(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 430 931 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **91400412.2**

(51) Int. Cl.5: **E04H 3/12**

(22) Date of filing: **24.03.89**

This application was filed on 18 - 02 - 1991 as a divisional application to the application mentioned under INID code 60.

(30) Priority: **30.03.88 JP 41063/88**
31.03.88 JP 41830/88

(43) Date of publication of application:
05.06.91 Bulletin 91/23

(60) Publication number of the earlier application in accordance with Art.76 EPC: **0 335 787**

(84) Designated Contracting States:
DE FR GB NL Bulletin 2

(71) Applicant: **OKAMURA CORPORATION**
7-18 Kitasaiwai 2-chome Nishi-ku
Yokohama-shi Kanagawa-ken(JP)

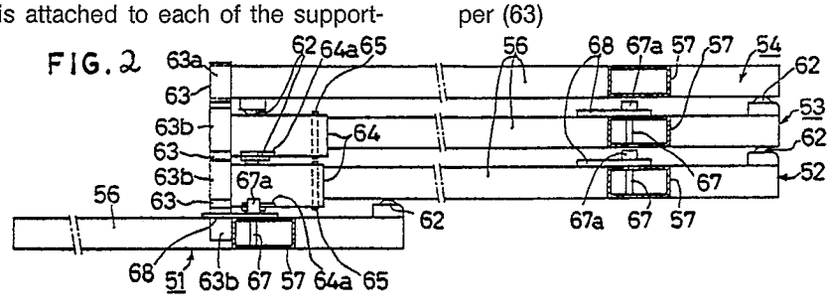
(72) Inventor: **Mitsumoto, Takayasu**
1-26-5, Take
Yokosuka-shi, Kanagawa-ken(JP)
Inventor: **Shimomura,Tsuneo**
45-6, Nokendai-dori, Kanazawa-ku
Yokohama-shi, Kanagawa-ken(JP)
Inventor: **Sato, Junnosuke**
3-1-10, Tomioka-Nishi, Kanazawa-ku
Yokohama-shi, Kanagawa-ken(JP)

(74) Representative: **Serin, Jean-Pierre et al**
Cabinet PIERRE LOYER 77, rue Boissière
F-75116 Paris(FR)

(54) A row floor-locking device for a telescoping seating system.

(57) A row floor-locking device for a telescoping seating system having a plurality of row floors both sides of which are movably supported through poles on a supporting truck. A front stopper (63) is attached to the forward end portion of each of the supporting trucks (56) except the innermost supporting truck (56); a rotatable plate (64) is pivotally attached by its rear end to a portion of each supporting truck (56) except the innermost and outermost supporting truck (56); a shaft (67) is attached to each of the supporting poles (57) except those set up at the outermost side, said shaft (67) being provided on an outwardly extending free end portion thereof with a pressing member (67a) extending over the neighboring supporting truck (56) so that when the supporting trucks (56) are moved over said rotating plates (64) disposed at the outer side of the supporting trucks (56), said pressing member (67a) acts to push down the rotating plates below the free end of the front stopper (63)

FIG. 2



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A ROW FLOOR-LOCKING DEVICE FOR A TELESCOPING SEATING SYSTEM

This invention relates to a row floor-locking device for a telescoping seating system having a plurality of row floors adapted to be extended or retracted like a nest of boxes.

In a multi-purpose hall or the like, it is known to employ a telescoping seating system having a plurality of row floors adapted to be retracted and received below the next higher row floor when not in use like a nest of boxes, and extended forward and disposed in a stepped relation when in use, the seatings on each of the row floors being simultaneously stood up from their collapsed states to complete the seatings.

A row floor-locking device in which each of row floors can be moved independently from each other and extended one by one from a lowest row floor is also disclosed for example in Japanese Utility Model Laid-Open Publication No 58-181759 and Japanese Patent Laid-Open Publication No 62-82176.

According these prior locking devices however, it is required to mount a locking member on the rear surface portion of each row floor so that the surface area available to each row floor becomes smaller accordingly, and the number of parts required for mounting the locking member becomes larger thereby raising the manufacturing cost.

