Plank Frame Barn Construction

Ben R. Eldredge
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By John L. Shawver

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PREFACE.

THIS matter was originally presented in the columns of *Carpentry and Building,* in response to continued requests for information concerning the plank frame system of construction, which for many years past has been growing in popularity in various sections of the country, more particularly the Central West. The author has given a great deal of attention to the subject, having been associated with the construction of plank frame barns for a long period, and he is, therefore, competent to discuss the matter from the standpoint of the practical builder. Barns of the character indicated have been extensively erected through various sections of the West, and it is with a view of presenting valuable data concerning the method of construction that this little work has been compiled. In the course of his articles the author points out the advantages of the form of construction referred to and describes wherein there is a saving of time, labor and material, an important consideration, especially in sections of the country where timber for building purposes is not in plentiful supply.

Constructing a Plank Frame Barn.

By John L. Shawver.

The growing interest in the plank frame barn, as manifested by inquiries which have emanated from many quarters, calls for specific information which will enable every builder and farmer to avail himself of the many advantages offered by this system of construction. The system has been in use in Central Ohio for the past 20 years, and has been rapidly growing in favor wherever people have had an opportunity of investigating its merits. During these years the system, which was at first somewhat crude and undeveloped, has been gradually improved, until to-day, after many of the most severe tests, it is believed to have reached very near perfection as regards economy of material and labor, strength of frame, convenience of arrangement and durability of structure. The advantages offered by this method of construction are:

1. A saving in timber of from 40 to 60 per cent.—a not small item in many localities where timber for building purposes has become a scarce article.

2. An opportunity to employ for the building of barns timber that could scarcely receive consideration if solid timber mortise and tenon frames were to be built.

3. A saving in the cost of sawing, cutting and hauling of about one-half of the timber.

4. A saving in cost of framing, ranging from 50 to 90 per cent., according to the plan of the building and the efficiency of the builders.

5. In cases where farmers' wives are expected to board and lodge the builders, a saving in labor and vexation of two or three weeks' unnecessary time for framing old style barns.

6. A riddance of practically all of the interior timbers. which are usually an interference with the use of the horse forks and hay slings, as well as a source of constant vexation at threshing time and all other times when the barn is in use.

7. The full benefit of the self supporting arch roof, a construction of combined triangles, long braces and perpendicular timbers.

8. Durability, arising from the fact that there are no mortises in which moisture may accumulate and cause the tenons to decay.

9. The strongest possible support for the track of the hay fork or sling.

10. Ease of addition to the main building should any ever be required.

Changes and variations in plans need cause no loss of timber, as is certain to be the case where a bill of materials has already been placed on the ground. If a piece of timber is too long the piece cut off is used at some point, though perhaps not over 18 inches in length and containing only 2 or more feet of stuff. Suppose we cut off 18 inches of an 8 x 8 we have lost 8 feet of lumber, which is worthless for any purpose save for fire wood. If a given piece is too short it is spliced in a moment's time and no loss of strength is sustained. In an old style framing if a piece was too short it required considerable labor to remedy the matter, and a loss of both timber and strength was sustained.

Herewith are illustrated two bents of a barn, Fig.

1, showing a plain gable barn with basement. Referring to it, 1 1 1 are posts of basement bent, consisting of five 2 x 8 planks, two of which are 8 feet long and three of which are 7 feet 2 inches. Upon these rest the joist bearers, marked 2 2 2, which consist of three planks 2 x 10, extending lengthwise of the barn. These base-

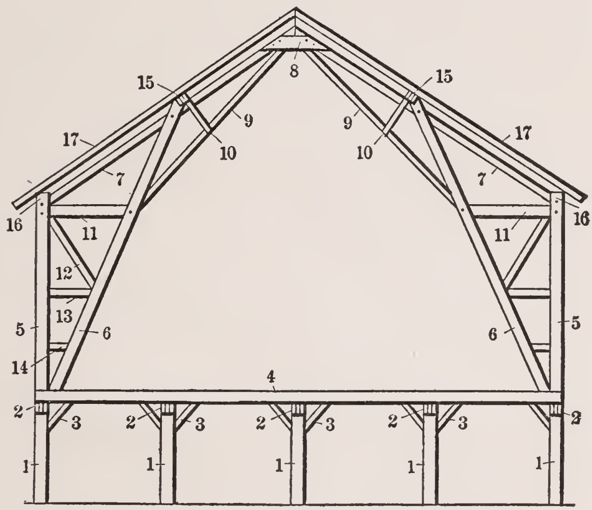


Fig. 1.—Interior Bent of Plain Gable Barn with Basement.

ment bents are thoroughly braced by a method which will be illustrated hereafter. The braces 3 3 3 are made of two 2 x 4 inch stuff the required length, with a short piece of the same material forming a clamp brace somewhat similar in shape to a clothes pin. The sill of the superstructure, marked 4, consists of two 2 x 8 inch plank, with 6-inch space between them. The posts 5 5 are made of two 2 x 8 inch plank, with intervening 2-inch space. The purlin posts, 6 6, are made of two 2 x 8 inch plank, with intervening space; 7 7 are roof supports, consisting of a 2 x 8 inch plank. The collar beams 8 are two 2 x 12 inch plank with intervening 2-inch space; 9 9 are sub-supports, made of a 2 x 6 inch plank;

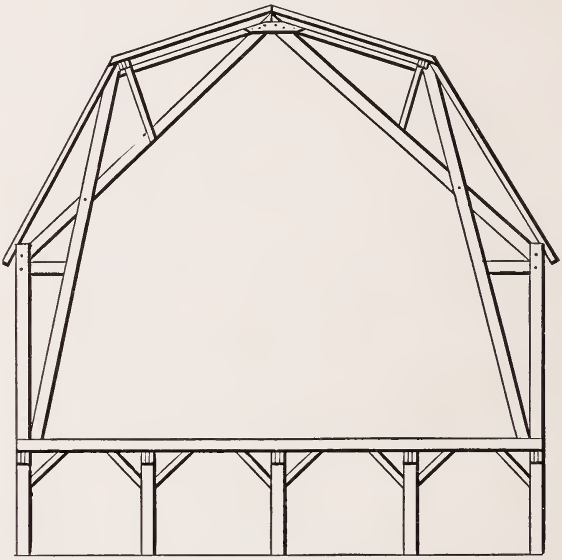


Fig. 2.—Barn Bent, Showing Gambrel Roof Construction.

10 10 are stays of two 2 x 4 inch plank, with intervening 2-inch space; 11 11 are the main ties of one 2 x 8 inch piece; 12, 13 and 14 are braces and ties of 2 x 6 inch plank; 15 15 are purlin plates, made of two 2 x 8 inch plank, with intervening 2-inch space into which couplings and braces enter.

