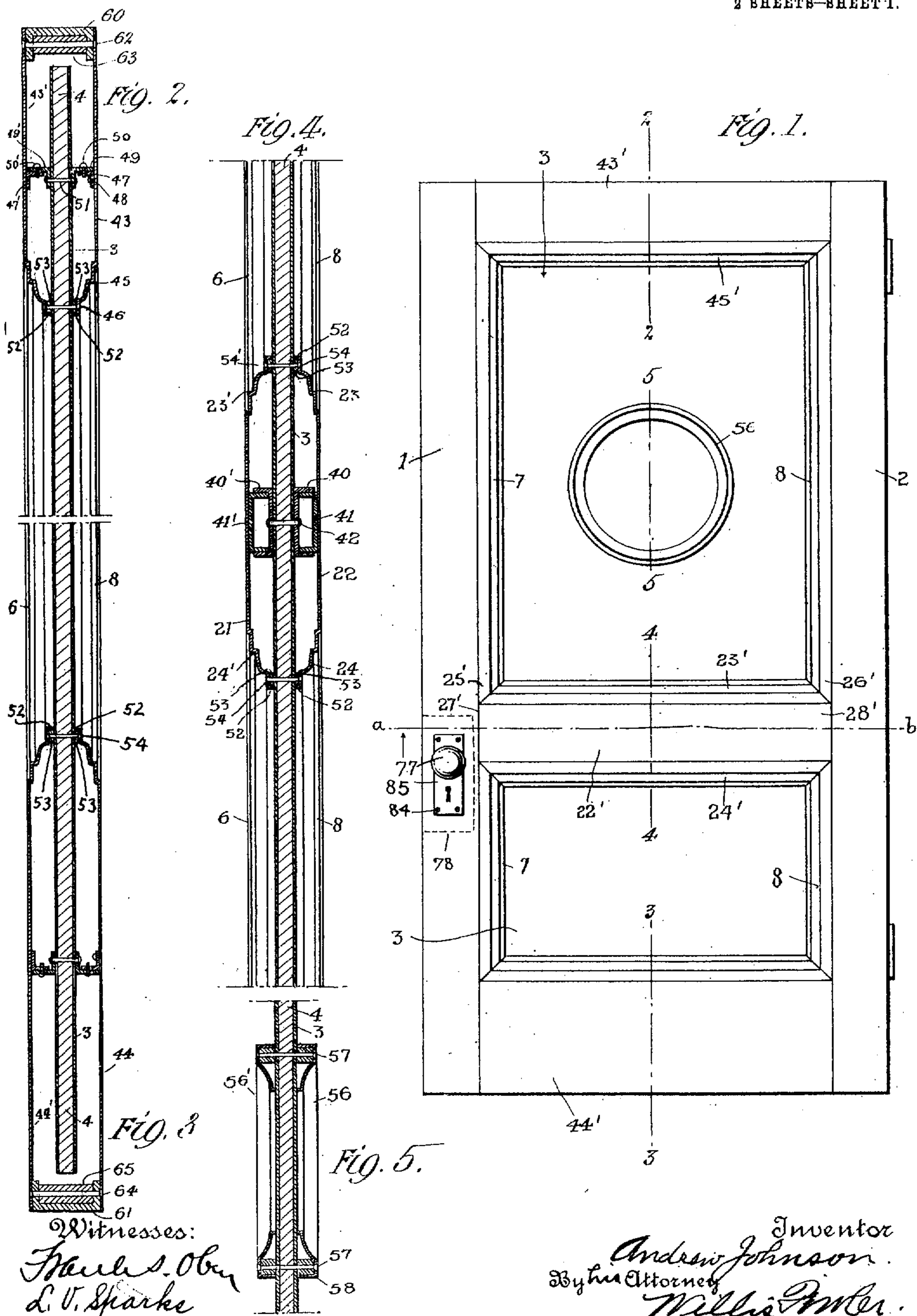


A. JOHNSON.
SHEET METAL DOOR AND THE LIKE.
APPLICATION FILED JUNE 1, 1910.

978,300.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.



