March 24, 1964 R. LAPOF 3,126,050

FOLDING PARTITIONS AND SEAL THEREFOR

Original Filed Feb. 5, 1960 6 Sheets-Sheet 1

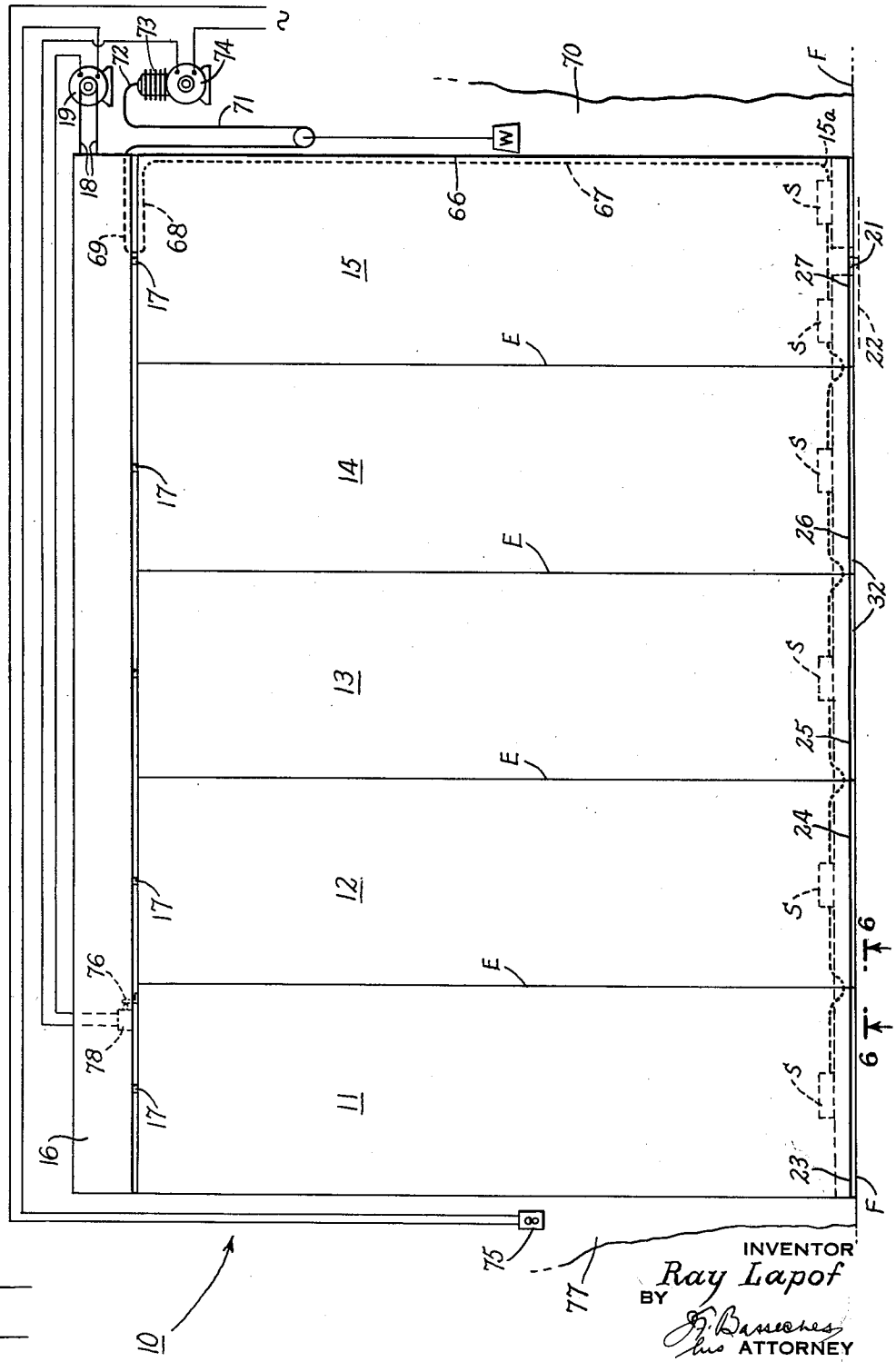


FIG 1

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Fig. 2

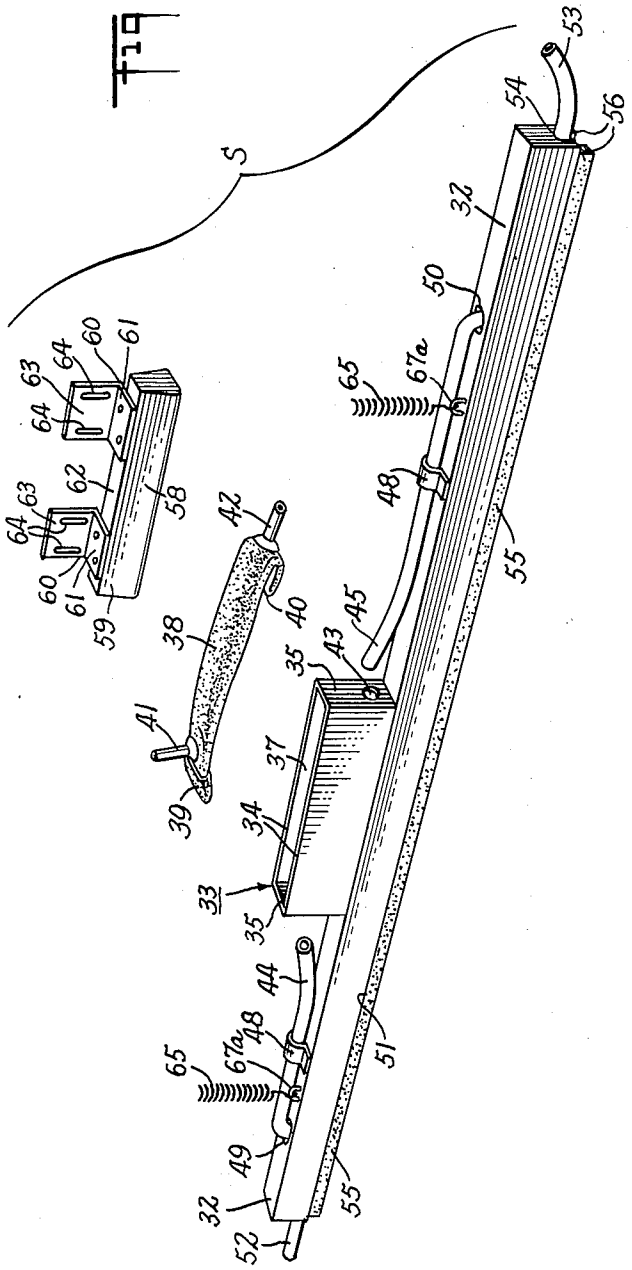
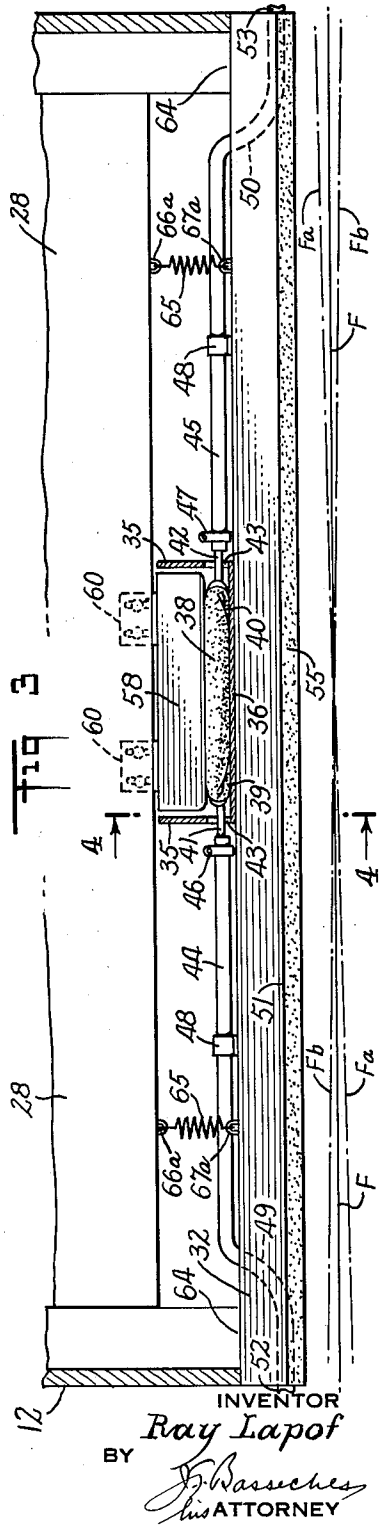