At 16 16 the main plates, made of two 2 x 8 inch plank, are placed into a V-trough and inverted over the top of the post. The rafters 17 17 may be spliced on the purlin plates. The topmost intersections are bolted, as shown by means of the dots. The upper ends of the

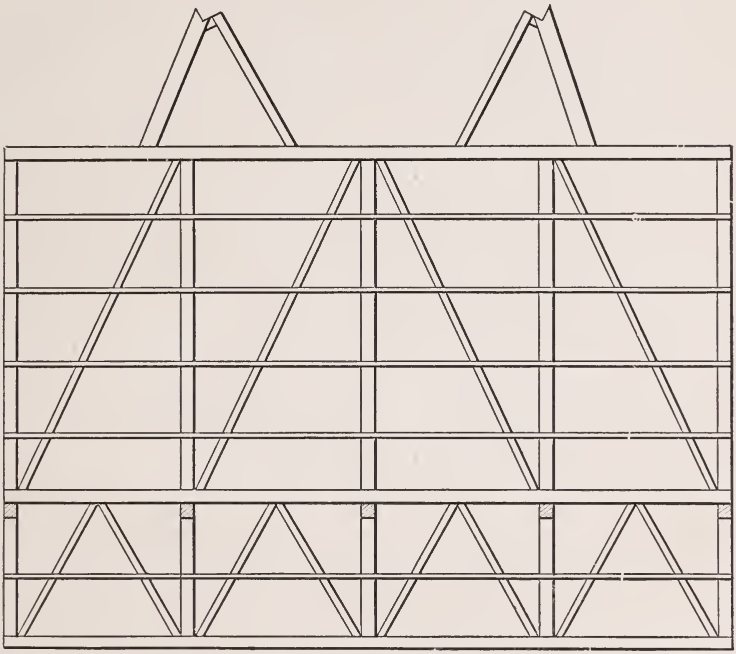


Fig. 3.—Outside View of End Bent of Superstructure and Basement Bents.—Scale, 3-32 Inch to the Foot.

purlin posts are cut down 4 inches, on a line parallel with the roof supports, and again at right angles with the first cut, forming a saddle, into which are placed the purlin plates.

In Fig. 2 is presented a view of an interior bent of a gambrel roof basement barn, which is constructed on the

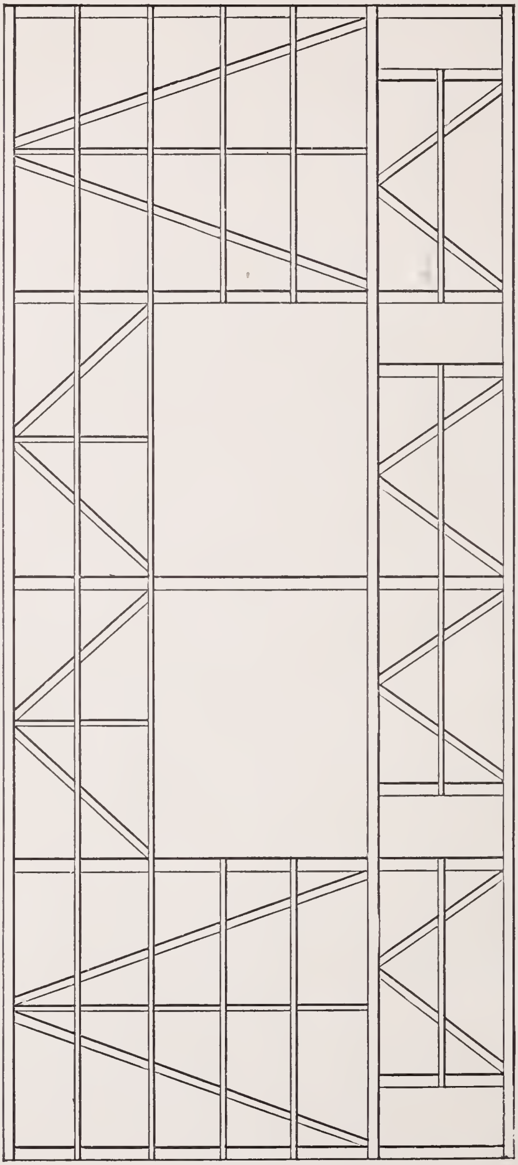


Fig. 4.—Side View of Plank Frame Barn.—Scale, 3-32 Inch to the Foot.

same general principles as shown in the previous figure. Hip roofs, gothic roofs, etc., are as readily provided for as either gable or gambrel roofs, so any man's taste may be fully met in this respect.

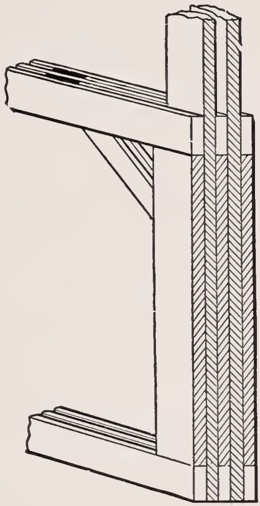


Fig. 5.—Detail Showing Section of Frame.—Scale, ¼ Inch to the Foot.

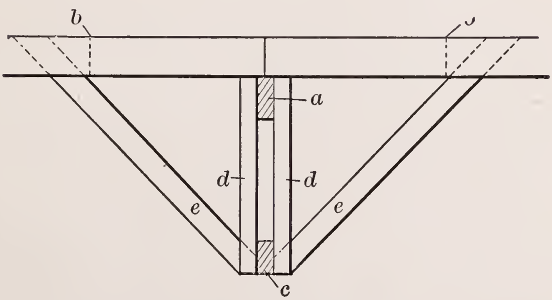


Fig. 6.—Section of Purlin Plate.—Scale, ¼ Inch to the Foot.

An outside view of the end bent of the superstructure and an end view of all the basement bents are shown in Fig. 3 of the illustrations. The braces in the basement are permitted to extend up and between the sills of the superstructure, thus binding both basement and superstructure into one solid frame work. In the interior of the basement, where long braces will not interfere with the arrangement or convenience, they are to be preferred to short ones, but where short braces are necessary

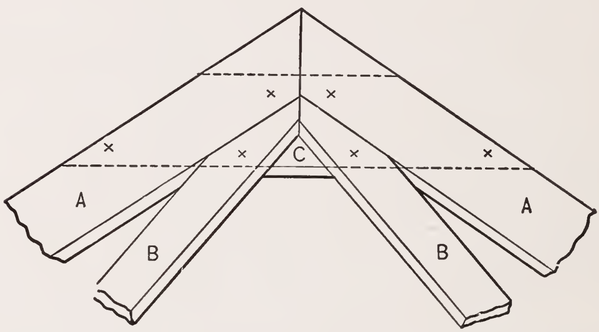


Fig. 7.—Detail at Peak of Barn.—Scale, ½ Inch to the Foot.

they are inserted in such a manner as to give greater strength than when mortised in as is usually done.

