

No. 871,127.

PATENTED NOV. 19, 1907.

E. H. LUNKEN & C. M. GONKLIN.  
METALLIC WINDOW CONSTRUCTION.

APPLICATION FILED NOV. 22, 1906.

7 SHEETS—SHEET 1.

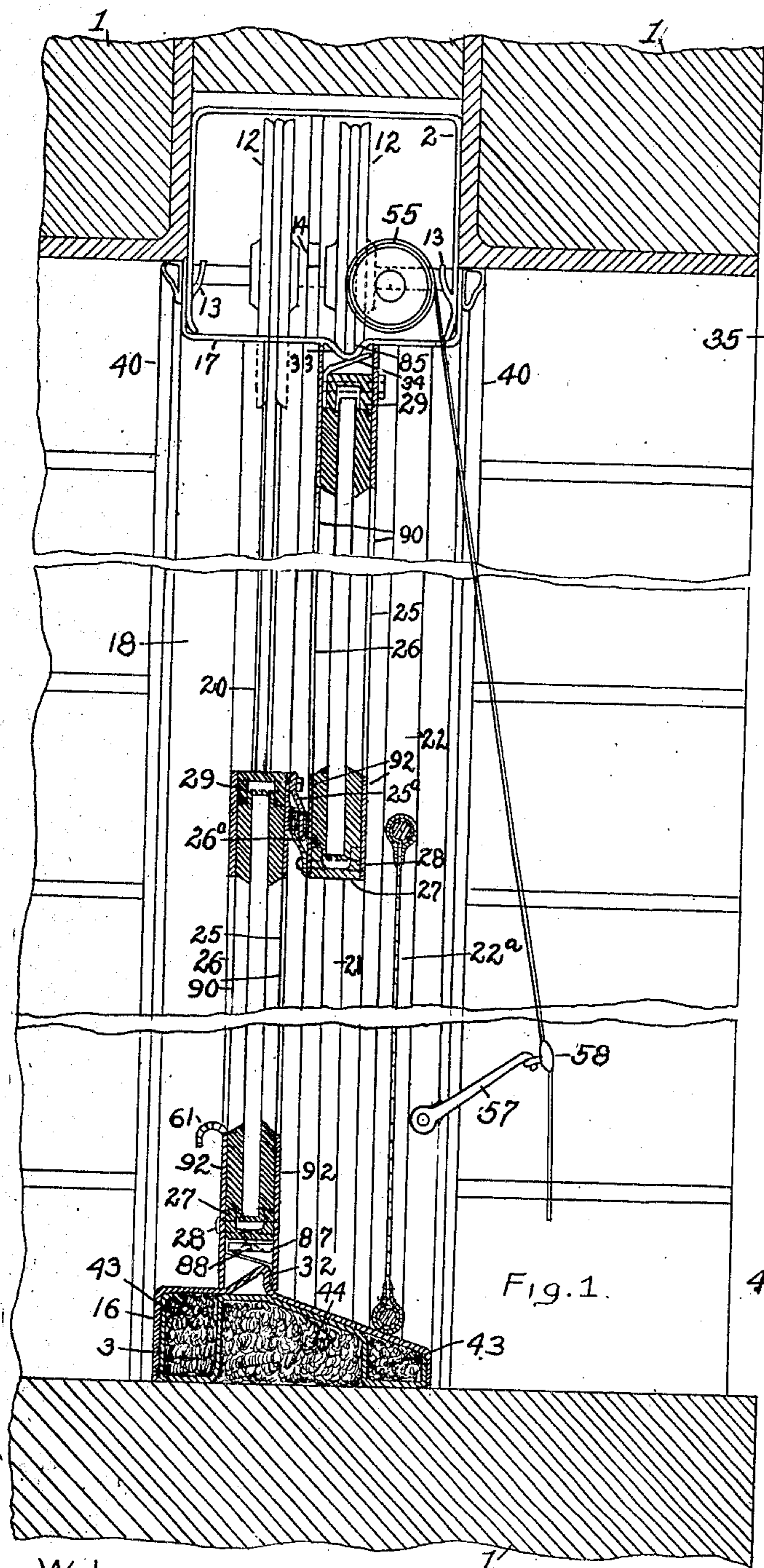


Fig 2.

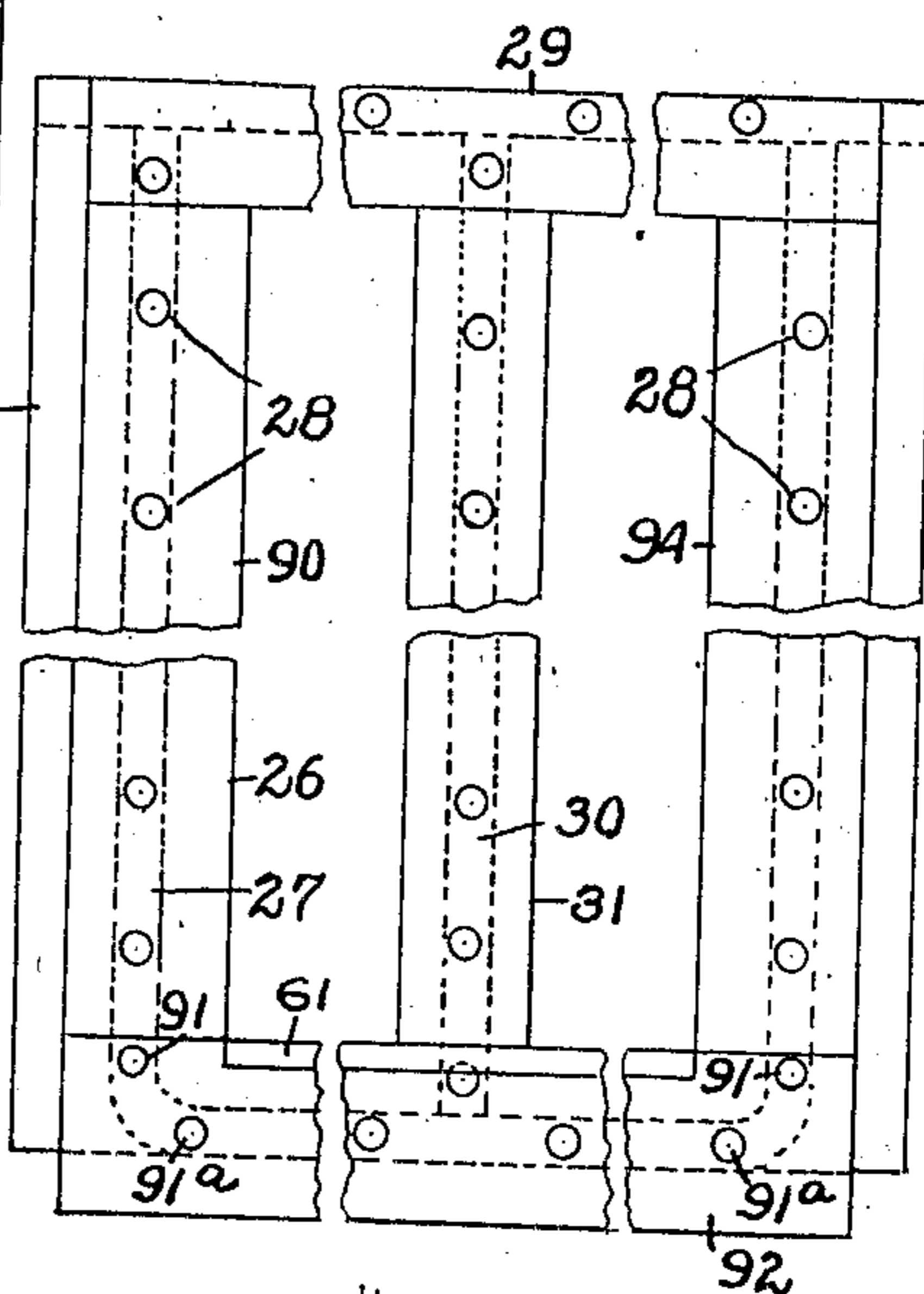
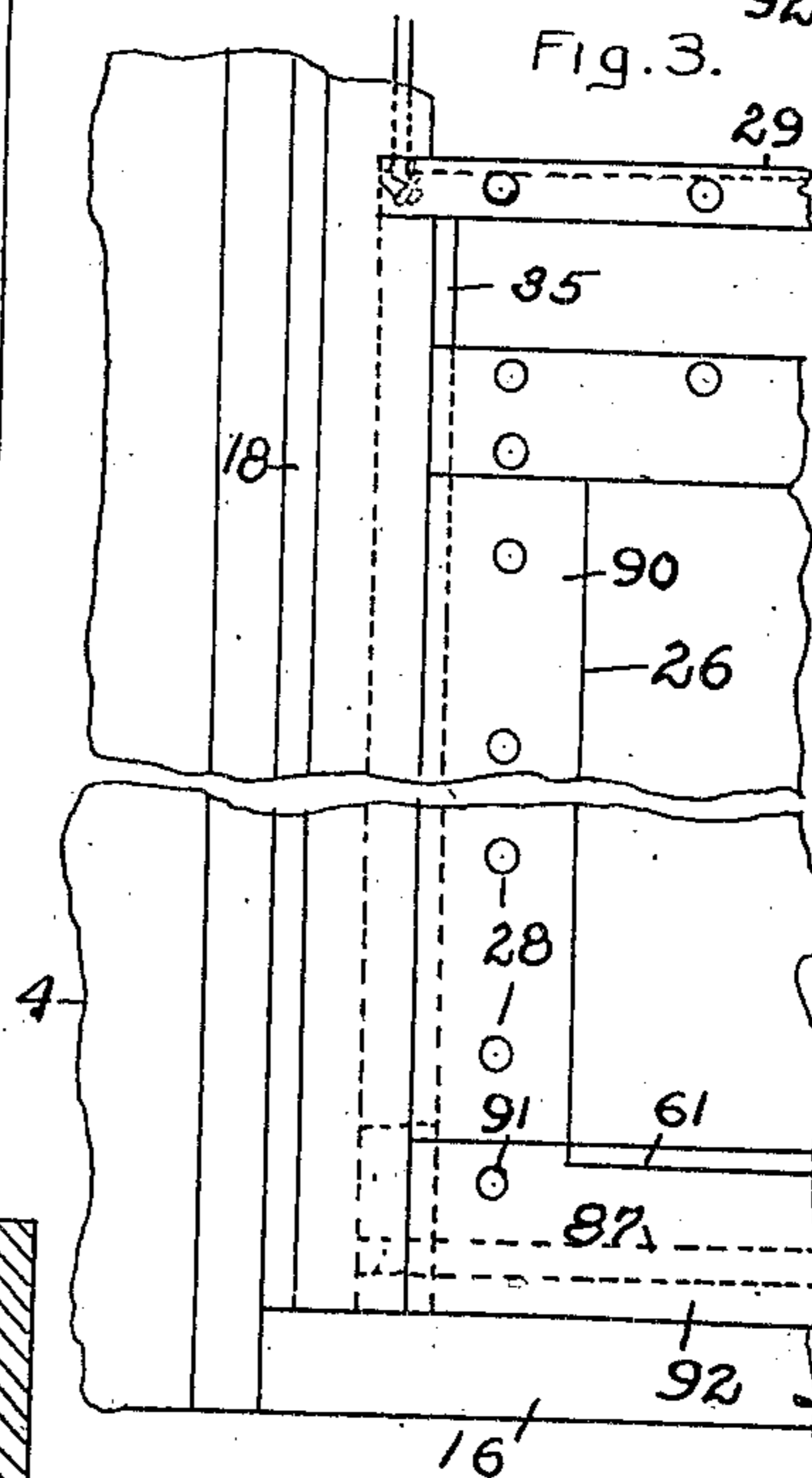


Fig. 3.



Witnesses.

