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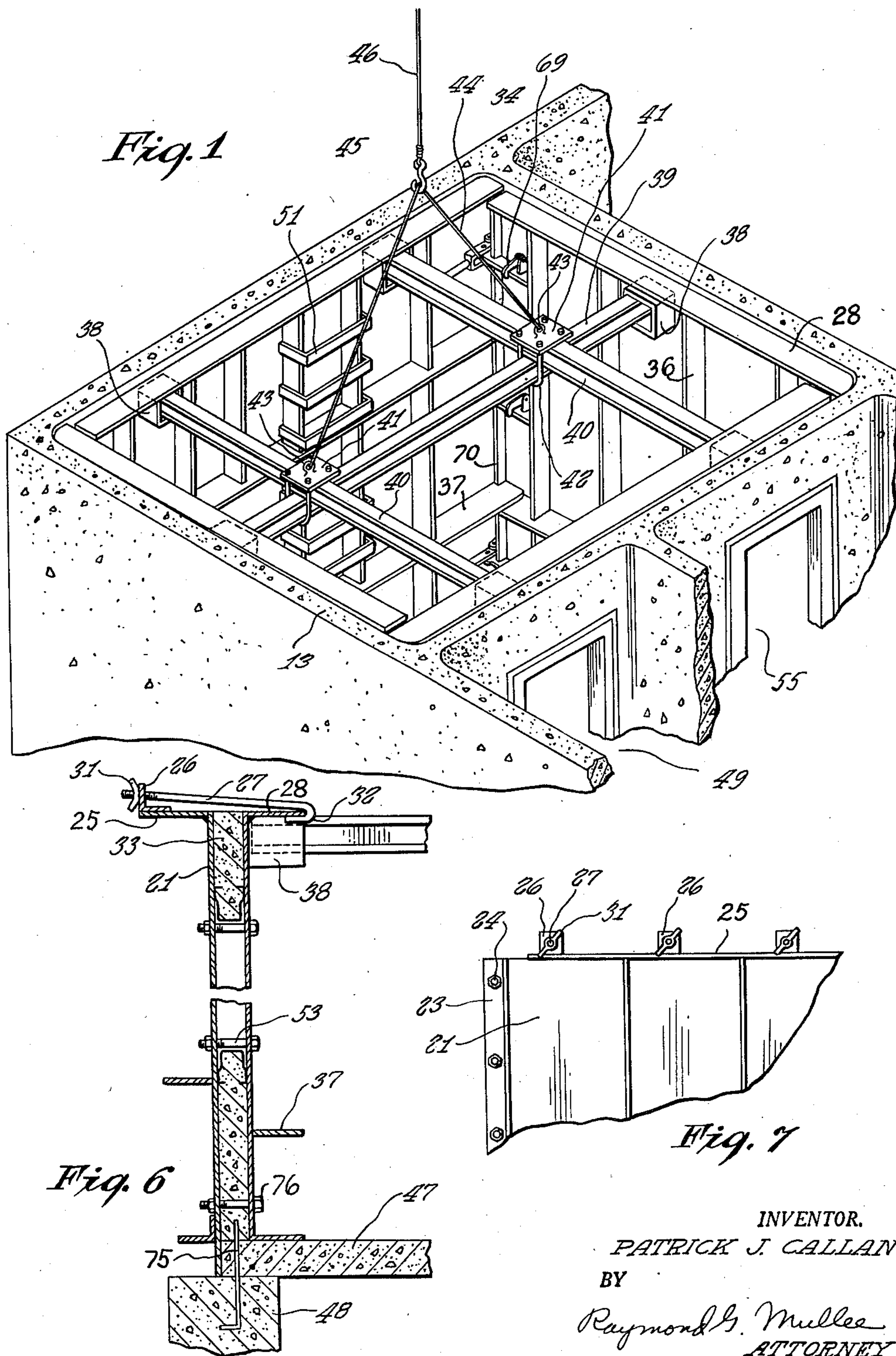
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COLLAPSIBLE FORM FOR CONCRETE WALL CONSTRUCTION

