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(54) **METHOD OF STOWING AND DEPLOYING WALL PANELS**

VERFAHREN ZUM VERSTAUEN UND EINSETZEN VON WANDPLATTEN

PROCÉDÉ POUR ESCAMOTER ET DÉPLOYER DES PANNEAUX MURAUX

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## Description

### BACKGROUND

**[0001]** The present invention relates to walls that are moveable between a stowed position and a deployed position. US Patent 5,072,766 describes an example of a prior art panel shutter assembly that includes a plurality of shutter panels.

### SUMMARY

**[0002]** In one embodiment, the invention provides a method of moving panels from a stowed position, in which the panels are substantially positioned above a ceiling, to a deployed position, in which the panels are substantially vertically aligned to form a wall. The method includes supporting a first panel having a first weight on a cam, rotating the cam in a first direction and lowering the first panel in response to rotation of the cam. Lowering the first panel separates the first panel from the cam. Supporting the first panel on a flexible lift member in response to lowering the first panel, so that the flexible lift member bears the first weight. Supporting a second panel having a second weight on a support rack, and biasing the second panel into engagement with the cam. The method further includes rotating the cam in the first direction and transferring the second panel from the support rack to the cam in response to rotating the cam, so that the cam bears the second weight. The method further includes further rotating the cam in the first direction, lowering the second panel in response to further rotation of the cam and transferring the second panel from the cam to the first panel, so that the first panel bears the second weight, and the flexible lift member bears the first weight and the second weight through the connection between the first panel and the flexible lift member. The method further includes fixing the second panel to the first panel through a mating tongue and groove engagement.

**[0003]** In another embodiment, the invention provides a method of moving panels from a deployed position, in which the panels are substantially vertically aligned to form a wall, to a stowed position, in which the panels are substantially positioned above a ceiling. The method includes supporting a first panel having a first weight on a flexible lift member, so that the flexible lift member bears the first weight, supporting a second panel having a second weight on the first panel, so that the flexible lift member bears the first weight and the second weight through the connection between the first panel and the flexible lift member. The method further includes moving the first and second panels substantially vertically and lifting the second panel off of the first panel with a cam, so that the cam bears the second weight, disengaging the second panel from the first panel by vertically displacing the second panel from the first panel. The method further includes transferring the second panel from the cam to a support rack, so that the support rack bears the second weight and displacing the second panel horizontally from the first panel by transferring the second panel onto the support rack. The method further includes further moving the first panel substantially vertically, lifting the first panel with the cam, and rotating the cam so that the cam bears the first weight.

**[0004]** In still another embodiment, the invention provides a wall panel assembly moveable between a stowed position and a deployed position. The wall panel assembly includes a first wall panel having a first weight and including a first carrier, a flexible lift member coupled to the first wall panel and a second wall panel having a second weight and including a second carrier. A prime mover moves the first and second wall panels between the stowed position and the deployed position. A support rack supports the second carrier and bears the second weight when the second wall panel is in the stowed position, and the flexible lift member bears the second weight when the second wall panel is in the deployed position through the connection between the first wall panel and the flexible lift member. A cam has an exterior perimeter that defines a recess sized to receive at least one of the first and second carriers. The cam rotates in response to the prime mover. Rotation of the cam in a first direction moves the first and second wall panels into the deployed position, and rotation of the cam in a second direction, opposite the first direction, moves the first and second wall panels into the stowed position.

**[0005]** Other aspects of the invention will become apparent by consideration of the detailed description and accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0006]**

Fig. 1 is a perspective view of a wall panel assembly according to some embodiments of the present invention.

Fig. 2 is an exploded perspective view of one of the panels of the wall panel assembly.

Fig. 3 is an exploded perspective view of a carrier and a carrier mounting bracket.

Fig. 4 is an exploded perspective view of another one of the panels of the wall panel assembly.

Fig. 5 exploded view of an object presence sensor of Fig. 4.

Fig. 6 is a top view of the wall panel assembly of Fig. 1.

Fig. 7 is a top view of a drive box assembly according to some embodiments of the present invention.

Fig. 8 is side view of the drive box assembly with parts removed for clarity.

Fig. 9 is an exploded perspective view of the drive box assembly.

Fig. 10 is a top view of a jamb assembly.

Fig. 11 perspective view of the panels in a stowed position.

Fig. 12 is a side view illustrating the rotation of the cam to release the bottom panel from the cam.

Fig. 13 is a side view illustrating the inclined support rack biasing the carrier of the first stowable panel against the cam.

Fig. 14 is a side view illustrating the cam engaging the carrier of first stowable panel.

Fig. 15 is a side view illustrating the cam lifting the first stowable panel off of the inclined support rack.

Fig. 16 is a side view illustrating the cam positioning the first stowable panel vertically above the bottom panel.

Fig. 17 is a side view illustrating the jamb vertically orienting the first stowable panel and the bottom panel, so that the dovetails of the panels mate when the cam releases first stowable panel.

Fig. 18 is a side view of the panels in a deployed position.

Fig. 19 is a side view illustrating the cam engaging the carrier of the top panel.

Fig. 20 is a side view illustrating the cam vertically displacing the top panel off of the remaining panels.

Fig. 21 is a side view illustrating the cam horizontally displacing the top panel with respect to the remaining panels as the cam transfers top panel onto the inclined support rack.

Fig. 22 is a side view illustrating the chain further lifting the remaining panels as the cam slot approaches the carrier of the next panel.

## DETAILED DESCRIPTION

**[0007]** Before any embodiments of the invention are explained in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the following drawings. The invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of "including," "comprising," or "having" and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items. Unless specified or limited otherwise, the terms "mounted," "connected," "supported," and "coupled" and variations thereof are used broadly and encompass both direct and indirect mountings, connections, supports, and couplings. Further, "connected" and "coupled" are not restricted to physical or mechanical connections or couplings.

**[0008]** Fig. 1 illustrates a wall panel assembly 10 including a plurality of wall panels 15, a drive assembly 20, first and second jamb assemblies 25a, 25b, and a cable device 30. The illustrated wall panel assembly 10 includes seven separate wall panels 15, but other quantities of wall panels 15 can be utilized. The illustrated plurality of wall panels 15 include a plurality of stowable panels 15s and a bottom panel 15b. The illustrated embodiment includes six stowable panels 15s and one bottom panel 15b.

**[0009]** A ceiling 35 having an opening 40 is illustrated in phantom in Fig. 1. The wall panel assembly 10 is positioned above the ceiling 35 to substantially hide the wall panel assembly 10 from view when stowed. The wall panels 15 move through the opening 40 to deploy and the illustrated first and second jamb assemblies 25a, 25b extend through the opening 40.

**[0010]** Fig. 2 illustrates one of the stowable panels 15s in detail. The stowable panels 15s are substantially identical, so the discussion of the stowable panel of Fig. 2 applies to all six of the illustrated stowable panels 15s. The illustrated stowable panel 15s includes a frame 45, front and rear panel faces 50f, 50r, top and bottom dovetail pieces 55t, 55b, carrier mounting brackets 60 and carriers 65. The frame 45 defines top and bottom support brackets 70t, 70b and left and right support brackets 751, 75r. The top and bottom and left and right support brackets 70t, 70b, 751, 75r connect to form the frame 45. The front and rear panel faces 50f, 50r are coupled to the frame 45 to provide first and second oppositely-facing wall surfaces. The illustrated stowable panel 15s is substantially cuboid in shape. The top and bottom dovetail pieces 55t, 55b are mounted on the top and bottom support brackets 70t, 70b, respectively.

**[0011]** The carrier mounting brackets 60 are coupled to the left and right support brackets 751, 75r, respectively. Fig. 3 illustrates one carrier mounting bracket 60 and one carrier 65 in greater detail. The illustrated carrier mounting bracket 60 includes a hollow tube 80, a first plate 85, a second plate 90, a plurality of fasteners 95 and a carrier retaining sleeve 100. The illustrated hollow tube 80 has a substantially square cross section. The hollow tube 80 and the first plate 85 are positioned on an

outside surface of the left support bracket 751 and the second plate 90 is positioned on a inside surface of the right support bracket 75r. The plurality of fasteners 95 extend through respective apertures in the hollow tube 80, the first plate 85, the right support bracket 75r and the second plate 90 to connect the carrier mounting bracket 60 to the frame 45. In the illustrated embodiment, the carrier retaining sleeve 100 is permanently affixed to the hollow tube 85, extends through an aperture in the first plate 85, and abuts the left support bracket 751. The carrier retaining sleeve 100 is hollow and is internally threaded. In the illustrated embodiment, one of the fasteners 95 is positioned above and three of the fasteners 95 are positioned below the carrier retaining sleeve 100. Other quantities, locations and configurations of apertures are possible.

**[0012]** The carrier 65 includes a fastener 115, a first bearing 120, a snap ring 125, a second bearing 130, a bearing retaining sleeve 135, and a nut 140. The fastener 115 may be a shoulder bolt and includes a head 145 and a shaft 150. The head 145 has a larger diameter than the shaft 150. The illustrated head 145 is round and includes a slot to receive a tool to tighten and loosen the fastener 115. The illustrated shaft 150 includes a threaded portion that is threaded into the carrier retaining sleeve 100. A distance between the head 145 and the carrier retaining sleeve 100 is adjustable by threading or unthreading the fastener 115 from the carrier retaining sleeve 100. The first bearing 120 is positioned on the fastener 115 in abutment with the head 145. The illustrated first bearing 120 is a needle bearing, but another suitable bearing or bushing can be utilized. The snap ring 125 is positioned adjacent the first bearing 120. In the illustrated embodiment, the shaft 150 defines a groove to receive the snap ring 125 therein. The snap ring 125 is operable to retain the first bearing 120 in abutment with the head 145. In another embodiment, a detent or other structural protuberance is utilized the retain the first bearing 120 in abutment with the head 145.

**[0013]** The second bearing 130 is positioned adjacent the snap ring 125. The illustrated second bearing 130 is a roller bearing, but another suitable bearing or bushing can be utilized. The bearing retaining sleeve 135 is positioned adjacent the second bearing 130. In some embodiments, the bearing retaining sleeve 135 is threaded onto the fastener 115 to retain the second bearing 130 in position on the fastener 115. In the illustrated embodiment, a nut 140 or other structural element is utilized to retain the second bearing 130 in abutment with the snap ring 125. The nut 140 is threaded onto the fastener 115 and is spaced from the bearing retaining sleeve 135 in the illustrated embodiment. The illustrated nut 140 abuts the carrier retaining sleeve 100. The nut 140 permits adjustment of a distance between the head 145 and the carrier retaining sleeve 100. The nut 140 performs the function of a lock nut 230 against the carrier retaining sleeve 100. Other distance adjustment configurations are possible and the illustrated nut 140 and carrier retaining sleeve 100 are given by way of example only.

**[0014]** With reference to Fig. 4, the bottom panel 15b includes many of the same features as the stowable panels 15s; only the features specific to the bottom panel 15b are discussed herein. The bottom panel 15b includes a bottom seal 155, an object present sensor assembly 160 and a chain mount 165. The seal 155 is coupled directly to the bottom support bracket 70b; the bottom panel 15b has no bottom dovetail piece 55b. The seal 155 is flexible and extends downwardly in a substantially arcuate configuration.

**[0015]** With reference to Fig. 5, the object presence sensor assembly 160 includes a main body 170, an arm 175, a spring 180 and a circuit element 185. The main body 170 is mounted to the bottom support bracket 70b and extends through an aperture 190 in the bottom support bracket 70b. The arm 175 is coupled to the main body 170 and extends substantially vertically and downward through the aperture 190 in the bottom support bracket 70b. The illustrated arm 175 includes a recess 195 and a pin 200. The illustrated main body 170 abuts the pin 200, and the arm 175 substantially abuts the seal. The spring 180 is coupled to the main body 170 and the arm 175 and retains the arm 175 in a first, un-actuated position. The illustrated circuit element 185 is a switch including a first moveable portion and a second portion. The switch second portion is mounted to the main body 170 and the first moveable portion is free to move with respect to the main body 170. When in the first, un-actuated position, the first moveable portion is spaced from the recess 195. In the second, actuated position, the first moveable portion contacts the recess 195. When actuated, the object presence sensor assembly 160 opens a circuit to stop operation of the drive assembly 20. When the seal 155 abuts an object, such as an obstruction or the floor, the arm 175 is biased upward to actuate the object presence sensor assembly 160 and therefore, stop operation of the drive assembly 20.

**[0016]** With reference to Fig. 4, the chain mount 165 includes an elongate bracket 205 having an arm, a second bracket 210 and an adjustable connector assembly 215. The elongate bracket 205 is connected to the right support bracket 75r by a plurality of fasteners 220. In another embodiment, the elongate bracket 205 includes an extension that is connected to the bottom support bracket 70b in addition to or in lieu of the elongate bracket 205 being connected to the right support bracket 75r. The arm projects substantially normal to the right support bracket 75r. The arm includes an aperture extending vertically therethrough. The adjustable connector assembly 215 includes an anchor 225, a stud 230, a nut 235 and a lock nut 240. The anchor 225 includes a first aperture oriented along a substantially horizontal axis and a second aperture oriented along a substantially vertical axis. The second aperture 240 is threaded in the illustrated embodiment. The stud 220 is threaded and extends through the arm aperture and into the vertical anchor aperture. The nut 235 and lock nut 240 thread onto the

stud 220 below the arm. The nut 235 and lock nut 240 are operable to couple the stud 230 to the arm. A distance between the arm and the anchor 225 is adjustable by adjusting the position of the nut 235 and the lock nut 240 on the stud 230.

**[0017]** With reference to Fig. 6, the drive assembly 20 includes a prime mover 245, a gear reducer 250, first and second output shafts 255a, 255b and first and second drive box assemblies 260a, 260b. The illustrated prime mover 245 is an electric motor, but in other embodiments, other suitable prime movers can be utilized. The illustrated gear reducer 250 includes one input coupled to the electric motor and first and second outputs 265a, 265b. The first and second outputs 265a, 265b are substantially co-linear and extend outwardly from the gear reducer 250. The first and second output shafts 255a, 255b are coupled to the respective first and second outputs 265a, 265b for rotation therewith. The first and second output shafts 255a, 255b extend toward and engage the respective first and second drive box assemblies 260a, 260b. The illustrated gear reducer 250 also includes a third output 270 (see Fig. 1) extending downward from the gear reducer 250. The third output 270 is engageable by a user for optional manual operation of the gear reducer 250. Although not specifically illustrated, the gear reducer 250 is mounted to the building structure.

**[0018]** The first and second drive box assemblies 260a, 260b are substantially mirror images, so only the first drive box assembly 260a will be discussed in detail. As shown in greater detail in Figs. 7-9, the first second drive box assembly 260a includes a first drive shaft 275, a first sprocket 280, a second drive shaft 285, a second sprocket 290, a cam 295, a third sprocket 300, a first chain 305, an idler sprocket 310, a flexible lift member 315, a support rack 320 and a bar 322. The first drive shaft 275 is coupled to the first output shaft 255a for rotation therewith. The first sprocket 280 is coupled to the first drive shaft 275 for rotation therewith. The illustrated first sprocket 280 has ten teeth. The second drive shaft 285 is spaced from and substantially parallel to the first drive shaft 275. The second sprocket 290 is coupled to the second drive shaft 285 for rotation therewith. The illustrated second sprocket 290 has sixty teeth. The cam 295 is coupled to the second drive shaft 285 for rotation therewith. The illustrated cam 295 includes a substantially circular outer perimeter defining a first radius and a slot 325 which defines a second radius, smaller than the first radius. The slot 325 is sized to receive one of the carriers 65. The illustrated slot 325 is substantially symmetrical and includes a first substantially planar portion 325a, a second substantially planar portion 325b and a first recess portion 325c between the first and second substantially planar portions. The substantially planar portions 325a, 325b guide the carrier 65 into the recess portion 325c when the cam 295 rotates. The third sprocket 300 is coupled to the second drive shaft 285 for rotation therewith. The illustrated third sprocket 300 is positioned between the second sprocket 290 and the cam 295. The illustrated third sprocket 300 includes thirty teeth and has a one inch pitch.

**[0019]** The first chain 305 encircles the first sprocket 280 and the second sprocket 290 to couple the first sprocket 280 to the second sprocket 290. The first chain 305 connects the first drive shaft 275 and the second drive shaft 285, such that rotation of the first drive shaft 275 causes rotation of the second drive shaft 285. The idler sprocket 310 is also coupled to the first chain 305 and is utilized to adjust tension in the first chain 305. The first and second sprockets 280, 290 having different quantities of teeth to permit further reduction of rotation of the second drive shaft 285. In the illustrated embodiment, the first sprocket 280 completes six full rotations while the second sprocket 290 completes only one full rotation. Other quantities of teeth and varieties of gear reduction are possible, and the illustrated is given by way of example only.

**[0020]** The illustrated flexible lift member 315 is a length of chain (herein referred to as a second chain) but other flexible lift members, such as cables, ropes, cords, strings, and the like can be utilized in place of the illustrated second chain 315. The second chain 315 engages the third sprocket 300 and thereby moves in response to rotation of the second drive shaft 285. The second chain 315 is coupled to the bottom panel 15b via the adjustable connector assembly 215. Specifically, a cross link member of the second chain 315 extends through the first aperture 235 of the anchor 215.

**[0021]** The illustrated support rack 320 is a vertically extending plate with an inclined upper edge. The inclined upper edge is sized to support the carriers 65. In the illustrated embodiment, the carrier second bearing 130 moves along the inclined upper edge. The inclined edge of the support rack 320 is angled downwardly toward the cam 295. Gravity is utilized to move the carriers 65 into engagement with the cam 295. In another embodiment, a separate motive force (in addition to gravity) is utilized to move the carriers 65 into engagement with the cam 295. In the illustrated embodiment, the incline is about 5 degrees, but other incline angles can be utilized. The bar 322 illustrated in Fig. 8 is positioned above the inclined support rack 320 and inhibits the carriers 65 from detaching from the inclined support rack 320. The bar 322 can assist in aligning the stowable panels 15s on the inclined support rack 320. The bar 322 is only illustrated in Fig. 8, but is omitted from the remaining figures for clarity.