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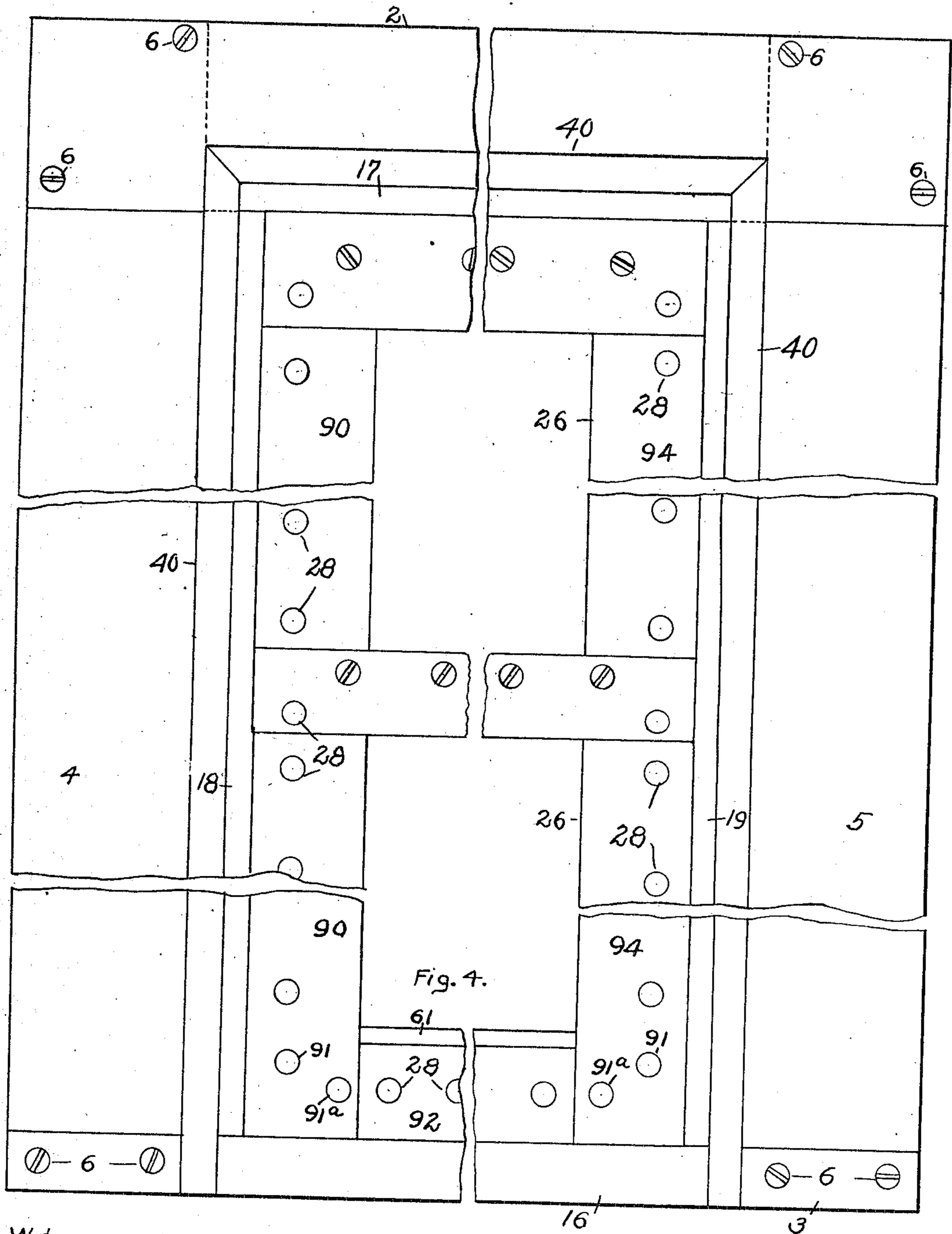
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7 SHEETS—SHEET 2.



Witnesses.

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7 SHEETS—SHEET 3.

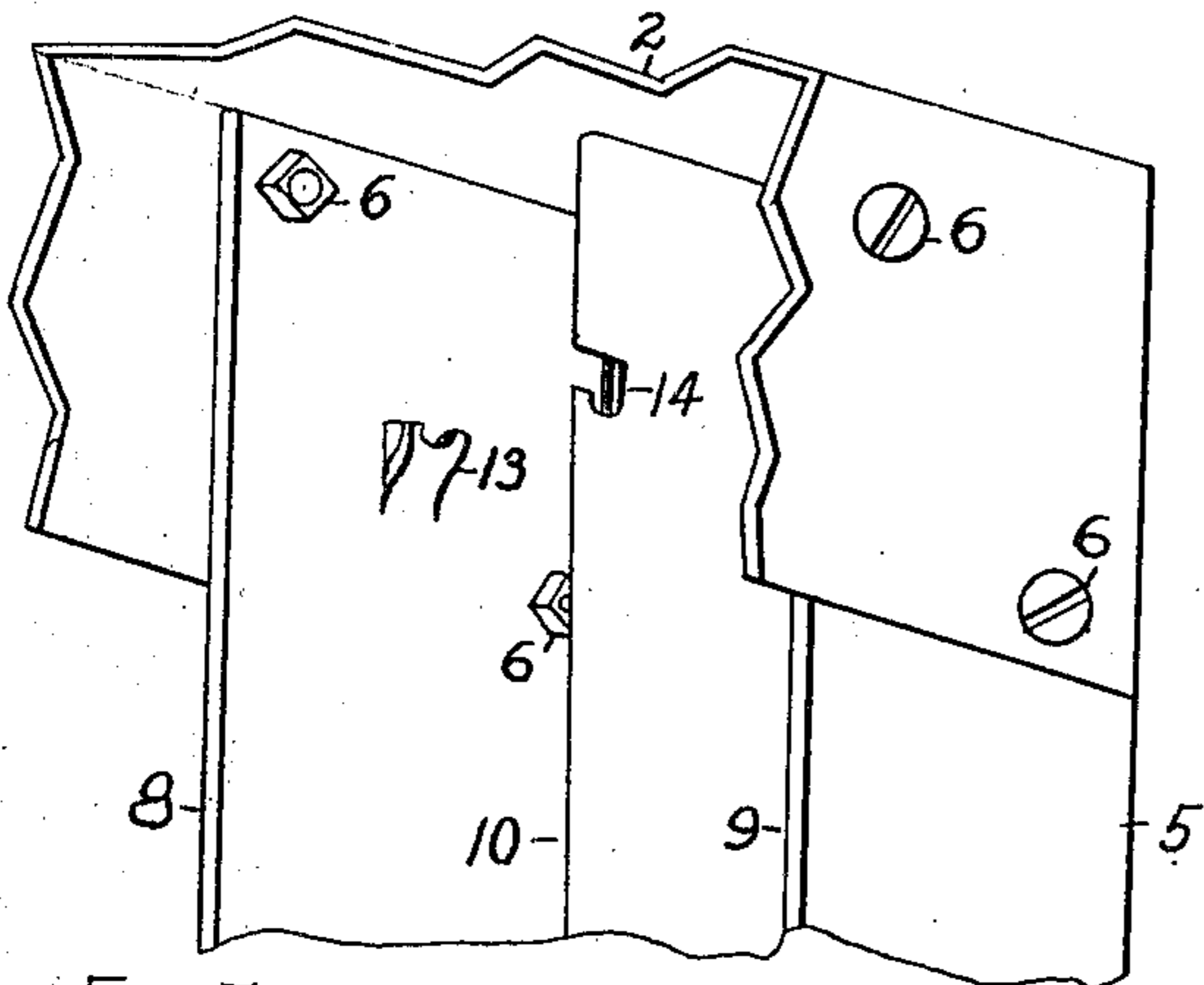


FIG. 7.

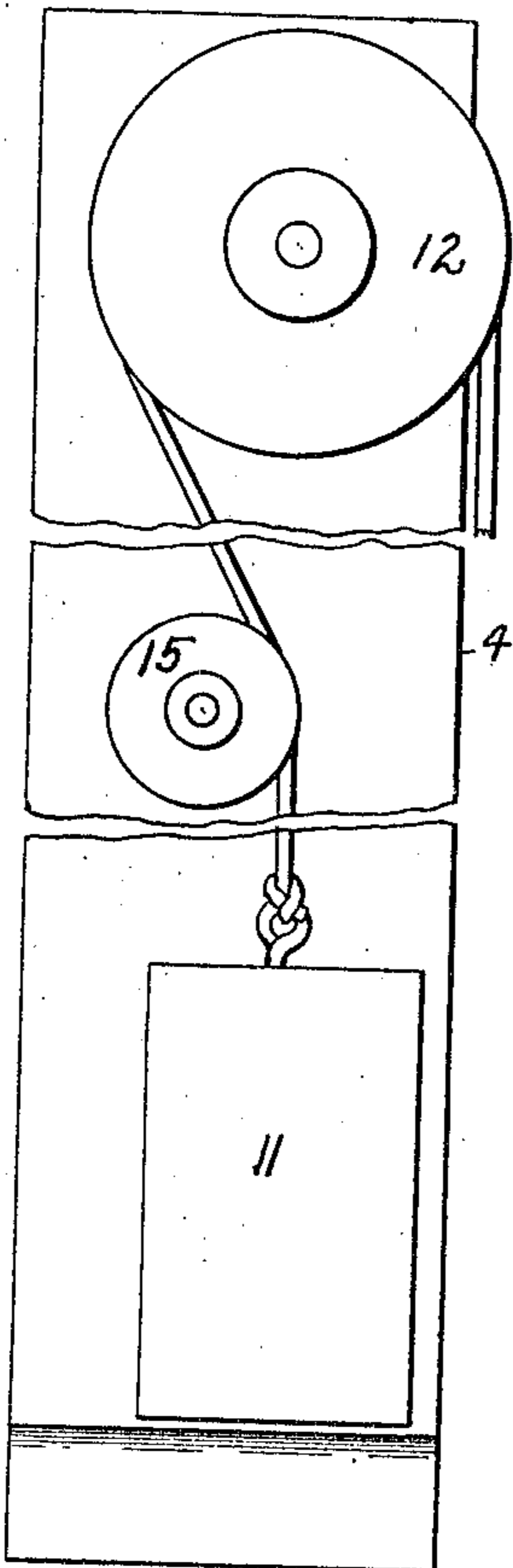


FIG. 6.

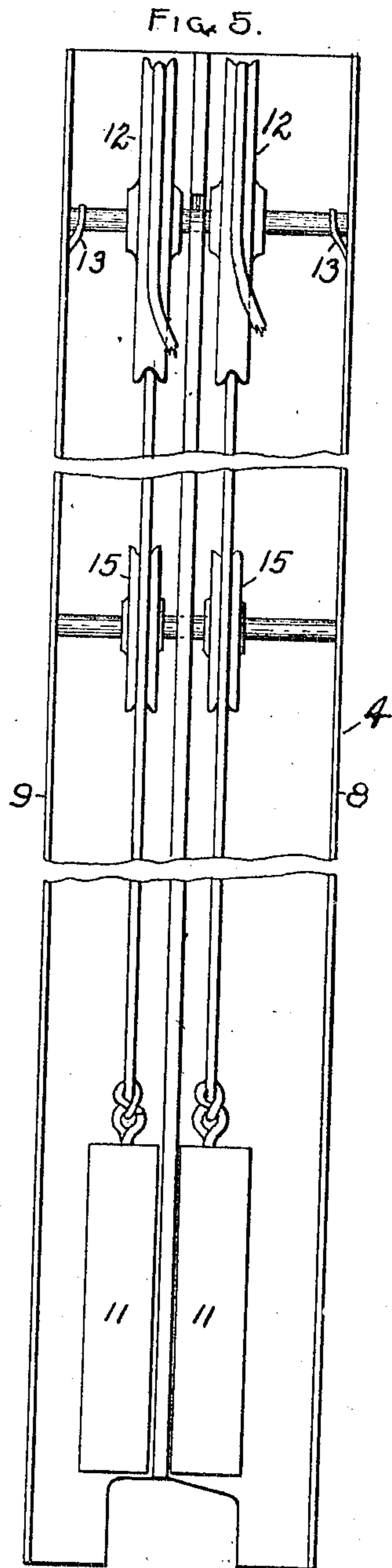


FIG. 5.

Witnesses.