A side view of the frame, which is of such a character as to fully explain itself, is presented in Fig. 4. The plate is made of two 2 x 8 plank spiked together to form a trough and inverted over the tops of the posts. The manner of constructing the bents of the basement is indicated in Fig. 5. If the posts can stand on solid pillars of stone no sills are necessary, and the fillers extend down to the lower ends of the posts and up to the joist bearers. A side view of the purlin plates, which are made of two 2 x 8 or 2 x 10 plank with a 2-inch space between them, is shown in Fig. 6. The coupling or splicing block extends either way from the roof support *a* to the dotted lines *b b*. At *c* is represented a sectional view of the sub-support, to which the stays *d d* are secured, and also the lower end of the braces *e e*. This arrangement gives sufficient strength to the purlin plates to sustain a slate or any other roof desired. Fig. 7 shows the manner in which the peak of the arch is constructed. The roof supports, which are usually of 2 x 8,

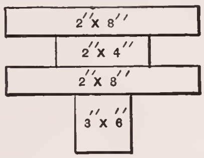


Fig. 8.—Detail Showing Construction of Posts in End Bent of Fig. 3.

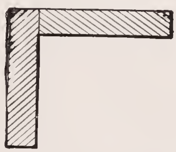


Fig. 9.—Sectional View of Plate.

are indicated by A A. The sub-supports, usually of 2 x 6 plank, are indicated by B B, while the dotted lines represent the collar beams, C, constructed of 2 x 12 inch plank, there being one on either side and bound together by ½-inch carriage bolts 6½ inches in length, their position being indicated by the small crosses.

Three posts of the end bent, shown in Fig. 3, are constructed of two 2 x 8 plank, one 2 x 4 and one

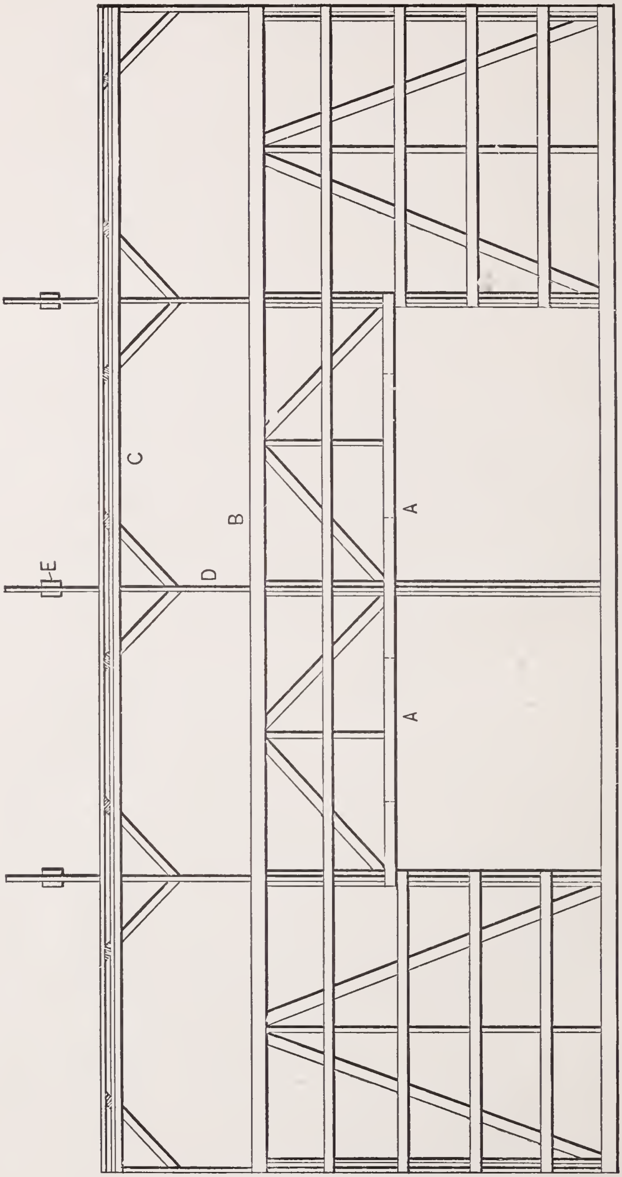


Fig. 10.—Side Elevation of Barn Having Two Driveways and Bay at Either End.

3 x 6, all as indicated by the cross section in Fig. 8 of the engravings.

It will be noticed that all of this work is easily and quickly done and that there is not only a saving in the timber, but also in the labor. As an example of the time required to erect a frame, I would state that I was recently called to another county to assist in building a basement barn, 40 x 80 feet in size, 8-foot basement and 16-foot superstructure, with plain gable roof. With three carpenters we commenced work on Wednesday morning, and on Saturday of the same week we raised the barn complete. In other words, it took four carpenters three days to frame a barn 40 x 80 x 24 feet.

In Fig. 10 is shown a side view of a barn with two driveways and bay at either end. A A are duplicated on inside of posts, with bridge blocks at dotted lines; B′ is main plate; C is purlin plate of two 2 x 8 plank set at right angles with roof and also braced at right angles; D is roof supports, forming the arch of the barn, and E the collar beams. Fig. 11 shows interior bent of a "ground" barn with decks above driveway. Should stables be desired in one or both ends joist bearers may extend entire width of barn.

There are doubtless many who would like some evidence of the strength, durability and popularity of this system of barn building, and I therefore submit a few facts in relation to these points.

First Test of Strength.—A small model made of linden strips 3-16 inch thick and ½, ⅜ and ¼ inch in width, made on a scale of ½ to 12 and representing a barn 40 x 60, with 8-foot basement and 20-foot superstructure, was found strong enough to support four men of average weight.

Second Test.—Several years ago a number of persons at a barn raising were discussing the frail appearance of the frame, and a test was made with chains and levers in an effort to crush the frame by drawing at opposite angles, but without the slightest effect.

