Low-cost Diagonal Fence Strainer

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Corner, line, and gate or fence end braces (or strainers) are an important part of any fence. With the use of high-tensile, smooth wire, these strainers are of even greater importance because of the necessity of maintaining the complete fence at the recommended tension. In recent years, the horizontal fence strainer (Fig. 1), (or the double-horizontal fence strainer), has been accepted as the standard and strongest fence strainer design. However, another fence strainer design, known as a diagonal fence strainer (Fig. 2), is structurally equal to the horizontal fence strainer, but is much less costly to install. It requires one less post and only about half the labor to install as the horizontal fence strainer. A diagonal fence strainer is equal in strength and holding force to a horizontal strainer. It has the same lifting force on the corner post as a horizontal strainer of the same size. On a high-tensile, smooth-wire fence, one diagonal strainer (as shown in Fig. 3) can be used for a corner in place of the currently used two horizontal braces (as shown in Fig. 4). In designing and installing a diagonal brace or strainer, several principles should be kept in mind.

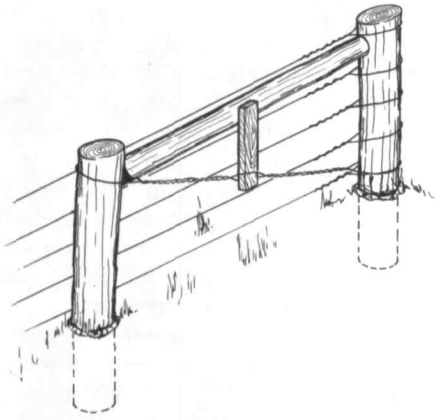

Fig. 1. *Horizontal, gate or fence end strainer.*

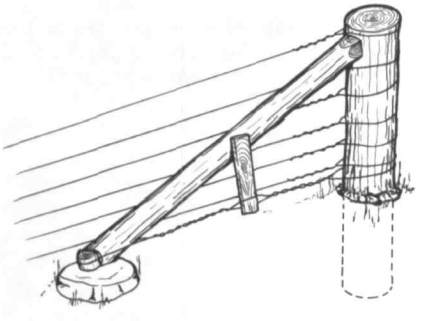

Fig. 2. *Diagonal gate or fence end strainer.*

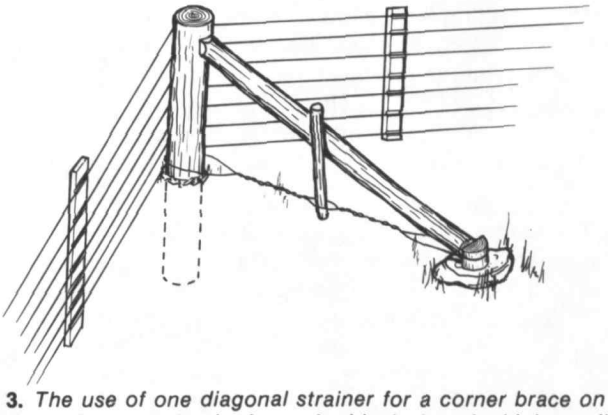

Fig. 3. *The use of one diagonal strainer for a corner brace on a high-tensile, smooth-wire fence. In this design, the high-tensile, smooth wire must be bent around the corner and must not be tied to the corner post. Also, this single strainer could be undesirable from a livestock standpoint. Cattle could straddle the brace or go on both sides and calves can go under the brace. If this is a problem, use two diagonal strainers running at the same angle as the fence as shown in Fig. 5.*

1. Make the diagonal (horizontal as well) brace as long as possible.

Practical lengths for compression members of diagonal (or horizontal) fence strainers.

Pipe size (inches)	Wood diameter* (inches)	Practical length (ft)	Allowable length (ft)
2		8	10
2½		9½	12
3		12	14½
3½		13½	17
4		15	19
	3	7½	
	4	10	
	5	12½	
	6	15	
	7	17½	
	8	20	

* Diameter at center and straight length assumed.

2. Be sure that the end of the diagonal brace in contact with the ground is free to move forward and is not blocked by a stake or post.

The reason: When the end of the diagonal bears against a stake or post and is not free to move, one-half to two-thirds of the total fence tension can be transmitted to the stake or

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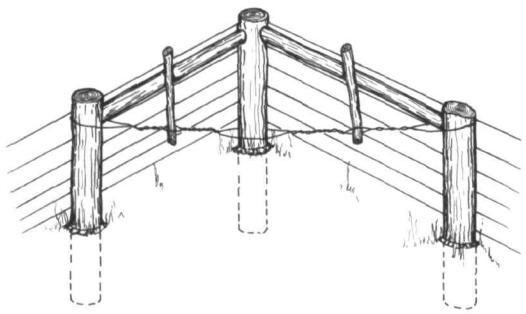


Fig. 4. *Currently used horizontal strainer corner brace which can be replaced by a single diagonal strainer or by two diagonal strainers.*

post. This reduces the ability of the strainer to resist pullout (failure).