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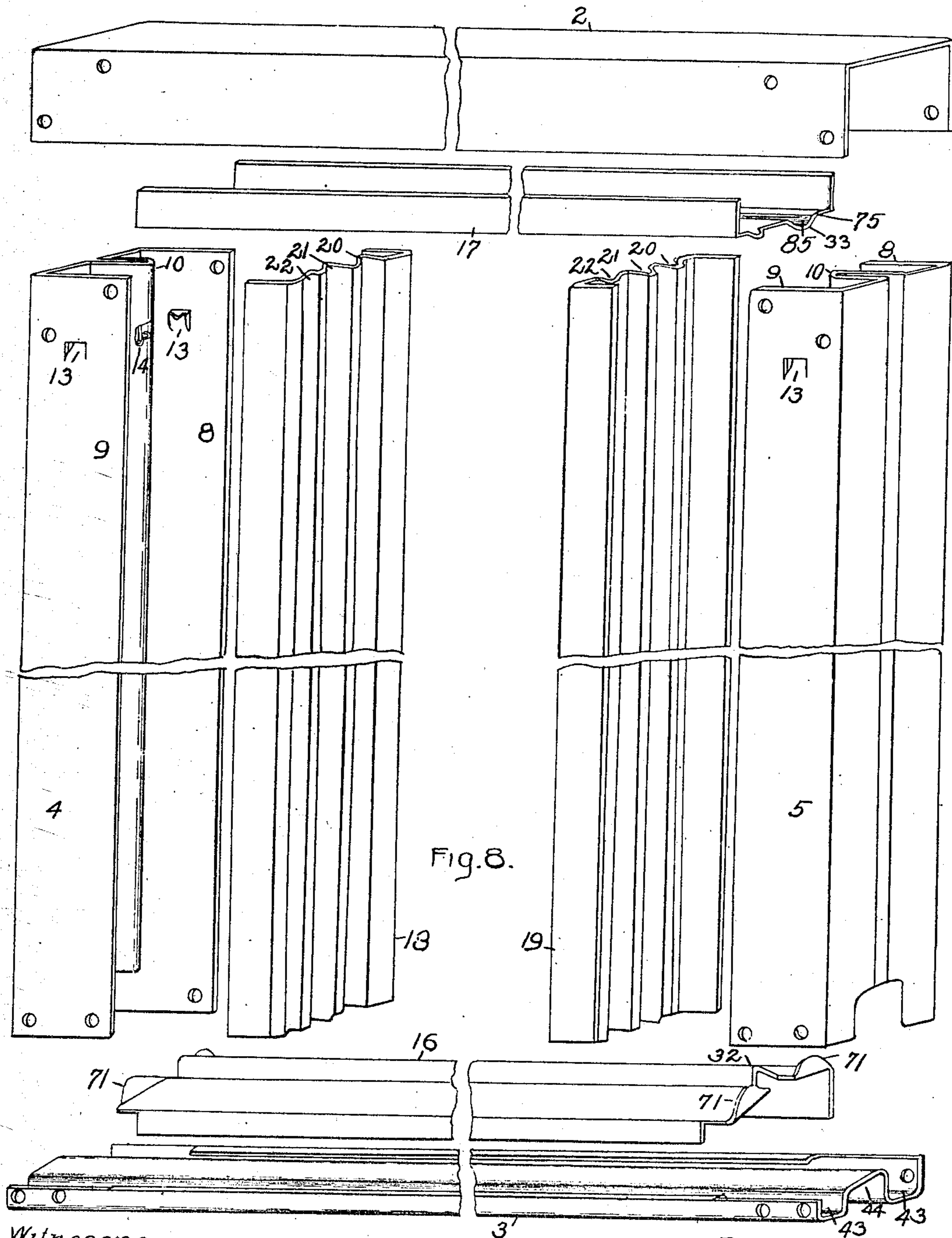
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7 SHEETS—SHEET 4.



Witnesses.

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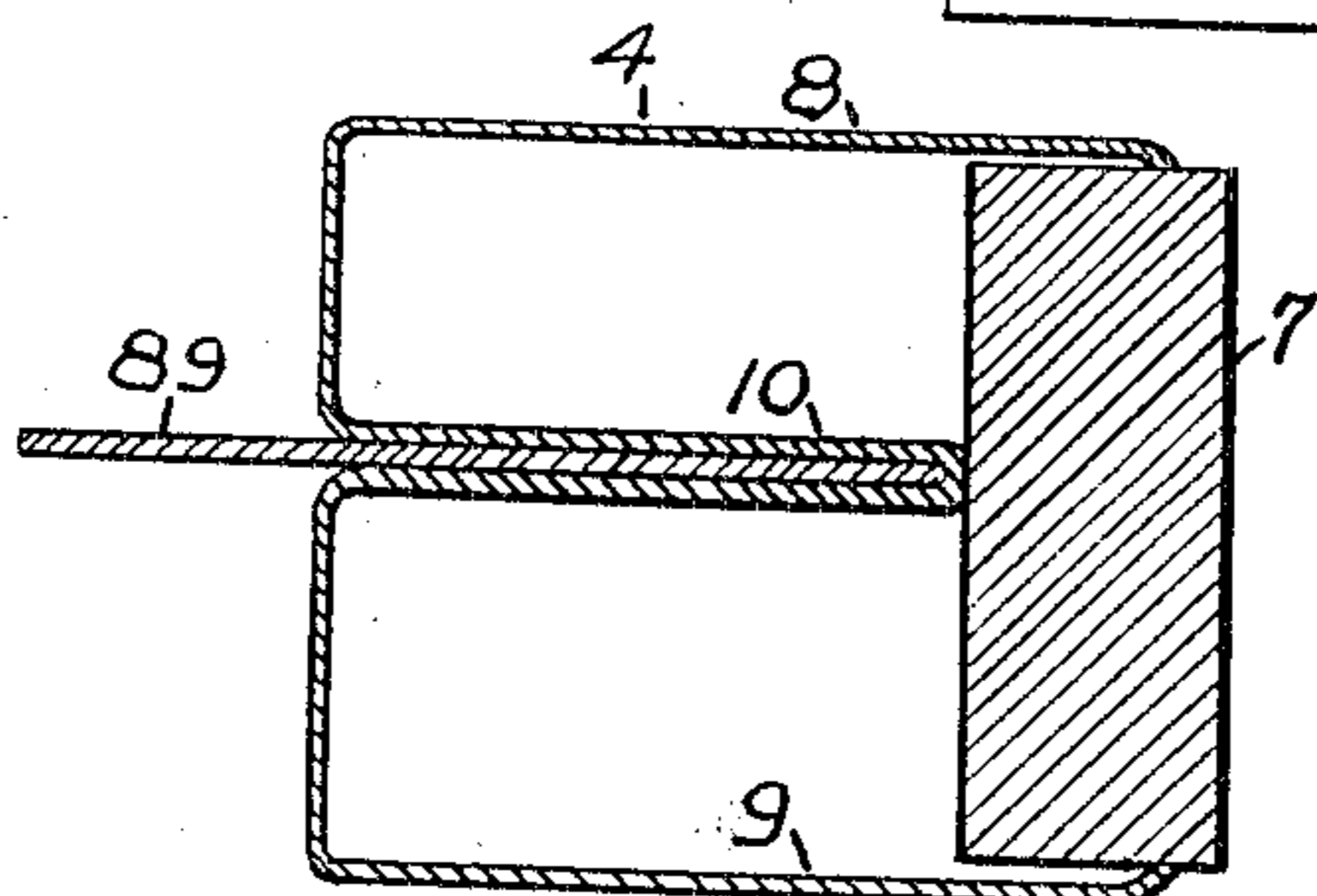
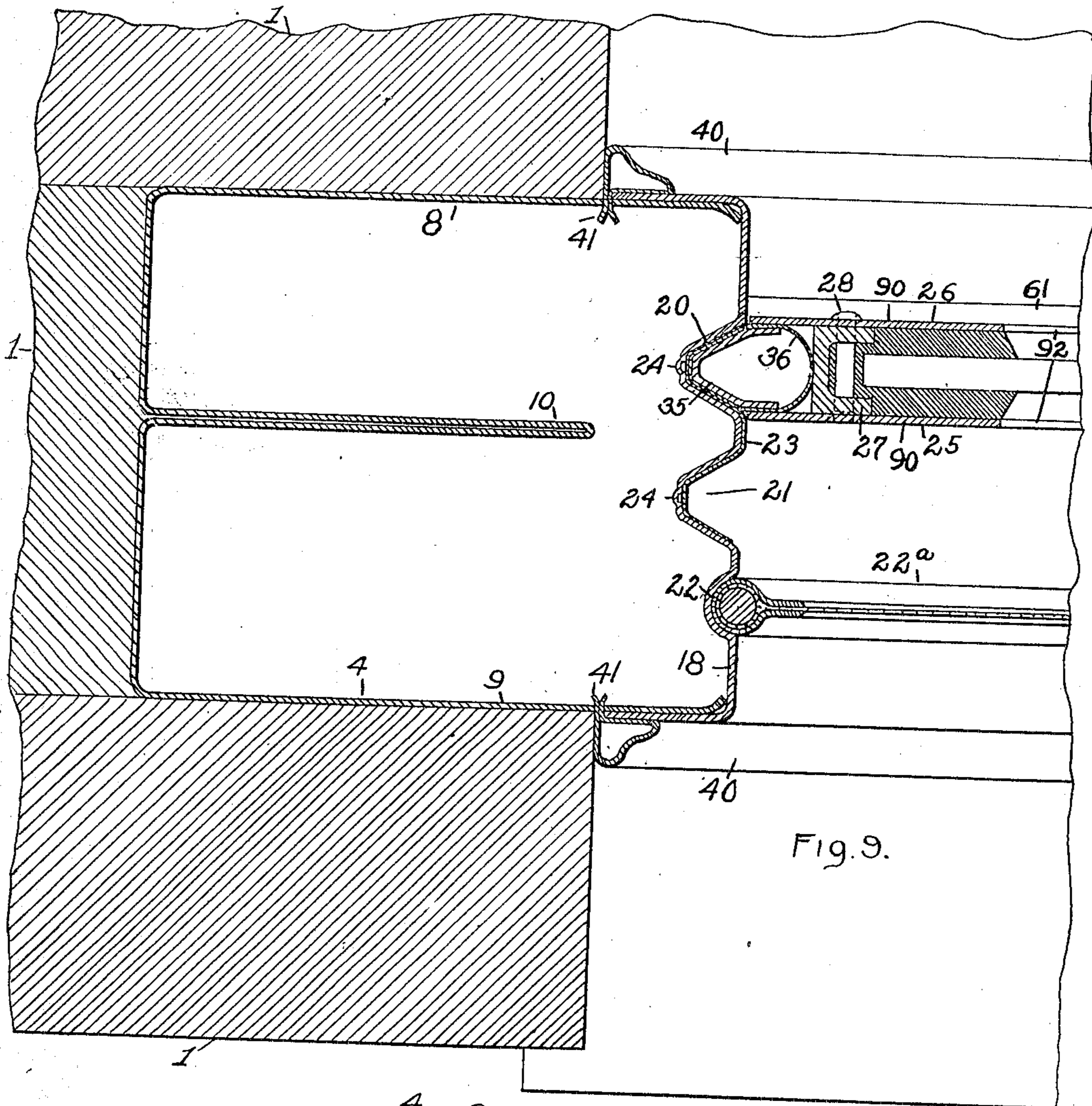
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7 SHEETS—SHEET 5.



Witnesses.

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7 SHEETS—SHEET 6.

