into the mixture, provided the quantity of pebbles should not be more than twice the quantity of sand. Reinforcement with woven wire fencing is recommended in all cases. The walls are made 4 inches thick except where the water supply pipe enters, at which place the thickness is increased to 8 inches to secure water tightness.

A cut off valve is placed just inside of the chamber for the operator's convenience should the float require attention or repairing. The valve stem is made to reach to the top of the chamber where it can easily be reached from the outside.

The water supply is regulated by a ball type of float valve and a tank float not less than 12 inches in diameter. The size of the float and the length of the valve arm will be governed by the amount of water pressure in the pipes.

The cover is made in two sections and is provided with handles to facilitate its removal. A plank cover may be used but a concrete cover is better because it will not become displaced, making the chamber a death trap for little pigs.

**Trough:** The water inlet to the trough is placed several inches above the trough floor so that it will not become clogged with dirt. The inlet is given a downward slope towards the trough so that the dirt can not work back into the float chamber. A check valve placed in the inlet makes it utterly impossible for dirt to work its way back into the float chamber.

A number of troughs located in different yards can be fed from the same float chamber provided the water level is kept the same. The troughs are not necessarily limited to one drinking hole but may be extended to satisfy a number of animals at once.
BARREL PRESSURE SYSTEM HOG WATERER

A slightly different pressure system may be built from oil barrels, (see fig. 22a). It consists of a float chamber and a drinking barrel.

DETAILS OF CONSTRUCTION

Float Chamber. The float chamber is made by setting an oil barrel in the ground so that a small part extends above grade. On level ground this should extend eight to twelve inches above grade. If ground is sloping it should be placed in higher ground and may be completely covered with earth. This is an advantage during freezing weather, also it is out of harm's way.

On oak stave barrel is desirable. Oil barrels, either linseed or kerosene, may be used to an advantage; since the staves are filled with oil, the barrels will last much longer.

A cut-off valve is placed near barrel as shown in section. This valve may be placed in barrel if supply pipe runs into barrel from side or the supply is placed in a horizontal position in chamber as shown in fig. 22. In many cases it is necessary to place supply three or more feet under ground so it is below frost line.

The water supply is regulated by a regular tank float and valve.

A concrete cover is shown. This should be reinforced with wire mesh or rods. A handle will help in removing lid.

Drinking Barrel. This barrel is similar to the float chamber barrel except that it must be set so about six inches extends out of ground.

A concrete cover with small opening will enable hogs drinking from barrel and prevent small pigs falling in. A screen made from hardware cloth or small mesh poultry netting could be placed a few inches under surface of water below opening as a precautionary measure to save small pigs. It would also prevent cobs, leaves and litter from settling in barrel.

A return bend will prevent silt or dirt from settling in supply pipe.

This system can be used during all seasons. The float chamber may be entirely underground or it may be covered over with straw or manure. It would be necessary to place a guard about opening to prevent litter falling in drinking hole.

Any number of drinking barrels may be served by the one float chamber. The water level in all barrels would be the same as in the float chamber.

Fig. 22a. Section, all-weather pressure hog waterer float control.
SMALL TROUGH FOR FARROWING PENS

Troughs used in farrowing pens are of two general types: (a) A long trough extending thru a number of adjacent pens and supplying a number of sows. (b) A small trough in each pen. (See fig. 23).

Advantages of the individual trough, compared with the long trough, may be stated as follows:

1. *More suitable for farrowing pens* in that (a) the feed and management of sows at farrowing time must, to secure the best results, be according to the individual needs of each animal and this is accomplished best where each sow has a separate trough. (See fig. 23). Sows require different care and feeding from one day to another just previous and subsequent to the time of farrowing. It is poor practice to indiscriminately dump food and water in a long trough that supplies a number of animals, some of which are due to farrow soon and the others with litters varying from a few hours to several weeks old. (b) At farrowing time it is important that sows be kept quiet. A small trough will help secure such conditions. Filling a long trough which runs thru many pens will disturb the animals the entire length of the trough, and in the end not secure a fair allotment of feed to the various animals.

2. *Promotes sanitation*. It is easily and quickly removed from the pen and cleaned. It is practically impossible to lift a long heavy trough out of the pens. Damp musty conditions must necessarily prevail around the sides and bottom of a trough that does not have its location frequently changed.

3. *Promotes health and vigor of the young pigs*. Because the small trough can be easily cleaned out there will not be souring and fermenting food left untouched from one meal to another, which, when eaten by the sow, often causes digestive disturbances and scour in the small pig.

