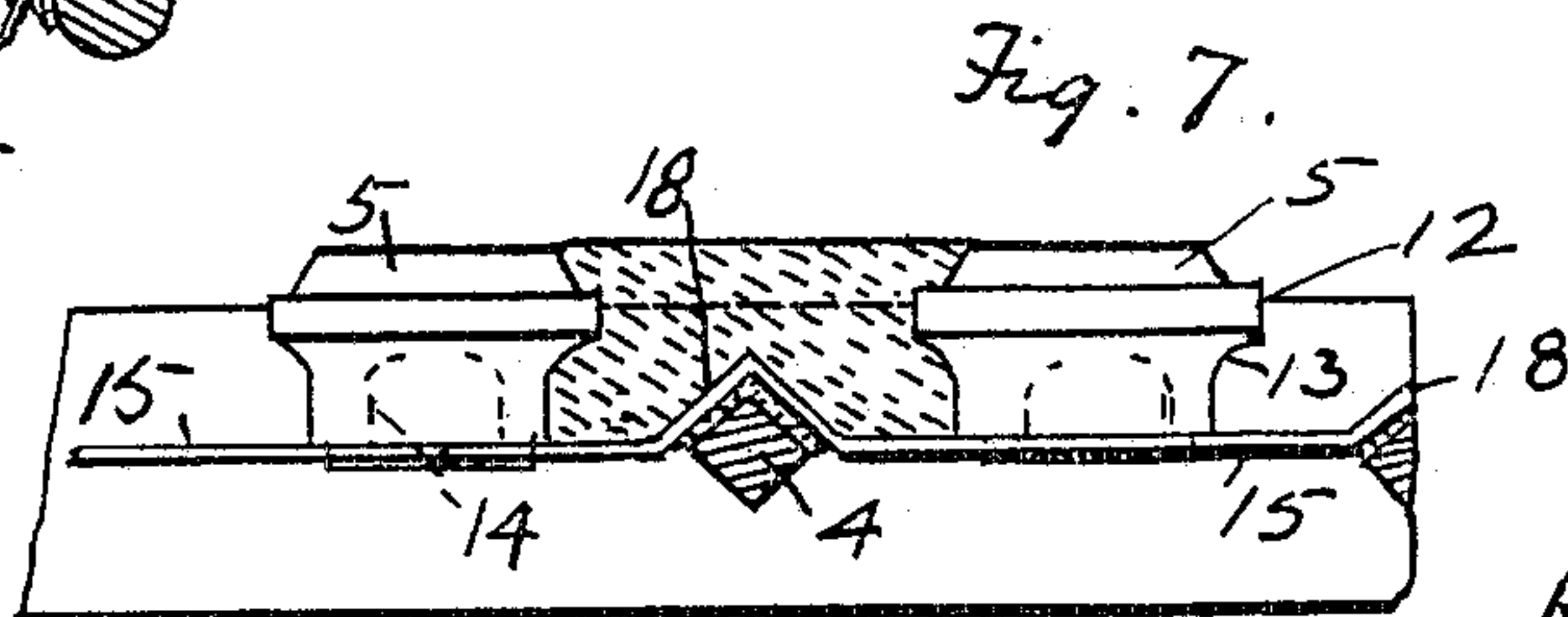