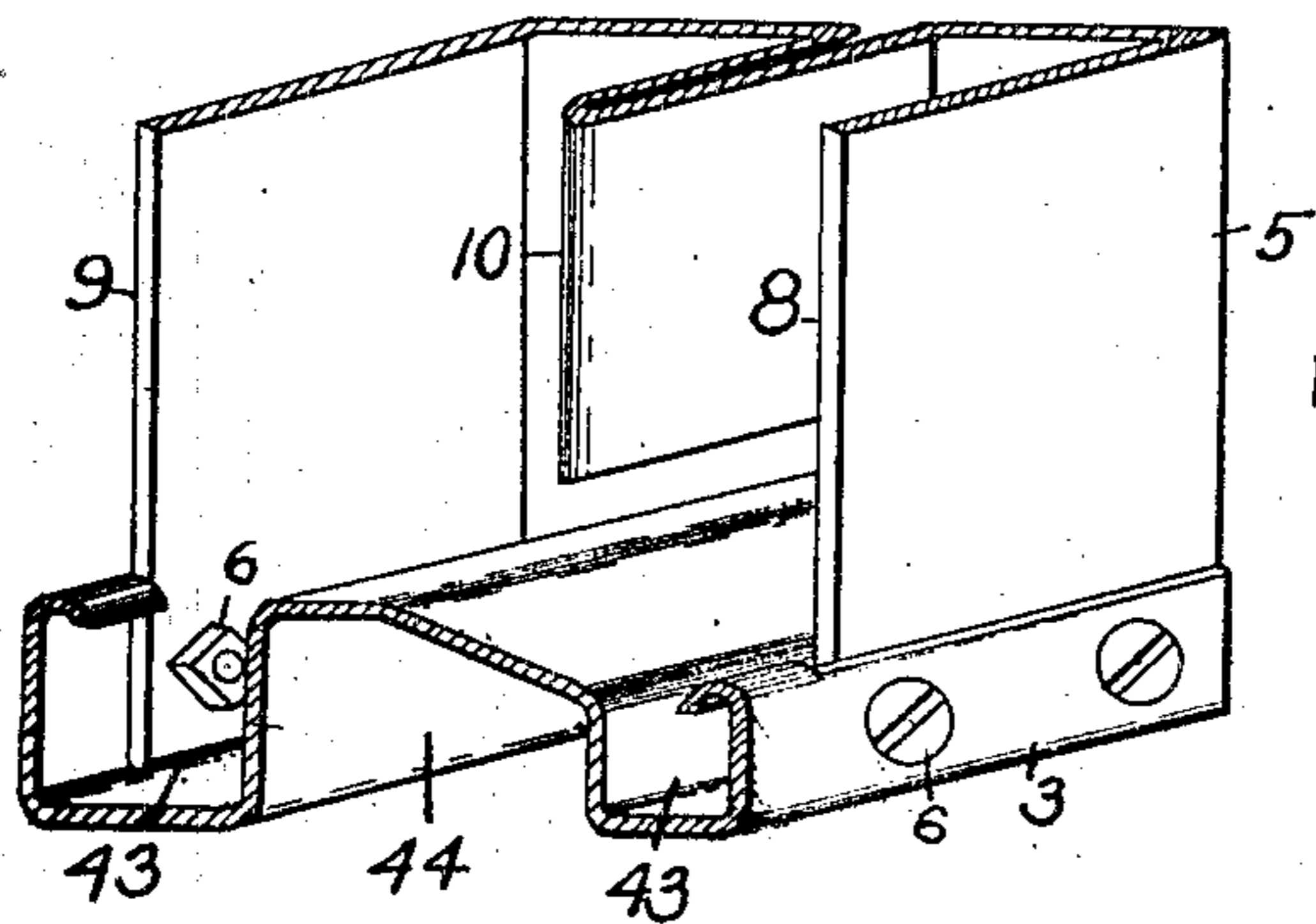


Fig. 11

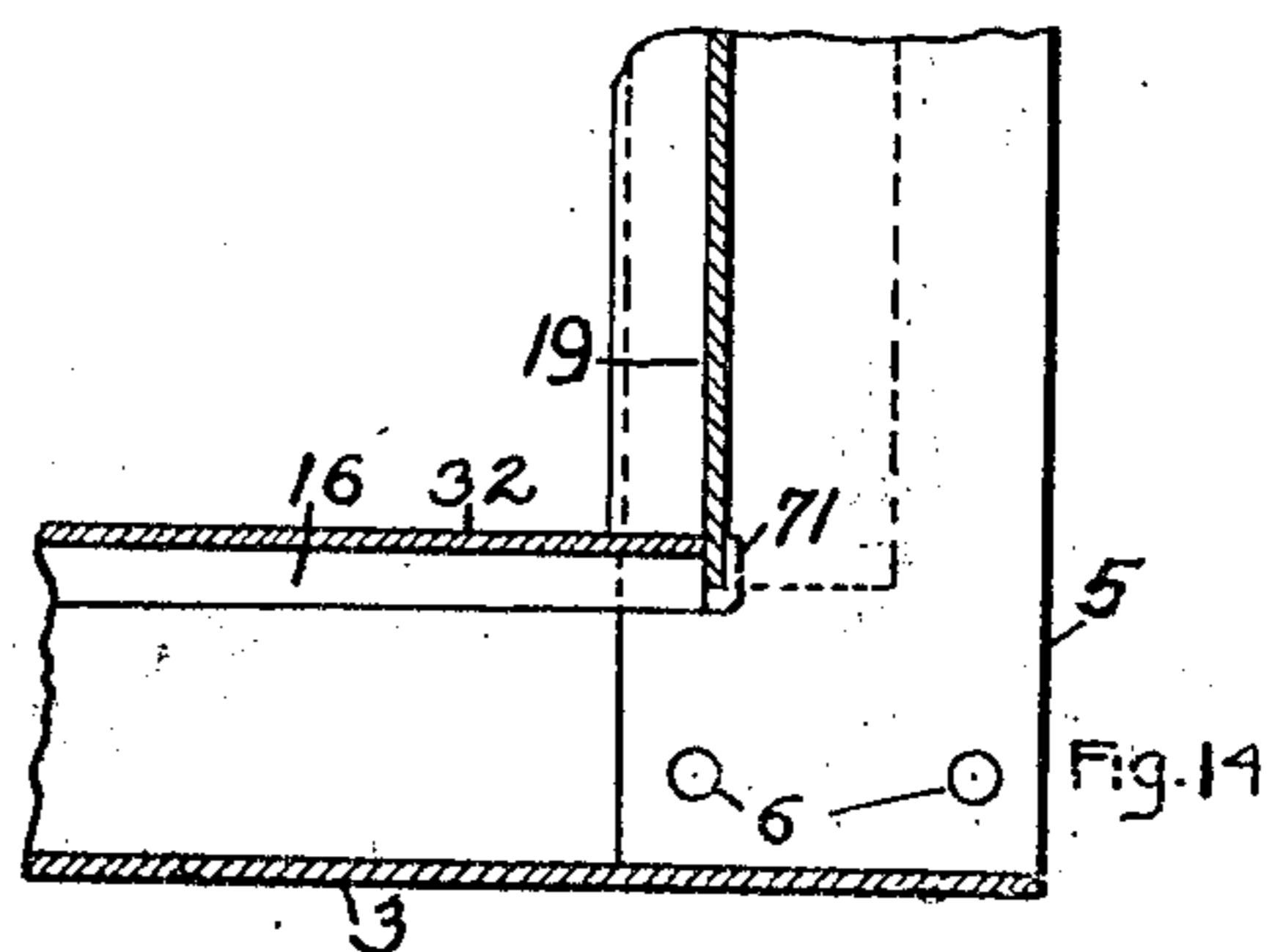


Fig. 14

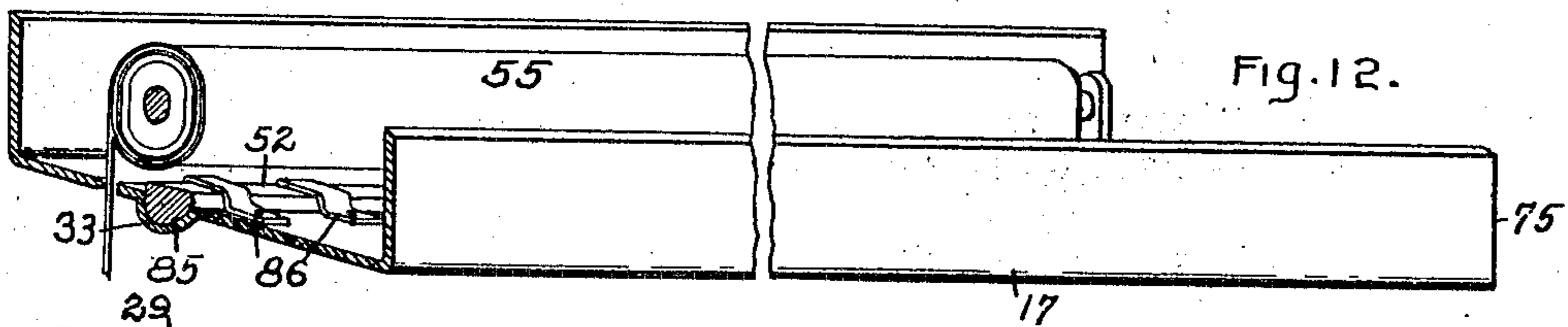


Fig. 12.

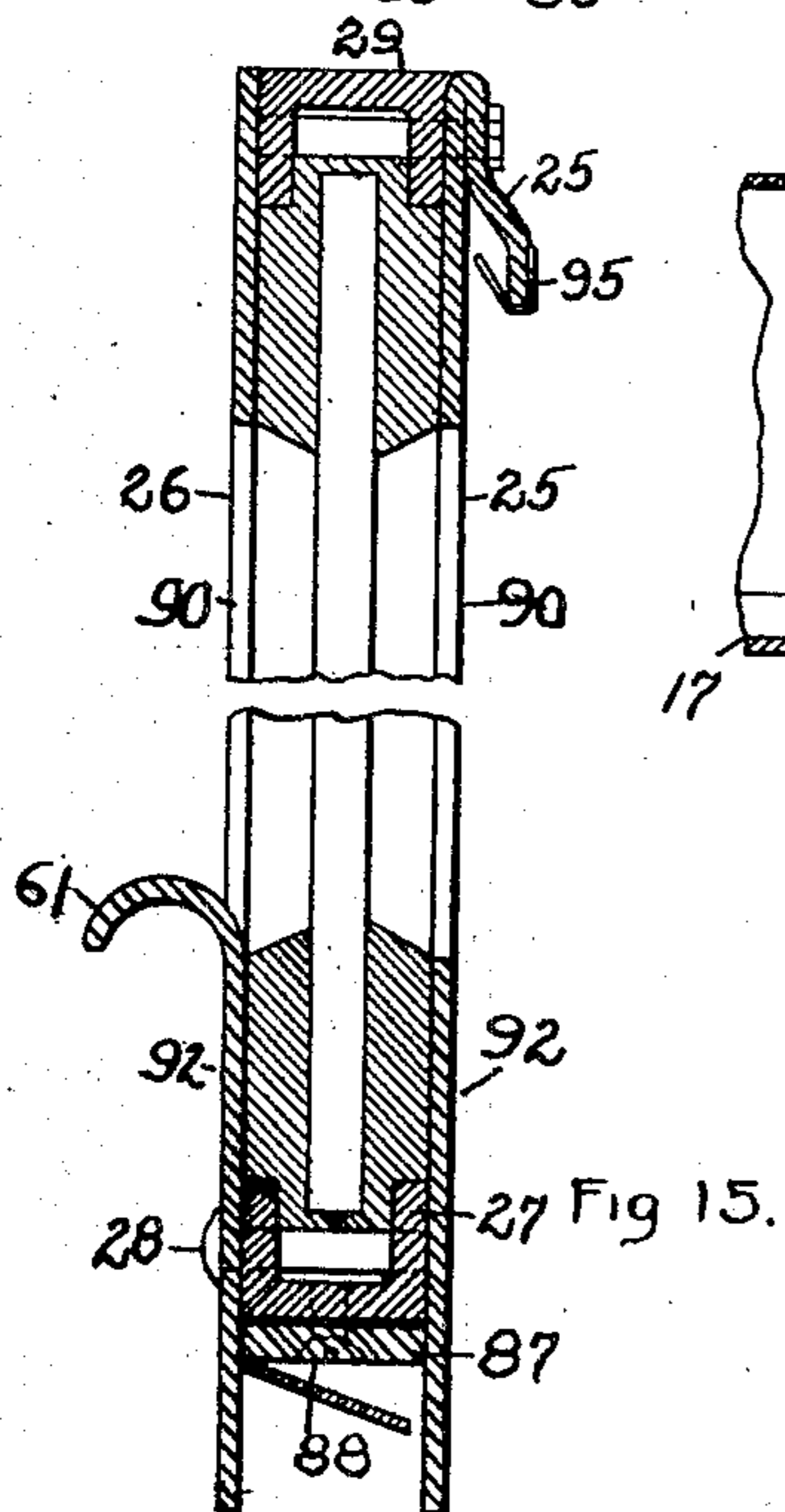


Fig 15.

