



- (51) **International Patent Classification:**
A47B 21/00 (2006.01) A47B 37/00 (2006.01)
- (21) **International Application Number:**
PCT/US2016/037924
- (22) **International Filing Date:**
16 June 2016 (16.06.2016)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
62/180,528 16 June 2015 (16.06.2015) US
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(81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

[Continued on next page]

(54) **Title:** RETRACTABLE DISPLAY

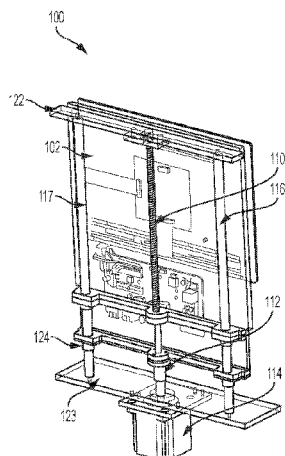


FIG. 1A

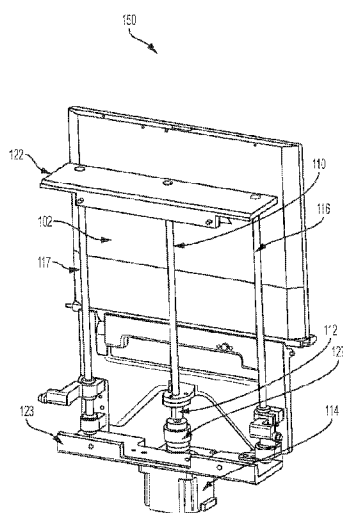


FIG. 1B

(57) **Abstract:** A retractable display may erect from a display housing cavity and tilt to a specified angle for optimum display characteristics. One example may include at least one of a display housing cavity, a display, a track mounted to the display inside the display housing cavity, and a lead screw disposed on the track which rotationally raises the track and the display out of the display housing cavity.



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- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

RETRACTABLE DISPLAY

Cross-Reference to Related Applications

[0001] This application claims priority to earlier filed U.S. provisional patent application No. 62/180,528 filed on June 16, 2015 and entitled “Touch Panels, Wireless Transmitter and Cable Overmold”, the entire contents of which are incorporated herein by reference.

Technical Field of the Application

[0002] This application relates to a retractable display and more particular to a display which can be raised, lowered and tilted.

Background of the Application

[0003] Conventionally, the need and quantity of digital displays has continued to increase year after year. However, no matter how small the displays are made, the display still requires a significant amount of space on a desk, wall, or other surface commonly associated with a display. What is needed is a solution that overcomes these limitations.

Summary of the Application

[0004] One example embodiment of the present application provides an apparatus including at least one of: a display housing cavity, a display, a track mounted to the display inside the display housing cavity, and a lead screw disposed on the track which rotationally raises the track and the display out of the display housing cavity.

[0005] Another example embodiment of the present application provides an apparatus including at least one of: a display housing cavity, a track mounted inside the

display housing cavity, and a lead screw disposed on the track which rotationally raises the track of the display housing cavity.

Brief Description of the Drawings

[0006] FIG. 1A illustrates a rear view of the display and movable track according to example embodiments.

[0007] FIG. 1B illustrates another rear view of the display and movable track according to example embodiments.

[0008] FIG. 2 illustrates a rear view of the display and movable track with a drive motor according to example embodiments.

[0009] FIG. 3 illustrates a side view of the display and movable track and a rotational tilt pin configuration according to example embodiments.

[0010] FIG. 4 illustrates a side view of the display and movable track inside a housing cavity and a rotational tilt hook configuration according to example embodiments.

[0011] FIG. 5A illustrates a side view of the display and movable track and a rotational tilt sprocket and driving belt configuration according to example embodiments.

[0012] FIG. 5B illustrates a side view of the display and movable track inside a housing cavity and a rotational roller and ramp configuration according to example embodiments.

[0013] FIG. 6A illustrates a tilt motor configuration located near the top of the display according to example embodiments.

[0014] FIG. 6B illustrates a side view of the tilt motor configuration located near the top of the display according to example embodiments.

[0015] FIG. 7 illustrates a rear view of the display in an extended and tilted position according to example embodiments.

[0016] FIG. 8 illustrates a top view of the display in a recessed position according to example embodiments.