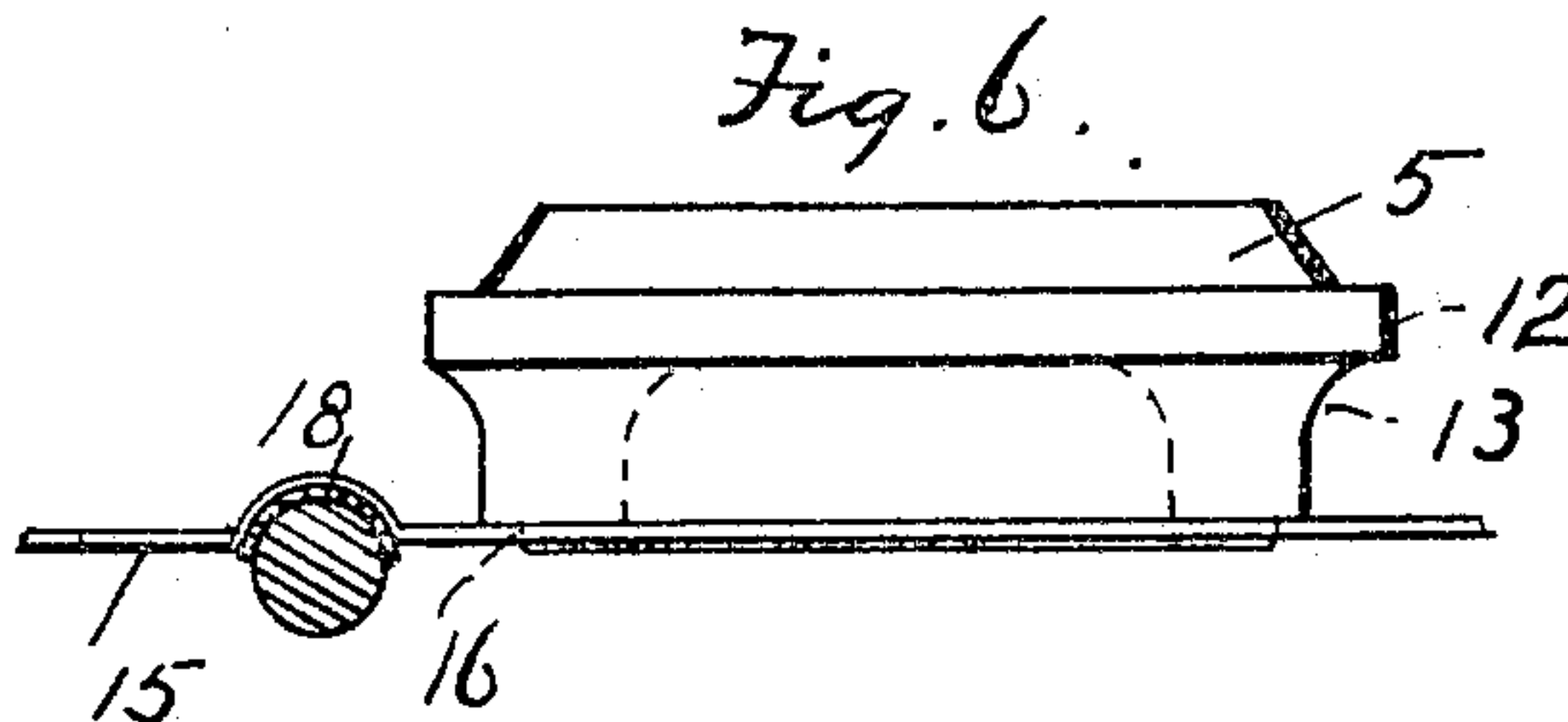