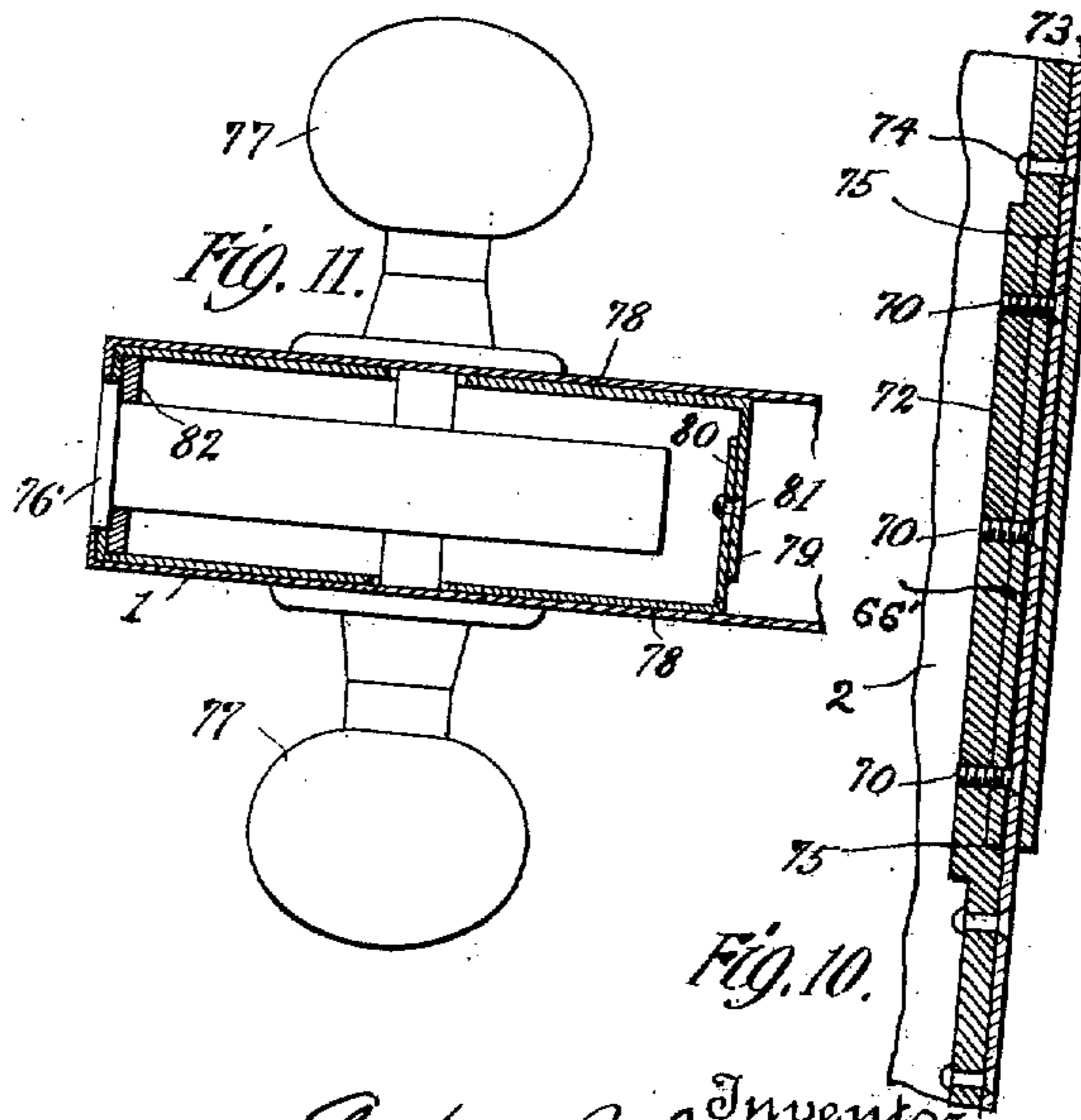
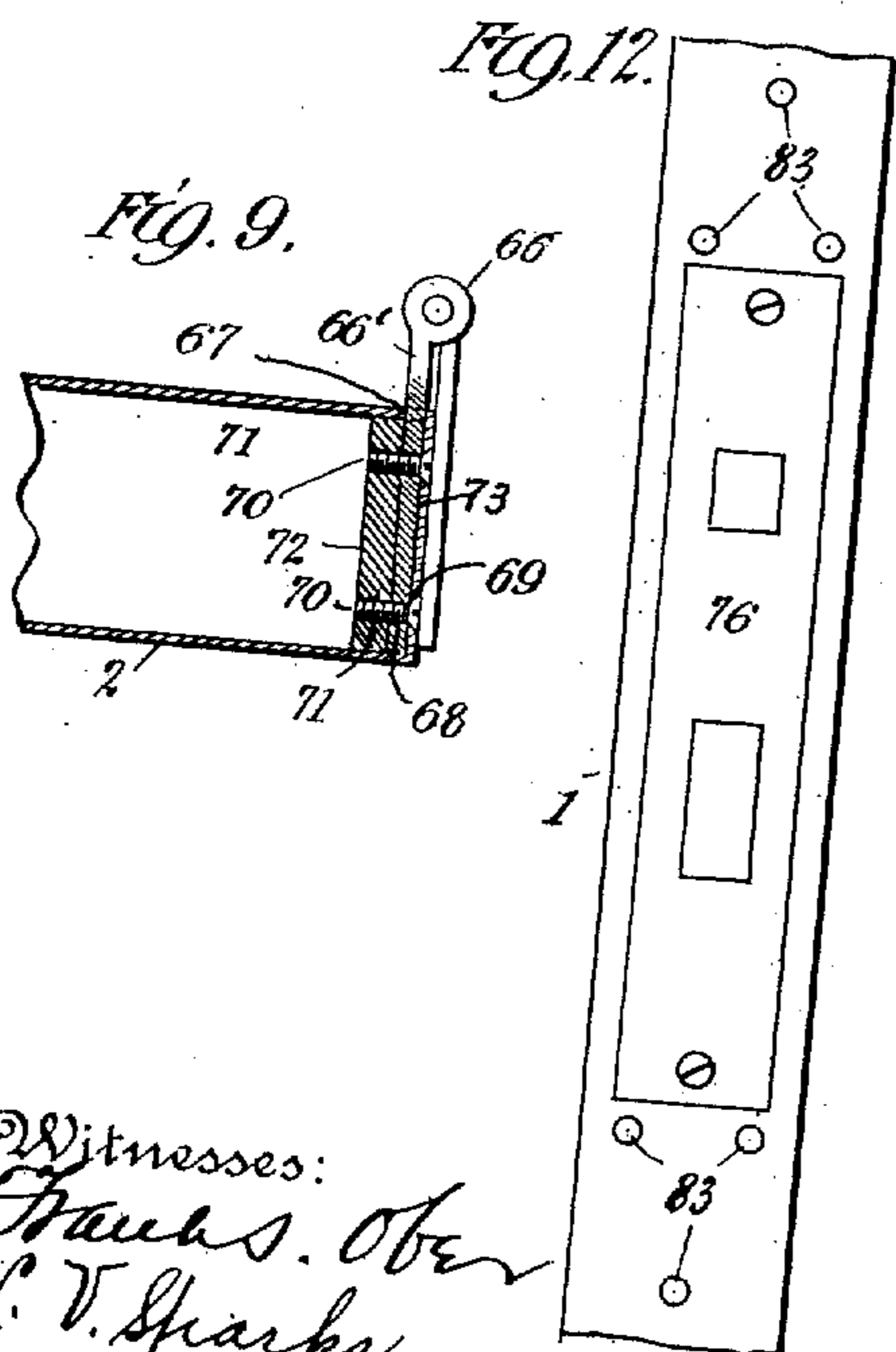
