Feb. 4, 1969 K. J. CARLO 3,425,173

APPARATUS FOR PARTITIONING A ROOM HAVING A STEPPED FLOOR

Filed Aug. 28, 1967

Sheet 1 of 3

FIG-1

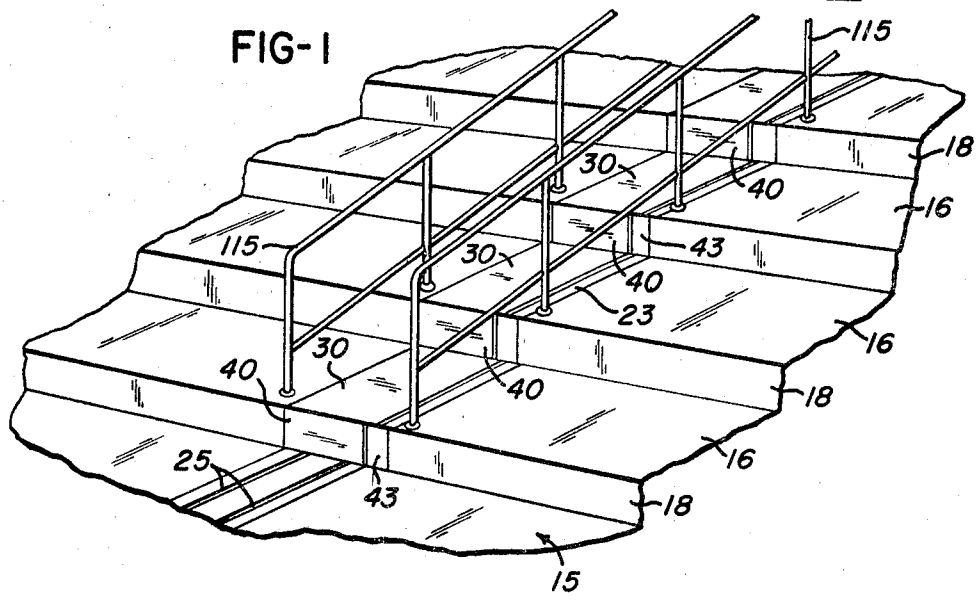
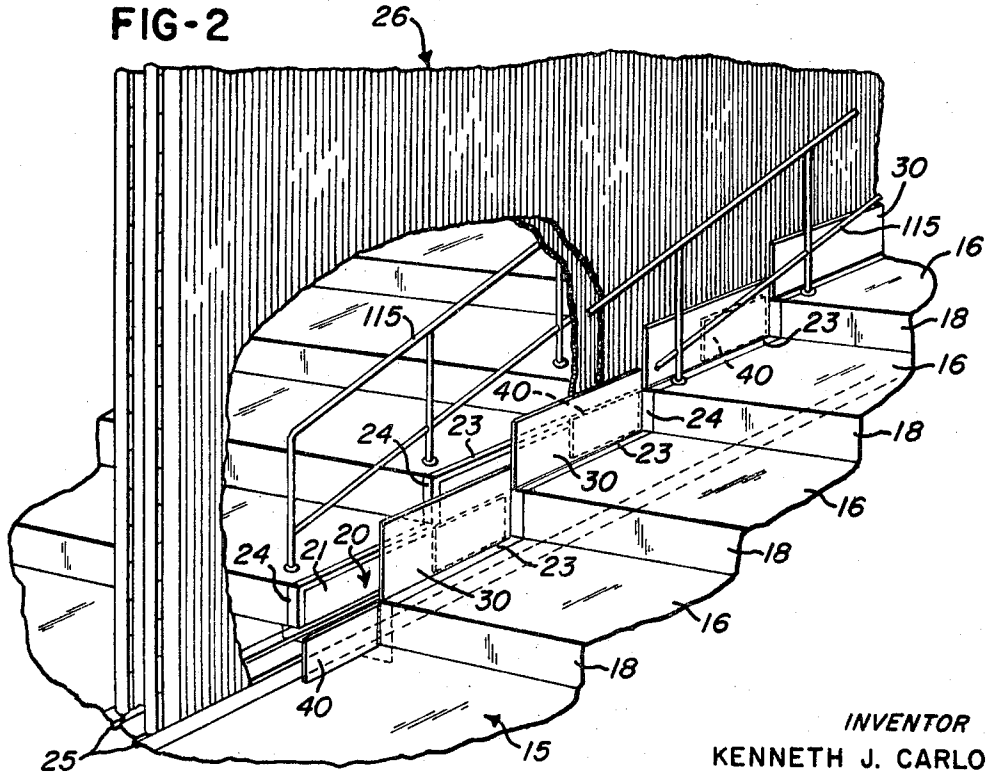


