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(54) MOVABLE WALL

(71) We, PANELFOLD INC., a body corporate organised and existing under the laws of the State of Florida, United States of America, of 10700 N.W. 36th Avenue, Miami, Florida 33167, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a movable wall comprising at least one wall panel or partition. There is disclosed herein a wall panel which is extendible in height and can provide an effective seal against a ceiling surface, compensate for variations and irregularities in the height of the ceiling surface to facilitate use of the wall with various types of ceilings.

Movable wall systems incorporating vertical panels, partitions, room dividers, and the like, are well known. In many installations, it is desired that the wall system include a continuous wall from floor to ceiling with a seal being provided at both the floor and the ceiling with the panel or panels being readily movable from one location to another. Portable wall systems have been provided in which the panels are vertically extendible in height and provided with a floor engaging support mechanism, such as rollers, casters, and the like, with a manual device being provided for extending the vertical height of the panels to secure them in desired position. The structure for extending the vertical height of the panels introduces the capability of damage to the ceiling, especially when the panel is being installed in an enclosure having a suspended ceiling. Movable wall systems are also known in which panels are suspended from an overhead track so that when the panels are in their vertically retracted or shortened condition, the panels may be moved along the track to a desired location after which the panels are extended in length to provide a continuous partition or wall. Prior patents illustrative of the development in their field of endeavour are as follows:

U.S. Pat. Nos. 1 716 625 — June, 1929
2 443 548 — June, 1948
2 742 675 — April 1956
2 886 147 — May 1959
2 945 568 — July 1960
2 962 132 — November 1960
3 174 593 — March 1965
3 335 532 — August 1967
3 400 504 — September 1968
3 453 790 — July 1949
3 753 328 — August 1973
3 967 420 — July 1976
Swiss Pat. No. 384 824 — February 1965

There is thus a need for a movable wall which can compensate for variations in the ceiling height and control the force exerted on the ceiling to enable the panels to be effectively used with various types of ceilings including ceilings of the kind in which acoustical panels, or the like, are supported by a grid work of supporting rails, channels, and the like.

According to the invention, there is provided a movable wall comprising at least one wall panel which, in use, extends generally vertically between a floor surface and an overhead surface and which has a fixed dimension slightly less than a predetermined vertical dimension, a bottom seal along the bottom edge of the panel intended for engaging said floor surface, a top seal along the top edge of the panel intended for engaging said overhead surface, either one or both of said bottom and top seals being resiliently biassed vertically and outwardly in relation to the panel and connected to the panel by one or more compressible and adjustable assemblies, the said assemblies or assembly being arranged to enable initial adjustment of the position of said resiliently biassed bottom and/or top seal to a position just beyond its final position, said adjustment permitting one in use to compensate for irregularities in building surfaces without changing the force exerted

on a floor or overhead surface by said bottom and/or top seal.

In some embodiments of the invention, the wall system includes portable panels which are completely separable from the ceiling and freely rollable along a floor surface to enable relocation of the panels or positioning of the panels in a desired orientation.

In other embodiments of the invention, the system includes a plurality of panels which are suspended from overhead trackways incorporated into the ceiling by a structure which supports the panels above the floor surface when the top and/or bottom seals of the panels are in a retracted condition and enables contact between the lower edge of the panel and the floor and the upper edge of the panel and the ceiling or track structure when the seals are in their extended positions with the supporting structure which normally suspends the panel from the trackway during movement of the panel being elevated from the supporting surfaces of the trackway when the panel is vertically extended.

There is disclosed herein a movable wall in which the ceiling engaging member is in the form of a channel-shaped member having parallel sides telescopically received over the upper edge of the panel and the channel includes parallel seals along each top edge portion thereof for engagement with a ceiling surface which may be in the form of ceiling panels and supporting structures or portions of the overhead supporting trackway in which the panel is provided with a guide structure interconnecting the channel and panel and adjustable spring bias structure to control the resistance to downward movement of the channel in relation to the panel. The guide structure is in the form of a plurality of threaded rods in threaded engagement with a slide block having one end of a spring associated therewith so that the resilient characteristics of the spring and the forces exerted by the spring on the guide block may be adjusted to customise the structure and resilient characteristics of the ceiling engaging member to satisfy the requirements for each installation.

The floor engaging member may be in the form of a channel having parallel sides telescopically receiving the lower edge of the panel and provided with longitudinally extending, transversely spaced multi seals on the lower edge thereof and including a manually actuated lever operating mechanism connecting the channel to the panel to move the channel to extended and retracted positions and automatically lock the channel in both positions by virtue of the specific linkage mechanism utilised.

The side edges of the panels may have means for retaining the panels in alignment with each other and including a peripheral seal for providing complete isolation of one surface of the panel from the other and thus preventing transfer of heat, light, and sound from one side of the panel or wall to the other.

The invention will be better understood from the following description of examples of the invention which refers to the accompanying drawings, in which:

Figure 1 is a schematic illustration of a first example of a movable wall according to the present invention installed in an enclosed space;

Figure 2 is a transverse, plan sectional view, on an enlarged scale, taken substantially upon a plane passing along section line 2—2 of Figure 1;

Figure 3 is a sectional view, similar to Figure 2 but taken along section line 3—3 of Figure 1;

Figure 4 is an enlarged front elevational view, with portions broken away, of the lower corner portion of a wall panel of the movable wall of Figures 1 to 3;

Figure 5 is a vertical sectional view taken substantially upon a plane passing along section line 5—5 of Figure 4 illustrating further structural details of a ball caster support and an associated channel shaped member having seals along the bottom edge thereof;

Figure 6 is a schematic illustration of another embodiment of a movable wall according to the invention installed in an enclosed space;

Figure 7 is a vertical, sectional view on an enlarged scale, illustrating the structural details of a wall panel of Figure 6 shown in its vertically extended position;

Figure 8 is a vertical, sectional view similar to Figure 7 but illustrating the wall panel in vertically retracted position;

Figure 9 is a vertical, sectional view taken substantially upon a plane passing along section line 9—9 of Figure 7 illustrating the specific structural details of the ceiling engaging member, floor engaging member and mechanism for retracting and extending the floor engaging member;

Figure 10 is a detailed, sectional view taken substantially upon a plane passing along section line 10—10 of Figure 9 illustrating further structural details of the actuating mechanism for raising and lowering the floor engaging member;

Figure 11 is a fragmental, side elevational view, with portions broken away, illustrating further structural details of the mechanism shown in Figure 10;

Figure 12 is a vertical, sectional view, similar to Figure 7, but illustrating a further embodiment of the invention and showing the panel in vertically extended position, engaging an overhead track;

Figure 13 is a sectional view, similar to Figure 12, but illustrating the wall panel in vertically retracted position and supported from the overhead track;

Figure 14 is a fragmental, elevational view, with portions broken away, of the lower corner of the panel illustrating additional structural details of the floor engaging member, the spring bias guide and support structure therefor and the retracting and extending mechanism therefor; and

Figure 15 is a transverse, sectional view taken substantially upon a plane passing along section line 15—15 of Figure 14 illustrating further structural details.