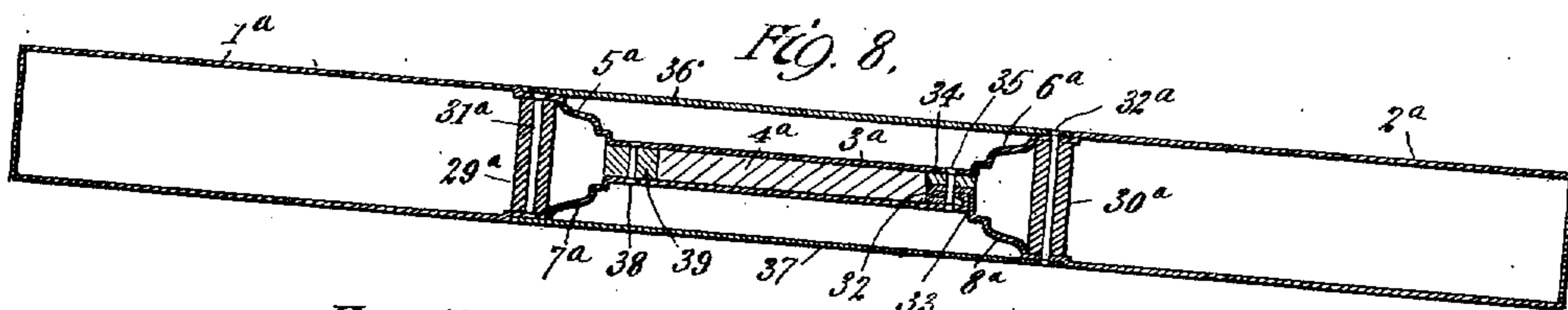
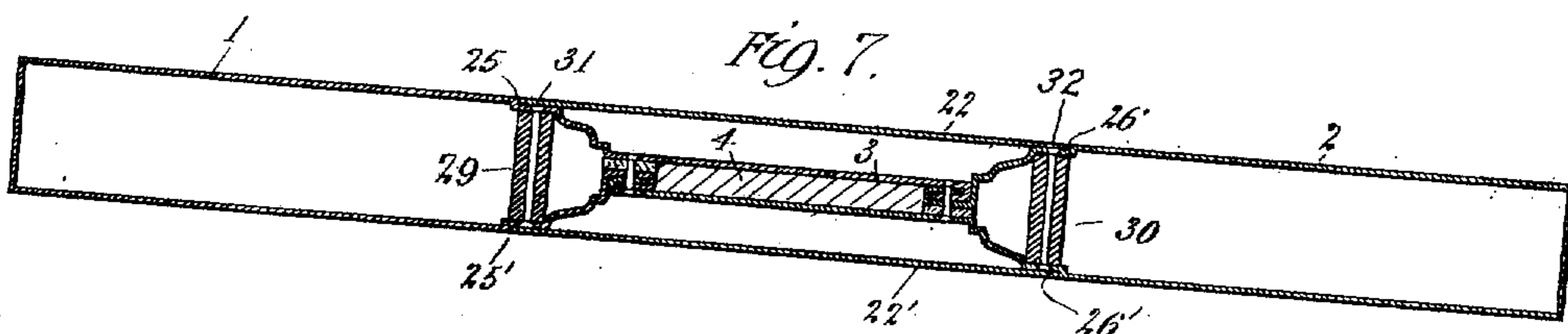