4. *Easy to move*. Moving a long heavy water soaked trough is a difficult and disagreeable task. Concrete troughs even when made in small units are cumbersome to handle. A small wooden trough does not have these objectionable features.

**DETAILS OF CONSTRUCTION**

Troughs when in use are damp most of the time and they should for this reason be made out of such decay resistant materials as fir or cypress. Two-inch material is preferable to one-inch material because the restive sow may root the trough about the pen. A bolt thru each end of the trough will go far to make it rigid and will add much to its permanency.
BILL OF MATERIALS AND ESTIMATE OF COST*

Trough for Farrowing Pen. (Fig. 23)

2 pcs. 2" x 8" x 2' 6" ±1 fir trough sides @ $42 per M } ............ .40
2 pcs. 2" x 8" x 1' 0" ±1 " ends @ $42 per M } ............. .13
1 pc. 2" x 12" x 1' 6" ±1 " floor @ $42 per M .............. .20
½ # 16 d nails @ 6c ......................................... .03

Cost of materials ......................................... .76
Labor estimate, 1 hr. @ 60c ................................... .60

Completed trough ........................................... 1.36

* On basis of approximate prices 1918. The bill of material is the constant basal guide — figure from it.

CONDIMENT BOX

An inexpensive box in which salt, charcoal, sulfur and other condiments can be fed is shown in fig. 24. The small opening for the hog to eat thru reduces the waste at feeding time to a minimum. Being practically inclosed the condiments are kept clean and palatable and are not wastefully trampled into the mud or dust.

The specifications and details for construction are given in the drawings (see fig. 24) combined with the following bill of materials.

BILL OF MATERIALS AND ESTIMATE OF COST*

Condiment Box. (Fig. 24)

2 pcs. 1" x 8" x 12' ±1 fir @ $52 per M .......................... .84
1 pc. 1" x 4" x 16' ±1 fir @ $52 per M .......................... .26
1# 8d nails @ 6c ................................................ .06

Cost of materials ............................................. 1.16
Labor estimate, 2 hrs. @ 60c .................................. .12

Total cost .................................................. 2.36

* On basis of approximate prices 1918. The bill of material is the constant basal guide — figure from it.
A box into which different feeds can be thrown and mixed is a useful and time-saving appliance for the feed room. (See fig. 25). Where the feed lot and the feed storage are some distance apart it is well to mount the box on wheels and make a cart out of it to haul the feed.

There are a number of factors to be considered in the design and construction of a feed mixing box.

1. **Size of the box.** For a herd of from 50 to 100 swine a box 4 ft. wide and 6 ft. long will be found ample. (See fig. 25). From 5 to 10 bushels can be readily mixed on this space at one time.

2. **Floor.** The floor should be smooth and tight; smooth to facilitate scooping and tight to prevent leakage.

3. **Walls or sides of the box.** The box will have sufficient capacity if made 12 inches high. This height will not interfere with operator’s scooping hand when turning the grain.

4. **Weight of the box.** A 2-inch by 4-inch frame covered with 1-inch material makes a box that is strong enough under average conditions and yet which is not too heavy to move about easily. A convenient way to save space is to upend the box against the wall.

**BILL OF MATERIALS AND ESTIMATE OF COST**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pc. 2&quot; x 4&quot; x 18' Y.P. framing</td>
<td>@ $40 per M.</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>1 pc. 1&quot; x 12&quot; x 16' Y.P. board</td>
<td>@ $55 per M.</td>
<td>.88</td>
<td></td>
</tr>
<tr>
<td>5 pcs. 1&quot; x 10&quot; x 6' 0&quot; Y.P. shiplap floor</td>
<td>@ $55 per M.</td>
<td>1.38</td>
<td></td>
</tr>
<tr>
<td>1# nails 8d and 16d</td>
<td>@ 6c</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td><strong>Total cost</strong></td>
<td></td>
<td><strong>4.00</strong></td>
<td></td>
</tr>
</tbody>
</table>

* On basis of approximate prices 1918. The bill of material is the constant basal guide — figure from it.
HOG RINGING CRATE

A crate that has been successfully used at the Iowa State Agricultural Experiment Station for holding swine while the ringing operation is being performed is illustrated in figs. 26, 27, and 28. It works on the same principle as a stanchion. The hog on entering the crate is encouraged to place its head thru the central opening between the 2 x 4" uprights which are fixed so that they can be closed together, thus trapping and holding him in the crate from which his snout is projected. Ringing can be readily done, and other operations also carried out successfully.