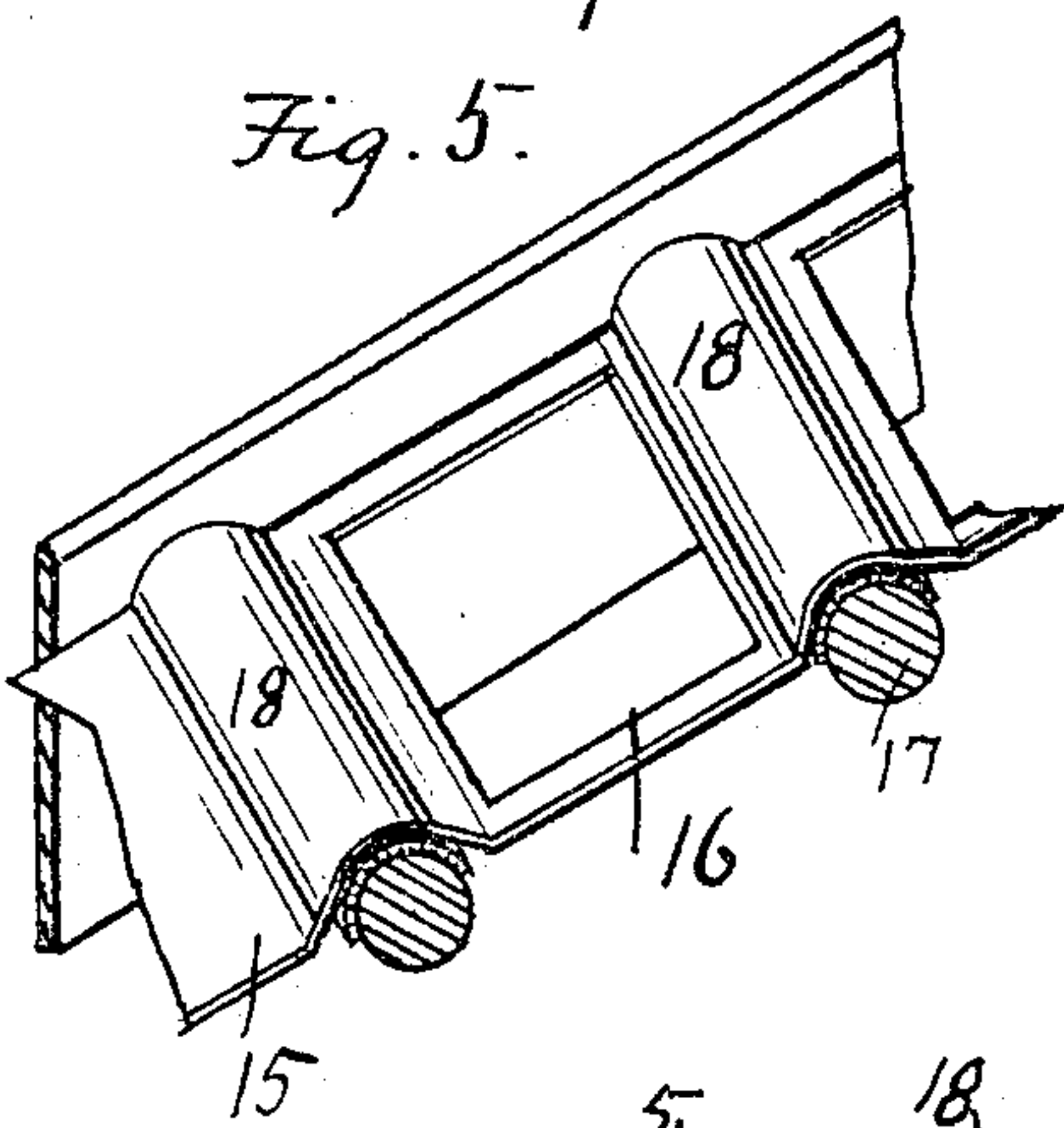
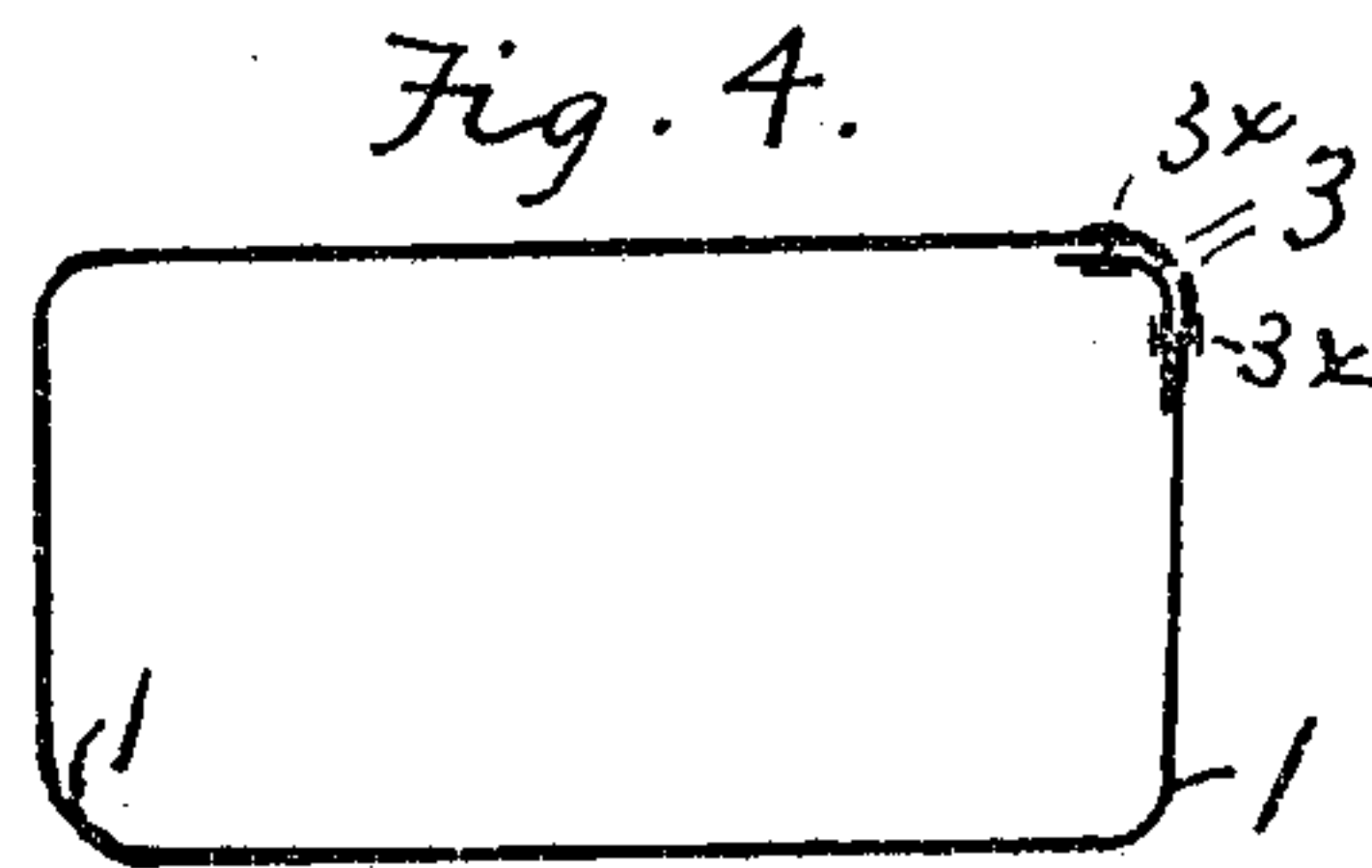