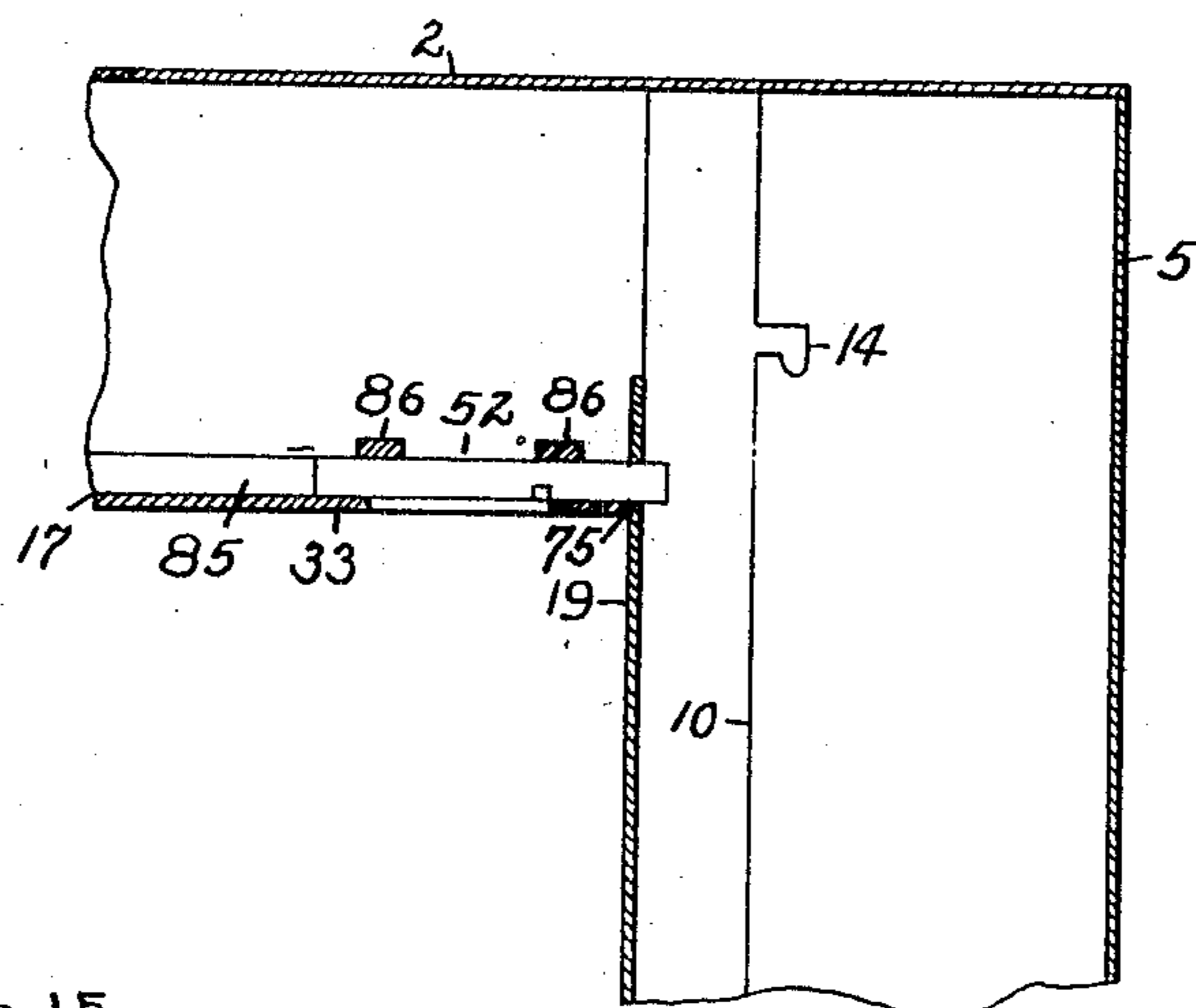


Fig. 13.

Witnesses.

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7 SHEETS—SHEET 7.

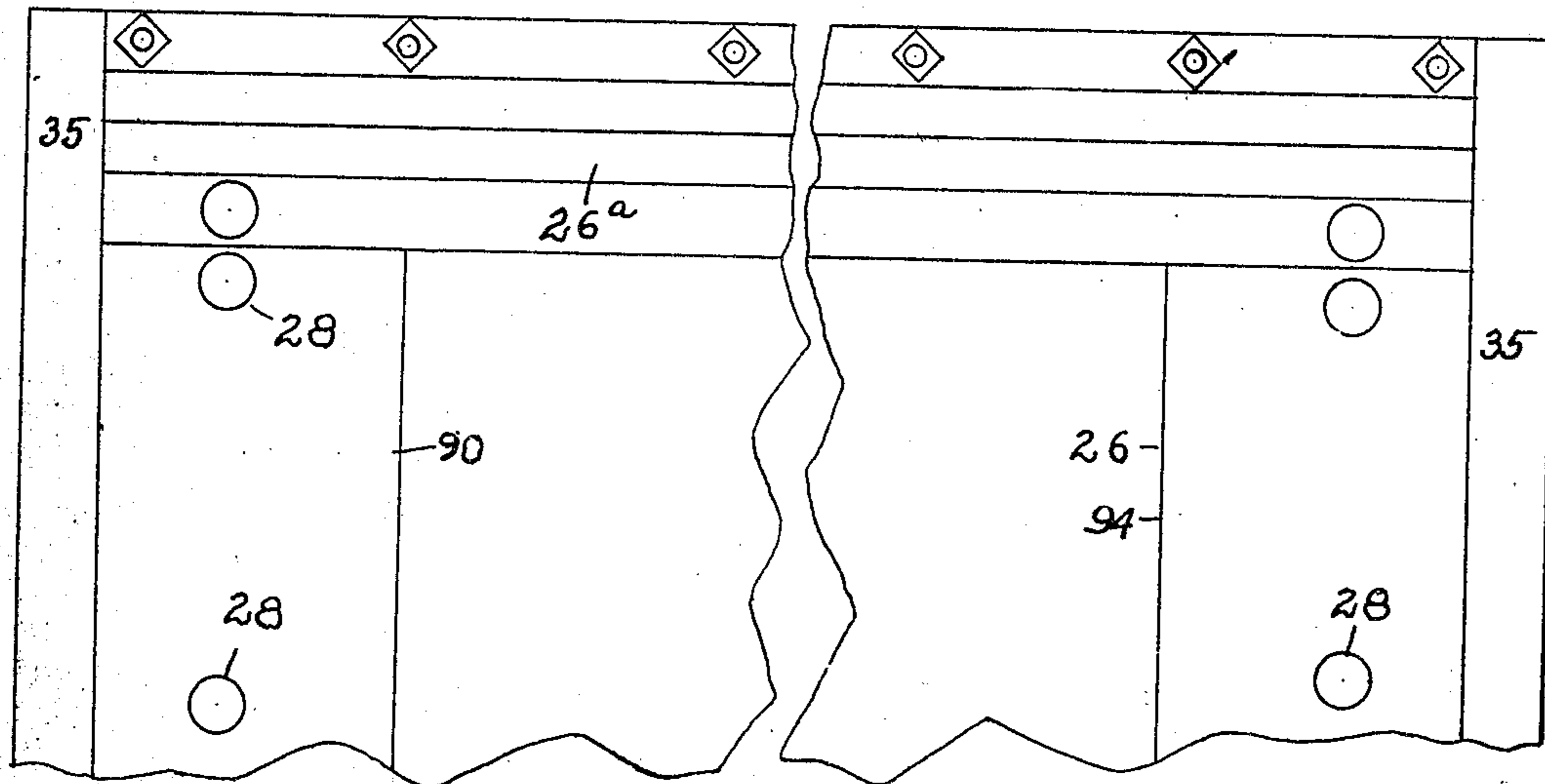


Fig. 16

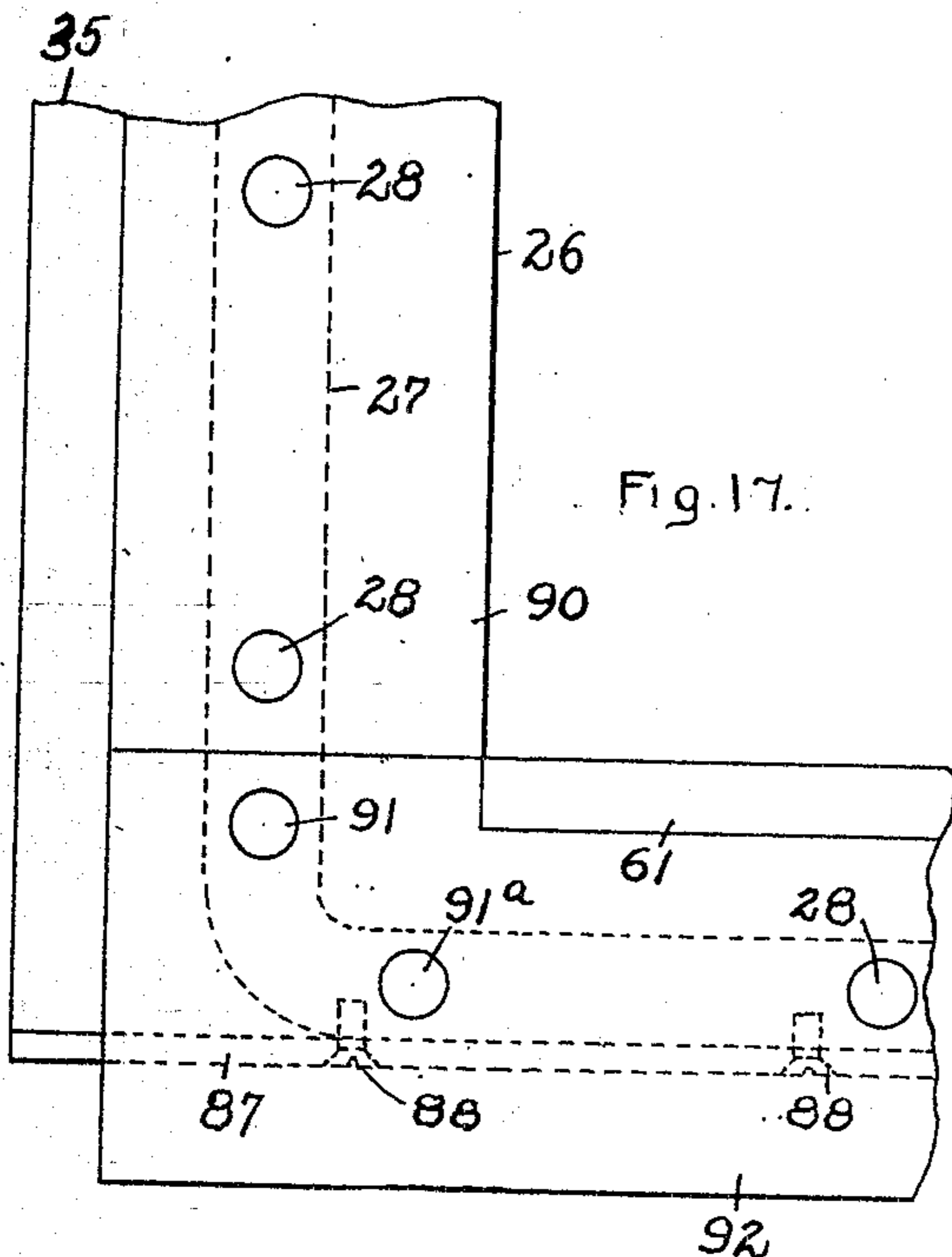


Fig. 17.

