June 6, 1961 E. R. HAWS 2,987,121

FOLDABLE PARTITION

Original Filed April 4, 1956 8 Sheets-Sheet 1

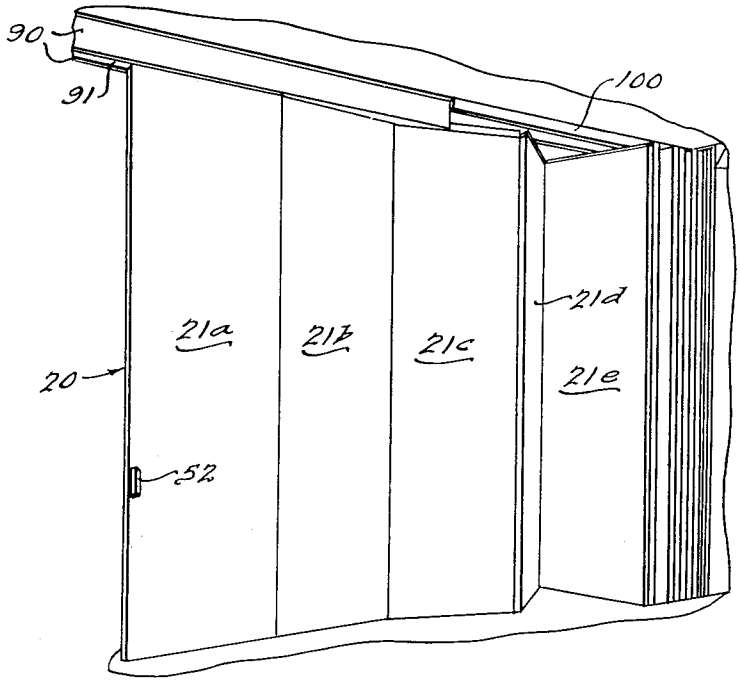

FIG. 1.

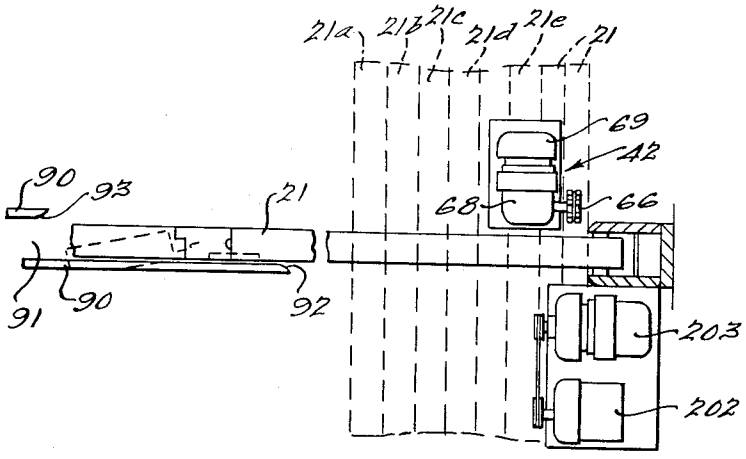

FIG. 2.

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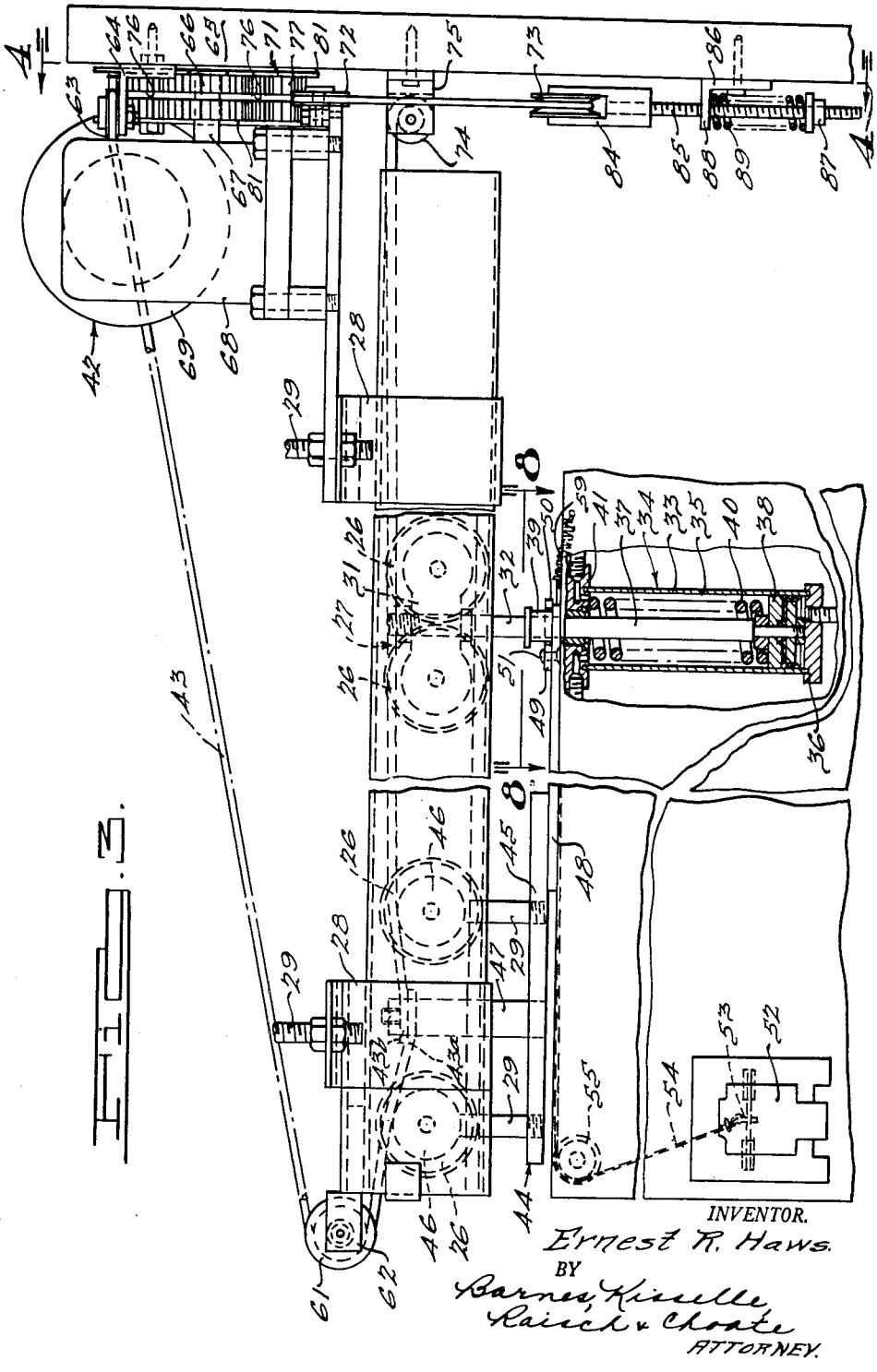

FIG. 2.

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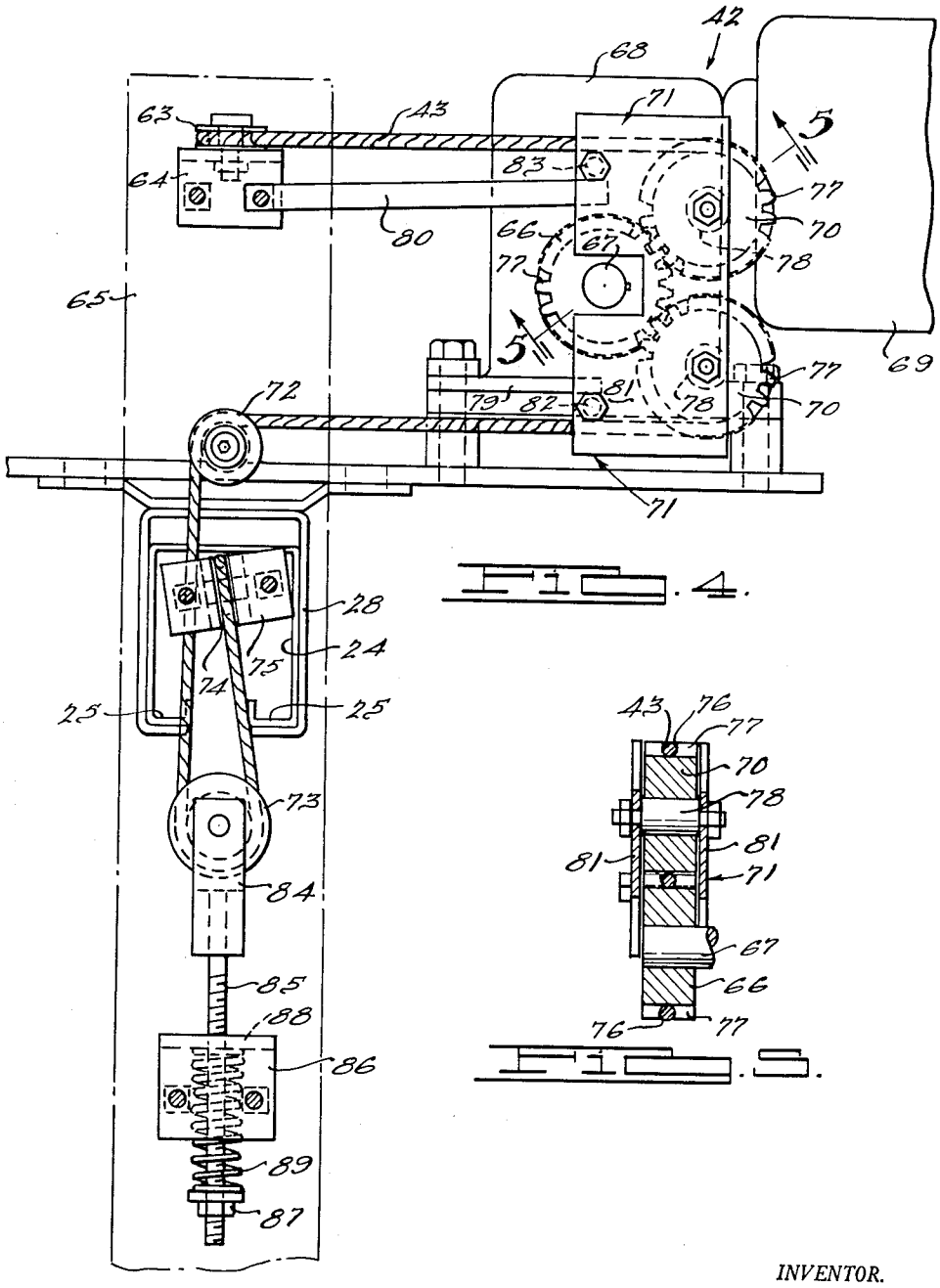

FIG. 4.

FIG. 5.