According to a feature of this invention, there is provided a row floor-locking device for a telescoping seating system having a plurality of oblong row floors both sides of which are movably supported through poles on a supporting truck so as to be moved back forward, said plurality of oblong row floors being capable of being extended forward and disposed in a stepped relation when in use, as well as of being retracted and received below the next higher row floor when not in use ;
characterized in that a front stopper having a free end extended inwardly over a neighboring supporting truck is attached to the forward end portion of each of the supporting trucks except the innermost supporting truck; that a rotatable plate is pivotally attached by its rear end to a portion of each supporting truck except the innermost and outermost supporting truck in such a manner that said rotatable plate is positioned immediately behind the proximate end of the front stopper, said rotatable plate being energized by means of a spring to cause the upper edge thereof to be raised up forward thereby to be engaged with a free end of the front stopper mounted on a next supporting truck neighboring outside a supporting truck on which said rotatable plate is mounted ; that a shaft is attached to each of the supporting poles except those set up at the outermost side, which are set up at each rear portion of the supporting trucks, said shaft being provided on an outwardly extending free end portion thereof with a pressing member extending over the neighboring supporting truck so that when the supporting trucks are moved over said rotating plates disposed at the outer side of the supporting trucks, said pressing member acts to push down the rotating plates below the free end of the front stopper; and that a rear stopper is pivotally mounted by its proximate portion on said shaft, said rear stopper being adapted to engage with the front edge of the front stopper as said rear stopper is moved forward beyond the front stopper and caused to swing downward due to its own weight.

According to a telescoping seating system utilizing a device of this invention, since the rotatable plate is mounted on the forward end portion of a supporting truck in such a manner as to collide with the front stopper mounted on a next outer row floor neighboring thereto, only the innermost row floor is permitted to move forward at first and any other row floors cannot move forward even if a forward-moving force is effected by an actuating means to every row floor.

When the innermost row floor is moved forward up to the maximum, the pressing member mounted on shaft fixed to a supporting pole of the innermost row floor pushes down the rotatable plate mounted on the next outer row floor to such an extent that the rotatable plate is disposed below the free end of the front stopper, thereby setting the next higher row floor free to move. At the same time, the rear stopper mounted on supporting pole of the innermost row floor is caused to swing down due to its own weight to be engaged with the front edge of the front stopper of the next higher row floor, thus allowing both of these row floors to move forward en bloc.

Each of the row floors is moved forward in the same manner as explained above, thereby finally forming a step-like seating structure.

When each of the row floors extended in a step-like seating structure is to be retracted and received below the next higher row floor, the engagement of the rear stopper at the foremost row floor is released by any desired means, thereafter each of the row floors are retracted backward by actuating means.

In this case, since each of the row floors except the foremost row floor is stopped moving backward by means of the rear stopper, only the foremost row floor is permitted to move backward at first.

When the foremost row floor is retracted up to

the maximum, the rotatable plate mounted thereon and passed through the free end portion of the front stopper mounted on the next outer row floor is restored to the original state by the elastic force of the spring and engaged with the front stopper. As a result, the foremost row floor is joined together with the next higher row floor.

Likewise, by releasing the engagement of the rear stopper of this next higher row floor, the backward movement of the following higher row floor can be effected. In this manner, the row floors can be retracted one after another.

Other features and advantages of this invention will be made clear by the following explanation based on the accompanying drawings, wherein :

Fig. 1 is a vertical sectional view of a telescoping seating system according to the invention as it is vertically sectioned at the central part thereof ;

Fig. 2 is a horizontal sectional view taken along the line IX-IX in the Fig. 1 ;

Fig. 3 is a partially cut front view of Fig. 1 ;

Fig. 4 is an enlarged front view of a pressing member of a rotating plate ;

Fig. 5 is a left side view taken belong the line XII-XII in Fig. 4.

Figs 1 to 3 show the left side portion of a telescoping seating system 55 comprising four row floors 51, 52, 53 and 54, the height thereof being increased in this order. By the way, since the right side portion of the telescoping seating system 55 is symmetrical with the left side portion, only the left side portion is shown in the drawings.

Each of the row floors 51, 52, 53, 54 comprises a pair of supporting trucks 56 disposed at the left side and the right side thereof, the size and shape of the supporting trucks being the same in all . However, supporting poles 57 which are different in height are set up at the rear portions of these supporting trucks, i.e. the more outwardly the supporting truck is disposed, the higher the supporting poles are set up. On the front surfaces of these poles are attached respectively a horizontal arm 58 extending forward. A floor plate 59 is secured between these arms 58.

