Oct. 30, 1962 M. J. KODARAS 3,061,056

LOUVERED DOOR

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FIG. 1

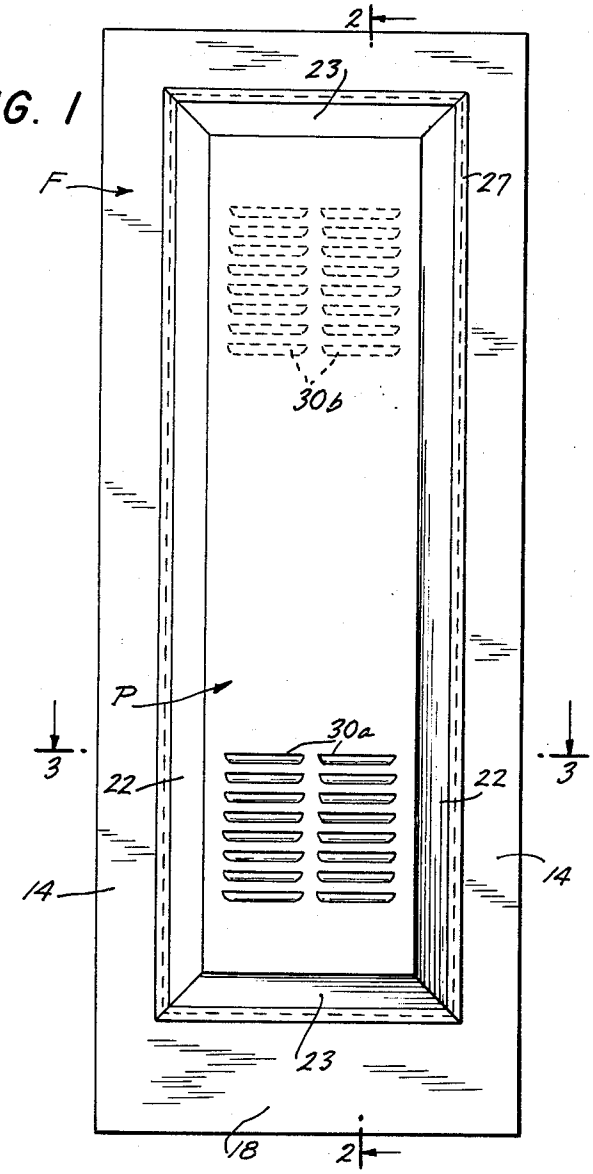


FIG. 2

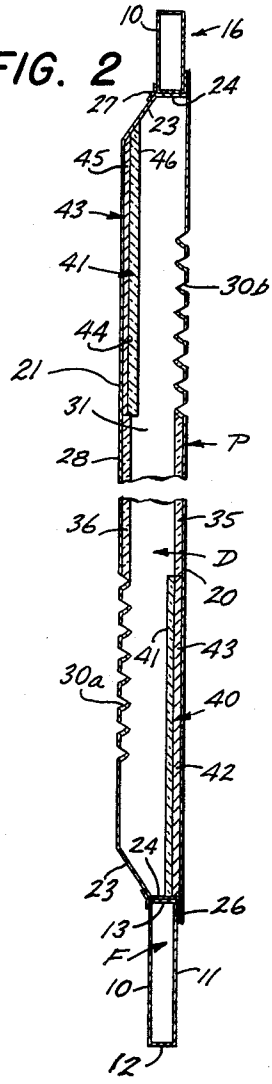


FIG. 3

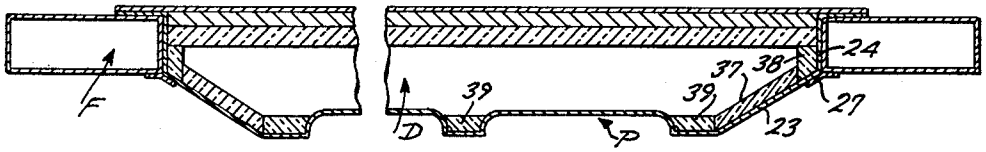
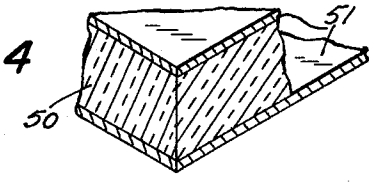


FIG. 4



INVENTOR.
MICHAEL J. KODARAS

BY

Dean, Fairbank & Hirsch
ATTORNEYS

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LOUVERED DOOR

Michael J. Kodaras, Scarsdale, N.Y., assignor to Elof Hansson, Inc., a corporation of New York

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9 Claims. (Cl. 189—46)

The present invention relates to louvered doors, more especially for air conditioned or ventilated premises.