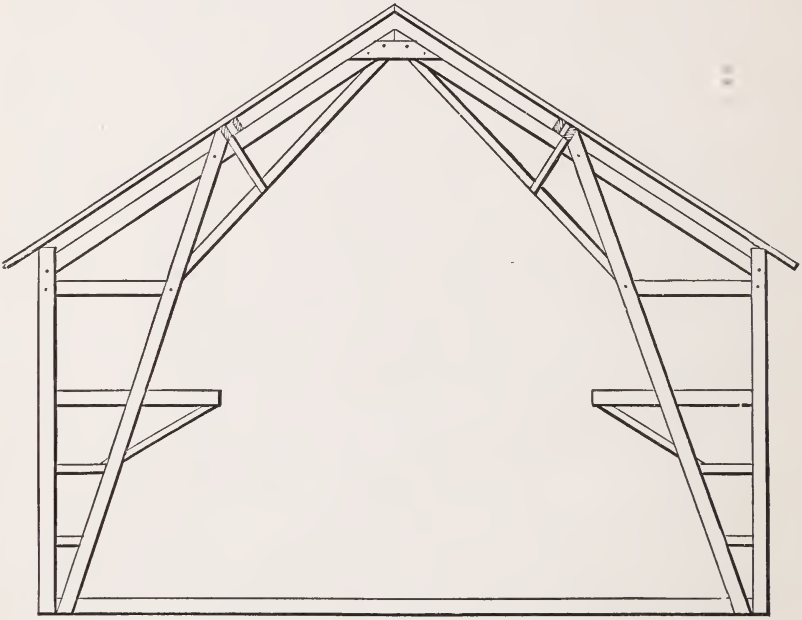


Fig. 11.—Interior Bent of "Ground" Barn with Decks Above Driveway.

Another example is found in a barn which was put up with a minimum quantity of spikes, because the owner did not wish to take time to go to town for more. The barn has been standing 14 years, within which time a number of destructive wind storms have passed over it without damage, though much damage to fences, forests and buildings resulted in the vicinity.

As evidence of the rapidity with which the framing may be done, I will refer to a basement barn, 40 x 80, 24 feet to the square, recently erected in Union County, Ohio. I began with three carpenters on Wednesday morning, and on Saturday of the same week the barn was raised complete. We were compelled to work under the disadvantages of considerable mud on the newly graded foundation site, necessity of carrying the timber some distance, and the short days in mid November. None of the hands had any previous experience in this work, so had to learn as they proceeded.

A large dairy barn was built the last week of October, 1896, just out of New York City. It is 100 x 36, with 8-foot basement and 16-foot superstructure. We had four house carpenters and two laborers. Began work Monday morning, but were delayed by the non-arrival of the spikes till nearly noon. The basement bents were each 100 feet in length, and there were nine bents in the superstructure. Both basement and superstructure were raised on Friday of same week in six hours with the help of 30 men.

Still another example may be given to show the difference between the plank frame and the mortise and tenon frame. With three helpers I framed a barn, 40 x 72, with 20-foot posts, while two carpenters, one of them a foreman, framed the sills for a corn crib, 5 x 40.

The system has been introduced into 32 States and some fair sized barns have been built in this way. One in Kentucky, 56 x 100; one in Colorado, 60 x 70; one in Wisconsin, 40 x 120, with wing 40 x 60; one in Ontario, 56 x 96, and one in Virginia, 60 x 100. I have yet to learn of any who, having built strictly to specifications, are dissatisfied with the frame. On the contrary, we are frequently in receipt of letters from those who have thus built stating that they are delighted not only because they have saved both money and timber, but at the same time have obtained a thoroughly strong frame without the usual interior timbers, which are so much in the way in handling hay or grain.

I shall be glad to have the friendly criticism of practical builders given in the columns of *Carpentry and Building.* Any suggestions which may lead to further improvements in the system will be appreciated very much, and due credit will be given to those who suggest them. It will be seen that the system is especially adapted to large grain and hay barns, to cover barnyards, which are becoming so popular in many sections of the country, to tool sheds, tobacco barns, amphitheaters, &c.

While there is not so large a saving in the timber of the basement as in the superstructure, there is yet a fair saving of timber even here, and at the same time there is great saving of labor. The timbers are employed only where they can serve a useful purpose, and special effort is made to so place the timbers as to secure the maximum amount of strength with the smallest possible amount of timber.

The following communications were brought out as the result of Mr. Shawver's invitation to the readers of *Carpentry and Building:*

Bracing a Basement Barn Built on the Plank Frame System.

From E. S. H., *Connecticut.*—I have been reading the articles of Mr. Shawver on barn framing with a great deal of interest, and I am desirous of obtaining full instructions in regard to bracing the interior of a basement barn: also a complete bill of materials for the frame of such a barn, 40 x 60 feet in area, basement 8 feet high and superstructure 20 feet high. The roof is of the gable pattern, one-third pitch. There is also a bay in each end and a double driveway.

Answer.—In referring to the above inquiry, Mr. Shawver submits the following information, accompanied by the illustrations presented herewith: The sketches here given will explain in detail the manner of inserting the braces and the way in which they are made. Of course, when long braces will not interfere with the desired use of the space they are preferred to short ones, but short ones properly inserted will give the same rigidity to the plank frame that braces of similar length will give to a mortise and tenon frame. The braces C C of Fig. 1 are inserted in the bents as the latter are constructed, but the brace shown in Fig. 2 is not inserted until the barn is raised.

In basement barns the joist bearer, A of Fig. 1, is made to extend lengthwise of the building, and the bents of the superstructure being placed crosswise we find the sill of a bent of a superstructure as represented at F F. But in ground barns the joist bearers extend crosswise of the barn, and the post B is permitted to extend up through the joist bearer about 7 inches. Two posts are then spiked to this projecting portion, one on either side, and thus again the brace shown in Fig. 2 may be inserted if thought necessary. If, however, the braces are properly inserted in the side walls of the frame the short braces may safely be omitted in ground barns.

The following is a bill of materials for a plank frame basement barn, 36 x 60 feet, basement 8 feet, with wall

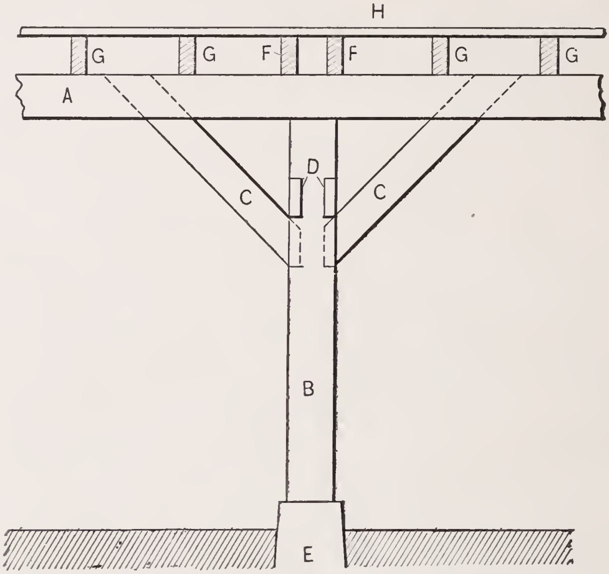


Fig. 1.—Showing Method of Bracing.