**[0022]** With reference to Fig. 10, the first jamb assembly 25a includes an external housing assembly 330 and an internal guidance system 335. The first jamb assembly 25a and the second jamb assembly 25b are substantial mirror images, so only the first jamb assembly 25a is described in detail. The external housing assembly 330 is mounted to a floor and the first drive box assembly 260a and includes first and second L-shaped brackets 340a, 340b, first and second mounting brackets 345a, 345b, first and second gaskets 350a, 350b and first and second alignment brackets 352, 353. The first and sec-

ond L-shaped brackets 340a, 340b define a structure substantially enclosed on three sides, thereby leaving one side substantially open. The illustrated first and second L-shaped brackets 340a, 340b are jamb receivers made from extruded aluminum. The illustrated first and second mounting brackets 345a, 345b are guide rails that extend across a portion of the open side. The first and second mounting brackets 345a, 345b extend inward into an interior of the structure. The first and second gaskets 350a, 350b extend inward from the first and second mounting brackets 345a, 345b across a portion of the open side. The first and second alignment brackets 352, 353 (see Fig. 8) engage and vertically align the panels 15 during stowage and deployment. The illustrated alignment brackets 352, 353 are shown by way of example only. Other configurations, shapes and quantities of alignment brackets can be utilized. In some embodiments, the alignment brackets are omitted. The external housing assembly 330 receives the second chain 315 extending therethrough. In some embodiments, the first jamb assembly 25a is mounted to a building wall and the external housing assembly 330 extends into a room in the building. In other embodiments, the first jamb assembly 25a is mounted to a building wall and the external housing assembly 330 is contained within the wall.

**[0023]** The internal guidance system 335 includes first and second guide brackets 355a, 355b coupled to respective first and second mounting brackets 345a, 345b. The first and second guide brackets 355a, 355b define a substantially vertical opening 40 sized to received the carriers 65 therein. The first and second guide brackets 355a, 355b substantially surround a portion of the carriers 65 to retain the panels in a substantially aligned orientation.

**[0024]** The cable device 30 (shown in Fig. 1) is a centrifugal cam 295 including a housing 360 and a cable 365. Although not specifically shown, one cable device 30 can be provided per drive box assembly 260a, 260b. The cable 365 is free to move with respect to the housing 360 at low speed, but the cable device 30 brakes at high speed. The housing 360 is coupled to the building or other structure and the cable 365 is coupled to the bottom panel 15b. In the event that the any component in the wall panel assembly 10 fails, the cable device(s) 30 support the bottom panel 15b, and thus, the remaining panels resting on the bottom panel 15b.

**[0025]** In operation, the panels 15b, 15s are moved between a stowed position (shown in Fig. 11) to a deployed position (shown in Fig. 18). Figs. 12-17 illustrate some of the steps of deploying the panels 15b, 15s and Figs. 19-22 illustrate some of the steps of stowing the panels 15b, 15s.

**[0026]** In a stowed position, the stowable panels 15s are supported on the support racks 320 via the carriers 65. The support racks 320 bear the weight of the stowable panels 15s in the illustrated stowed position. The support racks 320 are inclined to bias the stowable panels 15s into engagement with the cams 295. In the illustrated stowed position, the bottom panel 15b is supported on the cams 295 via the carriers 65 in the slots 325. In the illustrated stowed position, the cams 295 bear the weight of the bottom panel 15b and the chains 315 bear little or none of the weight of the bottom panel 15b. In another embodiment, the bottom panel 15b is supported by the chains 315 in the stowed position. In still another embodiment, the bottom panel 15b is supported by the support racks 320 in the stowed position. In the stowed position, the bottom panel 15b is recessed above the ceiling 35 so that the seal 155 is recessed above the ceiling 35. In another embodiment, the seal 155 is level with the ceiling 35 when the wall panels 15 are stowed.

**[0027]** Operation of the motor 245 rotates the first and second outputs 265a, 265b of the gear reducer 250. The first and second outputs 265a, 265b of the gear reducer 250 cause rotation of the respective first and second output shafts 255a, 255b. The first and second output shafts 255a, 255b rotate respective first drive shafts 275, which thereby rotate the respective first sprockets 280. Rotation of the first sprockets 280 causes movement of the respective first chains 305, which causes rotation of the respective second sprockets 290 and thereby, rotation of the respective second drive shafts 285. The cams 295 and the third sprockets 300 are coupled for rotation with the respective second drive shafts 285. Therefore, the cams 295 rotate about the respective second drive shafts 285 in response to operation of the motor 245.

**[0028]** To deploy the wall panels 15, the motor 245 causes the cams 295 to rotate to release the carriers 65 of the bottom panel 15b from the cam slots 325, to thereby lower the bottom panel 15b (see Fig. 12). When released from the cam slots 325, the chains 315 bear the weight of the bottom panel 15b through the chain mounts 165. As the second drive shafts 285 continue to rotate, the chains 315 continue to lower the bottom panel 15b. The first and second alignment brackets 352, 353 guide the bottom panel 15b to maintain the bottom panel 15b in a substantially vertical orientation.

**[0029]** As shown in Fig. 13, the inclined support racks 320 bias the carriers 65 of the first stowable panel 15s against the respective cams 295. The carriers 65 abut the cams 295 as the cams 295 rotate in response to rotation of the second drive shafts 285. In the illustrated embodiment, the second bearings 125 ride along the outside surface of the cams 295. When the cam 295 slots are oriented to receive the carriers 65 of the first stowable panel 15s, the inclined support racks 320 bias the carriers 65 of the first stowable panel 15s into the cam slots 325 (see Fig. 14). The carriers 65 ride along the inclined support racks 320 into the recess portions 325c.

**[0030]** With reference to Fig. 15, the cams 295 lift the first stowable panel 15s off of the inclined support racks 320, thereby transferring the weight of the first stowable panel 15s from the support racks 320 to the cams 295. In the illustrated embodiment, the cams 295 engage the first bearings 120 of the carriers 65. The recess portions 325c retain the carriers 65 until the cams 295 have ro-

tated to a position in which the slots 325 are facing substantially horizontal, such as the position illustrated in Fig. 16.

**[0031]** In the illustrated embodiment, the recess portions 325c are sized to receive the carriers 65. In other embodiments, the recess portions 325c are larger than the carriers 65 and permit the carriers 65 to slide along the recess portions 325c. In these embodiments, the carriers 65 roll along the slots 325 when the slots are facing substantially vertically upward. The recess portions 325c define a length which is adjustable to accommodate tolerance requirements and to minimize noise when the carriers 65 move along and abut ends of the recess portions 325c.

**[0032]** As shown in Fig. 16, the cams 295 continue to rotate in response to operation of the motor 245 to position the first stowable panel 15s substantially vertically above the bottom panel 15b. The first and second alignment brackets 352, 353 guide the first stowable panel 15s into vertically alignment with the bottom panel 15b. The cams 295 continue to lower the first stowable panel 15s onto the bottom panel 15b, such that the mating dovetail pieces 55t, 55b on a top of the bottom panel 15b and on a bottom of the first stowable panel 15s engage. As shown in Fig. 17, the cams 295 release the first stowable panel 15s and the chains 315 support the first stowable panel 15s in response to the connection between the first bottom panel 15b and the chains 315. The first stowable panel 15s is not connected to the chains 315, except for the indirect connection through the first bottom panel 15b.

**[0033]** With continued reference to Fig. 17, the first and second jamb assemblies 25a, 25b, specifically the first and second alignment brackets 352, 353, orient the first stowable panel 15s above the bottom panel 15b to guide the dovetails 55t, 55b into mating engagement when the cams 295 release the first stowable panel 15s. The first and second jamb assemblies 25a, 25b are fixed to the respective first and second drive box assemblies 260a, 260b and to the floor. The first and second alignment brackets 352, 353 guide and vertically align the panels 15b, 15s during deployment and stowage. The carriers 65 move within the internal guidance system 335 of the first and second jamb assemblies 25a, 25b.

**[0034]** The remaining stowable panels 15s are deployed in the same manor as the first stowable panel 15s is deployed. The stowable panels 15s rest on top of other stowable panels 15s and the bottom panel 15b when deployed. The top dovetail piece 55t of one panel mates with the bottom dovetail piece 55b of the panel above it, when the wall panel assembly 10 is deployed. The chains 315 bear the weight of all of the deployed panels 15 via the connection between the chains 315 and the bottom panel 15b. Fig. 18 is a perspective view of the panels 15b, 15s in a deployed position in which all of the stowable panels 15s are positioned on the bottom panel 15b. In the illustrated embodiment, the top panel 15s extends through the opening 40 above the ceiling 35. In another embodiment, a top of the top panel 15s is substantially level with the opening 40. The mating dovetail pieces 55t, 55b of the stowable panels 15s engage to substantially fix the adjacent deployed panels 15b, 15s together. The weight of the stowable panels 15s, the mating dovetail pieces 55t, 55b and the first and second jamb assemblies 25a, 25b, in combination, retain the wall panels 15 in a substantially vertical position when deployed. The front and rear panel faces 50f, 50r of the wall panels 15 together provide a substantially continuous wall surface when the wall panel assembly 10 is deployed.

**[0035]** To stow the panels 15, the motor 245 operates in an opposite direction of that of deployment. Operation of the motor 245 rotates the cams 295 in the opposite direction. With reference to Fig. 19, the cams 295 engage the carriers 65 of the top panel 15s. In response to rotation of the cams 295, the cams 295 lift the top panel 15s off of the other panels 15s, 15b, as shown in Fig. 20. The top panel 15s is first vertically displaced from the remaining panels 15s, 15b in response to rotation of the cams 295. The top panel 15s is then horizontally displaces from the remaining panels 15s, 15b in response to further rotation of the cams 295, as shown in Fig. 21.

**[0036]** Fig. 21 also illustrates that the chains 315 continue to lift the remaining panels 15s, 15b as the cams 295 transfer the top panel 15s onto the inclined support rack 320. The top panel 15s is urged up the inclined support rack 320 by the second substantially planar portion 325a. As shown in Fig. 22, the chains 315 further lift the remaining panels 15s, 15b as the cam 295 slots approach the carriers 65 of the next panel. In the illustrated embodiment, one full rotation of the cam 295 occurs per stowing or deploying of one panel 15. The illustrated third sprocket 300 has an outside perimeter that equals the height of the panels 15. The illustrated cams 295 have a larger diameter than the third sprockets 300 so that the cams 295 lift the panel 15s off of the remaining panels 15s, 15b while stowing and lowers the panel 15s vertically onto the remaining panels 15s, 15b while deploying. This lifting and lowering permits vertical alignment of the mating dovetail protrusions 55t, 55b prior to mating engagement of the mating dovetail protrusions 55t, 55b.

**[0037]** Various features and advantages of the invention are set forth in the following claims.

## Claims

1. A method of moving panels (15) from a stowed position, in which the panels (15) are substantially positioned above a ceiling (35), to a deployed position, in which the panels are substantially vertically aligned to form a wall, the method comprising:

   supporting a first panel (15b) on a cam (295), the first panel having a first weight;
   rotating the cam (295) in a first direction;
   lowering the first panel (15b) in response to ro-

tation of the cam (295), wherein lowering the first panel (15b) separates the first panel (15b) from the cam (295);
supporting the first panel (15b) on a flexible lift member (315) in response to lowering the first panel (15b), **characterised in that** the flexible lift member (315) directly bears the first weight and further **characterised by**:

supporting a second panel (15s) on a support rack (320), the second panel (15s) having a second weight;
biasing the second panel (15s) into engagement with the cam (295);
rotating the cam (295) in the first direction;
transferring the second panel (15s) from the support rack (320) to the cam (295) in response to rotating the cam (295), wherein the cam (295) bears the second weight;
further rotating the cam (295) in the first direction;
lowering the second panel (15s) in response to further rotation of the cam (295);
transferring the second panel (15s) from the cam (295) to the first panel (15b), wherein the first panel (15b) bears the second weight, and wherein the flexible lift member (315) bears the first weight and the second weight only through the connection between the first panel (15b) and the flexible lift member (315); and
fixing the second panel (15s) to the first panel (15b) only through a mating tongue and groove (55t, 55b) engagement.

**2.** The method of claim 1, further comprising supporting a third panel (15s) on the support rack (320), wherein the third panel (15s) has a third weight;
biasing the third panel (15s) into engagement with the cam (295);
rotating the cam (295) in the first direction;
transferring the third panel (15s) from the support rack (320) to the cam (295) in response to rotating the cam (295), wherein the cam (295) bears the third weight;
further rotating the cam (295);
lowering the third panel (15s) in response to further rotation of the cam (295);
transferring the third panel (15s) from the cam (295) to the first (15b) and second (15s) panels, wherein the first panel (15b) bears the second weight and the third weight, and wherein the flexible lift member (315) bears the first, second and third weights through the connection between the first panel (15b) and the flexible lift member (315); and
fixing the third panel (15s) to the second panel (15s) through a mating tongue and groove (55t, 55b) engagement.

**3.** The method of claim 2, wherein the cam (295) rotates approximately 360 degrees between transferring the second panel (15s) from the support rack (320) to the cam (295) and transferring the third panel (15s) from the support rack (320) to the cam (295).

**4.** The method of claim 1, wherein moving the second panel (15s) into engagement with the cam (295) includes inclining the support rack (320) at a non-horizontal angle, and moving the second panel (15s) into engagement with the cam (295) under the influence of gravity.

**5.** The method of claim 1, further comprising guiding the first panel (15b) to retain the first panel (15b) in a substantially vertical orientation while lowering the first panel (15b).

**6.** A method of moving panels (15) from a deployed position, in which the panels (15) are substantially vertically aligned to form a wall, to a stowed position, in which the panels (15) are substantially positioned above a ceiling (35), the method comprising:

supporting a first panel (15b) on a flexible lift member (315), the first panel (15b) having a first weight, **characterised in that** the flexible lift member (315) directly bears the first weight and further **characterised by**:

supporting a second panel (15s) on the first panel (15b), the second panel (15s) having a second weight, wherein the flexible lift member (315) bears the first weight and the second weight through the connection between the first panel (15b) and the flexible lift member (315);
moving the first (15b) and second panels (15s) substantially vertically;
lifting the second panel (15s) off of the first panel (15b) with a cam (295), wherein the cam (295) bears the second weight;
disengaging the second panel (15s) from the first panel (15b) by vertically displacing the second panel (15s) from the first panel (15b);
transferring the second panel (15s) from the cam (295) to a support rack (320), wherein the support rack (320) bears the second weight;
displacing the second panel (15s) horizontally from the first panel (15b) by transferring the second panel (15s) onto the support rack (320);
further moving the first panel (15b) substantially vertically;
lifting the first panel (15b) with the cam (295); and

rotating the cam (295) such that the cam (295) bears the first weight.

**7.** The method of claim 6, further comprising supporting a third panel (15s) on the second panel (15s), the third panel (15s) having a third weight, wherein the third weight is supported by the flexible lift member (315) through the connection between the flexible lift member (315) and the first panel (15b);
lifting the third panel (15s) off of the second panel (15s) with the cam (295), wherein the cam (295) bears the third weight;
disengaging the third panel (15s) from the second panel (15s) by vertically displacing the third panel (15s) from the second panel (15s);
transferring the third panel (15s) from the cam (295) to the support rack (320), wherein the support rack (320) bears the third weight, wherein the third panel (15s) is lifted and transferred prior to lifting and transferring the second panel (15s); and
displacing the third panel (15s) horizontally from the second panel (15s) by transferring the third panel (15s) onto the support rack (320).

**8.** The method of claim 7, wherein the cam (295) rotates approximate 360 degrees between lifting the third panel (15s) with the cam (295) and lifting the second panel (15s) with the cam (295).

**9.** The method of claim 7, further comprising biasing the third panel (15s) up an incline in response to transferring the second panel (15s) from the cam (295) to the support rack (320).

**10.** The method of claim 6, further comprising guiding the first panel (15b) to retain the first panel (15b) in a substantially vertical orientation while moving the first panel (15b) vertically.

**11.** A wall panel assembly (10) moveable between a stowed position and a deployed position, the wall panel assembly comprising:

a first wall panel (15b) having a first weight and including a first carrier (65);
a flexible lift member (315) coupled to the first wall panel (15b);
a second wall panel (15s) having a second weight and including a second carrier (65);
a prime mover (245) operable to move the first (15b) and second (15s) wall panels between the stowed position and the deployed position;
a support rack (320), wherein the support rack (320) supports the second carrier (65) and bears the second weight when the second wall panel (15s) is in the stowed position; **characterised in that** the flexible lift member (315) indirectly bears the second weight when the second wall panel (15s) is in the deployed position only through the connection between the first wall panel (15b) and the flexible lift member (315); and
a cam (295) having an exterior perimeter defining a recess (325), the recess (325) sized to receive at least one of the first and second carriers (65), the cam (295) being rotatable in response to the prime mover (245), wherein rotation of the cam (295) in a first direction moves the first (15b) and second (15s) wall panels into the deployed position, and wherein rotation of the cam (295) in a second direction, opposite the first direction, moves the first (15b) and second wall panels (15s) into the stowed position.

**12.** The wall panel assembly (10) of claim 11, further comprising a third wall panel (15s) having a third weight and including a third carrier (65), wherein the support rack (320) supports the third carrier (65) and bears the third weight when the third wall panel (15s) is in the stowed position, and wherein the flexible lift member (315) bears the third weight when the third wall panel (15s) is in the deployed position through the connection between the first wall panel (15b) and the flexible lift member (315).

**13.** The wall panel assembly (10) of claim 11, wherein the cam (295) rotates approximate 360 degrees between receiving the first carrier (65) and receiving the second carrier (65).

**14.** The wall panel assembly (10) of claim 13, further comprising a sprocket (300) coupled to the cam (295), wherein the cam (295) has a first diameter and the sprocket (300) has a second diameter, less than the first diameter.

