

June 21, 1960

N. BEL GEDDES
BUILDING STRUCTURES

2,941,794

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3 Sheets-Sheet 1

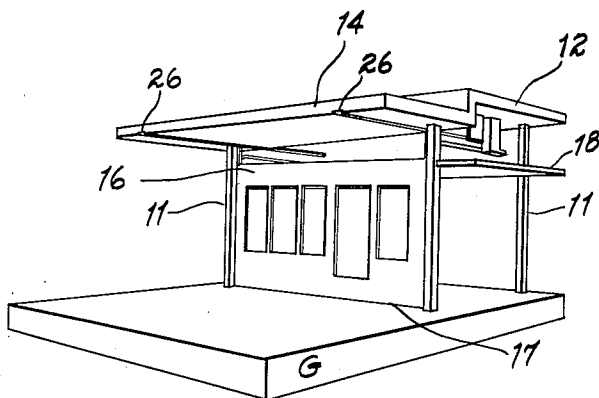


Fig. 1.

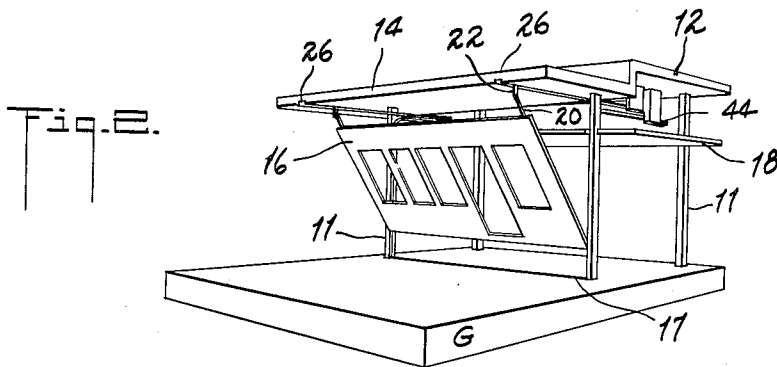


Fig. 2.

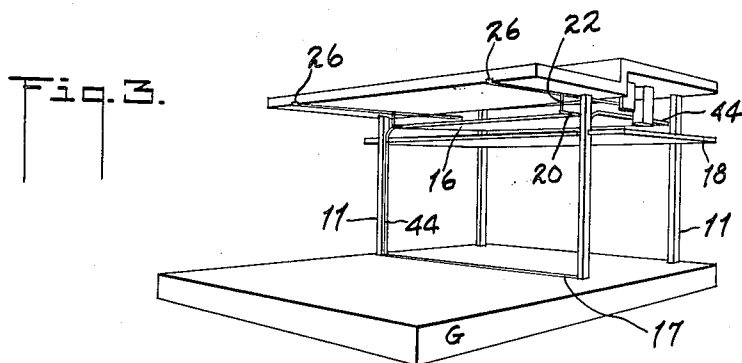


Fig. 3.