3. The diagonal brace can bear against the corner post in any location from the middle of the post to the top. However, probably the best place to have the diagonal brace contact the corner post is at the top.

The reason: The maximum bending moment of the corner post (located at ground level where the brace wire is attached to the corner post) is the same whether the diagonal brace bears at the top or middle of the corner post. The loading in the diagonal brace (compression) and lower brace wire (tension) will be double when the diagonal brace bears against the middle of the corner post as compared to when the diagonal brace bears against the top of the corner post. In the diagonal strainer, when the diagonal brace bears against the top of the post, the tension force in the wire brace is about equal to or a little less than the total tension in the fence. The length of the diagonal has no effect on this tension force. In the horizontal strainer, the tension force in the wire brace is about equal to or a little more than the total tension in the fence. The length of the top brace of the horizontal strainer does affect and cause the tension force in the wire brace of the horizontal strainer to vary, but only to a relatively limited amount (15 to 25%). The longer the horizontal strainer, the lower the tension force in the wire brace. The tension force of the wire brace of a horizontal strainer is higher (by 5 to 15%) than the tension force of the wire brace of a diagonal strainer of equal length.

4. When installing a diagonal strainer, the corner post should be set first, then the diagonal brace installed, then the bottom holding wire brace installed, and then the wires attached and tensioned. If this procedure is followed, the lower wire brace will not have to be twisted to tighten.

5. The diameter of the corner post used should be as large as possible.

6. If one diagonal strainer will not hold the fence tension, a second diagonal strainer should be installed as shown in Fig. 6, with each strainer taking half the tension of the fence.

In examining the diagonal and horizontal strainer, it may, at first, be very difficult to realize that these two strainer arrangements are structurally equal. However, upon complete examination and the determining of the forces in each of these structures, it will be found that the reaction of the

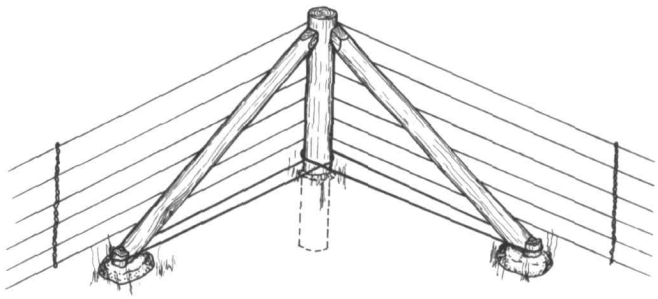


Fig. 5. *Two diagonal strainer corner braces.*

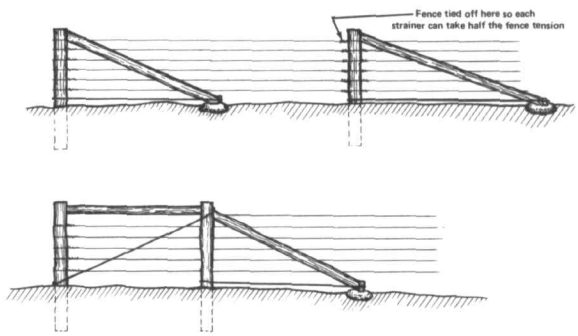


Fig. 6. *Use of two diagonal strainers for holding in soft soil. Also, one horizontal and one diagonal strainer could also be used as shown. Each of the diagonal strainers takes half of the tension in the fence; therefore, the fence must be tied off at each diagonal strainer.*

(tan means tangent)