**15.** The wall panel assembly (10) of claim 11, wherein:

the support rack (320) includes a non-horizontal incline, and wherein the second carrier (65) moves down the incline under the influence of gravity into engagement with the cam (295) when the second wall panel (15s) is in the stowed position; and/or
the cam recess (325) is substantially symmetrical, wherein the cam recess (325) includes a first portion (325a) for transferring the second wall panel (15s) from the support rack (320) to the cam (295) and a second portion (325b) for transferring the second wall panel (15s) from the first wall panel (15b) to the cam (295); and/or
the wall panel assembly (10) further comprises a jamb (25a,b) sized to receive the first and second carriers (65) when the flexible lift member (315) bears the first and second weights, wherein the jamb at least partially surrounds the first

and second carriers (65) to retain the first (15b) and second (15s) wall panels in a substantially vertical orientation; and/or
the first carrier (65) comprises a shaft (150), a head (145), and at least one bearing (120), wherein the at least one bearing (120) engages the support rack (320) when the first wall panel (15b) is stowed and engages the cam (295) when the first wall panel (15b) is moved between the stowed and deployed positions; and/or
the first wall panel (15b) is connected to the flexible lift member (315) and the second wall panel (15s) is connected to the flexible lift member (315) only coupled to the flexible lift member (315) indirectly through the first wall panel (15b); and/or
the flexible lift member (315) is a chain.

**Patentansprüche**

1. Verfahren zum Bewegen von Platten (15) aus einer verstauten Position, in der die Platten (15) im Wesentlichen oberhalb einer Decke (35) positioniert sind, in eine aufgestellte Position, in der die Platten im Wesentlichen senkrecht ausgerichtet sind, um eine Wand zu bilden, wobei das Verfahren die folgenden Schritte aufweist:

   Tragen einer ersten Platte (15b) auf einem Nocken (295), wobei die erste Platte ein erstes Gewicht aufweist;
   Drehen des Nockens (295) in einer ersten Richtung;
   Absenken der ersten Platte (15b) als Reaktion auf die Drehung des Nockens (295), wobei das Absenken der ersten Platte (15b) die erste Platte (15b) vom Nocken (295) trennt;
   Tragen der ersten Platte (15b) auf einem flexiblen Hebeelement (315) als Reaktion auf das Absenken der ersten Platte (15b), **dadurch gekennzeichnet, dass** das flexible Hebeelement (315) direkt das erste Gewicht trägt und außerdem **gekennzeichnet durch** die folgenden Schritte:

      Tragen einer zweiten Platte (15s) auf einem Tragegestell (320), wobei die zweite Platte (15s) ein zweites Gewicht aufweist;
      Lenken der zweiten Platte (15s) in einen Eingriff mit dem Nocken (295);
      Drehen des Nockens (295) in der ersten Richtung;
      Übertragen der zweiten Platte (15s) vom Tragegestell (320) auf den Nocken (295) als Reaktion auf das Drehen des Nockens (295), wobei der Nocken (295) das zweite Gewicht trägt;
      weiteres Drehen des Nockens (295) in der ersten Richtung;
      Absenken der zweiten Platte (15s) als Reaktion auf die weitere Drehung des Nockens (295);
      Übertragen der zweiten Platte (15s) vom Nocken (295) auf die erste Platte (15b), wobei die erste Platte (15b) das zweite Gewicht trägt, und wobei das flexible Hebeelement (315) das erste Gewicht und das zweite Gewicht nur **durch** die Verbindung zwischen der ersten Platte (15b) und dem flexiblen Hebeelement (315) trägt; und
      Arretieren der zweiten Platte (15s) an der ersten Platte (15b) nur **durch** einen passenden Feder- und Nuteingriff (55t, 55b).

2. Verfahren nach Anspruch 1, das außerdem die folgenden Schritte aufweist:

   Tragen einer dritten Platte (15s) auf dem Tragegestell (320), wobei die dritte Platte (15s) ein drittes Gewicht aufweist;
   Lenken der dritten Platte (15s) in einen Eingriff mit dem Nocken (295);
   Drehen des Nockens (295) in der ersten Richtung;
   Übertragen der dritten Platte (15s) vom Tragegestell (320) auf den Nocken (295) als Reaktion auf das Drehen des Nockens (295), wobei der Nocken (295) das dritte Gewicht trägt;
   weiteres Drehen des Nockens (295);
   Absenken der dritten Platte (15s) als Reaktion auf die weitere Drehung des Nockens (295);
   Übertragen der dritten Platte (15s) vom Nocken (295) auf die erste (15b) und die zweite Platte (15s), wobei die erste Platte (15b) das zweite und das dritte Gewicht trägt, und wobei das flexible Hebeelement (315) das erste, zweite und dritte Gewicht durch die Verbindung zwischen der ersten Platte (15b) und dem flexiblen Hebeelement (315) trägt; und
   Arretieren der dritten Platte (15s) an der zweiten Platte (15s) durch einen passenden Feder- und Nuteingriff (55t, 55b).

3. Verfahren nach Anspruch 2, bei dem sich der Nocken (295) um annähernd 360 Grad zwischen dem Übertragen der zweiten Platte (15s) vom Tragegestell (320) zum Nocken (295) und dem Übertragen der dritten Platte (15s) vom Tragegestell (320) zum Nocken (295) dreht.

4. Verfahren nach Anspruch 1, bei dem der Schritt des Bewegens der zweiten Platte (15s) in Eingriff mit dem Nocken (295) das Neigen des Tragegestells (320) unter einem nicht horizontalen Winkel und das Bewegen der zweiten Platte (15s) in Eingriff mit dem

Nocken (295) unter dem Einfluss der Schwerkraft umfasst.

**5.** Verfahren nach Anspruch 1, das außerdem den Schritt des Führens der ersten Platte (15b) aufweist, um die erste Platte (15b) in einer im Wesentlichen vertikalen Ausrichtung zu halten, während die erste Platte (15b) abgesenkt wird.

**6.** Verfahren zum Bewegen von Platten (15) aus einer aufgestellten Position, in der die Platten (15) im Wesentlichen vertikal ausgerichtet sind, um eine Wand zu bilden, in eine verstaute Position, in der die Platten (15) im Wesentlichen oberhalb einer Decke (35) positioniert sind, wobei das Verfahren die folgenden Schritte aufweist:

Tragen einer ersten Platte (15b) auf einem flexiblen Hebeelement (315), wobei die erste Platte (15b) ein erstes Gewicht aufweist, **dadurch gekennzeichnet, dass** das flexible Hebeelement (315) direkt das erste Gewicht trägt, und außerdem **gekennzeichnet durch** folgende Schritte:

Tragen einer zweiten Platte (15s) auf der ersten Platte (15b), wobei die zweite Platte (15s) ein zweites Gewicht aufweist, wobei das flexible Hebeelement (315) das erste Gewicht und das zweite Gewicht **durch** die Verbindung zwischen der ersten Platte (15b) und dem flexiblen Hebeelement (315) trägt;
Bewegen der ersten (15b) und der zweiten Platte (15s) im Wesentlichen vertikal;
Anheben der zweiten Platte (15s) weg von der ersten Platte (15b) mit einem Nocken (295), wobei der Nocken (295) das zweite Gewicht trägt;
Trennen der zweiten Platte (15s) von der ersten Platte (15b) **durch** vertikales Verschieben der zweiten Platte (15s) von der ersten Platte (15b);
Übertragen der zweiten Platte (15s) vom Nocken (295) zu einem Tragegestell (320), wobei das Tragegestell (320) das zweite Gewicht trägt;
Verschieben der zweiten Platte (15s) horizontal von der ersten Platte (15b) **durch** Übertagen der zweiten Platte (15s) auf das Tragegestell (320);
weiteres Bewegen der ersten Platte (15b) im Wesentlichen vertikal;
Anheben der ersten Platte (15b) mit dem Nocken (295); und
Drehen des Nockens (295), so dass der Nocken (295) das erste Gewicht trägt.

**7.** Verfahren nach Anspruch 6, das außerdem die folgenden Schritte aufweist:

Tragen einer dritten Platte (15s) auf der zweiten Platte (15s), wobei die dritte Platte (15s) ein drittes Gewicht aufweist, wobei das dritte Gewicht durch das flexible Hebeelement (315) durch die Verbindung zwischen dem flexiblen Hebeelement (315) und der ersten Platte (15b) getragen wird;
Anheben der dritten Platte (15s) weg von der zweiten Platte (15s) mit dem Nocken (295), wobei der Nocken (295) das dritte Gewicht trägt;
Trennen der dritten Platte (15s) von der zweiten Platte (15s) durch vertikales Verschieben der dritten Platte (15s) von der zweiten Platte (15s);
Übertragen der dritten Platte (15s) vom Nocken (295) zu einem Tragegestell (320), wobei das Tragegestell (320) das dritte Gewicht trägt, wobei die dritte Platte (15s) vor dem Anheben und Übertragen der zweiten Platte (15s) angehoben und übertragen wird; und
Verschieben der dritten Platte (15s) horizontal von der zweiten Platte (15s) durch Übertagen der dritten Platte (15s) auf das Tragegestell (320).

**8.** Verfahren nach Anspruch 7, bei dem sich der Nocken (295) um annähernd 360 Grad zwischen dem Anheben der dritten Platte (15s) mit dem Nocken (295) und dem Anheben der zweiten Platte (15s) mit dem Nocken (295) dreht.

**9.** Verfahren nach Anspruch 7, das außerdem den Schritt des Lenkens der dritten Platte (15s) bis zu einer Neigung als Reaktion auf das Übertragen der zweiten Platte (15s) vom Nocken (295) zum Tragegestell (320) aufweist.

**10.** Verfahren nach Anspruch 6, das außerdem den Schritt des Führens der ersten Platte (15b) aufweist, um die erste Platte (15b) in einer im Wesentlichen vertikalen Ausrichtung zu halten, während die erste Platte (15b) vertikal bewegt wird.

**11.** Wandplattenanordnung (10), die zwischen einer verstauten Position und einer aufgestellten Position beweglich ist, wobei die Wandplattenanordnung aufweist:

eine erste Wandplatte (15b) mit einem ersten Gewicht, und die einen ersten Träger (65) einschließt;
ein flexibles Hebeelement (315), das mit der ersten Wandplatte (15b) verbunden wird;
eine zweite Wandplatte (15s) mit einem zweiten Gewicht, und die einen zweiten Träger (65) einschließt;

eine Antriebsmaschine (245), die funktionsfähig ist, um die ersten (15b) und die zweiten Wandplatten (15s) zwischen der verstauten Position und der aufgestellten Position zu bewegen;
ein Tragegestell (320), wobei das Tragegestell (320) den zweiten Träger (65) stützt und das zweite Gewicht trägt, wenn sich die zweite Wandplatte (15s) in der verstauten Position befindet; **dadurch gekennzeichnet, dass** das flexible Hebeelement (315) indirekt das zweite Gewicht nur durch die Verbindung zwischen der ersten Wandplatte (15b) und dem flexiblen Hebeelement (315) trägt, wenn sich die zweite Wandplatte (15s) in der aufgestellten Position befindet; und
einen Nocken (295) mit einem äußeren Umfang, der eine Aussparung (325) definiert, wobei die Aussparung (325) bemessen ist, um mindestens einen von erstem und zweitem Träger (65) aufzunehmen, wobei der Nocken (295) als Reaktion auf die Antriebsmaschine (245) drehbar ist, wobei die Drehung des Nockens (295) in einer ersten Richtung die ersten (15b) und die zweiten Wandplatten (15s) in die aufgestellte Position bewegt, und wobei die Drehung des Nockens (295) in einer zweiten Richtung, entgegengesetzt der ersten Richtung, die ersten (15b) und die zweiten Wandplatten (15s) in die verstaute Position bewegt.

**12.** Wandplattenanordnung (10) nach Anspruch 11, die außerdem eine dritte Wandplatte (15s) mit einem dritten Gewicht aufweist, und die einen dritten Träger (65) einschließt, wobei das Tragegestell (320) den dritten Träger (65) stützt und das dritte Gewicht trägt, wenn sich die dritte Wandplatte (15s) in der verstauten Position befindet, und wobei das flexible Hebeelement (315) das dritte Gewicht durch die Verbindung zwischen der ersten Wandplatte (15b) und dem flexiblen Hebeelement (315) trägt, wenn sich die dritte Wandplatte (15s) in der aufgestellten Position befindet.

**13.** Wandplattenanordnung (10) nach Anspruch 11, bei der sich der Nocken (295) um annähernd 360 Grad zwischen dem Aufnehmen des ersten Trägers (65) und dem Aufnehmen des zweiten Trägers (65) dreht.

**14.** Wandplattenanordnung (10) nach Anspruch 13, die außerdem ein Kettenzahnrad (300) aufweist, das mit dem Nocken (295) verbunden ist, wobei der Nocken (295) einen ersten Durchmesser und das Kettenzahnrad (300) einen zweiten Durchmesser aufweist, der kleiner ist als der erste Durchmesser.

**15.** Wandplattenanordnung (10) nach Anspruch 11, bei der:

das Tragegestell (320) eine nicht horizontale Neigung umfasst, und wobei sich der zweite Träger (65) unter dem Einfluss der Schwerkraft nach unten auf der Neigung in einen Eingriff mit dem Nocken (295) bewegt, wenn sich die zweite Wandplatte (15s) in der verstauten Position befindet; und/oder
die Nockenaussparung (325) im Wesentlichen symmetrisch ist, wobei die Nockenaussparung (325) einen ersten Abschnitt (325a) für das Übertragen der zweiten Wandplatte (15s) vom Tragegestell (320) zum Nocken (295) und einen zweiten Abschnitt (325b) für das Übertragen der zweiten Wandplatte (15s) von der ersten Wandplatte (15b) zum Nocken (295) umfasst; und/oder
die Wandplattenanordnung (10) außerdem eine Einfassung (25a, b) aufweist, die bemessen ist, um den ersten und zweiten Träger (65) aufzunehmen, wenn das flexible Hebeelement (315) das erste und zweite Gewicht trägt, wobei die Einfassung mindestens teilweise den ersten und zweiten Träger (65) umgibt, um die ersten (15b) und die zweiten Wandplatten (15s) in einer im Wesentlichen vertikalen Ausrichtung zu halten; und/oder
der erste Träger (65) einen Schaft (150), einen Kopf (145) und mindestens ein Lager (120) aufweist, wobei das mindestens eine Lager (120) mit dem Tragegestell (320) in Eingriff kommt, wenn die erste Wandplatte (15b) verstaut wird und mit dem Nocken (295) in Eingriff kommt, wenn die erste Wandplatte (15b) zwischen der verstauten und der aufgestellten Position bewegt wird; und/oder
die erste Wandplatte (15b) mit dem flexiblen Hebeelement (315) verbunden wird und die zweite Wandplatte (15s) mit dem flexiblen Hebeelement (315) verbunden wird, mit dem flexiblen Hebeelement (315) nur indirekt durch die erste Wandplatte (15b) verbunden wird; und/oder
das flexible Hebeelement (315) eine Kette ist.

**Revendications**

**1.** Procédé de déplacement de panneaux (15) à partir d'une position escamotée, dans laquelle les panneaux (15) sont essentiellement positionnés au-dessus d'un plafond (35), vers une position déployée, dans laquelle les panneaux sont alignés essentiellement de manière verticale pour former une cloison, le procédé comprenant les étapes consistant à :

supporter un premier panneau (15b) sur une came (295), le premier panneau présentant un premier poids ;
faire tourner la came (295) dans une première

direction ;
abaisser le premier panneau (15b) en réaction à ladite rotation de la came (295), dans lequel l'abaissement du premier panneau (15b) sépare le premier panneau (15b) par rapport à la came (295) ;
supporter le premier panneau (15b) sur un élément de levage flexible (315) en réaction à l'abaissement du premier panneau (15b), **caractérisé en ce que** l'élément de levage flexible (315) porte directement le premier poids, et **caractérisé en outre par** les étapes consistant à :

supporter un deuxième panneau (15s) sur un bâti de support (320), le deuxième panneau (15s) présentant un deuxième poids ;
faire venir le deuxième panneau (15s) en prise avec la came (295) ;
faire tourner la came (295) dans la première direction ;
transférer le deuxième panneau (15s) depuis le bâti de support (320) vers la came (295) en réaction à ladite rotation de la came (295), dans lequel la came (295) porte le deuxième poids ;
faire encore tourner la came (295) dans la première direction ;
abaisser le deuxième panneau (15s) en réaction à ladite rotation supplémentaire de la came (295) ;
transférer le deuxième panneau (15s) depuis la came (295) vers le premier panneau (15b), dans lequel le premier panneau (15b) soutient le deuxième poids, et dans lequel l'élément de levage flexible (315) porte le premier poids et le deuxième poids seulement par l'intermédiaire du raccordement entre le premier panneau (15b) et l'élément de levage flexible (315) ; et
fixer le deuxième panneau (15s) au premier panneau (15b) seulement par l'intermédiaire d'une mise en prise par languette et rainure (55t, 55b) homologues.

**2.** Procédé selon la revendication 1, comprenant en outre à :

supporter un troisième panneau (15s) sur le bâti de support (320), dans lequel le troisième panneau (15s) présente un troisième poids ;
faire venir le troisième panneau (15s) en prise avec la came (295) ;
faire tourner la came (295) dans la première direction ;
transférer le troisième panneau (15s) depuis le bâti de support (320) vers la came (295) en réaction à ladite rotation de la came (295), dans lequel la came (295) porte le troisième poids ;
faire encore tourner la came (295) ;
abaisser le troisième panneau (15s) en réaction à ladite rotation supplémentaire de la came (295) ;
transférer le troisième panneau (15s) depuis la came (295) vers les premier (15b) et deuxième (15s) panneaux, dans lequel le premier panneau (15b) soutient le deuxième poids et le troisième poids, et dans lequel l'élément de levage flexible (315) porte les premier, deuxième et troisième poids par l'intermédiaire du raccordement entre le premier panneau (15b) et l'élément de levage flexible (315) ; et
fixer le troisième panneau (15s) au deuxième panneau (15s) par l'intermédiaire d'une mise en prise par languette et rainure (55t, 55b) homologues.

**3.** Procédé selon la revendication 2, dans lequel la came (295) tourne d'approximativement 360 degrés entre l'étape de transfert du deuxième panneau (15s) depuis le bâti de support (320) vers la came (295) et l'étape de transfert du troisième panneau (15s) du bâti de support (320) vers la came (295).

**4.** Procédé selon la revendication 1, dans lequel l'étape de déplacement du deuxième panneau (15s) pour le faire venir en prise avec la came (295) comprend les étapes consistant à incliner le bâti de support (320) selon un angle non horizontal, et déplacer le deuxième panneau (15s) pour le faire venir en prise avec la came (295) sous l'influence de la gravité.

**5.** Procédé selon la revendication 1, comprenant en outre une étape consistant à guider le premier panneau (15b) pour retenir le premier panneau (15b) en une orientation essentiellement verticale pendant l'abaissement du premier panneau (15b).