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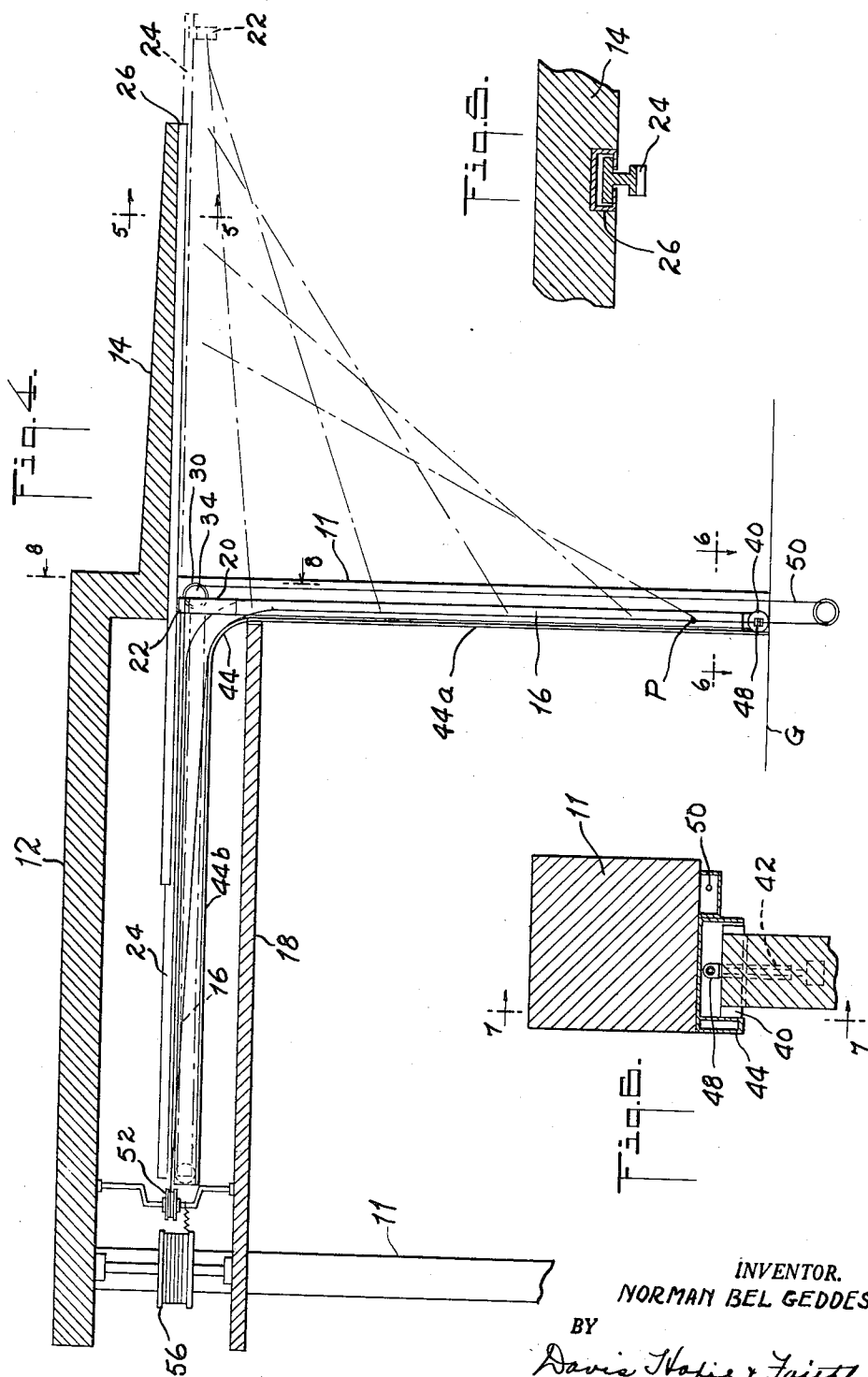
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3 Sheets-Sheet 2