Filed March 24, 1947

4 Sheets-Sheet 1



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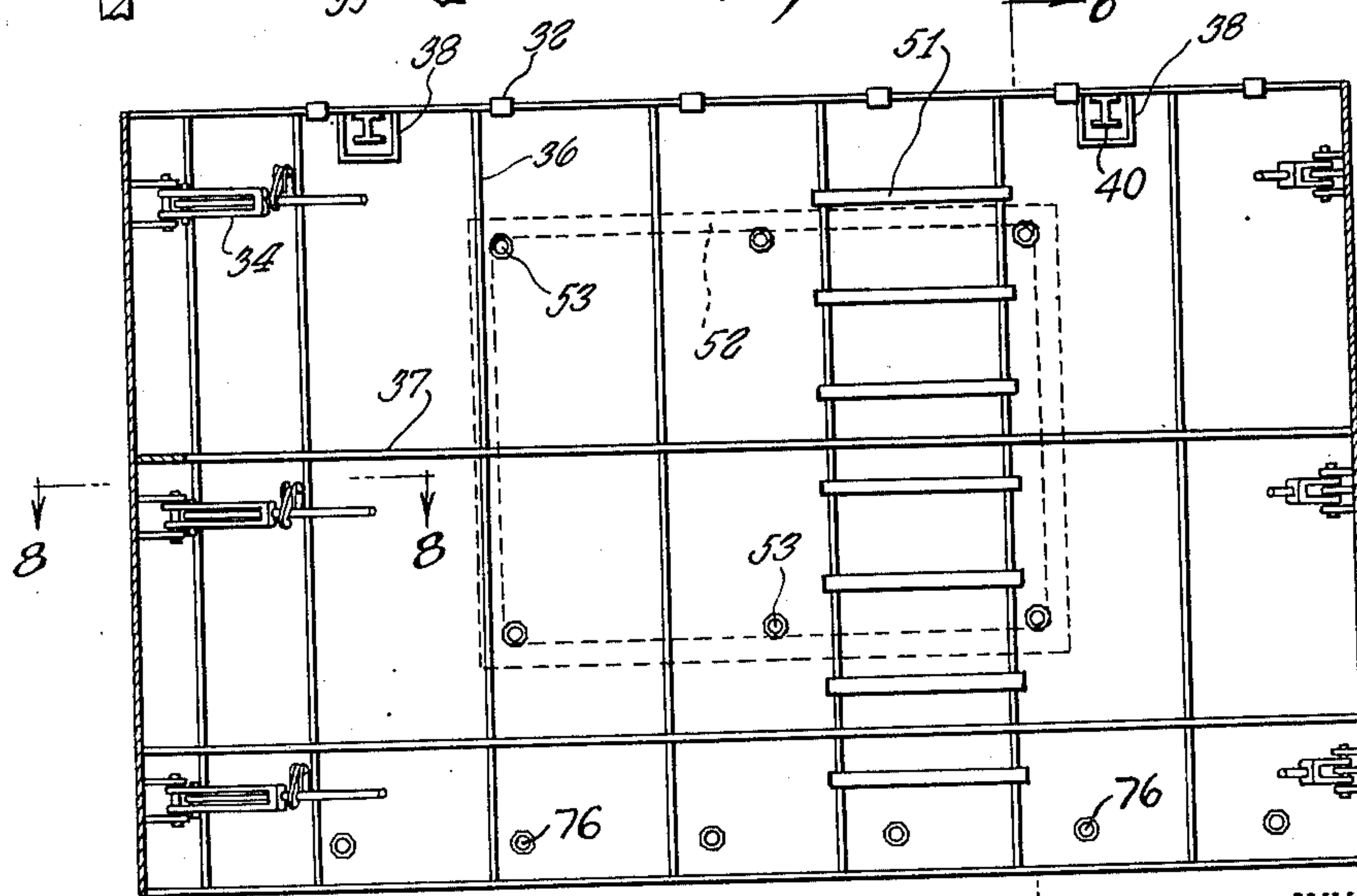
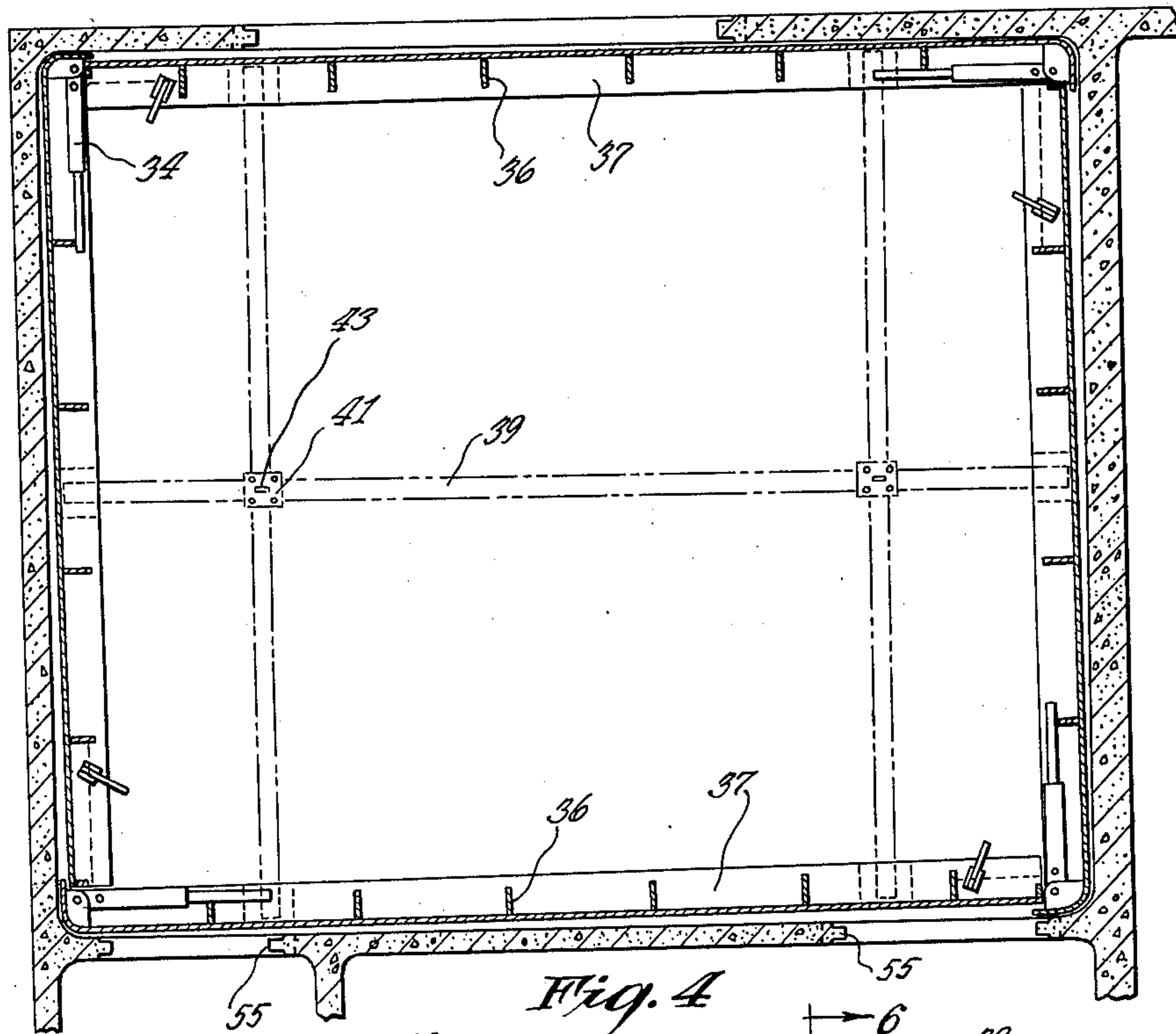