[0017] FIG. 9 illustrates a front view of the display in an extended and tilted position according to example embodiments.

[0018] FIG. 10 illustrates a rear view of the display and movable track having a belt driving mechanism according to another example embodiment.

Detailed Description of the Application

[0019] It will be readily understood that the components of the present application, as generally described and illustrated in the figures herein, may be arranged and designed in a wide variety of different configurations. Thus, the following detailed description of the embodiments, as represented in the attached figures, is not intended to limit the scope of the application as claimed, but is merely representative of selected embodiments of the application.

[0020] The features, structures, or characteristics of the application described throughout this specification may be combined in any suitable manner in one or more embodiments. For example, the usage of the phrases “example embodiments”, “some embodiments”, or other similar language, throughout this specification refers to the fact that a particular feature, structure, or characteristic described in connection with the embodiment may be included in at least one embodiment of the present application. Thus, appearances of the phrases “example embodiments”, “in some embodiments”, “in other embodiments”, or other similar language, throughout this specification do not necessarily all refer to the same group of embodiments, and the described features,

structures, or characteristics may be combined in any suitable manner in one or more embodiments.

[0021] According to example embodiments, a display, such as a computer monitor, a tablet computing device, a mobile device, or other device may be affixed to a track that moves up and down out of a recessed housing slot. The display may be a liquid crystal display (LCD), a light emitting diode (LED) display, a plasma display or any other compact display configuration known to those skilled in the art.

[0022] FIG. 1A illustrates a rear view of the display and movable track according to example embodiments. In FIG. 1A, the display and movable track 100 are shown without the recessed housing module. In this configuration, the display 102 is mounted to the movable track having a top securing panel 122 which is affixed to the top portion of the display, the guiding rods 116 and 117 and the lead screw 110. The guiding rods 116/117 and the lead screw 110 are mounted to the top securing panel 122 and to a bottom securing panel 123 which sits against a motor housing 114. Inside the motor housing 114 a motor turns the drive nut 112 to rotate causing the lead screw to turn and the display and movable track to move in an upward position. In this example, the motor is an in-line motor with respect to the drive nut 112. Additionally, the bushing or bearing set 124 on the guiding rods provides a support to maintain the movable track position as the motor drives the lead screw to move the display along the guiding rods.

[0023] FIG. 1B illustrates another rear view of the display and movable track with a slip clutch or safety clutch according to example embodiments. In FIG. 1B, the display and movable track 150 are shown without the recessed housing module. In this configuration, the display 102 is mounted to the movable track having a top securing panel 122 which is affixed to the top portion of the display, the guiding rods 116 and

117 and the lead screw 110. The guiding rods 116 and 117 and the lead screw 110 are mounted to the top securing panel 122 and to a bottom securing panel 123 which sits against a motor housing 114. Inside the motor housing 114 a motor turns the drive nut 112 to rotate causing the lead screw to turn and the display and movable track to move in an upward position. In this example, the motor is an in-line motor with respect to the drive nut 112. Additionally, the bushing or bearing set on the guiding rods provides a support to maintain the movable track position as the motor drives the lead screw to move the display along the guiding rods.

[0024] Below the drive nut 112 is a slip clutch 127 which is disposed between the motor housing 114 and the drive nut 112. In operation, the slip clutch 127 provides torque from the shaft of the motor 114 to the lead screw 110. If the user's finger or some other obstruction is pinched between the display 102 and the opening in the mounting surface, the clutch 127 slips causing a stoppage of further movement of the display and preventing damage or injury.

[0025] FIG. 2 illustrates a rear view 200 of the display and movable track with a drive motor according to example embodiments. Referring to FIG. 2, in this configuration the drive motor 115 is positioned 90 degrees from the lead screw 110 and the drive nut of the lead screw 112. In other embodiments, the drive motor 115 is positioned approximately 90 degrees from the lead screw 110 and the drive nut of the lead screw 112. The motor 115 will turn the bevel gear/worm gear 113 to drive the lead screw and move the movable track accordingly. The display 102 is mounted to the movable track having a top securing panel 122 which is affixed to the top portion of the display, the guiding rods 116 and 117 and the lead screw 110. The guiding rods 116/117 and the lead screw 110 are mounted to the top securing panel 122 and to a

bottom securing panel 123 which sits above the motor 115 and gear/worm gear 113. The motor 115 turns the drive nut 112 to rotate causing the lead screw to turn and the display and movable track to move in an upward position.