Fig. 3



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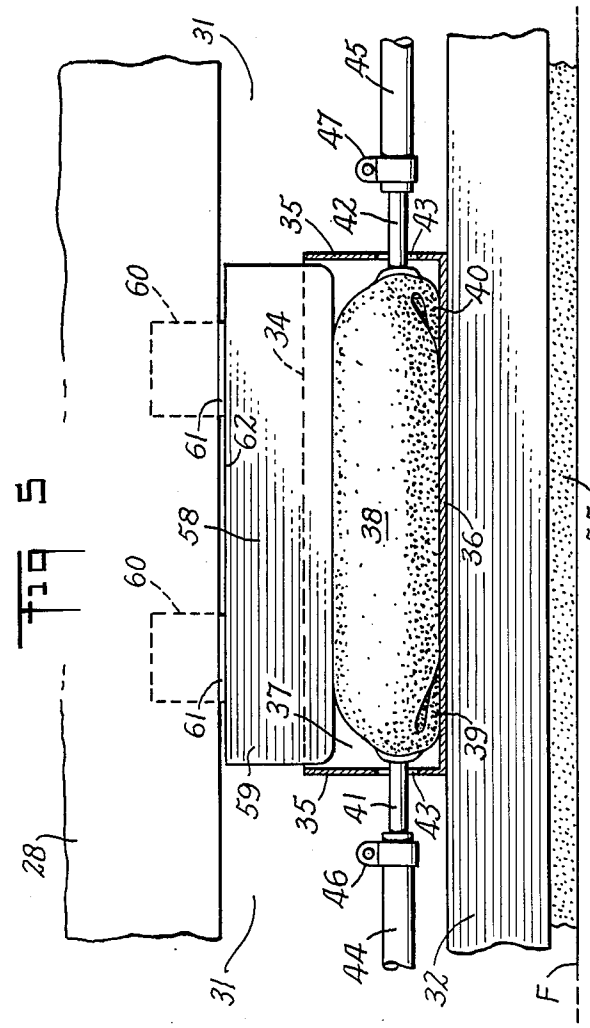