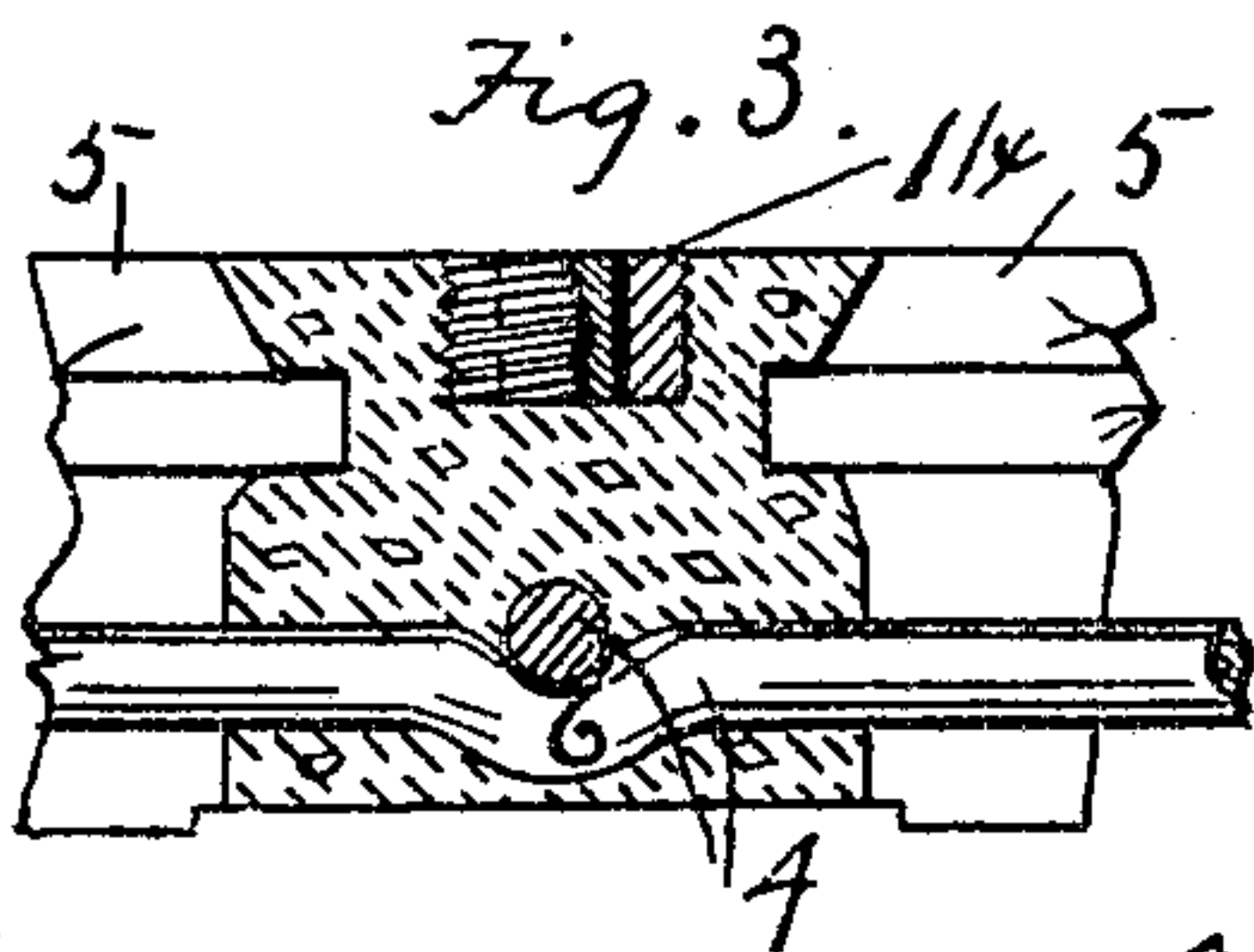