[0026] FIG. 3 illustrates a side view of the display and movable track and a rotational tilt pin configuration according to example embodiments. Referring to FIG. 3, the side view 300 illustrates the display 102 moving and tilting its axis along a two-track pivot-pin configuration. A first track 314 is a straight track which permits the first pin 318 affixed to the display track to move up and down accordingly. The second track 313 has an angled curve near a top portion of the track so the second pin 316 may travel along the curved portion to set the display at an angle with respect to the starting position.

[0027] FIG. 4 illustrates a side view of the display and movable track inside a housing cavity and a rotational tilt hook configuration according to example embodiments. Referring to FIG. 4, the display tilt configuration 400 includes a collar 344 and 346 which supports the display housing cavity in position on a flat surface, such as a table or desk. A support lip 348 may enable the display 102 to be tilted by guiding the display 102 upward and holding the display 102 in-place once in a resting position as indicated by the arrow. The support lip 348 is a gap-filling support structure that provides needed support when the display 102 is tilted backwards. The surface 330 supports the collar 344 to make a substantially planar collar which is not disruptive to surface of the desk. In operation, the display is shifted upward and then a pivot point bolt 316 provides a rotational axis for the display to bend enough to engage the hook 314 against the round bar 313 to secure the tilting position. Also, a support wedge 315

offers an angled surface to hold the tilted position firmly against the collar 344 of the display housing.

[0028] FIG. 5A illustrates a side view of the display and movable track and a rotational tilt sprocket and driving belt configuration according to example embodiments. In this configuration 500 a motor and drive belt are used to tilt the display at an angle. The collar portions 344/346 of the housing and the wedge 348 are illustrated along with the pivot location 352 and a platform 354 lifted by the lead screw to mount the upper sprocket of the pivot location 352. In operation, the drive belt 356 moves along the upper sprocket of pivot location 352 and a lower sprocket 356 both of which are rotated by the drive belt via a gear reduction configuration 358 and motor 359. The motor and gear reduction may travel vertically with the display and mount as the display is presented out of the housing and then tilted per the preference of the user. The tilted position is supported by a wedge 348

[0029] FIG. 5B illustrates a side view of the display and movable track inside a housing cavity and a rotational roller and ramp configuration according to example embodiments. In this configuration, the tilt mechanism 550 includes a heavily loaded torsion spring 316 with an attached roller 362 configured to travel up a ramp which may be part of the housing collar 347. As the roller touches the top of the ramp, a vertical wall creates a hard stop which holds the display in position. The collar 344 provides support for the display housing against the surface 330.

[0030] FIG. 6A illustrates a tilt motor configuration located near the top of the display according to example embodiments. Referring to FIG. 6A, the configuration 600 includes a local motor or tilt motor 362 mounted at the bottom of the display 102 which turns a wheel or tilt cam 366 connected to a turning rod affixed to the display

support or tilt arm 364. The motor 362 will move to tilt the display via a direct connection to the display mount and support 368 or tilt pivot shaft.

[0031] FIG. 6B illustrates a side view of the tilt motor configuration located near the top of the display according to example embodiments. Referring to FIG. 6B, the configuration 650 includes the display 102 tilted by the tilt motor 366 flywheel to a desired position. The collars 344 and 246 do not interfere with the movement of the display and provide support for the display housing.

[0032] In one example embodiment, a display housing cavity may house the display. A track may be mounted to the display inside the display housing cavity and a lead screw is disposed on the track which rotationally raises the track and the display out of the display housing cavity. Among various different embodiments, a motor is disposed in the display housing cavity, and a rotational drive nut is connected to the lead screw and is rotated by the motor to raise the track and the display out of the display housing cavity. The motor may be an inline drive motor disposed directly under the lead screw which is disposed in a center portion of the track and the display housing cavity. The motor may also be a 90 degree drive motor disposed under the track which is also configured to raise the drive nut. At least one guiding rod and bushing are disposed in parallel with the lead screw to guide the track and the display out of the display housing cavity. A tilt rotation motor may include a rotational axis to rotate the display once the display is erected outside the display housing cavity. Also, in another example, a two-pin two-track tilt mechanism is used where one track is uniform and the second track has a curved top portion permitting a top pin to secure a tilted position in the second track.