Fig. 5

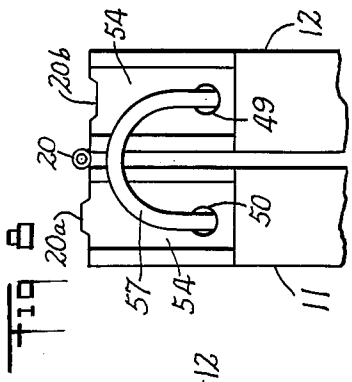


Fig. 8

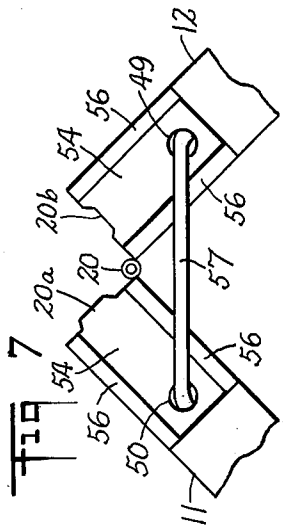


Fig. 7

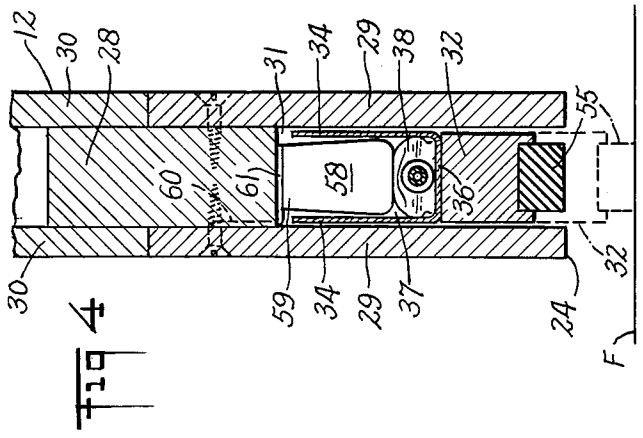


Fig. 4

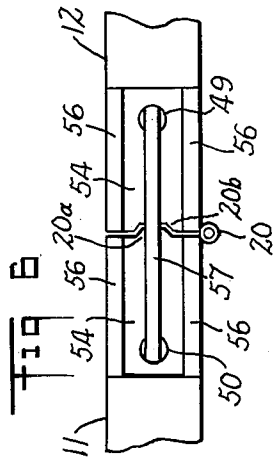


Fig. 6

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Fig 9

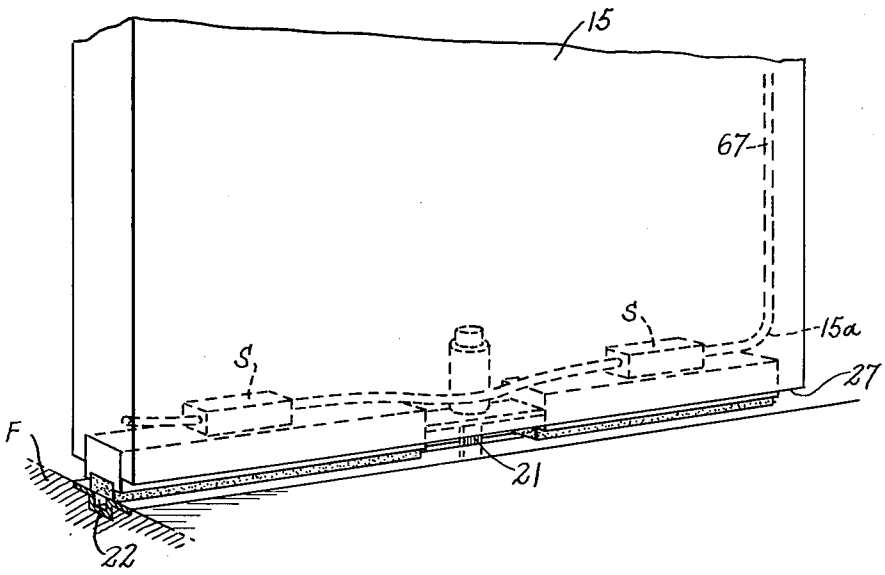
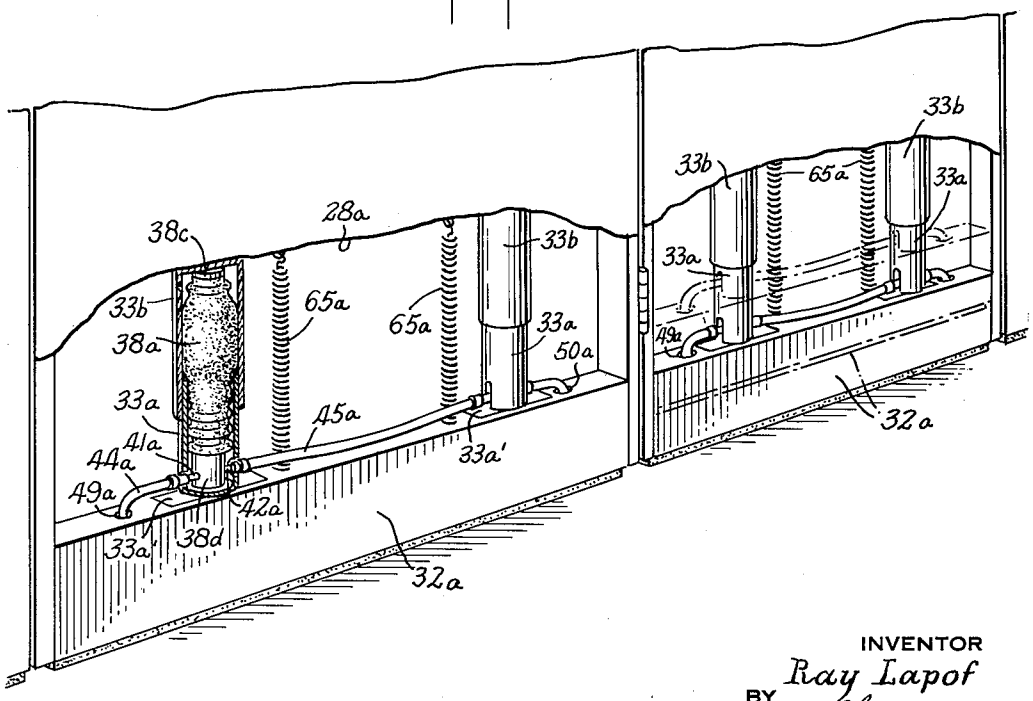


Fig 12



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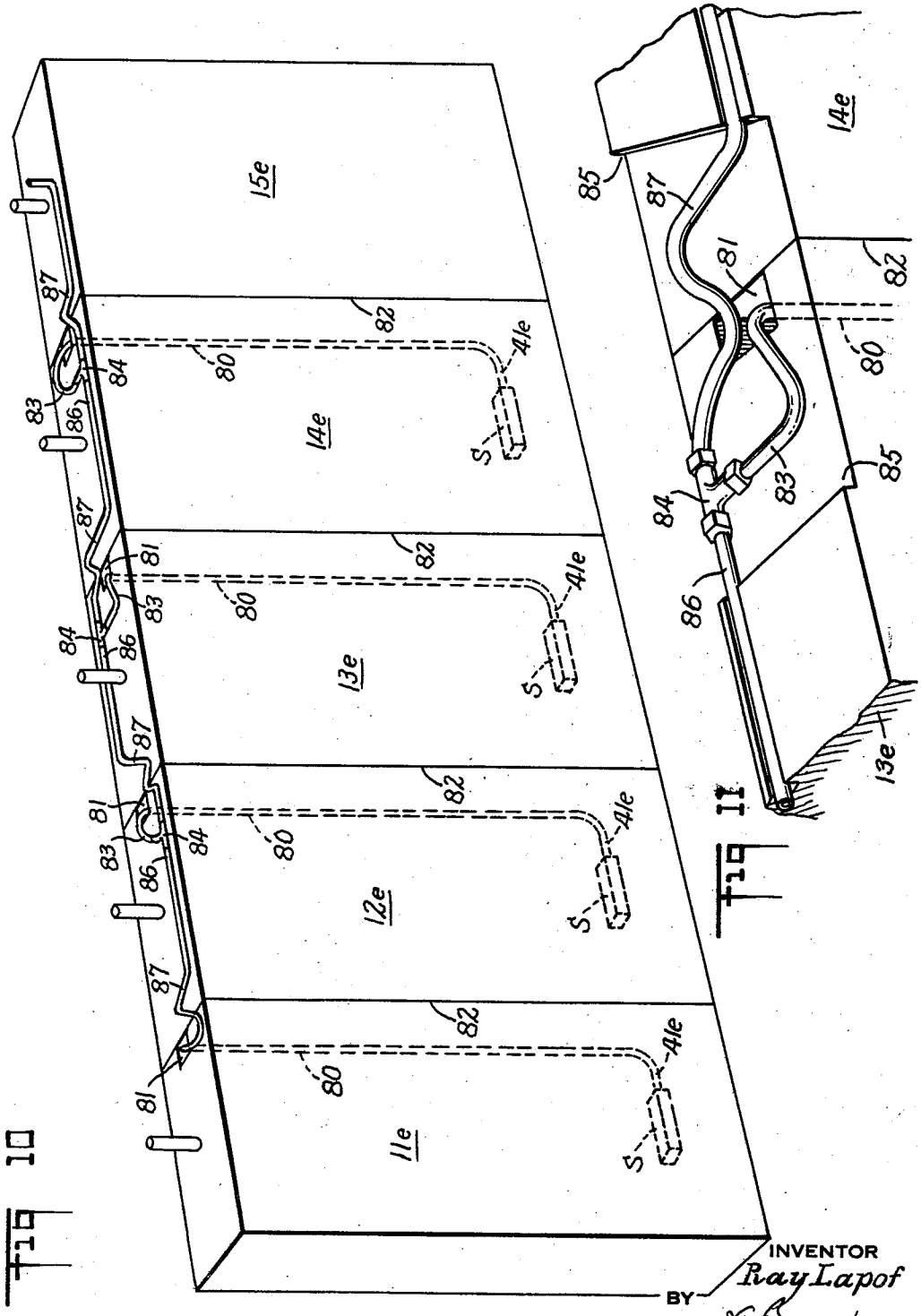