FIG-2



INVENTOR
KENNETH J. CARLO

BY
Marechal, Bibel, French & Bugg
ATTORNEYS

Feb. 4, 1969 K. J. CARLO 3,425,173

APPARATUS FOR PARTITIONING A ROOM HAVING A STEPPED FLOOR

Filed Aug. 28, 1967 Sheet 2 of 3

FIG-3

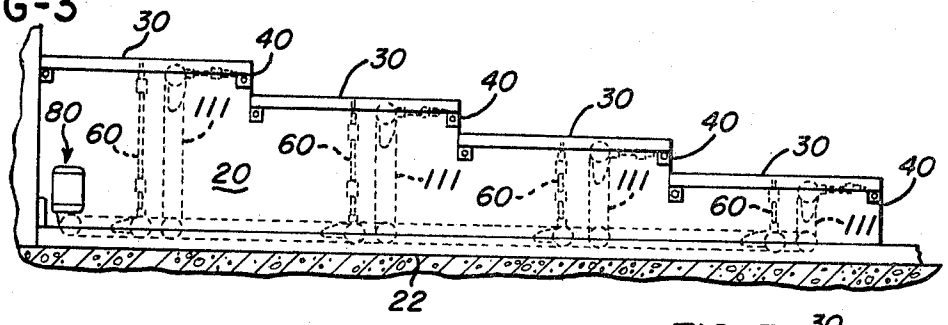


FIG-4

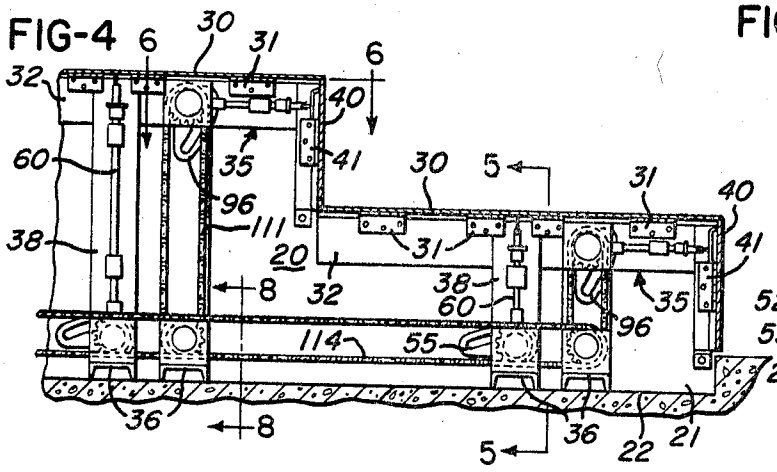


FIG-5

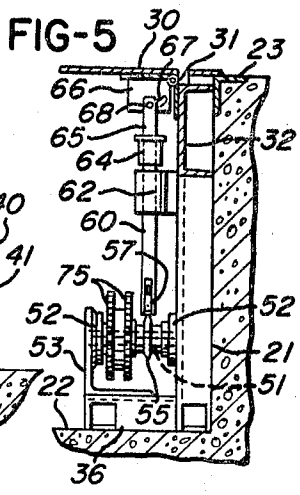


FIG-6

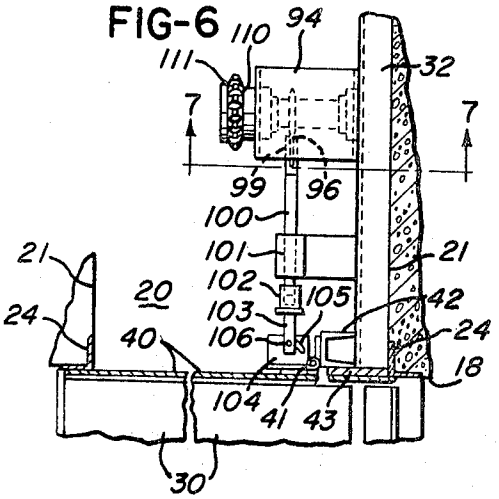


FIG-7

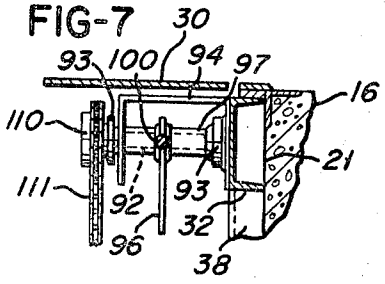
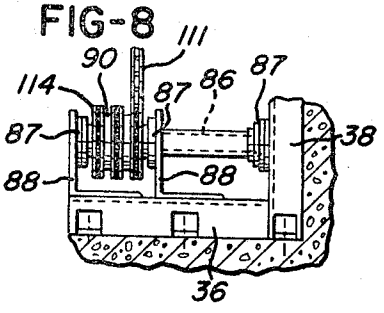


