

Feb. 12, 1935.

F. L. NEMEC

1,990,838

ROOF CONSTRUCTION

Filed June 30, 1930

3 Sheets-Sheet 1

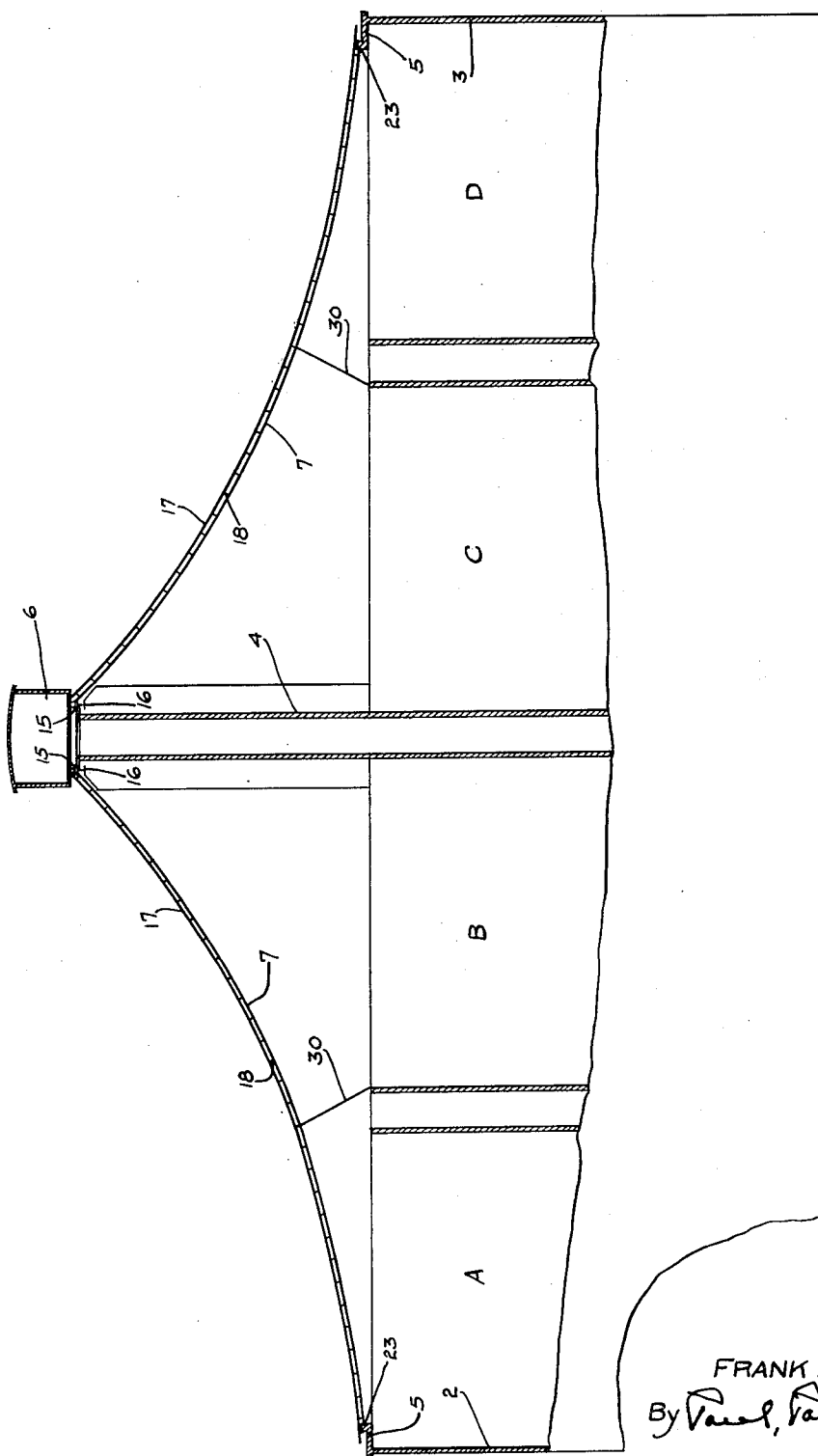


Fig. 1

INVENTOR
FRANK L. NEMEC
By *Paul, Paul, Moore*
ATTORNEYS

Feb. 12, 1935.