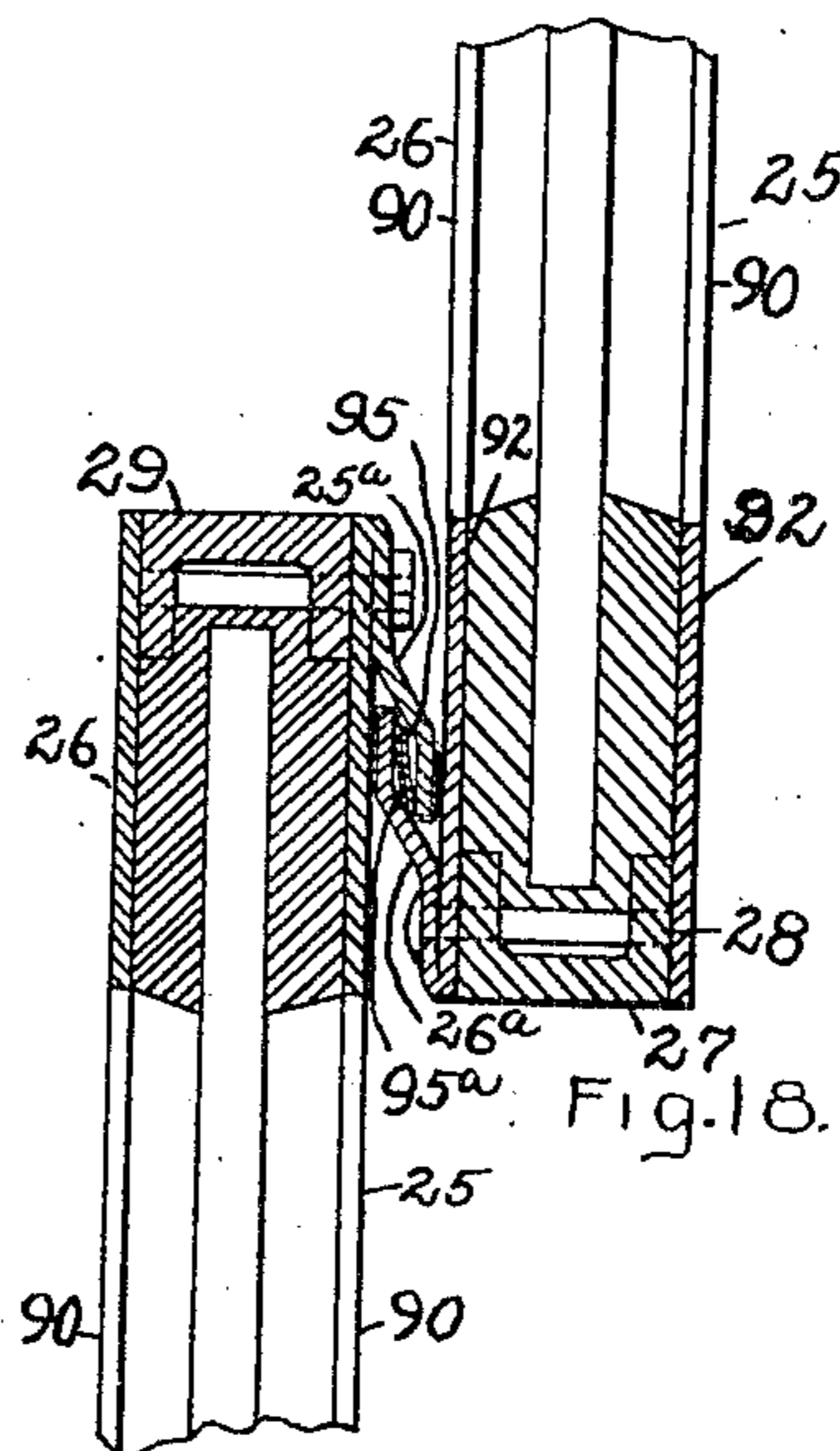


Fig. 18.

Witnesses.

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# UNITED STATES PATENT OFFICE.

EDMUND H. LUNKEN AND CHARLES M. CONKLIN, OF CINCINNATI, OHIO, ASSIGNORS, BY  
DIRECT AND MESNE ASSIGNMENTS, TO THE LUNKEN STEEL WINDOW CO., A CORPORATION OF OHIO.

## METALLIC WINDOW CONSTRUCTION.

No. 871,127.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed November 22, 1906. Serial No. 344,643.

*To all whom it may concern:*

Be it known that we, EDMUND H. LUNKEN and CHARLES M. CONKLIN, citizens of the United States, residing at Cincinnati, Ohio, have invented certain new and useful Improvements in Metallic Window Construction, of which the following is a specification.

Our present invention relates to improvements in metallic windows.

One object is to provide a pressed steel window frame and sash, that, although made of thicker and heavier material than the present so called hollow sheet metal windows, is much more compact, stronger and of better appearance.

Another object of the invention is to provide a window frame which may be shipped to a customer or user in a knock down condition, which may be readily assembled, and when so assembled, be of great rigidity, and the interior of which, containing the sash weights and pulleys, is accessible for repairs and repainting, and to enable the walling in of the frame separate from the exposed highly finished parts, such as the sash guides, sill and top piece, which may be attached after the completion of the building.

Other objects are to provide an improved construction of sash which will be very compact, and still be more rigid and stronger, especially at its corners, than those heretofore constructed, and which will permit of the ready insertion and removal of the glass, and to provide such means for holding the sash as to prevent rattling of same, and to enable it to be readily removed from and replaced in the window frame, and to provide improved forms of guides or ways for the sash.

Still further objects are to provide means whereby the weights which counterbalance the sash may be readily accessible, without resorting to the use of lids or covers in the lower part of the window frame, as is now customary; to provide special weather stripping coöperating with the metallic frame and sash for securing weather tight joints, and special and improved molding for securing tight joints with the masonry, and a finished appearance.

With these and other objects in view, the invention includes the special features of construction and arrangement and combination

of parts hereinafter described, and more particularly set forth in the appended claims.

The invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a vertical section through a window embodying our improvements. Fig. 2 is a face view of one sash. Fig. 3 is a face view of part of a sash and frame, showing one of the guide strips partly raised from the sash. Fig. 4 is an interior face view of our improved construction. Fig. 5 is a view similar to Fig. 1, with the sash and coverplates removed, showing the weights and arrangement of the pulleys. Fig. 6 is a side view of Fig. 5, more clearly illustrating the location of the pulleys. Fig. 7 illustrates the method of securing the side and top members of the corners. Fig. 8 is a perspective view of the various parts which constitute the window frame, in a separated condition, but with the various parts in proximity to each other, ready to be assembled. Fig. 9 is a section through one of the side members of the main frame, and showing part of the lower sash and screen. Fig. 10 illustrates the method to be employed when shipping the side members of the main frame, and of walling in the same to prevent the side walls of the frame from being collapsed, and also showing the simple method employed of attaching a strip of metal to act as a wind break, when desired. Fig. 11 is a detailed view, showing the method of removably connecting the side members of the main frame with the sill. Fig. 12 is a perspective view of the coverplate for the top cross bar of the main frame, showing location of the spring roller curtain or awning. Fig. 13 is a sectional view through one of the upper corners, showing the method in which the coverplate for the upper cross bar of the main frame is secured in place. Fig. 14 is a sectional detail view illustrating the method of retaining the side member coverplate in position at the bottom. Fig. 15 is a sectional view of the lower sash. Fig. 16 is a face view of the upper outside part of the lower sash, showing meeting rail and position of bolts and rivets. Fig. 17 is an enlarged detail view of one of the lower corners of the bottom sash. Fig. 18 is a detail view of the upper and lower sash, showing construction of meeting rail.

It will be understood that the entire win-

dow, sash and screen, is to be made of metal. We preferably construct all of those parts which have movement with relation to each other when in use, of brass or like rust-proof metal, while the remaining parts are constructed of pressed steel, the construction being such as to enable them to be readily formed in this manner, in shape and condition for assembling.

Referring, by reference characters; to these drawings, the numeral 1 indicates the masonry of a building having one of our improved windows in place therein. The frame consists of the top cross piece 2, sill 3 and side members 4 and 5. The top cross piece 2 overlaps the side members 4 and 5, at the top, as clearly shown in Fig. 7, and is removably secured by means of bolts 6. At the bottom, the sill 3 overlaps the side members 4 and 5, where they are likewise removably secured by bolts, as shown in Fig. 11. It will be understood that these various parts can be shipped in a knock-down condition, and assembled when ready to be walled into the building.

To aid in maintaining the shape, in transit, of the side members 4 and 5, we employ the means shown in Fig. 10. This consists of a wooden strip 7 placed in the opening of the side and top members, which securely holds in place the flat side walls 8 and 9, and rests against the center partition 10, of the side members. The presence of this wooden strip also prevents the side members and top cross piece from being damaged while being walled in. Of course, the wooden strip 7 is removed after the frames are walled in place, and may be used over again. The side members 4 and 5 are each provided with a center partition 10, formed out of the same piece as the body of the side members, which forms two channels for the guidance of the sash weights 11. As shown in Fig. 10, a strip of metal 89 may be easily inserted within the center partition 10, where it may be either secured by bolts or rivets, or simply forced therein. As this strip 89 projects further within the walls of the building than do the side members of the main frames, it serves as a wind break, and effectually prevents wind or rain from entering the room. The presence of this strip is optional with the purchaser.

The pulleys 12 are removably held in place in the top of the side members, and lie in brackets 13 punched out of the side walls of the side members. As an additional brace for the axle of these pulleys, we have provided a slot 14 in the partition 10. By this arrangement, we are enabled to employ a pulley of very large diameter, thereby reducing the friction and wear on the cables, and permitting of the easy operation of the sash. Owing to the large diameter of the pulleys, however, it is necessary that an in-

intermediate pulley 15 be employed, which guides the cable to the center of the channels, and permits the weights to ride centrally therein. After the frames are walled in, the finished coverplates can then be secured in place. The coverplate 16, for the sill, is first placed in position, being simply forced over the sill. The side coverplates 18 and 19 are then placed in position, and are prevented from becoming disengaged at the bottom, owing to the fact that they rest between the upturned ends 71 of the sill coverplate, and the end of the bead 32, which terminates at this point. The coverplate 17 for the top cross piece is next placed in position, and as its ends bear against the coverplates for the side members, it is impossible for these side member coverplates to become disengaged at the top. As a means for securing the coverplate for the top cross piece in place, we provide slide bolts 52, as clearly shown in Fig. 13, which engage correspondingly placed holes in the side coverplates. The bolts lie within the groove 85 formed within the top coverplate, which groove on the under side of the coverplate, forms a bead and engages a channel in the top part of the upper sash, for the purpose hereinafter described. The bolts 52 are held within the groove by means of retaining strips 86, which are riveted or otherwise secured to the top coverplate. A slot of the desired length is provided beneath these bolts in the coverplate of the top cross piece, through which a nail or other suitable instrument may be inserted to engage a hole in the bolts, by which means they can be operated. From the above, it will be seen that the coverplates cannot be removed unless the coverplate for the top cross piece is first removed, after which the coverplates for the side members may be taken out, which, in turn, permits the removal of the coverplate for the sill. The above arrangement is adapted especially for use when a shade roller is employed and where it is necessary that the upper coverplate shall be quickly removable to permit access to the roller. Where it is not desired to use a shade roller, however, the coverplate for the top cross piece may have its ends 75 cut square or straight, and adapted to rest on the tops of the side coverplates. In this event, the side coverplates would be put in place last and removed first, and any suitable means may be employed for securing the side coverplates to the top coverplates.

The side coverplates 18 and 19 are each provided with three grooves, pressed to the desired shape. The inner groove 20 acts as a guide for the lower sash, while the grooves 21 and 22 are guides for the upper sash and screen respectively.

The screen is shown at 22<sup>a</sup> as made of metal, but it will be understood that the

screen and its guiding grooves need not always be present, but may be included or omitted, according to the demands of the trade.

5 For a non-corrosive bearing surface, we provide the brass strip 23, which conforms to the shape of both the upper and lower sash guide grooves, and is securely held in place by rivets 24, or may be soldered there-  
10 in. The sash consists of outer strips 25 and inner strips 26, between which is interposed the U-shaped frame 27, preferably made of channel iron, as clearly shown in Fig. 2. This U-shaped piece 27 is constructed of  
15 one piece and continues entirely around three sides of the frame.