FIG 10

FIG 11

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Fig 13

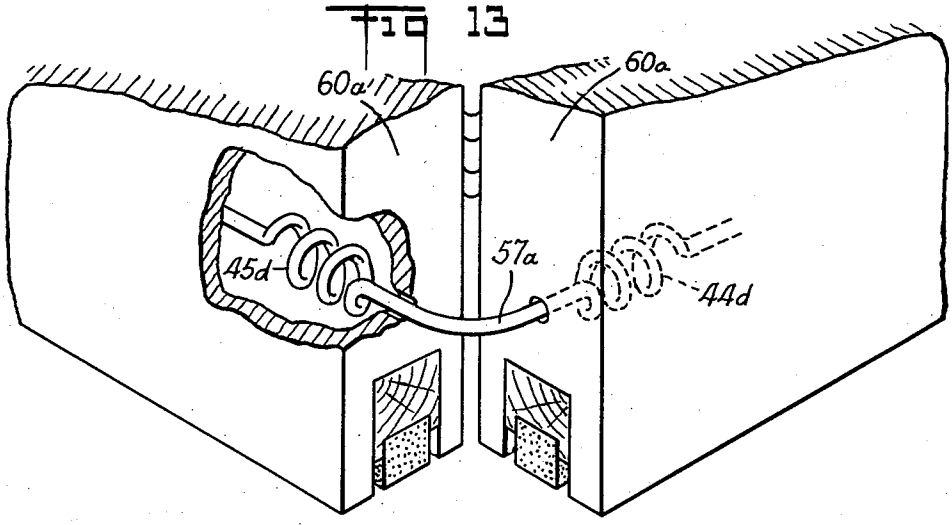


Fig 14

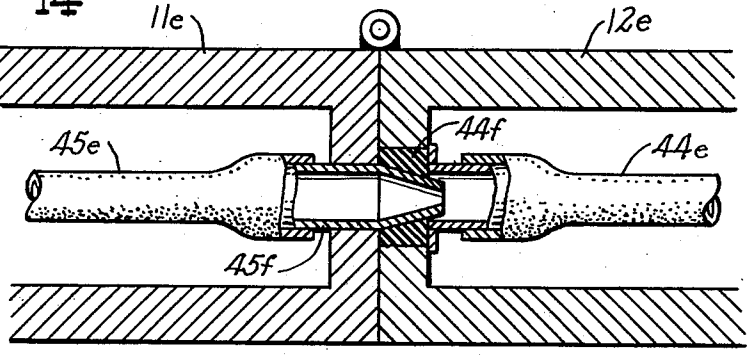
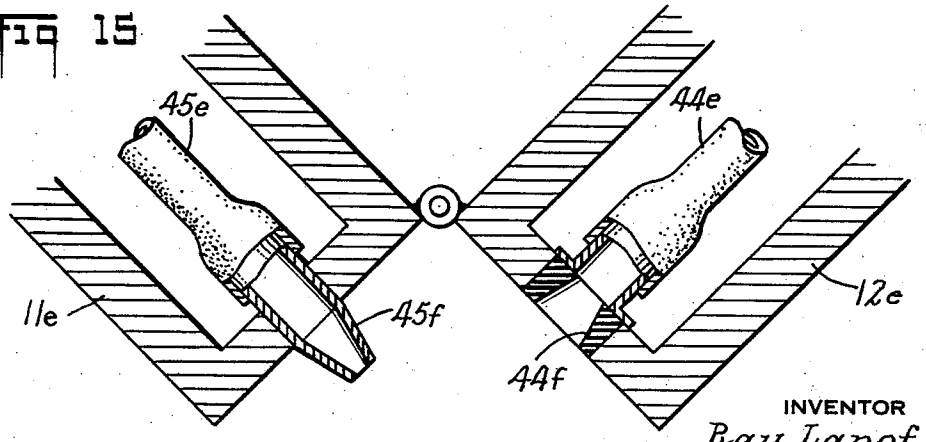


Fig 15



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United States Patent Office 3,126,050 Patented Mar. 24, 1964

3,126,050

FOLDING PARTITIONS AND SEAL THEREFOR

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Continuation of abandoned application Ser. No. 6,963, Feb. 5, 1960. This application July 16, 1962, Ser No. 212,185

2 Claims. (Cl. 160—40)

This invention relates to folding partitions and more particularly to folding partitions having floor seals combined therewith, and still more particularly to floor seals for folding partitions.

Known to me are the efforts heretofore made in the installation of folding partitions for subdividing gymnasiums, auditoriums, banquet halls, and other large rooms by massive sound-proof and heat insulating folding partitions, which are slidingly suspended from a guide track, particularly those which have long and extensive expanse, which are supported from roof supporting beams and are powerized for operation by reason of their great weight and numerous door panel units. Because of the extensiveness of these beam lengths and of the floor, each is subject to level variance of large magnitude occasioned by many factors that are not always attributable to poor craftsmanship, but include displacement changes and deflection due to changing load and other factors in the supporting structure, as well as the multi-panel partition elements. These variations have brought into play many ineffectual and expensive attempts to compensate for the disalignment or misalignment of the meeting edges of partition and floor by bodily release after lifting the great weight of the partition, and/or providing floor seals which have been projected at the floor edge of the panels when extended against the floor and are articulated by each other into floor sealing engagement.

I have found that prior seals which coordinate the operation of the floor seals for the door panels with each other by reason of the mechanical and interdependent coupling of the panels with each other, do not have sufficient tolerance to cope with the wide variances encountered in the installation, constructional maintenance and operating conditions during use to supply to the folding doors the desired rigidity of position, sound-proofness, freedom from light chinks, and insulation value which may be expected if all conditions were predictably attainable.