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FOLDABLE PARTITION

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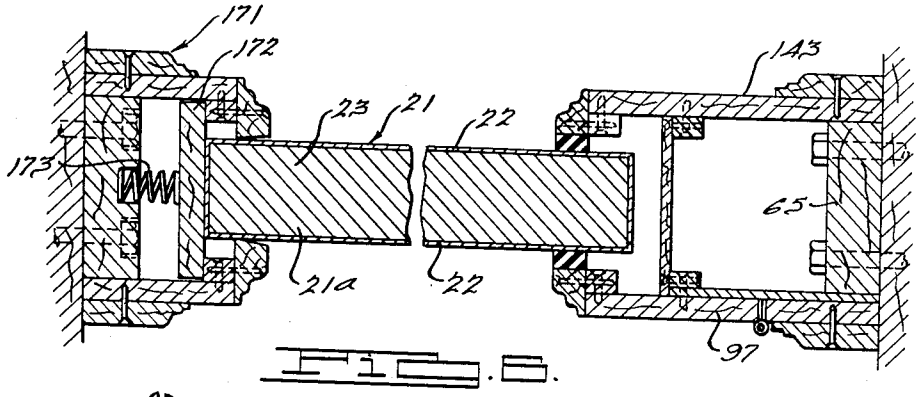

FIG. 8.

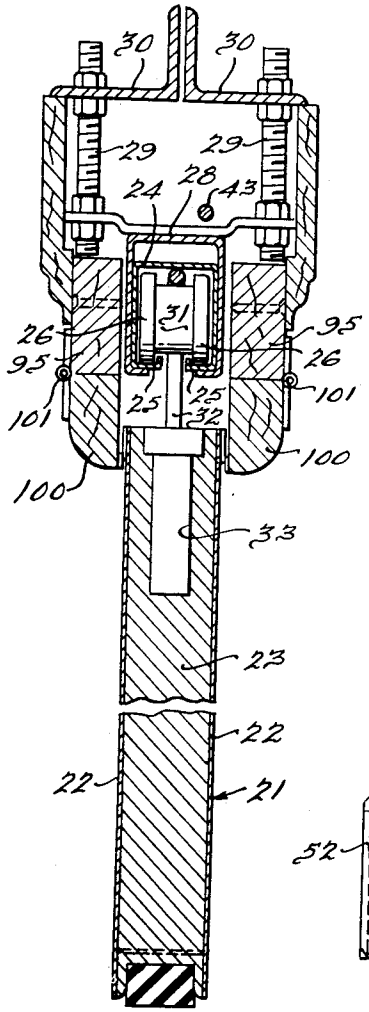

FIG. 7.

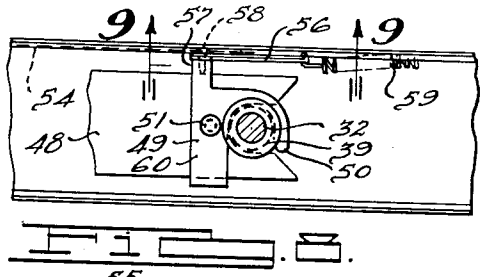

FIG. 9.

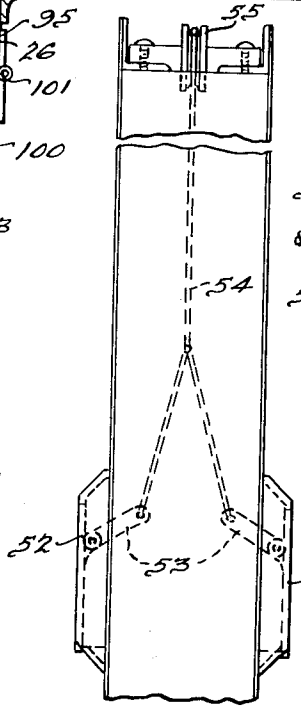

FIG. 10.

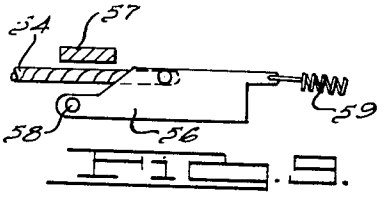

FIG. 11.

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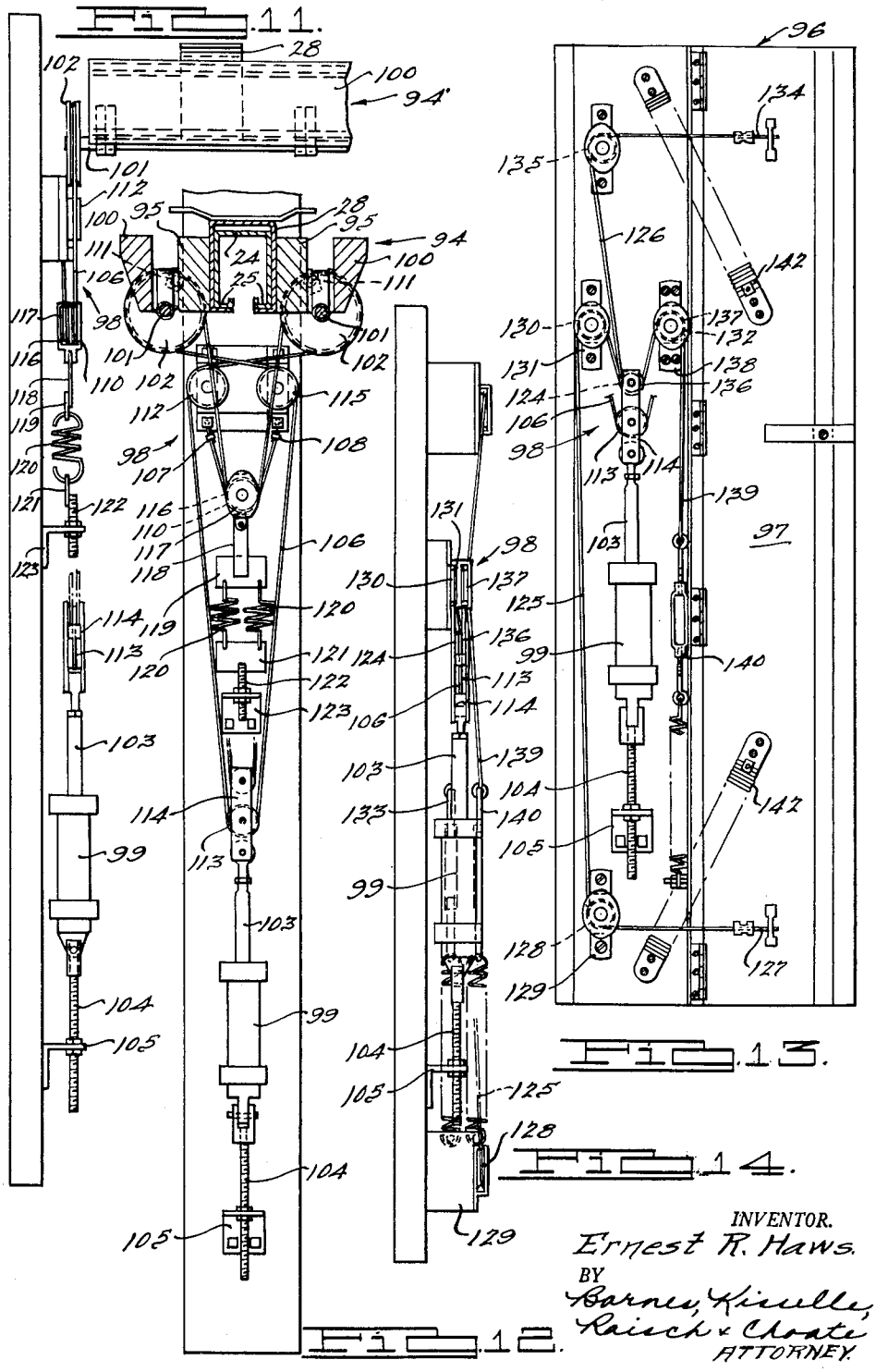

FIG. 11.

FIG. 13.

FIG. 14.

FIG. 12.

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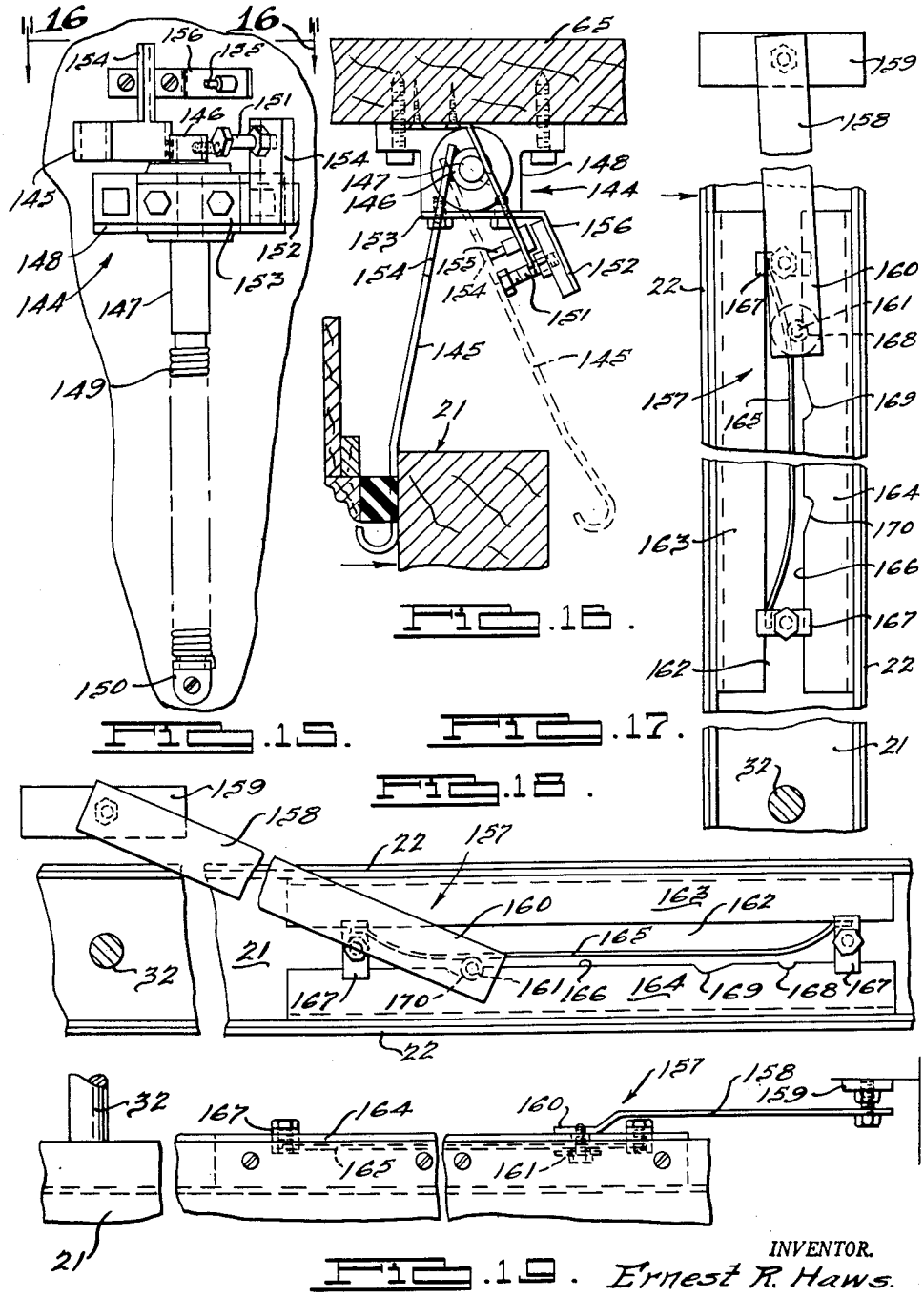

FIG. 15. FIG. 16. FIG. 17. FIG. 18. FIG. 19.