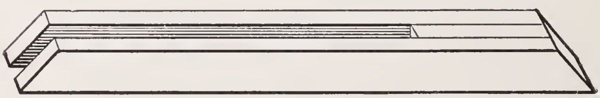


Fig. 2.—One Form of Brace Employed.

on one side, 16-foot superstructure, with a 23-foot bay at each end and a 14-foot driveway in the middle. Roof one-third pitch, plain gable, decks over driveway if permissible. Interior posts of basement to stand on stone pillars.

BILL OF MATERIALS.

Basement: First Bent.	Ins.	Ins.	Ft.
2 sills	2 x	8 x	60
(or six 2 x 8 x 20)			
12 posts	2 x	8 x	8
4 door posts	2 x	6 x	8
6 post fillers	2 x	8 x	8
4 nailers	2 x	6 x	12
1 nailer	2 x	6 x	14
3 joist bearers	2 x	10 x	60
(may use 14s and 24s.)			
10 braces	2 x	6 x	10
Bents 2, 3 and 4 similar.			
12 posts	2 x	8 x	8
18 post fillers	2 x	8 x	8
20 braces	2 x	4 x	6
3 joist bearers	2 x	10 x	60
Ends of Basement.			
8 sills	2 x	8 x	9
(or four 2 x 8 x 18)			
4 nailers	2 x	6 x	18
(or eight 2 x 8 x 9)			
4 nailers	2 x	8 x	18
16 braces	2 x	6 x	10
56 braces	2 x	4 x	6
28 brace blocks	2 x	4 x	16
Superstructure: Two End Bents.			
4 sills	2 x	8 x	36
(or eight 2 x 8 x 18)			
12 nailers	2 x	6 x	18
4 beams	2 x	8 x	36
(or eight 2 x 8 x 18)			
20 posts	2 x	8 x	16
10 post fillers	2 x	4 x	16
8 braces	2 x	6 x	18
8 purlin posts	2 x	8 x	8
8 braces	2 x	4 x	9
2 gable ties	2 x	6 x	18
6 stiffeners	3 x	6 x	16

Two Interior Bents.

4 sills	2 x 8 x 36
(or eight 2 x 8 x 18)	
4 sills	2 x 8 x 2
8 posts	2 x 8 x 16
8 purlin posts	2 x 8 x 24
(or twelve 2 x 8 x 16)	
4 roof supports	2 x 8 x 22
4 sub-supports	2 x 6 x 17
4 collar braces	2 x 12 x 5
8 stays	2 x 4 x 3
4 ties	2 x 8 x 8
4 ties	2 x 6 x 5
4 ties	2 x 6 x 4
4 braces	2 x 6 x 8

Two Floor Bents.

4 sills	2 x 8 x 36
(or eight 2 x 8 x 18)	
4 sills	2 x 8 x 2
8 posts	2 x 8 x 16
8 purlin posts	2 x 8 x 24
4 roof supports	2 x 8 x 22
4 sub-supports	2 x 6 x 17
4 collar braces	2 x 12 x 5
8 stays	2 x 4 x 3
4 ties	2 x 8 x 8
4 ties	2 x 6 x 5
4 ties	2 x 6 x 4
4 braces	2 x 6 x 9
8 joist bearers	2 x 8 x 8

Side Timbers.

4 sills	2 x 8 x 23
2 sills	2 x 8 x 14
24 nailers	2 x 6 x 12
4 nailers	2 x 8 x 14
8 plates	2 x 8 x 23
4 plates	2 x 8 x 14
8 purlins	2 x 8 x 23
4 purlins	2 x 8 x 14

8 couplings	2 x 8 x 8
4 couplings	2 x 8 x 4
4 braces	2 x 4 x 12
16 braces	2 x 4 x 7
8 deck joist	2 x 8 x 14

Floors, siding, roofing, doors, etc., will be the same as in other barns of same dimensions.

ESTIMATED COST OF FRAMING.

Foreman, $2.50 per day, 3 days	$7.50
Two journeymen, $2 per day, 3 days	6.00
Two apprentices, $1.25 per day, 3 days	3.75
Total	$17.25
Raising and inserting braces, 1 day	5.75
Total	$23.00

Cost of completing same as other barns of same dimensions and style of finish.

A Plank Frame Applied to a Skating Rink.

From N. B., *Sussex, N. B.*—We want to erect an auditorium, 50 x 200, with 16-foot posts and 12-foot sheds at each side for offices, waiting rooms, saloon, etc. We want galleries all around and a large band stand at one end, suspended from the roof. The building is to be used for a skating rink in winter and for public meetings during the summer. Will the plank frame system described in *Carpentry and Building* be suitable for the frame?

Answer.—The above inquiry was submitted to Mr. Shawver, who contributed the recent articles on plank frame construction, and in reply he says:

The plank frame is admirably adapted to such a building as that described, and can be quite cheaply constructed. In Fig. 1 of the sketches is shown one of the bents near the end on which the band stand is located, indicating the manner in which it is suspended from the roof by the rods A A, together with truss rod B. The galleries appear at either side, above which and beneath the eaves are the windows. If lighted by dormer windows, or if artificial light is employed, the shed roofs may

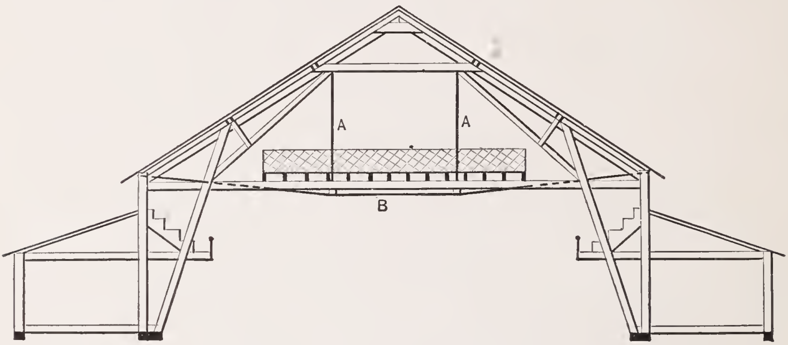


Fig. 1.—Bent Near the Band Stand.