Referring to the drawings and firstly to Figure 1, the illustrated movable wall is generally designated by the numeral 10 and includes a plurality of wall panels 12 arranged in vertical orientation and horizontal alignment to form a partition, room divider or portable wall between a floor surface 14 and a ceiling surface 16 with the portable panels 12 extending between vertical side walls 18 and 20 of an enclosed space. The wall panels 12 may be constructed of any desired standard size or may be constructed of various sizes to be installed in spaces having different height or width dimensions.

Referring now also to Figures 2 to 5, each of the wall panels 12 includes a pair of planar panel members 22 and 24 disposed in spaced parallel relation to each other and secured to a peripheral frame 26. The panel members 22 and 24 may be constructed of wood, plastics, metal or any other material used in constructing walls and provided with any external ornamentation or appearance characteristics as desired. For example, various types of wall-boards, laminated panels, flake board or the like may be used for this purpose with insulating material therebetween if desired with the overall thickness of the panel 12 being varied as desired so that the physical characteristics of the panels 12 will be compatible with the enclosed space in which the panels are used and be capable of being moved to a desired location and handled by individuals. The peripheral frame 26 if of channel-shaped configuration with the central web portion thereof disposed inwardly and the two side flanges extending to the periphery of the panel members 22 and 24 and being secured thereto in any suitable manner. The peripheral from 26 is preferably in the form of extruded channel. The side flanges are preferably disposed generally flush with the periphery of the panel members 22 and 24. The specific construction of the panel members and the specific construction of the frame supporting these panel members may be varied and in and of itself does not constitute an essential element of the present invention.

The upper edge of the panel 12 is provided with a spring biassed, inverted channel-shaped seal assembly 28 for engaging the ceiling surface 16. The seal assembly 28 is resiliently biassed vertically and upwardly in relation to the panel 12 and connected to the panel 12 by one or more compressible assemblies (not shown), such assemblies being arranged to enable initial adjustment of the position of the resiliently biassed seal assembly 28 to a position just beyond its final position, such adjustment permitting one in use to compensate for irregularities in the ceiling surface 16 without changing the force exerted on the floor surface 14 or ceiling surface 16 by the resiliently biassed seal assembly 28. The lower edge of the panel 12 is provided with a channel-shaped seal assembly 30 which is vertically extendible and retractable for sealing engagement with the floor surface 14. Also, the lower edge of the panel 12 is provided with a plurality of supporting assemblies 32 (Figure 4) for movable supporting engagement with the floor surface 14. The channel-shaped floor engaging seal-assembly 30 is vertically extended and retracted by an elevating and lowering mechanism 34, Figure 4.

The floor engaging supporting assembly includes a ball-type caster 36 journalled in a housing 38 fixedly supported on a bracket 40 by a nut and bolt assembly 42. The bracket 40 is fixedly secured to the channel-shaped peripheral frame 26 by suitable screw-threaded fasteners 44 or the like. A plurality of the ball caster type supporting assemblies are provided on each panel with each panel including at least two of the ball casters 36 for rolling contact with the floor surface 14 to facilitate movement of the panels 12 along the floor surface 14. This enables an individual to roll the panel 12 to a desired location when the panel has a vertical height less than the distance between the floor and ceiling

The floor engaging seal assembly 30 includes a channel-shaped member 46 having a central web portion 48, in use parallel to the floor surface 14, and a pair of parallel flanges 50 extending upwardly toward the panel members 22 and 24 as illustrated in Figure 5. The lower surface of the portion 48 has a pair of depending sealing members 52 in the form of a multiple blade sweeping or gripping member constructed of vinyl, rubber or the like for engagement with the floor surface 14 at a plurality of parallel lines of engagement. The flanges 50 of the channel-shaped member 46 are telescoped between a pair of depending strips 54 which form the outer components of an H-section member 56 having a web portion 58 thereof

extending across the bottom edges of the panel members 22 and 24 and the peripheral frame 26 as illustrated in Figure 5. The bottom inner edge of each strip 54 is provided with a vinyl seal 60 and the upper outer surface of each flange 50 is provided with a similar seal 62 thus forming a continuous seal between the panel 12 and the floor surface 14 when the sealing strips 52 are in engagement with the floor 14.

The elevating and lowering mechanism 34 includes an elongate threaded bolt 64 having its lower end swivelly connected to the web portion 48 of the member 46 as indicated by reference numeral 66, Figure 4. The swivel connection may be of any suitable detachable type of connection which rotatably connects the bolt 64 to the web portion 48 of the member 46. The bolt 64 extends up through an aperture 68 in the web 58 and is threaded through a thread block 70 fixedly secured in the peripheral frame 26 as illustrated in Figure 4. The upper end of the bolt 64 has a polygonal head 72 disposed in a recess 74, Figure 4, formed in the panel 12. The recess is defined by a box-like housing 76 extending inwardly from the outer surface of the panel member 24 so that the recess 74 is open to the exterior surface of the panel member 24 thereby providing access to the head 72 of the bolt 64 so that the bolt 64 can be rotated by a suitable powered wrench, manual ratchet wrench or the like. Thus, by rotating the bolt 64, the member 46 may be elevated and lowered. When the member 46 is lowered, the web portion 48 and the seals 52 thereon are positioned below the ball caster 36 and the ball caster 36 is elevated out of contact with the floor surface 14. When the member 46 is elevated, as illustrated in Figures 4 and 5, the aperture 49 in web portion 48 enables the web portion 48 and the sealing strips 52 to be elevated above the lower periphery of the ball caster 36 so that the panel 12 then will be rollingly supported by the ball caster 36 on the floor surface. As illustrated, two of the elevating and lowering mechanisms 34 are provided and they are positioned adjacent the supporting assemblies 32 as illustrated in Figure 4.

The side edges of the panels 12 include a channel-shaped member 106 having a central portion 108 provided with a longitudinal recess 112 and parallel flanges 114 telescoped over the panel members 22 and 24 as illustrated in Figure 3 with the central portion 108 being secured to the frame 26. In use, when adjacent panels 12 are aligned, the projections 110 and recesses 112 cooperate with each other in the manner illustrated in Figure 3 to provide an interengagement and one wall of the recess 112 is provided with a vinyl seal strip 116 to provide a vertical seal between the panels 12. The panel 12 which engages a wall 18 has its vertical side edge received in a channel-shaped receptor 118 secured to the wall 18 by suitable fastening means 120. The flanges of the channel-shaped receptor 118 telescopically receive the vertical side edge of the panel 12 between them and each flange has a seal strip 122 as illustrated in Figure 3.