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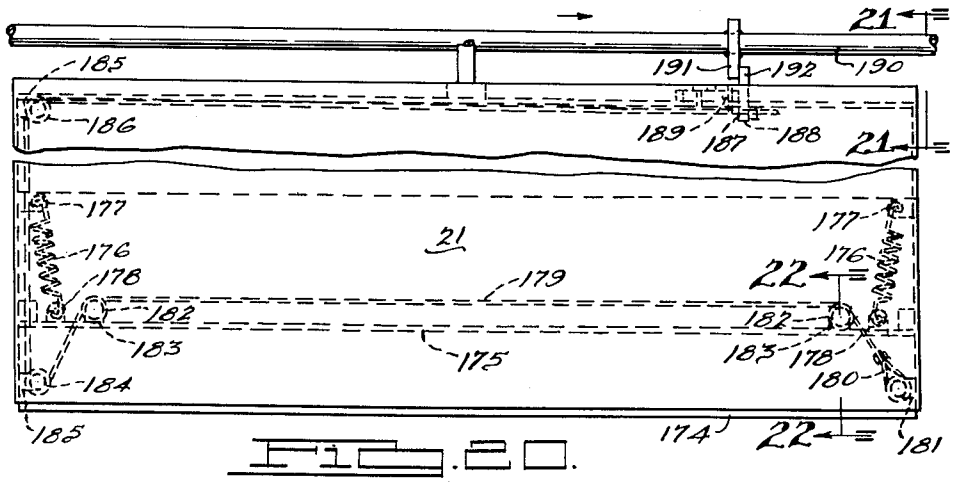

FIG. 20.

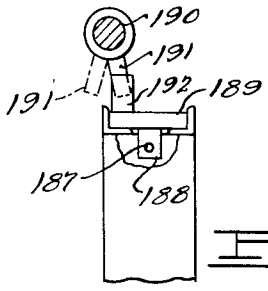

FIG. 21.

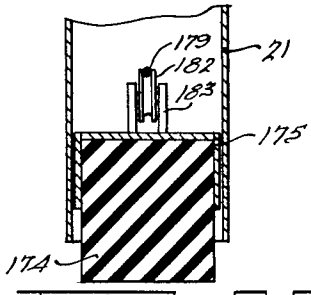

FIG. 22.

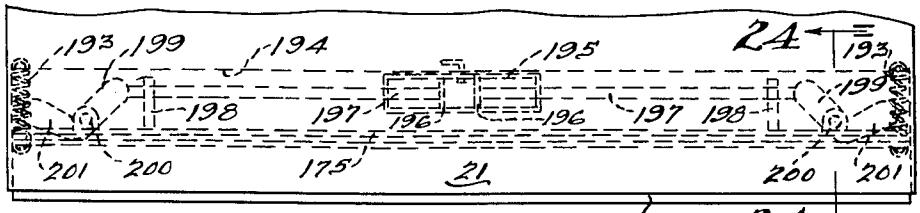

FIG. 23.

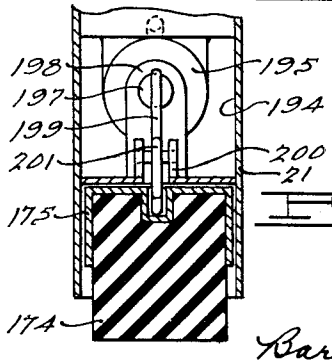

FIG. 24.

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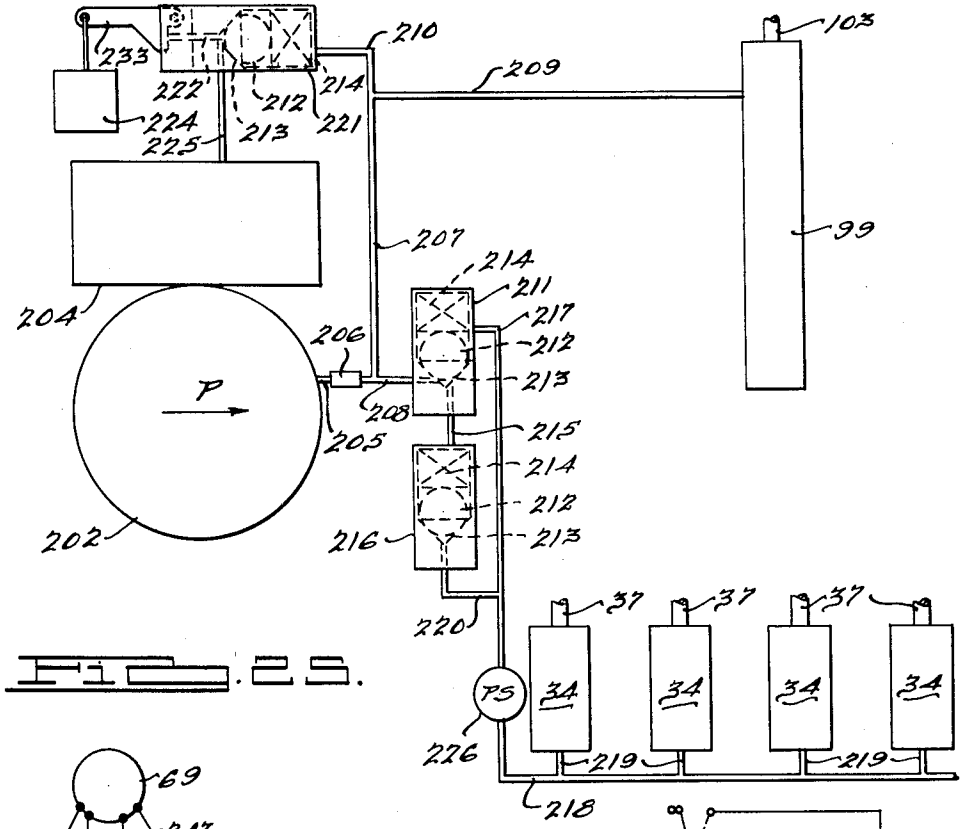

FIG. 25.

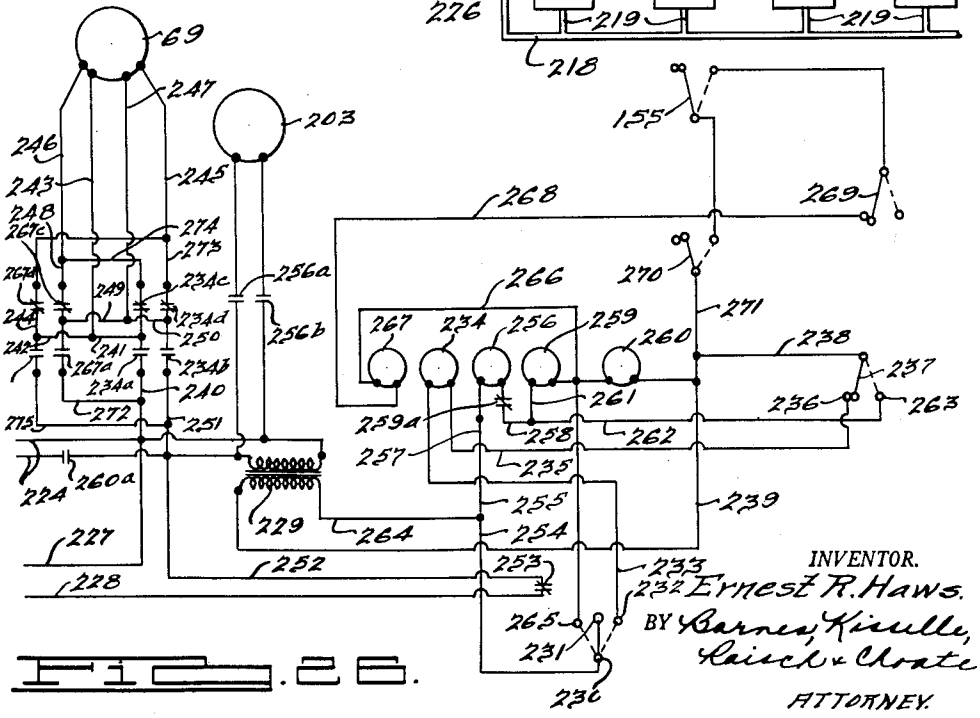

FIG. 26.

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United States Patent Office 2,987,121 Patented June 6, 1961

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FOLDABLE PARTITION

Ernest R. Haws, 23241 Fendell, Detroit, Mich.

Original application Apr. 4, 1956, Ser. No. 576,157, now Patent No. 2,929,445, dated Mar. 22, 1960. Divided and this application Apr. 13, 1959, Ser. No. 805,910
9 Claims. (Cl. 160—188)

This invention relates to foldable partitions or room dividers and more particularly to a foldable partition construction and arrangement embodying fully automatic operation in the folding and unfolding of the partition panels.

It is frequently desirable to be able to temporarily partition large auditoriums and gymnasiums or the like into sections so that several groups of persons may utilize the space to carry on varied activities without interference. The ideal foldable partition for temporarily partitioning a large room would be a room divider having characteristics approaching the rigidity and soundproof qualities of a permanent wall. Yet, such a partition must be comprised of light weight panels easily and efficiently movable into and out of room dividing position.

It is an object of the present invention to provide an improved partition having the desired characteristics of rigidity and soundproofness. It is a further object to provide improved means for moving the partition panel in a desired sequence of movements, that is, to cause the partition panels to be folded or unfolded as desired and in proper sequence therewith to cause the panels to be bodily raised or lowered relative to the room floor, the raising of the panels from the floor affecting the ease of their movement across the room and the lowering of the panels into contact with the floor affecting the stability, rigidity and soundproof qualities thereof when the partition is in room dividing position.

The improved partition structure embodying the present invention comprises rigid panel members hinged to each other along their adjacent vertical edges, at least alternate panel members being swivelly supported at their upper ends from an overhead supporting means, the latter including track means for guiding the partition during its folding and unfolding movements. Also, included is the provision of means for automatically moving the panel into extended position, said panels after reaching extended position being subject to actuation by a second means adapted to lower the panels into tight sealing contact with the floor of the room being divided. In the illustrated embodiment of the invention, the drive mechanism for moving the panels from a folded to an extended condition and then back to a folded condition comprises, preferably, a cable driven by electrically motivated cable drive means, said cable drive means having an improved construction and arrangement whereby the cable is gripped tighter should the resistance of the partition panel to movement increase for any reason, thus ensuring positive driving action under the most adverse conditions.

The mechanism for bodily moving the panels downwardly after they have been extended into their room dividing position comprises, preferably, a hydraulically actuated means. The present invention also includes improved means for straightening and locking the last few panels in extended position, the leading panels being guided into straight extended position by an overhead guide rail. The present invention also includes an improved device for "breaking" the panels when the panels are intended to be moved from extended to folded condition, it being necessary to provide a means for forceably swinging the first panel to be folded to start the proper folding sequence of all of the panels as the partition is moved from its extended condition to a folded condition. The present invention further includes the

provision of means for manually disconnecting the partition from the drive mechanism thus providing a safety device permitting manual movement of the panels in the event of a power failure, the disconnection from the drive mechanism permitting the panels to be freely movable without requiring the exertion of force to otherwise overcome the frictional drag of the drive mechanism.