DETAILS OF CONSTRUCTION

A ringing crate must be built very rigid and substantial to withstand the pulls, jerks and tugs of the struggling animal. A frame of 2 x 4 inch white pine, yellow pine or fir firmly nailed and bolted together is to be advised. Yellow pine or fir are preferable because nails hold better in them than in the softer white pine.

The sides of the crate are lined and the top is covered with 1 x 4 inch boards. (See fig. 27). Hemlock, pine and fir of the cheaper grades are suitable for this purpose.

Fig. 26. Hog ringing crate.
Fig. 27. Side elevation, hog ringing crate.

Fig. 28. End elevation and details, hog ringing crate.
The stanchions (figs. 26 and 28) are best made out of yellow pine, fir or some hard and substantial wood. Extra holes bored in the bottom cross piece where the stanchion is pivoted makes adjustment possible to accommodate different sized hogs. A catch and rack device on the cross bars near the top of the stanchion makes the stanchion automatic in locking and the large number of notches in the rack affords a wide range in the size of animals that can be tied without making the extra adjustment described above. This device must be made of hard maple or some close grained tough wood that will not split easily.

**BILL OF MATERIALS AND ESTIMATE OF COST**

Hog Ringing Crate. (Figs. 26, 27, and 28)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Unit Price</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 pcs. 2&quot; x 4&quot; x 10'</td>
<td>Y.P. or fir framing</td>
<td>@ $40 per M.</td>
<td>30</td>
<td>$120</td>
</tr>
<tr>
<td>2 pcs. 2&quot; x 4&quot; x 8'</td>
<td>Y.P. or fir stanchions</td>
<td>@ $40 per M.</td>
<td>2</td>
<td>$80</td>
</tr>
<tr>
<td>1 pc. 1&quot; x 4&quot; x 14'</td>
<td>Y.P. boards</td>
<td>@ $82 per M.</td>
<td>1</td>
<td>$82</td>
</tr>
<tr>
<td>1 pc. 1&quot; x 10&quot; x 16&quot;</td>
<td>Y.P. floor boards</td>
<td>@ $52 per M.</td>
<td>1</td>
<td>$52</td>
</tr>
<tr>
<td>1 pc. 2&quot; x 4&quot; x 4&quot; 6&quot;</td>
<td>Hard maple for rack</td>
<td>@ $100 per M.</td>
<td>1</td>
<td>$100</td>
</tr>
<tr>
<td>2 pcs. 1&quot; x 2&quot; x 9&quot;</td>
<td>For catch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 mach. bolts ¼&quot; x 4&quot;</td>
<td>@ 35c per doz.</td>
<td></td>
<td>9</td>
<td>$3.15</td>
</tr>
<tr>
<td>4 &quot; ½&quot; x 6&quot;</td>
<td>@ 45c per doz.</td>
<td></td>
<td>4</td>
<td>$1.80</td>
</tr>
<tr>
<td>3 pins ¼&quot; x 9&quot;</td>
<td>@ 15c</td>
<td></td>
<td>3</td>
<td>$0.45</td>
</tr>
<tr>
<td>1# 8d nails @ 6c</td>
<td></td>
<td></td>
<td>1</td>
<td>$0.06</td>
</tr>
<tr>
<td>1# 16d nails @ 6c</td>
<td></td>
<td></td>
<td>1</td>
<td>$0.06</td>
</tr>
</tbody>
</table>

Cost of materials: **$3.82**
Labor estimate, 8 hrs. @ 60c: **$4.80**

Complete crate: **$8.62**

*See similar materials elsewhere.

**HANDY HOG CRATE**

A hog crate is an almost indispensable part of the equipment used in swine production. It provides one of the easiest, quickest, and safest ways of transporting hogs from place to place. A crate light in weight has advantages over a heavy one in lifting and carrying about and in reduced transportation rates. Handles placed conveniently on each end of the crate facilitate handling and usually less difficulty will be met in Fig. 29. Crate for 200 lb. hog.
crating and uncrating the porker if easy sliding gates are located on each end. (See fig. 29).

CONSTRUCTION DETAILS

Altho it is desirable to have a crate light in weight, yet the wear and tear in service demands that it be firm and rigid in construction. (See fig. 29). A much stronger frame can be built if bolts are used in the corners and other important joints in preference to nails. Either white or yellow pine is a satisfactory material. The latter material, altho not as weather resistant as the former, can be used because the crate can be placed under shelter most of the time.