[0033] A wedge may also be disposed on the track and a round bar and hook tilt mechanism can be used so the hook rests against the round bar and the wedge rests against a surface of the display housing cavity to secure a tilted position of the display. Also, a torsion spring may be used and a ramp affixed to a surface of the display housing may be used along with a roller affixed to the torsion spring to secure a tilted position of the display against the ramp. Also, a tilt motor may be used with a drive belt and a top sprocket may be affixed to the display on a first end of the drive belt, and a bottom sprocket may be affixed to the tilt motor on a second end of the drive belt to rotate a tilted position of the display.

[0034] FIG. 7 illustrates a rear view of the display in an extended and tilted position according to example embodiments. Referring to FIG. 7, the rear view 700 illustrates the rear view of the display 102 after it has exited and tilted out of the display housing collar 101 which would ideally be flush with a desk, table or wall permitting the display to be used and retracted when not in use.

[0035] FIG. 8 illustrates a top view of the display in a recessed position according to example embodiments. In FIG. 8, the example 800 has the top of the display 102 depressed into the recess housing and in a manner that is flush with the display housing collar 101.

[0036] FIG. 9 illustrates a front view of the display in an extended and tilted position according to example embodiments. The display is fully erected and tilted out from the display housing cavity. The display may be erected from its cavity housing in a straight position, a slightly modified position (i.e., tilted position), a large degree of tilt, etc., depending on the user's preferences.

[0037] FIG. 10 illustrates a rear view of the display and movable track having a belt driving mechanism according to another example embodiment. Referring to FIG. 10, in this configuration 1000 the motor 114 is rotated 90 degrees (or approximately 90 degrees) from the planar area of the display 102 and display housing. This enables some distance to be afforded when embedding the display housing into a console 157. The console 157 (and display) may be part of an automobile, airplane, train, bus, or other transport with limited space. For example, the console 157 may be in and/or on a compact surface such as a dash, wall, seat or other location of a transport. The drive motor 114 would drive a pulley and timing belt or driving belt 156 that would be clamped to a lifting frame of the display via a clamp 159 which moves with the driving belt 156. The drive motor 114 is positioned 90 degrees from the driving belt 156. The motor 114 will turn the bevel gear/worm gear 113 to drive the driving belt 156 and move the movable track upward and downward accordingly. The display 102 is mounted to the movable track, and the guiding rods 116 and 117 permit the display and housing to move up and down in a uniform manner. The guiding rods 116 and 117 are mounted to the top securing panel and to a bottom securing panel 123. The motor 114 turns the driving belt 156 to rotate causing the display and movable track to move in an upward position.

[0038] It will be readily understood that the components of the application, as generally described and illustrated in the figures herein, may be arranged and designed in a wide variety of different configurations. Thus, the detailed description of the embodiments is not intended to limit the scope of the application as claimed, but is merely representative of selected embodiments of the application.

[0039] One having ordinary skill in the art will readily understand that the application as discussed above may be practiced with steps in a different order, and/or with hardware elements in configurations that are different than those which are disclosed. Therefore, although the application has been described based upon these preferred embodiments, it would be apparent to those of skill in the art that certain modifications, variations, and alternative constructions would be apparent, while remaining within the spirit and scope of the application. In order to determine the metes and bounds of the application, therefore, reference should be made to the appended claims.

[0040] While preferred embodiments of the present application have been described, it is to be understood that the embodiments described are illustrative only and the scope of the application is to be defined solely by the appended claims when considered with a full range of equivalents and modifications thereto.

WHAT IS CLAIMED IS:

1. An apparatus, comprising:
a display housing cavity;
a display;
a track mounted to the display inside the display housing cavity; and
a lead screw disposed on the track which rotationally raises the track and the display out of the display housing cavity.
2. The apparatus of claim 1, further comprising:
a motor disposed in the display housing cavity; and
a rotational drive nut connected to the lead screw and rotated by the motor to raise the track and the display out of the display housing cavity.
3. The apparatus of claim 2, wherein the motor is an inline drive motor disposed directly under the lead screw which is disposed in a center portion of the track and the display housing cavity.
4. The apparatus of claim 2, wherein the motor is a 90 degree drive motor disposed under the track.
5. The apparatus of claim 1, further comprising:
at least one guiding rod and bushing disposed in parallel with the lead screw to guide the track and the display out of the display housing cavity.