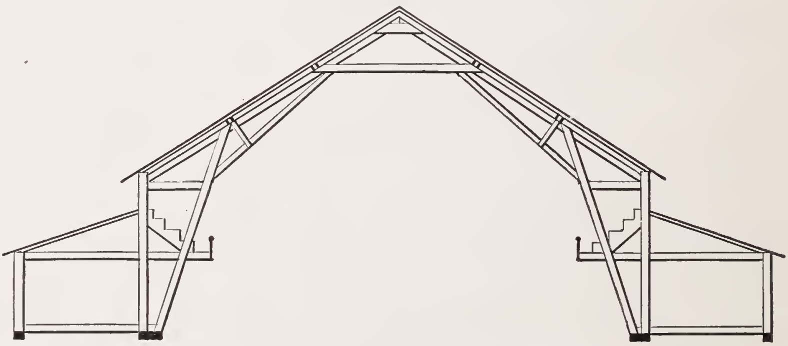


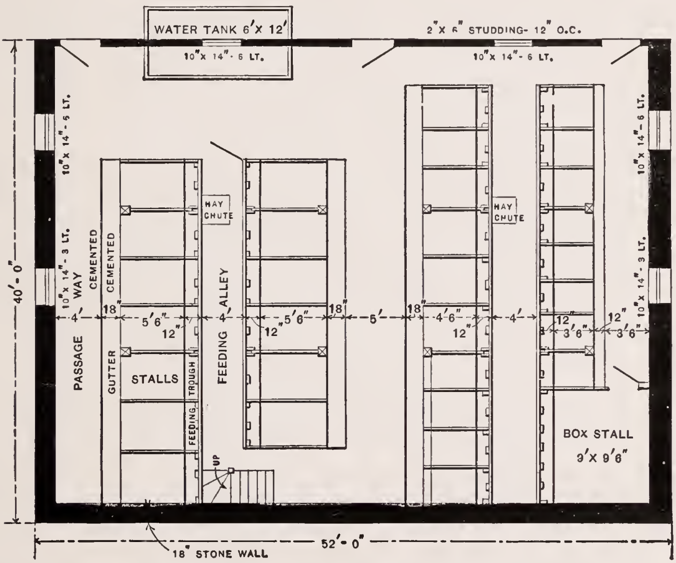
Fig. 2.—An Interior Bent.

be of the same pitch and a continuation of the roof of the main building, in which case the galleries may extend back beneath the roof of the sheds, and they need not extend out further than the purlin posts. The sketch,

Fig. 2, shows an interior bent without the band stand. The end bents will be constructed in a manner similar to that shown in Figs. 1 and 2 of my article on plank frame barns. A 200-foot building should have 17 bents placed 12½ feet apart.

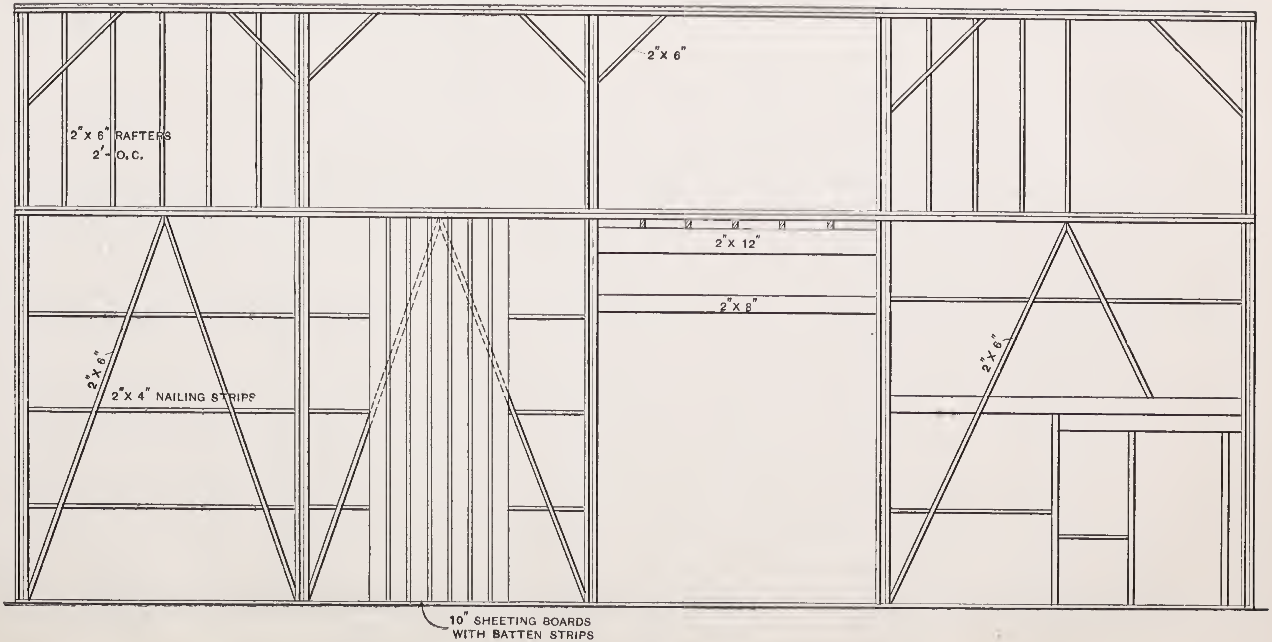
Construction of Plank Frame Basement Barn.

From S. H., *Minneapolis, Minn.*—I would like to have the readers experienced in plank frame barn con-



Basement Plan.—Scale, 1-16 Inch to the Foot.

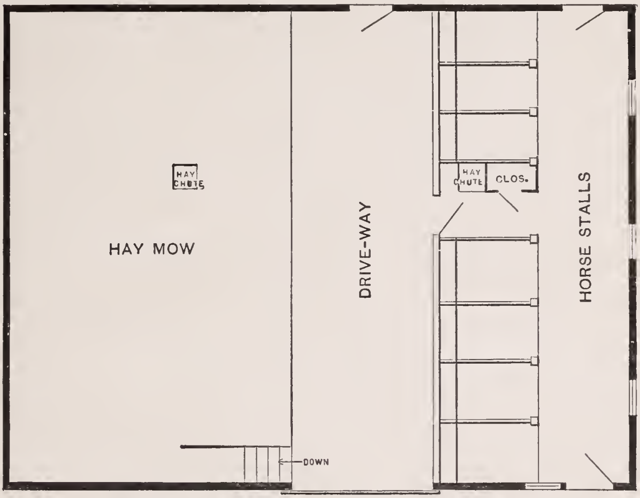
struction comment upon the plans of the basement barn which I send herewith and from which I intend to build next summer. I would like very much to know the



Elevation of Front Framing of Barn.—Scale, ⅛ Inch to the Foot.

Construction of Plank Frame Basement Barn.—Floor Plans.—Scale, **1-16** *Inch to the Foot.*

weak points of the barn and the best way to remedy them. I think the drawings showing the plans and details are so clear as to practically explain themselves.



Main Floor.—Scale, 1-16 Inch to the Foot.

Criticism of Plank Frame Barn Construction.