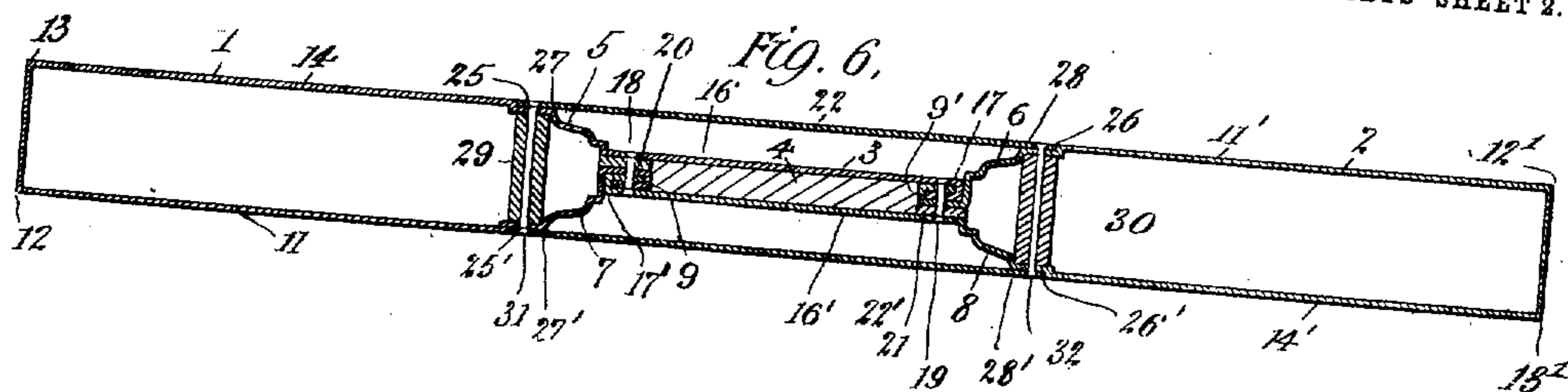
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