BILL OF MATERIALS AND ESTIMATE OF COST*

Hog Crate, (Fig. 29)

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 pcs. 1&quot; x 4&quot; x 12&quot; #2 W. P. boards</td>
<td></td>
<td>$52 per M.</td>
<td>1.25</td>
</tr>
<tr>
<td>2 pcs. 1&quot; x 8&quot; x 14&quot; #2 W. P. boards</td>
<td></td>
<td>$52 per M.</td>
<td>.99</td>
</tr>
<tr>
<td>2#d 8d nails</td>
<td></td>
<td>6c</td>
<td>.12</td>
</tr>
</tbody>
</table>

Cost of materials: .............................................. 2.36
Labor estimate 2 hrs. @ 60c.................................. 1.20

Total cost ..................................................... 3.56

*On basis of approximate prices 1918. The bill of material is the constant basal guide — figure from it.
HOG CARRY-ALL

The carry-all shown in figs. 30 and 31 is a contrivance that finds many uses on a stock farm. As shown in fig. 30 the carry-all is assembled ready to receive a sow with her litter of a few hours old, and transport them to other quarters. There is an especial need for such a device on farms employing small movable hog houses or on farms that have a large central house and a number of movable houses that are used in connection with it. The sow and her young can be moved from one movable house to another or from the large central house to a movable house as the case may be.

In a very short time the crate can be removed and a platform with runners is available. This drag, stone boat, or float as you choose to call it, will be found convenient for moving heavy articles because of the short lift necessary to put such article on the float.

DETAILS OF CONSTRUCTION

The many and severe uses to which a carry-all is subject demand that it be well made and durable. The removable crate (see figs. 30 and 31) is framed with 2 x 4-inch material securely bolted together. This frame is covered with 1 x 4-inch boards. In this way a rigid and yet not too heavy crate is obtained. Either white or yellow pine is a suitable material out of which to make the crate.

The stone boat or float is made by spiking 2-inch material on 4-inch runners. (See fig. 31). Fir or some other durable wood that is not easily susceptible to decay when coming in contact with the damp soil is advisable for constructing the float.

Fig. 31. End view and details, hog carry-all.
**PORTABLE HOG LOADING CHUTE**

An essential of a swine raiser's equipment is a small chute for loading the swine on the wagon. (See figs. 32 and 33). Many types of chutes are in use. Perhaps the simplest type is one consisting of a platform with a fence or railing on each side. Probably the most common type is a built-up enclosed inclined platform similar to figs. 32 and 33. However, figs. 32 and 33 have certain features not commonly found, namely:

1. It is made portable and is equipped with handles to facilitate its removal from one location to another.
2. It has a hinged platform at the top of the incline (see fig. 32) that provides a safe delivery of the hog into the hog rack or wagon and at the same time adapts the chute to wagons of different floor heights.
3. It has two small hinged gates at the top that are arranged to swing together to close the chute or to swing into and against the sides of the wagon rack closing the opening between the chute and the rack which so frequently gives trouble in loading swine.

**CONSTRUCTION DETAILS**

A loading chute must have rigidity and durability to withstand the loading of heavy animals and the wear and tear resulting in service and in moving from place to place.

A substantial frame of 2 x 4-inch yellow pine or fir is needed in structures of this type to minimize the tendency toward racking. Good stiff joints can be secured by using %4-inch carriage or machine bolts of the required length at each intersection besides thoroly spiking same.

The running gear or truck (see fig. 32, also 33) can be made from miscellaneous material that can usually be found around the average farm yards. The wheels can vary in diameter from the ones shown in the drawing by changing the location of a bearing on the diagonal brace or

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**BILL OF MATERIALS AND ESTIMATE OF COST**

Hog Carry-All. (Figs. 30 and 31)