FIG-8



Feb. 4, 1969 K. J. CARLO 3,425,173

APPARATUS FOR PARTITIONING A ROOM HAVING A STEPPED FLOOR

Filed Aug. 28, 1967 Sheet 3 of 3

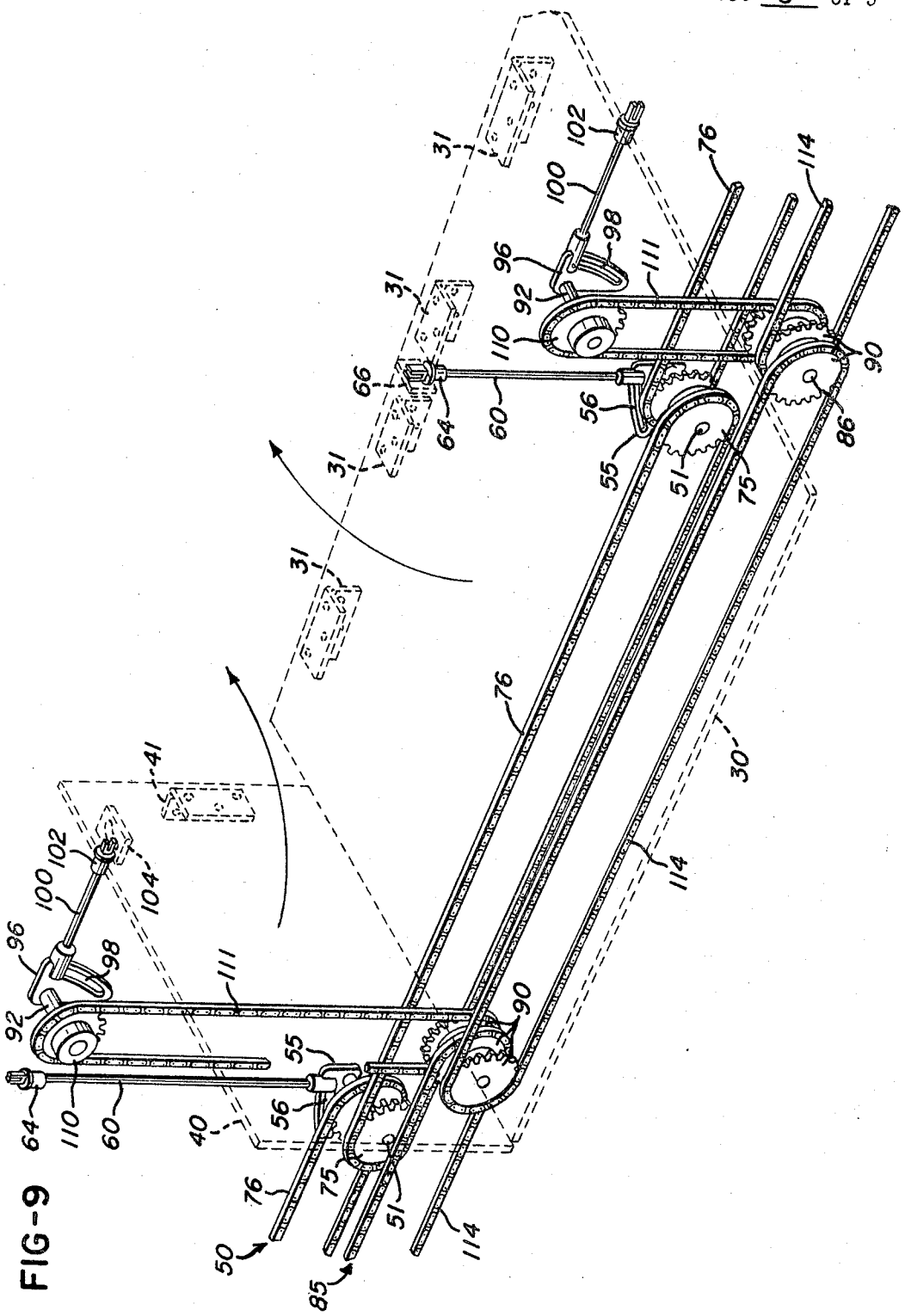


FIG-9

United States Patent Office 3,425,173 Patented Feb. 4, 1969

3,425,173

APPARATUS FOR PARTITIONING A ROOM HAVING A STEPPED FLOOR

Kenneth J. Carlo, Dyersville, Iowa, assignor to New Castle Products, Inc., New Castle, Ind., a corporation of Indiana

Filed Aug. 28, 1967, Ser. No. 663,702
U.S. Cl. 52—64 11 Claims
Int. Cl. E04b 1/343; E04h 3/10; E04f 11/04

ABSTRACT OF THE DISCLOSURE

A coilable partition is supported for extension within a trough formed within a stepped floor defined by alternate tread and riser surfaces, and tread and riser plates are automatically pivotable between positions closing and opening the trough by power driven mechanisms interconnecting the corresponding plates.

BACKGROUND OF THE INVENTION

Coilable partitions, such as shown in Carlo Patent No. 3,090,425 assigned to the assignee of the present invention, are frequently used for separating a room having a stepped floor such an auditorium, grandstand or lecture room, into a plurality of smaller rooms or areas. In some installations, the leading edge portion of the partition is stepped to accommodate the stepped floor as shown in Carlo Patent No. 3,090,424, also assigned to the assignee of the present invention, while in other installations, a slot or trough is formed within the stepped floor to provide for extending the full partition on horizontal tracks extending into the trough.

In the latter installations, usually a sloping flat cover plate is employed as a closure for the trough when the partition is retracted and is commonly hinged to one side of the trough so that it can be manually opened like a trap door for extending the partition and manually closed after the partition is retracted. Not only does the sloping cover plate present the hazard that someone might accidentally slip and slide down the cover plate but there is also the possibility that the operator of the partition may forget to close the cover plate after the partition is retracted.

SUMMARY OF THE INVENTION

The present invention is directed to an improved closure for a partition trough formed within a stepped floor of a room which trough particularly includes separate tread and riser plates which cover the trough so that the tread and riser surfaces of the floor extend flush across the trough when the partition is retracted. The tread and riser plates are individually hinged at one side of the trough and are automatically pivoted between open and closed positions by power driven mechanism so that all of the plates can be conveniently and quickly opened immediately before the partition is extended and conveniently and quickly closed after the partition is retracted to avoid the dangerous condition of an open or uncovered trough after the partition is retracted.