It is among the objects of the invention to provide a door of the above character, suitable for office buildings, hospitals, hotels, dwelling houses and like premises, as well as for telephone booths and the like, which limits the escape of sound through the louvers, at least to the same extent as effected at the cracks of the door gasketing and drop-seal of the door itself, sound insulation so adequate as to render the door sufficiently sound proof to assure privacy of speech and to avoid annoyance outside of the room from the clatter of type-writing machines operated therein, or to muffle if not prevent the escape of other noises without detracting from the substantially free flow of air propelled through the louvers; without detracting from or modifying the conventional appearance of a louvered door and without resort to any inflammable materials.

According to the invention, the conventional general construction of louvered doors is used, but the passage of intelligible speech or objectionable sounds through the louvers of the door is substantially precluded by supplementing the sound absorbing air duct liner portion at that portion of the face of the door panel directly opposed to the set of open louvers which faces the inside of the room with a sound barrier backing of preferably fire resistant, dense, impervious material.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

FIG. 1 is a face view of a door according to the present invention;

FIG. 2 is a view in longitudinal cross section taken on line 2—2 of FIG. 1;

FIG. 3 is a view in transverse cross section taken along line 3—3 of FIG. 2; and

FIG. 4 is a perspective view of a piece of the gypsum board element, with parts broken away.

Referring now to the drawings, the louvered door may comprise an outer hollow rectangular frame F which is rectangular in cross section, each cross sectional area comprising face walls 10 and 11 and end walls 12 and 13. The frame comprises two upright elements 14, 14, a similar transverse bottom element 15 and a transverse top element 16, each of the cross section construction described. Ordinarily each element 14, 14, 15 and 16 of the frame is made of a unitary sheet of suitable metal, usually sheet steel, bent to the rectangular form indicated, the end 26 of the sheet being welded to face 11. As the structure of the hollow frame is quite conventional, it need not be further described. The hollow frame F has mounted thereon the usual standard finishing hardware (not shown).

Assembled into the rectangular opening of the frame and protruding outwardly therefrom, at least at one side of the door, generally from one face only thereof, is a center panel P, usually of about twice the thickness of the frame F. This center panel, like the frame, is hollow and like the frame, except for the acoustic liner hereinafter described, is made of sheet metal, usually sheet steel.

The main panel structure, which itself is substantially conventional, may comprise a rectangular base plate 20 and a rectangular cover plate 21, which is parallel to plate 20 along the major portion of its length and width.

The cover plate 21 has a peripheral beveled flange 23 and a peripheral extension flange 24 extending forward from the outer edge of flange 23 at right angles to base plate 20 to near the corresponding edges of said plate 20 and resting upon the base plate 20. A peripheral flange 26 is turned horizontally outward from the edge of extension flange 24, is in face-to-face engagement with the peripheral area of plate 20 and is welded or soldered thereto. The beveled flange 23 of the cover plate 21 extends at an obtuse angle to the face 10 of the frame and is welded thereto as for instance by obtuse angle plate 27.

A set of conventional louvers 30*a* is provided near the bottom of the cover plate 21 of the panel P, and a similar set of louvers 30*b* near the top of the base plate 20 of the panel P. As is conventional, the sets of louvers 30*a* and 30*b* are at a distance usually about one foot from the inner edge of the top and bottom frame portions 15 and 16 respectively.

The center panel is hollow for substantially the entire length and width thereof to form an air flow duct D between the two sets of louvers. The air duct D formed by the hollow panel between and desirably beyond the two sets of louvers 30*a* and 30*b* is acoustically lined for sound insulation preferably at all portions other than the louvers. That acoustic lining is of sound absorptive material, preferably of fiber glass or rock wool, which are substantially non-inflammable. A section of the sound absorptive lining is shown at 35 covering the length and width of the base sheet 20 of the center panel from the lower end of the set of louvers 30*b* to a point substantially directly opposite the upper end of the set of louvers 30*a* in the cover plate 21 of the center panel. A similar sound absorptive lining is shown at 36, covering the length and width of the cover plate 21 of the center panel from the end of the set of louvers 30*a* in the cover plate 21 of the center panel, to substantially directly opposite the upper end of the set of louvers 30*b* in base plate 20 of the center panel.

