C. L. HOLT.

ROOF CONNECTION.

APPLICATION FILED APR. 15, 1919.

1,322,189.

Patented Nov. 18, 1919.

2 SHEETS—SHEET 1.

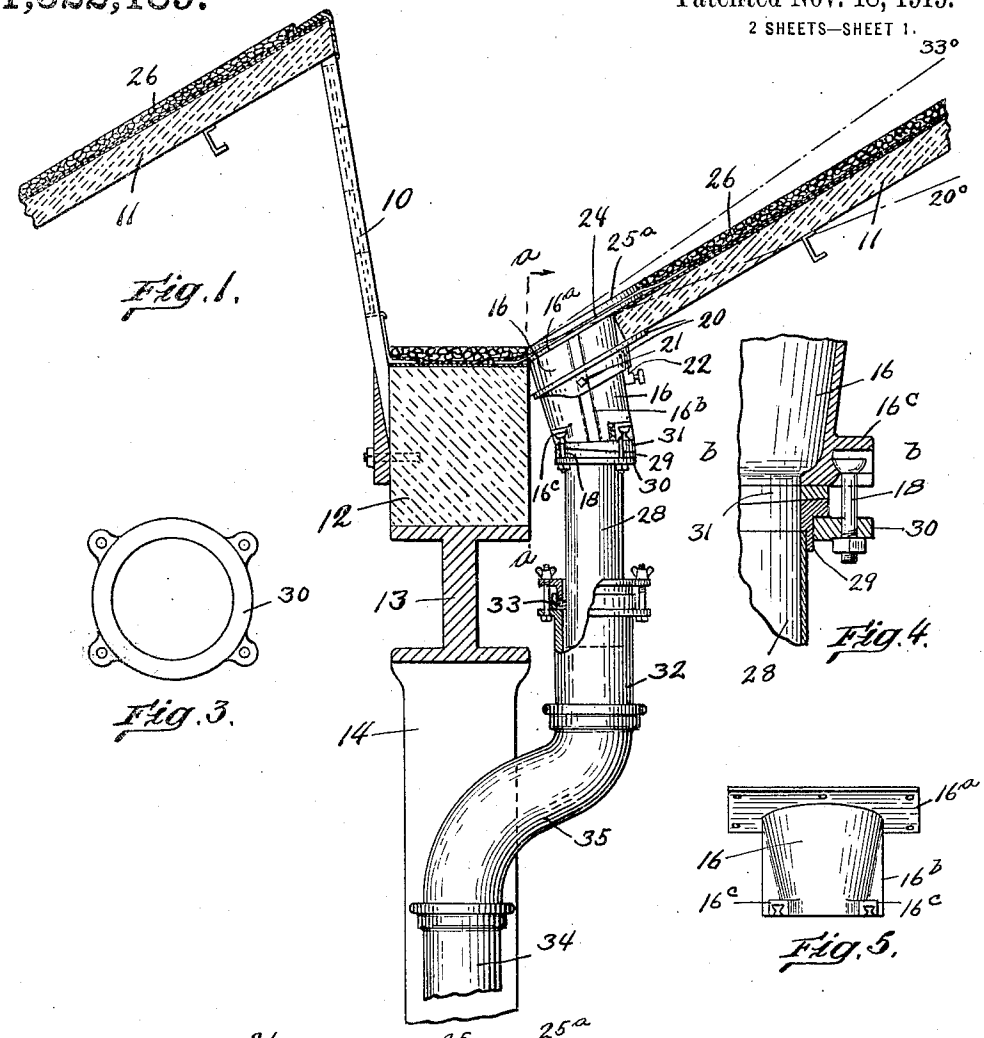


Fig. 1.

Fig. 4.

Fig. 3.

Fig. 5.