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 pcs. 2&quot; x 10&quot; x 14&quot; fir floor @ $40 per M.</td>
<td></td>
<td>1.87</td>
</tr>
<tr>
<td>1 pc. 4&quot; x 4&quot; x 16&quot; fir runner @ $42 per M.</td>
<td></td>
<td>0.90</td>
</tr>
<tr>
<td>3 pcs. 2&quot; x 4&quot; x 12&quot; Y. P. framing @ $40 per M.</td>
<td></td>
<td>0.96</td>
</tr>
<tr>
<td>2 pcs. 2&quot; x 4&quot; x 14&quot; Y. P. framing @ $40 per M.</td>
<td></td>
<td>0.75</td>
</tr>
<tr>
<td>6 pcs. 1&quot; x 4&quot; x 12&quot; W. P. boards, sides and top @ $52</td>
<td></td>
<td>1.25</td>
</tr>
<tr>
<td>3 pcs. 1&quot; x 4&quot; x 14&quot; W. P. boards, ends and gate @ $52</td>
<td></td>
<td>0.73</td>
</tr>
<tr>
<td>1 pc. 1&quot; x 4&quot; x 16&quot; W. P. boards, cross braces @ $52</td>
<td></td>
<td>0.27</td>
</tr>
<tr>
<td>8 bolts %4&quot; x 4&quot; @ 35c per doz.</td>
<td></td>
<td>0.24</td>
</tr>
<tr>
<td>6 bolts %4&quot; x 6&quot; @ 45c per doz.</td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td>4 eye bolts %4 x 2½&quot; @ 10c each.</td>
<td></td>
<td>0.40</td>
</tr>
<tr>
<td>2 hooks @ 10c each.</td>
<td></td>
<td>0.20</td>
</tr>
<tr>
<td>1# 8d nails @ 6c.</td>
<td></td>
<td>0.06</td>
</tr>
<tr>
<td>2# 16d nails @ 6c.</td>
<td></td>
<td>0.12</td>
</tr>
</tbody>
</table>

Cost of materials: 7.98
Labor estimate 5 hrs. @ 60c: 3.00
Completed carry-all: 10.98

*On basis of approximate prices 1918. The bill of material is the constant basal guide—figure from it.*
by lengthening or shortening the wooden supporting arms. (See fig. 32). Old cultivator wheels are splendid for this purpose. The details for constructing the supporting arms and self-locking stay or prop are clearly shown in the detailed drawing. (See fig. 33).

It is desirable to have some method by which the weight can be taken off the wheels and the chute be allowed to rest on the ground to insure stability while loading. This is accomplished in the chute described by tapping the top end of the wrought iron prop or stay lifting it so that the notch and the bolt become disengaged and the running gear can be swung backward until the axle shaft comes in contact with the floor. In this way the wheels and axle act as a third support for the floor. The dotted line in fig. 32 shows the position of the wheels when the chute is in position for loading. To mount the outfit on trucks lift up the front end and the wheels will swing downward and forward and automatically lock.

The general details of construction and the materials entering in same are fully described in drawings and specifications and the following bill of materials.

**BILL OF MATERIALS AND ESTIMATE OF COST**

**Portable Hog Loading Chute.** (Figs. 32 and 33)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Material</th>
<th>Rate per M.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pc. 2&quot; x 4&quot; x 16'</td>
<td>1</td>
<td>Y.P. or fir framing</td>
<td>$40</td>
<td>$44</td>
</tr>
<tr>
<td>1 pc. 2&quot; x 4&quot; x 12'</td>
<td>1</td>
<td>&quot; &quot; &quot;</td>
<td>$40</td>
<td>$32</td>
</tr>
<tr>
<td>2 pcs. 2&quot; x 4&quot; x 10'</td>
<td>1</td>
<td>&quot; &quot; &quot;</td>
<td>$42</td>
<td>$28</td>
</tr>
</tbody>
</table>
2 " 2" x 8" x 18' #1 fir floor @ $42 per M................................. 2.02
1 " 1" x 6" x 18' #2 Y.P. sides, gate @ $55 per M...................... .50
2 " 1" x 4" x 16' #2 " " @ $55 per M................................. .59
4 " 1" x 4" x 14' #2 " " @ $55 per M................................. 1.05
2 " 1" x 4" x 2" hard maple arms } .................................... .10
4 " 1" x 2" x 6" " " bearings } .......................................
2 " 1" piping 4' 6" long @ 13c per ft.................................. 1.17
4 mach. bolts 3/4" x 61/2" @ 45c per doz.............................. .15
2 cotter pins 1/4" x 21/2" @ 10c each............................... .20
2 mach. bolts 3/4" x 4" @ 35c per doz.............................. .06
2 lag screws 1/4" x 2" @ 8c each.................................. .16
2 pcs. wrought iron 3/4" x 2" x 2' prop {81/2 # @ 7c........ .60
2 " 1/2" x 2" x 6" strap, } ...........................................
1 pr. 6' strap hinges.................................................. .25
2 pr. 4' strap hinges.................................................. .40
Hook and staples..................................................... .25
3# 8d nails @ 6c...................................................... .18
2# 16d nails @ 6c...................................................... .12

Cost of materials..................................................... 8.84
Labor estimate 20 hrs. @ 60c........................................ 12.00

Total cost............................................................ 20.84

** On basis of approximate prices 1918. The bill of material is the constant basal
guide—figure from it.
* Wheels not figured in estimate.