Accordingly, it is an object of my invention to provide in combination with a folding partition assembly having a plurality of folding doors or panels, edge seals, particularly floor engaging edges having a wide gap tolerance factor, in which covering capacity along the length of the extended partition in each panel or door element is independently effective and markedly flexible, to be uninfluenced by the integrated nature of the panels to each other and the variations from perfect condition occurring in the supporting structure or floor workmanship, whereby simple sliding partition supports are inexpensively installed, with a high order of partition rigidity against lateral displacement, sound-proofness and light-proofness, as well as insulation value when the partitions are extended over the floor.

I have found, and it is an object of my invention to provide in combination with folding partitions, a floor seal assembly which is capable of independently and flexibly actuating each of the seals in the various panel units in relation to each other to meet large and unequal variations in gaps, by pneumatically positioning and maintaining the floor seals in sliding engagement from a retracted position to a projected intimate contact with the floor, so that level difference and inequality in the floor level is overcome, to serve the intended function of the seal in

locating the partitions from a stacked condition, where the seals are retracted to maximum clearance, to a projected position to span such clearance as well as variations caused by changes in supporting conditions for the span of partitions and inequality in floor levels along the length of the span, out-of-plumb adjustment or displacement of the suspension of the door or tracks or supporting trolleys, and by reason of a great many other causes known to the workers in the field.

It is a further object of my invention to provide folding partition installations in which floor sealing is effected automatically in accordance with varying conditions encountered in construction, as well as during operating conditions, by pneumatically actuated pressures, maintained flexible in accordance with a predeterminedly desired sealing pressure for preventing displacement, accommodation to floor levels, and insulation against sound and light, all of which is achieved simply and economically.

A still further object of my invention is to provide in a folding partition novel pneumatically actuated seals which are easy to install and economical to maintain, and which are capable of meeting a wide variety of operating and existing conditions with flexibility, to accommodate seal-to-floor irregularities of high magnitude heretofore not deemed possible, as well as the structural deflection normally encountered in such extensive installations.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, I make reference to the accompanying drawings, in which:

FIGURE 1 is a side elevational view diagrammatically to illustrate an installation in accordance with my invention;

FIGURE 2 is an enlarged perspective exploded view of details of the parts entering into the seal to be installed in a door or panel;

FIGURE 3 is a fragmentary enlarged side elevation, partly in section, of the bottom of a door or panel in which a seal in accordance with my invention is assembled;

FIGURE 4 is a further enlarged fragmentary section, taken on the line 4—4 of FIGURE 3, in retracted position of the seal;

FIGURE 5 is a side elevation of a fragment of the seal in projected position;

FIGURE 6 is a bottom corner edge view of adjacent doors in the extended condition of the partition in the direction of the lines 6—6 of FIGURE 1;

FIGURE 7 is a view similar to FIGURE 6, with the partition folded to an intermediate position;

FIGURE 8 is a view similar to FIGURE 6, with the partition folded to the fully stacked position;

FIGURE 9 is a fragmentary perspective view of a detail of a trailing panel which is also floor guided in a segmental track;

FIGURE 10 is a perspective view of another embodiment of folding doors with a feed line for the floor seals on top of the door;

FIGURE 11 is a fragmentary perspective view of a detail of the embodiment shown in FIGURE 10, at door joint;

FIGURE 12 is a fragmentary perspective view of a still further embodiment, some parts being broken away to show details;

FIGURE 13 is a fragmentary perspective view of a still further embodiment of a hinge connection of hose;

FIGURE 14 is a fragmentary section of a still further embodiment of a connection for the hose at the hinges, in extended position of contiguous panels; and

FIGURE 15 is a detail of the embodiment of FIGURE 14 in intermediate stacking position.

I now make reference to the drawings wherein my in-

vention aims to overcome problems heretofore encountered in folding partitions, particularly those installed in schoolrooms, gymnasiums, churches, auditoriums and restaurants, where large spaces are subdivided on occasion into separate rooms or spaces, to accommodate smaller groups, employing folding partitions which are normally stacked with clearance gaps from the bottom of the partition to the floor and suspended from, or attached to, tracks on the ceiling or roof without any floor track guides to interrupt the continuity of the smooth floor surface. Such multiple units are very frequently so massive that they function as walls or dividers encompassing several gymnasiums, or several lecture rooms. Such room dividers are required to be resistant to displacement from their hangers, and sound- and light-proof so that activity in one space does not interfere with the other. In large expanses clearances between 1" to 6" are desired because floor levels may vary over the portions traversed by the partition from the stacked position to the extended position. Roof beams, which support the tracks for the partitions, may also be deflected by snow loads and vibration, to cause a large variance in alignment to be covered by the vertical span of the door. Seals comprising telescopically extensible pads have been employed, as well as mechanically powerized expedients, bodily and vertically to shift partitions to attempt to meet the problem of overcoming large irregularities in alignment, over floor levels and deflection from an optimum condition. These expedients are not only ineffectual because of the integration of the partition elements and seals to each other, but they are limited in their ability to cope with the wide clearances which are required to be met. They are expensive because of the mechanical linkage which must be coordinated and because of the intercommunicating effect of distortion of one portion on another, so that there is not sufficient flexibility to meet the many conditions of irregularity which may arise to modify the seal contact to the floor. Also they fail to supply the requisite rigidity against lateral swing between door and floor, sound-proofness, insulation, and light-proofness, all because of the interdependence of linkage for operating or releasing the sealing action with the mechanical function of the coupled partitions, whose inflexible aspect places a great limitation upon the movement which the seals may take and because of the lack of accommodation which the prior art seals may have to irregularities resulting from errors in craftsmanship, design, or unpredictable incidents of temperature and load changes.

I have found that independence of actuation of the seals in the relation of one door to another, and particularly large displacement and flexibility, as well as requisite pressure to meet the optimum sealing requirements, may be effected by pneumatic displacement of the self-aligning, independently operable, telescopically guided seal in accordance with the extent of space that the seal has to bridge between the door edge and floor, increases the efficiency of the partition in sound-proofness, rigidity of contact with the floor, and light-proofness, and the ability to compensate for variations in construction and conditions which are large departures from optimum fitting of the partition elements and the floor.

Making reference to the drawings, I exemplify the same in connection with a partition **10** which comprises panel or door units, **11**, **12**, **13**, **14**, **15**, being shown, it being understood that as many more units may be interposed between the leading door **11** and the trailing door **15** as the width of the space to be divided demands.

The partition illustrated has the doors center hung from the beam of track **16** by pivotal hangers or door suspension pins **17**, guided on rollers for stacking and extension in a well known manner which will be described only briefly for the understanding of the invention. For very extensive and heavy partitions, the assembly from which the partition of doors is hung is united to a roof beam, with the tracks for the usual roller guided hangers or extension pins **17** arranged for powerized chain or cable drive, such as the chains **18** having a motor drive **19**.

