

July 31, 1956

W. M. DUNN

2,757,225

DOORS FOR RADIO SHIELDED ENCLOSURES

Filed Dec. 24, 1952

2 Sheets-Sheet 1

FIG. 1

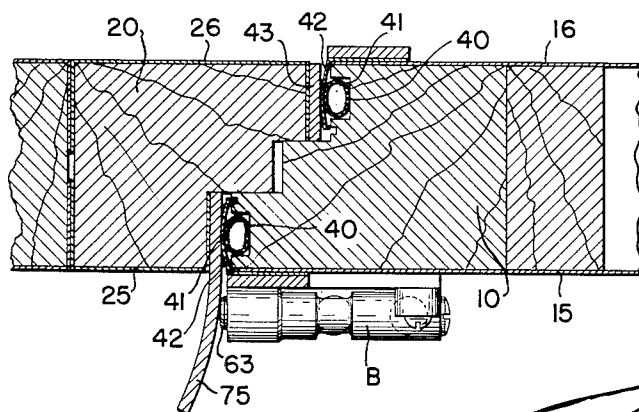
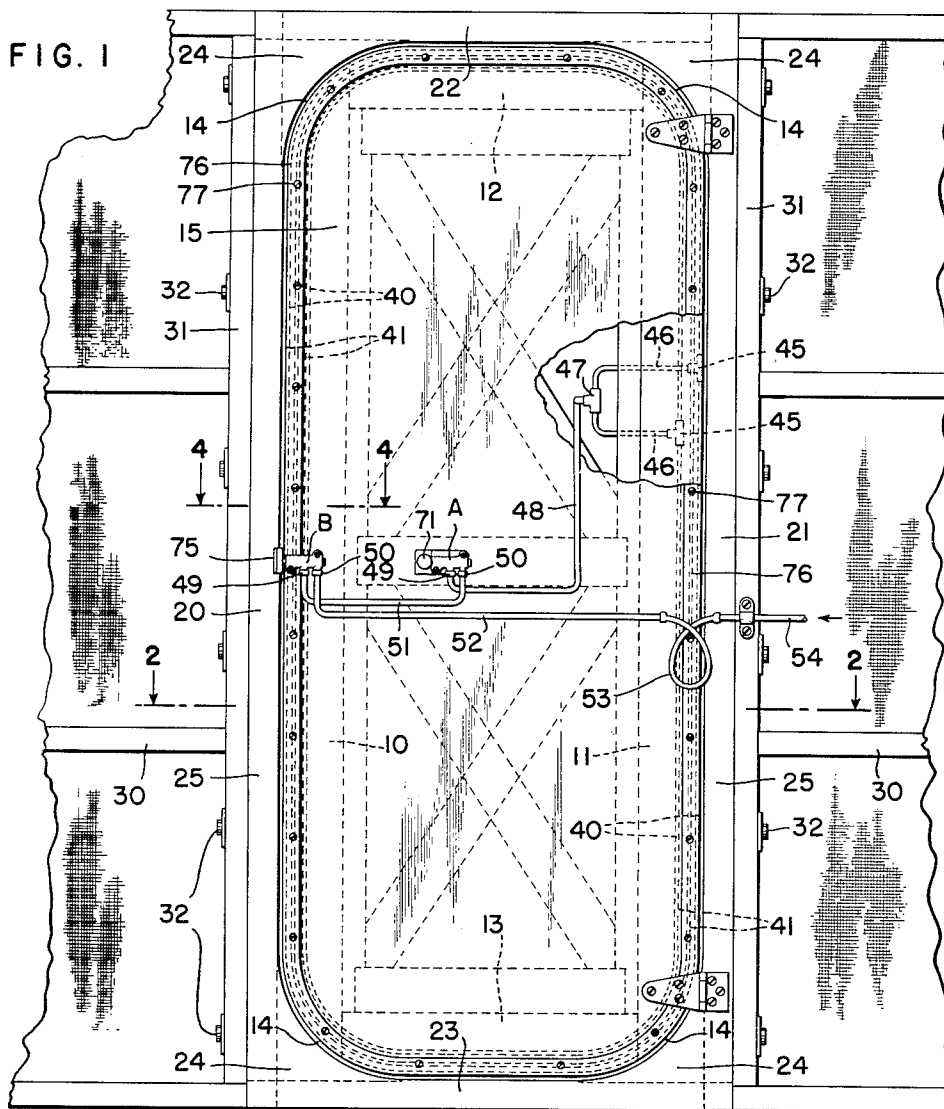


FIG. 4

INVENTOR.
WILLIAM M. DUNN

BY

James C. Hobensmith
ATTORNEY.