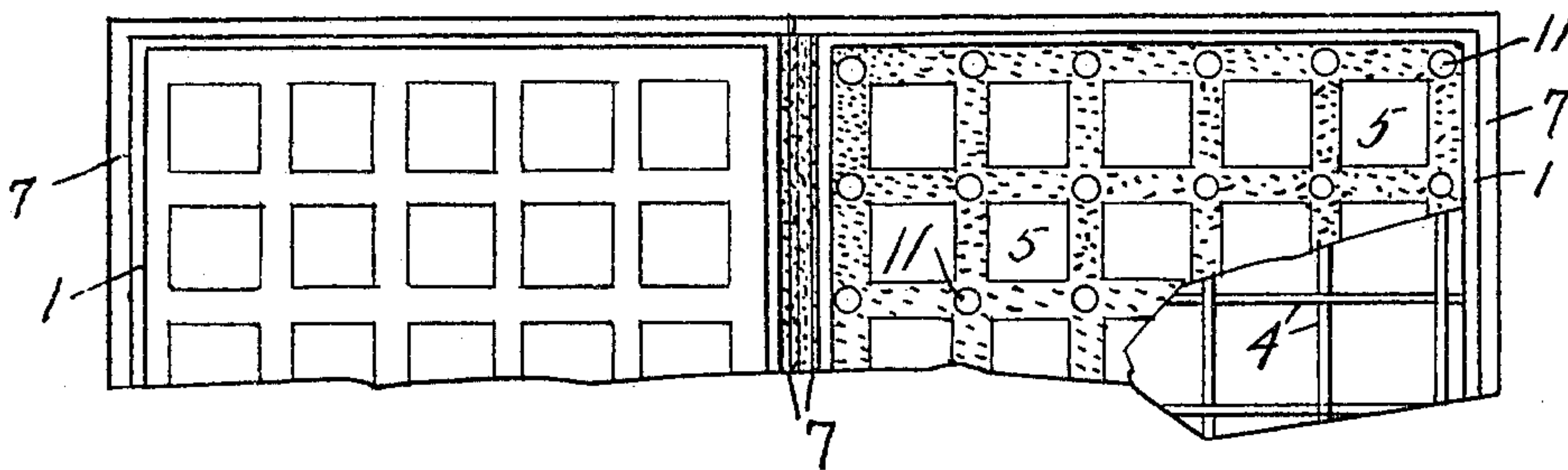