Each of the doors of the series **11** to **15** is hingedly connected to another at the contiguous vertical edges E by oppositely handed hinges **20**, for each alternate couple, except for the leading edge of the leading door **11**, which is free, as is also the trailing edge of the trailing door **15**. For a series in which a half door is used in the trailing position, the trailing edge may likewise be hinged to the partition frame in a manner well understood in this field. For each of the contiguous vertical edges E, mated interlocking light-proof ribs **20***a* and grooves **20***b* are provided.

The trailing door **15**, for a center hung folding partition series, has well known operating and folding linkage coupled at the upper edge, and a center guide pin **21** slidably engaging a short track **22** (see FIGURE 9) on the floor running approximately one-half of the trailing door width in the direction of extension of the partition.

The floor edges **23** to **26** are each furnished with floor seals S. Optionally, door **15** may have the seal omitted or provided with a single unitary seal for a vertically hinged type trailing door. In the case of a center hung or suspended trailing full door **15**, as illustrated, in which the trailing door at its bottom edge **27** has a guide pin **21** in a short track **22**, the seal may be omitted, or two seals located, one to each side of the guide pin **21**. The omission of a seal for the trailing door is well understood, as frequently this portion of the installation is projected from an enclosure for retaining the partition in the stacked condition.

The structure of the seals S in each of the doors supplied with the same may be understood by reference to FIGURES 2 to 8.

The second from the leading panel **12** is taken as an example, all other panels being similar, and it will be observed that at its bottom edge **24** there is provided a deep rail filler block **28** between one or both removable spacers **29**. The latter may be removable metal reinforced plates carrying the face plies **30**, and the two define between them a deep channel **31** across the full width of each door along the bottom edge to receive the seal S, the assembly of which is shown in detail in FIGURE 2.

The main body of the seal consists of a slide block **32** to which, at its central portion, there is fixedly supported an oblong casing **33**, two upstanding side walls **34**, and two upstanding end walls **35**, extending from the bottom wall **36** which is affixed to slide block **32** at its upper surface and from which projects an open mouth **37** to provide a deep guide space into which a pneumatically expansible cylinder **38** may be extended. I find it expedient to employ heavy rubber tubing, such as inner tubes of automobile tires, a section of which is sealed at opposite ends **39**, **40** with filler tubes **41**, **42** introduced adjacent the ends for ingress and exit of air, it being understood that for a terminal door such as leading door **11** only one filler tube need be supplied, or one such tube may be closed by well known closure means.

The size and dimensions of the cylinder or expansion chamber **38** relative to the casing **33** and its walls **34**, **35**, are preferably chosen to fit snugly within the casing to limit expansion upon introduction of air in the direction of the mouth **37**. A cylinder so provided is disposed in the casing with the ends **39** and **40** folded to contact the bottom **36** and to project the tubes or nozzles **41** and **42** through the end walls **35** through apertures **43**. Either or both of the projecting tubes **41** or **42** are then coupled to tubular line sections **44**, **45** by clamps **46**, **47**. The tubing employed is preferably heavy walled unexpansible hose capable of retaining high air pressures without yielding, but may be resilient to large mechanical pressure, as will appear as this description proceeds. The tubing sections **44**, **45** are attached to the upper face of the block **32** by

U-guides 48 and then directed through apertures 49 and 50 leading to the lower face 51 of the block 32 where the ends 52, 53 are guided in morticed portions or guide channels 54. Over these extending tube sections, coterminous with the lower face 51, there is then affixed a resilient pad 55 running substantially for the full length of the block 32 except where the channels 54 terminate adjacent the exit ends of the apertures 49 and 50, where the padding is bifurcated with branches 56 to bridge the hinge section 57 of the hose running from one door section to the contiguous door of the series.

The location of the apertures 49 and 50 in the contiguous door panel is governed by an approach as close as possible to the hinge point, with due allowance for the door thickness to be spanned in the stacked position and the bending characteristics of the pneumatic hose that is required to withstand the pressure so that a bend of 180° is within the elastic limits of flexibility without pinching the hose, as will be appreciated by those skilled in the art.

With an assembly thus provided, the seal S is completed by inserting the plunger or piston 58 to nest telescopically within the casing 33. The plunger 58 consists of a block conforming to the cross-section of the casing 33 to enter the mouth 37 to slide freely, with enough clearance to allow for some degree of canting and with some degree of constriction at the neck 59 where a great deal of unevenness in floor level is encountered. The plunger or piston 58 is provided with L-shaped brackets 60, one horizontal branch 61 of which being affixed to block 58 at its uppermost surface 62, the other branch 63 of which having adjusting slots 64 arranged to be affixed to the rail 28.

Thereupon a seal assembly S is mounted in each door by sliding the block 32 into the channel 31 to nest the plunger 58 in the casing 33, the assembly being spring biased into upward limiting position against the abutments 64 of the vertical stile of the door by springs 65 anchored to eyes 66*a* and 67*a* on the rail 28 and block 32, respectively.

Coupling of the series of doors with powerizing means is effected by directing the hose section 15*a* along a vertical edge of the last door to have a seal. In the illustration, the trailing door 15 is morticed on its edge 66 to hold the vertical section of hose or metal pipe 67 to a flexible section 68 which is looped with the fold 69 adjacent the supporting pin 17 and a branch supported on the track 16 outwardly supported in the frame 70 to provide a take-up loop 71 kept yieldably taut by a counterweight or like expedient.

The terminal portion of the hose 72 leads to the air compressor 73, powerized by the motor 74, which is part of the wiring system in controlling the motorizing means 19 for actuating the folding partitions. A switch 75 controls the starting of the motor 19 to extend the partitions. The leading door 11 carries a switch actuator 76 in the limiting or closed position of the partitions, which moves the leading door 11 against the frame 77 to engage the switch 78 with provision for breaking the circuit for the motor 19, but closing the circuit for actuating the motor 74 for actuating the compressor 73. Such sequential wiring system is so well known and understood by the skilled electrician as not to require detailing.

It will be understood also that the compressor may be furnished with an automatic gauge to control and maintain the air pressure feeding the air system, or a separate air storage tank may be supplied which is maintained at predetermined pressures, with suitable electromagnetic valve control means actuated by the electrical system and controlled by the switch 78 to release the requisite pressure of air from the tank for actuation and maintenance of the pressure in the seals S.