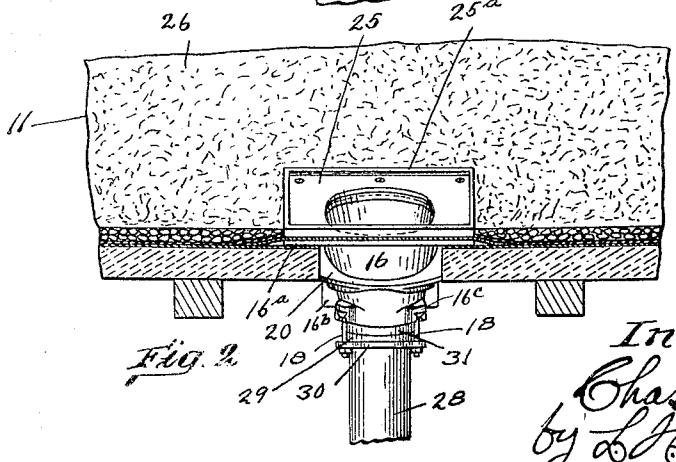


Fig. 2.

Inventor,
Chas. L. Holt,
by L. H. Harriman
Atty.

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2 SHEETS—SHEET 2.

Fig. 6.

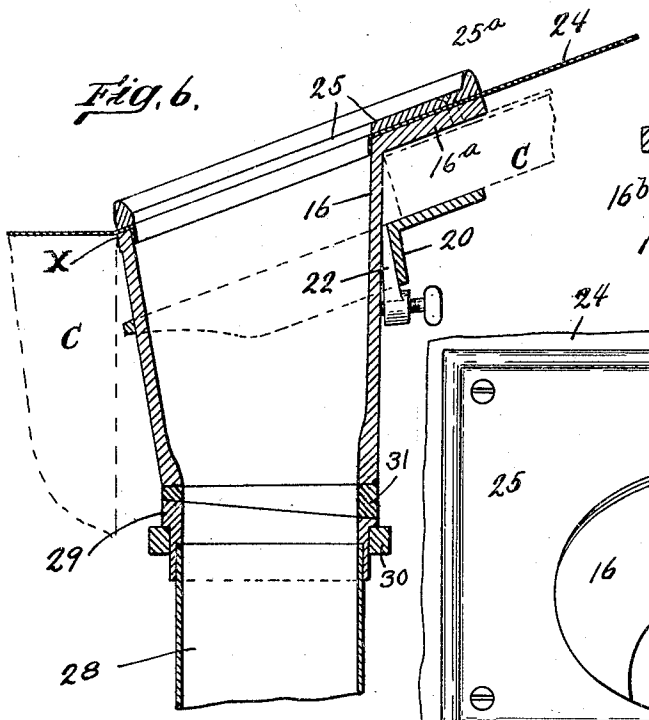
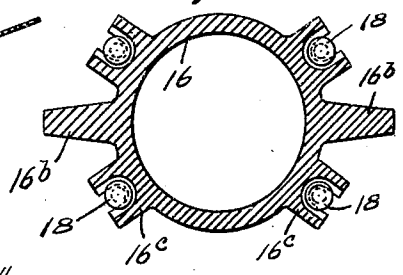


Fig. 7.