Referring now to Figures 6 to 11 of the drawings, a movable wall generally designated 212 includes a plurality of portable wall panels 214 arranged in vertical orientation and horizontal alignment to form a movable wall between a floor surface 216 and a ceiling surface 218 in order to provide a movable wall, partition, or the like, in an enclosure defined by vertical walls 220 so that the enclosed space may be divided into smaller enclosed spaces for various purposes. The wall panels 214 are constructed of any desired standard size and may be of various heights for installation in spaces having different height or width dimensions.

Each wall panel 214 includes a pair of planar panel members 222 to 224 disposed in spaced relation to each other and in generally parallel relation, with the panel members 222 and 224 being secured to a peripheral frame 226 generally in the form of a channel-shaped extrusion. The panel members 222 and 224 may be constructed of wood, plastics, metal, or any other material used in constructing walls and wall panels and provided with any external ornamentation or appearance characteristics, as desired. Various types of wall boards, laminated panels and flake board may be used for this purpose with insulating material therebetween, if desired, with the over-all thickness of the panel 214 being varied, as desired, so that the physical characteristics of the panels 214 will be compatible with the enclosed space in which the panels are used and be capable of being moved to a desired location and handled by individuals.

The upper edge of the panel 214 is provided with a spring biased ceiling engaging member 228 generally in the form of an inverted channel in which the spring force exerted on the channel may be adjusted to be maintained constant. The bottom edge of each panel 214 is provided with a floor surface engaging member 230 which also is in the form of a channel-shaped member and is vertically extendible and retractable for sealing engagement with the floor surface 216. Also, the lower edge of the panel 214 is provided with a plurality of supporting assemblies generally designated by numeral 232 for movable supporting engagement with the floor surface 216 when the floor engaging member 230 is in retracted posi-

tion with the floor engaging member 230 being vertically extended and retracted by an elevating and lowering mechanism.

Each supporting assembly includes a ball-type caster 236 rotatably journaled in a housing 238 fixedly supported on a bracket plate 240 by a screw threaded stud 242 with the bracket plate 240 being secured to the peripheral frame 226 by suitable screw threaded fasteners 244, or the like. A plurality of the ball-type casters 236 are provided on each panel 214 with each panel including at least two of the ball-type casters for rolling contact with the floor surface 216 to facilitate movement of the panels 214 along the floor surface to enable an individual to roll the panel 214 to a desired location when the panel has a vertical height less than the distance between the floor and ceiling.

The floor engaging member 230 includes a channel-shaped member 246 having a central web portion 248 parallel to the floor surface 216 and a pair of vertically extending parallel flanges 250 which extend upwardly alongside of the lower edge portions of the panel members 222 and 224 and move telescopically in relation thereto. The web portion 248 includes a pair of depending seal strips 252 oriented in parallel, transversely spaced relation, which are in the form of multiple blade members constructed of vinyl, rubber, or the like, for engagement with the floor surface 216 along a plurality of parallel lines of engagement. The flanges 250 of the channel-shaped member 246 include an inwardly extending seal strip or sweep 254 at the upper edge thereof for sealing engagement with the external surface of the panel members 222 and 224 and enabling vertical movement of the channel-shaped member 246 in relation to the panel 214.

The elevating and lowering mechanism for the floor engaging member 230 includes a vertically elongate link 256 (Figs. 10 and 11) having its lower end pivotally connected to a vertically disposed guided rod 258 (Fig. 11) by a transverse pivot pin 260. The rod 258 is vertically reciprocally guided by a guide block 262 secured to the peripheral frame 226 by screw threaded fasteners 264 with the lower end of the rod 258 being connected to the web portion 248 of the channel-shaped member 246 by an elongate threaded bolt 266 that extends up through the web portion 248 and threads into an internally threaded bore 268 in the rod 258, as illustrated in Figures 9 and 10. The bolt 266 provides an adjustment for the effective length of the rod 258. The bolt 266 is provided with washers 270 above and below the web portion 248 and a collar 272 with a set screw 274 therein for maintaining the adjusted position of the bolt 266. As the link 256 is moved with the upper end thereof moving in an arcuate path, the rod 258, bolt 266 and floor engaging member 230 will be raised and lowered with the limits of such movement being adjusted by the adjustable connection between the bolt 266 and the rod 258.

The upper end of the link 256 is connected to one corner of generally triangular sector plates 276 by a pivot pin 278 in which the plates 276 serve as a lever for movement of the link 256 when the sector plates 276 are pivoted or rotated about a shaft or axle 280 which is supported by a supporting base 282 that is connected to a horizontal frame member 284 by screw threaded bolts or other fasteners 286. The axle or shaft 280 is supported in alignment with openings 288 in the panel members 222 and 224 defined by a grommet 289 and the axle or shaft 280 is hollow with the interior thereof being square or of other polygonal configuration, as indicated by numeral 290, to receive a square or comparably shaped drive element, such as the male output element of a wrench handle, such as is found in socket wrench sets. The sector plates 276 and axle or shaft 280 are integral with each other and formed of two identical components oriented in face-to-face relationship to each other and journalled in bores 292 in the two mounting plates or bases 282, as illustrated in Figure 10. The sector plates 276 include a pin therebetween and base 282 includes a pin 296 to limit the pivotal movement of the sector plates 276 about the axis defined by the axle or shaft 280 defined by bosses on the sector plates 276. The two base members 282 are secured in assembled relation by screw threaded fasteners 298, with this entire assembly being anchored to the frame member 284 such that the floor engaging member 230 will be retained in its retracted position and in its extended position by the abutment pin 294 and 296 and the orientation of the pivot axis defined by the pivot pin 278, the link 256 and the rotational axis of the sector plates 276 with the two positions of the floor engaging member being on opposite sides of a vertical plane passing through the rotational axis of the sector plate 276 so that spring force exerted on the floor engaging member will retain the floor engaging member in both of its positions as the centre of the pin 278 shifts to opposite sides of the rotational axis of the sector plates 276.

Each end of the floor engaging member 230 is provided with a guide assembly 300 in the form of an elongate threaded rod 302 having its lower end provided with a head 304 having a screw driver receiving kerf 306 therein and rotatably journalled in a deformed or countersunk socket 308 in the bight portion 248 of the channel-shaped

member 246. The upper end portion of the threaded rod 302 is of reduced diameter and provided with a smooth external surface, as indicated by numeral 310. The threaded portion of the rod 302 is screw threaded through an internally threaded and floating guide block 312 which is movably guided in a guideway 314 defined by an edge plate 316, an internal block 318 and screw threaded fasteners 319 which also anchor an upper, rigid guide block 320 in position for reciprocally receiving the reduced end portion 310 of the threaded guide rod 302. A coil spring 322 extends between the internally threaded floating guide block 312 and the stationary guide block 320 which has a passageway 324 therethrough with the spring being telescoped over a projection 326 on the floating block 312 and a projection 328 on the stationary block 320. By engaging a screw driver with the screw driver kerf 306, the threaded guide rod 302 may be rotated, thus adjusting the floating guide block 312 towards and away from the stationary guide block 320 thereby preloading the spring 322 to a desired length. The spring pressure exerted onto the floor engaging member 230 and thus the spring bias force engaging the floor engaging member 230 with the floor surface can thus be adjusted so that the spring force will be substantially constant within the limits of the spring, thereby enabling variations in vertical height between the floor and ceiling to be compensated for while maintaining a predetermined force exerted by the panel on the floor surface and, more importantly, on the ceiling surface. The spring 322 also serves to bias the floor engaging member 230 downwardly, thus maintaining the retracted linkage in its retracted position when the pivot pin 278 is swung above and to the opposite side of the rotational axis of the sector plates 276 so that this over-centre arrangement will ensure that the floor engaging member 230 will be retained in retracted position during movement of the panel 214.