**6.** Procédé de déplacement de panneaux (15) à partir d'une position déployée, dans laquelle les panneaux (15) sont alignés essentiellement de manière verticale pour former une cloison, vers une position escamotée, dans laquelle les panneaux (15) sont essentiellement positionnés au-dessus d'un plafond (35), le procédé comprenant les étapes consistant à :

supporter un premier panneau (15b) sur un élément de levage flexible (315), le premier panneau (15b) présentant un premier poids, **caractérisé en ce que** l'élément de levage flexible (315) porte directement le premier poids et **caractérisé en outre par** les étapes consistant à :

supporter un deuxième panneau (15s) sur le premier panneau (15b), le deuxième panneau (15s) présentant un deuxième poids,

dans lequel l'élément de levage flexible (315) porte le premier poids et le deuxième poids par l'intermédiaire du raccordement entre le premier panneau (15b) et l'élément de levage flexible (315) ;
déplacer les premier (15b) et deuxième (15s) panneaux de manière essentiellement verticale ;
lever le deuxième panneau (15s) en l'écartant du premier panneau (15b) avec une came (295), dans lequel la came (295) porte le deuxième poids ;
mettre hors de prise le deuxième panneau (15s) d'avec le premier panneau (15b) en déplaçant verticalement le deuxième panneau (15s) à partir du premier panneau (15b) ;
transférer le deuxième panneau (15s) depuis la came (295) vers un bâti de support (320), dans lequel le bâti de support (320) porte le deuxième poids ;
déplacer le deuxième panneau (15s) horizontalement à partir du premier panneau (15b) par transfert du deuxième panneau (15s) sur le bâti de support (320) ;
déplacer en outre le premier panneau (15b) de manière essentiellement verticale ;
lever le premier panneau (15b) avec la came (295) ; et
faire tourner la came (295) de telle manière que la came (295) porte le premier poids.

**7.** Procédé selon la revendication 6, comprenant en outre les étapes consistant à :

supporter un troisième panneau (15s) sur le deuxième panneau (15s), le troisième panneau (15s) présentant un troisième poids, dans lequel le troisième poids est supporté par l'élément de levage flexible (315) par l'intermédiaire du raccordement entre l'élément de levage flexible (315) et le premier panneau (15b) ;
lever le troisième panneau (15s) en l'écartant du deuxième panneau (15s) avec la came (295), dans lequel la came (295) porte le troisième poids ;
mettre hors de prise le troisième panneau (15s) d'avec le deuxième panneau (15s) en déplaçant verticalement le troisième panneau (15s) à partir du deuxième panneau (15s) ;
transférer le troisième panneau (15s) depuis la came (295) vers le bâti de support (320), dans lequel le bâti de support (320) porte le troisième poids, dans lequel le troisième panneau (15s) est levé et transféré préalablement au levage et au transfert du deuxième panneau (15s) ; et
déplacer le troisième panneau (15s) horizontalement à partir du deuxième panneau (15s) par transfert du troisième panneau (15s) sur le bâti du support (320).

**8.** Procédé selon la revendication 7, dans lequel la came (295) tourne d'approximativement 360 degrés entre l'étape de levage du troisième panneau (15s) avec la came (295) et l'étape de levage du deuxième panneau (15s) avec la came (295).

**9.** Procédé selon la revendication 7, comprenant en outre une étape consistant à faire monter une pente au troisième panneau (15s) en réaction au transfert du deuxième panneau (15s) depuis la came (295) vers le bâti du support (320).

**10.** Procédé selon la revendication 6, comprenant en outre une étape consistant à guider le premier panneau (15b) pour retenir le premier panneau (15b) en une orientation essentiellement verticale pendant le déplacement du premier panneau (15b) de manière verticale.

**11.** Ensemble formant panneau de cloison (10), mobile entre une position escamotée et une position déployée, l'ensemble formant panneau de cloison comprenant :

un premier panneau de cloison (15b) présentant un premier poids et comprenant un premier élément porteur (65) ;
un élément de levage flexible (315) couplé au premier panneau de cloison (15b) ;
un deuxième panneau de cloison (15s) présentant un deuxième poids et comprenant un deuxième élément porteur (65) ;
un élément moteur (245) pouvant servir à déplacer les premier (15b) et deuxième (15s) panneaux de cloison entre la position escamotée et la position déployée ;
un bâti de support (320), dans lequel le bâti de support (320) supporte le deuxième élément porteur (65) et porte le deuxième poids lorsque le deuxième panneau de cloison (15s) se trouve en position escamotée ; **caractérisé en ce que** l'élément de l'élevage flexible (315) porte indirectement le deuxième poids, lorsque le deuxième panneau de cloison (15s) est en position déployée, seulement par l'intermédiaire du raccordement entre le premier panneau de cloison (15b) et l'élément de levage flexible (315) ; et
une came (295) présentant un périmètre extérieur définissant un évidement (325), l'évidement (325) étant dimensionné pour recevoir au moins un parmi les premier et deuxième éléments porteurs (65), la came (295) pouvant être tournée en réaction à l'élément moteur (245), dans lequel une rotation de la came (295) dans une première direction déplace les premier

(15b) et deuxième (15s) panneaux de cloison jusque dans la position déployée, et dans lequel une rotation de la came (295) dans une deuxième direction, opposée à la première direction, déplace les premier (15b) et deuxième (15s) panneaux de cloison jusque dans la position escamotée.

**12.** Ensemble formant panneau de cloison (10) selon la revendication 11, comprenant en outre un troisième panneau de cloison (15s) présentant un troisième poids et comprenant un troisième élément porteur (65), dans lequel le bâti de support (320) supporte le troisième élément porteur (65) et porte le troisième poids lorsque le troisième panneau de cloison (15s) est en position escamotée, et dans lequel l'élément de levage flexible (315) porte le troisième poids, lorsque le troisième panneau de cloison (15s) est en position déployée, par l'intermédiaire du raccordement entre le premier panneau de cloison (15b) et l'élément de levage flexible (315).

**13.** Ensemble formant panneau de cloison (10) selon la revendication 11, dans lequel la came (295) tourne d'approximativement 360 degrés entre l'étape de réception du premier élément porteur (65) et l'étape de réception du deuxième élément porteur (65).

**14.** Ensemble formant panneau de cloison (10) selon la revendication 13, comprenant en outre un pignon (300) couplé à la came (295), dans lequel la came (295) présente un premier diamètre et le pignon (300) présente un deuxième diamètre, inférieur au premier diamètre.

**15.** Ensemble formant panneau de cloison (10) selon la revendication 11, dans lequel :

le bâti de support (320) comprend une pente non horizontale, et dans lequel le deuxième élément porteur (65) descend la pente sous l'influence de la gravité pour venir en prise avec la came (295) lorsque le deuxième panneau de cloison (15s) est en position escamotée ; et/ou
l'évidement de came (325) est essentiellement symétrique, dans lequel l'évidement de came (325) comprend une première partie (325a) permettant de transférer le deuxième panneau de cloison (15s) depuis le bâti de support (320) vers la came (295) et une deuxième partie (325b) permettant de transférer le deuxième panneau de cloison (15s) depuis le premier panneau de cloison (15b) vers la came (295) ; et/ou
l'ensemble formant panneau de cloison (10) comprend en outre un piédroit (25a, b) dimensionné pour recevoir les premier et deuxième éléments porteurs (65) lorsque l'élément de levage flexible (315) porte les premier et deuxième poids, dans lequel le piédroit entoure au moins partiellement les premier et deuxième éléments porteurs (65) afin de retenir les premier (15b) et deuxième (15s) panneaux de cloison en une orientation essentiellement verticale ; et/ou
le premier élément porteur (65) comprend un arbre (150), une tête (145), et au moins un palier (120), dans lequel le au moins un palier (120) vient en prise avec le bâti de support (320) lorsque le premier panneau de cloison (15b) est escamoté et vient en prise avec la came (295) lorsque le premier panneau de cloison (15b) est déplacé entre la position escamotée et la position déployée ; et/ou
le premier panneau de cloison (15b) est raccordé à l'élément de levage flexible (315) et le deuxième panneau de cloison (15s) est raccordé à l'élément de l'élevage flexible (315) en étant seulement couplé à l'élément de levage flexible (315) indirectement par l'intermédiaire du premier panneau de cloison (15b) ; et/ou
l'élément de levage flexible (315) est une chaîne.