The supporting truck 56 supporting the outermost row floor 54 is fastened on the floor 60. Other supporting trucks 56 are adapted to move back and forth on the floor surface 60 by means of wheels 61. On the side walls located both forward and rear end portions of the supporting truck 66 are mounted guiding rollers 62 via bearing members 62a thereby keeping constant the spaces between adjacent supporting trucks 56.

Althrough not shown in the drawings, collapsible seatings are set up on each of the row floor 59, and any known moving means is also provided in the telescoping seating system.

When not in use, each of the row floor 51, 52 and 53 can be received like a nest of boxes below the highest row floor 54. On the other hand, when in use, each of the row floors 51, 52 and 54 can be extended forward to form a step-shaped structure.

As shown in Fig. 3, on each of the upper surfaces of the forward portion of the supporting trucks 56 of the row floors 52, 53 and 54 is fastened the proximate end portion 63a of the front stopper 63 facing inward (Fig. 3, right side portion). The free end portion 63b of the front stopper 53 is extended over the center portion of the supporting truck 56 of neighboring inner row floors 51, 52 and 53.

The upper surface portions of the supporting truck 56 of the row floors 52 and 53, which is located immediately rearward of the proximate end portion 63a of the front stopper 63 are covered by a rotating plate 64 comprising a top plate 64a and pair of side plates 64b, and having an inverted U-shaped section. The rear end portion of the rotating plate 64 is pivotally mounted on a shaft 65 piercing widthwise through the supporting truck 56.

The rotating plate 64 comprises an upwardly extending projection 64a protruding from an inner edge portion of the middle of upper surface thereof, and is always energized counter-clockwise as shown in Fig. 5 by means of a torsion spring 66 which is idly fitted on the inner end portion of the shaft 65. One leg portion 66a of the torsion spring 66 is caught in the back surface of the top plate 64a and the other leg portion 66b is caught on the upper surface of the bearing member 62a for receiving the guiding roller 62 as indicated by a dotted line in Fig. 5.

As shown in Fig 2, a pressing member 67a slightly enlarged in diameter is mounted on the outer side of the shaft 67 piercing through the width of supporting pole 57 of each row floor 51, 52 and 53.

On a portion of the shaft 67 which is located between the pressing member 67a and the outer side of the supporting pole 57 is pivotally mounted a proximate portion of a rear stopper 68 having a V-shaped profile consisting of an upwardly extending piece 68a and a forwardly extending piece 68b connected with each other at their proximate portions.

A pair of stoppers 69 and 70 is attached to the supporting pole 57 in such a manner that the stopper 69 is slightly spaced apart from the rear edge of the rear stopper 68 and the stopper 70 is slightly spaced apart from the lower edge of the rear stopper 68 so that the rear stopper is permitted to rotate within a predetermined range of angle confined by these stoppers 69 and 70.

A hook 68c is provided at the lower edge of

the forward end portion of forwardly extending piece 68b of rear stopper 68 and is adapted to engange with the free end 63b of the front stopper 63.

According to this telescoping seating system, each of the row floors 51, 52 and 53 received below the row floor 54 while they are not in use can be pulled out by means of a moving mechanism (not shown).

However, since the rotating plate 64 disposed on the supporting truck 56 is being contacted to the front stopper 53, the row floors 52 and 53 cannot move forward, and therefore only the innermost row floor 51 is permitted to move forward.

When the forward movement of the row floor 51 is completed, the hook 68c of the rear stopper 68 mounted on the row floor 51 engages with the front stopper 63 mounted on the row floor 52 and simultaneously the pressing member 67a mounted on the row floor 51 pushes downward the rotating plate 64 mounted on the row floor 52 as shown is Figs. 2 and 5.

Accordingly, the rotating plate 64 mounted on the row floor 52 is set free to pass through below the front stopper 63b mounted on the row floor 53 as shown in Fig. 4.

Therefore, the row floor 52 is now ready to move forward together with the row floor 51.

Likewise, when the forward movement of the row floor 52 is completed, the pressing member 67 mounted on the row floor 52 pushes downward the rotating plate 64 mounted on the row floor 53.