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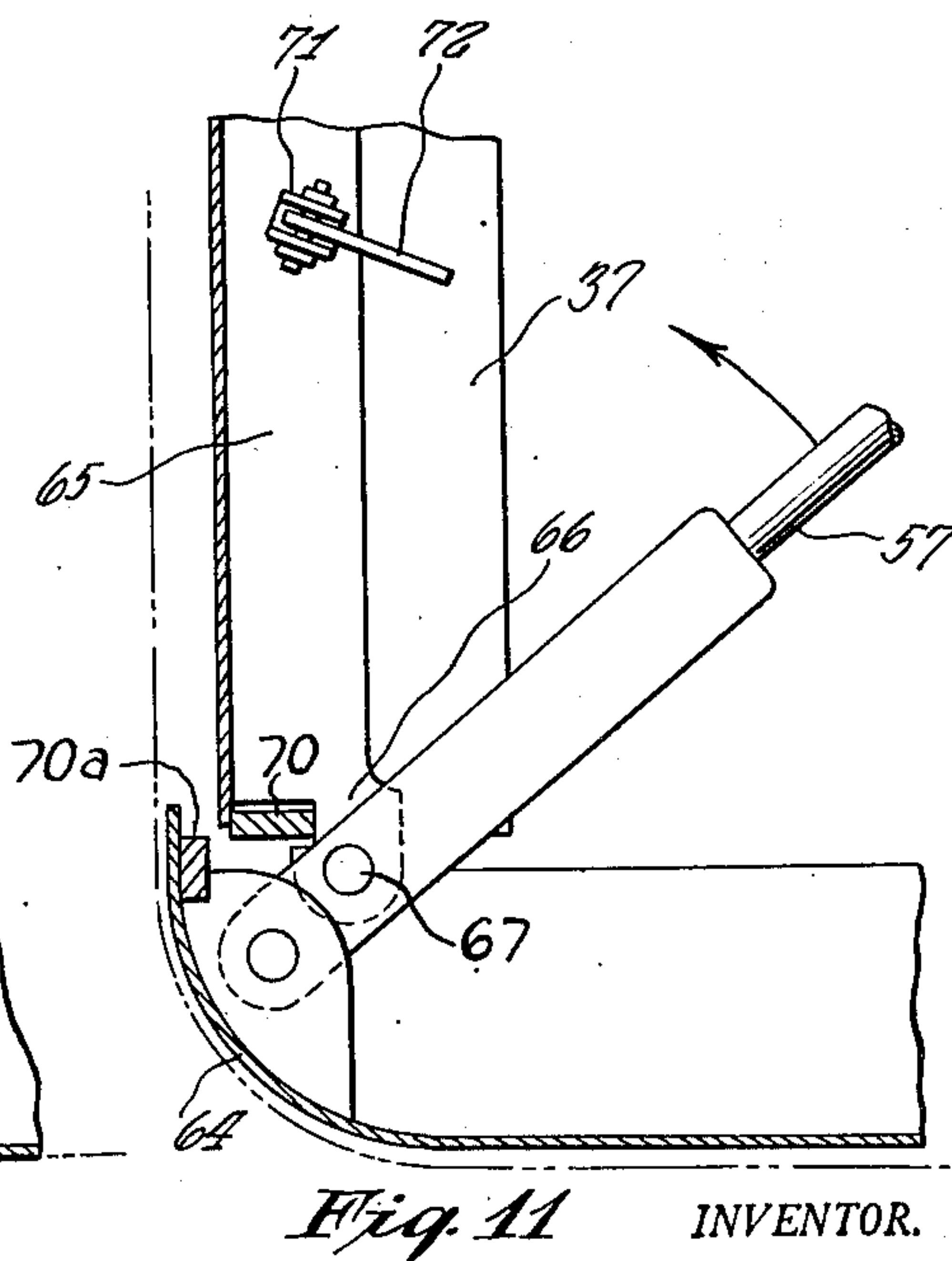
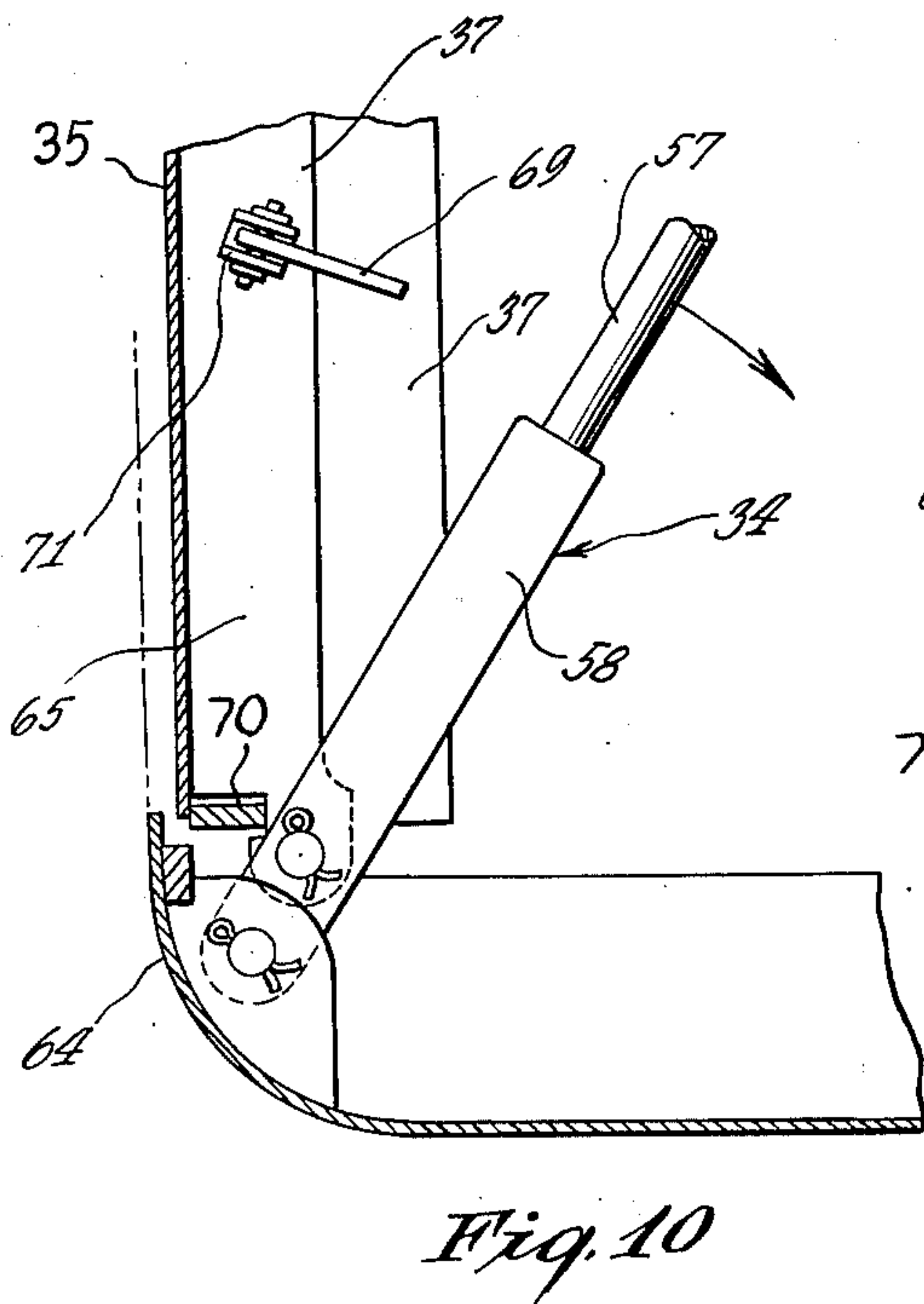