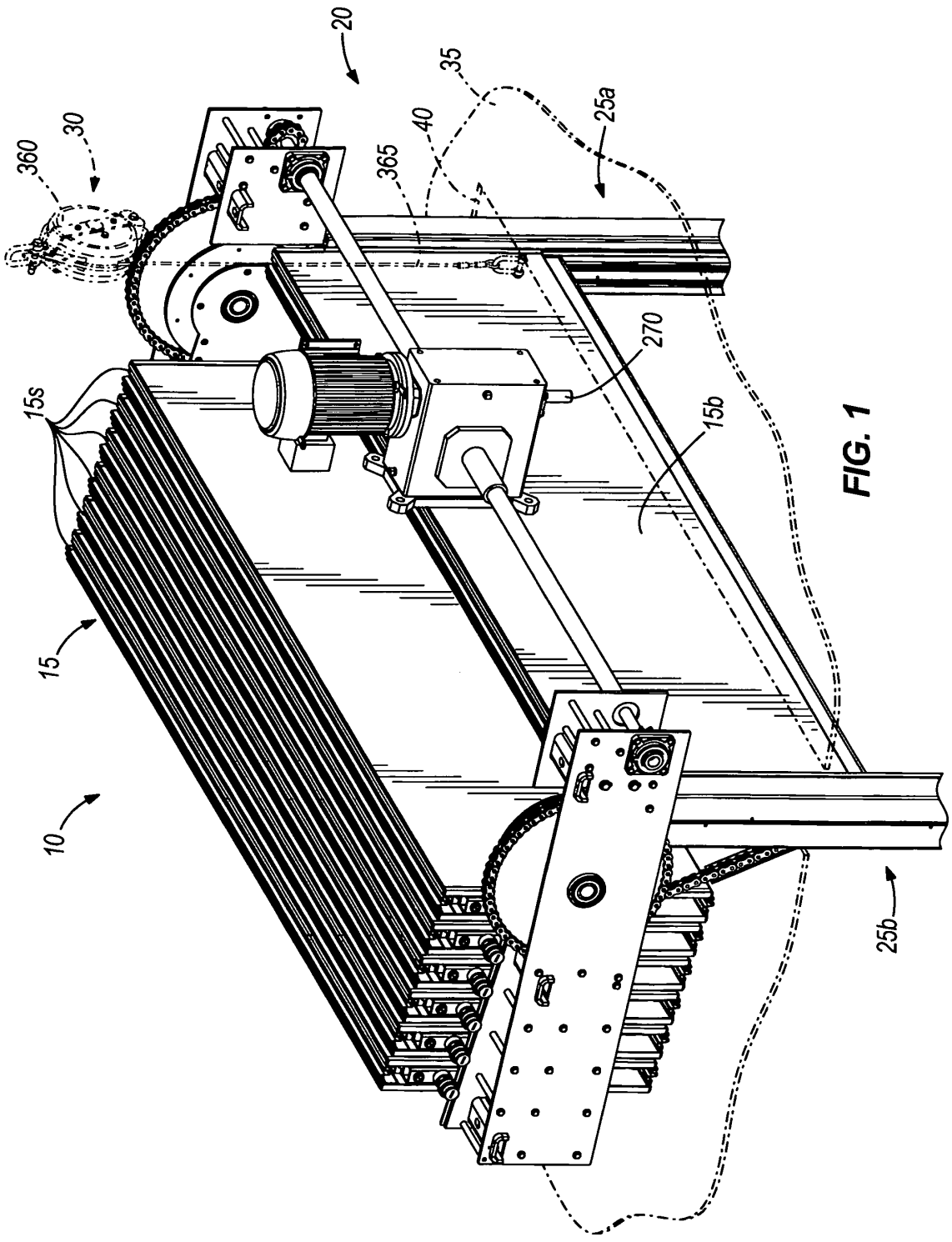



FIG. 1

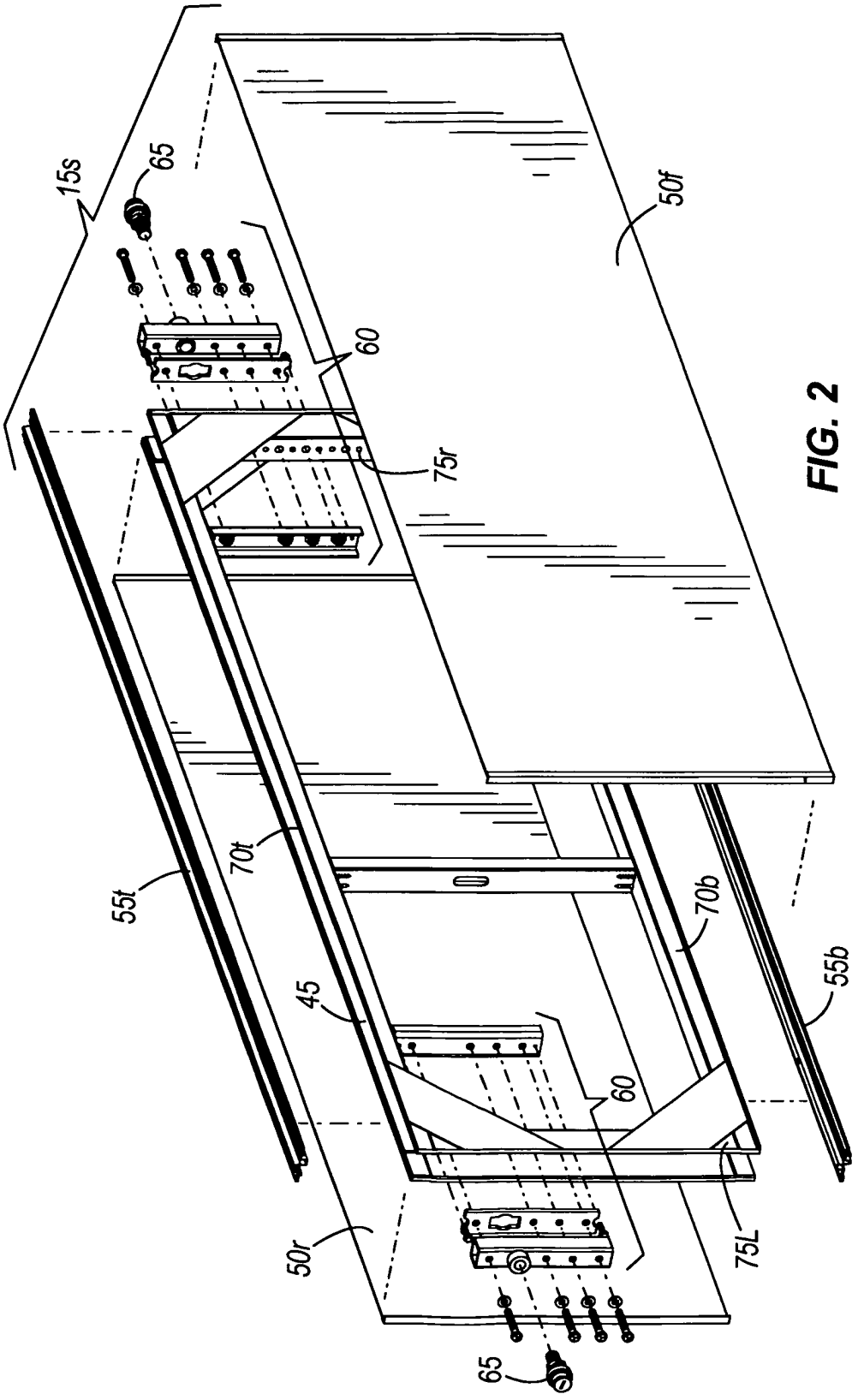



FIG. 2

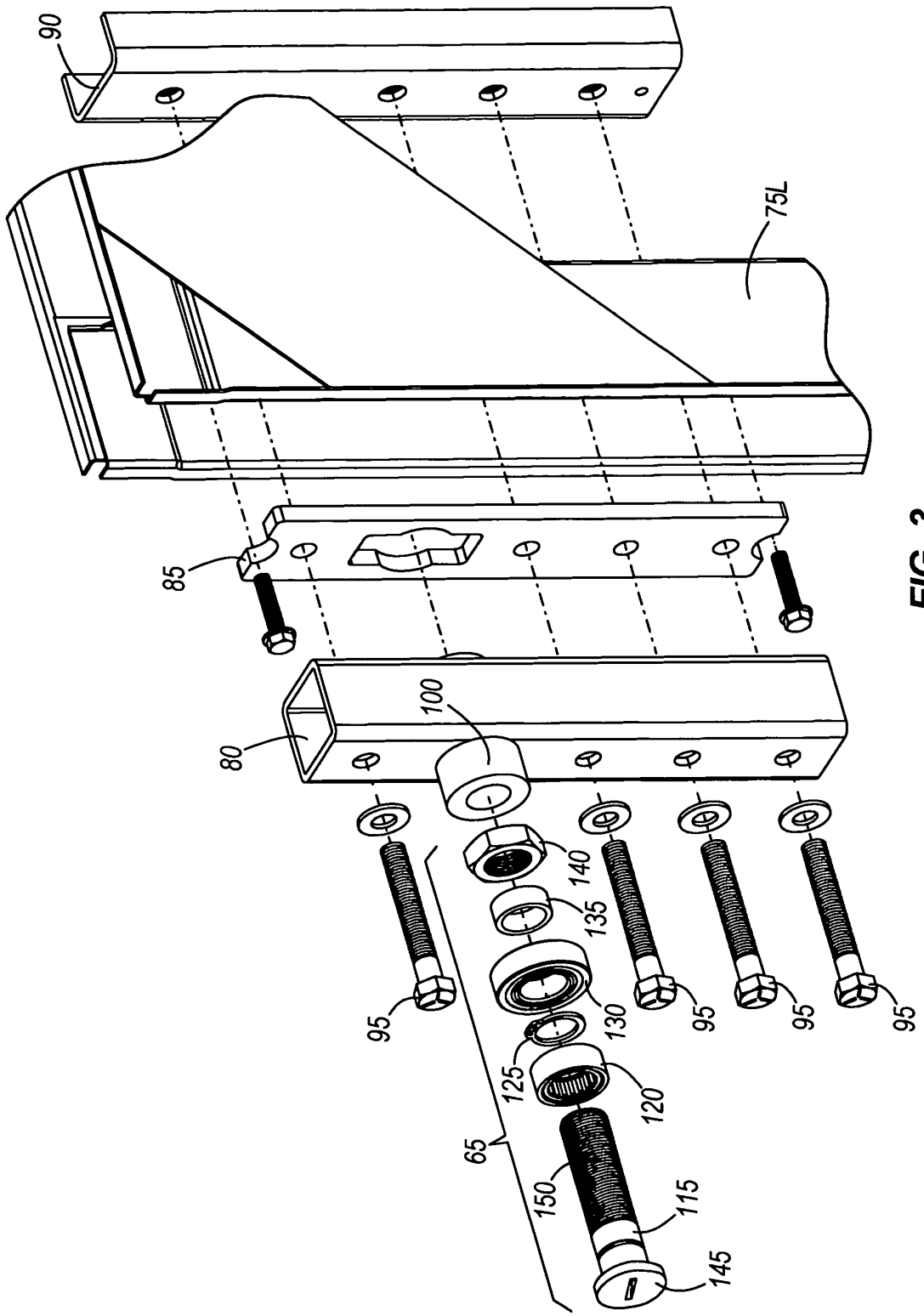
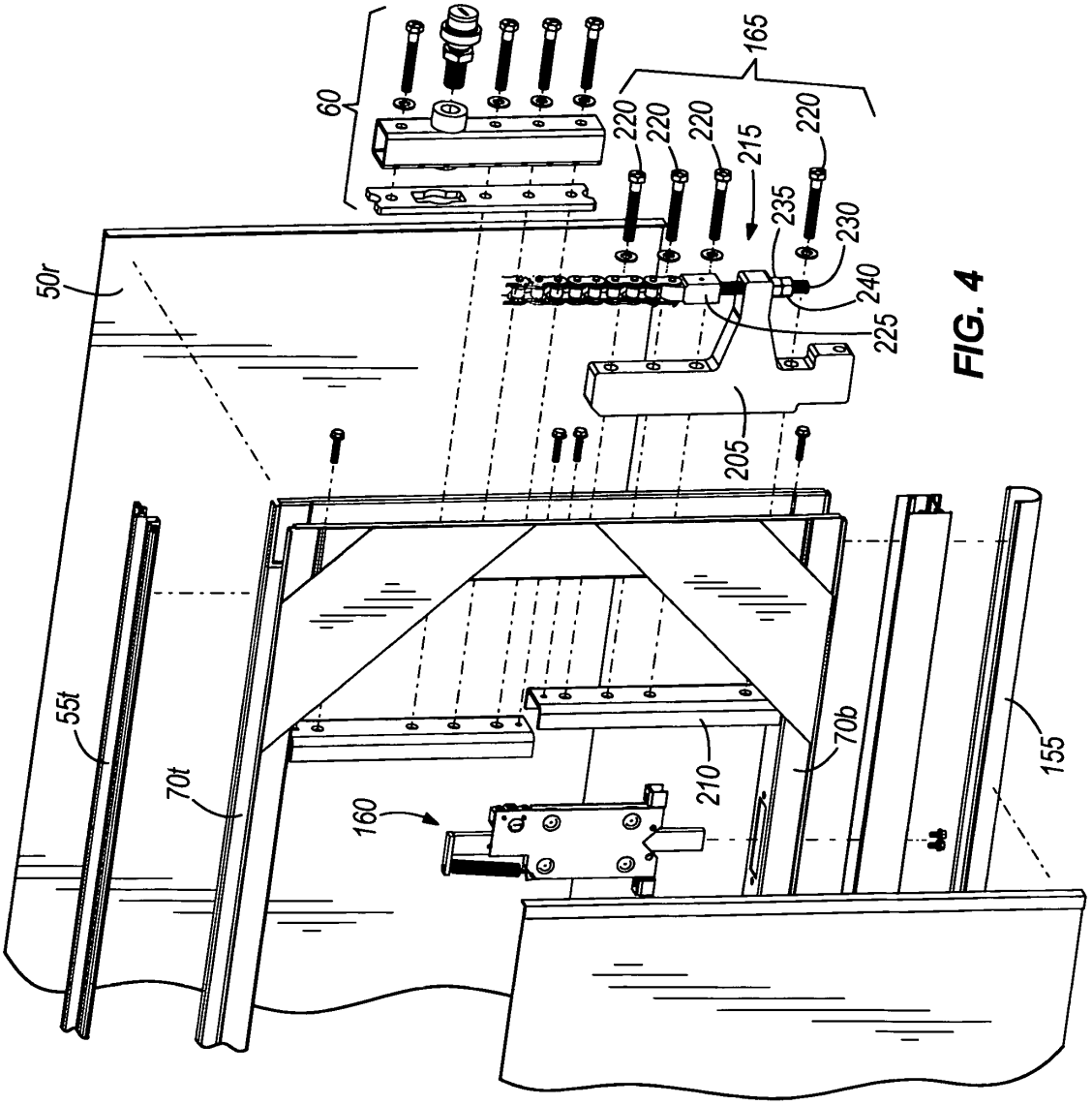



FIG. 3


60
165
220
220
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215
220
235
230
240
225
50r
205
55t
70t
160
210
70b
155

FIG. 4

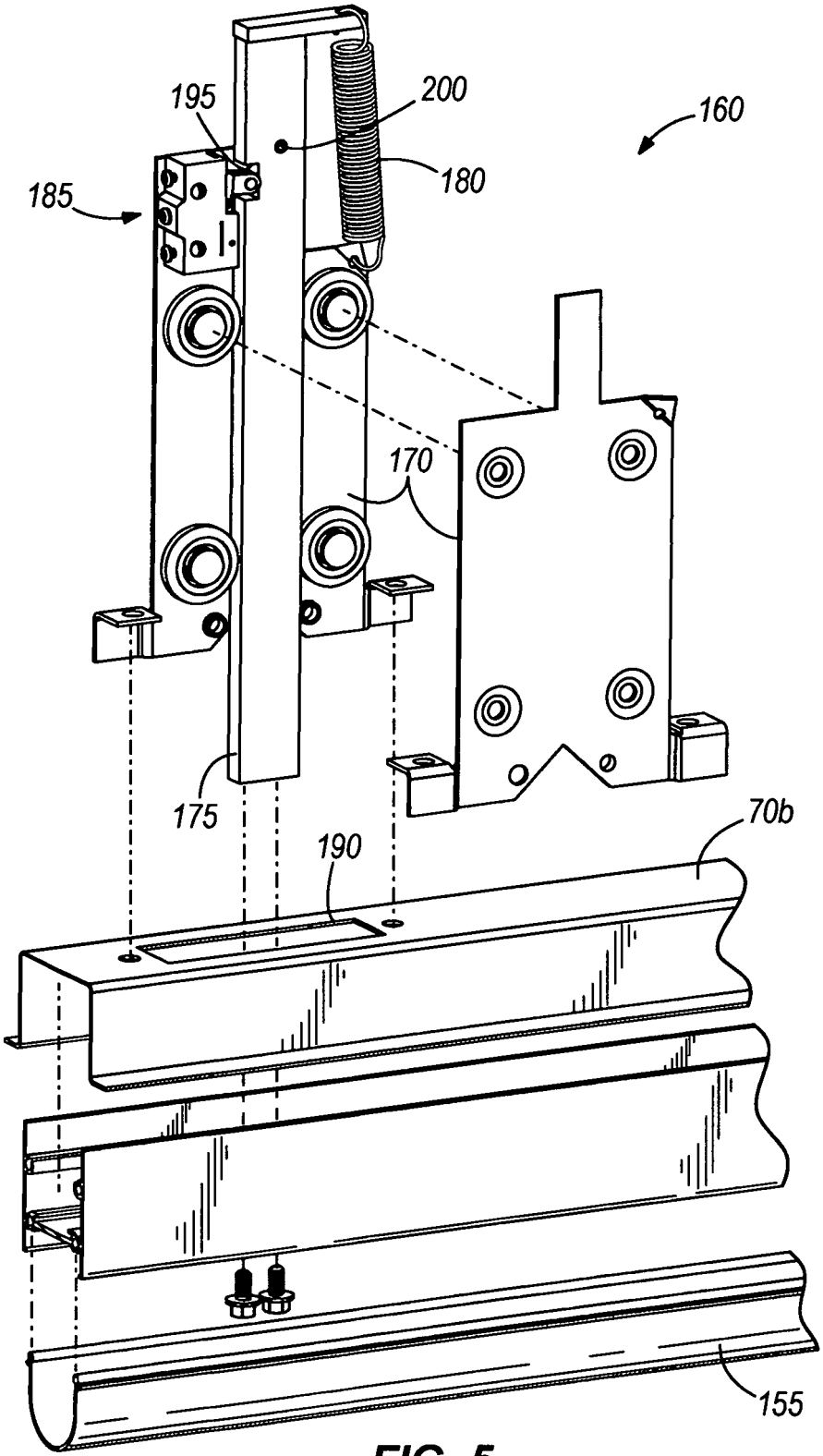



FIG. 5

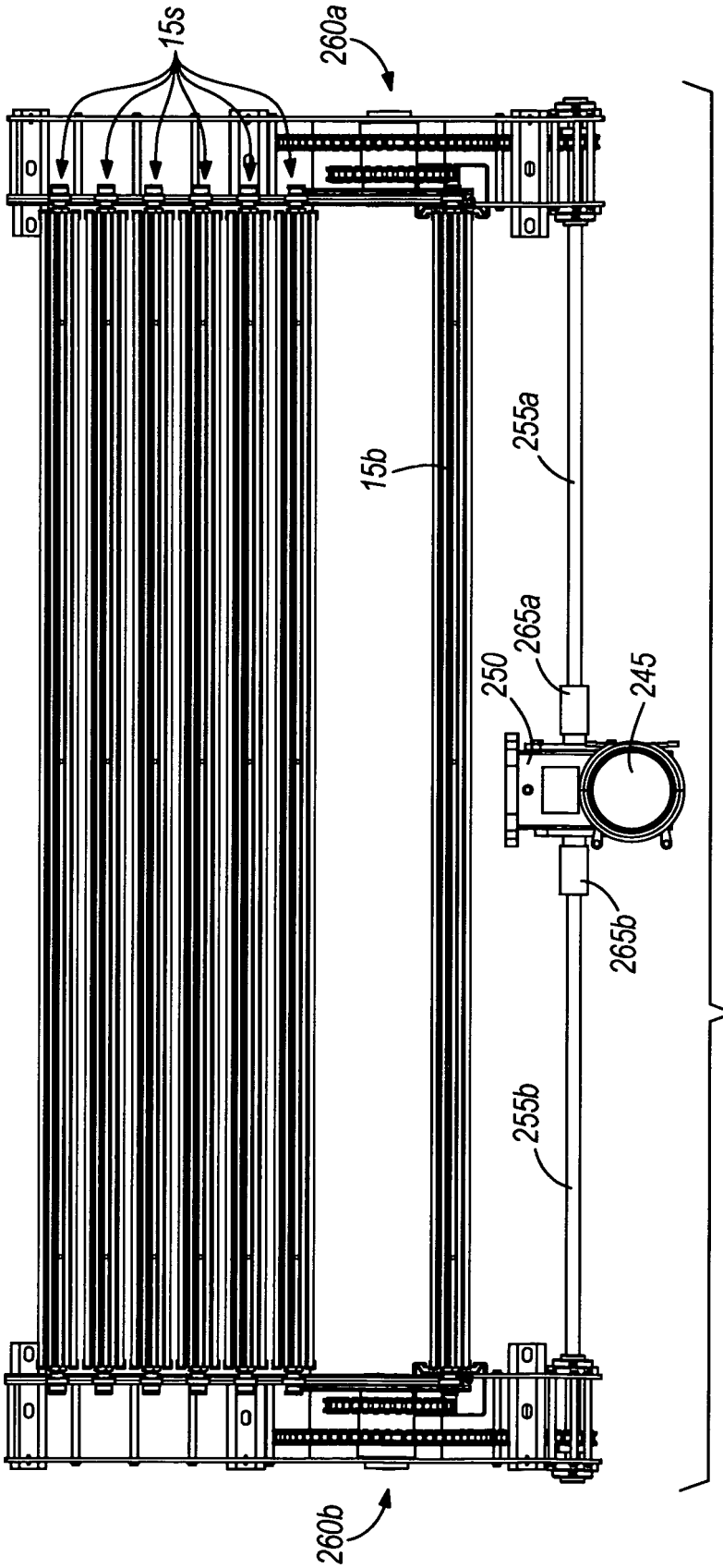



FIG. 6

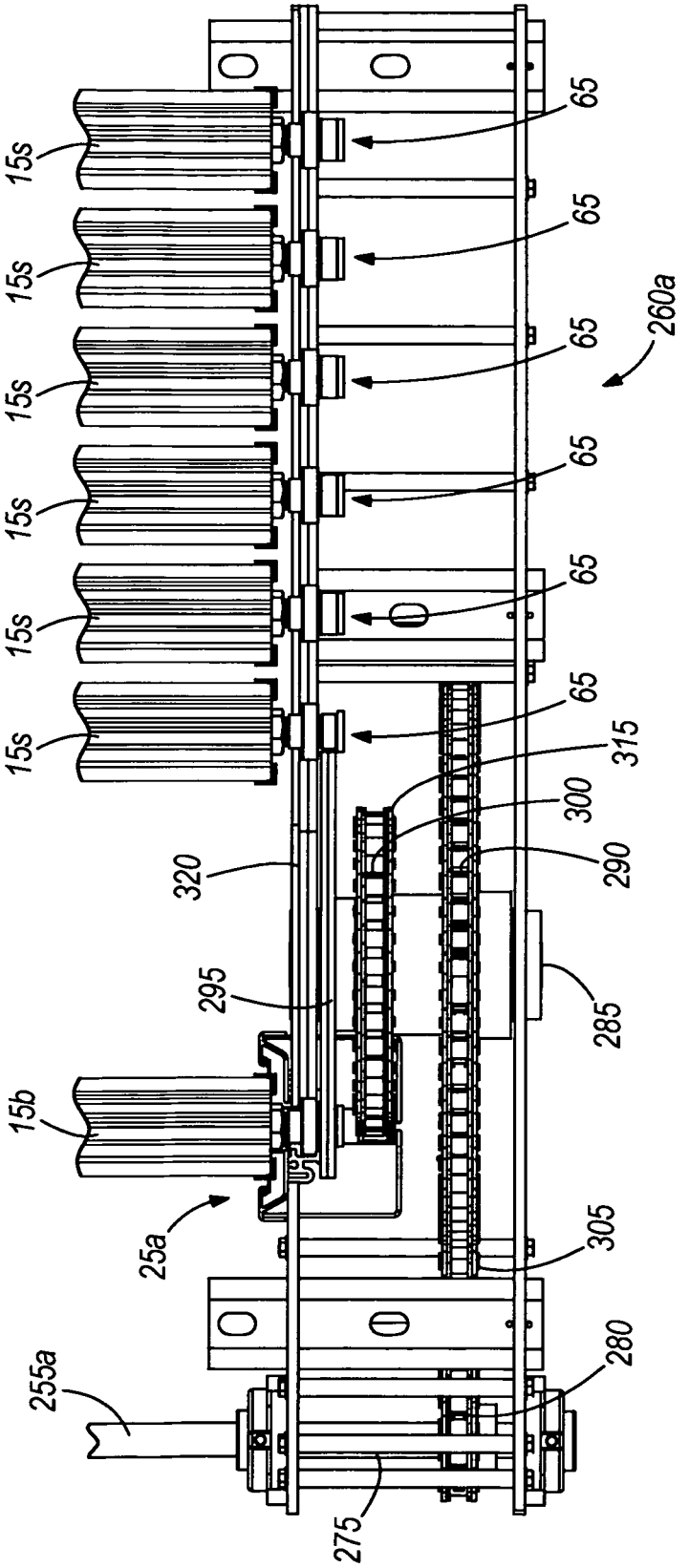

15s
15s
15s
15s
15s
15s
65
65
65
65
65
65
260a
315
300
290
320
295
285
15b
25a
305
280
255a
275