The inner and outer frames 25 and 26 are secured to the U-shaped frame 27, by means of rivets 28, extending entirely through the  
20 three members. By this construction, a channel is provided between the inner and outer frames 25 and 26, into which glass may be slid from the top. To securely hold the glass in place, a removable bar 29, preferably  
25 of channel form in cross section, is employed, which closes the opening at the top, between the side frames 25 and 26, and lies upon the ends of the U-shaped frame 27, overlapping the same, for the purpose hereinafter de-  
30 scribed. The removable bar 29 may conveniently be held in place by bolts passing through it and the side frames, as clearly shown in Fig. 18.

Where it is desired to use more than one  
35 glass in a single frame, we provide a muntin consisting of the center piece 30 (which lies between the inner and outer frames 25 and 26 at the top and bottom, where it is secured by rivets) and side plates 31, which overlap  
40 this center piece 30 and are riveted thereto.

It will be observed that the U-shaped frame 27 lies inwardly, and is removed from the outer edges of the side frames 25 and 26 on three sides, thereby forming a channel on  
45 the three sides of the frame. The horizontal or bottom portion of the U-shaped frame is removed from the lower edges of the frames 25 and 26, to form a channel into which the bead or edge piece 32 of the sill projects to  
50 form a tight joint. The outer face of the bead 32 is disposed in a vertical plane, so as to lie flat against the inner face of the frame 25, making it practically impossible for water to work its way up through between the  
55 parts. The removable piece 29, at the upper edge of the top sash, is likewise removed from the outer edges of the frames 25 and 26, forming a channel, the object of which is to provide a weather proof joint between the  
60 top cross piece coverplate 17 and the upper sash, inasmuch as the bead 33 lies within this channel when the sash is closed. As a further protection against the weather, spring brass strips 34 are provided within the

top channel of the upper sash and the bot- 65  
tom channel of the lower sash.

The brass weather strip within the bottom channel of the lower sash, is held in place by means of the bar 87, and lies between this bar 87 and bottom of U-shaped frame 27. 70  
The bar 87 is removably held in place by screws 88, and projects beyond the side frames 25 and 26, for the purpose hereinafter described. At the top of the upper sash, the weather strip is removably held be- 75  
tween the removable bar 29 and one of the frames 25 or 26. When inserting the weather strip for the bottom sash, it is angular in cross section, one end of the angle lying between the bar 87 and bottom of U-shaped 80  
frame, while the other rests against either the frame 25 or 26, as desired. After the bar 87 is secured in place, the weather strip is then bent over the strip 87, as shown in Figs. 1 and 15, the free end of which bears 85  
against the bead 32. The weather strip for the top sash, however, can be placed in position after having first been formed to the desired shape, or it may be inserted in a flat form, and after secured in place between the 90  
removable bar 29 and either of the side frames 25 or 26, can then be bent to shape.

The lower cross piece of the inner sash frame 26 has its upper edge 61 turned over, as illustrated in Figs. 1 and 15, the object 95  
being to provide a continuous handle, by which means the lower sash can easily be raised, thereby eliminating the expense and time of attaching separate handles. The presence of this handle, which extends the 100  
length of the lower bar, terminating at the inner edges of the vertical members of the lower sash, as shown in Fig. 17, also tends to strengthen and stiffen the frame, particularly when the frame is of great width. 105

An important feature in the construction of the sash, lies in the method employed of securing the side frames 25 and 26 to the U-shaped frame at the corners. It will be ob-  
served that the bottom piece 92, of the side 110  
frames 25 and 26, embraces the edges of the side pieces 90 and 94, the purpose of which being to enable the placing of both rivets 91 and 91<sup>a</sup> (one on either side of the corner formed by the U-shaped frame) in the bot- 115  
tom piece, as shown in Fig. 17, thereby greatly increasing the strength of these corners and insuring a right-angular frame.

The channels at the sides of the sash, formed by the inner and outer frames 25 and 120  
26 and U-shaped frame 27, contain the removable guides 35. These removable guides consist of metallic strips preferably V-shaped in cross section, as shown in Fig. 9, and are preferably made of pressed steel. To form a 125  
non-corrosive bearing surface, we envelop these pressed steel guides with a thin sheet of spring brass 36, bent to conform to the shape

of the pressed steel guides. They, however, continue around the open end of these steel guides, as clearly shown in Fig. 9, and bear against the U-shaped frame 27. A weather tight joint is effectually made by means of these non-corrosive coverings for the guide strips, owing to the fact that they bear against the U-shaped frame 27, which forces them into the guide grooves of the cover-plates for the side members 4 and 5 of the main frame. The tension of the spring brass strips 36, however, is not severe enough to cause too much friction between the bearing surfaces, and therefore, the sash can be operated with perfect ease and still maintain a tight joint. These guide strips are held in place between the extending ends of the removable bar 29 and the weather strip retaining piece 87, which project sufficiently beyond the U-shaped frame for this purpose. In both ends of the removable bar 29, holes are provided, through which the ropes or cables for the weights extend, and are knotted or otherwise secured.

When it is desired to remove the sash, the bar 29 is first removed, and is permitted to rest against the top coverplate. Should it also be desired to remove the coverplates, the same operation must first be performed, as above described for the removal of the sash. The slide bolts 52 are then disengaged from the holes in the side coverplates, which permits the removal of the top coverplate. The side and sill coverplates can then be removed in the manner before described.

For serving as finishing strips to the main frame, we secure the molding strips 40 to the inner and outer walls of the side and top members of the main frame. These molding strips are preferably made of sheet metal, bent to any desired form, and are removably held to the side members of the main frame by means of tongues 41, projecting at intervals along the strip 40, which tongues engage correspondingly spaced slots in the side members of the main frame, and when in place, the tongue 41 can be bent over on the inside of the side members of the main frame, which securely holds them in place. The molding strips 40 also serve to form a weather tight joint between the side members of the main frame and the coverplates, as clearly shown in Fig. 9. These molding strips 40 however may be entirely omitted if so desired.

Suitable meeting rails are provided between the upper and lower sash to present a weather tight joint. In this instance, we have formed them of the same piece as the upper bar of the lower sash side frame 26 and the lower bar of the upper sash of the frame 25, as shown in Fig. 18. They consist of similar reversely arranged portions 25<sup>a</sup> and 26<sup>a</sup> overlapping each other when the sash are closed. As these portions 25<sup>a</sup> and 26<sup>a</sup>

are of the same piece as the upper and lower members of the top and bottom sash respectively, it is only necessary to bend them to the desired shape, eliminating the presence of bolts or rivets to secure these meeting rails, and greatly increasing the strength and rigidity of these particular members, especially should the sash be of great width. To insure a positive joint between these meeting rails, we employ spring brass weather strips 95 and 95<sup>a</sup>, soldered or otherwise secured to the meeting rails on their outer sides. As they are bent around the edge of said meeting rails, as shown in Fig. 18, and their loose ends permitted to bear against each other when the sash are closed, a positively tight joint is obtained at a reduced cost and a small amount of labor. Of course any suitable means of securing the sash cord pulleys within the main frame may be employed and we do not wish to limit ourselves to the precise construction shown, but we do wish to avoid the customary perforations or openings in the side frames for sash cord pulleys.

Referring to Figs. 1 and 12, it will be seen that we provide a spring roller curtain or screen 55, secured by any suitable means to the inside of the top cross piece coverplate 17. A slot is provided through the coverplate 17, beneath the spring roller curtain, through which the curtain is guided. The curtain is preferably placed on the outside of the sash, and when drawn down, can be made to form an awning, by simply providing arms 57, pivotally connected to each side of the main frame, and which engage eyes in the lower part of the curtain, as clearly shown in Fig. 1. When the curtain is entirely raised, the lower bar 58 of said curtain, entirely covers the groove 59 in the coverplate 17, and effectually prevents the weather from entering the pocket in the top cross piece.

While the shade carried by the roller may be of any suitable material, we prefer to use asbestos or like fire-proof substance, which will aid, when drawn down, in making the window more completely fire-proof.

We claim as new, the location of the roller shade within the inclosed chamber, the easy access thereto in combination with the awning effect.

It will be understood that while we have spoken of a shade or curtain, we do not use this term in the restricted sense in which it is usually applied to the shades or curtains which are provided on the inside of windows for excluding the sun. While it may be of such material as to have this function when used in the manner contemplated by us, its main function is to protect the windows. Where it is made of fire-proof material, such as asbestos and the like, it will of course make the windows more nearly fire-proof. In some instances, however, it may be desirable to provide means for covering the win-

dow opening with a protecting curtain or screen which will serve to prevent the glass from being broken by flying missiles and which will also serve to keep out insects without obstructing the light, the curtain, shade, or screen, in this instance, being made of reticulated screen material, such for instance as wire fabric.

In present sheet metal window frame and sash construction, it is necessary to use very thin sheet metal, (usually #24 gage) which is easily dented and perforated, and quickly damaged by corrosion. In our improved construction, it is possible to use heavy sheet metal, as all of the members of the main frame are of simple form and easily pressed from thick sheet metal. The side members, however, of the main frame, we prefer to make of a thinner sheet metal than the cover-plates, as these are entirely walled in and cannot be damaged after the building is erected, and are also protected by the cover-plates. While the building is in process of erection, the cover-plates are not placed in position, as before stated, owing to the fact that they are highly finished, and may be scratched or otherwise marred. This, therefore, leaves the sill unprotected before the sill coverplate is put on, and the projecting edges may be bent out of shape. To remedy this, however, concrete or other like mixture may be filled in the grooves, and also beneath the sill in the channel.

All of the bearing surfaces are made of sheet brass spring metal strips, or other rust-proof material, such as the strips 23 34, 36, 25<sup>a</sup> and 26<sup>a</sup> and can be readily renewed whenever necessary, and therefore, the window is made very durable and can always be kept weather tight.

We are aware that our construction can be varied without departing from the essence of our invention; thus, other means of balancing the sash may be employed, or one sash be arranged to balance the other, in which event weights and weight channels would be dispensed with, and still the feature of the removable coverplates (which really constitute the finished parts of the frame) be retained, and we wish to claim this feature of the removable finished parts of the frame broadly. Again, the screen may be hinged to swing out instead of sliding in grooves in the side coverplates.

It is evident that our construction of window frames may be used with the side, top and bottom members riveted or welded together thus dispensing with the knock down feature, and it may in some cases be preferred not to remove the cover plates while the frame is being walled in, still this would not evade our invention, as the construction and arrangement of parts, which effect other advantages would not be changed. The feature of removability of the cover

plates, however, is one of special importance.

Heretofore it has been necessary, in both wood and metal constructions, to wall in the completed window frame and thereafter paint or otherwise finish the exposed parts. In our construction the exposed or finishing parts are a separate part of the window frame, and these are finished, painted, japanned or enameled, preferably at the factory, and then in their finished state are quickly and removably secured in place and to the previously walled in outer frame. This not only avoids the danger of injury to the finish by the masons in walling in the frames, but enables us to impart to the exposed or finishing parts the high finish desirable for residences and office buildings, secured by enameling or japanning, which can only be done at the factory or like place equipped with ovens or kilns.

From the foregoing, it will be seen that we have invented a method of constructing metallic windows, radically different than those heretofore used, and which enables the production of metallic windows that are simple, compact, strong, durable, ornamental, rust-proof, its essential parts readily detachable and accessible for renewing or re-finishing, and which, although highly finished and ornamental as to its exposed parts, permits of being walled in, without damage to said finished parts, and all of these features and advantages are obtained in the most inexpensive and practical way possible.

The sliding sash windows of metallic construction heretofore used, have been unsatisfactory and impractical, and although there is an urgent demand for metallic windows for office and residence buildings, we believe our method to be the first that will be acceptable to architects, and will be generally adopted, and we therefore wish our invention and claims to be broadly construed, as we consider our invention one of value and importance.

Having thus described our invention, what we claim is:—

1. In fire-proof window construction, the combination with the side finishing plate, of a top finishing plate having a movable connection for engaging the top end of the side finishing plate, substantially as described.

2. In fire-proof window construction, in combination with the sill, a removable finishing plate for said sill, and means for removably securing the lower ends of the side finishing plate to the sill finishing plate, substantially as described.

3. In fire-proof window construction, in combination with the sill, a removable finishing plate provided with upturned ends for said sill, and means for removably securing the lower ends of the side finishing plate to the sill finishing plate.