F. L. NEMEC

1,990,838

ROOF CONSTRUCTION

Filed June 30, 1930

3 Sheets-Sheet 2

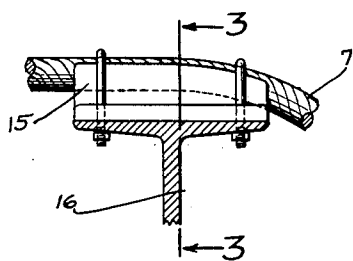


Fig. 2

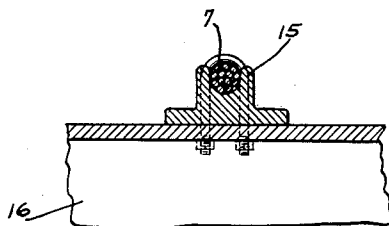


Fig. 3

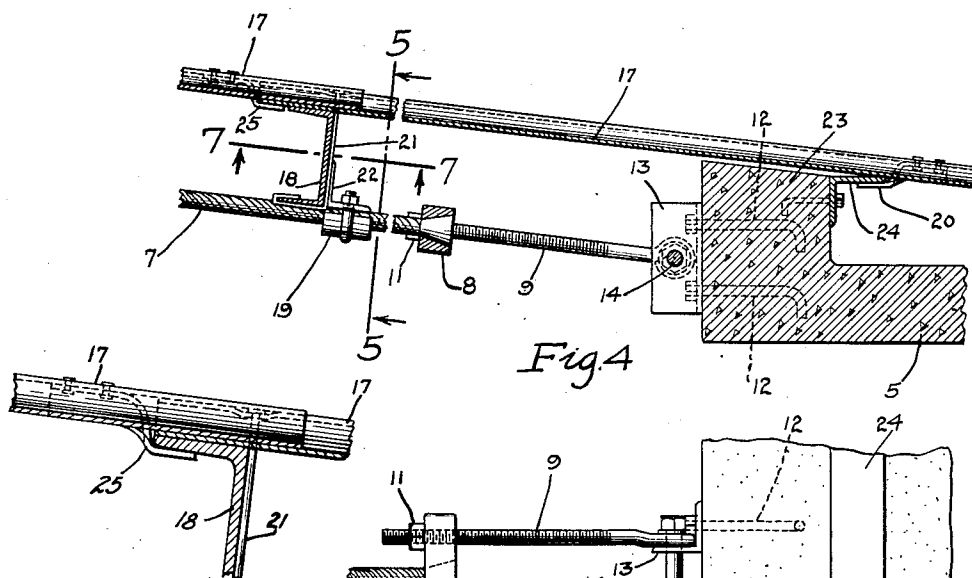


Fig. 4

Fig. 8

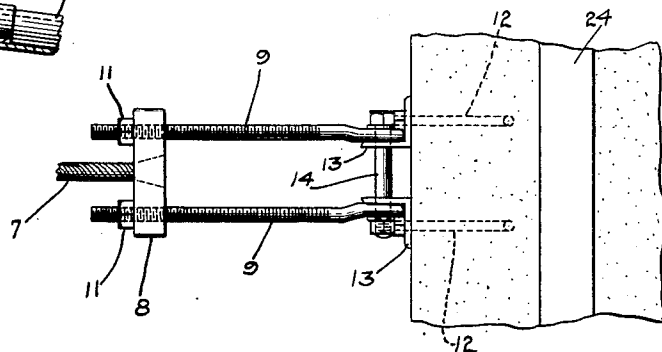


Fig. 6

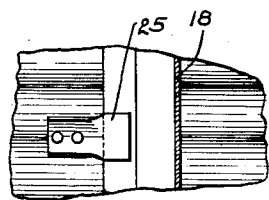


Fig. 7

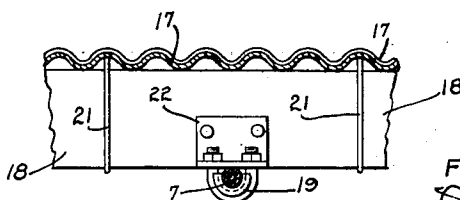


Fig. 5

INVENTOR
FRANK L. NEMEC
By *Vareb, Paul M. Moore*
ATTORNEYS

Feb. 12, 1935.