The ceiling engaging member 228 is in the form of an inverted channel-shaped member 330 including an uppermost web portion 332 and a pair of depending parallel flanges 334 which are spaced apart sufficiently to receive the upper edge of the panel 214 therebetween. The side edge portions of the web portion 332 include longitudinal seal members 336 mounted thereon and the inner lower edge portions of the flanges 334 also include an inwardly extending seal strip or sweep 338 thereon engaging the external surface of the panel members 222 and 224. The seals 336 engage the ceiling surface 218 which in this embodiment of the invention is a ceiling of the kind which includes a plurality of modular panels 340 which may be acoustical or of other suitable structure supported by a grid work of inverted T-shaped supporting strips or frame members 342 with the panels 340 merely resting on the horizontal flanges 344 which define the bottom edge of the supporting strip or frame member 342 in a conventional and well known manner so that only limited vertical pressure can be exerted on the ceiling surface 218 without damaging the ceiling or lifting the panels. The structure of the panels provides a "light" touch and maintains a constant force regardless of variations in the ceiling height as normally encountered. Of course, the panel structure may be utilized with various types of ceilings in which excessive vertical pressure exerted on the ceiling would cause damage or displacement thereof.

The ceiling engaging member 228 (Fig. 9) is vertically movably supported from the upper edge of the panel 214 by a guiding and adjusting mechanism generally designated by numeral 346 and which is similar to the guiding and adjusting mechanism connecting the floor engaging member 230 to the bottom of the panel 214. The guiding and adjusting mechanism 346 includes an elongate screw threaded rod 348 having a head 350 at the upper end thereof provided with a screw driver receiving kerf 352 and journalled in a socket 354, formed in the web portion 332 of the channel-shaped member 330. The lower end of the screw threaded rod 348 is provided with a reduced end portion 356 which is externally smooth and received through a stationary guide block 358. The threaded portion of the threaded rod 348 is screw threadedly engaged with an internally threaded, floating guide block 360 which is vertically guided by the external wall 316 and a block 362 similar to the block 318 at the lower end of the panel with fasteners 364 securing the assembly in place. A coil spring 366 engages the blocks 358 and 360 with the block 358 having a tubular extension 368 thereon and the block 360 including a tubular extension 370 thereon telescopically received in the remote ends of the coil spring 366. Thus, by adjusting the screw 348 by inserting a screw driver into the kerf 352, the initial position of the ceiling engaging member 228 may be adjusted. This also provides an adjustment of the force exerted by the spring 366 since it will control the necessary movement of the ceiling engaging member 228 that may be necessary to accommodate variations in ceiling height. By shortening the effective length of the spring, the force exerted on the ceiling will be maintained constant throughout the range of compression and expansion of the spring. Thus, for a particular installation, the ceiling engaging member 228 as well as the floor engaging member 230 may be initially adjusted so

that only a relatively short length of the spring will be compressed when the vertical length of the panel 214 is extended which is the installed position of the portable wall. The short length of compression of the spring enables the maintenance of a constant force being exerted on the ceiling surface as compared to an arrangement where the complete length or a substantial lengthwise portion of the spring is compressed which might occur if the floor-to-ceiling height varies from one end to the other of the portable wall which is not an unusual occurrence in many buildings.

To provide lateral stability to the upper edge of the panel 214, a plurality of stabilizing buttons generally designated by numeral 372 (Fig. 8) are mounted on the horizontal flange 344 of the grid frame 342. These buttons are each in the form of a frusto-conical member 374, preferably of a plastics material, and are shaped to correspond with the internal hollow interior configuration 374 of the web portion 332 of the channel-shaped member 330. The buttons 372 include an anchor pin 376 extending upwardly through a clip 378 which is a commercially available item and involves inwardly extending flanges at the opposite ends of the longitudinal edges thereof so that the clip may be inserted up over the flange 344 and twisted to interlock with the flange 344 of the T-bar or rail 342. Thus, by providing a plurality of the buttons 372 which may be attached to the flange 344 by merely inserting them upwardly and twisting a partial turn, the portable wall system may be stabilized at its upper edge.

With the wall in assembled position, as illustrated in Figure 6, when it is desired to relocate the wall or a portion thereof in another position, it is only necessary to insert the tool into the opening 288 and turn it in a manner to raise the floor engaging member 230 upwardly which lowers the panel 214 so that it will disengage from the ceiling surface 218 and the buttons 372 and be supported by the ball-type casters 236 so that the panel 214 may then be rolled along the floor supporting surface to its desired new location. The buttons 372 may be easily removed and replaced on the frame grid work for the suspended ceiling or additional buttons may be installed wherever desired.

Another embodiment of the invention is illustrated in Figures 12 to 14—and the panel structure is substantially the same as that disclosed in Figures 6 to 11 except that the entire supporting assemblies 232 are omitted. Accordingly, the same reference numerals are utilized in Figures 12 to 14 to indicate like parts. The floor engaging member 230 and the ceiling engaging member 228 are identical, except that the holes 249 which receive the supporting assemblies 232 may be omitted as is the elevating and lowering mechanism 234 for the floor engaging member 230. In this arrangement, the ceiling surface 218^1 is provided with a trackway 380 that may be supported from an overhead support structure 382 in any suitable manner with the trackway 380 including horizontal bottom flanges 384 which may support the ceiling surface 218^1 and also provide a surface for engagement by sealing strips 386 which may be the same as those illustrated in Figs. 6 to 11 or the same as the multiple bladed sealing strips 252 utilized on the floor engaging member 230. The horizontal flanges 384 terminate in spaced relation to each other, thus providing a longitudinal slot 388 receiving an adjustable supporting rod 390 therethrough which has a circular supporting disc 392 retained on the upper end thereof by a retaining nut or the like 394. The supporting rod 390 extends through the central web of the ceiling engaging member 228 and is anchored thereto by retaining nuts 396 and 398 oriented in such a manner that when the disc 392 is engaged with the upper surface of the flanges 384, the seal strips 386 on the ceiling engaging member 228 will be spaced downwardly from the lower surfaces of the flanges 384 as illustrated in Figure 13, which is the condition in which the floor engaging member 230 has been elevated by the elevating mechanism (link 256 etc.) and the panel 214 is suspended for movement along the trackway. By utilizing the disc 392, the panels 214 may be moved in various directions in relation to the ceiling when the trackways are disposed in angular intersecting relations as desired in any particular installation. After the panel 214 has been moved to the desired location, the elevating mechanism is activated to lower the floor engaging member 230 which will increase the vertical height of the panel 214 and elevate the panel 214 so that the seal strips 386 will engage the flanges 384 and form a seal therewith in which position the disk 392 has been elevated from the flanges 384 as illustrated in Figure 12, thus anchoring the panel in the desired location.