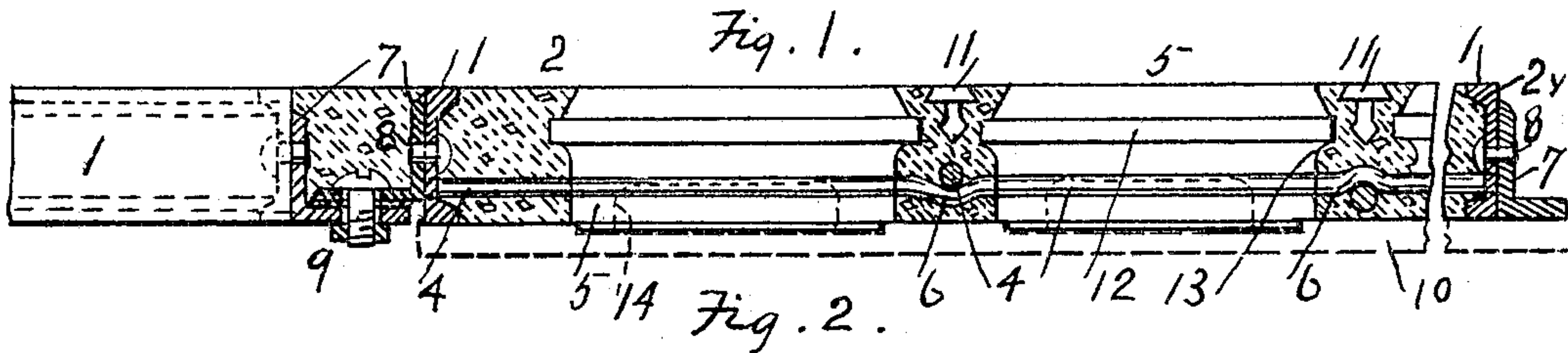