From John L. Shawver, *Bellefontaine, Ohio.*—In response to the wish of "S. H.," Minneapolis, Minn., I offer a few suggestions in connection with his proposed plank frame basement barn. It is well, indeed, that he should insist on knowing what he is doing, for many have made blunders because they attempted to build plank frames without having first investigated the proper method of construction. Too many guess at it. As pioneers in this work, we started, 25 years ago, on small structures, and month by month studied and contrived until a system was evolved that is adapted to barn structures of any reasonable size. Each point has been carefully tested as we proceeded, and if not fully satisfactory was discarded for something better. We now have over 7000 structures in some 44 States and provinces, some of them quite large, and have received many gratifying testimonials as to their strength, durability and cheapness.

The floor plans submitted by " S. H." are very good in design and arrangement, save that the hay chutes are made to appear directly over one of the main girders. Of course, this he would discover and rectify. Should it be difficult to obtain 8 x 8 stuff for posts and 8 x 10 for girders, the former may very easily be constructed of two 2 x 8's and two 2 x 4's, box pattern, thus saving something in materials and risk from dry rot. The girders might be made of two 4 x 10's, or four 2 x 10's, leaving an air space of 2 inches in the middle and saving the necessity of making mortises.

The drawings indicate the use of two 2 x 12's and one 2 x 8 for cross sills, the 2 x 8 being flat. In my opinion, the 2 x 8 is needless. The plates are all flatwise, while they must sustain much weight. We prefer purlin plates set on edge at right angles with the combined pressure of both sets of rafters. The main plates we make of three 2 x 6 inch, or 2 x 8 inch, according to the size of the structure when on edge to sustain the weight and two to sustain the outward pressure of the roof and the contents of the building. In this case, the purlins should incline 45 degrees.

The drawings of the correspondent indicate that the nailers are cut to fit between the posts, in which case they must be mortised, gained or toe nailed. The first two require unnecessary work, while the latter is not strong enough. If the bents are constructed in three sections, they will be tedious to raise in position. If completed before raising, they will be weak at the purlin plate. The drawings indicate also that staging would be required in setting the upper frame, and that quite a large amount of the work is done as the frame is being raised. In our experience we never use any staging, and we do most of the work from the ground before beginning to set for the frame. Most men can work more rapidly on the ground, with all materials handy, than they can aloft, where materials must be drawn up with ropes. I believe " S. H." can save enough on labor alone to pay his expenses to go to some point and see one of our plank frame constructions. Besides, he will find wherein he can greatly improve upon his method of construction. Those who are within convenient reach to do so can visit the barn of Dr. W. I. Chamberlain, near Cleveland, Ohio, which is easily accessible by railroad, while the doctor, who is one of the editors of the *Ohio Farmer,* takes great delight in showing his barn to visitors. This barn, which is 40 x 82 feet in size, required four carpenters two and a half days to frame and two hours and fifteen minutes to raise.

We do not usually give name and address of our patrons, because it leads to much inconvenience to them. Should any of the readers write to Dr. Chamberlain, I would suggest that they inclose a stamped envelope, properly addressed, for reply.

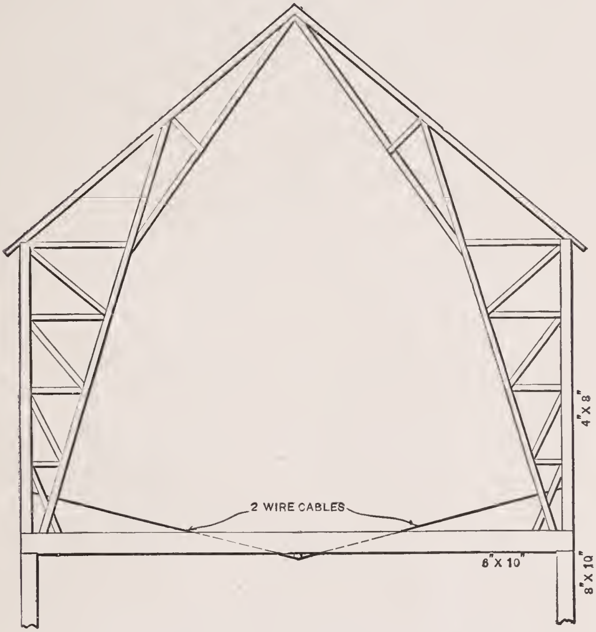
Criticism of Plank Frame Barn Construction.

From J. M. B., *Monroeton, Pa.*—In the December issue of *Carpentry and Building,* page 327, the correspondent " S. H." of Minneapolis wants to know the weak points of his barn frame, a sketch of which was presented in connection with his communication. I think one weak point is what he calls the plate in the gable, which is made of two 2 x 8 inch pieces, equal to a 4 x 8 inch, with a span of at least 30 feet between purlin posts, which are only 2 x 6 inches. In my opinion, with the hay mow filled with hay, the gable will bulge or spring out, as the weight, 45 to 50 tons, will exert quite a pressure. As to the remedy I am not so clear. He might use a flat truss or a beam large enough to stand the pressure; one, say, 16 inches wide at the center and tapering to 8 inches at each end. I will say, in conclusion, that I have had no experience with plank frames.

Is the Barn Frame of Sufficient Strength?

From C. G., *Vergennes, Vt.*—I send herewith a rough sketch of bent of barn which I intend to put up in the spring. It is 30 feet wide and has 26-foot posts. What I wish to know is this: Is the truss strong enough to carry the load that will be put upon it? I would like to have the "wood butchers" take hold of it and tear it apart and tell me what to put in its place.

From John L. Shawver, *Bellefontaine, Ohio.*—Permit me to offer a substitute for the barn frame proposed by the correspondent "C. G." of Vergennes, Vt., in the March issue of the paper. His timber trusses take up too much room, and at the same time the timbers are too expensive for this day and age. We place a little more timber in the joist bearer and prefer it in a different shape. He suggests 7 x 8 inches, and this would be 30 feet in length. We would use three 2 x 10's, and could use any lengths to make the 30 feet; consequently our timbers could be purchased at much less cost. Instead of the 7 x 8 inch truss timbers we would use two wire cables made of galvanized wire, seven strands, and doubled. While we would use a little heavier posts in the stables, the posts of the superstructure would contain only about one-half as much material, but this, too, we would prefer



Is the Barn Frame of Sufficient Strength?

of different shape. In place of the 7 x 8 inch we would use two 2 x 8's, and instead of the beam we would prefer the arch and the angling purlin posts, and thus have the interior entirely free from all timbers.