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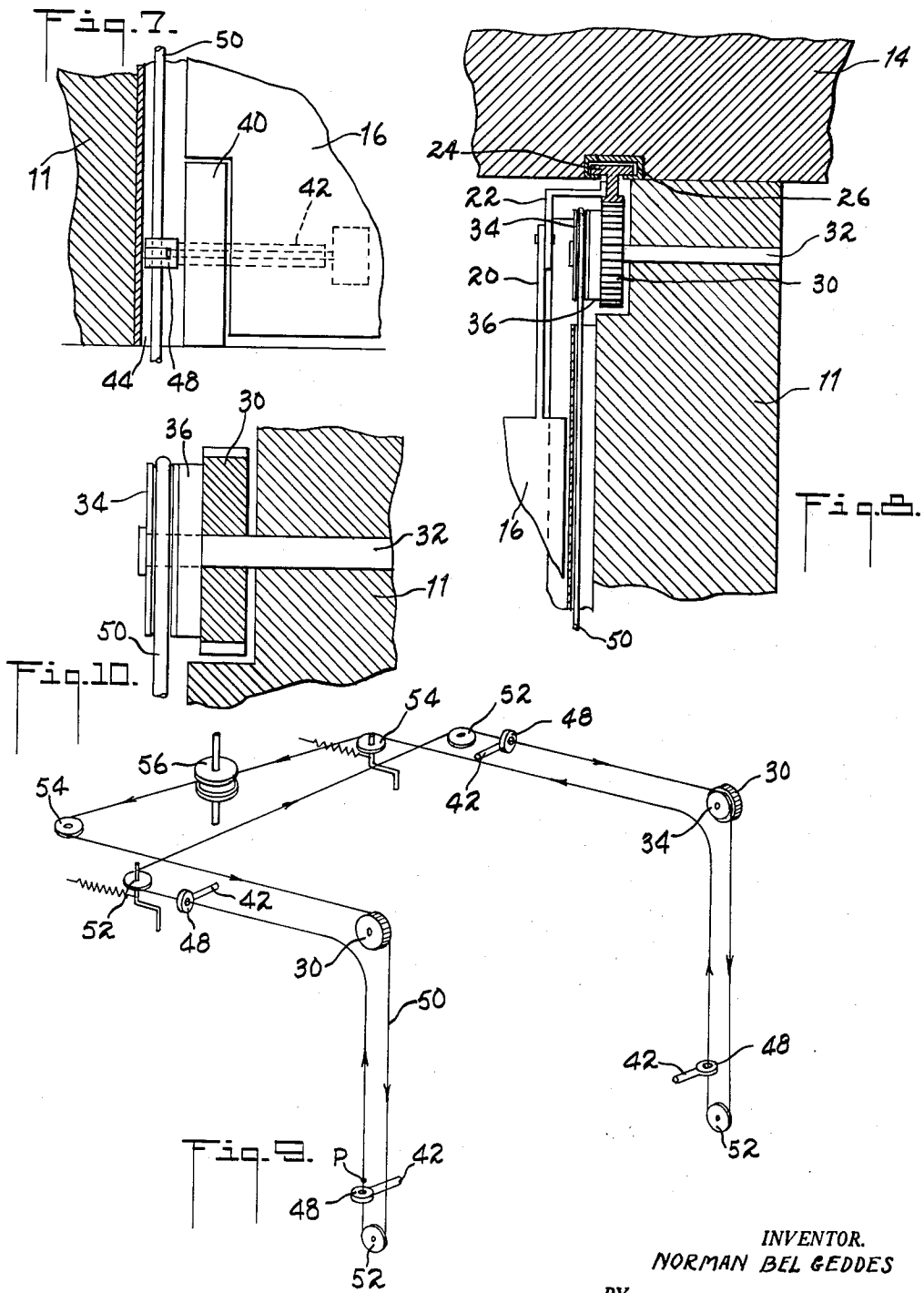
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3 Sheets-Sheet 3



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BUILDING STRUCTURES

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3 Claims. (Cl. 268—30)

This invention relates to an improvement in building structures suitable for human occupancy, such as houses, apartments, stores, offices, factories, etc., and has for its purpose improvement in ventilation and increase in the effective use of space. This is accomplished by providing removable wall sections so that all or a part of the wall areas can be eliminated and replaced at will quickly and with little or no effort.

Only the exceptionally well planned present day structures of this sort are properly ventilated. Natural ventilation has heretofore been predicated on opening windows and doors. This ventilation has usually been limited to a small fraction of the exterior wall area. Also, in present day structures, it is sometimes desirable to remove walls or partitions in order to permit greater freedom of circulation of people from place to place within the structure or from outside to inside and inside to outside.

My invention permits the removal of entire walls or parts of walls, either selected ones, or all of them, as desired. This permits the maximum of flexibility, so that one may make the most use of the structure itself as well as of sun, breeze and rain. In inclement weather, the walls can be closed in a watertight manner. In climates or conditions where it is desired, several walls may be installed successively to take care of the special condition. For example, the outermost wall may be for hurricane protection, a second wall inside of that for ordinary use, and a third wall may be a screen for protection from insects. The same applies to parts of walls as, for example, panels, partitions, doors and the like.