ANDREW JOHNSON, OF JAMESTOWN, NEW YORK.

SHEET-METAL DOOR AND THE LIKE.

978,300.

Specification of Letters Patent.

Patented Dec. 13, 1910.

Application filed June 1, 1910. Serial No. 564,471.

To all whom it may concern:

Be it known that I, ANDREW JOHNSON, a subject of the King of Sweden, residing in Jamestown, Chautauqua county, State of New York, have invented certain new and useful Improvements in Sheet-Metal Doors and the Like, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to improvements in sheet metal doors, and the particular objects of the invention are to make a door of this class comparatively light and at the same time with high power of resistance to strains and great durability.

The invention also seeks to provide a sheet metal door that is both fire and sound proof as well as weather-proof and air-tight.

With these and other objects in view, my invention consists in the various novel and peculiar arrangements and combinations of the several different parts of the structure all as hereinafter fully set forth and then pointed out in the claims.

I have illustrated types of my invention in the accompanying drawings, wherein; Figure 1 is a broad side view of a sheet metal door made in accordance with my invention. Figs. 2, 3, 4 and 5 are enlarged views of vertical sections through the door taken on planes 2—2, 3—3, 4—4, 5—5, respectively, in Fig. 1. Figs. 6, 7 and 8 are enlarged views of horizontal sections of three modified forms, respectively, of construction of the door, the plane of the section being indicated by line *a—b*, Fig. 1. Fig. 9 is an enlarged horizontal sectional view taken through the hinge stile and the hinge of the door. Fig. 10 is a vertical sectional view through the door hinge and its mounting in the hinge stile, the plane of the section being at right angles to that of Fig. 9. Fig. 11 is an enlarged horizontal sectional view taken through the lock and lock-stile of the door. Fig. 12 is a front edge view of the door showing the lock and the manner of securing the box for the lock within the lock-stile.

Referring to the drawings, in which like numbers of reference designate like parts throughout, 1 is the lock-stile and 2 is the hinge-stile of the door, between which stiles

is the interposed panel 3. The stiles are made hollow and between the two sheets or plates on the opposite sides of the door forming the panel there is preferably interposed a filling 4 of suitable light weight fire-proof material, such as asbestos.

In Figs. 6 and 7, I show the two door stiles and the interposed panel together with the ornamental moldings 5 and 6, respectively, between the stiles and panel, upon one side of the door, and 7 and 8, respectively, upon the other, as being formed from two sheets of metal bent longitudinally on themselves to form the door. Thus each sheet of metal comprises one complete hollow stile and one face of the panel and the vertical moldings. Considering one of the two sheets of metal thus constituting the door, the sheet has one longitudinal edge bent into a hook form at 9, thence it curves outwardly at 7, which is the molding, and continues straight at 11, and is bent at 12 and 13 at right-angles and continues straight at 14 whence it curves inwardly at 5, which is also the molding, and continues thence straight at 16 and at its end is bent into a hook form 17. The hooked parts 9 and 17, respectively, form interlocking members of the joint between the two corresponding sheets of material of which the door is composed, and the bends 7 and 5, respectively, constitute the ornamental molding or bead-like finish, while the straight parts 11 and 14, and the straight section between the corners 12 and 13, form the hollow stile. The straight part 16 between the molding 5 and the hooked end 17 constitutes one face of the door panel 3. These described parts 9 to 17, inclusive, are found in the corresponding sheet of metal forming the other half of the door and are marked from 9' to 17', respectively, except the moldings which are marked 6 and 8, respectively. The hooked edges 9 and 17 of one piece of metal are interlocked with the hooked edges 9' and 17', respectively, of the corresponding sheet of metal and these overlapping and interlocking joints are rolled so as to fit snugly and firmly together and are made fast by means of rivets 18 and 19, respectively, though any other means of uniting these interlocking joints may be adopted. In order to strengthen the structure within the panel area and at the inter-

locking joints, I insert a flat metallic bar 20 between the interlocking joint 9 and 17', and the plate 16 of the panel on one side, and similarly a metal bar 21 between the joint 9' and 17, and the plate 16' of the opposite side of the door panel. It will be noted that these overlapping and interlocking edges of the sections of sheet metal constituting the door structures are clear of the moldings and are brought wholly within the area of the panel which being a flat surface can take a very high pressure in rolling the joint so that the union of these parts may be made more intimate than if the joint fell within the hollow parts of the structure.

In the construction shown in Fig. 6, the center rails 22 and 22', upon opposite sides of the door, respectively, are formed of sheet metal plates bent and cut to fit across the door panel and between the stiles with which it lies flush. These center rail plates have their edges formed with the same ornamental bead or molding 23 and 24, 23' and 24', respectively, as the beads 5, 6, 7 and 8 of the stiles. The hollow stiles 1 and 2 are formed at their inner edges toward the panel with an offset 25 and 26, upon one side of the door and 25' and 26', upon the other side of the door, and the ends 27 and 28, 27' and 28', respectively, of the rail plates fit flatly against the offsets, as indicated in Fig. 6, so that a solid bearing is afforded at this point. Upon the interior of the hollow stiles are inserted tubular braces or spacing members 29 and 30, between the offsets 25, 26' and 26, 25', respectively, and through these tubular members extend rivets 31 and 32, respectively, these rivets also passing through the offsets 25 and 25' and 26 and 26' and the flat ends 27, 27' and 28, 28', respectively, of the rail plates. It will thus be seen that a very solid and substantial connection is made between these parts. This gives increased rigidity to the door structure near the junction of the stiles and the panel, the tubular members 29 and 30 being preferably made of steel and their ends being brought in flat contact with the inner sides of the offsets 25, 25' and 26, 26'. In this construction, in Fig. 6, the rail plates 22, 22' are thus united by means of rivets but in the construction shown in Fig. 7, these rivets do not extend through the rail plates 22 and 22', but only through the offsets 25, 25' and 26, 26'. In this construction, the ends of the rails are welded to the flat offsets instead of being riveted, but in other respects the construction shown in Fig. 7 is identical with that described in Fig. 6.