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**Fig. 33. End view and details, portable loading chute.**
LARGE LOADING CHUTE

A chute suitable for loading and unloading livestock on railroad stock cars is presented in figs. 34, 35, and 36. This type of structure must be very rigidly constructed to withstand the severe usage occasioned by the loading of heavy and refractory animals.

Because of its size and shape a chute of this type will under ordinary circumstances be built in the open and will therefore be exposed to all sorts of weather. For this reason it should be made from materials that are durable and weather resistant. Fir, white pine, and cypress are materials that are quite permanent and decay resistant under the changing weather conditions. Fir is specified in the accompanying bill of materials because of its toughness, adapting it to resist the wear and tear of service, as well as for its lasting qualities.

BILL OF MATERIALS AND ESTIMATE OF COST*

Large Loading Chute. (Figs. 34, 35, and 36)

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 pcs. 4&quot; x 6&quot; x 18' fir runners</td>
<td>1</td>
<td>$42 per M.</td>
<td>$3.02</td>
</tr>
<tr>
<td>2 &quot; 4&quot; x 4&quot; x 16' posts</td>
<td>1</td>
<td>$42 per M.</td>
<td>$1.66</td>
</tr>
<tr>
<td>4 &quot; 2&quot; x 12&quot; x 16' floor</td>
<td>1</td>
<td>$40 per M.</td>
<td>$5.38</td>
</tr>
<tr>
<td>1 &quot; 2&quot; x 12&quot; x 18'</td>
<td>1</td>
<td>$40 per M.</td>
<td>$1.12</td>
</tr>
<tr>
<td>1 &quot; 2&quot; x 12&quot; x 12'</td>
<td>1</td>
<td>$40 per M.</td>
<td>$0.96</td>
</tr>
<tr>
<td>4 &quot; 2&quot; x 8&quot; x 18' cross ties</td>
<td>1</td>
<td>$40 per M.</td>
<td>$3.84</td>
</tr>
<tr>
<td>9 &quot; 2&quot; x 6&quot; x 16' sides to chute</td>
<td>1</td>
<td>$40 per M.</td>
<td>$5.76</td>
</tr>
<tr>
<td>2 &quot; 2&quot; x 6&quot; x 14' uprights and cleats</td>
<td>1</td>
<td>$40 per M.</td>
<td>$1.12</td>
</tr>
<tr>
<td>7 &quot; 2&quot; x 6&quot; x 12' for sides and gate</td>
<td>1</td>
<td>$40 per M.</td>
<td>$3.36</td>
</tr>
<tr>
<td>3 &quot; 2&quot; x 4&quot; x 14' toe holds</td>
<td>1</td>
<td>$40 per M.</td>
<td>$1.12</td>
</tr>
<tr>
<td>2 pr. 8&quot; heavy W. I. strap hinges</td>
<td>1</td>
<td>$35 c.</td>
<td>$0.70</td>
</tr>
<tr>
<td>2 machine bolts 3/4&quot; x 6&quot; @ 7c.</td>
<td>1</td>
<td>$0.14</td>
<td>$0.14</td>
</tr>
<tr>
<td>2 pr. hooks and staples or hasp and staples</td>
<td>1</td>
<td>$0.30</td>
<td>$0.30</td>
</tr>
<tr>
<td>10 # 6d nails @ 6c.</td>
<td>1</td>
<td>$0.60</td>
<td>$0.60</td>
</tr>
</tbody>
</table>

Cost of materials........................................$29.08
Labor estimate 16 hrs. @ 60c................................9.60
Completed chute...........................................$38.68

*On basis of approximate prices 1918. The bill of material is the constant basal guide—figure from it.

Fig. 34. Side elevation, platform loading chute.
Fig. 35. Platform loading chute.

Fig. 36. Details, platform loading chute.
ALFALFA RACK FOR SWINE

A rack affords a practical and economical method of feeding alfalfa hay to swine. (See fig. 37). The leaves and much of the best part of the hay are eaten, whereas they might otherwise be wasted. A tight trough at the bottom is essential to catch the leaves and finer particles of the alfalfa that break off in feeding and handling. (See figs. 37 and 38). The trough front of this rack made 6 inches high is an additional factor in saving the alfalfa.