6. The apparatus of claim 1, further comprising:

a tilt rotation motor comprising a rotational axis to rotate the display once the display is erected outside the display housing cavity.

7. The apparatus of claim 1, further comprising:

a two-pin two-track tilt mechanism wherein one track is uniform and the second track has a curved top portion which permits a top pin to secure a tilted position in the second track.

8. The apparatus of claim 1, further comprising:

a wedge disposed on the track; and

a round bar and hook tilt mechanism wherein the hook rests against the round bar and the wedge rests against a surface of the display housing cavity to secure a tilted position of the display.

9. The apparatus of claim 1, further comprising:

a torsion spring;

a ramp affixed to a surface of the display housing; and

a roller affixed to the torsion spring to secure a tilted position of the display against the ramp.

10. The apparatus of claim 1, further comprising:
- a tilt motor;
 - a drive belt;
 - a top sprocket affixed to the display on a first end of the drive belt; and
 - a bottom sprocket affixed to the tilt motor on a second end of the drive belt to rotate a tilted position of the display.
11. An apparatus, comprising:
- a display housing cavity;
 - a track mounted inside the display housing cavity; and
 - a lead screw disposed on the track which rotationally raises the track of the display housing cavity.
12. The apparatus of claim 11, further comprising:
- a motor disposed in the display housing cavity; and
 - a rotational drive nut connected to the lead screw and rotated by the motor to raise the track and a display out of the display housing cavity, wherein the track is mounted to the display.
13. The apparatus of claim 12, wherein the motor is an inline drive motor disposed directly under the lead screw which is disposed in a center portion of the track and the display housing cavity.

14. The apparatus of claim 12, wherein the motor is a 90 degree drive motor disposed under the track.

15. The apparatus of claim 12, further comprising:
at least one guiding rod and bushing disposed in parallel with the lead screw to guide the track and the display out of the display housing cavity.

16. The apparatus of claim 12, further comprising:
a tilt rotation motor comprising a rotational axis to rotate the display once the display is erected outside the display housing cavity.

17. The apparatus of claim 11, further comprising:
a two-pin two-track tilt mechanism wherein one track is uniform and the second track has a curved top portion which permits a top pin to secure a tilted position in the second track.

18. The apparatus of claim 12, further comprising:
a wedge disposed on the track; and
a round bar and hook tilt mechanism wherein the hook rests against the round bar and the wedge rests against a surface of the display housing cavity to secure a tilted position of the display.

19. The apparatus of claim 12, further comprising:
- a torsion spring;
 - a ramp affixed to a surface of the display housing; and
 - a roller affixed to the torsion spring to secure a tilted position of the display against the ramp.
20. The apparatus of claim 12, further comprising:
- a tilt motor;
 - a drive belt;
 - a top sprocket affixed to the display on a first end of the drive belt; and
 - a bottom sprocket affixed to the tilt motor on a second end of the drive belt to rotate a tilted position of the display.