F. L. NEMEC
ROOF CONSTRUCTION
Filed June 30, 1930

1,990,838
3 Sheets-Sheet 3

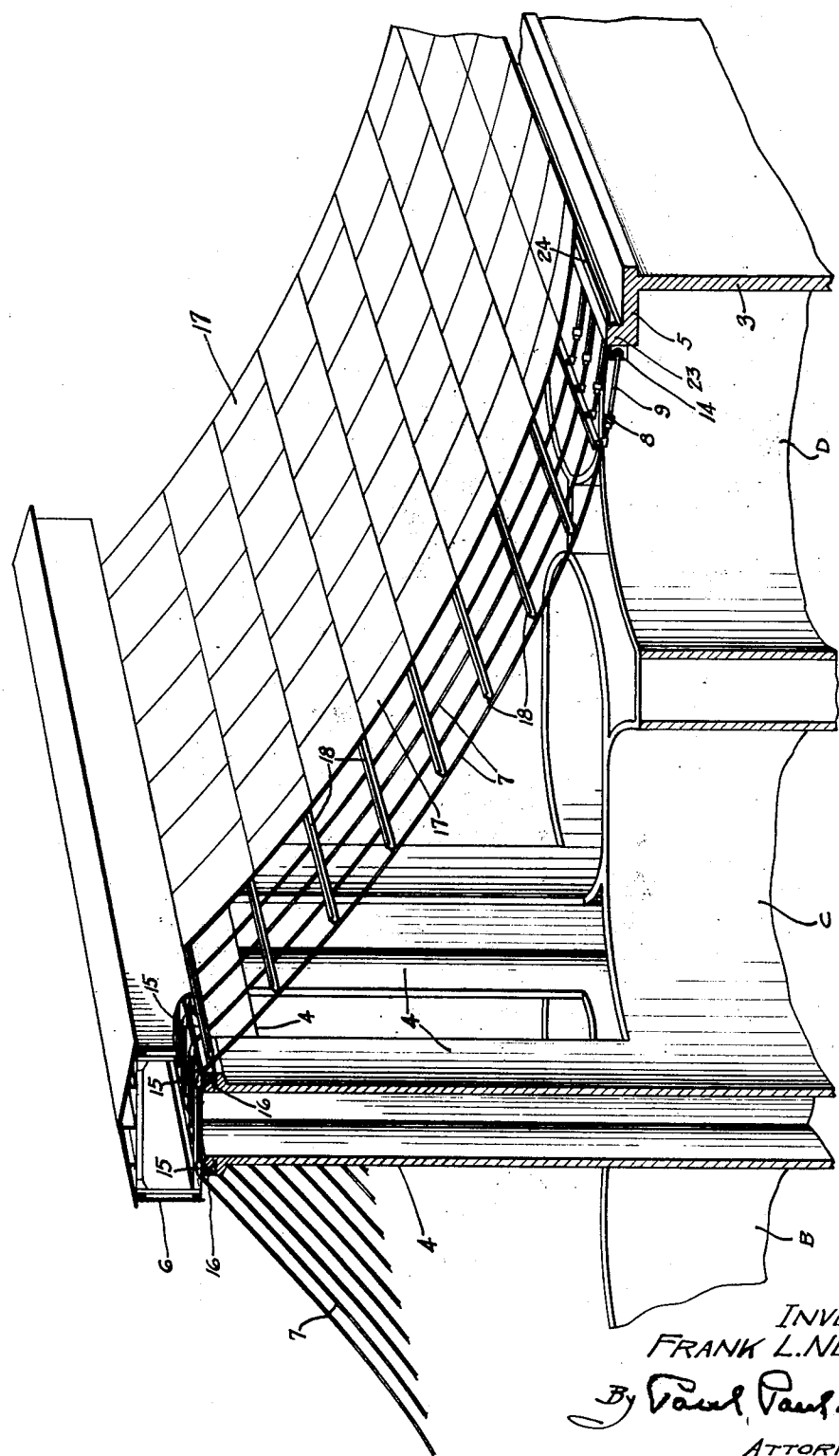


Fig. 9

INVENTOR
FRANK L. NEMEC
By *Paul Paul Moore*
ATTORNEYS

UNITED STATES PATENT OFFICE

1,990,838

ROOF CONSTRUCTION

Frank L. Nemec, Minneapolis, Minn., assignor to
Fegles Construction Company, Limited, Minne-
apolis, Minn., a corporation of Canada

Application June 30, 1930, Serial No. 464,880.

2 Claims. (Cl. 108—1)

This invention relates to new and useful im-
provements in roof constructions and more par-
ticularly to roofs for spanning or enclosing large
areas where few or no intermediate supports
can be used.

An object of the invention is to provide a roof
construction comprising a plurality of spaced
apart flexible supporting elements secured at
their ends to suitable supports whereby said
elements form catenaries adapted to sustain a
suitable roofing material or roof covering.

A further object is to provide an improved
gable roof comprising a plurality of flexible
roof supporting elements adapted to be secured
to the side walls of the building and having
their intermediate portions supported upon a
central support such as the ridge pole of the
roof, whereby said elements will provide catenary
roof-supporting elements adapted to sustain a
suitable roofing material, and whereby an inex-
pensive, light, and durable roof is provided.

A further object is to provide a roof con-
struction including spaced apart supports hav-
ing means thereon for supporting sheets of
roofing material without the use of intermediate
supports, the sheets having freedom of relative
movement to accommodate the stretch of the sup-
porting means.

Features of the invention reside in the con-
struction of a roof supported in such a manner
as to assume a catenary curve; a roof adapted
to span large floors or areas without the use
of intermediate supports; a roof comprising a
plurality of spaced apart catenaries supported