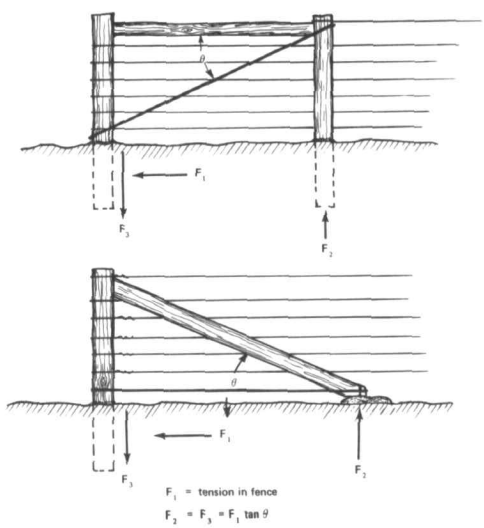
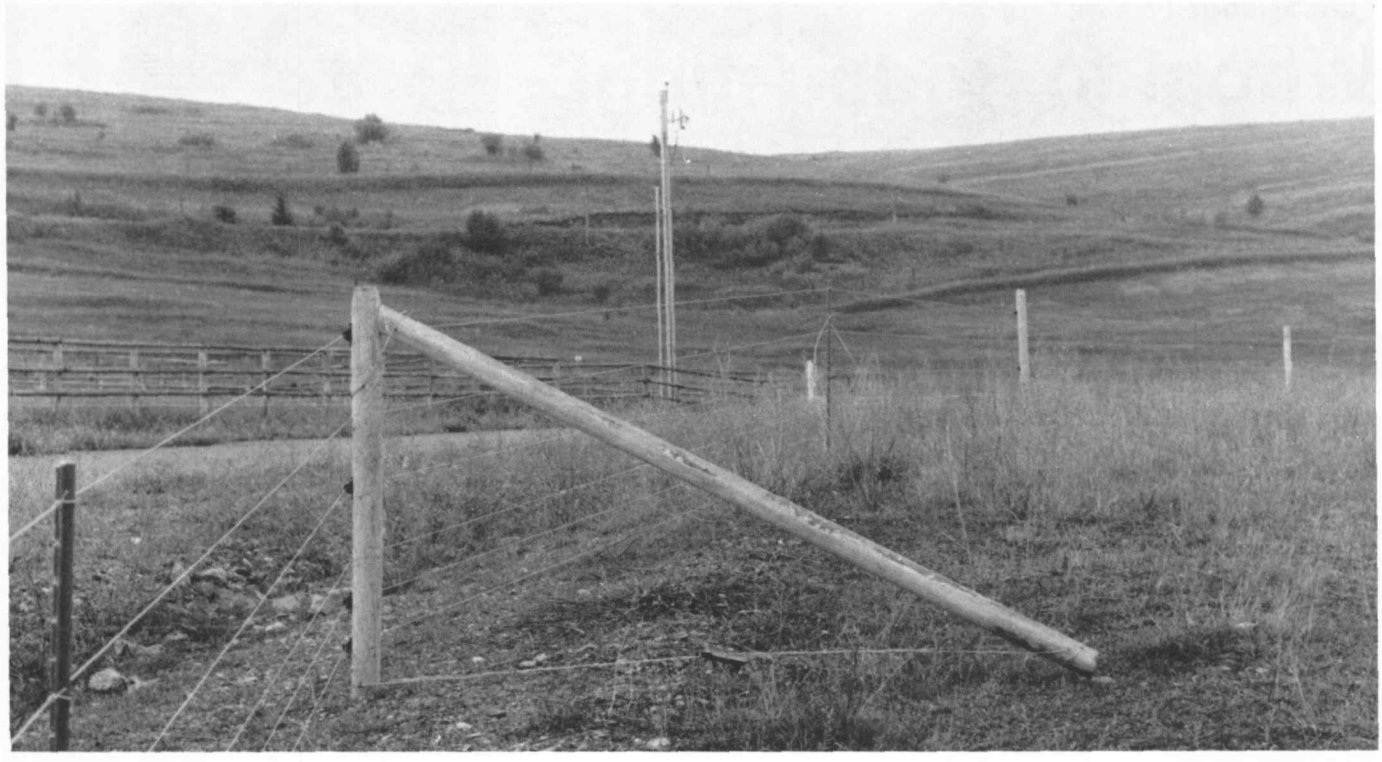


Fig. 7. *Reaction of the ground on horizontal and diagonal strainers.*

ground on the strainer is the same (see Fig. 7). These reactions are a force (F_1) horizontal to the ground (below the ground) pushing on the corner post in reaction to the tension



Diagonal fence strainer supporting a six-wire electric fence using high-tensile smooth wire in a sheep pasture owned by Billy Hardman near Missoula, Mont. Photo taken in Sept. 1983. This example is similar to Fig. 3.

in the fence. A second force (F_2) is an upward force on the end of the diagonal brace resting on the ground, and also an upward force (F_2) on the second post of the horizontal strainer. There is also a downward-pulling force (F_3) exerted by the ground on the corner post to hold it in the ground. The greater the fence tension force is with either the horizontal strainer or diagonal strainer, the greater this force (F_3) can be. By making the diagonal as long as possible or, for that matter, the top of the horizontal strainer as long as possible, the force tending to pull the corner post out of the ground will be reduced.

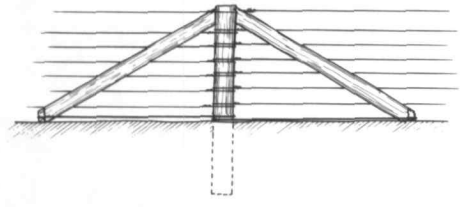


Fig. 8. *Design for a line strainer using the diagonal strainer design. When using the diagonal strainer for a line strainer, care must be exercised not to over-tension the brace wire and jack the post out of the ground.*

When using the diagonal strainer as a line brace (Fig. 8), care must be exercised not to over-tension the brace wires. When the diagonal is used as a line strainer, and the brace wires are over-tensioned, the vertical post can be jacked out of the ground. For this reason, the diagonal strainer may not be as good a line brace as a horizontal brace with two brace wires. However, when high-tensile, smooth wire is used, the need for line braces is reduced or eliminated.

There is an old German proverb that says, "Everything that is good, is probably not new, and everything that is new, is probably not good." This proverb applies to the diagonal strainer. The diagonal strainer design is not new as it was in use 50 years ago in South Dakota. It has also been used in eastern Washington and, to a limited extent, in New Zealand.