In this manner, the row floors 51, 52 and 53 are successively pulled out, and when forward movement of these row floors 51, 52 and 53 is completed, the row floor 51 is locked to a floor with any desired means thereby completing a step-like seating structure. Subsequently each of the collapsible seatings (not shown) is stood up thereby rendering the telescoping seating system ready for use.

When it is desired to retract the row floors 51, 52 and 53, the rear stopper 68 mounted on the row floor 51 is raised at first thereby releasing the engagement between the row floor 51 and the row floor 52. Then, when the moving mechanism (not shown) is actuated to move the row floors backward, only the row floor 51 is permitted to move rearward, because both row floors 52 and 53 are still fastened respectively with the rear stopper 68.

When the rear stopper 68 mounted on the row floor 52 is raised with hand, or automatically raised by an actuating means (not shown) projecting outward from the rear portion of the row floor 51, the row floors 52 and 53 can be successively retracted and received below the row floor 54.

According to a telescoping seating system utilizing the row floor-locking device of this invention, a row floor neighboring to the next lower row floor does not move forward unless the forward movement of this next lower row floor is completed and works as a guide during the forward movement of this next lower row. In this manner, the row floors are extended forward successively in the order of inner one beginning from the innermost one. Accordingly, even if each of the row floors is big and elongated, it is possible to prevent the row floors from weaving or getting out of order or interfering with each other during the extending operation thereof, and to smoothly carry out the extending operation.

The retracting operation of the row floors can be effected by successively releasing the engagements of the rear stoppers, and the row floors can be smoothly retracted in the order of inner row floor beginning from the innermost one.

Claims

1. A row floor-locking device for a telescoping seating system having a plurality of oblong row floors (51, 53, 54) both sides of which are movably supported through poles (57) on a supporting truck (56) so as to be moved back and forward, said plurality of oblong row floors (51, 53, 54) being capable of being extended forward and disposed in a stepped relation when in use, as well as of being retracted and received below the next higher row floor when not in use ;

characterized in that a front stopper (63) having a free end extended inwardly over a neighboring supporting truck (56) is attached to the forward end portion of each of the supporting trucks (56) except the innermost supporting truck (56); that a rotatable plate (64) is pivotally attached by its rear end to a portion of each supporting truck (56) except the innermost and outermost supporting truck (56) in such a manner that said rotatable plate (64) is positioned immediately behind the proximate end of the front stopper (63), said rotatable plate (64) being energized by means of a spring (66) to cause the upper edge thereof to be raised up forward thereby to be engaged with a free end (63b) of the front stopper (63) mounted on a next supporting truck (56) neighboring outside a supporting truck (56) on which said rotatable plate (64) is mounted; that a shaft (67) is attached to each of the supporting poles (57) except those set up at the outermost side, which are set up at each rear portion of the supporting trucks (56), said shaft (67) being provided on an outwardly extending free end portion thereof with a pressing member (67a) extending over the neighboring supporting

truck (56) so that when the supporting trucks (56) are moved over said rotating plates (64) disposed at the outer side of the supporting trucks (56), said pressing member (67a) acts to push down the rotating plates below the free end of the front stopper (63); and that a rear stopper (68) is pivotally mounted by its proximate portion on said shaft, said rear stopper (68) being adapted to engage with the front edge of the front stopper (63) as said rear stopper (68) is moved forward beyond the front stopper (63) and caused to swing downward due to its own weight.