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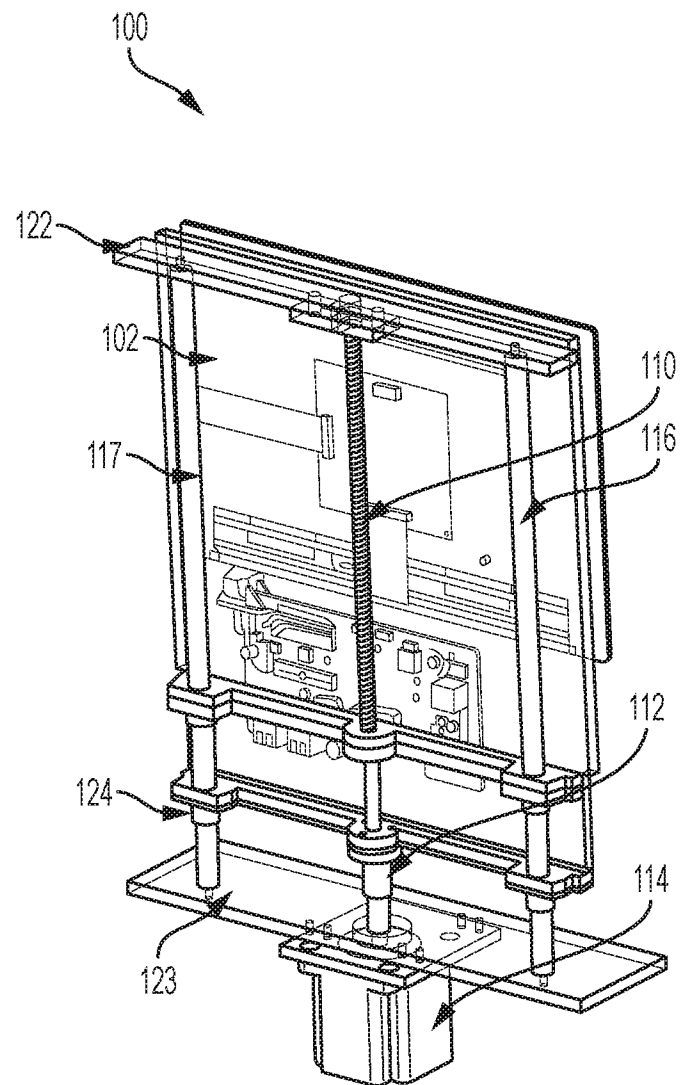


FIG. 1A

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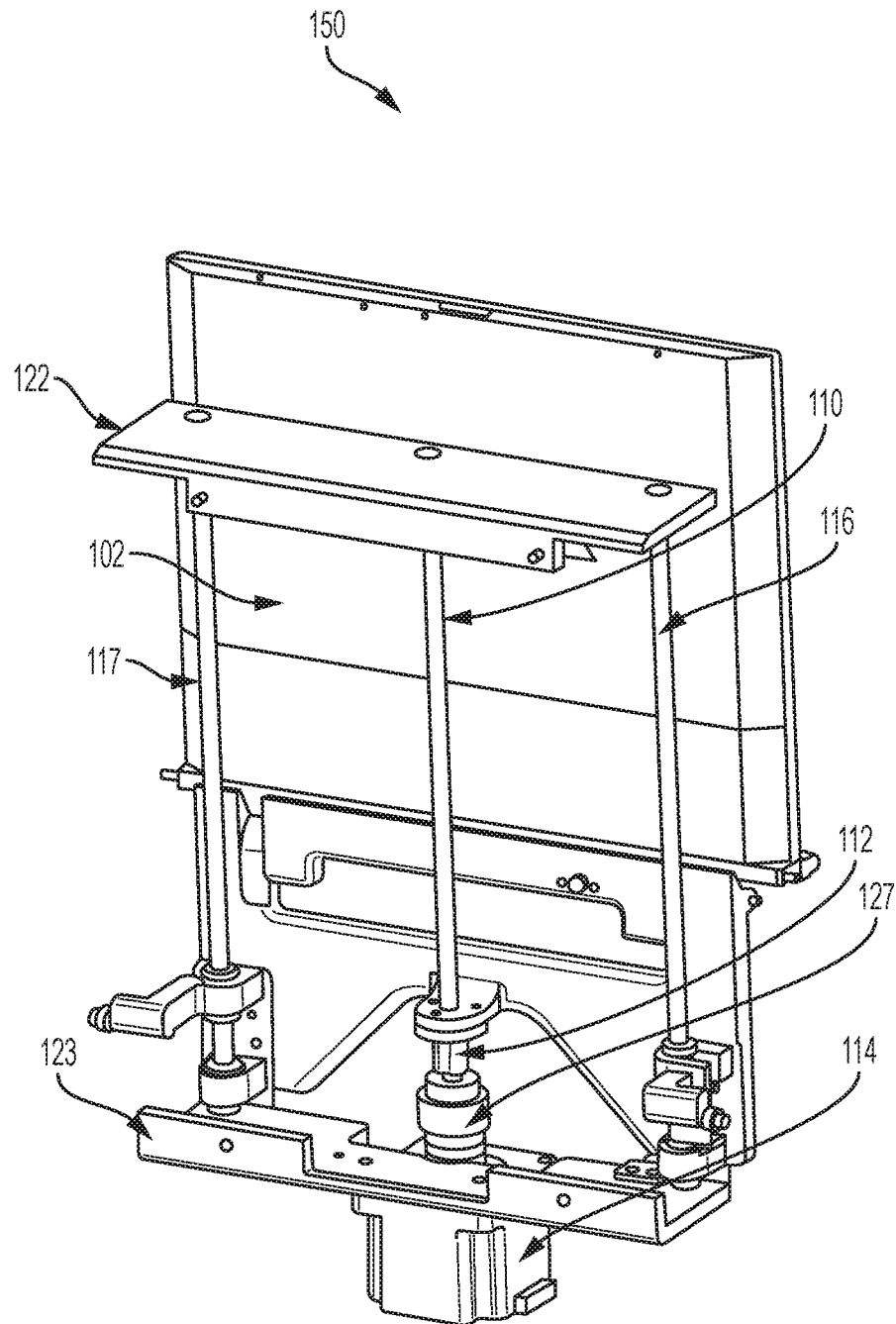


