June 12, 1923.

1,458,498

P. M. PIEL

ROOF AND WALL CONSTRUCTION

Filed July 2, 1919

2 Sheets-Sheet 1

Fig. 1.

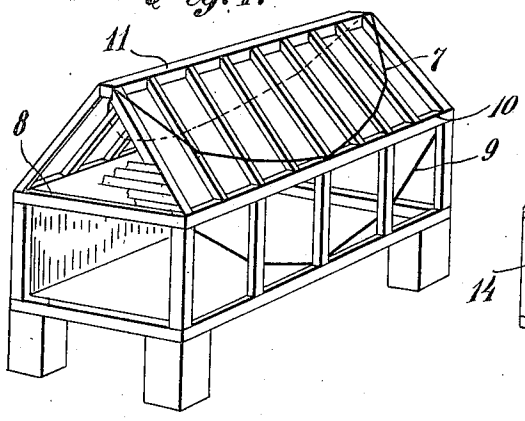


Fig. 2.

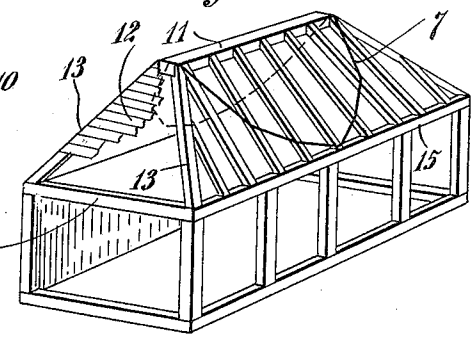


Fig. 3.

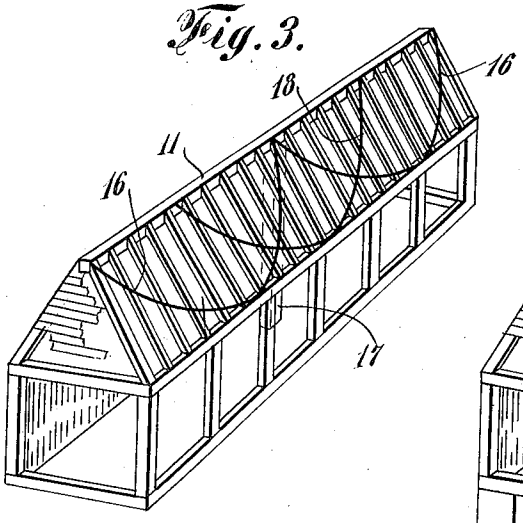
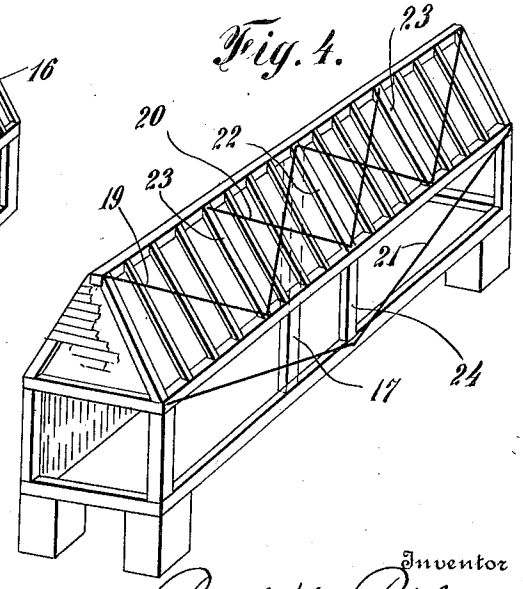


Fig. 4.



Inventor

Paul M. Piel

By Williams & Rutchard

his Attorneys

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2 Sheets-Sheet 2

Fig. 5.