In Fig. 8, I show my improved door as constructed of a single piece of sheet metal, the longitudinal edges of which are formed hook shaped at 32 and 33, respectively, and are interlocked so as to form a concealed

joint which lies wholly within the area of the panel of the door. Interposed between this joint and the adjacent plate of the panel is a reinforce metallic bar 34, rivets 35 being secured through both of the plates forming the opposite faces of the panel, the interlocking joint and the reinforce bar, the same as in the construction described in Fig. 6. This joint within the panel area can be rolled with great pressure, the same as the one previously described in reference to Figs. 6 and 7. In this construction, the single sheet of metal is bent and shaped to form the hollow stiles 1^a and 2^a with the intermediate panel 3^a having the fire-proof filling 4^a. The ornamental moldings 5^a, 6^a, 7^a, and 8^a, are also formed between the hollow stiles and the panel 3^a, in the same manner as described in reference to Fig. 6. The center rails 36 and 37 upon opposite sides of the panel 3^a are formed in the same manner as the center rails 22, 22', in Figs. 6 and 7, and the ends of the rail members are fitted against the flat offsets at the inner edges of the hollow stiles, the same as in Figs. 6 and 7. The tubular members 29^a and 30^a for spacing and bracing the two sides of the hollow stiles are likewise inserted with the rivets 31^a and 32^a, respectively, extending through said tubular members. In Fig. 8, however, the rivets 32^a extend through the material of the center rails 36, 37, respectively, while the rivets 31^a do not extend through the material of the center rail, but the ends of such rails are welded to the flat offsets, as described in reference to Fig. 7. In this construction in Fig. 8, the two plates or sheets forming the opposite sides of the panel 3^a are firmly secured together at a point corresponding to the lap-joint on the opposite side by means of rivets 38 which pass through tubular metallic spacing members 39. By using the tubular members 39 along this line, where the two plates of the panel are thus secured, instead of a solid bar, the structure is made much lighter and at the same time is made very strong and solid places are provided where the riveting is done, the same as in the construction of the tubular members 29 and 30, with their respective rivets extending through them.

Beneath the center rail 22 is arranged a pair of telescoping channel-irons 40 and 41, the channel 41 being smaller than 40 and fitting within it with its flanges extending in an opposite direction from those of the channel 40, as indicated in Fig. 4. The channel-iron 40 has its under or flat portion placed flatly against the panel 3, to which it is secured by rivets 42 and it extends transversely of the panel for the entire width thereof and along the center line of the rail 22. The back or flat part of the channel-iron 41 is in contact with the underside of the rail plate 22, to which it is welded, and

provides a solid backing for the same, and one which will not make a sharp crease in the rail plate as is apt to happen where a comparatively narrow piece is used for such purpose. This telescoping arrangement of the adjustable channel-irons may be used to vary the distance at which the outer channel stands out from the panel, so that rail plates of different depths may be thus compensated for. Beneath the opposite rail plate 21' there is a similar arrangement of telescoping channel-irons 40' and 41', the inner one 40' being secured to the opposite side of the channel 3 by means of the same rivets 42. This arrangement and association of these channel-irons provides a very firm and stiff brace across the panel of the door and affords a comparatively large backing surface for the rail plates 22 and 22'.