July 31, 1956

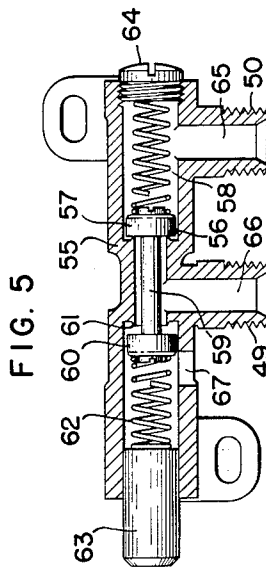
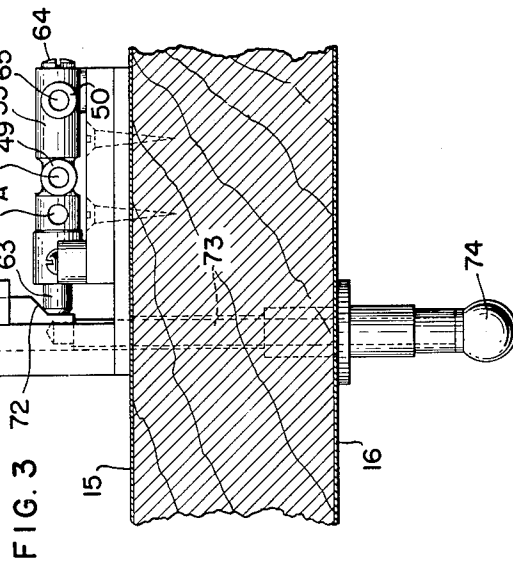
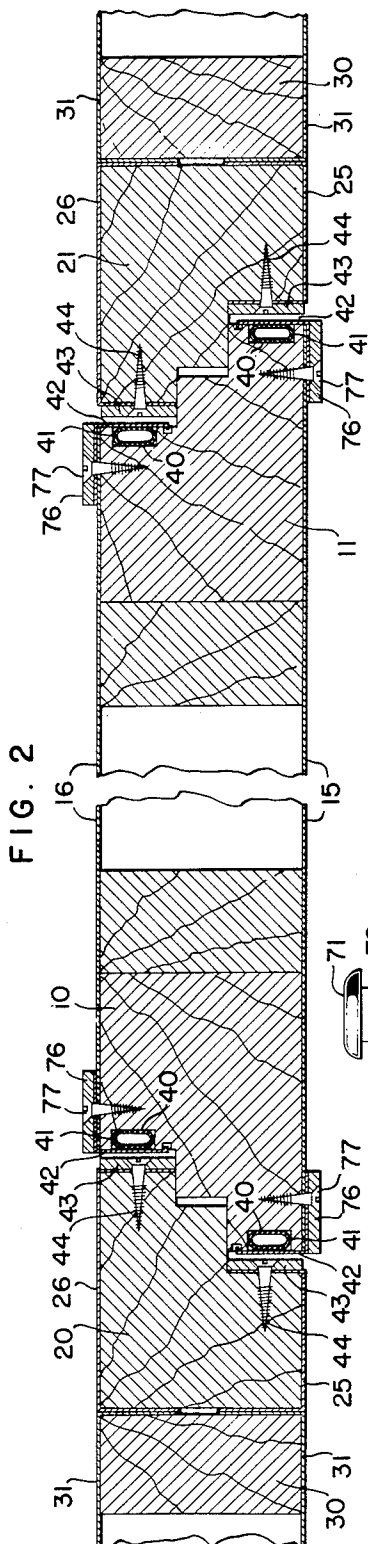
W. M. DUNN

2,757,225

DOORS FOR RADIO SHIELDED ENCLOSURES

Filed Dec. 24, 1952

2 Sheets-Sheet 2



1

2

2,757,225

DOORS FOR RADIO SHIELDED ENCLOSURES

William M. Dunn, Philadelphia, Pa., assignor to Ace Engineering & Machine Co., Inc., Philadelphia, Pa., a corporation of Pennsylvania

Application December 24, 1952, Serial No. 327,871

7 Claims. (Cl. 174—35)

This invention relates to doors for radio shielded enclosures and it relates more particularly to the means in connection with such doors for preventing wave leakage through the cracks between the edges of the door and the frame in which the door is mounted.