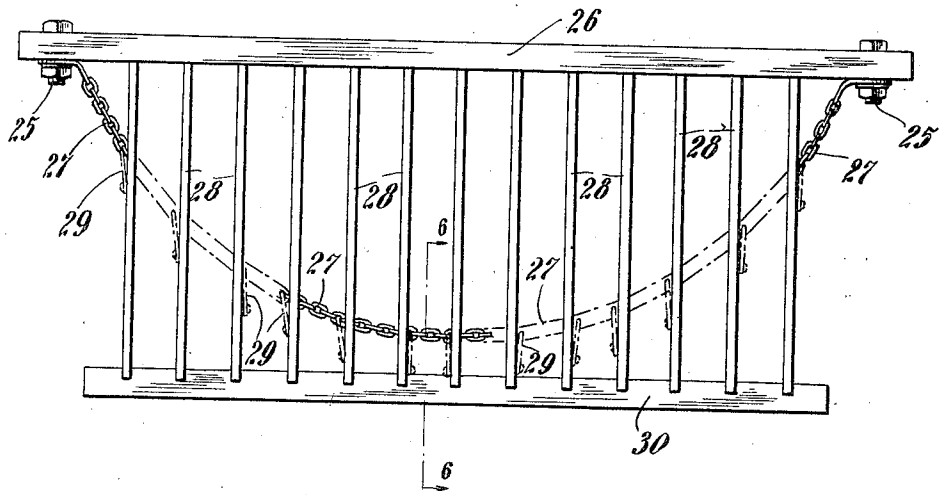
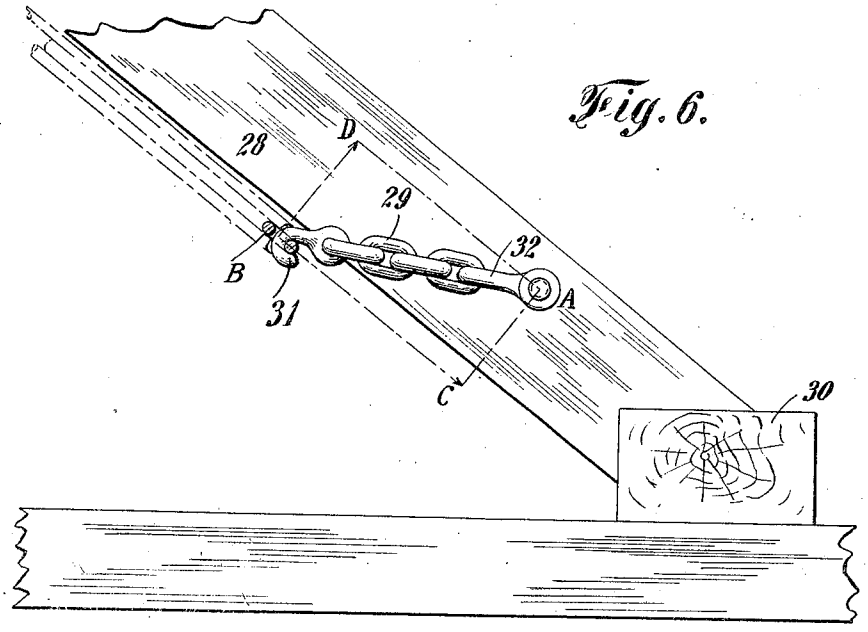


Fig. 6.



Inventor

Paul M. Piel

By Williams & Pritchard

his Attorneys

Patented June 12, 1923. 1,458,498

UNITED STATES PATENT OFFICE.

PAUL M. PIEL, OF LAKE PARLIN, MAINE.

ROOF AND WALL CONSTRUCTION.

Application filed July 2, 1919. Serial No. 303,264.

To all whom it may concern:

Be it known that I, PAUL M. PIEL, a citizen of the United States, and a resident of Lake Parlin, Jackman, Maine, have invented certain new and useful Improvements in Roof and Wall Constructions, of which the following is a specification.

This invention consists in means for reinforcing building walls, in the generic sense including both upright walls and partitions and the covering walls generally designated as roofs. The object of the invention is to reinforce the wall against distortion in the plane of the wall, for instance so as to concentrate at desired corners of the wall, all the distortive forces acting in its plane.

One special object of the invention is to thus resolve these forces when acting in the plane of a slanting roof so that, in the absence of such stiffening means, they would develop an outward lateral thrust on the eave-supporting upright walls, as explained for instance in the prior patents Wilbur, No. 8295 of 1851, and Stouffer, No. 571,055 of 1896. According to the present invention, the lateral thrust on the eave-supporting walls is eliminated, and all forces acting on the roof are resolved into vertical components vertically acting on the eave-supporting walls or posts and the gable-supporting walls or posts, so that large slanting roofs may be rigidly mounted without recourse to the usual intermediate ridge-supporting poles or eave-to-eave cross-ties, which so commonly obstruct the space under such roofs.

In the accompanying drawings which show several adaptations of my invention:

Figure 1 is a diagram showing the invention applied to the slanting roof and the side wall of a building;

Figure 2 is a diagram showing the invention applied to a roof with slanting gable ends;

Figure 3 is a diagram of the invention applied to an extraordinarily long roof;

Figure 4 is a diagram of a modification of the adaptation of Figure 3;

Figure 5 is a skeleton plan of a roof or wall supplied with the invention; and

Figure 6 is a diagram of one method of connecting the tie-member of the invention to a roof rafter.