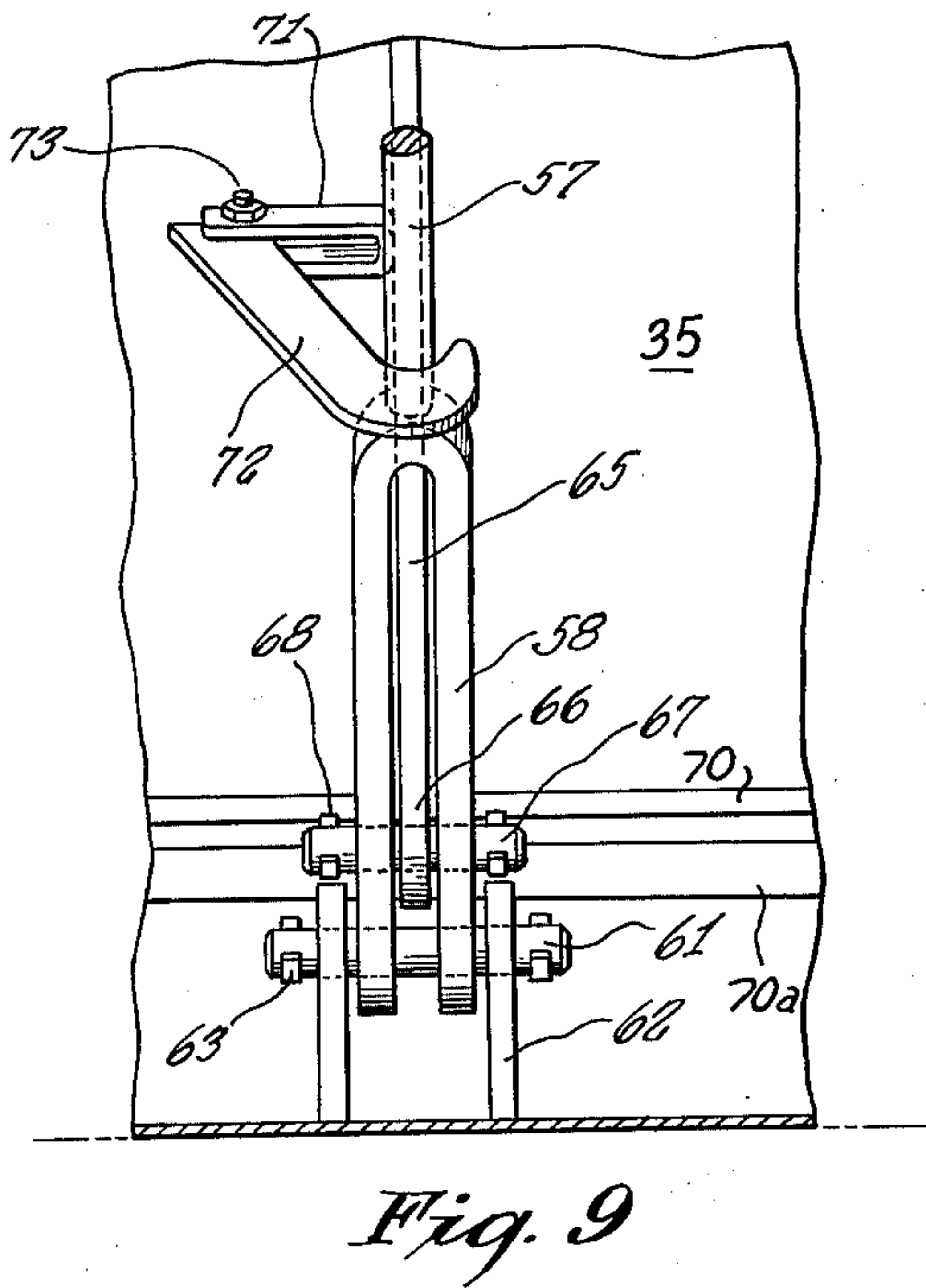
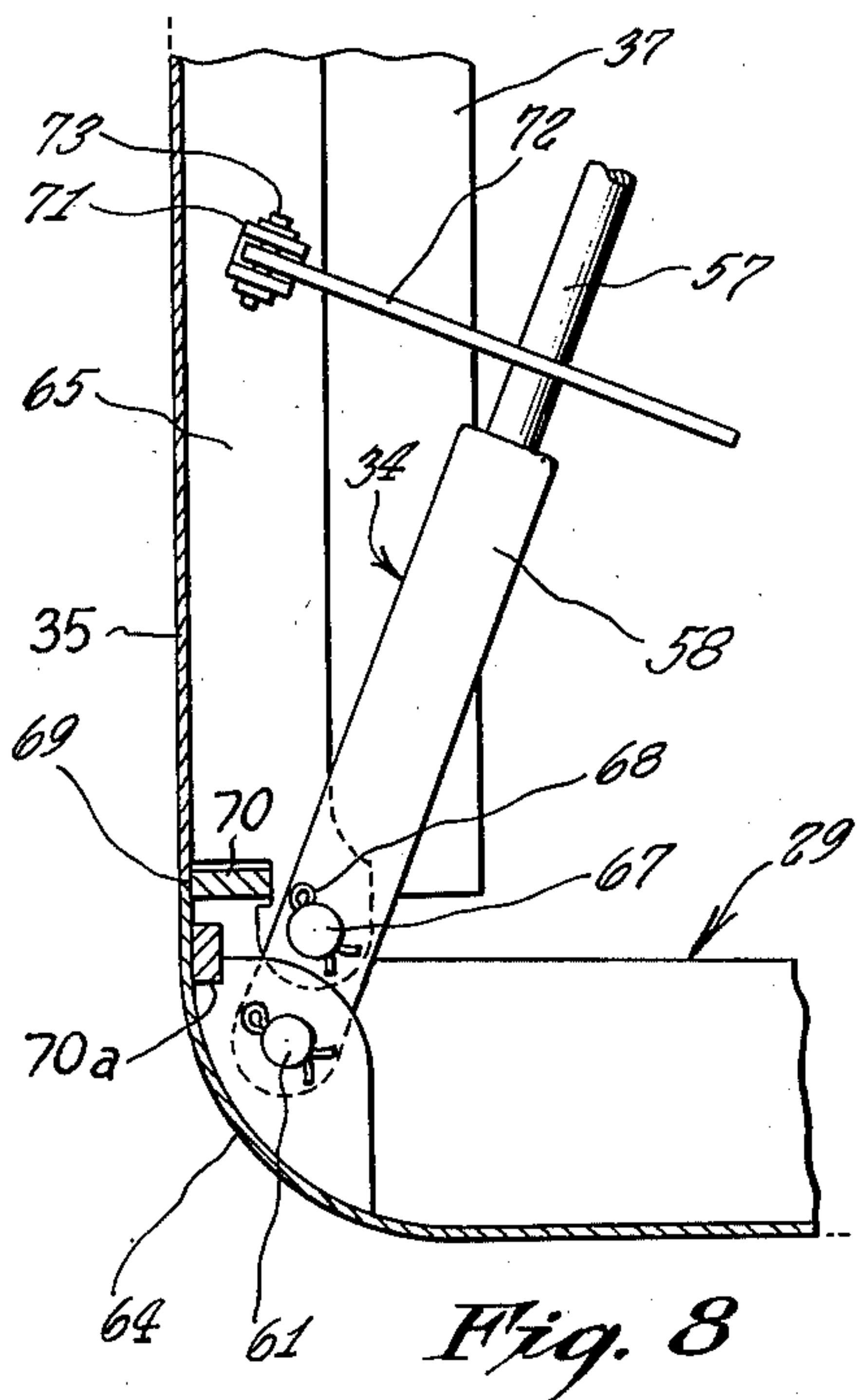