FIG. 7

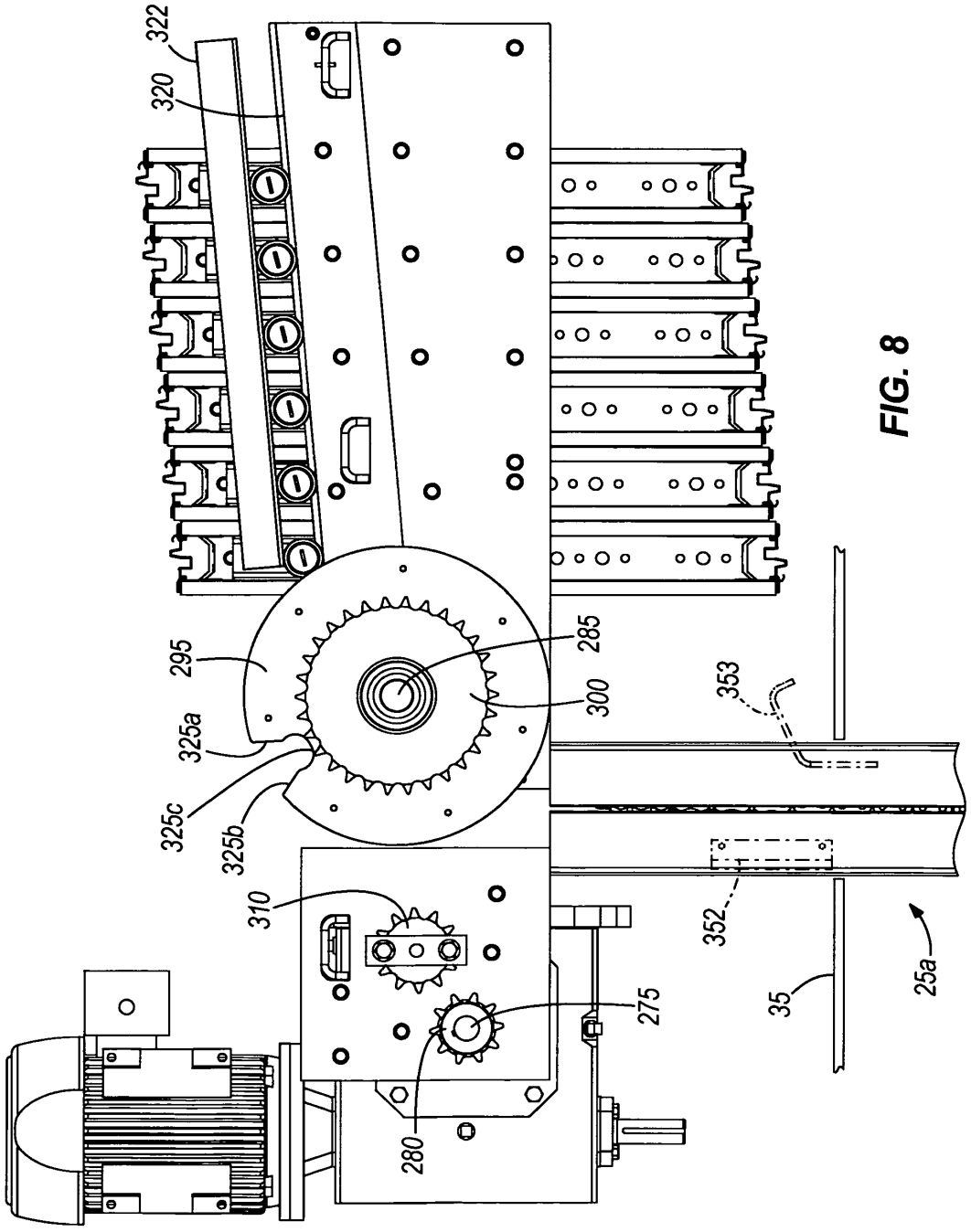



FIG. 8

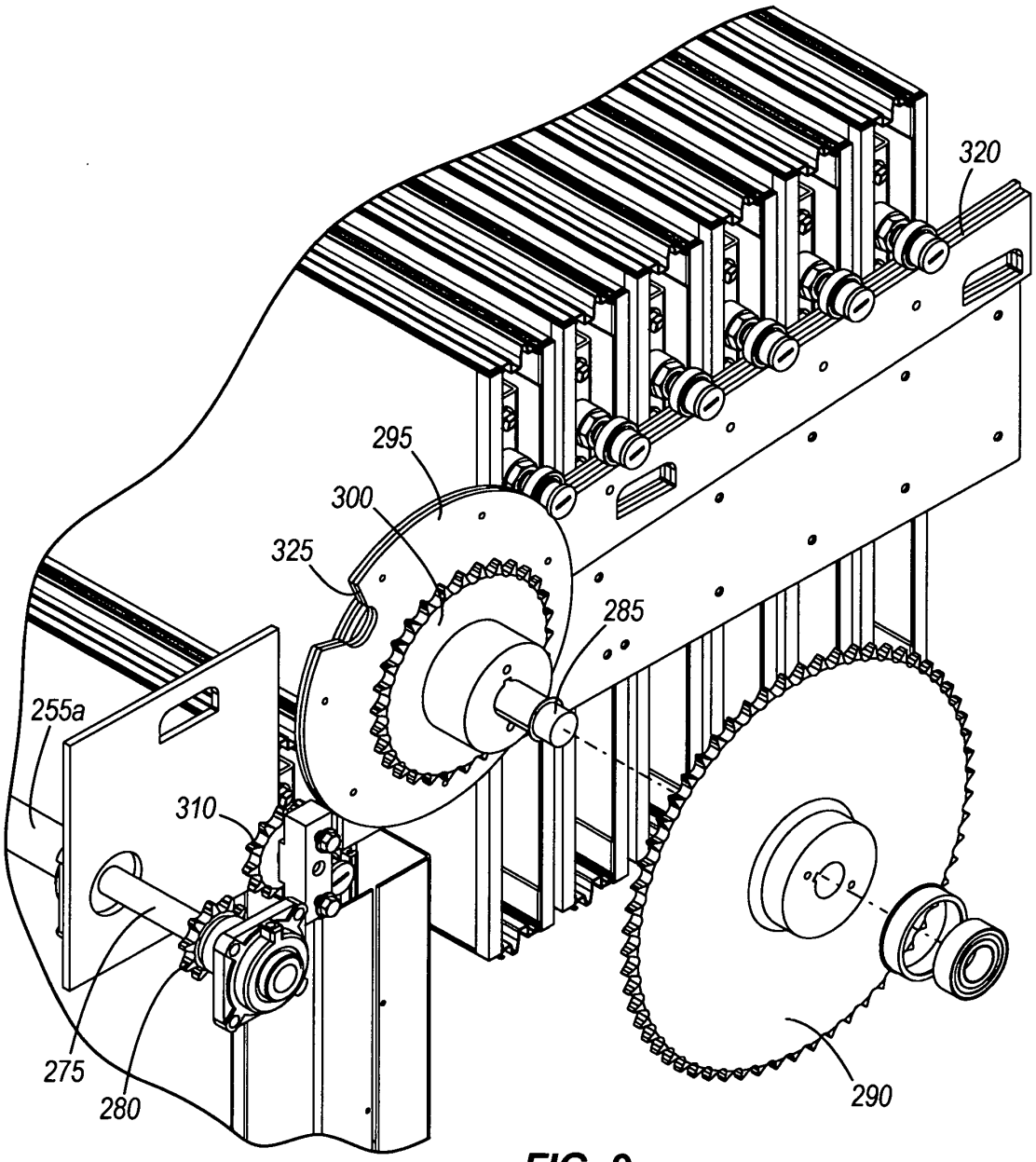
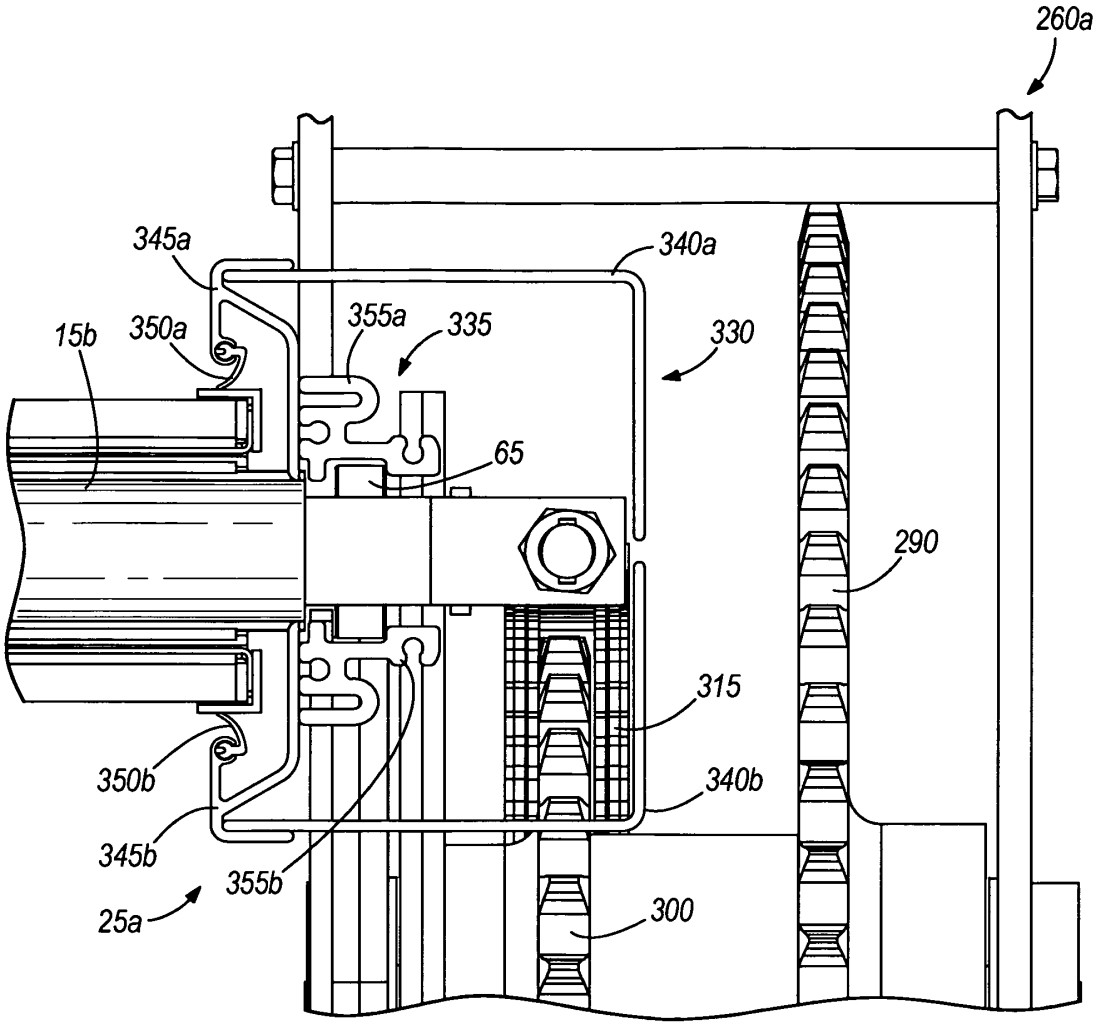



FIG. 9


260a
345a
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355a
335
15b
350a
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65
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315
350b
340b
345b
355b
25a
300

FIG. 10

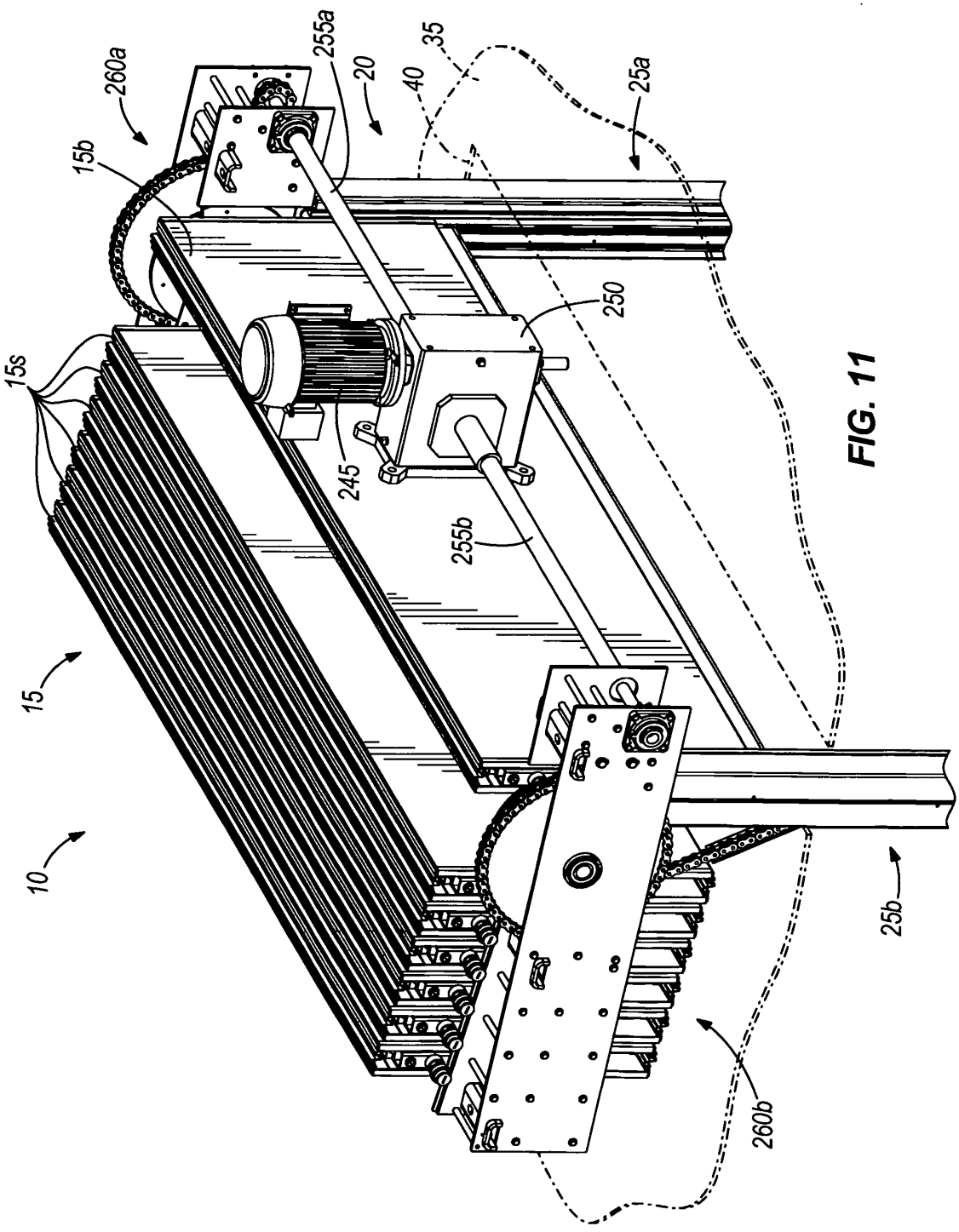
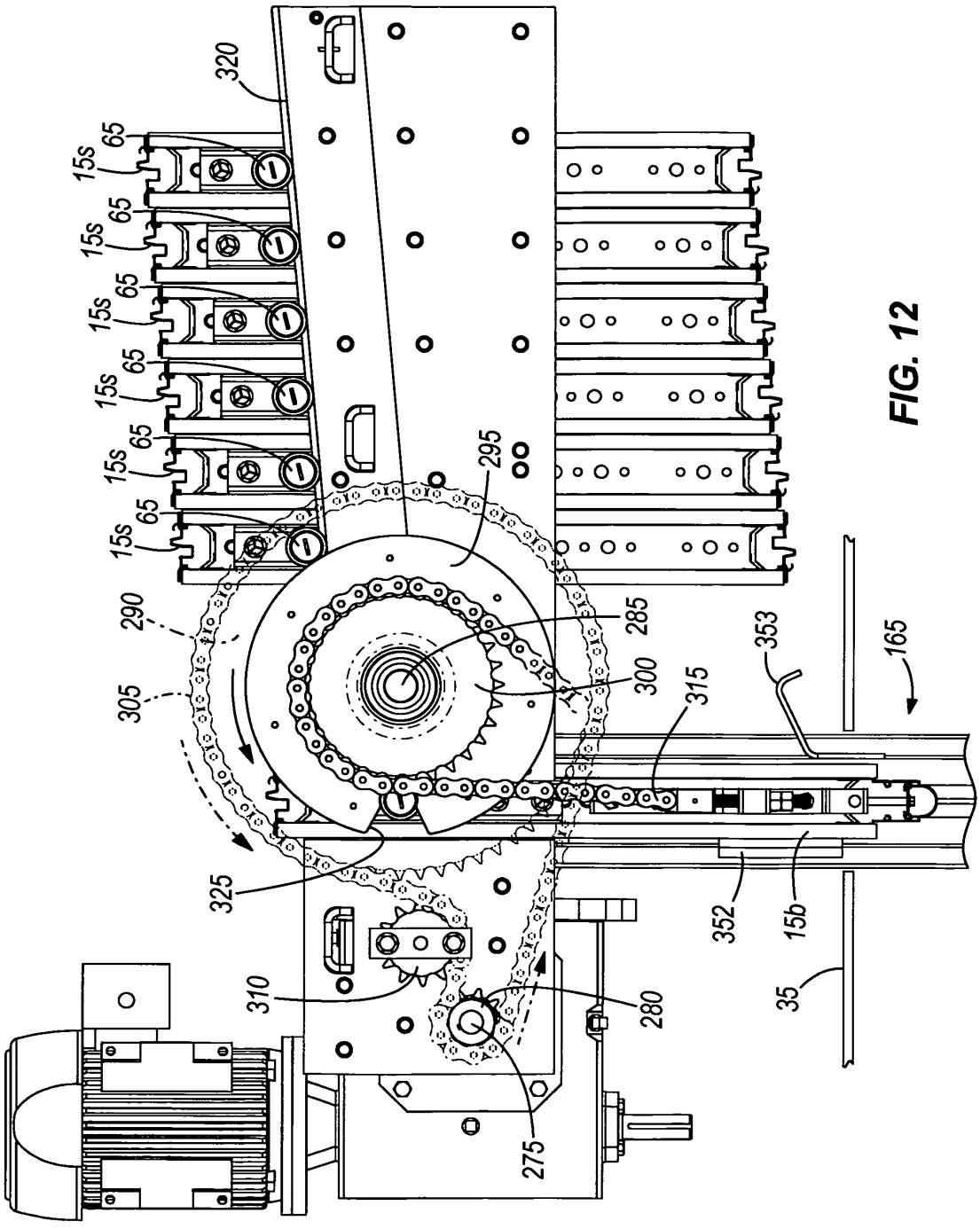