With an installation as provided, it will be now apparent that operation of the folding partitions is accomplished in the following manner: Normally, when the folding partitions are stacked, air pressure from the compressor 73 (or a storage tank, not shown) is cut off from

the feed line 67 and preferably released by positively operated release valves in the feed line (not shown). The springs 65 lift the blocks 32 to the maximum height to urge the casing 33 into nesting engagement with the plunger 58 until the block 32 abuts the vertical stile at 64. The upward pressure of the springs scavenges the air in the cylinder or chamber 38 to deflate the cylinder 38 and compress its dimensions to raise the seal from the floor and clear it. The installation of partitions with floor clearances of great magnitude is thus possible within a limited space in the gap between the rail 28 and the block 32 in the channel 31, and I have found that rise in clearance between the bottom 24 and the floor level F is possible to meet a number of reasonable irregularities including unlevel floors, and structural deflection occasioned by changes in load factors, or both, heretofore deemed unattainable. The depth of the block 32 in overlapping relation to the sides defined by the doors at the wall portions defined by the spacers 29 and plies 30 is the only limitation as to relative expansion of the telescopic portions of the seal, in which event overlap of the casing 33 and the plunger 58 is made with corresponding expansion capacity of the chamber 38 as will now appear.

When extension of the partition 10 has been fully effected by mechanism well known in the art, by powerizing the motor 19, contact of the stop 76 against the switch 78 will release air from the compression (or storage tank where used), to enter the feed line 67 and hose to each of the seals, to dilate or inflate the chambers 38, to force the plunger 58 and casing 33 in an expanded telescopic slidable movement and project the block 32 against the floor F to engage the pad 55 with the floor and conform to the same.

The center suspension of the chamber 38, casing 33 and plunger 58 with the cantable clearance between these relatively slidable members and the yieldability of the pneumatic expedient employed, together with the independence of coupling of the seal in one door to the seal in a contiguous door, as well as by reason of the flexibility of the hose extension 57, result in a seal which is self-aligning to the floor. Any unlevel condition, as shown by the dotted lines F*a* and F*b* in FIGURE 3, is automatically met to secure an intimate contact of the seal with the floor. Pressure between the pad 55 and the floor F may be exerted to the pressure retaining capacity of the chamber 38, the case 33, and the toughness of the walls of the chamber to retain the chosen pressure. The rigidity of the casing and the relatively small clearance between the block 58 and the casing will increase the capacity for maintaining the pressure in the chamber 38. While the weight of the partition doors may limit the pressure which may be exerted in contacting the pads with the floor, where double rails are employed for the hangers for actuating the doors, to prevent upward displacement of the partitions from the tracks guiding the same, greater pressures may be effected. Pressures may be therefore maintained to the end that not only is a floor seal secured which results in light- and sound-proofness to a substantial degree, but also floor engagement which rigidly holds the partition against lateral displacement relative to the floor, making it possible to use the partitions as a relatively rigid wall in an auditorium, for example, where it may be used to provide a subdivision of smaller gymnasiums and where a high order of resistance to lateral displacement is required.

During protracted periods of use of the partition in the extended position, air pressure may be maintained at predetermined degrees by gauges, as will be well understood.

The use of pneumatic pressure is highly desirable because it supplies a highly flexible medium, and any leakage which may occur leaves no undesirable effect.

When it is desired to stack the partition, no difficulty is experienced at the hinge juncture between doors and the difference in lengths of the hose at hinge portions

which must be traversed, since the straight hinge section 57 of the hose where it overlaps the corner of one door to the other, rides or spans the elbow as progressively shown in FIGURES 6, 7 and 8, first riding over the narrow resilient pad sections 56, as shown in FIGURE 7, to intersect the corner in a straight line, and then forming a hidden fat loop, as shown in FIGURE 8, it being understood the hose may have sufficient body not to sag when in a loop as shown in FIGURE 8.

While I have shown and described accommodation for hinging of the floor seals by the intercommunicating hose feed between panels adjacent the floor, I have also shown in FIGURES 10 and 11 another embodiment of my invention wherein the hose hinge sections are confined to the portion adjacent the ceiling or suspension portions of the folding doors. In this embodiment, the folding partition assembly 10*a*, consisting, for illustration purposes, of door panels 11*e* to 15*e*, has each panel 11*e* to 14*e* provided with a floor seal S (excluding, as customary in the trade, the trailing panel). The construction of the floor seal S may be identical with that shown in FIGURES 1 to 9, or as will be described in connection with FIGURE 12. However, only one filler tube 41*e* is connected to each expansion cylinder 38. The other is closed off or sealed to secure parallel feed to the seals as distinguished from series feed of the former embodiment. The feed tube sections 80 are each upwardly directed in a vertically extended morticed channel 81 formed in the trailing edge 82 of each door panel and then extended into an elbowed section 83 to the T-coupling 84, which is supported in the clearance section 85. Each T-coupling 84 has its opposite branch connected to a feed line 86, the leading one being coupled to the rising section feed tube 80 in the leading door panel and the trailing one, 87, which should be flexible hose, being connected to the air compressor line as in the first embodiment. Between each door or panel where there is a branch of the T-coupling, there is a snaked section having a fat looped portion in the extended condition of the partition, which length of loop serves to allow for the difference in length required to form an elbow when the doors are stacked, as described in connection with the first embodiment. In other respects the operation of the partition and the floor seals is in accordance with the prior preferred embodiment.

While I have shown and described each of the floor seals actuatable by an expansion cylinder of tubular outline which may have limited expansion capacity though of great equalizing value, to meet short length floor irregularities, I may increase the magnitude of expansion to achieve the previously unattainable floor clearance of almost 6" by the embodiment shown in FIGURE 12. In this embodiment the slide blocks 32*a* are guided in the lower door edge of each panel as in the first embodiment and biased by springs 65*a* to draw the seals S from the floor in the normally stacked position of the door panels. In this embodiment the blocks 32*a* are provided with spaced tubular casings 33*a* and held to the block by ears 33*a'* fastened to the top of the block. A telescopic tube section 33*b* is coupled to the filler block 28*a* in similar inverted position. Within the casing provided by the telescoping tube sections 33*a* and 33*b*, there is enclosed an expansion chamber 38*a* consisting of accordion pleated tubes of rubber or like molded, thin walled tubing, to be capable of returning to its shape and with expansibility limited only by the casing walls 33*a* and 33*b*, telescopically to provide a great lengthwise expansibility as air pressure expands these chambers. One end, 38*c*, is provided with a pressure block, the other end, 38*d*, is provided with a fitting having entrance and exit tubes 41*a* and 42*a* to which feed hose 44*a* and exit tube 45*a* may be connected, to interconnect a series of expansion chambers of contiguous seals S in each contiguous door panel. The operation of the seals with the rectilinear expansion chambers may otherwise be the same as in the embodiment described in FIGURES 1 to 9, but by having more or a multiple of pneumatically actuatable rectilinearly projected chambers, a greater linear floor clearance gap may be spanned with a high degree of mechanical force, to secure rigidity of floor contact of great magnitude and floor conforming quality for great irregularity, as well as changes in overall beam spanning distances caused by varying roof loads.