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UNITED STATES PATENT OFFICE

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COLLAPSIBLE FORM FOR CONCRETE WALL
CONSTRUCTION

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3 Claims. (Cl. 25—131)

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This invention relates to building construction and more particularly to wall forms for receiving poured concrete to cast the walls of a room or series of rooms in a single operation.

Heretofore, in order to have wall forms which could be easily removed from the hardened concrete, it has been considered necessary to provide forms which give a tapered wall, or forms which would have to be almost entirely disassembled to pull them out of the concrete without damage. The tapered forms made a room which was of smaller area at the floor than at the ceiling and thus an awkward and distorted appearance, and the other forms required time for assembly and removal.

It is an object of the present invention to provide a building wall form for the room of a house wherein the sides need not be tapered and wherein the form can be adequately collapsed both at the top and bottom so that the same can be easily pulled out of the space without any slight chance of the walls being injured or damaged.

It is another object of the present invention to provide a locking device for collapsible forms which is used in the corners of the inner form and which will move inwardly the side edges of both parts of the form located at the corner and wherein when these locking devices are moved to extend the side edges, the same will be retained so as to give a good locking engagement of the side edges and in abutting relationship with one another.

It is another object of the present invention to provide a simple arrangement for locking together the outer and inner forms at the top edges thereof.

A further object is the provision of a collapsible inner form or tank-like structure in which each of the parts is rigid or inflexible from one corner of the tank to the next, thereby obviating the necessity of any separate stiffening elements to prevent the tank walls from sagging inwardly under the pressure of the poured concrete surrounding it.

It is still another object of the present invention to provide a simple hoisting bar arrangement which will engage with the side parts of the inner form sufficiently to be certain that equal lifting force will be applied upon all sides of the form at the time of its withdrawal from the room which has been formed by the same.

For other objects and for a better understanding of the invention, reference may be had to the following detailed description taken in con-

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nection with the accompanying drawings, in which:

Fig. 1 is a perspective view looking down into the interior of a finished room of a house with the inner form or tank released from the walls thereof and about to be drawn out of the same by a hoisting cable.

Fig. 2 is a top view, chiefly in section but partly in plan, of the concrete wall and of the inner and outer forms, the inner form being in its expanded or cement receiving position.

Fig. 3 is a fragmentary top plan view of one corner of the inner and outer forms showing the fastening devices extending across the top edges of the forms for securing the same together.

Fig. 4 is a transverse cross-sectional view taken through the building structure and the interior wall form when the form parts have been released as in Fig. 1 and preparatory to being removed from the room.

Fig. 5 is a cross-sectional view taken on line 5—5 of Fig. 2 and looking in the direction of the arrows thereof and upon one of the inner form parts.