While discs 392 have been illustrated for supporting the panel, it is within the purview of this invention to support the panel with conventional rollers or wheels. Likewise any other supporting structure may be used along with a suitable track or other overhead support.

When the panel is lifted off the track 380, it becomes quite rigid and stable since the entire weight is supported from the floor surface by the floor engaging means which due to its frictional resilient contact with the floor will provide stability against lateral or longitudinal movement of the wall.

In such a system, single panels can be

movably supported by the tracks for movement to a final position and the panel is then extended to remove the load from the track. This installation of the panels in a one by one sequence eliminates the necessity of the track supporting the entire wall.

The embodiments of the invention illustrated compensate for changes or variations in the floor to ceiling dimension. Frequently building settlement, snow loads, floor loads and other conditions may cause as much as a one to two inch variation in the floor to ceiling dimension, especially in large open span areas. The walls as disclosed will function effectively without buckling or binding even if such dimensional changes exist prior to or occur after installation.

In each embodiment of the invention, the force exerted on the ceiling surface by the ceiling engaging member can be adjusted and maintained constant and the adjustment of the bottom spring arrangement connected with the floor engaging member serves to support or counterbalance the weight of the panel in a manner to compensate for variations in the floor-to-ceiling heights which may be encountered in typical building structures. By using the disclosed portable wall system, the panels may be installed between a floor and a suspended ceiling utilizing conventional T-bar support rails or grid structures. The anchoring buttons may be attached to the bottom flange of the T-bars by merely a twisting action and the portable wall panels quickly installed and extended in a desired position. The side edges of the panels may be provided with any suitable type of interengaging structure in order to maintain alignment of the panels. The movable wall illustrated in Figures 12 to 14 requires the installation of the overhead trackway and support of the overhead trackway from an adequate overhead support. By installing the trackway in a desired grid pattern, or the like, a proper orientation of a plurality of panels may be easily obtained with the panels being completely suspended from the overhead trackway during movement from one position to another and the side edges of these panels may also be provided with any suitable interengaging structure to provide a desired continuity of seal as well as the alignment of the panels.

The vertical adjustment of the ceiling and floor engaging members enables the side edges of the panels 214 to be disposed in a true vertical orientation even though the floor or ceiling surface may not be level. The ball-type caster combined with the vertically retractable floor engaging member enables the panels to be easily rolled along the floor surface from one location to another and eliminates the use of separate conveying devices, or carts which are normally employed to transport such panels. This arrangement also eliminates the necessity of physically lifting and carrying the panels since the vertical shortening of the panels enables the panels to be rolled from one position to another while in substantially a vertical position. In the wall system shown in Figs. 12 to 14, the overhead trackways provide support for the panels during movement and enable movement to a desired location and the vertical movement of the supporting discs in the trackway completely disengages the rigid components of the trackway from the rigid components of the panel, thereby isolating the panel from any vibration, noise and temperature difference which may exist in the trackway as compared with the panel.

WHAT WE CLAIM IS:—

1. A movable wall comprising at least one wall panel which, in use, extends generally vertically between a floor surface and an overhead surface and which has a fixed vertical dimension slightly less than a predetermined vertical dimension, a bottom seal along the bottom edge of the panel intended for engaging said floor surface, a top seal along the top edge of the panel intended for engaging said overhead surface, either one or both of said bottom and top seals being resiliently biassed vertically and outwardly in relation to the panel and connected to the panel by one or more compressible and adjustable assemblies, the said assemblies or assembly being arranged to enable initial adjustment of the position of said resiliently biased bottom and/or top seal to a position just beyond its final position, said adjustment permitting one in use to compensate for irregularities in building surfaces without changing the force exerted on a floor or overhead surface by said bottom and/or top seal.

2. A movable wall according to claim 1, in which both of said bottom and top seals are vertically movable and at least one of said vertically movable seals is resiliently biassed and includes said adjustable compressible guide assembly.

3. A movable wall according to Claim 1, in which both of said bottom and top seals are vertically movable and said vertically movable top seal is resiliently biased and includes said adjustable-compressible assembly.

4. A movable wall according to Claim 1, in which both of said bottom and top seals are vertically movable and said vertically movable bottom seal is resiliently biased and includes said adjustable-compressible assembly.

5. A movable wall according to Claim 1, in which both of said bottom and top seals are vertically movable and both of said vertically movable seals are resiliently

biased and include said adjustable-compressible assemblies.

6. A movable wall according to Claim 1, in which each of said resiliently biased seals includes an elongate channel-shaped member having a pair of spaced parallel flanges telescopically receiving the opposite surfaces of the panel and longitudinally extending, transversely spaced seals along the channel-shaped member for engaging the floor or overhead surface, said adjustable-compressible assemblies interconnecting the channel-shaped member and panel to enable initial adjustment of the position of the channel-shaped member in relation to the panel.

7. A movable wall according to Claim 6, in which each of said adjustable-compressible assemblies includes an elongate rod extending through and journalled in a central web portion of the channel-shaped member, a portion of said rod being externally threaded and the other portion thereof being externally smooth, a floating guide block screw-threaded onto the threaded portion of the rod, guide means in the panel for preventing rotation of the floating block but enabling vertical movement thereof, a stationary guide block in the panel in spaced relation to the floating guide block and including an aperture rotatably and reciprocally receiving the portion of the rod below the externally threaded portion thereof, a compression coil spring encircling the rod and interposed between the stationary block and floating block to bias the floating block, rod and channel-shaped member outwardly in relation to the panel, and means on said rod accessible exteriorly of the channel-shaped member to enable rotatable adjustment of the threaded rod in relation to the floating block in order to adjust the initial position of the channel-shaped member whereby compression of the spring will enable the channel-shaped member to conform with variations in the floor surface-to-overhead surface height with the initial adjustment of the channel-shaped member enabling the force exerted on the floor or overhead surface by the channel-shaped member to be adjusted to a desired value.

8. A movable wall according to Claim 6, in which the central web portion of said channel-shaped member is shaped to engage one or more positioning fixtures located on the floor or overhead surface between the seals on said channel-shaped member.

9. A movable wall according to Claim 3, in which said vertically movable bottom seal includes a vertically movable bottom member along the bottom edge of the panel, and a manually actuated mechanism for moving said vertically movable bottom member to extended and retracted position and locking said member in both positions.