After 20 years' experience in building barns without the cross beams it would require peculiar conditions to induce us to use them, for they are continuously in the way, both when storing away hay or grain and when getting these out again for the thresher or for the feeding of stock. The upper portion of the frame submitted by "C. G." does not show any braces, and we are at a loss to know if there is to be none, or if these were omitted because it is not that portion of the structure that is under consideration. Let me say, however, that that is one of the most prevalent mistakes in the construction of a barn. There are too few braces, and the first baby tornado that happens to pass that way will "lay it out in fine shape." While we use plenty of braces, they are usually only 2 x 6 inches, and so do not take timber very rapidly. The geometrical triangle is the strongest figure one can secure, and it is with that idea always in mind that we do our barn work.

Bents for 12-Sided Plank Frame Barn.

From J. D., *Ubly, Mich.*—I send herewith a rough sketch, Fig. 1, showing one of the bents of a 12-sided plank frame barn, and would like to have the architectural readers of the paper state whether or not it will be strong enough for the purpose, and, if not, wherein changes can be made to advantage.

Note.—With a view to obtaining the opinion of an expert who has had long experience in the construction of plank frame barns, we submitted the inquiry of our correspondent above to John L. Shawver, who furnishes the following in reply:

In the first place, the purlin posts in the sketch of the correspondent are so sloping that while they brace well they are not in position to sustain the most weight, and these with the roof supports are so long that they have

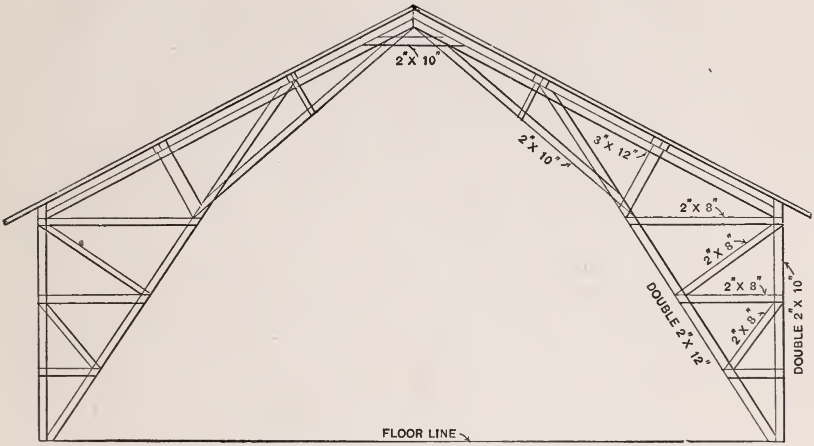


Fig. 1.—Elevation of Bent Submitted by "J. D."

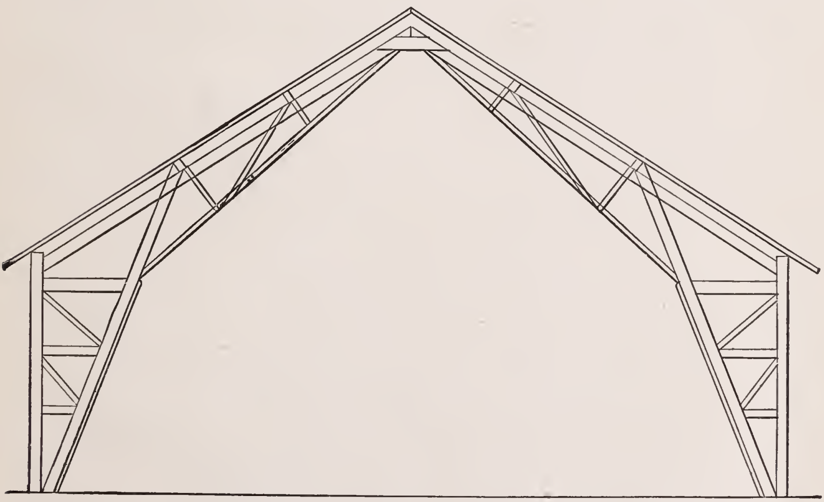


Fig. 2.—One Form of Plank Frame Suggested by Mr. Shawver.

to be spliced. While this is easily done in the case of posts, it is not so readily performed with supports, and, when so done, it will not present as attractive an appearance as would otherwise be the case.

In the second place, one of the weakest points about the barn is the shape. It is true it would be a novelty in most communities, but, like the round barns, is wasteful

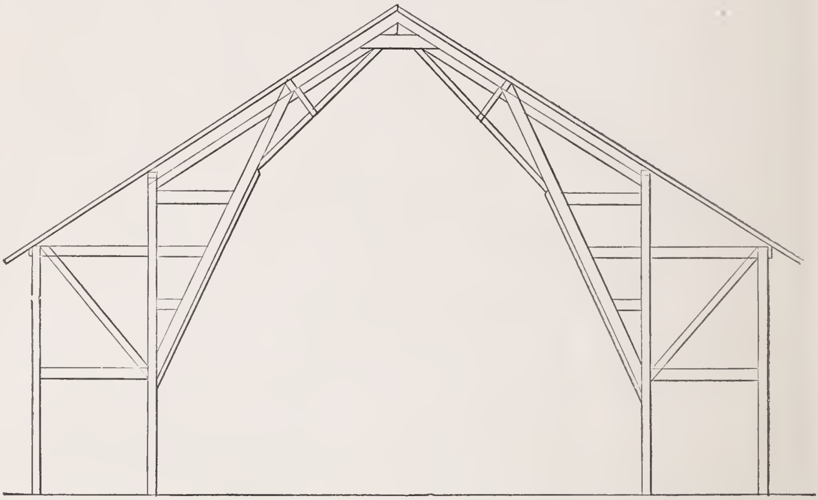


Fig. 3.—The Preferable Style of Framing.

of material. It is out of the question to place joists, rafters, flooring, sheathing, roofing, &c., on barns of this shape without much waste of both materials and labor. Then, too, it is next to impossible to provide for satisfactory lighting or ventilation, both of which are essential features in every up to date barn.

The frame construction indicated in Fig. 2 is stronger, and at the same time gives more open space in the interior, this being secured by running the purlin posts up to the first purlin plate, instead of to the second, and supporting the second plate on the truss brace. This saves in the lengths of the purlin posts, but requires the same length of supports and longer sub-supports.

The form of construction indicated in Fig. 3 is, in my opinion, preferable to either of the others, if it is found that the vertical posts set in 10 feet will not in any way interfere with the purpose of the structure. In this case all the timbers are either shortened or placed in such shape that they may be spliced without in any way weakening the structure. Whichever form may be used by the correspondent, it is important in bents or arches of this size that the purlin posts should be placed on the inner edge with 2 x 6, which will add materially to the strength of the frame, and at the same time prevent any tendency to spring sideways either in the raising or from the pressure of the hay or grain within after the building is completed.