Fig. 6 is a fragmentary and cross-sectional view taken on line 6—6 of Fig. 5 and looking in the direction of the arrows thereof and including one of the wall openings.

Fig. 7 is a fragmentary elevational view of one corner of the outer wall form looking upon the wing nut for tightening the fastening devices.

Fig. 8 is a cross-sectional view taken on line 8—8 of Fig. 5 and looking in plan upon one of the locking devices with the same in its locked position.

Fig. 9 is a side elevational view of the locking device shown in Fig. 8.

Fig. 10 is a view similar to Fig. 8 except that the handle for the locking device has been released and one of the form parts has been moved inwardly away from the wall surface.

Fig. 11 is a view similar to Fig. 10 except that the arm has been moved to a greater extent and sufficiently to move both of the form parts away from the wall surface.

Referring now to Fig. 2, 21 represents an outer wall form made of sheet metal, such as cold rolled steel, the inner face of which is smooth and the outer face of which is reinforced with vertically extending metal ribs 22. This form 21 extends throughout the height of the first story of a house and is made up of parts, one part for each side wall of the house. At the corners of

the parts there are provided angle iron strips 23 which are secured to the sheet material and which have holes therethrough for receiving securing bolts 24, Fig. 3. The top of each outer form part has an outwardly extending flange 25 with upstanding lugs 26 spaced from one another along the outer edge of the flange and adapted to receive fastening rods 27 connected with radially inwardly extending flanges 28 of inner wall form 29. Wing nuts 31 are provided on the fastening rods to tighten them. The opposite ends of the rods have hook portions 32 adapted to fit down over the edge of the flanges 28, Fig. 6. When the forms are assembled there will be provided a space between them into which concrete 33 will be poured. The flanges 25 and 28 serve as the supports for men working on the forms. These flanges will also prevent loss of cement which might overflow the top of the forms.

The inner wall form 29 is made the same external dimension as the room to be formed. This form or tank 29 comprises four parts connected together in the corners by locking devices 34. Each of these parts as indicated at 35, comprises a sheet metal member, preferably of cold rolled steel, the outer face of which is smooth and the inner face of which has welded to it a plurality of laterally-spaced, vertically extending, reinforcing ribs 36 and a plurality of vertically spaced laterally-extending reinforcing members 37. Beneath the flanges 28 are box-like brackets 38 which loosely receive the ends of hoisting bars 39 and 40, Fig. 1. The bars 40 extend in one direction and the bars 39 extend in another direction at right angles thereto. The bars or I beams 39 and 40 are not long enough to extend the full depth of the box brackets, but permit the sides of the tank 29 to be collapsed to the Fig. 4 position. These bars 39 and 40 are tied together by a plate 41 and U-bolts 42. The plate 41 has an eye projection 43 into which a cable 44 can be extended. This cable 44 can be grasped by a hook 45 of a crane cable 46. By this arrangement the entire inner wall form 29 is lowered onto a previously formed floor 47, Fig. 6, resting upon a foundation wall 48. The locking devices are preferably extended to a locked position to make the form rigid and to facilitate the locating of the form 29 upon the floor 47. The locating of the form 29 can be done either before the outer wall form has been set up or at a later time. One of these inner wall forms 29 will be employed for each room or closet of the house. The closet space is indicated at 49, Fig. 2. U-shaped straps 51 are secured to two of the vertical ribs 36 to provide a ladder by which workmen can enter and leave the form 29.

In order to provide a window opening in the completed wall, metal bucks or frames 52 are disposed therein and supported by through bolts 53 extending between the inner and outer wall forms and bearing against the inside of the frames. Before removing the forms, these bolts 53 will be withdrawn from them. Door frames 55 extending into closet space 49 and into an adjoining room will be similarly retained by through bolts 53.

Referring now particularly to Figs. 8 to 11, there will be described the action of the locking devices 34 used in the corners of the inner wall forms. There is a set of three locking devices 34 in each corner, one near the floor, one near the ceiling and the third in an intermediate position. These locking devices include an op-

erating hand lever 57 having a bifurcated portion 58 which is pivoted at its outer end to a pivot pin 61 extending between and through vertically spaced brackets 62 on one form part and retained therein by cotter pins 63. The form part is rounded at the corner as indicated at 64 whereby to provide a rounded wall corner in the room which is easy to clean and which permits the forms to be of such shape and without sharp side edges that they will be extracted from the cement walls without damaging the wall.

On a laterally-extending plate 65, which is welded to the associated tank part 35, there is provided a projection 66 adapted to extend through the bifurcated portion 58 of the lever 57 for connection therewith by means of a pin 67 secured thereto by cotter pins 68. When the lever 57 is in the position shown in Fig. 8, the wall units are retained in flush and abutting engagement and their side edges are joined as indicated at 69. In order to insure accurate alignment of the meeting edges 69 of the tank sides, and to support the edge at the extremity of the rounded portion 64, there is provided a vertically extending reinforcing bar 70 welded to the adjacent form part 35, and overlapping the edge of the latter as shown in Fig. 10. Each tank 29 has four bars 70—one in each corner—providing positive stops limiting expansion of the tank. Another reinforcing bar 70a is welded to the rounded part 64 in spaced relation to the edge aforesaid. On the plate 65 is an upwardly extending bracket 71 of U-shape and to which is pivoted a catch 72 by means of a bolt 73. This catch is pivoted over the lever 57 to retain the same in the locked position.