10. A movable wall panel according to Claim 9, in which said vertically movable member is in the form of a channel-shaped member having spaced parallel, upwardly extending flanges rigid with an interconnecting central web portion and said web portion includes a plurality of screw threaded members swivelling connected thereto, said panel including threaded blocks receiving the screw threaded members whereby rotation of the screw threaded members will extend and retract said channel-shaped member.

11. A movable wall according to Claim 10, in which said screw threaded members are disposed adjacent the side edges of the panel to enable independent adjustment for orienting the side edges of the panel in vertical position.

12. A movable wall according to Claim 9, in which said manually actuated mechanism includes a guide rod connected with said vertically movable member and a linkage assembly, connected with the guide rod, including a rotatable lever connected to the guide rod by a connecting link to cause reciprocation of the guide rod upon angular movement of the lever, there being means supporting said lever to move the connection between the lever and link to an over-centre position with respect to the rotational axis of the lever to lock the vertically movable bottom seal in extended and retracted positions.

13. A movable wall according to Claim 9, in which said panel has mounted on its lower edge one or more rolling supporting assemblies whereby the vertically movable bottom member when in retracted position will be located above said rolling supporting assemblies thereby enabling the panel to be movably supported on the floor surface by the rolling supporting assemblies and whereby the bottom member can move downwardly beyond the rolling supporting assemblies to engage the floor surface thereby forming the sole contact between the panel and the floor surface, and lifting the panel to bring the top seal into engagement with the overhead surface and secure the panel between the floor and overhead surfaces.

14. A movable wall according to Claim 13, in which said vertically movable bottom member is in the form of a channel-shaped member having spaced parallel, upwardly extending flanges rigid with an interconnecting web portion, and longitudinally extending, transversely spaced seal members mounted on said web portion for engagement with the floor surface when in extended position.

15. A movable wall according to Claim 14, in which said rolling supporting assem-

blies are disposed interiorly of the channel-shaped member when in extended position, said web portion having apertures therein enabling passage of the rolling supporting assemblies therethrough when the channel-shaped member is moved to retracted position thereby enabling the rolling supporting assemblies to engage the floor surface and the panel to be moved along the floor surface in upright position when the over-all height of the panel is less than the distance between the floor surface and the overhead surface.

16. A movable wall according to Claim 9, in which said top seal includes one or more upwardly extending support rods each having a supporting assembly mounted thereon for engagement with an overhead track supported from the overhead surface, said support assemblies being movable vertically with the top seal whereby the support assemblies will be disengaged from the track and spaced above the supporting surfaces of the track when said bottom member is extended and the top seal is engaged with the overhead surface or track, said support assemblies being engageable with the supporting surfaces on the track when said bottom member is retracted and the vertical dimension of the panel is shortened thereby suspending the entire weight of the panel from the overhead track and enabling movement of the panel along the track.

17. A movable wall according to Claim 1, in which at least one of said resiliently biased seals includes a manually actuated mechanism for selectively retracting the seal inwardly toward the panel or extending the seal outwardly from the panel for engagement with said floor or overhead surface.

18. A movable wall according to claim 1, in which said panel includes upwardly extending support rods each having a support assembly along the top edge thereof for engagement with an overhead track when the panel has an over-all height less than the distance between the floor surface and overhead surface to enable the panel to be moved while suspended from the overhead track.

19. A movable wall substantially as herein described with reference to and as illustrated in Figures 1 to 5, Figures 6 to 11 or Figures 12 to 15 of the accompanying drawings.

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Sheet 1

Fig. 1

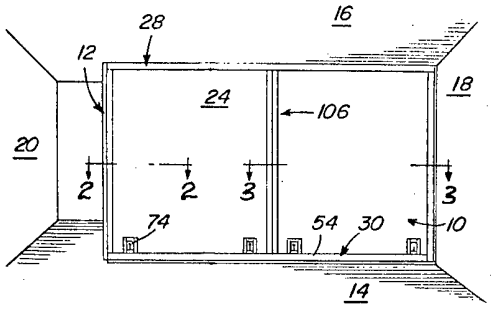

Fig. 4

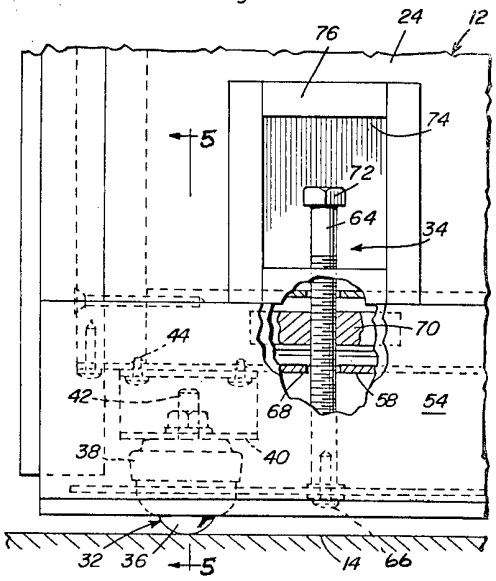

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Fig. 2

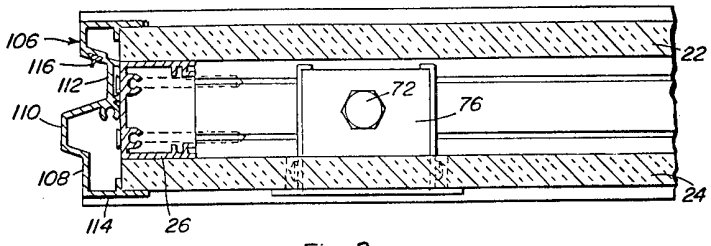
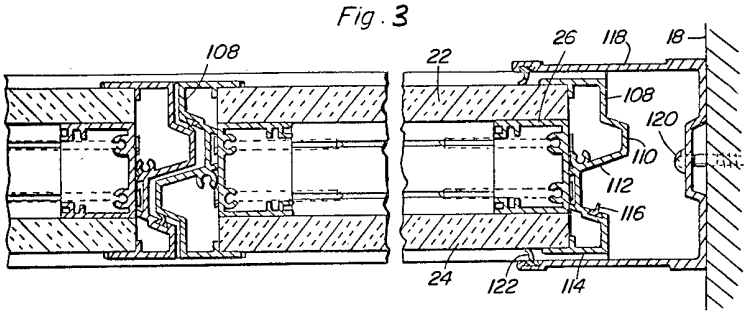


Fig. 3



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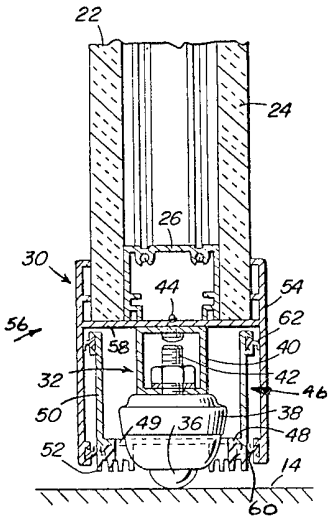