4. In fire-proof window construction, a main frame consisting of side members, sill and top cross-piece, the side members provided with sash guides, and a removable finishing plate for the top cross-piece, substantially as described.
5. In fire-proof window construction, a main frame comprising a sill, top cross-piece, and side members suitably secured together, and a removable finishing plate adapted to be applied to each of the side, top, and bottom members of the main frame, substantially as described.
6. In fire-proof window construction, a main frame consisting of a sill, top, and two side members suitably secured together, a second finishing frame fitting within the main frame and consisting of a sill, top, and two side members removably secured one to the other at their ends, said second frame adapted to be applied to the main frame, substantially as described.
7. In fire-proof window construction, a main frame consisting of a sill, top, and two side members suitably secured together, a second finishing frame fitting within the main frame and consisting of a sill, top, and two side members removably secured one to the other at their ends, said second frame adapted to be applied to the main frame after the main frame has been walled in, substantially as described.
8. In fire proof window construction, a main frame, a removable finishing frame consisting of removable side, top and bottom cover plates secured within the main frame, the side cover plates of the finishing frame having sash guides, an upper and lower sash guided by the sash guides, and means for balancing the sash.
9. In fire-proof window construction, an outer main frame, an inner frame composed of a removable sill, top and two side members, said removable members secured one to the other at their ends, in combination with sash guides on the side members, an upper and a lower sash guided therein, and means for balancing the sash, substantially as described.
10. In fire-proof window construction, an outer main frame, an inner removable frame adapted to be secured to the main frame after said main frame has been walled in, the removable frame composed of a removable sill, top, and two side members, said removable members secured one to the other at their ends, in combination with sash guides on the side members, an upper and a lower sash guided therein, and means for balancing the sash, substantially as described.
11. In fire-proof window construction, a main frame comprising a sill, top cross piece, and side members suitably secured together, and a removable finishing plate adapted to be applied to each of the side, top and bottom members of the main frame after the main frame has been walled in, substantially as described.
12. In fire-proof window construction, a main frame comprising a sill, top cross piece, and side members suitably secured together, and a removable finishing plate adapted to be applied to each of the side, top, and bottom members of the main frame after the main frame has been walled in, the side finishing plates being provided with integral sash guides continuous throughout the entire length of said plates, substantially as described.
13. In fire-proof window construction, a main frame having a side member of channel form, a partition within the channel, the whole formed of one piece, a space provided within said partition, and a strip inserted within said space and projecting beyond the side members of the main frame, substantially as described.
14. In fire-proof window construction, a main frame having side members with weight channels, a cover plate removably secured to each member, and sash and screen guides carried by each cover plate, substantially as described.
15. In metallic window construction, a main frame comprising a sill, top cross piece and side members of pressed metal in channel form, secured together at the corners, and a removable cover plate of pressed metal closing the open side of each piece or member and covering the entire exposed face thereof, substantially as described.
16. In metallic window construction, a main frame comprising a sill, top cross piece and side members of pressed metal in channel form, suitably secured together at the corners, and a cover plate of pressed metal having side flanges embracing the sides of each of said pieces or members of the frame, substantially as described.
17. In fire-proof window construction, a sill, having substantially three distinct channels, the whole formed of one piece and a filling of concrete or other like mixture in said channels for the purpose of preserving the shape of said sill while the frame is being walled in, substantially as described.
18. In fire-proof window construction, a main frame consisting of side members, sill and top cross piece, removable cover plates therefor, the cover plates for the side members resting upon the cover plate for the sill, and the cover plate for the top cross piece member lying between the two side cover plates, and suitably secured in position, whereby the removal of said side and sill cover plates is dependent upon the removal of the top cross piece cover plate, substantially as described.
19. In fire-proof window construction, the combination with the sill cover plate having

upturned ends, and a shoulder adjacent to said upturned ends, with a space between them, for the purpose of receiving the lower ends of the side cover plates and holding them in position, substantially as described.

20. In fire-proof window construction, the combination with the sill cover plate having upturned ends, and a bead pressed in the upper face thereof, said bead terminating near the upturned ends, presenting a space between them, for the purpose of receiving the lower ends of the side cover plates and holding them in position, substantially as described.

21. In fire-proof window construction, the combination with the side cover plate having a recess at its upper end, of a top cover plate having a movable bolt for engaging said recess, substantially as described.

22. In metallic window construction, a metal frame having a channeled top piece, and a removable cover plate having a slot for the passage of a screen, substantially as described.

23. In metallic window construction, a metal frame having a channeled top piece, and a removable cover plate carrying a screen roller, substantially as described.

24. In metallic window construction, a metal frame having a channeled top piece, and a removable cover plate carrying a screen roller, a slot in said cover plate for guiding said screen to the outside of the sash, substantially as described.

25. In fire-proof window construction, a sash comprising facing strips and an interposed spacing member, and a weather strip comprising a strip of spring metal having one edge clamped between the facing strip and spacing member, and its other edge bent to engage a bead carried by the main frame, substantially as described.

26. In fire-proof window construction, a sash comprising facing strips and an interposed spacing member, and a weather strip comprising a strip of spring metal having one edge clamped between a removable bar and the spacing member, and its other edge bent to engage a bead carried by the main frame, substantially as described.

27. In fire-proof window construction, a sash comprising facing strips with an interposed spacing member, the strips extending beyond the spacing member, and a yielding member having outwardly converging sides, and located in the channel formed by the said extended edges of the facing strips, and designed to co-act with the guide grooves, substantially as described.

28. In fire-proof window construction, the combination with the side frame members, substantially V-shaped sash guiding channels, of a sliding sash having channeled edges and V-shaped strips yieldingly held in

said channeled edges, and adapted to engage said V-shaped channels in the side frame members, substantially as described.

29. In fire-proof window construction, the combination with the side frame members having sash guiding channels, of a sliding sash having channeled edges and strips yieldingly held in said channeled edges, and a detachable connection between one of the strips and the sash for preventing longitudinal movement of the strip in relation to the sash, whereby upon disengagement of said connection, the strip may be longitudinally moved out of the channeled edge and the sash removed from the frame, substantially as described.

30. In fire-proof window construction, the combination with the side frame members having substantially V-shaped sash guiding channels, of a sliding sash having channeled edges, and wedge-shaped strips yieldingly held in said channeled edges, and engaging the V-shaped channels and means for permitting one of the strips to be moved longitudinally out of the channel edge, to effect the removal of the sash, substantially as described.

31. In fire-proof window construction, the combination with the side frame members having sash guiding grooves, of a sliding sash having a channeled edge, a strip yieldingly seated in said channel, and a detachable connection between the strip and the sash at the end thereof for preventing the longitudinal movement of the strip in the channel, substantially as described.

32. In fire-proof window construction, the combination with the side frame members having substantially V-shaped sash guiding channels, of a sliding sash having channeled edges, and wedge-shaped strips yieldingly held in said channeled edges, and engaging the V-shaped channels, and a detachable connection between one of the strips and the sash for preventing longitudinal movement of the strip in relation to the sash, whereby upon disengagement of said connection, the strip may be longitudinally moved out of the channeled edge and the sash removed from the frame, substantially as described.

33. In fire-proof window construction, the combination with the side frame members having sash guiding grooves, of a sliding sash having channeled edges, strips yieldingly seated in said channeled edges, and engaging the sash guiding grooves, and movable cord-holding devices for holding the sash cords, said devices projecting over the ends of the strips to hold them removably in place, substantially as described.

34. In fire-proof window construction, the combination with the side frame members having guiding grooves, of a sliding sash having a channeled edge, guide strips

- removably held in said channeled edge, a retaining strip overlying the top edge of the guide strips, said retaining strip being removable, for the purpose of inserting glass in the sash, a removable strip at the bottom edge of the sash and overlying the bottom edge of the guide strips, said strip also retaining a spring brass weather strip in place, substantially as described.
35. In fire-proof window construction, the combination with the side frame members having guiding grooves, of a sliding sash having a channeled edge, a guide strip removably held in said channeled edge, a removable retaining strip overlying the top edge of the guide strips, a sash cord suitably secured to the end of the retaining strip, said retaining strip being removable for the insertion of a glass within the sash, substantially as described.
36. In fire-proof window construction, the combination with the side frame members having sash guiding grooves or channels, and a lining of non-corrosive metal for said grooves, of a sash having yielding strips in its edges, and a covering of non-corrosive metal for said strips, substantially as described.
37. In fire-proof window construction, the combination with the side frame members having sash guiding grooves, of a sliding sash having channeled edges, strips yieldingly seated in said channeled edges, and engaging the sash guiding grooves and movable cord-holding devices for holding the sash cords, said devices projecting over the ends of the strips, to hold them removably in place, and a covering of non-corrosive metal for said strips, substantially as described.
38. In fire-proof window construction, a sash having a channeled edge, a guiding bar located in said channel and a facing strip for said guiding bar having spring edges bearing against the bottom of the channel, substantially as described.
39. In fire-proof window construction, the combination with the channeled frame members and removable cover plates, of molding pieces secured to the frame members and overlapping the edges of the cover plates and forming a finishing strip, substantially as described.
40. In fire-proof window construction, the combination with the frame members having slots, of molding pieces having tongues engaging said slot for holding the molding pieces in place, substantially as described.
41. In fire-proof window construction, the combination with the side frame members having slots, of molding pieces comprising strips of metal bent into the desired shape with their edges in contact, said edges having tongues adapted to be inserted through said slots for holding the molding in place, substantially as described.
42. In fire-proof window construction, a sill having a bead thereon, with a vertical edge, and a sash having a channel to receive said bead, and a spring packing strip secured in said channel and cooperating with the bead to secure a weather proof joint, substantially as described.
43. In fire-proof window construction, a horizontal frame member having a bead thereon, and a sash having a channel to receive said bead, and a weather strip in the channel cooperating with the bead, substantially as described.
44. In fire-proof window construction, the combination of a sash having a horizontally disposed member, an inclined meeting rail carried thereby, and formed of the same piece as the horizontal member and providing a groove, and an oppositely converging meeting rail carried by the sash adapted to enter said groove and contact with the first named rail, substantially as described.
45. In metallic window construction, the combination of a sash having a horizontally disposed member, a meeting rail carried thereby, and formed of the same piece as the horizontal member, a groove formed by said meeting rail, adapted to be engaged by an oppositely converging meeting rail carried by another sash, and metallic weather strip secured to said meeting rails, and adapted to bear against each other when the sash are closed, to form a weather tight joint, substantially as described.
46. In fire-proof window construction, a sill having a channel on its lower and its upper side for the reception of concrete or other like mixture and a removable cover plate embracing the upper side of said sill, substantially as described.
47. In fire-proof window construction, an upper and a lower sash, a downwardly inclined meeting rail carried by the top bar of the lower sash, an upwardly inclined meeting rail carried by the bottom bar of the lower sash, and metallic weather strips carried by said meeting rail and adapted to bear against each other when the sash are closed to form a weather tight joint, substantially as described.
48. In fire-proof window construction, a main frame comprising a sill, top cross piece, and side members suitably secured together, and a removable finishing plate adapted to be applied to each of the side, top and bottom members of the main frame after the main frame has been walled in, said finishing plates being secured and engaging with each other at their ends so that the removal of one of said finishing plates permits the removal of the other finishing plates, substantially as described.
49. In fire-proof window construction, a main frame comprising side members carrying sash guides, top and bottom cross mem-

bers, and removable finishing plates for covering said cross members, substantially as described.

5 50. In fire-proof window construction, a sill having a channel in its lower side for the reception of concrete, and a removable finishing plate for covering said sill, substantially as described.

10 51. In fire-proof window construction, a main frame, a removable finishing frame consisting of removable side, top and bottom cover plates secured within the main frame, the side cover plates of the finishing frame having continuous sash guide grooves  
15 extending the entire length thereof, top and

bottom sash with projecting guides fitting within the sash guide grooves, weights for balancing the sash, and sash cord pulleys within the main frame substantially above the side cover plates, whereby the weights 20 and sash are connected without perforating the side cover plates for the sash cord pulleys and cords, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

EDMUND H. LUNKEN.

CHARLES M. CONKLIN.

Witnesses:

BEN B. DALE,

BERNARD J. HAUSFELD.