upon opposite walls of the building or structure
by suitable means and having an intermediate
or central support forming the ridge pole of the
roof, and upon which said catenaries are sup-
ported by means of suitable saddles so that they
may assume natural catenary curves between
the supports; the means for taking up slack in
the catenaries whereby they may be alined with
one another; and, in the simple and inexpensive
construction of the roof as a whole.

Other objects of the invention will appear
from the following description and accompany-
ing drawings and will be pointed out in the
annexed claims.

In the accompanying drawings, there has been
disclosed a structure designed to carry out the
various objects of the invention, but it is to be
understood that the invention is not confined to
the exact features shown as various changes may
be made within the scope of the claims which
follow.

In the drawings:

Figure 1 is a diagrammatic view of a building,
partially in section, illustrating the catenary
roof construction;

Figure 2 is an enlarged detail sectional view
illustrating a means for supporting the cate-
naries at the ridge of the roof;

Figure 3 is a detail sectional view on the line
3—3 of Figure 2;

Figure 4 is an enlarged detail sectional view
showing an upper portion of one of the side
walls of a building and a means for securing the
catenaries to the upper portions of the side
walls;

Figure 5 is a detail sectional view on the
line 5—5 of Figure 4;

Figure 6 is a detail plan view of Figure 4,
showing the roof covering removed;

Figure 7 is a detail sectional view on the
line 7—7 of Figure 4;

Figure 8 is an enlarged detail view showing
a modified means for holding the lapping por-
tions of the upper plates in position; and Figure
9 is a perspective view, partially in section, show-
ing a roof constructed in accordance with my
invention, and also showing a portion of the
longitudinal support provided at the center of
the structure.