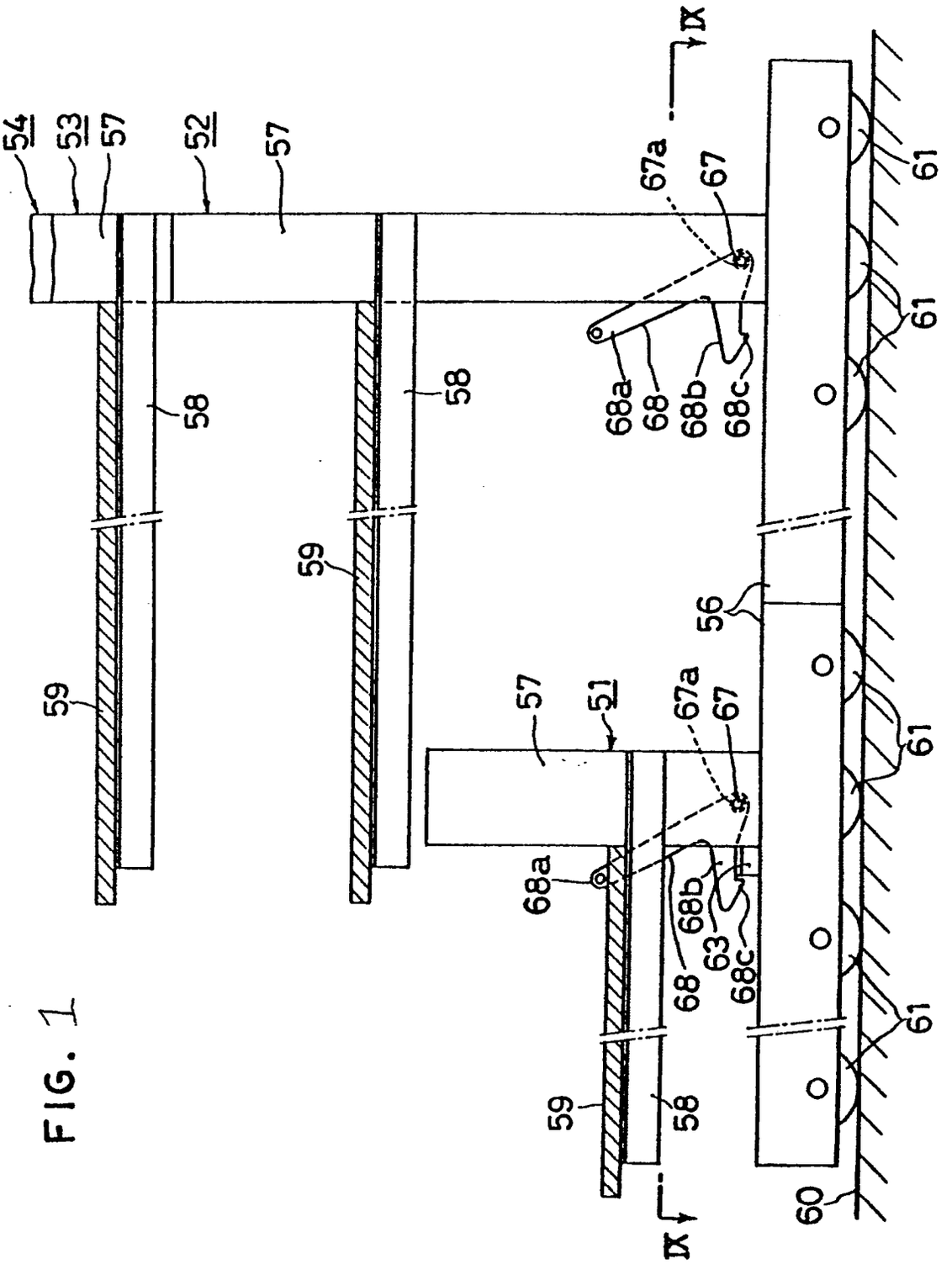

FIG. 1

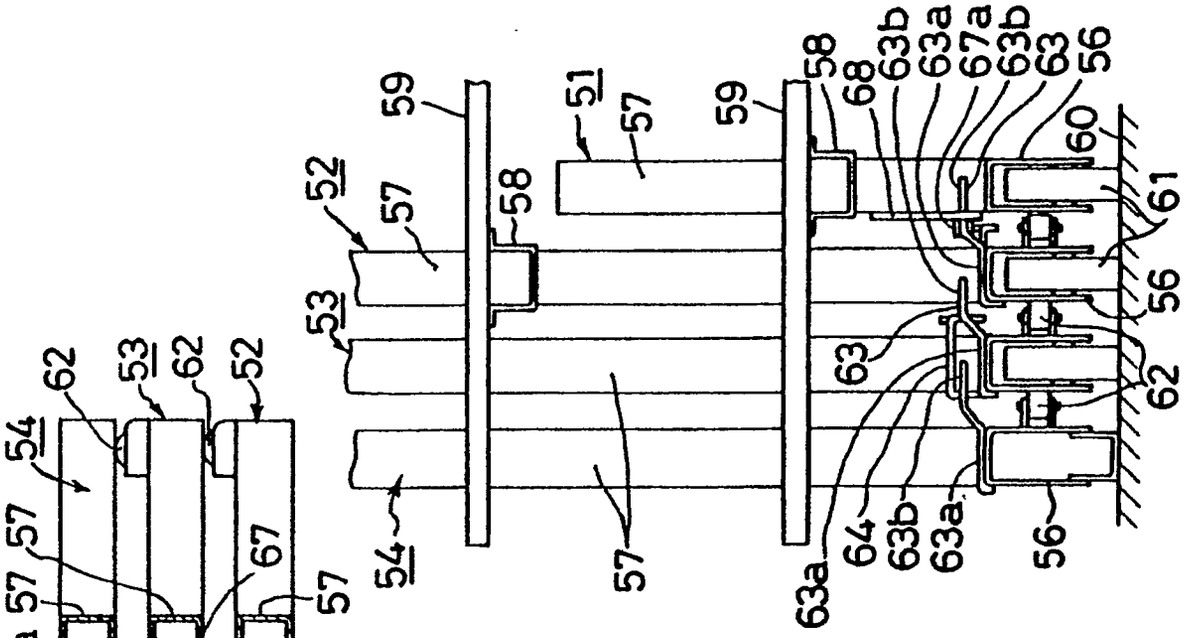
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