Other objects, features and advantages of the present invention will appear from the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

FIG. 1 is a perspective view of a foldable partition constructed in accordance with the present invention and showing the partition partially extended.

FIG. 2 is a diagrammatical plan view illustrating the arrangement of the partition operating motors, the latter being adapted to be located in ceiling pockets, which would be located at the upper right hand corner of FIG. 1.

FIG. 3 is a side elevational view of the driving mechanism for extending and retracting the partition and includes details of construction showing how the panel members may be supported for movement along the overhead track means.

FIG. 4 is a view in part sectional taken substantially through line 4—4 of FIG. 3 looking in the direction of the arrows.

FIG. 5 is a sectional view taken substantially through line 5—5 of FIG. 4 looking in the direction of the arrows.

FIG. 6 is a fragmentary horizontal sectional view taken on a plane just below the level of the top of the panels shown in FIG. 1, the view illustrating the relationship of the ends of the partition to the starting and sealing jambs.

FIG. 7 is a fragmentary vertical sectional view taken transversely through the hood jamb.

FIG. 8 is a view in part sectional taken substantially through line 8—8 of FIG. 3 looking in the direction of the arrows.

FIG. 9 is a view taken substantially through line 9—9 of FIG. 8 looking in the direction of the arrows.

FIG. 10 is an end view of the lead panel shown in FIG. 1.

FIG. 11 is a side elevation of the mechanism for automatically operating the hood jambs.

FIG. 12 is a front elevation of FIG. 11

FIG. 13 is a front elevation of the mechanism for automatically operating the side jambs.

FIG. 14 is a side elevation of the mechanism shown in FIG. 13.

FIG. 15 is a front elevation of a means for imparting initial movement to the inner end panel upon folding operation of the partition.

FIG. 16 is a view taken substantially through line 16—16 of FIG. 15 looking in the direction of the arrows.

FIG. 17 is a fragmentary top elevation of a mechanism for controlling the swinging movement of an end panel.

FIG. 18 is a view showing the parts illustrated in FIG. 17 in a second position.

FIG. 19 is a side elevation of FIG. 17.

FIG. 20 is a fragmentary side elevation showing a mechanism for automatically operating the floor seal associated with the bottom of each panel.

FIG. 21 is a view in part sectional taken substantially through line 21—21 of FIG. 20 looking in the direction of the arrows.

FIG. 22 is a sectional view taken substantially through line 22—22 of FIG. 20 looking in the direction of the arrows.

FIG. 23 is a fragmentary view in part similar to FIG. 20 illustrating a second means of operating the floor seal.

FIG. 24 is a view taken substantially through line 24—24 of FIG. 23 looking in the direction of the arrows.

FIG. 25 is a schematic diagram of the hydraulic system utilized in the present embodiment for forcing the panels downwardly after the latter have reached their extended or room dividing position.

FIG. 26 is a schematic diagram of the electrical circuitry of the present invention.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring to FIG. 1, there is shown a foldable partition generally designated **20**. The partition **20** comprises a series of panels **21** hingedly connected to each other by vertically spaced concealed type hinges (not shown). The lead panel **21***a* and at least each alternate panel thereafter, such as the panels designated **21***c* and **21***e*, are swivelly suspended for swinging movement about a vertical axis from an overhead guideway structure extending substantially from wall to wall along the line of division of the space to be partitioned. It will be understood that the last panel **21** is also swivelly suspended. The panels intermediate the swivelly suspended panels, such as the panels **21***b* and **21***d*, are supported and guided by virtue of their hinged connection to the panels **21***a*, **21***c* and **21***e*, and so on. Preferably, each panel **21** is a hollow shell structure several inches thick having sound retarding and heat insulating aluminum facings **22** pressure mounted on a phenolic impregnated heavy fiber honeycomb core **23**. Such a panel is relatively lightweight while being sufficiently rigid to withstand much abuse, such as being crashed into by persons engaged in athletic endeavors when the partition is used in gymnasium installations. Further, such a panel is impervious to expansion, shrinkage or warpage due to variations in seasonal moisture content of the air. As will be noted, the core is suitably hollowed out as required to provide passageways and cavities to receive hydraulic cylinders, tubing, control cable and the like.

The overhead guideway and supporting structure comprises an inverted substantially U-shaped track **24** having inturned lip portions **25** forming the surfaces on which the rollers **26** of panel carrying carriage devices **27** are adapted to roll. The U-shaped track **25** is carried by a series of spaced supporting brackets **28** which in turn are suspended from hanger bolts **29** carried by an overhead truss **30**. The overhead truss **30** is supported by the building walls.

Each carriage device **27** comprises a body member **31** having the rollers **26**, of which there are four, journalled at the corners in any convenient manner. Each body member **31** has journalled therein a vertically extending rod or stem **32**. The rod or stem **32** projects downwardly between the track lip portion **25** to a point below the track **24**. Substantially at the longitudinal center thereof those panels, such as the panels **21***a* and the alternate panels thereafter, which are adapted to be supported by a carriage device **27** are provided with a cavity **33** adapted to receive a hydraulic cylinder assembly **34**. The hydraulic cylinder assembly **34** comprises a cylinder **35** adapted to be connected at its lower end **36** to a source of fluid under pressure. The cylinder piston rod **37** carries a piston **38** at its lower end and is coupled at its upper exposed end by a suitable coupling device **39** to the lower end of the rod or stem **32**. Surrounding the piston rod **37** is a compression spring **40** having one end bearing on top of the piston **38** and the other end bearing against the underside of the upper cylinder head **41**. In effect, the foregoing construction provides a fixed piston and movable cylinder arrangement. The compression spring **40** supports all of the weight of the panel **21** on the piston and piston rod assembly, the latter being supported by the carriage device **27**. The introduction of fluid under pressure to the lower end **36** of the cylinder results in the cylinder **35** and the panel **21** being forced downwardly relative to the piston thereby placing the spring **40** under compression. Upon release of the fluid pressure, the spring **40** will raise the cylinder **35** and the panel **21** attached thereto upwardly to their normal inoperative position. The manner in which the up and down movement of the panels **21** fits into the sequence of operations of the present construction and arrangement will be hereinafter more fully explained.

The present invention embodies an improved drive mechanism for moving the partition **20** from folded to extended and then back to folded condition, as desired. In this preferred form, the drive mechanism, generally designated **42**, utilizes a cable **43**, although a chain drive may be utilized if desired.

Although the cable **43** could be fastened directly to any one of the carriage devices **27**, particularly the carriage device **27** carrying the lead panel **21***a*, an important advantage, as will be explained, may be derived by attaching the cable **43** to a separate lead trolley, generally designated **44**. The lead trolley **44** comprises a body member or platform **45** suspended below the track **24** from hanger bolts **29** carried by shaft housing members **46** in which the lead trolley rollers **26** are journalled in any suitable manner. As best seen in Fig. 3, the body member or platform **45** is provided with an upstanding post **47** to which the cable ends **43***a* and **43***b* are clamped in any convenient manner.

The platform **45** has secured to its underside a rearwardly extending extension piece **48** which, as is best shown in FIG. 8, is provided with a latch device pivotally mounted thereon. The latch device comprises a latch plate **49** swingable in a horizontal plane and having a hook portion **50** thereon. The hook portion **50** is adapted to encircle the coupling device **39** joining the piston rod **37** and the stem or rod **32**, thus coupling the lead trolley **44** to the lead panel supporting carriage device **27**. To uncouple the lead trolley **44** from the immediately following trolley or carriage device **27**, it is only necessary to pivot the latch plate **49** in a counter-clockwise direction about its pivot axis **51** to move its hook portion **50** out of engagement with the coupling device **39**. The latch plate **49** is pivotally actuatable by a remote control cable operated mechanism. Referring to FIG. 19, there is shown mounted on each side of the lead panel **21***a* a pivoted hand grip member **52** having a bell crank lever **53** extending inwardly of the panel. There are two hand grip members **52** accessible from opposite sides of the panel **21***a*. A common cable **54** extends from the levers **53** up and over a pulley **55** suitably mounted at the upper corner of the panel **21***a* to a trigger member **56** mounted on the interior of the panel **21***a* wall. As best seen in FIG. 9, the trigger member **56** underlies an arm **57** on the latch plate member **49**. If one of the hand grip members **52** is grasped and pulled upwardly so as to swing a bell crank lever **53** downwardly about its pivot axis, the cable **54** will raise the trigger member **56** in a counter-clockwise direction about its pivot axis **58**. The upper edge of the trigger member **56** will abut the side edge of the arm **57** of the latch plate **49** causing the latch plate to be pivoted in a counter-clockwise direction about its pivot axis **51**. A spring means **59** is provided to restore the trigger member to its normal inoperative position after actuation. The latch plate will remain in open position until the lead trolley **44** and the lead panel supporting carriage device **27** are brought back into their normal operative relationship. That is, upon the coupling device **39** abutting the inclined edge of the latch plate arm portion **60**, the latch plate **49** will be swung in a clockwise direction so as to

cause its hook portion 50 to again hook over the coupling device 39.

A function of the foregoing structure is to provide an emergency means for releasing the panels 21 from the drive mechanism 42. It will be readily understood that in the event of a power failure, such as might result from a fire within the building, it would be highly desirable to be able to move the panels 21 manually. Without the provision of means for releasing the panels from the drive mechanism, the frictional drag of the latter would make manual movement of the panels extremely difficult.

Referring now to FIGS. 3 and 4 and starting with the end 43*a* of the drive mechanism cable 43, it will be noticed that the cable 43 passes over a pulley 61 mounted on a bracket 62 located substantially at the head end of the guide track 24. The cable 54 then extends completely across the room to a pulley 63 mounted on a bracket 64 secured to a structural member 65 of the building. It will be noted that the axis of the pulley 63 is a vertical axis to permit the cable to change direction and to extend in a substantially horizontal plane towards the cable drive mechanism 42, as best seen in FIG. 4. It will be noted that the cable 43 interwinds about the peripheries of three gears, one of which, the gear 66, is power driven. The power driven gear 66 is keyed to a shaft 67 of a speed reduction unit 68 powered by an electric motor 69. Two vertically spaced idler gears 70 mounted in a cage 71 and the gear 66 in mesh with the idler gears 70 comprise the three gears about which the cable 43 winds. It will be noted that the cable 43 is interwound between the gears 66 and 70 so that it passes around the top of gear 70, then between the top gear 70 and the driven gear 66, then around the gear 66, then between the gear 66 and the bottom gear 70, and then around the bottom gear 70 and off the underside thereof to a pulley 72 mounted for rotation about a horizontal axis on the building structural member 65. From the pulley 72 the cable passes downwardly around a second pulley 73 vertically spaced below the pulley 72 and then back up over a pulley 74 mounted on a bracket 75 secured to the structural member 65 of the building. The cable 43 then follows a substantially horizontal path to the point at which its end 43*b* is secured to the post 47 carried by the lead trolley 44.