Other features and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a stepped floor having a trough adapted to receive a coilable partition and including automatically operated tread and riser plates constructed and operated in accordance with the invention;

FIG. 2 is a view similar to FIG. 1 showing the tread and cover plates in open positions for extending the partition;

FIG. 3 is an elevational view through the trough showing the general arrangement of the operating mechanism for the tread and riser plates;

FIG. 4 is an enlarged fragmentary elevational view of the mechanism for operating the tread and riser plates;

FIG. 5 is a section taken on the line 5—5 of FIG. 4;

FIG. 6 is a section taken on the line 6—6 of FIG. 4;

FIG. 7 is a section taken on the line 7—7 of FIG. 6;

FIG. 8 is a section taken on the line 8—8 of FIG. 4; and

FIG. 9 is a diagrammatic perspective view of the operating mechanism shown in FIGS. 3–8.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGS. 1 and 2 illustrate a typical illustration of apparatus constructed in accordance with the invention wherein a concrete floor **15** has a portion with a stepped cross-sectional configuration formed by a series of horizontal tread surfaces **16** alternately connected by vertical riser surfaces **18**. A trough **20** is formed within the floor **15** normal to the tread surface **18** and is defined by parallel spaced wall surfaces **21** (FIGS. 2 and 5) extending vertically from an eccentrically flat horizontal base surface **22**. Embedded angle strips **23** (FIG. 5) and **24** (FIG. 6) define the top edges of the trough **20** and serve to protect the outside corners of the adjacent concrete or other material defining the trough **20**. Floor track means may consist of a pair of parallel spaced tracks **25** (FIGS. 1 and 2) mounted on the floor **15** and the base surface **22** of the trough **20** to guide the lower edge portion of a partition **26**. The partition **26** may be of the coilable dual wall type constructed in a manner similar to the partition shown in the above Patent No. 3,090,425 with its upper edge portion (not shown) connected to and supported on an overhead track secured to the ceiling.

A tread plate **30** is provided for each of the tread surfaces **16** and each tread plate is connected by a series of hinges **31** (FIG. 4) to an upper channel **32** (FIGS. 4 and 5) of a corresponding generally T-shaped frame **35** rigidly mounted on one of the wall surfaces **21** forming the trough **20**. Each frame **35** includes a set of two transverse foot-like base channels **36** (FIG. 4) which are connected to the upper channel **32** by corresponding vertical or riser channels **38**. The latter channels **38** of each frame **35** have a length which corresponds to the depth of the trough **20** under the corresponding tread surface **16**.

A riser plate **40** (FIGS. 1 and 4) is provided for each of the riser surfaces **18** and each riser plate is pivotally connected by a hinge **41** (FIG. 4) to a vertically extending channel **42** (FIG. 6) rigidly connected to the upper channel **32** of the corresponding frame **35** and to a plate **43** (FIG. 6) connected to the corresponding adjacent angle strip **24**.

Thus each tread plate **30** is pivotable between a horizontal closed position extending between the corresponding angle strips **23** and with its upper surface substantially flush with the corresponding tread surface **16**, and a vertical open position extending parallel to the wall surfaces **21**. Similarly, each of the vertical riser plates **40** is pivotable between a closed position extending between the angle strips **24** with its outer surface substantially flush with the riser surface **18** and an open position extending parallel to the adjacent open tread plate **30**. The respective hinges **31** and **41** form pivot means supporting the tread and riser plates for movement between closed positions to form continuations of the tread and riser surfaces across the trough and open positions permitting the extension of the partition **26** within the trough.

Means interconnecting the tread plates **30** and operable to pivot them between their open and closed positions includes a drive mechanism **50** (FIG. 9). The mech-

anism **50** simultaneously opens and closes all of the tread plates **30** and includes a separate transverse shaft **51** (FIG. 5) supported below each of the tread plates **30** on aligned bearings **52**, one being mounted on one of the vertical channels **38** and the other mounted on an angle bracket **53** secured to the corresponding base channel **36**. A cam **55** (FIG. 9) is rigidly mounted on each of the shafts **51** and includes a curved or arcuate slot **56** which receives a follower **57** mounted on the lower end portion of a vertically extending push rod **60** (FIGS. 5 and 9). The rod **60** is supported by one or more sleeve-type bearing members **62** rigidly connected to the corresponding frame channel **38**.

The upper end portion of each push rod **60** is threaded to receive an adjustable coupling **64** (FIG. 5) secured to the lower end portion of a rod **65** having a slot for receiving a flat tab **66** secured to the underside of the corresponding tread plate **30**. An arcuate slot **67** (FIG. 5) is formed within each tab **66**, and each rod **65** is connected to the corresponding tab by a pin **68** extending through the slot **67**.