In the arrangement of Figure 1, each roof slope is provided with a flexible tie-member 7, such as a cable for instance, connected to the gables, and extending from gable to gable in a depending loop, and intermediately connected with each rafter, or with certain rafters at certain intervals, so as to approximate a curve, for instance a catenary or parabola when the cable receives equal thrusts from rafters at equal intervals. The rafter thrusts are thus resolved into tension in the cables or tie-members, which tensions are in turn resolved into a longitudinal compression of the ridge-pole 11, and vertical compression upon the gable-supporting walls which may be resisted by any convenient means such as a truss formed by the gable beams and a cross-tie 8. Or gable-supporting posts may be employed. Thus the ridge-pole constitutes an upper compression member common to the trusses of the two roof slopes. As will be noted the load component of each roof slope exerted at the ridge-pole normal to the plane of its own resisting truss, is supported by the truss resistance of the complementary roof slope, so as to produce a complete balance of all forces which might develop outward horizontal thrust upon the eave-supporting walls.

The same scheme may be applied to the side walls of the building, for instance by employing a tie-member 9 connected to the wall studding and forming a catenary-like or parabola-like loop suspended from the ends of the eave beam acting as a compression member. This will be of use when it is necessary or desirable to carry the entire weight of the side wall on the corner posts, for instance when no suitable foundation can be erected between them.

The cable ties 7 and 9 may be secured to the inner sides of the roof rafters and wall studding.

In Figure 2, the tension members 7 of the roof trusses are connected to the ends of the ridge-pole 11, acting as a common compression member. In this instance there are slanting end-gable-roofs 12 whose ridge-poles 13 and eave-beams 14 constitute end trusses to carry the end weight of ridge-pole 11 upon the corner posts of the building, while the longer eave-beams 15 act as tie-members between these end trusses.

In the long roof of Figure 3, each roof slope has at least two cable ties 16 extending from the middle of the ridge-pole 11 to its opposite ends. In this instance the middle

of the ridge-pole will be supported either by a post 17, or an eave-to-eave cross-tie, or an extra cable tie 18 disposed in each roof slope and anchored to the ridge-pole at the middle points in the span of its primary catenary ties 16.

In the arrangement of Figure 4, the truss ties are straight tension members 19, 20 and 21, bearing their loads only at their middle points, in which instance, extra strong rafters 22, 23, and uprights 24, may be employed as special compression members in the respective trusses.

Figure 5 shows a skeleton plan of a roof slope, or a vertical wall, with its cable tie 27 anchored by bolts 25 to the ends of the ridge-pole or beam 26, and connected to the individual rafters or uprights 28 by short suspenders 29. In this instance the cable tie is assumed to consist in a chain, and the suspenders are short chains bolted to the rafter or uprights and hooked into the nearest or most convenient chain links so that the suspenders will pull on the rafters or uprights approximately in counter line to their thrust against the eave-beam or sill-beam 30.

Figure 6 shows a detail elevation section of such a suspender connection for a roof truss, for instance as it would appear in the plane 6—6 of Figure 5. This suspender 29 is a short chain secured to the rafter 28 by a bolt A passing through the anchor link 32, and secured to the tie chain 27 by a hook 31 connected to the link B thereof. It will be noted that the pull of this suspender from B toward A, is resolved into a main component B—C which constitutes the rafter thrust borne by the suspender and catenary, and a lesser component B—D normal to the roof plane and serving to hold the chain snugly against the rafters.

Since I have not essayed to illustrate and describe all adaptations of my generic inventive idea, it must be understood that various other adaptations thereof may be devised, many by the exercise of technical skill, and others by supplemental invention, but all within the spirit and basic principles of the invention and the scope and intent of the following claims. In these claims the word "wall" will generically designate not only upright walls usually so designated, but also sloping walls such as employed for overhead covering or roofs.

I claim:

1. In a roof the combination with a ridge pole and an eave structure, of a tension member attached to the ridge pole, and a plurality of rafters across which the tension member extends and to which it is connected so that it is furthest from the ridge pole midway of its length, with the result that the tension member draws said rafters against the ridge pole.

2. In a roof the combination with a ridge pole and an eave structure, of a continuous tension member attached to the ridge pole adjacent the ends of the ridge pole, and a plurality of rafters across which the tension member extends and to which it is connected so that it is further away from the ridge pole at intermediate rafters than at end ones with the result that the tension member draws said rafters against the ridge pole.

3. In a roof the combination with a ridge pole and a pair of eave structures, of a plurality of rafters from the pole to each eave structure, a tension member attached to the ridge pole for each set of rafters across which the tension member extends and to which it is connected so that it is further away from the ridge pole at intermediate rafters than at end ones with the result that the tension member draws said rafters against the ridge pole.

4. In a roof the combination with a ridge pole and a pair of eave structures, of a plurality of rafters from the pole to each eave structure, a continuous tension member for each set of rafters attached to the ridge pole near its end across which the tension member extends and to which it is connected so that it is further away from the ridge pole at intermediate rafters than at end ones with the result that the tension member draws said rafters against the ridge pole.

In testimony whereof, I have affixed my signature to this specification.

PAUL M. PIEL.