FIG. 5 illustrates in cross-section the manner in which the cable 43 winds about the gears 66 and 70 without interfering with the gear teeth. It will be noted that the gears are provided with centrally located and peripherally extending slots 76. The diameter of the cable 43 is slightly larger than the depths of the slots 76 and, accordingly, the cable is slightly squeezed between the meshing gears, the teeth 77 of the gears being in mesh on each side of the cable 43. As has been stated, the gears 70 are idler gears carried by a cage 71, suitable shaft means 78 being provided for journalling the two gears 70 in the cage 71. The cage 71 is a floating unit. The cage 71 is supported only by the meshing relationship of the two idler gears 70 with the power driven gear 66. As the cable 43 is placed in tension it will tend to pull the cage 71 toward the power driven gear 66, thus increasing the tightness of the mesh of the teeth of the power driven gear 66 with the teeth of the idler gears 70 and at the same time increasing the grip of the gear bodies on the cable 43. To prevent the cage 71 from rolling right around the power driven gear 66, a couple of torsion bars 79 and 80 are provided. A torsion bar 79 is secured to the base of the speed reduction unit 68 in any convenient manner and projects into the space between the side walls 81 of the cage unit 71 where it overlies a bolt head 82. The torsion bar 80 is secured in any convenient manner to the bracket 64 holding the upper pulley 63 and extends also into the space between the side walls 81 of the cage unit where it underlies a bolt head 83. The co-action between the torsion bars 79 and 80 and their respective co-acting bolt heads 82 and 83 is such that the cage unit can only move in a substantially horizontal direction inwardly and outwardly as the tension of the cable 43 is increased or decreased. Thus, even if the tension on one side of the cable 43 should be momentarily greater than the tension on the other side, the torsion bars will not permit the cage unit 71 to roll around the power driven gear 66.

The pulley 73 is mounted on a yoke member 84 carried on a head end of an adjusting stud or bolt 85. The adjusting stud projects through a bracket member 86 mounted on the building structural member 65. Interposed between nut means 87 carried on the lower end of the adjusting stud 85 and the flange portion 88 of the bracket member 86 is a compression spring 89. By placing the compression spring 89 under a pre-load, a desired tension may be maintained on the cable 43. Should the cable 43 eventually stretch, it would only be necessary to turn the nut means 87 to increase the compression on the spring 89 thereby taking up the slack in the cable 43, the spring pushing the adjusting bolt further downward.

It will be understood that the overhead track 24 may be concealed within the ornamental ceiling of the room to be partitioned.

Referring now to FIG. 1 and FIG. 2, there are shown a couple of spaced strips of material or rails 90 which extend below the ornamental ceiling of the room and which provide a guide way 91 for the upper ends of the panels 21. As shown in FIG. 4, the rail 90 toward the front extends closer to the side wall 81 of the building than the rail 90 to the rear. It will be understood that FIG. 2 does not represent a true scale picture of the relationship of the two ends of the rails 90. Upon the partition drive mechanism 42 being actuated to move the panels from folded to extended position, the lead panel 21*a* will start to move substantially broad side to the direction in which it should move to give the desired partitioning effect. However, since the front rail 90 will abut the panel 21*a* at a point off center from the panel center of suspension it will cause the panel to start to swing in a counter-clockwise direction, as viewed in FIGS. 1 and 2. As shown in FIG. 2, the rail 90 may be provided with a rounded contact edge 92 to avoid the strip gouging into the upper surface of the panel and the panel may be provided with a wear strip (not shown) along its upper edge. The rear rail 90 having its end 93 further away from the right hand wall 81 of the room will permit the panel 21*a* to swing about its center of suspension until it is substantially parallel and between the rails 90, after which the panel will continue its movement in the desired direction. As the panel 21*a* is pulled across the room it will guide the following panels properly into the guide way or slot between the rails. It will be noted that neither of the two rails 90 extends completely to the right hand wall 81 of the room. As shown in FIGS. 1 and 2, it is obvious that the guide rails 90 cannot extend completely to the wall 81 since room must be provided for the folding and the unfolding section of the panels 21. Accordingly, the present invention embodies improved automatic hood folding and unfolding means as well as improved automatic jamb folding and unfolding means.

The hood structure 94 comprises those strips of material 95 which form an extension of the guide rails 90 extending along the ceiling of the room. The jamb structure 96 includes a vertically extending panel 97 which is located at the extreme right end of the partition as viewed in FIG. 1. The hood and jamb mechanisms embodying the present invention comprise cable mechanism 98 operated from a common hydraulic cylinder 99, these structures being shown in detail in FIGS. 11 to 14 inclusive.

Referring first to FIGS. 11 and 12 which illustrates the hood operating mechanism, it will be noted that the hood structure 94 comprises strips of material 95 secured to the brackets 28 which support the U-shaped track 24. Hinged to each strip 95 on each side of the track is a flap 100. The hinge pivot comprises a longitudinally ex-

tending shaft **101** carrying a pulley **102** at the inner or wall **81** end thereof. The flaps **100** are secured to the shaft **101** so that when the shafts are rotated the flaps will swing. In FIG. 12 the flaps are shown in their up position which corresponds to the position in which they are shown in FIG. 1. In the illustrated embodiment, the flaps **100** are adapted to be pulled down through hydraulic power and are adapted to be restored to their up position, as shown in FIG. 9, by spring power. The reason for this is that the hood flaps **100** are utilized in straightening out the last several panels of the partition after the same have been extended completely across the room, as will be more fully explained. For hydraulically actuating and lowering the hood flaps, the hydraulic cylinder **99** having an upwardly extending piston rod **103** is provided. The hydraulic cylinder **99** is supported at its lower end by an adjusting screw **104** which passes through a mounting bracket **105** secured to a building structural member **65**. The hydraulic cylinder **99** is held in upright position by the tension on a cable **106** through which movement of the piston rod **103** is transmitted to the pulleys **102** mounted on the hood shafts **101**. The cable **106** follows a rather devious path mainly to reduce the distance that the piston rod **103** has to travel to get the desired rotation of the pulleys mounted on the hood shafts. It will be noted that the cable **106** is not a continuous cable, the two ends **107** and **108** respectively thereof being fastened to a bracket **109** mounted on the building structural member **65**.

Referring to FIG. 12 and starting with the left end **107** of the cable **106** it will be noted that the cable passes downwardly around the underside of a pulley **110** then upwardly to the inner side of the right hood shaft pulley **102** and around this latter pulley. To insure that the cable **106** will not slip relative to this pulley **102**, the cable is fastened at **111** to the periphery of the pulley. After almost completely encircling the pulley **102** the cable **106** passes off the underside thereof and laterally of the track **24** to an idler pulley **112** mounted on the bracket **105**. The cable **106** then drops down to a pulley **113** carried by a pulley carrier **114** secured to the upper end of the piston rod **103**. From this pulley **113** the cable **106** passes up to and around a second idler pulley **115** paralleling the first idler pulley **112** and then over to the second or left hood shaft pulley **102**. Here again the cable **106** is secured to the periphery of this pulley to prevent any possibility of the cable slipping relative to the pulley. The cable **106** then passes downwardly through a pulley **116** paralleling the pulley **110** and then back up to where the other end **108** is secured to the bracket **109**. The two pulleys **110** and **116** are mounted in a carrier **117** which is attached to a vertical member **118** connecting the pulley carrier **117** to a plate **119** illustrated as having two tension springs **120** depending therefrom. The lower ends of the two tension springs **120** are hooked into a second plate **121** which has attached thereto an adjusting screw **122**, the adjusting screw **122** passing through a bracket **123** mounted on the building structural member **65**. It will be readily apparent that movement of the adjusting screw **122** upwardly or downwardly relative to the bracket **123** will increase or decrease the tension on the springs **120** which in turn will effect the tension or the degree of slackness in the cable **106**.

In operation, as the piston rod **103** is pulled downwardly due to the appiication of fluid under pressure to the hydraulic cylinder **99** the portions of the cable passing around the pulleys **110** and **116** will also be pulled downwardly. The tension in the cable **103** will be transmitted through the cable **103** to the springs **120** which will be stretched permitting the pulleys **110** and **116** to rise permitting the cable portions to move. Because of the manner in which the cable portions are wound around the pulleys **102**, the pulley **102** mounted on the left hand hood hinge shaft **101** will rotate in a counter-clockwise direction swinging the left flap **100** downwardly and the pulley **102** mounted on the right hand hood hinge shaft **101** will rotate in a clockwise direction swinging the right flap **100** on this shaft downwardly. Upon the hydraulic pressure being released the stored up energy in the springs **120** will cause the pulleys **110** and **116** to be pulled downwardly and this motion will be transmitted through the cable **106** to the piston mounted pulley **113** which will be raised upwardly. The hood flaps **100** will then fly upwardly.

As in the case of the hood flaps **100**, the vertically extending jamb flap **97**, of which there is only one, is moved to a closed position by the application of hydraulic force and is spring urged toward its open position. The same hydraulic cylinder **99** used to actuate the hood flaps **100** is also used to actuate the jamb flap **97**. It will be noted that the carrier **114** connected to the end of the piston rod has mounted therein a second pulley **124** located above the first pulley **113** which was part of the cable and pulley system operating the hood jamb. The cable and pulley system involved in operating the jamb flap **97** is much simpler than that used in operating the hood flaps **100**. The jamb flap cable and pulley mechanism involves use of two separate cables **125** and **126**, respectively. The cable **125** is connected at its one end **127** to the jamb flap **97** near the bottom thereof and extends from this connection around an idler pulley **128** mounted on a bracket **129** located near the bottom of the building structural member **65**. The cable **125** then passes upwardly to an idler pulley **130** mounted on a bracket **131** secured to the building structural member **65** and passes over the pulley **130** downwardly around the pulley **124** carried by the carrier **114** connected to the piston rod **103**. The cable **125** then passes upwardly over an idler pulley **132** mounted in parallel relation to the idler pulley **131** and then downwardly to a toggle bolt **133**. The second cable **126** is connected at **134** to the jamb flap **97** near the upper end thereof and passes from its point of connection over a pulley **135** located substantially vertically above the pulley **128** over which the first cable **125** passed. The second cable **126** passes downwardly through a second pulley **136** in alignment with the pulley **124** carried by the carrier **114** attached to the piston rod **103** and then passes upwardly over a second idler pulley **137** mounted in the same bracket **138** in which the idler pulley **132** over which the first cable **125** passed is mounted. The free end **139** of this cable **126** is also connected to the upper end of the toggle bolt **140**. The cable **125** and the cable **126** could be one piece divided into two effective sections which are related on each side of a common toggle bolt. Each toggle bolt **133** and **140** is connected to a tension spring **141** secured to the building structure element. It will be readily apparent that each toggle bolt **133** and **140** may be adjusted to increase or decrease the tension on the tension spring **141** thereby increasing or decreasing the tension in the cable system.

The jamb flap **97** is urged in its open direction by two coil springs **142** which, as shown in FIG. 13, lie across the hinge line of the jamb flap. When the jamb flap **97** is pulled to a closed position by hydraulic actuation the two springs **141** are folded over at the hinge line and since they have a tendency to exert a force which would cause them to straighten up they are always urging the jamb flap **97** in its open or outward direction. Thus, as soon as the pressure is released in the hydraulic cylinder **99** the springs **141** will exert tension through the jamb flap **97** on the cables **125** and **126** causing the piston rod **103** to be pulled back up. The mechanism is then ready for actuation the next time it is desired to close the jamb flap **97**.

Referring for a moment to the right end of FIG. 6 the relationship of the jamb flap **97** to the cabinet structure **143** in which the hydraulic actuating and the cable and pulley mechanism **98** are concealed is clearly visible. Likewise, with reference to FIG. 7, the relationship of the hood flaps **100** to the overhead structure is also clearly visible.