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VAULT LIGHT CONSTRUCTION.

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Witnesses

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# UNITED STATES PATENT OFFICE.

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## VAULT-LIGHT CONSTRUCTION.

No. 799,254.

Specification of Letters Patent.

Patented Sept. 12, 1905.

Application filed October 28, 1904. Serial No. 230,426.

*To all whom it may concern:*

Be it known that we, ROBERT H. OLD and WILLIAM J. LEDERLE, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have jointly invented new and useful Improvements in Vault-Light Construction, of which the following is a specification.

The invention relates to coverings for vaults and the like, and has for its objects to provide a simple, efficient, and economical construction protected against the injurious effects of expansion and contraction due to variations of temperature and also protected against leakage and to produce a unit for such construction that can be used singly or combined indefinitely with others of like character, and, further, to provide that such construction may be made of standard material now on the market and made complete at the factory ready for speedy instalment by workmen of ordinary skill.

The invention consists in the construction hereinafter described and pointed out.

In the accompanying drawings, forming a part of the specification, Figure 1 is a partial longitudinal section of a tile-holding frame of a vault-light structure containing several glasses, a part being broken away near the right end of said figure and a portion of the left-hand part remaining unsectioned. Fig. 2 is a partial plan view of a plurality of such frames secured together, one frame or section being complete and certain parts omitted in the other. Fig. 3 is a partial section of a modified detail on about twice the scale of Fig. 1. Fig. 4 is a diagrammatic view showing a feature of construction of a frame. Fig. 5 is a partial perspective showing a modification. Fig. 6 is a partial longitudinal section of the frame of Fig. 5 with glasses inserted, and Fig. 7 is a partial longitudinal section showing a modification.

Numeral 1 denotes a frame to hold a tile 2, made of any suitable cement inserted therein in plastic or semifluid condition, as will be described. The frame is preferably made of a flanged metal bar or of "channel-iron" of approximately the form shown in cross-section and bent to inclose a rectangle or other suitable figure, the ends 3 of the bar being joined, as by rivets 3<sup>x</sup> or by any suitable means.

4 denotes iron or steel rods secured in the frame near its lower flange and preferably within the recess or channel 2<sup>x</sup> and crossing each other at regular intervals corresponding to the number, size, and location of the glasses or lenses 5 which may be used. At the points where rods cross each other one or both are provided with bends, as indicated at 6, whereby the main portions of the rods may be disposed in practically the same plane and whereby movement of the transverse rods lengthwise of each other is prevented. These bends are further advantageous for the reason that they translate a part of the longitudinal expansion transversely, and so divide or distribute its effect. This function, however, is rendered less important by the protection against variation of temperature afforded by the cement cover and by the situation of the rods at the lower part thereof remote from the influence of external temperatures.

The unitary frame described can be used singly or in combination with any suitable number of like construction. A plurality of frames when desired can be combined with an iron supporting-frame, (indicated at 1<sup>x</sup> in Fig. 2.) To provide for such combination, each frame has an angle-bar 7 fixed thereto in any suitable manner, as by rivets 8. These flanges are secured to the sides of the frames in such manner that they do not extend below the frames or glasses and do not, therefore, obstruct the light passing obliquely from the bottom of the glasses. In assembling the frames the flanges of bars 7 are overlapped and bolted together, as indicated at 9, the bolt-holes being made sufficiently large to provide for a slight movement, as may sometimes be advantageous to allow for contraction and expansion or for a small adjustment that may be convenient in completing the compound covering. Red or white lead or a suitable cement is preferably applied between the contiguous flanges of the angle-bars. The flanges of the angle irons or bars, which thus connect frames, separate the frame-bodies, and thus provide a pocket for cement between said bodies and above the flanges, and the suitable filling of these pockets when the cover has been placed is practically the only work that will not ordinarily be done at the factory, where all the work of the construction except the filling can



be done under favorable conditions and without annoyance to the public.