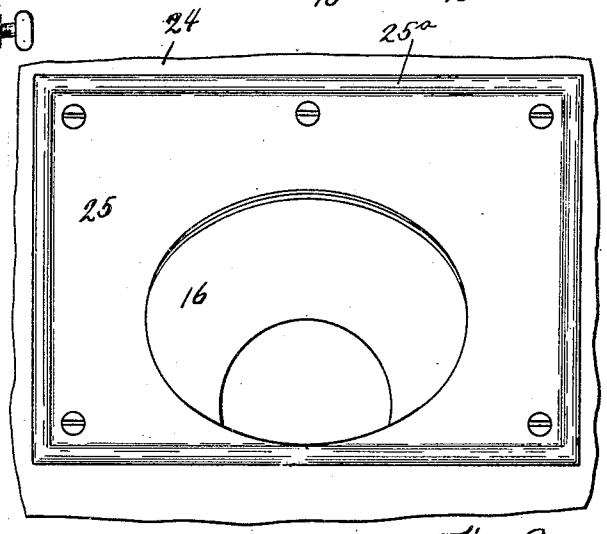
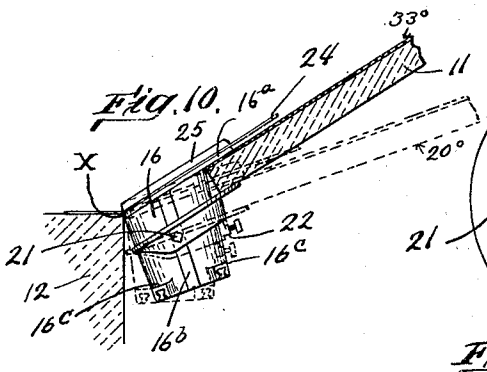


Fig. 8.

Fig. 10.



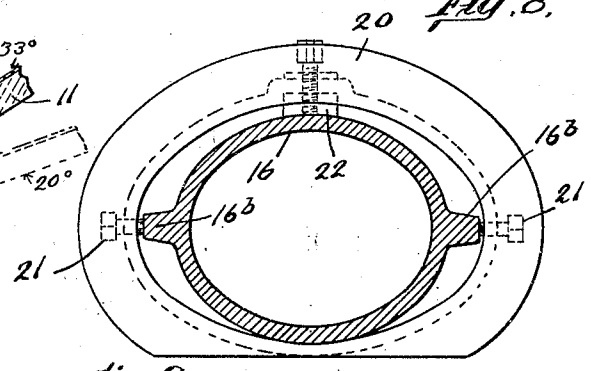


Fig. 9.

Inventor,
Chas. L. Holt,
by L. K. Harriman
Atty.

UNITED STATES PATENT OFFICE.

CHARLES L. HOLT, OF LAWRENCE, MASSACHUSETTS, ASSIGNOR TO HOLT ROOF CONNECTION CO., OF LAWRENCE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

ROOF CONNECTION.

1,322,189. Specification of Letters Patent. Patented Nov. 18, 1919.

Application filed April 15, 1919. Serial No. 290,183.

To all whom it may concern:

Be it known that I, CHARLES L. HOLT, a citizen of the United States, and a resident of Lawrence, county of Essex, State of Massachusetts, have invented an Improvement in Roof Connections, of which the following is a specification.

This invention particularly relates to connections for internal drainage to the surfaces of what are known as "saw-tooth roofs", which consist of a series of oppositely inclined roof sections forming a series of valleys, the section forming one side of each valley being nearly vertical and principally of glass and the sections forming the other side being inclined at angles usually from 20° to 33° and being formed of plank or cement, covered with water proofing material.

Roofs of this character are frequently of large area, so that the length of each valley is so great that provision for drainage at intervals throughout the length of each valley must be made.

As usually constructed, roofs of this character are provided with girders which extend continuously throughout the length of each valley at the bottom thereof, to provide a support for the ends of the roof beams or timbers.

These girders are usually supported by upright posts arranged at suitable intervals, and, where a wooden beam or timber is employed to support the roof timbers, usually an iron I-beam is provided between the timber and the posts.

Inasmuch as the location of the roof drain in the middle of the lowest portion of the valley would make it necessary to weaken the roof supports to a highly objectionable extent, such an arrangement is not considered practicable, and, to avoid this difficulty, it has been common practice to build up a "cricket" in the bottom of the valley, that is, to fill up the valley with concrete, or to build in a false roof of wood, so that the bottom of the valley will extend for a distance, equal to nearly half its original width, onto the adjacent portion of the inclined roof section, thereby permitting the roof drain to be set in the portion which extends over the inclined roof section, so that the drain pipe may pass downward at one side of the middle girder.