The upper rails 43 and 43', and the lower rails 44 and 44', are formed substantially alike and are mounted in the same manner on the door panel between the stiles so that a description for one will serve for all of them. Referring to Figs. 1 and 2, the upper rail 43 comprises a plate of sheet metal having its upper edge formed straight and its lower edge shaped with a bevel or molding finish 45, and the lower edge is riveted to the panel 3 by means of rivets 46 which rivets likewise extend through the lower edge of the opposite rail 43' and secure both rails firmly to the panel. This rail plate 43 is fitted snugly between the stiles 1 and 2, as indicated in Figs. 1 and 2, and beneath the rail plate 43 at about the center of its width is secured an angle-iron 47 extending through the length of the plate and attached thereto by rivets 48. The other flange of the angle-iron 47 which projects inwardly is screwed to the outwardly extending horizontal flange of a second and similar but larger angle-iron 49, by means of screws 50, the other flange of the angle-iron 49 being secured to the panel 3, by means of rivets 51, which rivets extend through the panel and through a corresponding flange on a similar angle-iron 49' on the opposite side of the panel and by means of which and another angle-iron 47' and screws 50', the rail plate 43' is secured in place. The outer flange of the angle-iron 47 being welded to the under side of the rail plate 43', instead of being riveted like the angle 47. The lower rail plates 44 and 44', are secured to the panel plates, which lie beneath the rails, by means of riveted angle-irons similar to those described in reference to the upper rail plates 43 and 43', respectively. The edge of the molding of each of the rail plates is formed with an inwardly projecting flange 52 (as shown in Figs. 2 to 4), which fits against the outer face of the panel so as to make a tight joint therewith, and a strengthening strip 53 is inserted against the inner face of

the flange 52, so as to fill the space between the panel and the under side of the molding and along the line where the riveting is done. In Fig. 4, the rivets 54 are shown as passing through the panel plates, the strengthening strips 53 and 53', and the moldings 23 and 23', respectively. This construction affords a strong one for the placing of the rivets which connect these rail plates upon opposite sides of the door, the flange 52 itself acting to stiffen the structure.

If desired, a molding frame may be applied to the panel of the door, as shown in Figs. 1 and 5, wherein a circular frame is shown and this comprises upon each side of the door an annular shaped molding frame 56, which is made of a desired pattern in molding and is hollow and fits with its edges against the door panel. Rivets 57 are passed through the molding and the plates of the door panel, and through the molding 56' on the opposite side of the panel, so as to secure the parts together, a suitable piece 58 being inserted within the hollow part of the molding through which the rivets pass, for the purpose of supporting the molding and affording a solid place for the rivets 57. This part 58 may be a continuous strip or a tubular piece surrounding each rivet.

The upper and lower ends of the door are completely closed in a substantial manner by means of comparatively heavy channel-irons 60 and 61, respectively, which are secured in place water and air tight by welding so as to seal the door at the top and bottom. These channels are cut to fit tightly between the open ends of the stiles 1 and 2, and the end rails, and are placed with their flanges projecting inwardly. The channel-iron 60 is secured in place by rivets 62, which pass through both of the rail plates 43 and 43', and the flanges of the channel-iron, within which are inserted suitable pieces 63 at the points where the rivets are located in order to make a more solid construction for the rivets. The channel-iron 61 at the lower edge of the door is similarly secured in place by means of rivets 64 and the bracing piece 65.

The door hinge 66 (see Figs. 9 and 10), is secured in place at the back edge of the door by inserting one of the hinge blades or leaves 66' through a slot 67 formed in the hollow stile 2 and placing the blade across the interior of the stile flatly against the inner face of the rear edge of the stile, so that the screw holes 68 in the hinge leaf register with the screw holes 69 in the plate forming the rear edge of the hollow stile. The hinge screws 70 take into threaded perforations 71 formed in a comparatively thick steel plate 72, which is fitted snugly between the plates of the hollow stile and lies flatly against the rear edge 73, of the hinge stile

to which it is secured by means of rivets 74, the plate 72 being countersunk at 75 for receiving the hinge blade 66' so that the same lies flush with the plate or bar 72, as indicated in Fig. 10. This reinforce plate or band 72, may extend practically the entire length of the hinge stile, or at least far enough to take in all of the hinges with which the door may be provided, and it serves as a substantial strengthening piece and gives a firm anchorage for the hinges. This hinge plate 72 may be made as massive as desired according to the size of the door or the strength required at the hinge stile for the mounting of the hinges.

At a suitable point in the hollow lock stile 1, I mount the door lock 76 which is provided with the usual door knobs 77. This lock is inserted in a box or casing 78 which is formed of a single piece of sheet metal and bent into a box like form and fits snugly within the hollow stile 1, with its ends 79 and 80 overlapping and riveted together at 81 toward the inner part of the door. Within the box 78 is fixed a reinforce piece 82 which fits in the interior of the box against the side thereof toward the outer end of the lock, and the box is held in place in the stile by means of suitable rivets 83, at the upper and lower ends thereof, respectively. This box 78 extends a considerable distance above and below the lock, as indicated in dotted lines, in Fig. 1, and it serves as a solid part for the reception of the screws 84, of the door knob plate 85, see Fig. 1.

The interior of the door as well as all of its parts are painted to protect the same against rust and corrosion and afterward dried in an oven at a high heat.