The invention is a structure partially enclosing an area, such as a chamber or the like, and having a vertical partition capable of being raised to a horizontal position and stored, preferably above the area which it partially encloses, with the side which normally faces the area facing upward throughout its travel and during storage. Specifically, the structure has a partition, which is the term I use in the generic sense to include all of the foregoing examples, disposed vertically between one floor and an overhead shelter, which may be the roof or the next succeeding upper floor of the structure. Suspended below the roof or upper floor is a ceiling. At each lateral edge of the partition are columns extending between the floor and overhead shelter. To remove the partition, its top edge is moved outward horizontally and its bottom edge is moved upwardly until the partition is horizontal, after which it is moved horizontally to storage, preferably between the ceiling and roof or upper floor of the chamber. The initial movement of the partition is in a direction away from the area which it partially encloses, so that the surface of the partition which faces that area when the partition is vertical faces upward during its entire journey to and in the horizontal position. This permits objects attached to the wall, such as pictures, curtains, shelves, etc., to remain in their attached position without damage to them.

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Having described my invention generally, I now turn to a specific means for carrying it out, by way of example. In the drawings,

Fig. 1 is a perspective view of a section of a house, with the wall in the closed vertical position;

Fig. 2 is the same view as in Fig. 1 except that the wall is in a partially open position;

Fig. 3 is the same view as in Fig. 1 except that the wall is in a fully removed position;

Fig. 4 is a schematic view of the wall and the track guiding its movement, showing various positions of the wall;

Fig. 5 is a section view, taken along the line 5—5 of Fig. 4;

Fig. 6 is a section view, taken along the line 6—6 of Fig. 4;

Fig. 7 is a section view, taken along the line 7—7 of Fig. 6;

Fig. 8 is a section view, taken substantially along the line 8—8 of Fig. 4;

Fig. 9 is a schematic view of the cable drive mechanism with the cable moving in a direction to remove the wall from its closed vertical position; and

Fig. 10 is a section view similar to Fig. 8 except that it is enlarged and has a gear of Fig. 8 in cross-section.

As shown in Figs. 1—3, supporting columns 11 rest on the floor G and support a roof 12 with a cantilevered canopy 14, or it could be a column-supported canopy, or roof to another room. Supported between the columns is a section of removable wall 16. Between the columns at the ground is a watertight closure 17. Beneath the roof 12 at a convenient distance above the ground G is a ceiling 18. As shown in Fig. 8, the wall 16 is hung from straps 20 which are in turn hung from L-shaped brackets 22, each of which is mounted on a toothed rack 24. Each rack 24 rides in a track 26 which is countersunk in the canopy 14 (see also Fig. 4) and guides and supports the top in its outward and return horizontal movement as hereinafter explained.

Countersunk in each column 11 at the juncture of the column and the canopy 14 (see Fig. 10) is a gear 30 mounted on a shaft 32, which gear has its teeth engaged with the rack 24. Also mounted on the shaft 32 is a pulley 34. Between the pulley 34 and the gear 30 is a normally engaged clutch 36 which connects the pulley 34 and the gear 30, and causes them to move in unison when it is engaged. The clutch is controlled by a normally deenergized solenoid which, when energized, causes the clutch to be disengaged and thereby to disconnect the pulley 34 from the gear 30.

As shown in Figs. 4 and 7, at the bottom of the wall 16 adjacent to each column 11 is a wheel 40 mounted on a shaft 42 imbedded in the wall 16. At the outer end of the shaft 42 (see Fig. 6) is a gripping device 48 for gripping a cable, which device is controlled by a solenoid.

Each wheel 40 is guided by a track 44 having a U-shaped cross-section, with the open part facing the wall 16. Each track 44 is in the shape of an inverted L, with a vertical leg 44a countersunk in a column 11 for the height of the column, and a horizontal leg 44b extending inwardly from the column for a distance roughly equal to the height of the wall. The horizontal leg 44b lies above the ceiling 18. The effect of the track is to prevent the wheel 40, and hence the bottom of the wall 16, from rising in a direction other than vertical when the wall is raised, until the wheel has reached the junction of the legs 44a and 44b and the wall is in a horizontal position with its inside surface up. After the wheel and the bottom of the wall have reached this junction, the effect of the track is to prevent them from moving in a direction other than horizontal when the

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wall is moved inwardly, until the wheel has reached the inward end of the leg 44b.

As shown in Fig. 9, an endless cable 50 runs over the pulleys 34, over pulleys 52 mounted at each end of each track 44 and through each gripping device 48. Other pulleys 54 are located as needed to provide free movement of the cable. Pulleys are spring-mounted as necessary to keep the cable taut. The cable is driven by a motor 56.