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Fig. 6

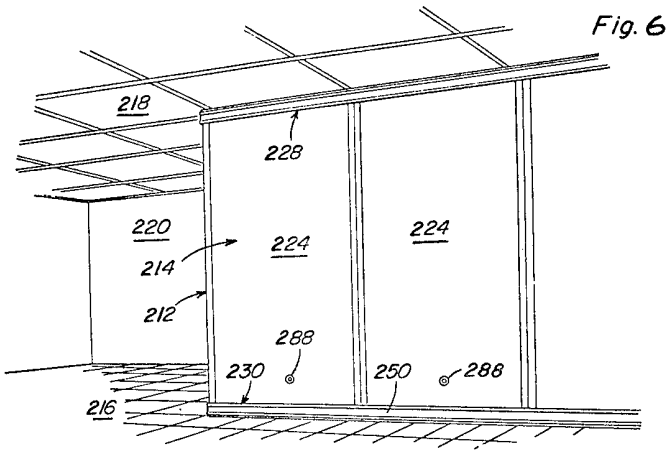

Fig. 10

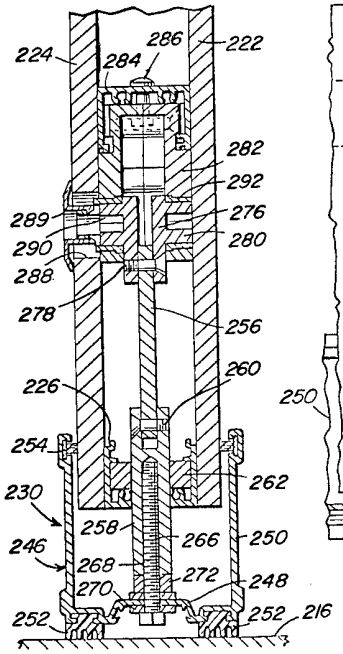

Fig. 11

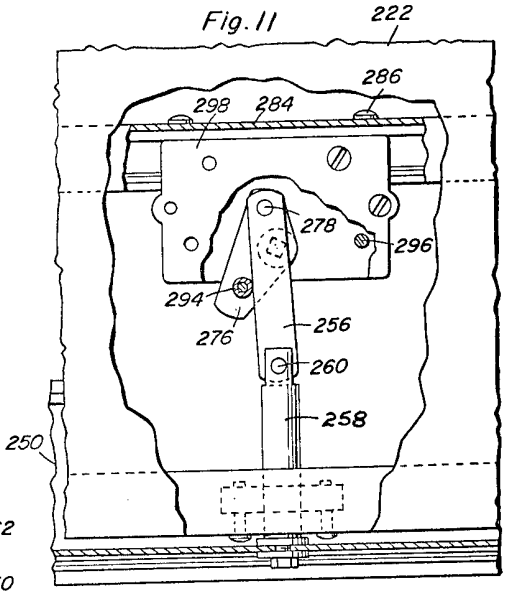

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Fig. 7

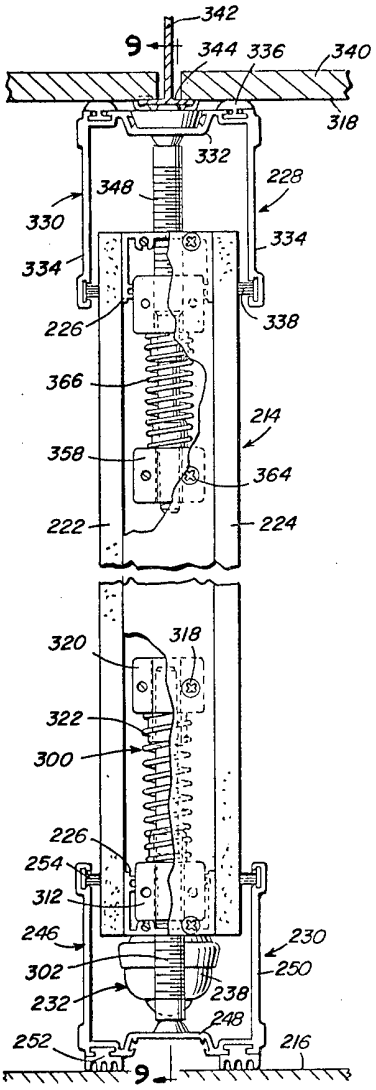

Fig. 8

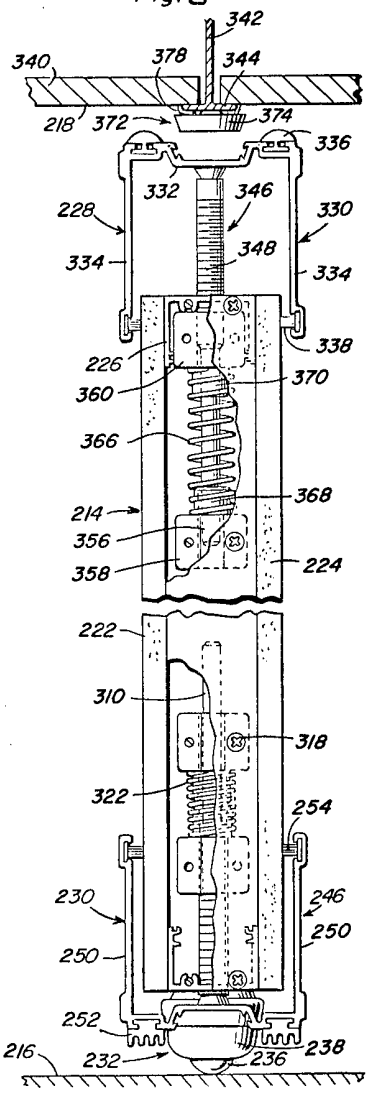