A pair of sprockets **75** (FIG. 5) are rigidly connected to each shaft **51**, and a series of endless chains **76** (FIG. 9) successively connect the sprockets **75** to a drive sprocket (not shown) mounted on the output shaft of an electric motor drive and gear reducing unit **80** (FIG. 3) located at the inner end of the trough **20**.

Means interconnecting the riser plates **40** and operable to pivot them between their open and closed positions includes a drive mechanism **85**. The mechanism **85** simultaneously opens and closes all of the riser plates **40** and includes a series of transverse shafts **86** (FIGS. 8 and 9) supported adjacent one side wall of the trough below each of riser plates **40** by a series of three aligned bearings **87**, one being mounted on the corresponding vertical frame channel **38** and the other two mounted on corresponding angle brackets **88** (FIG. 8) secured to the corresponding base channel **36**. A triple sprocket **90** is rigidly secured to each of the shafts **86** between the bearings **87** mounted on the angle brackets **88**.

Referring to FIGS. 6, 7 and 9, a transverse shaft **92** is positioned vertically above each shaft **86** and is supported by a pair of bearings **93**, one mounted on the corresponding frame channel **32** and the other one mounted on an angle bracket **94** rigidly secured to the frame channel **32**. A cam member **96** is rigidly secured to each shaft **92** between tubular spacers **97** and each cam member **96** includes an arcuate slot **98** in a manner similar to each cam member **55**.

A follower **99** is positioned within each slot **98** and is supported by one end portion of a horizontally extending push rod **100** (FIGS. 6 and 9) supported by a sleeve-type bearing member **101** secured to the corresponding frame channel **32**. A threaded coupling **102** connects the opposite end of each push rod **100** to a rod **103** having its forward end slotted to receive a tab **104** secured to the inner surface of each riser plate **40** above the corresponding hinge **41**. Each of the tabs **104** is constructed similar to each tab **66**, that is, with an arcuate slot **105** for receiving a corresponding cross pin **106**.

A sprocket **110** (FIGS. 6 and 7) is rigidly secured to the outer end portion of each shaft **92** and is connected by an endless chain **111** to the innermost sprocket **90** (FIG. 8) mounted on the corresponding shaft **86**. A series of endless chains **114** (FIG. 9) successively connect the other two sprockets **90** on each shaft **86** to a second drive unit **80** (not shown) mounted adjacent the drive unit **80** so that all of the shafts **86** are rotated simultaneously at the same speed.

In operation, when it is desirable to open the trough **20** for extending the coilable partition **26**, the drive **80** for the chains **76** is actuated causing cams **55** and push rods **60** to move the tread plates **30** simultaneously from their horizontal closed positions to their vertical open positions. Immediately after the tread plates are opened, the drive for the chains **114** is actuated to cause the cams **96** and push rods **100** to move the riser plates **40** from their corresponding closed positions to open positions adjacent the underneath surfaces of the corresponding open tread plates **30** as shown in FIG. 2. To close the trough **20** after the partition **26** is retracted, the operation is merely reversed. That is, the drive **80** for the chains **114** is reversed to close simultaneously the riser plates **40** after which the drive **80** for the chains **76** is reversed to close simultaneously the tread plates **30**.

From the drawings and the above description, it becomes apparent that apparatus constructed in accordance with the invention provides several desirable features and advantages. For example, by providing separate pivotable tread plates **30** and riser plates **40** for the corresponding tread surfaces **16** and riser surfaces **18**, the trough **20** can be closed so that the tread surfaces **16** and riser surfaces **18** continue smoothly across the trough **20**. Thus if desired, the tread and riser plates may serve as steps and used in conjunction with a pair of parallel spaced hand rails **115** to form an aisle, as shown in FIG. 1.