As the lever 57 is pulled clockwise about the pivot 61 to the position shown in Fig. 10, the part having the projection 66 is first pulled inwardly from the concrete wall surface. On further movement of the lever 57 toward the position shown in Fig. 11, the pin 67 encounters increasing resistance to translatory movement, whereupon the lever 57 pivots on pin 67, imparting translatory motion to pin 61. Such motion is transmitted through the bracket 62 to the adjacent unit, as a result of which the latter unit will be pulled inwardly and made to overlap the end of the first unit. When the lever 57 is moved to a further extent than shown in Fig. 11, the units will be moved away from the concrete wall to the maximum extent. Thereafter the inner wall form may be easily removed from the top of the room. The crane cable 46 will be tightened and lifting of the form will be effected.

In operation, the builder starts with a concrete floor 47 and foundation wall 48 (Fig. 6) from which project embedded rods 75 around the border of the floor. The inner forms or tanks 29—one for each room, or closet—are lowered to their approximate position by the crane cable 46. The window bucks are temporarily located and hung on the outsides of the tanks by means of bolts 53. The same is done for the door frames. The four walls of the outer form 21 are positioned with their bottoms resting on foundation wall 48 and lying flush against the perimeter of floor 47, and are then bolted together. Reinforcing mesh and conduits are placed in the spaces between forms, where concrete is to be poured.

An operator enters the interior of one of the tanks 29 by descending the ladder 51. He pushes each of the twelve levers 57 until it is locked by the associated catch 72, thereby expanding the inner form or tank 29 into the Fig. 2 position in

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which it constitutes a rigid, inflexible, non-collapsible structure as long as the levers are held by their respective catches. The space between the inner and outer forms, or between two contiguous inner forms, is automatically adjusted to conform with the thickness of the window frames 52, door frames 55, and spacing blocks (not shown). The forms are locked in their final positions by tightening the fastening rods 27 (Figs. 2 and 3), the transverse bolts 53 encompassed within the window and door frames, and other transverse bolts 76 joining the forms near the bottom as shown in Figs. 5 and 6.

The spaces between the forms are then filled with a rich mixture of concrete of 1-2-2 mix, puddled thoroughly against the steel forms which have very smooth finished surfaces. After a setting of about twenty-four hours, the fastening rods 27, and bolts 53 and 76 are removed, the catches 72 are released, locking levers 57 are pulled to collapse the inner forms or tanks to the Fig. 4 position, and the forms are removed, leaving a set of finished walls, which do not require carpentry, lumber, nails, lathing or plastering. Each inner form 29 is lifted in one piece out of the finished room by the crane cable 46 and moved to the next location to provide a form for the room of another house.

By placing a concrete floor on top of the completed walls, the building may be conditioned for the construction of second floor rooms in the same manner and by the use of similar forms as in the case of the first floor rooms shown in Fig. 1.

It should now be apparent that there have been provided, inner and outer wall forms for building a house with rooms therein, which are of simple construction, easy to set up and easy to withdraw from the final building structure. It should also be apparent that the rooms are without tapered walls and that the inner wall form comprises parts, one part for each side of a room, and that each of these parts are withdrawn inwardly and are completely separated from the inner wall surface of the room at the time of the withdrawal of the inner wall form from the building structure.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A wall form arrangement for building construction, which comprises an outer wall form adapted to form the exterior wall surface of the building structure, an inner wall form comprising multiple plate parts, one for each wall sur-

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face of a room, said parts having edges adapted to be drawn into flush engagement with one another, one of said parts at each corner having a rounded portion, the other of said parts at each corner terminating short of said corners, said parts being mounted for movement relative to each other from a position where the juxtaposed edges thereof are flush and in engagement with each other to a position where said edges overlap, and a locking lever device disposed in each of the corners and connected between the adjacent parts to expand the inner wall form, to position the edges of the parts into flush engagement with each other and to retain the same in such engagement, said locking lever device being operable to contract the parts, whereby the edges of said parts may overlap one another upon the parts to reduce the size of the inner wall form, whereby said inner wall form may be withdrawn from a wall.

2. A wall form arrangement for building construction as defined in claim 1 and stop means on the edges of the respective parts which terminate short of said corner and engageable with the respective rounded portions to limit the expansion of said parts when in the position where the edges are in flush engagement with each other.

3. A wall form arrangement for building construction as defined in claim 1 and a hoisting bar structure comprising bars intersecting one another, said bars being of a length less than the distance between opposite wall form parts, projections on said respective wall form parts respectively slidably receiving the ends of said bars whereby to permit the collapse and expansion of said wall form parts, and a cable device attached to said bars.

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