The sides of the rack are placed back of the trough far enough to encourage the hog to use the trough as a place to eat from. (See fig. 38). The 3-inch spacing of the guards allows the hog to pull only so much feed thru as he will clean up. Narrow guards make far more openings and consequently less chance for the alfalfa to become wedged in the upper portions of the rack. To further lessen the danger of clogging, the top of the rack is made wide and the guards are given a steep slope.

DETAILS OF CONSTRUCTION

An alfalfa rack for swine must be strong and well braced to resist the tugging, pulling, and rooting of the hungry animals. Fir, white pine, and cypress should be given preference to other less permanent building materials because the rack will ordinarily be exposed to all kinds of weather

Fig. 37. Alfalfa rack for swine.
weather and will often be filled with moist hay. For specifications and
details of construction see figs. 37 and 38 and bill of materials.

**BILL OF MATERIALS AND ESTIMATE OF COST**

**Alfalfa Rack for Swine. (Figs. 37 and 38)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 pcs.</td>
<td>2&quot; x 4&quot; x 12' fir framing</td>
<td>@ $40 per M.</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td>1 pc.</td>
<td>2&quot; x 4&quot; x 10'</td>
<td>@ $40 per M.</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>2 pcs.</td>
<td>2&quot; x 6' x 10' trough front</td>
<td>@ $40 per M.</td>
<td>.80</td>
<td></td>
</tr>
<tr>
<td>2 pcs.</td>
<td>1&quot; x 12' x 12' or cypress floor</td>
<td>@ $60 per M.</td>
<td>1.44</td>
<td></td>
</tr>
<tr>
<td>7 pcs.</td>
<td>1&quot; x 3' x 18' or W. P. guards</td>
<td>@ $52 per M.</td>
<td>1.61</td>
<td></td>
</tr>
<tr>
<td>2#</td>
<td>8d nails</td>
<td>@ 6c</td>
<td>.12</td>
<td></td>
</tr>
<tr>
<td>2#</td>
<td>16d nails</td>
<td>@ 6c</td>
<td>.12</td>
<td></td>
</tr>
</tbody>
</table>

Cost of materials: 5.95
Labor estimate, 4 hrs. @ 60c: 2.40

Total cost: 8.35

*On basis of approximate prices 1918. The bill of material is the constant basal guide—figure from it.

**ENCLOSED ALFALFA RACK FOR SWINE**

The enclosed alfalfa rack presented in figs. 39, 40, 41, and 42 has all the advantages claimed for the open rack shown in figs. 37 and 38, and offers even greater economy in feeding alfalfa, or clover, or soy-bean hays to swine.

Alfalfa placed in this rack is kept dry and palatable under all weather conditions. The tight roof with its long projecting eaves serves as a
Fig. 39. Two-way alfalfa rack for swine.

Fig. 40. Part elevation and section, enclosed two-way alfalfa rack.
Fig. 41. Section, enclosed two-way alfalfa rack.

Fig. 42. Section, enclosed one-way alfalfa rack.
guard to keep all but driving rains out of the feed trough. The small openings to the trough (see figs. 39 and 40) reduce to a minimum the possibility of wetting by driving rains.

A second factor of economy in this rack is the saving of feed from waste. In addition to the feed saving trough and rack arrangements found in the open type of rack, small openings are provided for the hog to gain access to the feed. Because of these openings the hog eats with its head inside, hence there will be less hay pulled outside and trampled under foot.

There are presented two types of this inclosed rack, a large two or double way feeding from both sides, (figs. 39, 40, and 41) and a smaller one or single way feeding from one side. (Fig. 42).