From the foregoing description, it will be seen that my invention provides a comparatively light weight sheet metal door which has great power of resisting strains and blows and the door is accordingly a very durable structure. The door is also waterproof, sound-proof and fire-proof, all parts of the structure being made of fire-proof material. As the sheet metal plates constituting the door extend from the top to the bottom of the same and are fastened together by one or more invisible seams, which are securely rolled and riveted together, or welded as the case may be, there is no liability of the door being ripped open at any of its joints or of the door sagging out of shape no matter how hard the usage thereof may be. As the various parts of the door may be ornamented as desired by means of metallic moldings or beads, the door may be made to closely resemble the ordinary wooden door.

I wish to be understood as not limiting my invention to the precise construction of the various different parts of the structure as herein set forth, as various modifications

may be made in the same without, however, departing from the spirit of the invention.

Having thus described my invention what I claim and desire to secure by Letters Patent is;

1. A door or the like formed from sheet metal bent longitudinally to form the stiles and the interposed panel, the ends of the sheet metal which extend longitudinally of the door being formed into an interlocking joint falling within the area of the panel and the said interlocking parts being securely united together.

2. A door or the like formed from sheet metal bent longitudinally to form the stiles and the interposed panel, the ends of the sheet metal which extend longitudinally of the door being formed into an interlocking joint falling within the area of the panel and the said interlocking parts being securely united together, and suitable filling material in the space between the sheets forming the panel.

3. A door or the like formed from sheet metal bent longitudinally to form the stiles and the interposed panel, the ends of the sheet metal which extend longitudinally of the door being formed into an interlocking joint falling within the area of the panel and the said interlocking parts being securely united together, and a longitudinal reinforce bar located between said interlocking joint and the adjacent sheet of metal of the said panel.

4. A door or the like formed from sheet metal bent longitudinally to form the stiles and the interposed panel, the ends of the sheet metal which extend longitudinally of the door being formed into an interlocking joint falling within the area of the panel and the said interlocking parts being securely united together, and rails each formed of sheets of metal bent into shape and fitted across the panel between the stiles and securely fastened to the panel.

5. A sheet metal door or the like comprising stiles and the interposed panel, rails formed of sheet metal bent into shape and fitted across the panel between the stiles and securely fastened thereto, a channel-iron having its underside secured to said panel transversely thereof and a second channel-iron reversed in its position and of less width than the first one and adapted to fit within the channel of the first iron with its underside outermost, said channel-irons lying beneath the sheet metal of the rail so that the back of the outer channel-iron makes contact with the underside of the rail.

6. A sheet metal door or the like comprising stiles and the interposed panel, rails formed of sheet metal bent into shape and fitted across the panel between the stiles and securely fastened thereto, an angle iron secured to said panel transversely thereof be-

neath said rail, and a second angle-iron secured to the first mentioned one and also to the underside of said rail.

5 7. A door or the like formed of sheet metal, a box formed of sheet metal bent into shape with the ends of the sheet metal secured together and adapted to be inserted within the lock stile of the door and secured thereto for receiving the door lock.

10 8. A door or the like formed of sheet metal, a box formed from a sheet of metal bent into shape with its ends overlapping and secured together and adapted to be inserted within the door stile for receiving the
15 lock, the front end of said box being secured to the front end of the lock stile for holding the box in place.

9. A door or the like made of sheet metal, a reinforce bar inserted within the hinge stile
20 near the outer end thereof, a door hinge having one leaf or blade thereof inserted through the sheet metal of the hinge stile and interposed between said reinforce bar and the outer end of said stile, and screws
25 passing through the sheet metal of the outer end of the stile, the hinge leaf and said reinforce bar for securing the hinge in place.

10. A door or the like comprising two

30 sheets of metal each bent longitudinally to form one of the stiles and one face of the interposed panel, the ends of the sheets of metal which extend longitudinally of the door being formed into interlocking joints falling within the area of the said panel and being securely united. 35

11. A door or the like made of sheet metal and comprising stiles and the interposed panel, rails formed of sheet metal plates bent into shape and fitted across the panel between the stiles and securely fastened
40 thereto, the edges of the rail plates being formed with inwardly projecting flanges engaging the surface of the panel, a filling piece placed against each of the flanges and between said rail and panel with two opposite
45 sides of said filling piece in full contact with said rail and panel, respectively, and rivets extending through said rails, panel and filling piece.

In testimony whereof, I have hereunto set
50 my hand in the presence of two subscribing witnesses.

ANDREW JOHNSON.

Witnesses:

OTTO W. WIKQUIST,
OLOF A. OLSON.