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Fig. 9

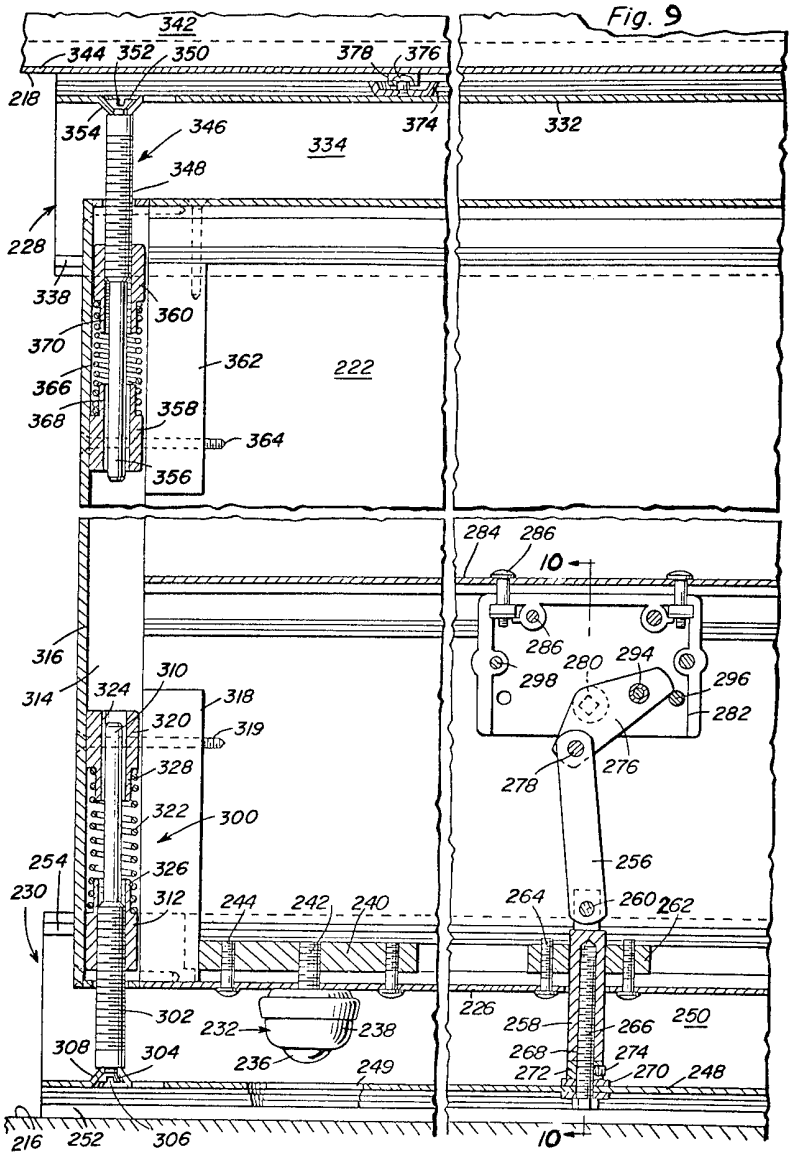

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Fig. 12

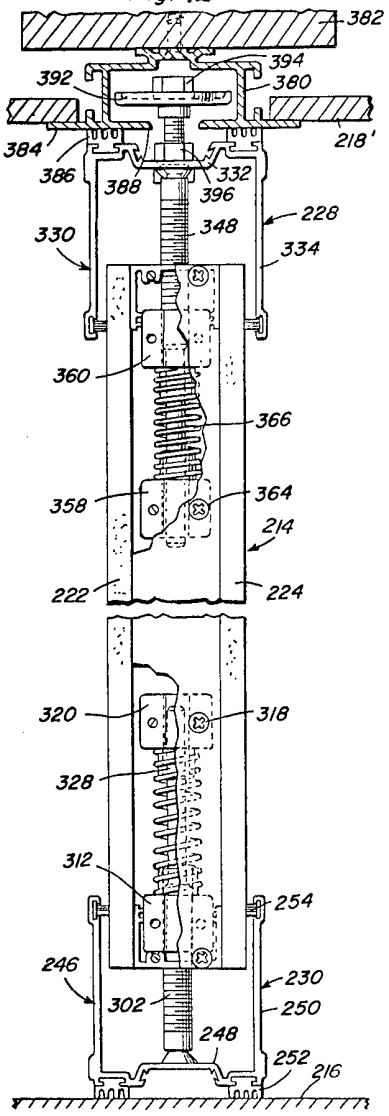

Fig. 13

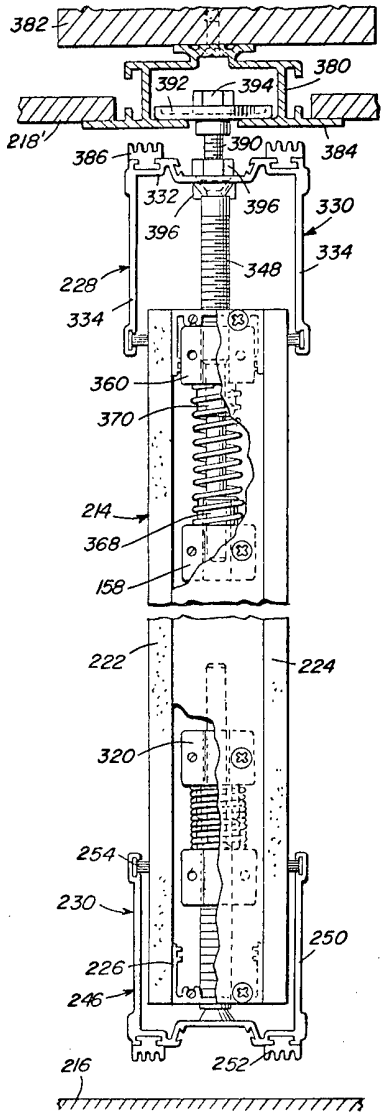

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Fig. 14

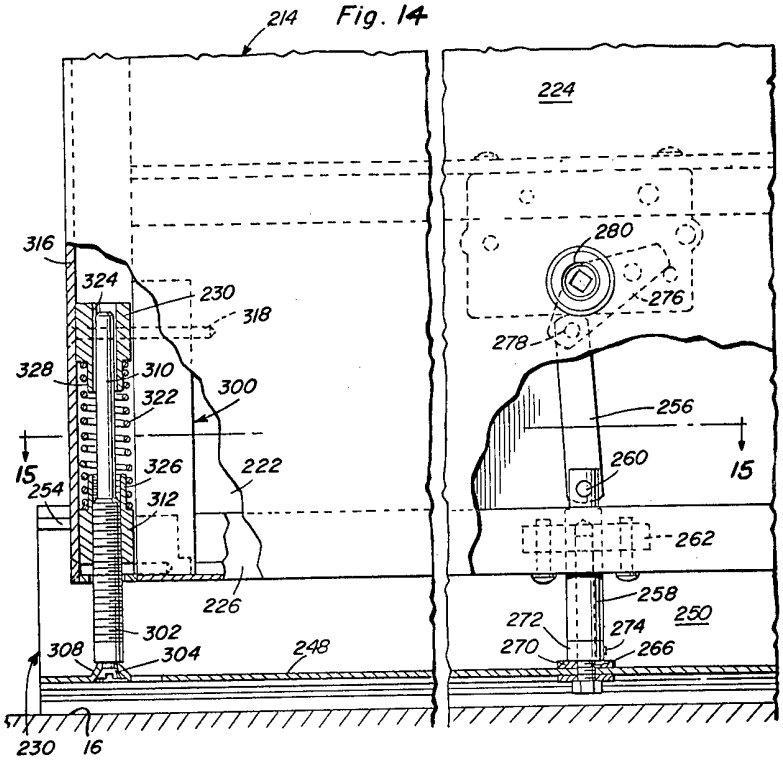

Fig. 15