### BILL OF MATERIALS AND ESTIMATE OF COST *

**Enclosed Alfalfa Rack for Swine — (Two-Way) (Figs. 39, 40, and 41)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pc.</td>
<td>2&quot; x 4&quot; x 16' Y.P. runner</td>
<td>@ $40 per M.</td>
<td></td>
<td>.42</td>
</tr>
<tr>
<td>10 pcs.</td>
<td>1&quot; x 10' x 16' Y.P. shiplap for floor, ends, and roof</td>
<td></td>
<td>@ $55 per M.</td>
<td>7.43</td>
</tr>
<tr>
<td>6 pcs.</td>
<td>1&quot; x 10' x 14' Y.P. shiplap for sides</td>
<td>@ $55 per M.</td>
<td></td>
<td>3.85</td>
</tr>
<tr>
<td>8 pcs.</td>
<td>1&quot; x 4&quot; x 16' Y.P. board for cornice, corner boards, and cleats</td>
<td>@ $55 per M.</td>
<td></td>
<td>1.81</td>
</tr>
<tr>
<td>2 pcs.</td>
<td>1&quot; x 4&quot; x 14' Y.P. boards for cornice, corner boards, and cleats</td>
<td>@ $52 per M.</td>
<td></td>
<td>.48</td>
</tr>
<tr>
<td>9 pcs.</td>
<td>1&quot; x 3&quot; x 12' Y.P. board for feed guards</td>
<td>@ $52 per M.</td>
<td></td>
<td>1.40</td>
</tr>
<tr>
<td>2 pr.</td>
<td>6&quot; heavy strap hinges</td>
<td>@ 25c.</td>
<td></td>
<td>.50</td>
</tr>
<tr>
<td>2#</td>
<td>16d nails</td>
<td>@ 6c.</td>
<td></td>
<td>.12</td>
</tr>
<tr>
<td>5#</td>
<td>8d nails</td>
<td>@ 6c.</td>
<td></td>
<td>.30</td>
</tr>
<tr>
<td><strong>Total cost of materials</strong></td>
<td></td>
<td></td>
<td></td>
<td>16.31</td>
</tr>
<tr>
<td><strong>Labor estimate</strong></td>
<td>10 hrs. @ 60c.</td>
<td></td>
<td></td>
<td>6.00</td>
</tr>
<tr>
<td><strong>Total completed rack</strong></td>
<td></td>
<td></td>
<td></td>
<td>22.31</td>
</tr>
</tbody>
</table>

---

*On basis of approximate prices 1918. The bill of material is the constant basal guide — figure from it.

**Bill of Materials and Estimate of Cost**

**Enclosed Alfalfa Rack for Swine (One-Way) (Fig. 42)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pc.</td>
<td>2&quot; x 4&quot; x 16' Y.P. runners</td>
<td>@ $40 per M.</td>
<td></td>
<td>.43</td>
</tr>
<tr>
<td>6 pcs.</td>
<td>1&quot; x 10' x 16' Y.P. shiplap for sides, roof, floor, etc.</td>
<td></td>
<td>@ $55 per M.</td>
<td>4.40</td>
</tr>
<tr>
<td>5 pcs.</td>
<td>1&quot; x 10' x 12' Y.P. shiplap for sides, roof, floor, etc.</td>
<td></td>
<td>@ $55 per M.</td>
<td>2.75</td>
</tr>
<tr>
<td>2 pcs.</td>
<td>1&quot; x 4&quot; x 16' Y.P. boards for cornice, cornice, cleats, and etc.</td>
<td></td>
<td>@ $52 per M.</td>
<td>.56</td>
</tr>
<tr>
<td>4 pcs.</td>
<td>1&quot; x 4&quot; x 14' Y.P. board for cornice, cornice, cleats, and etc.</td>
<td></td>
<td>@ $52 per M.</td>
<td>.96</td>
</tr>
<tr>
<td>3 pcs.</td>
<td>1&quot; x 3&quot; x 12' Com. board for feed guards</td>
<td></td>
<td>@ $52 per M.</td>
<td>.47</td>
</tr>
<tr>
<td>1 pc.</td>
<td>1&quot; x 3&quot; x 16'</td>
<td></td>
<td>@ $52 per M.</td>
<td>.21</td>
</tr>
<tr>
<td>1 pr.</td>
<td>6&quot; heavy strap hinges</td>
<td>@ 25c.</td>
<td></td>
<td>.25</td>
</tr>
<tr>
<td>1#</td>
<td>16d nails</td>
<td>@ 6c.</td>
<td></td>
<td>.06</td>
</tr>
<tr>
<td>2#</td>
<td>8d nails</td>
<td>@ 6c.</td>
<td></td>
<td>.12</td>
</tr>
<tr>
<td><strong>Total cost of materials</strong></td>
<td></td>
<td></td>
<td></td>
<td>10.21</td>
</tr>
<tr>
<td><strong>Labor estimate</strong></td>
<td>7 hrs. @ 60c.</td>
<td></td>
<td></td>
<td>4.20</td>
</tr>
<tr>
<td><strong>Completed rack</strong></td>
<td></td>
<td></td>
<td></td>
<td>14.41</td>
</tr>
</tbody>
</table>

---

*On basis of approximate prices 1918. The bill of material is the constant basal guide — figure from it.