This arrangement is objectionable on account of the excessive expense of filling up the valley to the necessary extent and it is particularly objectionable on account of the fact that, in order to get the necessary slope in the bottom of the valley to the drain, it is necessary to build the "cricket" much higher at the points midway between the outlets than at the outlets, so much so that it often becomes necessary to fill in up to the sash level, or undesirably close to the glass of the upright section.

While these objections may be largely, and I believe entirely, obviated by arranging the outlet fitting in the inclined roof section as closely as possible to the middle supports, certain other difficulties are encountered in thus arranging the outlet fitting, and it is these difficulties which it is the primary object of my invention to overcome.

Some of these difficulties are due to the fact that the angle of inclination of the inclined roof sections are likely to be different with different buildings, so that a fitting which is adapted for one inclination will not be suitable for another. Much complication and expense may, therefore, be saved by the employment of a fitting which is adaptable for roofs of all inclinations, so that the production of such a fitting is one of the objects of my invention.

A further object of my invention is to provide a form of roof fitting adapted to be located in the inclined roof section of the valley which will provide a large, effective area for the ingress of water to the drain pipe without unduly enlarging the roof aperture, so that the water flowing into the valley will be conducted to the drain pipe before it can rise to an undesirable extent in the valley.

Another object of my invention is to provide a form of fitting for use in the above specified location which is but slightly, if any, greater than that involved in installing a connection for an ordinary flat roof.

Other objects are to provide the fitting with means whereby it may be locked to roof sections of different inclinations, so that, by employing a slip joint in the pipe to which it is connected, the advantages of a roof connection, such as that broadly claimed in my prior Patent #1059671, may be secured, and to provide means whereby

connection between the fitting, at whatever inclination it may be positioned, and a vertical drain pipe, may be readily made.

I accomplish these objects by the means shown in the accompanying drawings in which:

Figure 1 is a sectional view of the bottom portion of a valley of a saw-toothed roof, showing, in side elevation, a form of roof connection, which embodies my invention.

Fig. 2 is a sectional view at the line *a*, *a* of Fig. 1.

Fig. 3 is a detail view of a coupling ring which I employ.

Fig. 4 is a detail sectional view of a portion of the fitting connection.

Fig. 5 is a detail view of the roof fitting from the rear side.

Fig. 6 is a central sectional view of the roof connection on an enlarged scale.

Fig. 7 is a sectional view at line *b*—*b* of Fig. 4.

Fig. 8 is a plan view of the roof fitting.

Fig. 9 is a sectional view at line *c*—*c* of Fig. 6.

Fig. 10 is side elevation of the fitting, showing adjustments to roof sections of different inclinations.

In Fig. 1 of the drawing a portion of a valley in a saw-toothed roof is shown, which comprises the nearly vertical roof section 10, composed principally of glass, the inclined section 11, which is shown as an ordinary planked roof supported by roof timbers, which are usually supported in stirrups on a main timber, as 12, the latter being supported by iron I-beam, as 13, mounted on upwright posts, as 14.

According to my invention, I provide a roof fitting 16, which is of tubular form and of sufficient length to extend completely through any roof to which it is likely to be applied, said fitting being elliptical in form at its upper end and tapering to a circular form at its lower end, a preferable arrangement being such that the internal cross-sectional area at the upper end is approximately double that at the lower end, for reasons to be explained. Said fitting is provided with a flange 16^a which extends about both ends and one side of the elliptical opening, the flange being reduced to nothing at the middle of the opposite side, indicated by the character X, Fig. 6. In practice the angle of inclination of the inclined roof sections, corresponding to the section 11, vary from approximately 20° to 33° from the horizontal, and, according to my invention, the fitting 16 is so constructed that the angle between what I may term as its front side, which comes next the timber 12, and the plane of the flange 16^a, exceeds a right angle by the minimum angle at which the inclined roof section is likely to be built, namely, approximately 20°, while the surface at the lower end of the fitting is preferably formed at an angle to said front side which exceeds a right angle by the mean roof angle, for example 6°. The fitting is also provided with side ribs 16^b, which extends from nothing, at points adjacent the under-side of the flange, to the lower end of the fitting, the edges of said flanges being parallel, as shown in Fig. 5. The lower end of the fitting is provided with bosses 16^c, having dove-tailed slots formed in their under sides, which are adapted to receive the heads of clamping bolts, 18, as shown in Fig. 4.