FIG. 3

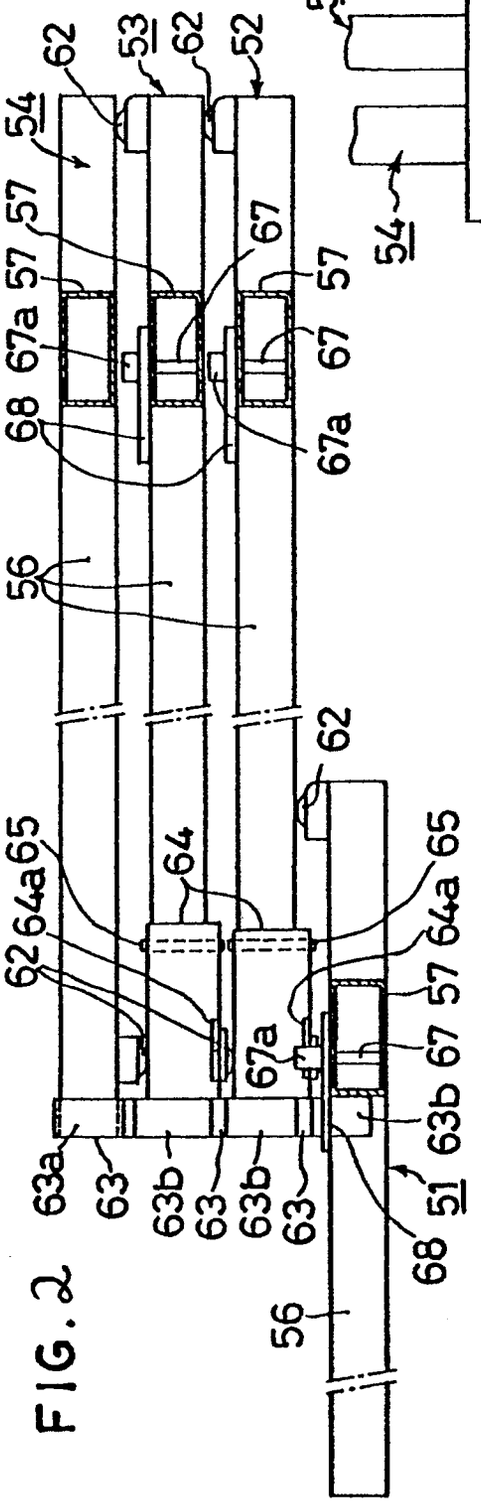
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FIG. 2