Sound absorptive lining 37 of similar material as 35 and 36 desirably covers the beveled area 23 at the sides of the center panel P, and the corresponding extension flange 24 is similarly covered at 38. Similarly sound absorptive liner 39 may cover the area between and laterally of the two desirably laterally spaced louver sections $30a^1$ and $30a^2$, etc. as shown.

Beyond the section 35 of sound absorbing liner of base plate 20 of the center panel, there is a composite liner section 40 made up of a sound absorbing liner layer 41, similar to section 35, with a sound barrier backing 42, desirably cemented thereto in face-to-face relation. The sound barrier backing is of dense, fire resistant, sound impervious, sound reflecting material. For this purpose gypsum board is to be preferred. The sound barrier backing layer preferably of gypsum board is desirably of mass at least three times the mass of the metal omitted at the set of louvers opposed thereto. As shown in perspective in FIG. 4, gypsum board consist of a panel 50 of gypsum that may be ½ inch thick and a sandwiched between two sheets of thick fire proof fiber board 51 cemented to its opposite faces.

While the composite section 40, which consists of the outer layer 42 of gypsum board, which is in contact with plate 20 of the center panel and the inner layer 41 of fiber glass cemented thereto, may extend only for that part of the length of the inner panel that corresponds to the opposed set of louvers 30*a*, it is preferable, as shown, to have it extend from the end of liner 35 clear to the extremity of the center panel, even though much of the area at the blind pocket beyond the louvers 30*a* is of little or no sound absorbing or sound barrier utility in operation.

Similarly, beyond the section **36** of the sound absorbing liner of cover plate **21** of the center panel, there is a liner section **43** made up of a sound absorbing layer **44**, similar to section **36**, but here, as in section **40**, section **43** has a sound barrier backing **45** cemented to layer **44** to form the composite liner section **43**. The outer end of the composite liner section **43** may be beveled at the end as at **46**, to engage the bevel flange **23** of the panel cover plate **21**. Alternatively, as in the case of composite liner section **40**, the composite liner section **43** of sound absorbing and sound barrier material may, if desired, extend only from the end of section **36** for the length of the air transfer duct wall portion that corresponds to the length of the louver portion **30***b*.

The cross sectional area of the air transfer duct acoustically lined and the combined area of each set of louvers, that is the louvers at the inside surface of the door and those at its ouside surface, are preferably substantially equal, so that there is no reduction or expansion of the cross sectional area of flow of the air as it passes through one set of louvers into the acoustically lined air transfer duct, along that duct or from the duct, to leave the room by way of the other set of louvers.

For the usual installation, the sound absorbent material of fiber glass for instance, may be of a thickness in the order of ½ inch. For installations where the escape of the lound noise of heavy mechinery is to be barred or greatly reduced, the fiber glass or rock wool liner may be of a thickness in the order of one inch or more.

In operation, much of the sound that would otherwise escape from the room, say through the set of louvers **30***a*, is reflected back to the room by the backing layer **45** of dense, impervious gypsum board opposite the set of louvers **30***b*. Accordingly, the fiber glass or rock wool liner material, including elements **44**, **35**, **36**, **41**, **37**, **38** and **39** of the acoustically lined air transfer duct effectively absorbs the sound (much of which as noted is reflected back into the room), so that the air escaping from the room through the set of louvers **30***a* carries a relatively negligible volume of sound, not sufficient to render even loud speech within the room intelligible if audible at all, either in the adjoining room or corridor, thereby assuring privacy. Similarly, the louver door is effective substantially to eliminate the escape through the door of objectionable clatter of typewriting machines within the room.