Operation is as follows: Starting with the wall in its closed vertical position, the motor 56 is energized and causes the cable 50 to move in the direction shown in Fig. 9. The normally engaged clutch 36 connects the pulley 34 with the gear 30 so that, as the cable moves the pulley 34, its movement in turn causes the gear 30 to move. The movement of the gear 30 causes the rack 24 to move outwardly, in turn causing the top of the wall 16 to move outwardly. As this occurs, the bottom of the wall, guided by the wheel 40 riding in the track 44, moves upward. When the wheel has moved upward to a point P a short distance from the bottom, the solenoid in the gripping device 48 is energized, causing the device to grip the cable 50 and move with the cable 50. Simultaneously with the energizing of the solenoid controlling the gripping device, the solenoid controlling the clutch 36 is energized, causing the clutch to disengage and to disconnect the gear 30 and the rack 24 from the pulley 34. The movement of the cable 50 causes the bottom of the wall to move upward until the wall is level. During the upward movement of the bottom of the wall, the top of the wall moves outward in a horizontal plane guided by the track 26 to which it is connected through the rack bar and straps and brackets as previously explained. After the bottom of the wall reaches the top position, the cable pulls the bottom inward, guided by the wheel 40 riding in the track 44. During the inward movement the top of the wall moves inward in a horizontal plane, again guided by the track 26. When the wall has reached its fully removed position as shown in Fig. 3, the motor and the solenoids are deenergized.

The reverse operation is as follows: With the wall in its open horizontal position, the motor 56 is energized in the reverse direction and it impels the cable 50 in the direction opposite to that shown in Fig. 9. The solenoid controlling the gripping device 48 is energized so that the device grips the cable 50, causing both the bottom and top of the wall to move in reverse, the bottom along the track 44 toward the closed vertical position and the top first outward and then inward in a horizontal plane, guided as before by the track 26. Simultaneously with the energizing of the solenoid controlling the gripping device, the solenoid controlling the clutch 36 (see Fig. 8) is energized, causing the clutch to disengage and the rack 24 and the gears 30 to run free of the pulley 34. When the gripping device reaches point P, the solenoid controlling the gripping device 48 is deenergized and the cable is released. Simultaneously with this release, the solenoid controlling the clutch 36 is also deenergized, causing the clutch to engage and thereby connecting the gear 30 to the pulley 34. The movement of the pulley 34 causes the gear 30 to drive the rack 24 inward and the rack in turn drives the top of the wall inward until it is in its closed vertical position in alignment with columns 11.

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The above apparatus is illustrative of a mechanical arrangement for imparting the required movement to the partitions, but any number of mechanical ways for imparting such movement will readily occur to the reader. For example, the gripping device may be controlled mechanically instead of by solenoid. The same is true of the clutch. And it may be necessary to wrap the cable around the pulley 34 several times, to prevent slipping. It is to be understood that my invention contemplates all such mechanical modifications.

I claim:

1. A mechanism for moving a vertical partition, comprising means for moving the top of the partition horizontally, means for moving the bottom of the partition upward in a vertical plane and means for moving the entire partition horizontally in a direction opposite to that of the first horizontal movement after the bottom has moved upward to the height of the top.

2. A mechanism as claimed in claim 1 in which the means for causing horizontal movement of the top alone comprises the combination of a gear and a toothed bar, said gear being capable of being driven by the toothed bar, said bar being slidably mounted in a horizontal plane for support of the top of said partition, and the means for moving the entire partition horizontally is a tensioned member.

3. A mechanism for moving a vertical partition, comprising means for moving the top of the partition horizontally, means for moving the bottom of the partition upward in a vertical plane and means for moving the entire partition horizontally in a direction opposite to that of the first horizontal movement after the bottom has moved upward to the height of the top, said top of the partition horizontal moving means including a gear, clutch means and a toothed bar, said gear being rotatably mounted in a fixed position, said bar being slidably mounted in a horizontal plane for support of the top of said partition and said clutch means being capable of engaging the gear and bar for the first part of the first horizontal movement of the partition and disengaging the gear and bar for each of said movements of said partition thereafter, said means for moving the entire partition horizontally being a tensioned member.

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