Heretofore radio shielded rooms have been provided with doors having pneumatically operated means for closing the cracks around the edges of the door against the leakage of electronic waves therethrough, but the control of the application of the pneumatic pressure was such that it was possible to inadvertently apply the pressure when the door was open and thereby cause damage to the contact making members, either directly, or when an attempt was subsequently made to close the door with the pressure so applied.

The principal object of the present invention is to provide means for controlling the application of pneumatic fluid pressure to the elastic tubing, provided around the edges of the door, which serves to press the contact members carried by the door into contact with the complementary contact members carried by the door frame, the arrangement being such that the pressure cannot be applied when the door is in the open position, whereby distortion and damage to the contact members upon attempts to close the door when the pressure is so applied will be effectively prevented.

A further object of the present invention is to provide means for controlling the application of fluid pressure to effect contact between contact members around the periphery of the door of a radio shielded enclosure which is so constructed and arranged that the pressure will be automatically relieved in the event of the door being inadvertently opened.

A further object of the present invention is to provide means for controlling the application of fluid pressure, to effect contact between contact members around the periphery of the door of a radio shielded enclosure which will be simple and efficient, and in the use of which a minimum of attention on the part of the operator will be required.

The nature and characteristic features of the present invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part hereof, in which:

Figure 1 is a front elevation of a door structure, for a radio shielded enclosure, embodying the main features of the present invention;

Fig. 2 is an enlarged horizontal section, taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional detail view, also enlarged, illustrating a preferred arrangement for the manual operation of one of the valves used for controlling the admission and release of the fluid pressure employed in the device;

Fig. 4 is a fragmentary sectional detail view, also enlarged, illustrating a preferred arrangement for the automatic operation of another of the valves used for controlling the admission and release of the fluid pressure, the section being taken on the line 4—4 of Fig. 1; and

Fig. 5 is a longitudinal sectional view, further enlarged, of one of the control valves illustrating the internal construction and arrangement thereof.

It should, of course, be understood that the description and drawings herein are illustrative merely and that various modifications and changes may be made in the structure disclosed without departing from the spirit of the invention.

Referring to the drawings, in the particular embodiment of the invention therein shown, the door proper comprises a suitable structure, the members 10 and 11 at the sides and the members 12 and 13 at the top and bottom of which are so shaped at their ends as to provide the door with rounded corners as at 14. The frame work 10 of the door is covered on both faces with sheet metal, and one of said sheet metal faces 15 is usually made of copper and the other 16 is made of ferrous metal whereby both the electrical and the magnetic waves will be intercepted.

The side members 10 and 11 and the top and bottom members 12 and 13 of the door structure are also shaped in cross-section whereby there is provided a series of step-like ledges extending entirely around the door.

The door frame preferably comprises upright members 20 and 21 at the sides, horizontal members 22 and 23 at the top and bottom, respectively, and filler members 24 at the corners. The inner faces of said members 22, 23 and 24 are shaped complementary to the step formation of the pieces at the sides and top and bottom edges of the door.

The inside and outside faces of the door frame members are also covered with sheets of metal 25 and 26, respectively, and the shielded enclosure in which the door is used may be of the usual form of frame work panels 30 covered by metallic screening or sheets 31 secured to frame-work of said panels. The panels adjacent the door may be secured to the door frame members 20 and 21 by bolts 32 or other suitable fastening means.

The outermost step portion of the door proper is provided with a recess 40 in which an elastic tube 41 is positioned. Said tube 41 extends entirely around the periphery of the door, likewise the side and top and bottom members of the door are provided at the lowest step of the edge thereof with another recess 40 in which another elastic tube 41 is positioned, also extending entirely around the periphery of the door structure.

Extending across the recesses 40, in which the elastic tubes 41 are positioned, are contact members 42 made of thin flexible sheet metal which are bent around and over the material which forms the shield on the inner and outer faces of the door, being securely held against the same by metallic strips 43 which extend around adjacent the edge of the door, being secured in place by suitable screws 44.

Each of the elastic tubes 41 has its ends connected to a T-joint 45 at the end of one of the pipes 46. The pipes 46 in turn are connected to a T-joint 47 at the end of a pipe 48. The pipe 48 is connected to the outlet nipple 49 of a valve A, the internal construction and manner of operation which will be hereinafter described.

The inlet nipple 50 of the valve A is connected by a pipe 51 to the outlet nipple 49 of the valve B substantially similar to valve A.