In the selected embodiment of the invention
here shown, for purposes of disclosure, there is
illustrated in Figures 1 and 9, a building struc-
ture including side walls 2 and 3 and a central
support 4 located intermediately of the side
walls 2 and 3 and having its upper portion
towering above the top plate members 5 of the
side walls. The central support 4 extends sub-
stantially the full length of the structure. The
structure shown in Figures 1 and 9 represents
a grain storage elevator, and is shown compris-
ing a plurality of tanks or bins A, B, C, and D,
for the storage of grain or other materials. The
usual cupola 6 is shown supported upon the
central support 4 above the roof.

A feature of this invention resides in the con-
struction of a simple and inexpensive roof
adapted to enclose the tops of the bins A, B, C,
and D, as shown in Figure 1. The novel roof
herein shown is comparatively light and inex-
pensive in construction, as compared to an ordi-
nary rigid type of roof, and because of the ab-
sence of intermediate supports, it is well adapted
for use in building structures having large un-
obstructed ground or floor areas. As here
shown, the roof employs a plurality of flexible
supporting elements 7 which may be of cable,

chain, or other material applicable for the purpose. These supporting elements are supported between the side walls 3 and 4, and the central support 4, and assume catenary curves as best shown in Figure 9. It is important that the flexible elements 7 be so adjusted as to accomplish agreement in deflection of adjacent elements, that is, they must be so adjusted longitudinally as to cause all of the elements 7 in a given roof to assume corresponding catenary curves. This is essential in order that the roof may be made uniform and even in appearance. To thus adjustably support the flexible roofing elements 7, they are shown provided at their ends with suitable anchor blocks 8 having apertures therein adapted to receive threaded rods 9 provided with adjusting nuts 11, as shown in Figure 6. The rods 9 may be secured to the top plates 5 of the side walls by suitable anchor bolts 12, indicated in dotted lines in Figures 4 and 6. Angle irons 13 are shown secured to the anchor bolts 12 and are apertured to receive a bolt 14 with which the rods 9 are engaged. By thus securing the roof-supporting cables 7 to the side walls 2 and 3, they may readily be adjusted in length by simply changing the positions of the adjusting nuts 11 upon the rods 9, as will readily be understood by reference to the drawings.

Suitable saddles 15 are shown secured to I-beams 16 provided at the upper portion of the central support 4, and extending substantially the full length of the structure. These I-beams cooperate to form in effect the ridge pole of the roof. Two saddles 15 are shown provided for each catenary, one upon each angle iron 16. Suitable U bolts secure the cables to the saddles and prevent movement of the roof under wind pressure.

A suitable roofing material or covering is supported upon the catenary cables 7 and may comprise a series of metallic plates 17, preferably corrugated, secured in a suitable manner to the cables. If preferred, purlins 18 may be secured to the catenaries by suitable clamps 19 to provide means for securing the roof plates 17 as shown in Figure 4. These plates have lapping, abutting portions and as indicated in Figure 4, the upper edge portion of the under plate is preferably secured to the purlin on which it is seated by suitable means such as nails or pins 21 which pass through apertures in the plate and downwardly around the lower edge of the purlin, as best shown in Figure 4. Thus, this portion of the plate is firmly secured. The lower portion of the same plate as indicated in this figure, is slidably held on the elevated portion 23 of the side walls 2 and 3 by means of suitable clips 20 which engage brackets 24 secured to the raised portions of the walls 5. The clips 20 lap the flanges of the brackets 24 a considerable distance and are free to slide thereon to allow a corresponding movement of the plate.