By the construction shown and described, there is provided a louvered door for ventilated premises, the cost of which is but little more than that of conventional louvered doors, but which in addition to being thoroughly incombustible, has the additional utility of being to all intents and purposes, sound proof.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A substantially sound proof louvered door for ventilated premises, said door comprising an outer frame having the usual standard finishing hardware, a center panel of metal mounted in said frame, of greater thickness than the frame, having a set of louvers in one face thereof and a similar set of louvers in the opposite face thereof, the sets of louvers in the two faces of the center panel being one near the top of the panel and the other near the bottom of the panel, said panel being hollow to afford a substantially unobstructed air transfer duct therein between the two sets of louvers, fire resistant sound absorbing material lining at least those portions of the duct between and those opposed to the louvers, but free of the louvers themselves, those portions of the air transfer duct wall directly opposed to the louvers on that face of the panel which faces the room, having a layer of dense, sound-impervious, fire resistant, sound reflecting, non-metallic material, interposed between the sound absorbing layer thereat and the corresponding wall portion of the air transfer duct.

2. A substantially sound proof louvered door for ventilated premises, said door comprising an outer hollow sheet metal frame, a thicker hollow center sheet metal panel within said frame, comprising a sheet metal base plate and a sheet metal cover plate assembled thereto, having the periphery thereof secured to the frame, the plates of said panel having a series of louvers near the upper end of one and near the lower end of the other, the plates defining a substantially unobstructed duct therebetween, a liner of fire resistant, sound absorbing material, but leaving uncovered at least the various louvers, that portion of the sound absorbing material registering with the area opposed to the louvered area of each panel face having at the outer face thereof a sound barrier layer of dense, sound-impervious, sound reflecting, non-metallic material which intervenes between the sound absorbing liner portion opposed to the louvers and the corresponding plate of the center sheet metal panel.

3. The combination recited in claim 2 in which the cross sectional area of the sound duct between the louvers near the top and those near the bottom of the door is substantially equal to the combined area of the louvers of each of said two sets of louvers.

4. The combination recited in claim 2 in which the sound insulation material is selected from the group consisting of fiber glass and rock wool.

5. The combination recited in claim 2 in which the sound barrier layer is of gypsum board.

6. A substantially sound proof louvered door for ventilated premises, said door comprising an outer hollow sheet metal frame, a thicker hollow center sheet metal panel, said panel comprising a sheet metal base plate and a sheet metal cover plate assembled thereto, the periphery of said panel being secured in place within the sheet metal frame, the plates of said panel having a series of louvers near the upper end of one and near the lower end of the other, the plates defining a substantially unobstructed duct therebetween of nearly the length and width of the panel, a liner of fire resistant, sound absorbing material covering that portion of the duct between the two sets of louvers, two sound barrier comprising sound-impervious, sound reflecting, non-metallic layers of dense, material covering those portions of the duct which are directly opposed to the respective regions of the sets of louvers, and liner of fire resistant, sound absorbing material covering at least the remaining portions of the duct other than the sets of louvers.

7. The combination recited in claim 6 in which the sound barrier layers are of gypsum board, directly bonded to the wall of the air transfer duct and each of said sound barrier layers has bonded thereto a liner layer of fire resistant, sound absorbing material.

8. The combination recited in claim 7 in which each layer of gypsum board and its superposed layer of sound absorbing material extends not only the length of the panel opposed to the respective sets of louvers, but therebeyond to the proximate end of the panel.

9. As an article of manufacture, an acoustically lined center panel for a substantially fireproof, substantially sound proof door for ventilated premises, said panel comprising a wall structure consisting of a pair of parallel plates of metal, one of said plates having louvers therethrough near one end of the panel and the other of said plates having similar louvers therethrough near the other end of the panel, one of said plates having a beveled rim and having a peripheral extension flange at right angles to the plates, engaging the companion plate and secured

thereto, said plates affording a substantially unobstructed air transfer duct therebetween, fire resistant sound absorbing liner material covering much of the inner face of the component plates of the panel, but leaving exposed the louvers, that portion of each of the metal plates of the panel, which is opposed to the louvered region of the other plate, having in addition to the sound absorbent liner, a sound barrier sound reflecting and sound-impervious layer of gypsum board on the outer face thereof, intervening between the sound absorbent liner and the panel wall.

References Cited in the file of this patent

UNITED STATES PATENTS

2,037,369	Eager et al.	Apr. 14, 1936
2,328,761	Wamnes et al.	Sept. 1, 1943
2,620,521	Fleet	Dec. 9, 1952
2,871,056	Levitt	Jan. 27, 1959