The inlet nipple 50 of the valve B is connected to pipe 52 which is connected, by means of a flexible hose 53, with a pressure supply pipe 54 secured to a stationary part of the structure as, for example, the upright member of the door frame on the hinge side of the door.

The internal arrangement of the valves A and B is shown more specifically in Fig. 5 of the drawings, and comprises in each instance, a housing 55 having an internal valve seat 56 upon which, in the normal or closed position when the door is open, a valve member 57 is seated,

said valve member 57 being impelled to the closed position by means of a spring 58.

The valve member 57 is connected by a stem 59 to another valve member 60 which, when the valve is in the inert position, is raised from its seat 61, but which is adapted to be impelled to a closed position by means of a spring 62 which is interposed between the inner end of a plunger 63 and the valve member 60 at the end of the housing in which the plunger 63 is located. The other end of the housing is closed by means of a member 64 threaded therein which also serves to provide a bearing for the end of the spring 58, the other end of which bears against the valve 57. The spring 62 is of such strength as to overcome the spring 58 and thus shift the valve members when the plunger 63 is pushed inwardly.

The inlet nipple 50 of each valve has a passageway 65 communicating with the end of the housing between the valve member 57 and the threaded closure member 64.

The outlet nipple 49 of each valve is likewise provided was a passageway 66 which communicates with the interior of the housing 55 between the valve seats 56 and 61. The interior of the housing 55, between the valve seat 61 and the place therein in which the plunger 63 is positioned, is provided with an exhaust port 67, the foregoing arrangement being such that, whenever the valve member 57 is in the closed position, the air under pressure which is used to inflate the elastic tubes is prevented from flowing through the valve.

When, however, the plunger 63 is actuated the valve members 57 and 60 will be shifted to prevent the air from flowing through the exhaust port 67, and at the same time permitting the air under pressure to flow past the valve seat 56 and through the passageway 66 of the outlet nipple 49 to the particular pipe which is connected thereto.

The valve A which is mounted upon the door, preferably on the outer face and intermediate the sides thereof, is adapted to be manually actuated by means of a push bar 70 having a handle 71 on the outer end thereof, and provided on its shank with an inclined surface 72 which is adapted, when the handle member is pushed inwardly to push the plunger 63 into the casing of the valve A, and thus permit the air, by reason of the automatic operation of the valve B, to flow from pipe 51 to pipe 48; thence through T 47 to pipes 46 and thence through T's 45 to the respective tubes 41.

The push bar 70 having the inclined surface 72 for the actuation of the plunger 63 of the valve A is adapted to be actuated from the inside of the door by means of a rod 73 extending through the door and having a handle 74 on the innermost end thereof, which is adapted to be grasped by a person within the enclosure for the manual actuation of the valve A when required.

The control of the valve B is automatic in that the plunger 63 of the same is actuated by an inclined striker plate 75 which is secured to the vertical side member 20 of the door frame structure.

Each face of the door may be mechanically and electrically reinforced by a metallic strip 76 extending entirely around the edge and secured to the door by screws 77.

The operation of the device should now be readily understood.

When the door is in the open position and air or other fluid under pressure is supplied by means of the pipe 54 through the flexible hose 53 and pipe 52 to the inlet end of the valve B located at the edge of the door, this valve always being closed when the door is open, the air will not be permitted to flow any further than the valve B until the door is closed.

Upon the closing of the door, the valve B will be actuated by means of the plunger 63 thereof encountering the inclined striker plate 75, so that, as the door is brought to the fully closed position, the plunger 63 will be shifted and thus through the intermediary of the spring 62 will cause the valve members 57 and 60 to be shifted, which

will operate to close the exhaust port 67 and at the same time permit the air under pressure to flow past the valve member 57, which now has been moved from its seat. The air will then flow through the passageway 66 to the outlet nipple 49 of the valve B to the pipe 51 and thence to the valve member 57 at the inlet end of the valve A.

When, however, the push bar 70 is manually actuated to cause the plunger 63 of the valve A to move inwardly, the valve member 57 of said valve A will be moved from its seat and the actuating fluid permitted to flow past same through the passageway 66 of the outlet nipple 49 to the pipe 48; thence through the T 47 to the pipes 46, then through the respective T's through the elastic tubes 41 which are seated in the recesses 40 which extend entirely around the periphery of the door.