The upper plate 17 shown in this same figure preferably has its lower portion overlapping the upper portion of the lower plate and the nails 21 preferably held in place by means of clips 25 secured to the under side of the plate and extending under the upper edge of the lower plate 17. The clips 25 lap the adjacent edge of the lower plate a considerable distance so that a free sliding movement of the upper plate upon the lower one is permitted to compensate for the stretch of the cables and also to allow for

expansion and contraction. The upper edge of the upper plate 17, as shown in Figure 4, is secured to the adjacent purlin in substantially the same manner as above described with reference to the lower plate in this figure, and this construction may be carried throughout the roof and in this way provision is made for movement of the covering plates or sheets one upon another and at the same time all of them will be held against possibility of displacement on the cables by wind or other means.

In the form of roof shown in Figure 1, the catenary cables preferably extend from side wall to side wall, passing over the saddles 15 secured to the I-beams 16 at the top of the central support 4, as will readily be understood by reference to Figure 1. By thus supporting the cables, the major portion of the weight of the roof will be supported upon the central support 4 and not upon the side walls of the building.

The catenary elements 7, as hereinbefore stated, may be of cable, rods, flat bands, or other material applicable for the purpose. The central support 4 extends considerably above the side supports so that the major portion of the roof is substantially supported thereon, thereby relieving the side walls of excessive roof strains. The rods 9 and adjusting nuts 11 provide means whereby the catenaries may be horizontally adjusted so that when the roof covering is secured thereto, the roof will be substantially uniform. In some instances, it may be found desirable to dispense with the catenary cables 7 and support the roofing material or roof covering directly upon the side and central supports, in which case the roofing material must be of a length to reach from one support to another, and each roof section be provided with means on the edges thereof for connecting them together to provide a roof which will be substantially leak-proof.

Referring to Figure 1, it will be noted that the central support will extend lengthwise of the building structure to provide a ridge pole as in a gable roof. The roof supports also will be substantially rigid so as to prevent them from swaying vertically. In wide roof spans, it may be necessary to provide suitable hold-down stays as indicated at 30 in Figure 1, to prevent the roof from swaying.

Figure 8 shows a slightly modified construction in which the clip 25 engages the upper flange of the purlin on which the lapping portions of the covering sheets are seated. In some cases this manner of holding the sheet may be used in place of that shown in Figure 4.

The roof herein described readily lends itself for use as an economical covering for large spans or areas where few or no intermediate supports can be used as, for example, in a grain storage bin, as shown in Figure 1. The roofing material may be supported directly upon the catenaries 7 or upon suitable purlins 18 secured to the catenaries. In either event, the roof sections at each side of the central support, as shown in Figure 1, assume the shape of catenary curves. Because of the simplicity of the roof, it may well be used as a practical roof construction for large drill halls, auditoriums, garages, factories, and other buildings requiring large areas of unobstructed floor space.

I claim as my invention:

1. A roof construction comprising spaced apart supports, flexible means suspended from said supports over the space between them, purlins secured to said flexible means transversely there-

- of, covering sheets supported on said purlins and having their contiguous edges overlapped and adapted for freedom of sliding movement one upon the other, and means on one of said sheets adapted to engage an under surface of the edge portion of a sheet which it overlaps to thereby normally hold the overlapping portions of said sheets in place and permit relative movement thereof.
- 5 2. A structure of the class described, comprising suitable side supports and a central support extending substantially the full length of the structure and towering above said side supports, a plurality of flexible elements freely suspended between said supports and forming catenary curves, suitable roofing material supported by said elements and comprising a plurality of independent sheets in overlapping slidable relation, and means by which the lengths of said flexible elements may be varied to accomplish agreement in deflection of adjacent elements.
- 10 FRANK L. NEMEC. 10