In the foregoing there has been described the structural

features embodying the construction of the partition, the overhead support structure, the drive mechanism, the safety device for permitting the manual disconnecting of the panels from the drive mechanism, the hood operating mechanism and the automatic jamb operating mechanism. Some reference has been made to the manner in which the individual mechanisms and units operate without any indication being given as to the sequence in which the various operations or movements might occur. However, before this can be done there are a few additional features of construction to be described.

Referring to FIGS. 15 and 16, there is illustrated a mechanism for "breaking" the partition **20** so that it can be folded after having been extended across the room. Upon the drive mechanism **42** being reversed to pull the lead panel **21***a* from left to right as viewed in FIG. 1, the last panel **21** would have the normal tendency merely to travel in a straight line until it ran into a wall member. To start the panel folding properly, pressure must be exerted on the end thereof in the direction of the arrow shown in FIG. 16.

The pressure applying mechanism, generally designated **144** comprises an arm **145** secured, as by welding, to a collar **146**. The collar **146** is carried on the upper end of a vertically extending shaft **147**. The shaft **147** is journalled in a bracket **148** secured to a building structural member **65**. Beneath the bracket **148** the shaft **147** carries a torsion spring **149**, one end of which is affixed to the shaft **147** and the other end of which is hooked over the bracket **150** journalling the lower end of the shaft **147**. Thus, as viewed in FIG. 16, when the arm **145** is forced in a clockwise direction the torsion spring **149** is wound up ready to drive the arm **145** to the dot and dash position shown in FIG. 16.

An adjustable stop **151** is mounted on an arm **152** of bracket **153** secured to the front face of the bracket **148**. This stop limits the swinging movement of the arm **145** in a counter-clockwise direction.

The arm **145** is shown with an upstanding portion **154** adapted, in the dot and dash position of the arm, to engage a limit switch **155**, for a reason to be hereinafter explained. The limit switch **155** is mounted on arm or bracket **156** secured to the building structural member **65** above the bracket **148**.

The pressure or partition "breaking" device **144** may be mounted at any convenient height above floor level.

After the partition **20** has been "broken" by the pressure device **144**, it is desirable that the movement of the last panel **21**, the panel affected by the pressure device **144**, be controlled or guided to prevent the panel from flopping from first one side and then to the other. Accordingly, the present invention includes a control or guide means, generally designated **157**. The control or guide means comprises an arm **158** located above the panel **21** and pivotally journalled on a bracket **159**. The bracket **159** may be secured in any convenient manner to the track **24**. The free end **160** of the arm **158** is provided with a roller **161** adapted to operate in a slot **162** formed by two spaced horizontal metal strips or the like **163** and **164**, respectively.

An elongated leaf spring **165** is provided to maintain the roller **161** in bearing engagement with the edge **166** of the strip **164**. The spring **165** is maintained in proper position by clamps **167** interposed between the strips **163** and **164** at each end thereof.

The edge **166** of the strip **164** is notched at three places, that is, it is provided with notches **168**, **169** and **170**, respectively. The notch **168** provides a rest position for the roller **161** when the panel **21** is in the position shown in FIG. 17. That is, the panel **21** lies beneath the track **24** in parallel relationship thereto. Upon the panel being moved by the pressure device **144** in the direction of the arrow in FIG. 17, the roller **161** will leave the notch **168** and will be urged into the notch **169**. As the panel **21** continues to be moved so that its center of suspension **32** moves toward the bracket **159**, the roller **161** being hooked in the notch **169** results in the arm **158** being swung in a counter-clockwise direction as viewed in FIG. 17. And, as the center of suspension **32** of the panel moves toward the bracket **159**, the panel swings about its center of suspension in a clockwise direction, the swinging movement being stabilized by the arm **158**. Finally, the relationship shown in FIG. 18 is reached. The swinging movement of the panel in a clockwise direction had continued until the roller **161** was forced out of the notch **169**. The panel then continued to move relative to the roller **161** until the notch **170** was reached, the spring **165** forcing the roller **161** into this notch. It will be noted from FIG. 18 that the center **32** is as close to the bracket **159** as it can get without the panel **21** going beyond the right angle relationship to the position it had in FIG. 17.

Upon the partition **21** again being unfolded or extended the roller **161** will remain in contact with the notch **170** causing the arm **158** to swing in a clockwise direction, as viewed in FIG. 18, as the panel suspension point **32** moves away from the bracket **158** and the panel swings in a counter-clockwise direction about its center of suspension. This continues until the relationship shown in FIG. 17 is again attained.

Referring now briefly to FIG. 6, there is shown at the left end thereof the structure comprising the sealing jamb, generally designated **171**. The sealing jamb **171** is the structure for receiving the end of the panel **21***a* should the partition **20** be of the type that extends from wall to wall of the room. It will be understood that the room may be of such a width that it might be desirable to have two partitions **20** each extending from a side wall and meeting at the center of the room. In such an arrangement, each partition would be provided with a starting jamb comparable to that shown at the right end of FIG. 6. It will be further understood that these details do not directly affect the operability of the folding partition. The sealing jamb, **171**, may be provided with a buffer **172** mounted by spring means **173** on the building wall and adapted to be abutted by the end of the partition **21***a* so as to provide a tight seal at this end.

Although the partition panels **21** are adapted to be raised and lowered hydraulically to cause the panels to press tightly against the floor of the room in which the partition is installed, there may be circumstances or conditions of installation in which it may be desirable to have the rubber seal, which is usually provided at the bottom of each panel **21**, itself independently movable up and down. In FIGS. 20 to 24 inclusive, there are shown two alternative methods of mounting and motivating the rubber seals for upward and downward movement relative to the panels **21***a*. Referring first to the construction illustrated in FIGS. 20 to 22 inclusive, the rubber seal **174** is shown mounted in a channel seal carrier **175**. The seal carrier **175** is suspended by suitable suspension springs **176** from the panel **21**. It will be noted that the panel has attached to the end walls thereof brackets **177** adapted to receive the upper ends of the springs **176**. It will be further noted that the seal carrier **175** is provided with brackets **178** adapted to receive the lower ends of the spring **176**. Suitable mechanism is provided for urging the seal carrier **175** and thereby the seal **174** downwardly relative to the panel **21**. The mechanism includes a cable **179** having its one end **180** tied to a bracket **181** fastened to the end wall of the panel **21**. From the bracket **181** the cable passes up and over two or more pulleys **182** mounted on brackets **183** secured to the top of the seal carrier **175**. The cable **179** then passes downwardly around and under another pulley **184** mounted on a bracket **185** at the left end of the panel **21**, as viewed in FIG. 20. The cable **179** then passes upwardly along the inner side of the left end of the panel **21** where it passes over a pulley **186**. The cable **179** then passes along beneath the top of the panel **21** to the point where its end **187** is adapted

to be connected to a depending projection **188** carried by a slide **189**. Referring to FIG. 20, it will be readily apparent that if the slide **189** is moved to the right the cable **179** will be placed under tension causing it to exert a downward pressure on the pulleys **182**. The downward pressure exerted on the pulleys **182** will force the rubber seal downwardly against the upward urging of the tension springs **176**.

The slide **189** may be moved to the right, as viewed in FIG. 20, by any convenient means. There is illustrated a draw bar **190** having a projection **191** thereon. Referring to FIG. 21, the draw bar with its downwardly depending projection **191** is normally in the position shown in dotted outline. Upon all of the panels **21** having reached their extended position across the room, the draw bar **190** will be given a slight turn in a counterclockwise direction, as viewed in FIG. 21, so that the projection **191** thereon will be in alignment with the upstanding projection **192** on top of the slide **189**. On the draw bar **190** being moved to the right by any suitable means, the projections **191** and **192** will abut each other causing the slide **189** to be moved to the right and will result in the seal **174** being pressed against the floor. It will be understood that the structure shown in FIG. 20 will be duplicated for each panel **21**.

In FIGS. 23 and 24 there is illustrated a mechanism comprising a hydraulic cylinder adapted to move the seal carrier **175** and the rubber seal **174** carried thereby in a downward direction relative to the panel **21**. As in the previously described embodiment, the seal carrier is suspended from the bottom of the panel **21***a* by suspension springs **193**, the panel being provided with a convenient or suitable recess **194** for receiving the suspension springs and the other parts of the mechanism for raising and lowering the seals. Also mounted in a recess **194** above the seal carrier **175** is a double ended hydraulic cylinder **195**. The cylinder **195** is provided with two pistons **196** and two piston rods **197** extending in opposite direction. Since the piston rods are of substantial length, suitable support structures **198** may be provided to support the free ends of the piston rods. The free end of each piston rod **198** abuts one arm of a bell crank lever **199** pivotally mounted on a bracket **200** carried by the upper side of the seal carrier **175**. Each bell crank lever **199** is provided with an arm **201** which extends in a substantially horizontal direction, the arm **201** acting more in the nature of a cam. Referring to FIG. 23, it will be noted that if the pistons **196** and piston rods **197** are moved in a direction to cause the bell cranks **199** to pivot about their pivot axis so that the arms **201** thereon will be swung in a downward direction, the arms **201** will cam the seal carrier **175** downwardly against the upward urging of the springs **193**. Upon the hydraulic pressure in the cylinder **195** being released the spring will restore the seal carriers to their uppermost position; also restoring the parts of the hydraulic actuating mechanism to their normal inoperative position.

The foregoing substantially completes the detailed description of the construction and arrangement embodying the present invention. Further understanding of the manner in which the individual mechanisms and units operate and also further understanding as to the sequence in which the various operations or movements might occur may best be obtained after first explaining FIGS. 25 and 26 which, respectively, schematically illustrate the hydraulic and electrical circuits involved in the present invention.

Referring first to FIG. 25, a pump **202** adapted to be driven by an electric motor **203** (see FIG. 1) is illustrated. The pump **202** is adapted to draw fluid from a sump, reservoir or tank **204**. The pump **202** discharges into a line **205** having a check valve **206** therein. Beyond the check valve **206**, the line **205** splits into two branches **207** and **208**, respectively. The branch **207** in turn splits into two additional branches **209** and **210**, respectively.

The branch or line **209** leads to the hydraulic cylinder **99** which operates the automatic hood and jamb folding mechanisms. The line or branch **208** of the main line **205** leads to a relief valve **211**. The relief valve is provided with a ball **212** urged into sealing contact with its seal **213** by a spring **214**. It will be noted that fluid flowing through line **209** is directed, when the ball **212** is in contact with its seat **213**, to a line **215** leading to a second relef valve **216**. In the relief valve **211**, the fluid under pressure from line **208** tends to raise the ball **212**; whereas, in relief valve **216** the fluid under pressure from line **215**, which line is actually a conduit of line **208**, tends to urge the ball **212** into seating engagement, as will be further explained. The relief valve **211** is connected above its ball **213** by a line **217** to a line **218** having branches **219** leading to each of the panel **21** hydraluic actuating cylinders **34**. The relief valve **216** has a line **220** leading from beneath its ball **212** to the line **218**.