FIG. 11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285
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300
315
353
165
325
352
15b
310
280
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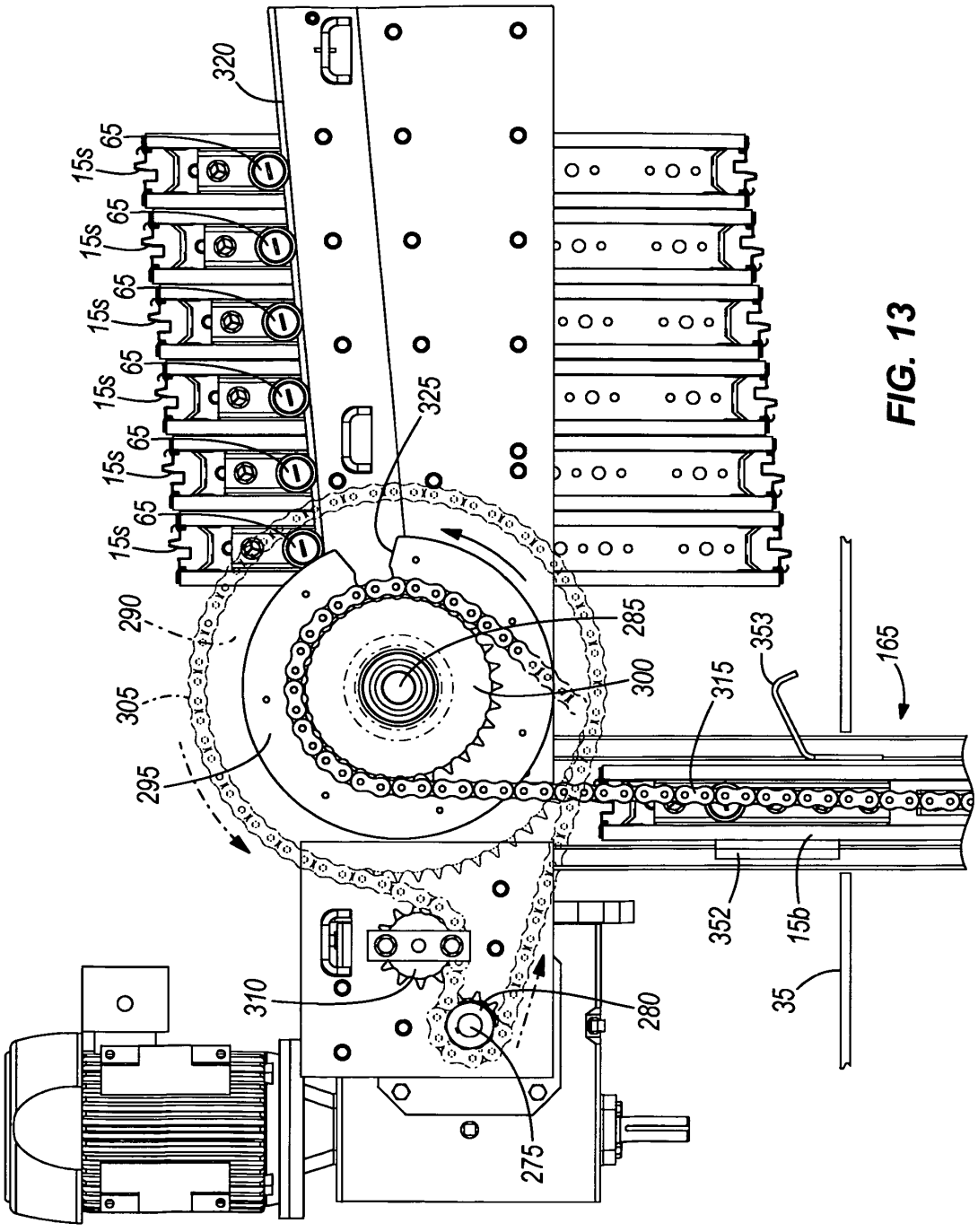
275

FIG. 12


320
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15s
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15b
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FIG. 13

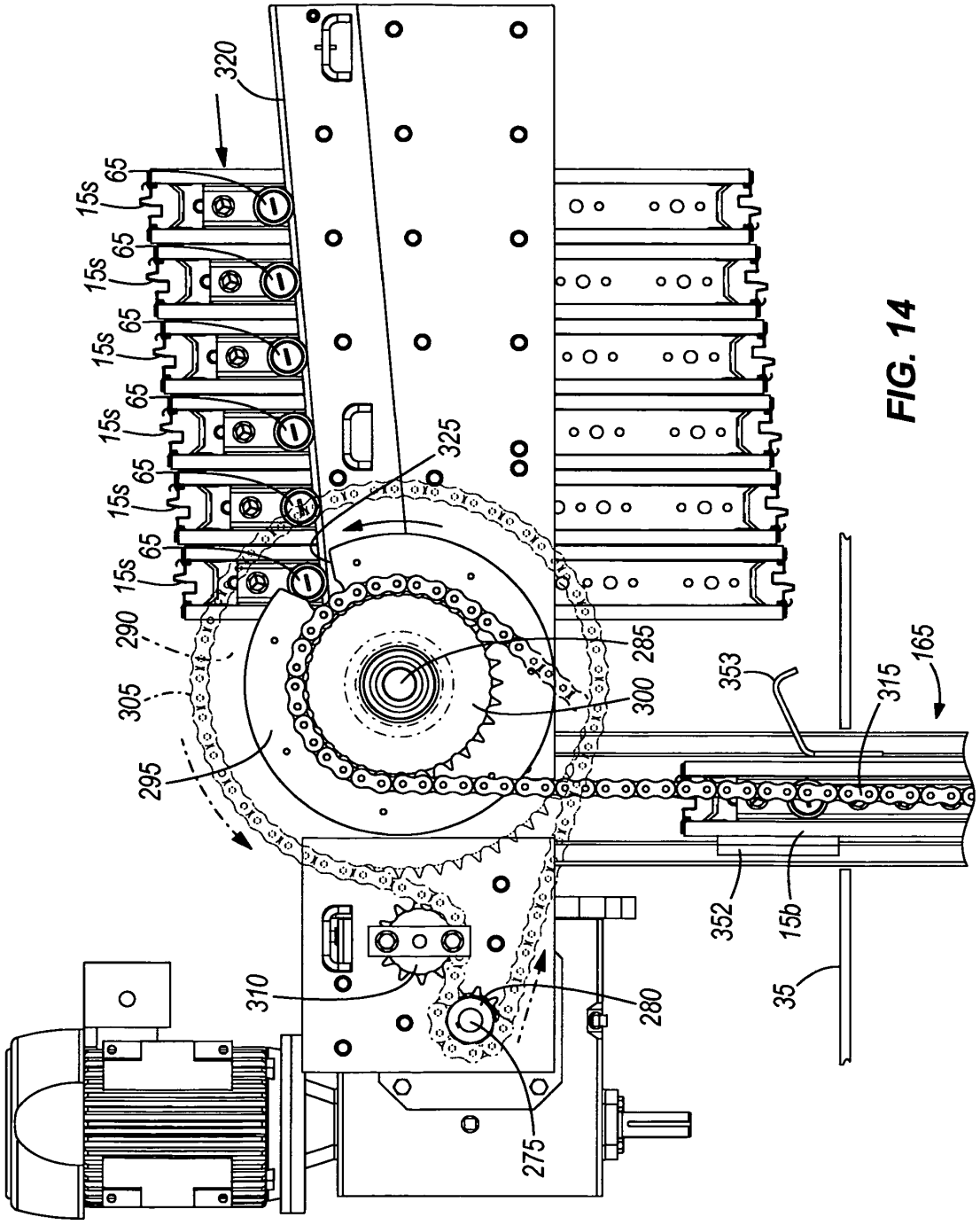
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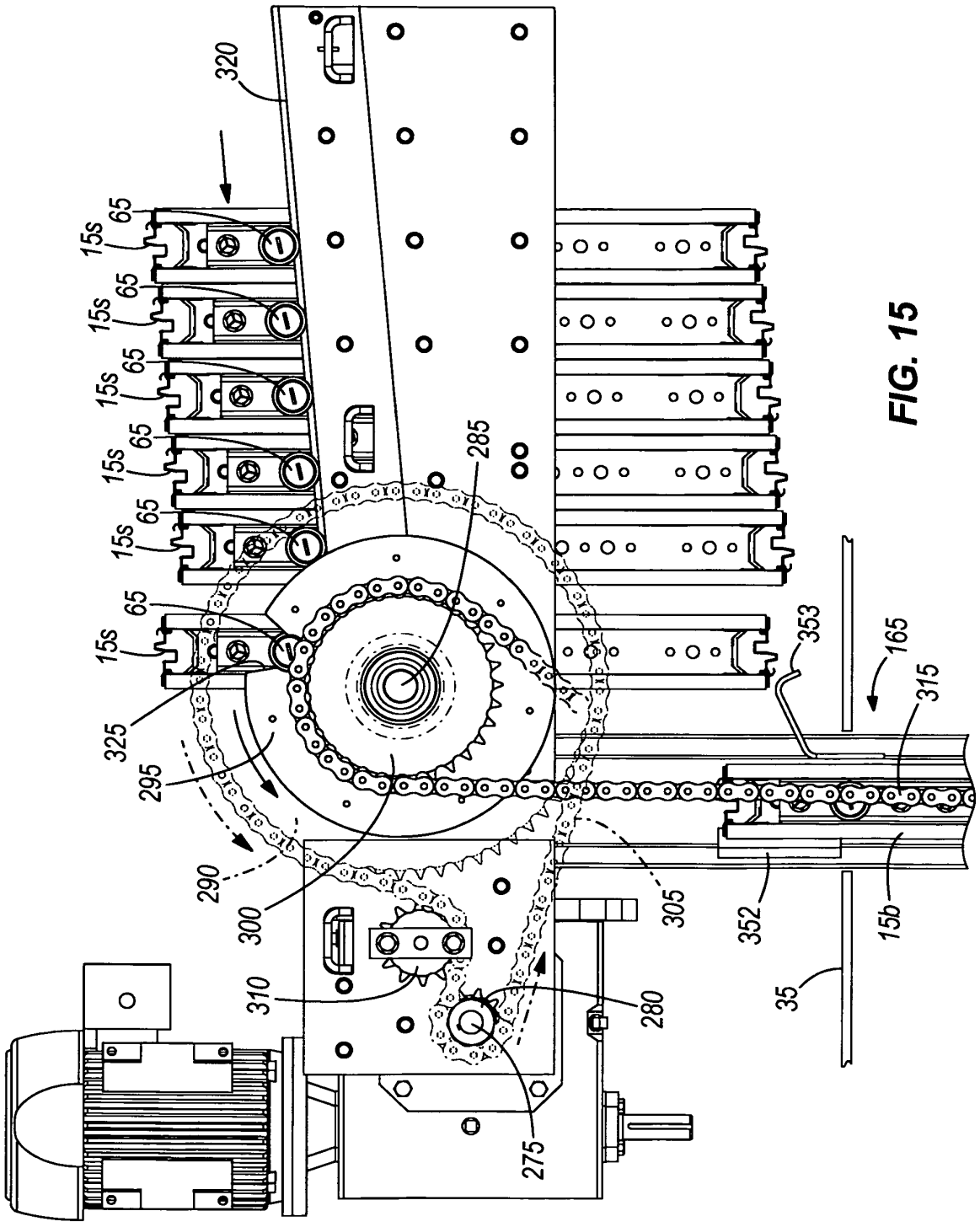
FIG. 14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15s
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325
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305
352
353
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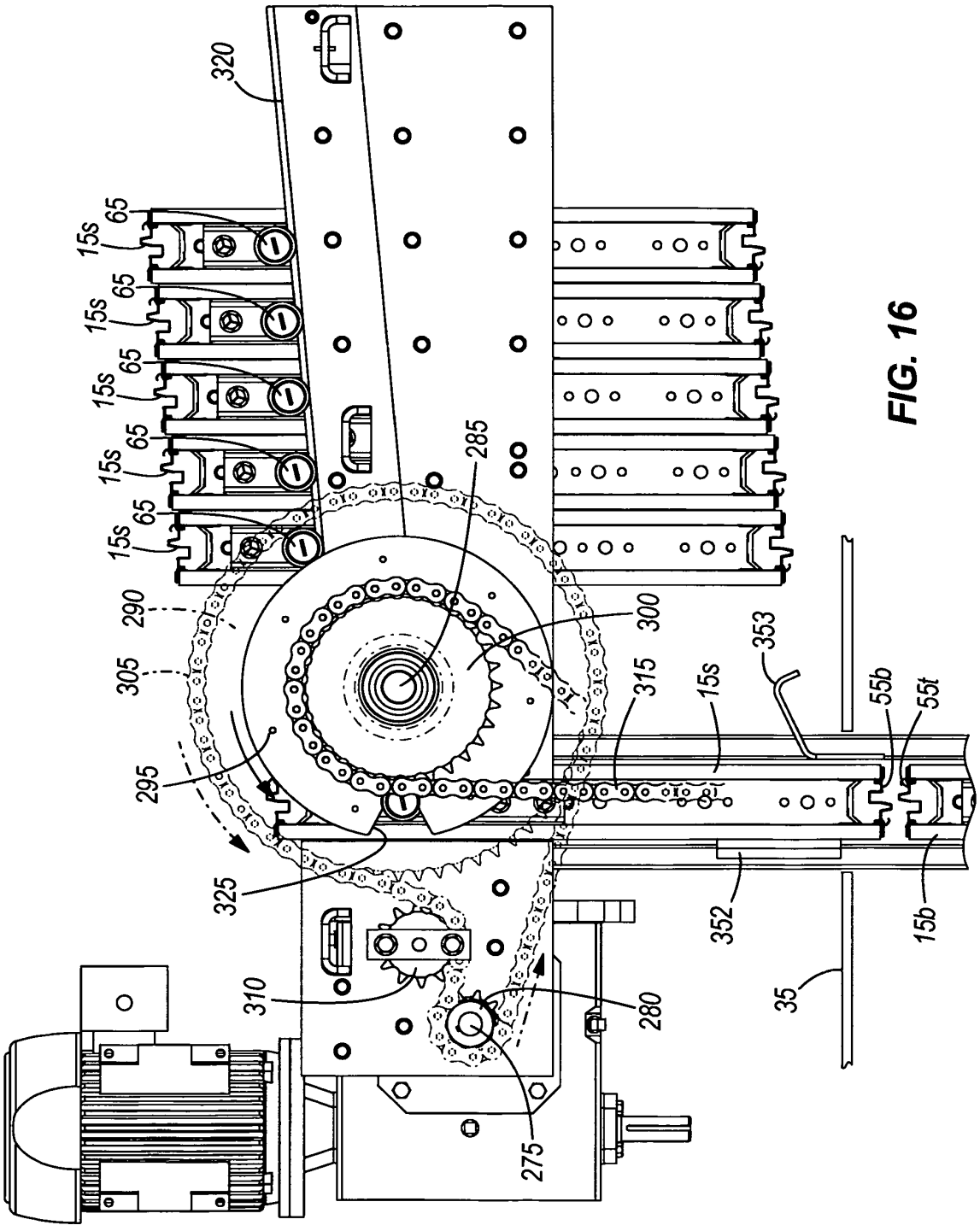
315
15b
35

FIG. 15


320
65
15s
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300
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315
353
55b
55t
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325
352
15b
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FIG. 16