When the elastic tubes are thus inflated the contact members 42 which extend over the same will be pushed outwardly until the same contact with the complementary contact strips 43 carried by the door frame which are electrically grounded through the shielding plates 25 and 26 on the inner and outer faces of the door frame.

By the foregoing arrangement, the passage of stray waves of an electric or magnetic character, through the crack which is necessarily provided around the edges of the door, will be effectively prevented.

I claim:

1. In a door structure for radio shielded enclosures in which a contact member is provided around the periphery of the door, and a complementary contact member around the door frame, and in which pneumatic means including an elastic tube are used for causing one of said contact members to engage the other when fluid pressure is applied to said elastic tube to distend the same, the means for controlling the application of fluid under pressure to said elastic tube which comprises the provision of a supply pipe line, a valve in said pipe line automatically operated to open position by the closing of the door and to closed position by the opening of the door, and an independent manually operated valve in said pipe line, each of said valves being adapted when closed to prevent the flow of fluid under pressure to the elastic tube, and each adapted when closed to exhaust the fluid from the elastic tube.

2. In a door structure for radio shielded enclosures in which a contact member is provided around the periphery of the door, and a complementary contact member around the door frame, and in which pneumatic means including an elastic tube are used for causing one of said contact members to engage the other when fluid pressure is applied to said elastic tube to distend the same, the means for controlling the application of fluid under pressure to said elastic tube which comprises the provision of a supply pipe line, a valve in said pipe line automatically operated to open position by the closing of the door and to closed position by the opening of the door, and an independent manually operated valve in said pipe line.

3. In a door structure for radio shielded enclosures in which a contact member is provided around the periphery of the door, and a complementary contact member around the door frame, and in which pneumatic means including an elastic tube are used for causing one of said contact members to engage the other when fluid pressure is applied to said elastic tube to distend the same, the means for controlling the application of fluid under pressure to said elastic tube which comprises the provision of a supply pipe line, a valve in said pipe line automatically operated to open position by the closing of the door and to closed position by the opening of the door, and an independent manually operated valve in said pipe line, each of said valves being separately adapted to control the flow of fluid under pressure to the elastic tube and to exhaust the fluid from the elastic tube.

4. In a door structure for radio shielded enclosures in which a contact member is provided around the periphery of the door, and a complementary contact member around

5

the door frame, and in which pneumatic means including an elastic tube are used for causing one of said contact members to engage the other when fluid pressure is applied to said elastic tube to distend the same, the means for controlling the application of fluid under pressure to said elastic tube which comprises the provision of a supply pipe line, a normally closed valve in said pipe line adapted to be automatically operated to permit the fluid to pass said valve when the door is closed, and a manually operated valve in said pipe line.

5. In a door structure for radio shielded enclosures in which a contact member is provided around the periphery of the door, and a complemental contact member around the door frame, and in which pneumatic means including an elastic tube are used for causing one of said contact members to engage the other when fluid pressure is applied to said elastic tube to distend the same, the means for controlling the application of fluid under pressure to said elastic tube which comprises the provision of a supply pipe line, a normally closed valve in said pipe line adapted to be automatically operated to permit the fluid to pass said valve when the door is closed, and a manually operated valve in said pipe line, each of said valves being separately adapted when closed to exhaust the fluid from the elastic tube.

6. In a door structure for radio shielded enclosures in which a contact member is provided around the periphery of the door, and a complemental contact member around the door frame, and in which pneumatic means including

6

an elastic tube are used for causing one of said contact members to engage the other when fluid pressure is applied to said elastic tube to distend the same, the means for controlling the application of fluid under pressure to said elastic tube which comprises the provision of a supply pipe line, a normally closed valve in said pipe line adapted to be automatically operated to permit the fluid to pass said valve when the door is closed, and a manually operated valve disposed in said pipe line between the automatically operated valve and the elastic tube.

7. In a door structure for radio shielded enclosures in which a contact member is provided around the periphery of the door, and a complemental contact member around the door frame, and in which pneumatic means including an elastic tube for causing one of said contact members to engage the other when fluid pressure is applied to said elastic tube to distend the same, the means for controlling the application of fluid under pressure to said elastic tube which comprises the provision of a supply pipe line, a normally closed valve in said pipe line adapted to be automatically operated to permit the fluid to pass said valve when the door is closed, and a manually operated valve disposed in said pipe line between the automatically operated valve and the elastic tube, each of said valves being separately adapted when closed to exhaust the fluid from the elastic tube.

No references cited.