The branch line **210**, shown at the upper portion of FIG. 25, leads to a release valve **221**. The release valve **221** is of similar construction to the relief valves, that is, it has a ball **212** adapted to seat against a conical seat **213** and spring urged into seating engagement by a spring **214**. The line **210** leads into the spring side of the ball. The ball **213** of the release valve **221** may be dislodged from its seat by a rod **222** which may be pushed in ball unseating direction by a bell crank lever **223** actuated by a solenoid **224**, as will be more fully explained. The release valve **221** has a line **225** leading therefrom to the sump or tank **204**.

In operation, the fluid under pressure from the pump **202** passes through the line **205**, through the check valve **206** and into the lines **207** and **208**. At this moment the fluid in the line **208** does not have enough pressure to force open the relief valve **211**. Therefore, all of the fluid will flow through the line **207** to the two branches **209** and **210**. The fluid through the branch **210** is stopped because it urges the ball **212** of the relief valve **221** into tighter seating engagement with its seat **213**. Therefore, the fluid will flow through the line **209** into the hydraulic cylinder **99** which operates the tautomatic hood and jamb folding mechanisms. It will be recalled that the hoods and jamb are hydraulically forced into closed position. Upon the completion of the closing movement of the hoods and jamb, the pressure will build up in the hydraulic cylinder **99** resulting in increased pressure in the lines **209**, **207** and back to line **208**. The pressure buildup in line **208** will be sufficient to cause the ball **212** of the relief valve **211** to lift from its seat thereby permitting fluid to flow from the line **208** through the relief valve **211** into the line **217**, and thence to the line **218** and into the branches **219** leading to the hydraulic cylinders **34** located in the various panels **21**. The pressure buildup in the cylinders **34** will overcome the resistance of the springs **40** resulting in the panels **21***a* being forced downwardly.

Before the partitions **21***a* can be retracted or returned to a folded condition, the pressure in the system must be released. This is accomplished through the release valve **221**. The solenoid **224** is actuated to swing the bell crank lever **233** in a direction to cause the rod **222** to unseat the ball **212** from the seat **213** of the release valve **221**. The pressure in the hydraulic cylinder **99** will then drop permitting the springs which are part of the hood and jamb operating mechanism to retract the piston rod **103** forcing the fluid under pressure from the cylinder **99** back through line **209** and then through line **210** past the ball **212** into the line **225** leading to the tank **204**. Meanwhile, the spring pressure of the spring **214** in the relief valve **211** will be strong enough to cause the ball **212** to seat against its seat **213** thereby blocking any return flow of fluid through the line **217**. However, the line **220** is a bypass for the line **217** under this condition and as the springs **40** in the various panels **21** cause retraction or upward movement of the panels

21 the fluid beneath the pistons 38 in the cylinders 34 will be forced back through the lines or branches 219 into the line 218 and then through line 220 through the valve 216, the ball 212 of the valve 216 being lifted off its seat by the pressure of the fluid. The fluid being discharged from the cylinders 34 will then flow through the line 215 through the relief valve 211 into the line 208 leading therefrom and then through line 207 and into branch 210 from where it will find its way back to the tank 204 through the release valve 221.

Provision may be made to operate the bell crank lever 233 by a manual pull cord in case of a power failure rendering the solenoid 224 inoperative.

It will be noted that the line 218 was indicated as having a valve 226 therein, the valve designation being the letters PS within a circle. The PS is a designation for a pressure switch. It will be understood that when the partition is extended across a room, the hydraulic pressure in the cylinders 34 as well as the hydraulic pressure in the cylinder 99 is acting to maintain the panels 21 in their down position and to maintain a hood and jambed in their closed positions, respectively. Pressure having been applied to the hydraulic system by the pump 202, the check valve 206 will maintain the fluid in the system under pressure and prevent the fluid from backing up into the pump. Under ideal conditions, the pressure would be maintained at the cut-off point until the release valve 221 was actuated to permit the fluid in the system to discharge back into the reservoir or tank 204. At the completion of the actuation of the hoods and jamb by the hydraulic cylinders 99 and the actuation of the panels by the cylinders 34, and upon pressure in the system reaching the predetermined cut-off point, the pressure switch 226 will automatically be actuated to cut-off the electric current to the pump motor 203.

As long as the partition is in its extended position, it is desirable that the pressure in the system be maintained above a limit at which the panels would begin to rise or the hoods and jamb would start to move away from the panels. The pressure switch 226 thus may be used to compensate for any seepage that might occur in the hydraulic cylinders 34 and 99. Should the pressure in the hydraulic cylinders 34 drop because of seepage, the pressure switch 226 would respond by closing the circuit leading to the electric motor 203 of the pump 204, thereby causing the pump motor to start up and to pump the pressure in the system back up to the predetermined cut-off point. Likewise, if seepage in the hydraulic cylinder 99 should cause a drop in the fluid pressure of this part of the circuit, this pressure drop would be reflected at the relief valve 216. The pressure in the conduit 218 leading to the hydraulic cylinders 34 would be greater than the pressure on the top side of the ball 212 of the relief valve 216 causing the ball 212 to rise off its seat and thereby causing a drop in pressure in the conduit 218. In other words, the pressure in the hydraulic cylinder 34 side of the system would become equal to the pressure in the hydraulic cylinder 99 side of the system. The drop in pressure in the conduit 218 would be reflected at the pressure switch 226 thereby permitting this switch to close causing the pump motor to re-start.

Referring now to FIG. 26, the schematic electric circuit involved in the present invention is illustrated. As illustrated the electrical circuit comprises a one hundred and ten volt single phase circuit feeding power into lines 227 and 228. The electrical circuit includes a number of relays, microswitches, a key operated switch, a thermo-reset switch, a pressure switch and limit switches. All of the foregoing relays and switches utilize 24 volt current, which is obtained from a transformer indicated at 229. Movement of the partition 20 is actuated by operation of a key switch 230 which has to be held in the "in" or "out" position to cause movement of the partition. The purpose of this is to keep the operator from leaving while the partition is in motion.

To cause movement of the partition in the out direction, that is, from a folded position to an extended position across the room, the key must be turned so that a circuit is closed through the button 232 of the key operated switch 230. The actuation of the key operated switch 230 causes the switch contact 231 to engage the button 232 leading to the line 233. The line 233 leads to the input terminal of the coil of a control relay designated 234. The output side of the coil of the control relay 234 is connected to line 235 which leads to a terminal 236 of a limit switch 237. When the partition panels are in folded position, the limit switch 237 is closed, as shown in solid line in FIG. 25, thus providing a circuit through lines 238 and 239 to the input side of the transformer 229. The control relay coil 234 will thus be energized causing normally open control relay elements 234*a* and 234*b* to close and normally closed relay elements 234*c* and 234*d* to open, the relay 234 being a double throw unit.

To permit the circuit to be followed, it will be assumed that power line 227 is the input line. Thus, current will flow through line 227, line 240, relay element 234*a*, and to line 241. From line 241 the current splits into two branches formed by lines 242 and 243. From line 242 the current travels through line 244, through normally closed relay 267*d* to line 245. Lines 243 and 245 each lead to input terminals of the motor 69. It will be understood that the motor 69 is a split-phase motor having starting and running windings. Thus, lines 243 and 245 tie into the leads to the running and starting windings, respectively. In the condition as has just been described, lines 246 and 247 represent lines connected to the output terminals of the motor 69. The current flow from line 246 is through line 248, normally closed relay 267*c*, line 249, into line 250. The output current through line 247 ties into line 250 directly. Line 250 feeds into line 251 including the relay 234*b* which is now in closed condition due to the energization of the control relay coil 234. Line 251 feeds into line 252 which is connected to one side of a thermo-reset relay 253, the output side of the thermo-reset relay 253 being tied into power line 228. It should be noted that although control relays 234*c* and 234*d* are shown as normally being closed, when the key actuated switch 230 has been turned so as to close the circuit through the button 232 thereby energizing the control relay 234, the control relay elements 234*c* and 234*d* are open and no current can flow through the branches in which they are positioned.

Upon the partition 20 reaching its fully extended position the limit switch 237 is operated so as to open the same, that is, causing the arm thereof to move from solid line position to the dot and dash position, thereby causing the arm to move off the button 236 and to engage the button 263. This stops the operation of the motor 69, because upon the circuit through the button 236 being broken the control relay 234 is de-energized causing the control relay elements 234*a* and 234*b* to open thereby isolating the motor from the input and output sides of the power source. However, it will be noted that the transformer line 264 has the two branches 254 and 255 leading therefrom. The branch 254 leads to the key actuated switch 230.

The branch 255 leads to the input terminal of a control relay 256 which when energized closes normally open contacts 256*a* and 256*b* thereby causing operation of pump motor 203. The line 255 has in series therewith a normally closed switch 257 which is the switch operated by the pressure device 226 shown in the hydraulic circuit diagram. As was stated, the switch 257 remains closed until the pressure in the system builds up to a predetermined cut-off point at which point the switch is forced open to thereby deenergize the control relay 256, causing the contacts 256*a* and 256*b* to open and causing motor 203 to stop. Line 258 connected to the output side of control relay 256 contains normally closed relay

contacts 259*a* related to control relay 259, having a function to be hereinafter explained.

In close proximity to control relay 259 is control relay 260 which when energized closes normally open contacts 260*a* thereby energizing solenoid 224, the solenoid which controls the action of the release valve 221 of the hydraulic circuit. The line 258 containing the contact relays 259*a* is joined with lines 261 and 262. The line 261 contains the aforementioned control relay 259. The line 262 leads to the terminal 263 of the limit switch 237.

Thus, upon the extension of the partition panels 21 completely across the room, the limit switch 237 arm will be moved from contact 236 to contact 263, causing the motor 69 to stop and pump motor 203 to start up. Pump motor 203 will cause pump 204 to pump fluid into the hydraulic system until the pressure switch 257 is forced open.

Should the pressure in the hydraulic system drop, the switch 257 will close, as has been explained, and the pump 203 will again start to deliver pressure.

The circuit for controlling the movement of the partition from "out" or extended condition to "in" or folded condition is slightly more complicated in that it includes additional limit switches, for reasons which will become apparent. To cause the partition to move in, that is, to fold, the operator must turn the key switch to make contact between the contact 231 and switch contact 265 thus closing a circuit between line 254 and line 266, the latter leading to the input terminal of control relay coil 267. The output terminal of the control relay 267 is hooked up to line 268 which is attached to one terminal of normally closed limit switch 269. In series with limit switch 269 are two additional limit switches, the normally open limit switches 155 and 270. Limit switch 155 has been mentioned before, it being shown in FIGS. 15 and 16. The line 271 containing the limit switches 155 and 270 ties in with line 239 leading to the transformer 229.

Thus, in order for the control relay 267 to be energized the key switch 230 contact 231 must be in contact with button 265 and the limit switches 155 and 270 must be closed. Turning the key switch 230 to close contact 231 with contact 265 closes a circuit through the control relay 260 causing the solenoid 224 to be energized thereby opening release valve 221 and dumping the pressure in the hydraulic system. The release of the pressure in cylinders 34 will cause the partition panels 21 to be spring lifted as has been explained. Release of pressure in the cylinder 99 will permit the hood flaps 100 to raise by spring action and the jamb panel 97 to swing open, again by spring action. Upon the jamb opening the limit switch 270 will be moved from its normally open to a closed position. With the release of the pressure of the hood and jamb against the panels 21, the spring 149 will drive the arm 145 in a direction to "break" the last panel 21. Upon the arm portion 154 engaging the limit switch 155, this switch will close. The control relay 267 is now part of a closed circuit and will be energized causing its contacts 267*a* and 267*b* to close and its contacts 267*c* and 267*d* to open.