While I have shown and described means to interconnect the independent door seals to each other by hose elbows exposed at the upper or lower door edges where a loop may be exposed in stacked condition of the partition, I may minimize the exposure of a looped section by the construction shown in FIGURE 13. In this form, each seal expansion chamber, as in any of the prior embodiments, has the feed tube interconnecting the contiguous seals by hose sections 44*d* and 45*d* in the form of a helically coiled hose section which is encased in a sheathing of springy material to maintain the coil resilient and contracted. A spiral coil, resiliently biased by a spring casing to normally contract the coiled hose, may also be employed. The extension 57*a* of the hose may bridge from one side wall aperture 49*a*, 50*a*, to an end wall aperture formed in the vertical edges 60*a* of the panels at adjacent edges which are hinged to each other, to keep the interconnecting sections of the hose running in series taut and not dangling in both extended or stacked condition of the partition.

In FIGURE 14 I have shown still another embodiment of inter-panel coupling of the air hose. In this form, adjacent dor panels, for example, 11*e* and 12*e*, are hinged to each other and are each provided with floor seals S as in FIGURES 2 or 12. However, the interconnecting exit hose 44*e* of one panel and the intake hose 45*e* of the hose on the adjacent panel terminate in a female fitting 44*f* and male fitting 45*f* in the contiguous vertical meeting edges of the door panels 12*e* and 11*e*, respectively. The effect will be to couple the cup of the female fitting over the conical extension of the male fitting. The female cup seat being made of resilient material, such as self-sealing rubber, will engage the conical rigid wall of the male fitting to make an air seal for the hose when the panels are extended and air pressure is fed to the air chambers of the seals to transmit air from one seal to another. Likewise, when the panels are stacked, the release of air can be effected completely wtih the initial break in the panels from the extended to the stacked position, to leave the seals under the traction of the normally contracting springs.

In general in the embodiments of a combination of the telescopic casings 33 and block 58 for chamber 38 therein and the telescopic casings 33*a* and 33*b* for the accordion pleated chamber 38*a* therein, it is intended to provide unlimited expansible, rigid means for the relatively thin walled air sealable chambers. This thereby provides an arrangement whereby a great mechanical force may be transmitted to the movable sections of the telescopic casings. The effect is to transmit great pressure to secure the mechanical values of the great air pressure, limited only by the ability of the telescopic casings to withstand the air pressure and the air chambers to seal this pressure when so confined. Thus by this combination there is supplied a floor seal for the panels which may be articulated into floor engagement to meet large variations and irregularities in the existing conditions and in operating conditions which the extensive partition assembly may encounter.

Important advantages in the combination hereof result from the use of the novel expansion member for actuating the floor seals as opposed, for instance, to a conventional pneumatic or hydraulic cylinder and piston arrangement.

These advantages flow from the large seal deflecting force which may be developed by the use of such expansion members even when the same are operated under

low air pressures. This is true because of the large piston area available through the use of the expansion members, particularly the embodiments of FIGURES 1 to 9.

Thus, for instance, to develop a seal deflecting force of about 60 pounds through the use of a conventional 1" piston and cylinder (which is the maximum piston size usable, for instance, in a 3" thick door panel), a pressure of about 107 p.s.i. is required in the system. This figure is derived by dividing the desired force (60 pounds) by the area of the piston (about ¾ square inch) times the efficiency factor for air powered devices (about 75%). Even if two conventional air cylinders were employed, the system would require the use of pressures exceeding 53 p.s.i.

In contradistinction to conventional cylinder and piston devices, the expansion member hereof permits a 60 pound force to be developed through the use of far lower pressures than even a pair of conventional piston assemblies. Thus, an expansion chamber 6 inches in length by one inch in width provides 6 square inches of area as compared to the ¾ square inch of a conventional 1 inch piston. Hence, a pressure of only about 13 p.s.i. is required for a 60 pound seal deflection.

The ability to operate at lower pressures minimizes maintenance problems since it is well known that it is necessary periodically to bleed condensed moisture from the low point of high pressure systems. Low pressure devices seldom, if ever, require bleeding.

Further, the initial cost of a 60 p.s.i. system and of conventional cylinder and piston assemblies obviously far exceeds the cost of the low pressure system and bladder and telescopic guide type expansion member of applicant's device. Thus, the novel device herein described is less expensive to produce, easier to maintain and more efficient to operate, since there is less air leakage at lower pressures.

This application is a continuation of application Serial No. 6,963, filed Feb. 5, 1960, now abandoned, entitled Folding Partitions and Seal Therefor.

Having thus described the invention and illustrated its use, what is claimed as new and is desired to be secured by Letters Patent is:

1. A folding partition assembly comprising a plurality of hingedly connected door panels slidably mounted on a fixed overhead support, with the lower edges of said panels disposed above the floor level, said panels being slidable along said support from a stacked condition to an extended condition, the combination having vertically extended recess portions in the panels open at the lower edges of said panels, vertically movable floor seals carried within said recess portions of the panels, spring means urging said seals upwardly to a normal position clear of said floor and a pneumatically actuated expansion member interposed between said panels and said seals,

said expansion member including an open ended canister disposed between the side edges of the panel, the lengthwise dimension of said canister being substantially less than the length of said panel, the width of said canister being less than the thickness of said panel, a plunger member of cross section corresponding substantially to the cross section of said canister loosely telescoped within said canister, the ends of said plunger being spaced from the adjacent sides of said canister to permit a considerable relative tilting of said plunger and said canister in the plane of said panel, and a pliable, air-tight, deformable bladder disposed between said plunger and said canister adapted, upon inflation, to shift said plunger outwardly of said canister, the combination including means for inflating said bladders.

2. A folding partition assembly comprising a plurality of hingedly connected door panels slidably mounted on a fixed overhead support, with the lower edges of said panels disposed above the floor level, said panels being slidable along said support from a stacked condition to an extended condition, the combination having vertically extended recess portions in the panels open at the lower edges of said panels, vertically movable floor seals carried within said recess portions of the panels, spring means urging said seals upwardly to a normal position clear of said floor and a pneumatically actuated expansion means interposed between said panels and said seals, said expansion means including a pair of open-ended canisters disposed between the side edges of the panel, the canisters forming said pairs each being spaced on opposite sides of the longitudinal center line of said panels, the lengthwise dimension of said canisters being substantially less than the length of said panel and the width of said canisters being less than the thickness of said panel, plunger members of cross section corresponding substantially to the cross sections of said canisters telescoped within said canisters, pliable, deformable, air-tight bladders disposed between said plungers and canisters adapted, upon inflation, to shift said plungers outwardly of said canisters, the combination including means for inflating said bladders, said seals being variably tiltable in the plane of said panels in response to a variable positioning of the plungers and canisters of each pair.

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