Another important advantage is provided by the automatic operation of the tread and riser plates between their open and closed position by actuation of the corresponding mechanisms **50** and **85**. That is, the tread and riser plates can be conveniently and quickly opened for extending the partition **26** and conveniently and quickly closed after the partition is retracted so that the trough **20** does not remain uncovered when the partition is retracted. The actuating mechanisms **50** and **85** for opening and closing the corresponding tread and riser plates also provide the features of positive and dependable operation and, in addition, the relationship of the cams **55** and **96** to their corresponding push rods **60** and **100** assures that the tread and riser plates are locked in their respective closed positions to prevent the plates from being manually opened from above the floor **15**.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. Apparatus for partitioning a room having a step-like floor defined by a plurality of alternating horizontal tread and vertical riser surfaces, comprising means defining a trough interrupting said tread and riser surfaces, a retractable partition, a corresponding plurality of tread and riser plates, pivot means supporting each said tread and riser plate for movement between a closed position to form continuations of said tread and riser surfaces across said trough and an open position exposing said trough to provide for extending said partition within said trough, means interconnecting said tread plates and operable to move said tread plates between said open and closed positions, and means interconnecting said riser plates and operable to move said riser plates between said open and closed positions.

2. Apparatus as defined in claim **1** including means for mounting said pivot means for each said tread and riser plate on the same side of said trough to effect positioning of said riser plates adjacent the corresponding said tread plates when said tread and riser plates are in said open position.

3. Apparatus as defined in claim **1** wherein said interconnecting means includes cam means for moving each said tread and riser plate between said open and closed positions, and power drive means connected to said interconnecting means for said tread and riser plates.

4. Apparatus as defined in claim **1** wherein said means interconnecting said tread plates and said riser plates include a rotary cam member for each said tread and riser plate, follower means engaging each said cam member and connected to the corresponding said plate, and drive means for rotating each said cam member.

5. Apparatus as defined in claim 4 wherein each said cam member comprises a plate having means defining a curved slot therein, and said follower means engages said cam member at said slot.

6. Apparatus as defined in claim 4 including a shaft supporting each said cam member, sprocket means mounted on each said shaft for rotation with the corresponding said cam member, said drive means comprising endless chain means extending around said sprocket means, and reversible power drive means connected to said chain means.

7. Apparatus as defined in claim 6 wherein said shaft and cam member for each said riser plate is positioned horizontally behind said riser plate, said shaft and cam member for each said tread plate is positioned below said tread plate, said sprocket means comprising four sprockets for each said riser plate and two sprockets for each said tread plate, and said chain means comprising a series of endless chains successively connecting said sprockets for adjacent said riser plates and a series of endless chains successively connecting said sprockets for said tread plates.

8. Apparatus as defined in claim 1 including means for operating said means interconnecting said tread plates to effect simultaneous movement of said tread plates, and means for operating said means interconnecting said riser plates to effect simultaneous movement of said riser plates.

9. Apparatus as defined in claim 8 including first power drive means connected to effect said simultaneous movement of said tread plates, and second power drive means connected to effect said simultaneous movement of said riser plates.

10. In a movable room divider arrangement, the improvement for dividing a room in which the floor includes a series of alternating horizontal tread and vertical

riser surfaces, comprising means in said floor defining a trough extending transversely through said series of surfaces, a corresponding series of tread plates and riser plates, means mounting each said tread plate for movement between a first position in which said tread plates are generally coextensive with the corresponding said tread surfaces and a second position in which said tread plates expose said trough, means mounting each of said riser plates for movement between a first position in which said riser plates are generally coextensive with an associated said riser surface and a second position in which said riser plates expose said trough, and mechanical linkage means for moving said tread plates and said riser plates between their said first and second positions.

11. The arrangement of claim 10 in which each of said tread and riser plates are pivotally mounted adjacent a common side of said trough and in which each said tread plate in said second position assumes a generally vertical alignment with respect to said trough and in which each said riser plate in said second position is positioned vertically adjacent the corresponding said tread plate.

References Cited

UNITED STATES PATENTS

292,071	1/1884	Thompson	52—9 X
2,576,556	11/1951	Babson	52—183
2,859,488	11/1958	Mackintosh	52—9
3,090,424	5/1963	Carlo	160—23
3,090,425	5/1963	Carlo	160—25

FRANK L. ABBOTT, *Primary Examiner.*

PRICE C. FAW, JR., *Assistant Examiner.*

U.S. Cl. X.R.

52—8, 186; 108—99; 160—23