In the motor 69 circuit the condition now exists that current will flow through line 227 to line 272. In line 272 the current flows through now closed contacts 267*a* to line 249. From line 249 the current splits two ways. One branch is through line 247. The other branch is through line 250, to line 273 having normally closed contacts 234D in series therewith and then to line 245 to the motor.

On the output side of the motor current flows out through lines 243 and 246. From line 246 the current flows through line 274 having normally closed contacts 234*c* in series therewith, line 274 joining line 241 which makes a juncture with line 242. Line 243 also joins with line 242 and the current flows through now closed contact relays 267*b* through line 275 to a juncture with line 252 and on out through line 228.

The movement of the partition in the "in" or folded direction continues until the normally closed limit switch 269 is tripped and held open thus cutting the current to the cable drive unit motor 69.

It will be understood that the direction of rotation of the motor 69 is controlled by the actuation of the switch 230. With switch 230 closed at contact 232, input current to the motor was through leads 243 and 245 and output flow was through leads 246 and 247. With switch 230 closed at 265, input current to the motor is through leads 247 and 245 and output flow through leads 246 and 243. Thus, in effect leads 243 and 247 have been reversed. It will be readily understood that the reversal of a split-phase motor is easily accomplished by reversing one set of leads, preferably the leads to the starter winding. Preferably, leads 243 and 247 are the leads to the starter winding of the motor 69.

A brief resume of the operation sequence of the foldable partition embodied in the present invention is as follows: The operation involved in a complete cycle of the partition begins with the turning of the key in the key operated switch 230 to the "out" direction, it being assumed that the partition 20 is in a folded condition when it is desired to extend the partition across the room. Upon the key being turned and held toward the "out" position, the cable drive unit 42 will drive the partition in an outward or extended direction until the lead panel 21*a* of the partition reaches the out limit switch 237, causing the cable drive unit motor 69 to stop and the pump or hydraulic unit motor 203 to start up. The hydraulic unit 202, pumping oil to the hydraulic cylinder 99 located in the vertical jamb section, first causes the jamb 97 to pull the innermost panel within reach of the upper hood 100. Secondly the upper hood 100 aligns the first sections of the partition, which have no guide track at the top, as has been explained. After the jamb 97 and hood 100 have completed their operations, the pressure buildup in the hydraulic system causes the relief valve 211 to open causing the hydraulic pressure to shift to the cylinders 34 within the partition panels. The partition is then pressed downwardly to the floor. As has been explained, the partitions are maintained in tight engagement with the floor through the medium of the pressure switch 226.

The retraction of the partition begins with the turning of the key in the key operated switch to the "in" position. The first thing which occurs after the turning of the key to the "in" position is the energization of the solenoid 224 attached to the hydraulic system, the solenoid causing the pressure release valve 221 to open thereby releasing the pressure in the hydraulic system. Upon the hydraulic pressure being released, the doors will be spring raised to their up position. Also, the hood and jamb mechanism are restored to the up and open condition through the medium of the springs 120 and 142 which form part of their mechanism. The innermost panel 21 will be "broken" by the action of the spring loaded arm 145. As soon as the arm reaches a predetermined position as determined by the adjustable stop 151, the limit switch 155 will be closed and the circuit will be completed energizing the cable drive unit motor 69 causing the partition 20 to be moved by the cable unit 42 in a retracted or folding direction. When the partition is completely folded, as determined by the limit switch 269, the cycle is completed.

This application is a division of my copending application Serial No. 576,157, filed April 4, 1956, now Patent No. 2,929,445, issued Mar. 22, 1960.

I claim:

1. An electrical control system for a foldable partition installation having a partition propelling mechanism adapted to be driven by a first electric motor and a hydraulic system pump adapted to be driven by a second electric motor, said control system including an actuating switch means, a first circuit including control elements

related to said first and second motors, and a second circuit including control elements related only to said first motor, said first motor when controlled through said second circuit operating in a reverse direction to that in which it operates when controlled through said first circuit, said actuating switch means being adapted to selectively connect either said first or second circuits to a source of electrical current.

2. An electrical control system for a foldable partition installation having a partition propelling mechanism adapted to be driven by a first electric motor and a hydraulic system pump adapted to be driven by a second electric motor, said control system including an actuating switch means, a first circuit including control elements related to said first and second motors, and a second circuit including control elements related only to said first motor, said first motor when controlled through said second circuit operating in a reverse direction to that in which it operates when controlled through said first circuit, said actuating switch means being adapted to selectively connect either said first or second circuits to a source of electrical current, said first circuit being divided into a first motor control circuit and a second motor control circuit having a common switch means therebetween, said common switch means being in closed relation to said first motor control circuit and in open relation to said second motor control circuit when said partition is in folded condition, said actuating switch means upon connecting said first circuit to said current source causing said partition to be moved to extended position by said propelling mechanism, said common switch means being automatically actuated to open said first motor circuit upon said partition reaching fully extended position thereby stopping said first motor and to close said second motor circuit thereby starting said second motor to drive the pump of the hydraulic system.

3. An electrical control system for a foldable partition installation having a partition propelling mechanism adapted to be driven by a first electric motor and a hydraulic system pump adapted to be driven by a second electric motor, said control system including an actuating switch means, a first circuit including elements related to said first and second motors, and a second circuit including control elements related only to said first motor, said first motor when controlled through said second circuit operating in a reverse direction to that in which it operates when controlled through said first circuit, said actuating switch means being adapted to selectively connect either said first or second circuits to a source of electrical current, said first circuit being divided into a first motor control circuit and a second motor control circuit having a common switch means therebetween, said common switch means being in closed relation to said first motor control circuit and in open relation to said second motor control circuit when said partition is in folded condition, said actuating switch means upon connecting said first circuit to said current source causing said partition to be moved to extended position by said propelling mechanism, said common switch means being automatically actuated to open said first motor circuit upon said partition reaching fully extended position thereby stopping said first motor and to close said second motor circuit thereby starting said second motor to drive the pump of the hydraulic system, said second motor control circuit containing a pressure responsive switch effective to open said second motor circuit upon the pressure in the hydraulic system reaching a predetermined maximum.

4. An electrical control system for a foldable partition installation having a partition propelling mechanism adapted to be driven by a first electric motor and a hydraulic system pump adapted to be driven by a second electric motor, said control system including an actuating switch means, a first circuit including control elements related to said first and second motors, and a second circuit including control elements related only to said first motor, said first motor when controlled through said second circuit operating in a reverse direction to that in which it operates when controlled through said first circuit, said actuating switch means being adapted to selectively connect either said first or second circuits to a source of electrical current, said first circuit being divided into a first motor control circuit and a second motor control circuit having a common switch means therebetween, said common switch means being in closed relation to said first motor control circuit and in open relation to said second motor control circuit when said partition is in folded condition, said actuating switch means upon connecting said first circuit to said current source causing said partition to be moved to extended position by said propelling mechanism, said common switch means being automatically actuated to open said first motor circuit upon said partition reaching fully extended position thereby stopping said first motor and to close said second motor circuit thereby starting said second motor to drive the pump of the hydraulic system, said second motor control circuit being adapted to remain energized after said partition reaches extended position even if said actuating switch means is released, and pressure control means effective to open or close said second motor control circuit in response to variations in pressure in the hydraulic system supplied by said hydraulic pump.

5. An electrical control system for a foldable partition installation having a partition propelling mechanism adapted to be driven by a first electric motor and a hydraulic system pump adapted to be driven by a second electric motor, said control system including an actuating switch means, a first circuit including control elements related to said first and second motors, a second circuit including control elements related only to said first motor, said first motor when controlled through said second circuit operating in a reverse direction to that in which it operates when controlled through said first circuit, said actuating switch means being adapted to selectively connect either said first or second circuits to a source of electrical current, said actuating switch means when connecting said first circuit to a current source causing said partition to be propelled from a folded to an extended position, and means effective upon said partition reaching extended position to actuate said first motor control elements to stop said first motor and to actuate said second motor control elements to start said second motor.

6. An electrical control system for a foldable partition installation having a partition propelling mechanism adapted to be driven by a first electric motor and a hydraulic system pump adapted to be driven by a second electric motor, said control system including an actuating switch means, a first circuit including control elements related to said first and second motors, a second circuit including control elements related only to said first motor, said first motor when controlled through said second circuit operating in a reverse direction to that in which it operates when controlled through said first circuit, said actuating switch means being adapted to selectively connect either said first or second circuits to a source of electrical current, said actuating switch means when connecting said first circuit to a current source causing said partition to be propelled from a folded to an extended position, means effective upon said partition reaching extended position to actuate said first motor control elements to stop said first motor and to actuate said second motor control elements to start said second motor, said second motor control elements including means effective as long as said partition is in extended position to energize said second motor independently of said actuating means switch upon a drop of pressure in the hydraulic system.

7. An electrical control system for a foldable partition installation having a partition propelling mechanism adapted to be driven by a first electric motor and a hydraulic system pump adapted to be driven by a second electric motor, said control system including an actuating

switch means, a first circuit including control elements related to said first and second motors, a second circuit including control elements related only to said first motor, said first motor when controlled through said second circuit operating in a reverse direction to that in which it operates when controlled through said first circuit, said actuating switch means being adapted to selectively connect either said first or second circuits to a source of electrical current, said actuating switch means when connecting said first circuit to a current source causing said partition to be propelled from a folded to an extended position, means effective upon said partition reaching extended position to actuate said first motor control elements to stop said first motor and to actuate said second motor control elements to start said second motor, said last mentioned means including a normally closed pressure responsive switch adapted to open the circuit to said second motor only upon a predetermined pressure being reached in the hydraulic system.

8. An electrical control system for a foldable partition installation having a partition propelling mechanism adapted to be driven by a first electric motor and a hydraulic system pump adapted to be driven by a second electric motor, said control system including an actuating switch means, a first circuit including control elements related to said first and second motors, a second circuit including control elements related only to said first motor, said first motor when controlled through said second circuit operating in a reverse direction to that in which it operates when controlled through said first circuit, said actuating switch means being adapted to selectively connect either said first or second circuits to a source of electrical current, said actuating switch means when connecting said first circuit to a current source causing said partition to be propelled from a folded to an extended position, means effective upon said partition reaching extended position to actuate said first motor control elements to stop said first motor and to actuate said second motor control elements to start said second motor, said last mentioned means including a normally closed pressure responsive switch adapted to open the circuit to said second motor only upon a predetermined pressure being reached in the hydraulic system, said pressure responsive switch automatically closing the circuit to said second motor upon the pressure in the hydraulic system dropping below a predetermined limit.

9. An electrical control system for a foldable partition installation having a partition propelling mechanism adapted to be driven by a first electric motor and a hydraulic system pump adapted to be driven by a second electric motor, said control system including an actuating switch means, a first circuit including control elements related to said first and second motors, and a second circuit including control elements related only to said first motor, said first motor when controlled through said second circuit operating in a reverse direction to that in which it operates when controlled through said first circuit, said actuating switch means being adapted to selectively connect either said first or second circuits to a source of electrical current, said actuating switch means when connecting said second circuit to a current source causing pressure release means to release the pressure in the hydraulic system and the partition then to be retracted from an extended to a folded position by said first motor.

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