FIG. 5

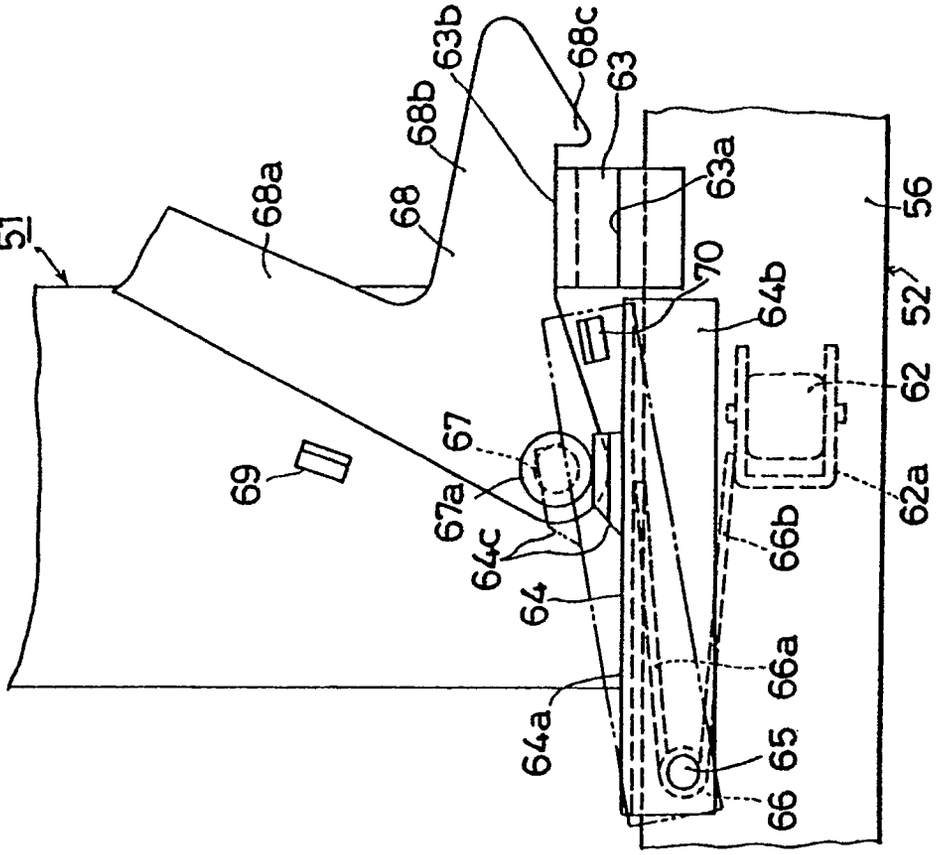
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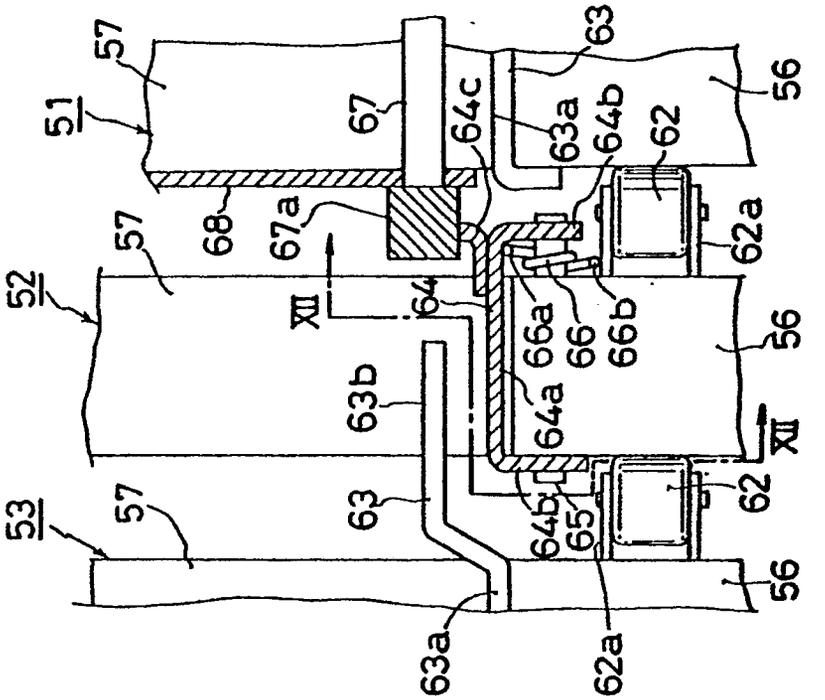
FIG. 4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