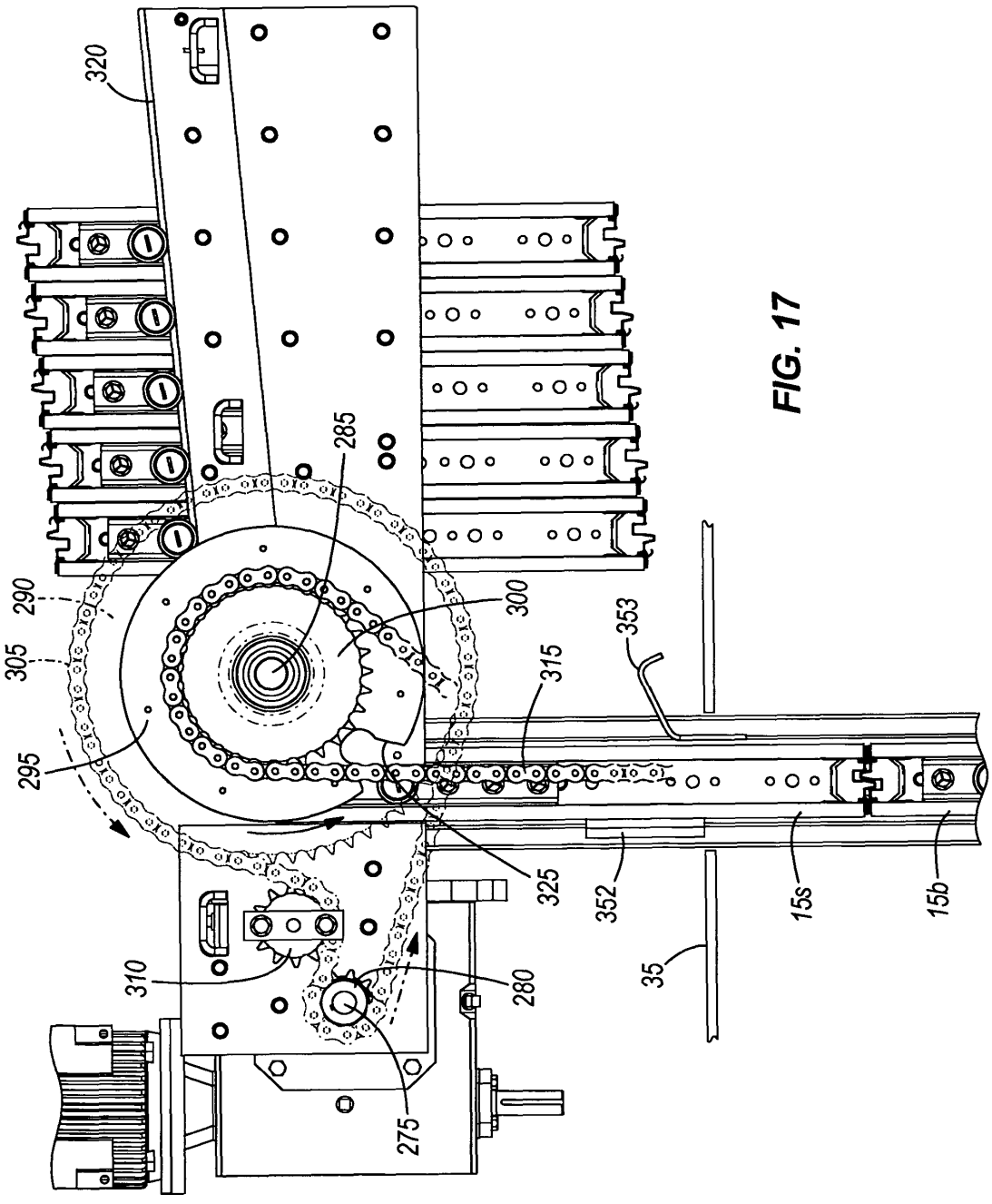



FIG. 17

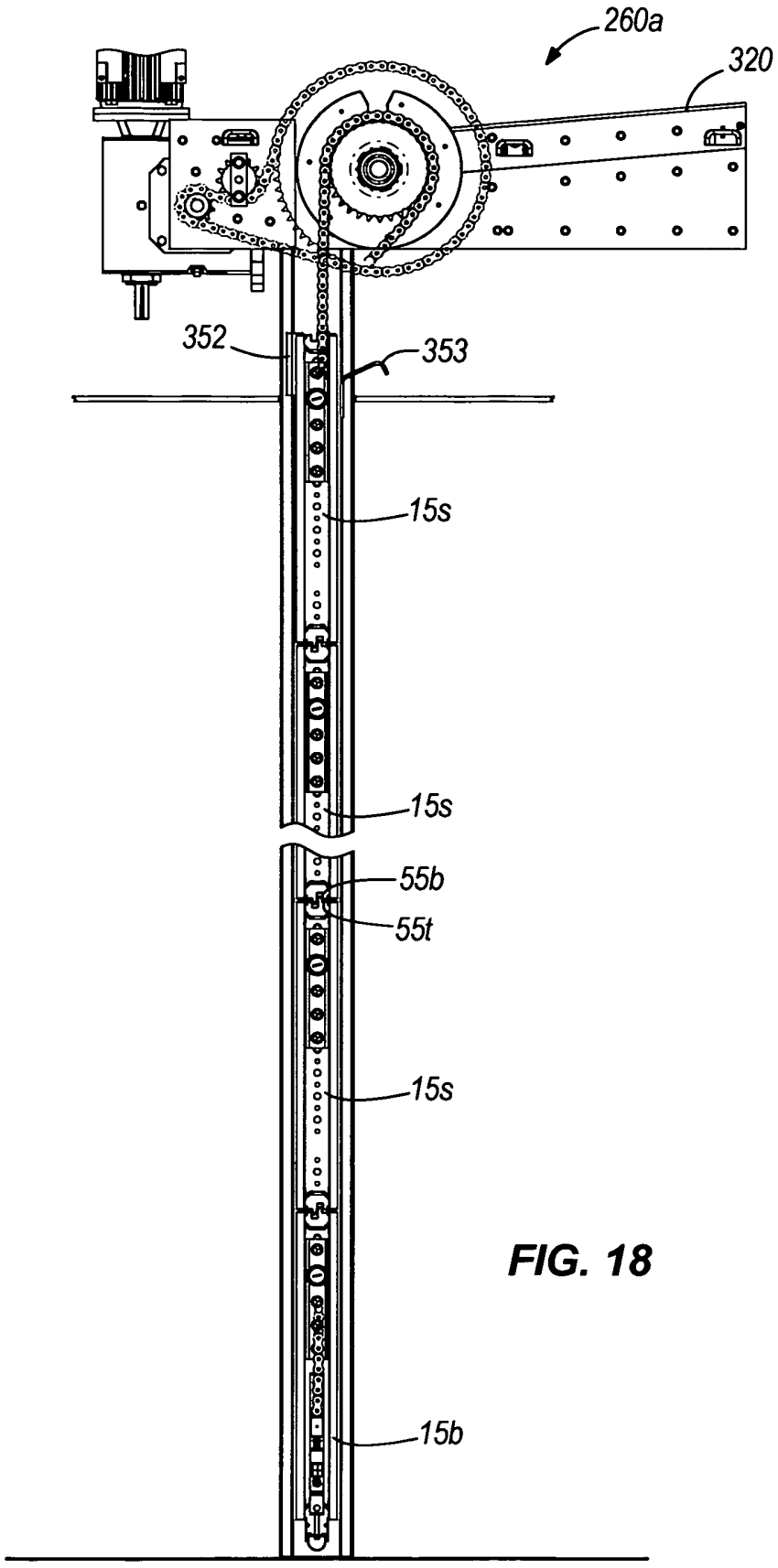



FIG. 18

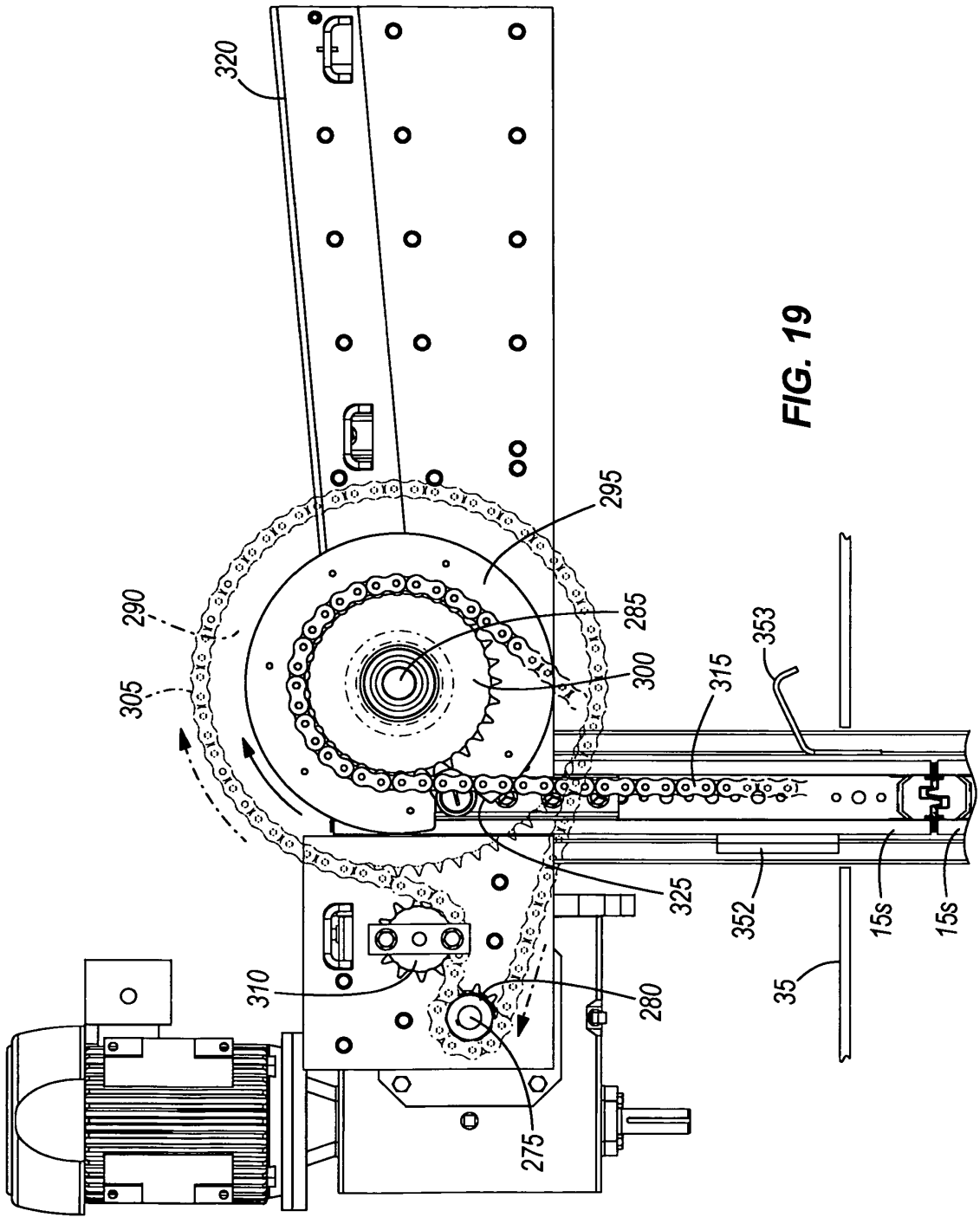
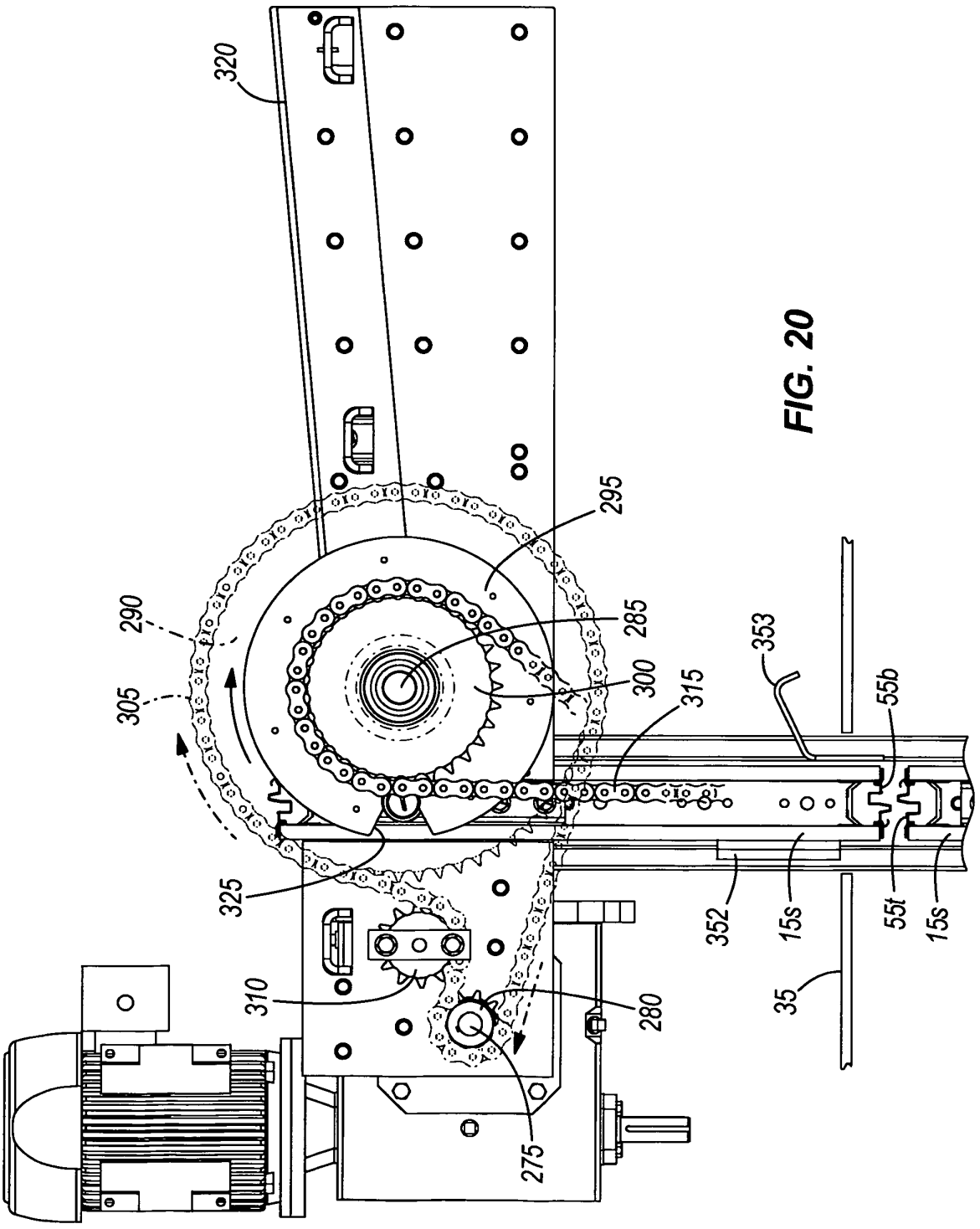



FIG. 19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15s
55t
15s
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FIG. 20

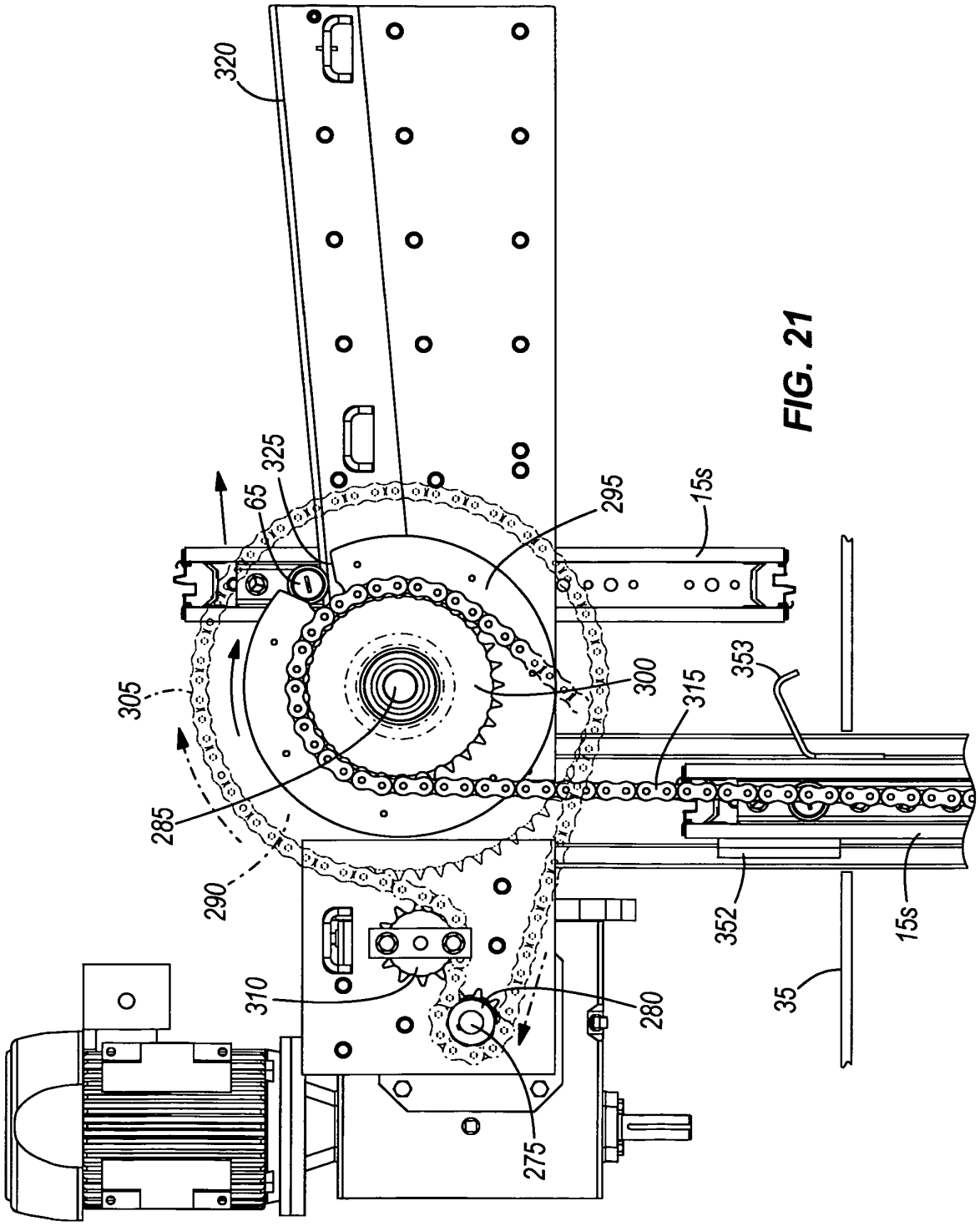


FIG. 21

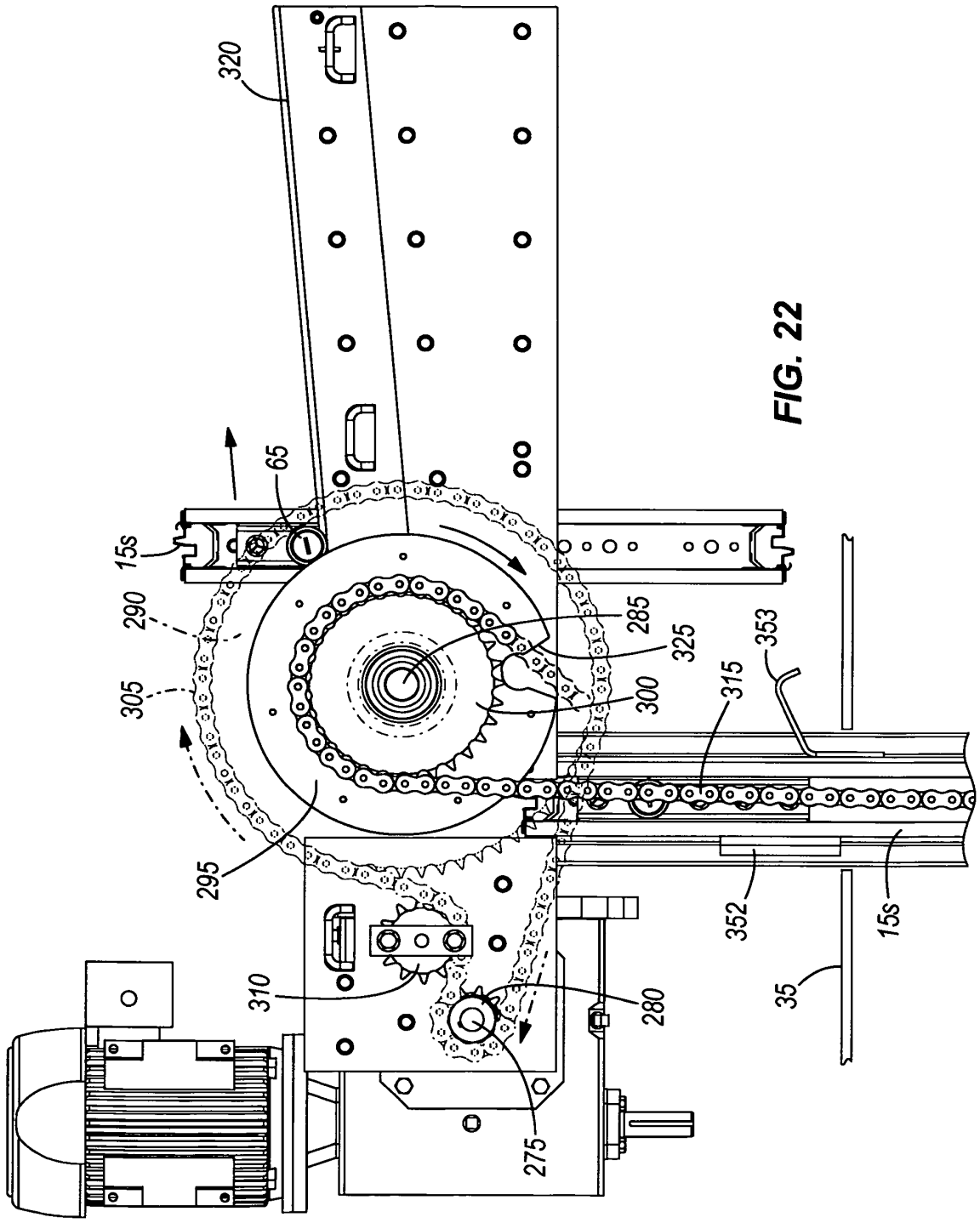


FIG. 22

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- US 5072766 A **[0001]**