An elliptically shaped, flanged clamping collar 20, is provided, which is adapted to fit loosely on the exterior of the fitting 16 in as close proximity thereto as would be required by a roof of minimum thickness, said collar being provided with a pair of set screws 21 disposed at opposite ends of its long diameter, in position to engage the edges of the ribs 16^b, to clamp the collar to the fitting, and a wedge 22 is provided, which is adapted to be driven in between the collar and the fitting at the rear side of the latter.

In setting the fitting into position, an elliptically shaped opening is cut through the roof section 11, which corresponds as closely as possible to the exterior of the fitting adjacent its flange, in such a position that its long diameter extends in the direction of the timber 12, so that the timber forms the lower side of the roof opening at the middle thereof. When the fitting is placed in position in the roof, it will be suspended by its flange, and its front side, at the point X, will rest against the timber 12, as shown in Figs. 1 and 6. The fitting is then locked to the roof by forcing the collar 20 against the under side of the roof, and by locking it in position by means of the set screws 21 and wedge 22, as before described.

The fitting will thus be held in a certain angular position with relation to the vertical, dependent on the inclination of the roof surface in which it is placed. That is, with the above described construction, the fitting may be considered as adjustable to different angular positions, dependent on the inclination of the roof, the point X as a pivotal point, from an initial position, corresponding to a roof of minimum pitch, in which the side of the fitting rests against the timber 12, throughout its entire length, and a position in which the angle between the timber and the adjacent side of the fitting is equal to the difference between the angle of a roof of minimum pitch and that of a roof of maximum pitch, as illustrated by the dotted and full line positions of Fig. 10.

In completing the connection of the fitting to the roof surface, a copper flashing 24, having an aperture, corresponding to the fitting orifice, is placed in position on the

flange 16ª, said flashing being adapted to extend beyond the flange 16ª onto the roof surface and onto the surface of the timber 12, and being bent so that it lies flat thereon, and then a clamping ring 25, having a gravel-stop rib 25ª about its edge is clamped onto the flashing by bolts, which are threaded in the flange 16ª, as indicated in Figs. 1 and 6. The usual roof covering may then be applied, an ordinary tar and gravel roof covering 26 being indicated, which brings the roof surface up to the level of the gravel stop 25ª, both on the roof section 11 and on the timber 12.

In practice, the roof covering directly over the timber is gradually increased in thickness in each direction from the middle of the fitting, so that the bottom of the valley will be inclined to each fitting, from each side, from points midway between each fitting, as indicated in Fig. 2.

In making the connection between the lower end of the fitting and the drain pipe, a smooth surfaced brass tube 28 is provided, to one end of which a flanged ring 29 is rigidly connected, and a coupling ring 30 is passed onto said tube into engagement with said ring 29. The surface of the flanged ring 29 is inclined or disposed in a plane inclined to the axial line thereof, and a wedge-shaped lead washer 31 is also provided, and adapted to be interposed between the lower end of the fitting and the ring 29. By rotatably adjusting both the washer 31 and the tube 28, the latter may be held in a vertical position, with the several engaging surfaces in flat contact, and when thus adjusted, the bolts 18 are suspended in the dove-tailed slots of the fitting and passed through the ring 30 and the nuts are screwed thereon, so as to force said surfaces into water-tight engagement, as indicated in Figs. 1, 2 and 4.