10 denotes a board or sheet to temporarily support the glasses in proper position before  
5 they are surrounded with cement. This temporary support may be marked or provided with seats whereby to regulate the situation of the glasses, and it can be coated with wax or otherwise defended against adhesion of the  
10 cement. The glasses or lenses having been properly placed, cement is poured in about them and all the spaces are filled and the upper surface smoothed and the glasses cleaned in usual manner. In the cement near the cor-  
15 ners of the glasses are placed plugs 11, of soft metal, such as lead, to prevent slipping; but preferably we use, as indicated in Fig. 3, hard-metal rings or short tubes 11<sup>x</sup>, which may be screw-threaded on their exterior and on their  
20 interior, if desired, said tubes being first filled with a friction metal, such as lead, and inserted while the cement is sufficiently plastic and before the finish of the surface. The lead and the lead-receptacles obviate slipping, the hard  
25 metal of the latter preventing the rapid wear of the former. The external threads or equivalent projections of the lead-receptacles secure them in the cement when the latter sets or hardens, as usual. Any suitable cement, such  
30 as customarily made of Portland cement mixed with water and furnace-slag or broken stone, may be employed. The coefficient of expansion is practically the same in such cement as in glass, and as the latter is wholly supported  
35 by the cement and is not in contact with metal it and the parts between it and the cement are protected against contraction and expansion. The glasses have a customary projection 12, whereby they are held in the hardened cement,  
40 and they are provided each with inclined curved surfaces or arches, as shown at 13, whereby they bear against the cement immediately adjacent the rods, which latter constitute the support of the cement, the lat-  
45 ter directly supporting the glasses. The exterior arches of the outer series of glasses are of course supported by the channel-iron through the medium of cement, as illustrated. The curved parts 13 of two adjacent glasses  
50 combined with the interposed cement constitute an arch, of which a rod may be considered the key, the thrust of the glasses being largely toward the sides of the rod and opposite in direction. Obviously inclined planes  
55 could be substituted for the curved faces and secure a similar result. Since the inclined and opposite faces of the glass and of the metal supporting bar or part are approximately parallel and cement is held between them, it  
60 follows that the glass by its weight presses the cement toward the bar in lines oblique to vertical lines, whereby the metal better supports the cement and glass than in prior con-

structions in which the cement had no such underlying inclined supporting metal bar or foot. To reduce the weight, the glasses in molding or pressing can be cut away, as indicated at 14. Any desired form of glasses or lenses can be employed.

As a partial modification of the invention 70 it is proposed in some cases to employ a sheet-metal plate or soffit 15, provided with seats having openings 16, situated practically in the same plane as the transverse rods 17. At 18 the plate is bent to partially surround the  
75 rods, as shown in Figs. 5, 6, and 7. The particular form of the rods in cross-section is not essential.

Obviously the herein-described improvements are not limited to vaults, but are ap- 80 plicable to area-way, skylight constructions, and other constructions of the same general character.

We are aware that glasses having curved and angular faces suspended from and below 85 frames are not new. Our improvement in this direction is characterized by the construction set forth, whereby glasses with plain bottoms are so supported that said bottoms are not above the lower level of the supporting-frames 90 and connections.

Having described the invention, what we claim is—

1. A tile-frame, in combination with a detachable angular connecting-bar having one 95 part provided with means for connecting it with a like reversely-situated part of a second connecting-bar to make therewith a receptacle for cement when frames are assembled, said bars being adapted for connection with either 100 side of the frame, a glass supported in said frame, and means for connecting the bar to the frame the bottom of said bar being situated in substantially the same plane as the bottom of the glass. 105

2. Tile-frames for vault-covers, each provided with a detachable flanged fastening-bar adapted for connection with a second cooperating fastening-bar, said bars when connected comprising a pocket for cement, the flanges 110 being reversely situated and overlapping, and cement in said pocket, the bottom of said bars being situated in substantially the same plane as the bottom of the frame.

3. A tile-frame for vault-covers, a detach- 115 able angular fastening-bar adapted for connection with a cooperating-bar, said bars when connected including a receptacle for cement, and adjustable connections consisting of bolts and overlapping bar-flanges provided with 120 bolt-holes larger than the bolts.

4. In a vault-cover, a frame, cement held in the frame and supported by metal parts connected to the frame, and glasses held in the cement, said glasses having inclined faces 125 adapted to press the cement laterally and

downwardly toward the metal parts, said parts  
being situated in the lower part of the cement,  
and having faces approximately parallel to  
the inclined faces of the glasses, the cement  
5 being situated between said parallel inclined  
faces, all as set forth, whereby the pressure  
of the weight of each glass against cement

and of cement against the metal part is oblique  
to the vertical.

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