A pipe section 32, having a stuffing box 33 at one end, is telescopically engaged with the tube 28, and the opposite end of said section is connected to the drain pipe line 34 by a suitable off-set connection 35, which may be set in different positions according to the distance of the pipe 32 from the line of the drain pipes.

With the above described construction, any appreciable quantity of water which accumulates in the valley will immediately flow over the lower edge of the fitting and be conducted away by the drain pipe, and, as the opening thereto is substantially longer than wide, substantial accumulation of the water in the valley will be prevented, so that the water will not rise against the glass 10 to an objectionable extent.

As the drain pipe is of a size sufficient to conduct away all the water which would be supplied under ordinary conditions, the water level in the valley is not likely to reach a point in which more than half the inlet orifice will be covered.

The above described construction may be readily adapted to a roof section of any pitch within ordinary limits without change in construction, the only necessity being to bend the front portion of the flashing to correspond to the angle between the inclined roof surface and the surface of the middle timber, and to make the necessary adjustments of the parts, as already described.

I claim:

1. In combination with a roof valley having a middle support and an inclined roof section joined thereto, a fitting arranged to extend through the roof section with one side in close proximity to said support, a flexible sheet of waterproof material arranged to form a water-tight connection between the upper end of the fitting and the surfaces of the roof section and support, and means, rigid with said fitting, for supporting the same on the roof section surface.

2. In combination with a roof valley having a middle support and an inclined roof section joined thereto, a fitting arranged to extend through the roof section with one side in close proximity to said support and having a supporting flange at its upper end disposed at an obtuse angle to said side, to rest on the roof surface, and terminating adjacent the line of connection between the roof section and the support, a flashing having a water-tight connection with the upper end of said fitting and flange and extending onto the adjacent surfaces of said roof section and support, to provide a water-tight connection between the fitting and the waterproof covering of said surfaces, and a drain pipe connection with the lower end of said fitting.

3. In combination with a roof valley having a middle support, and an inclined roof section joined thereto, a fitting arranged to extend through the roof section with one side in close proximity to said support and adapted to be held at different angles to the horizontal, according to the inclination of the roof section, a supporting flange on said fitting adapted to extend onto the surface of said roof section and terminating within said surface, a sheet of flexible waterproof material arranged to form a water-tight connection between the upper end of the fitting and the surfaces of the roof section and support, a drain pipe, and an angularly adjustable coupling means between said fitting and pipe, adapted for adjustment according to the different angular positions at which the fitting may be supported.

4. In combination with a roof valley having a middle support and an inclined roof section joined thereto, a roof fitting arranged in said roof section in close proximity to said support and positioned with

relation to the vertical according to the inclination of said roof section, means to lock said fitting to said section and to form a water-tight connection between its upper end and the surfaces of the roof section and support, a drain pipe having a vertically disposed stuffing box section connected thereto, a pipe slidable in said stuffing box and an angularly adjustable connection between said pipe and said fitting.

5. In combination with a roof valley having a middle support and an inclined roof section jointed thereto, a roof fitting of oblong form at its upper end, and tapering to a circular form at its lower end, arranged in said roof section with its longer side in close proximity to said support, means to form a water-tight connection with the surfaces of the roof section and support, a drain pipe, and means to connect the lower end of the fitting to said drain pipe.

6. In combination with a roof valley having a middle support and an inclined roof section joined thereto, a roof fitting extending through said roof section and having a water-tight connection with the surface of said section and said support, said fitting having a supporting flange at its upper end formed to taper from an oblong form at its upper end to a circular form at its lower end, oppositely disposed, exterior ribs on said fitting extending longitudinally of its tapering sides with their edges in approximate parallelism, a collar arranged to encircle said fitting and to engage the under side of the roof, and locking devices for said collar arranged to engage the edges of said ribs.

In testimony whereof I have signed my name to this application.

CHARLES L. HOLT.