FIG. 1B

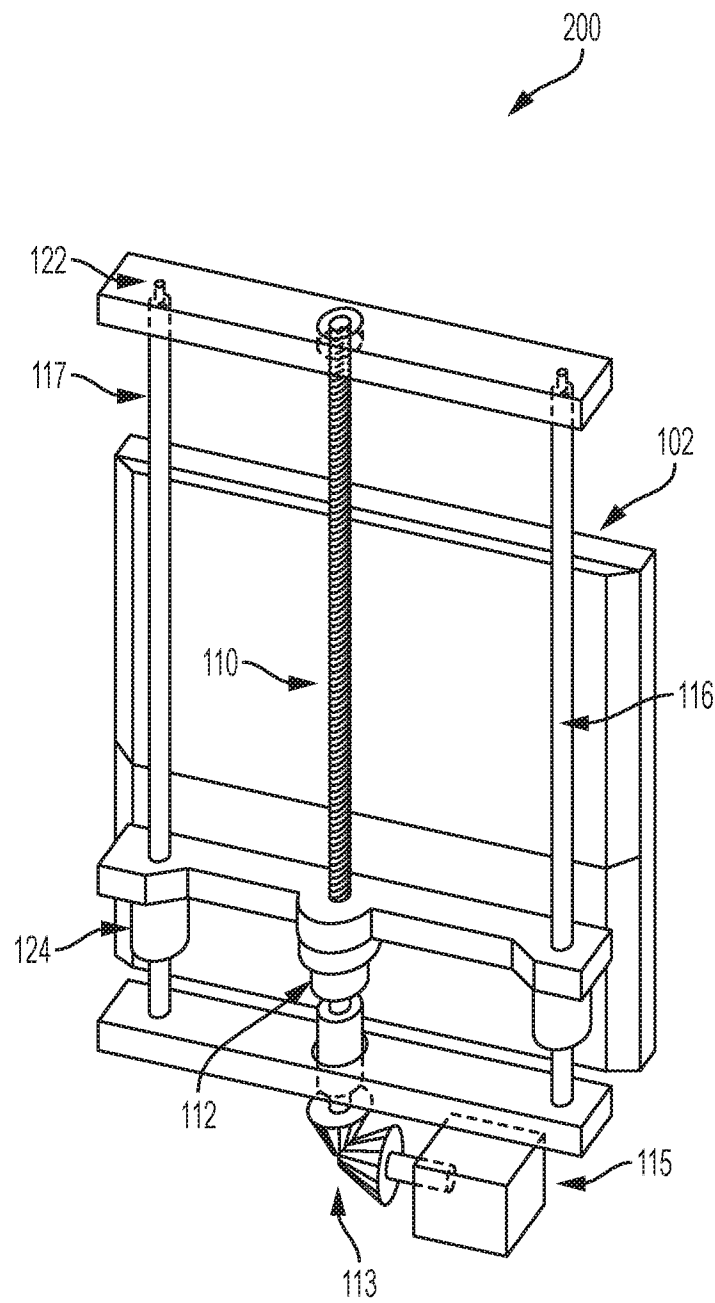


FIG. 2

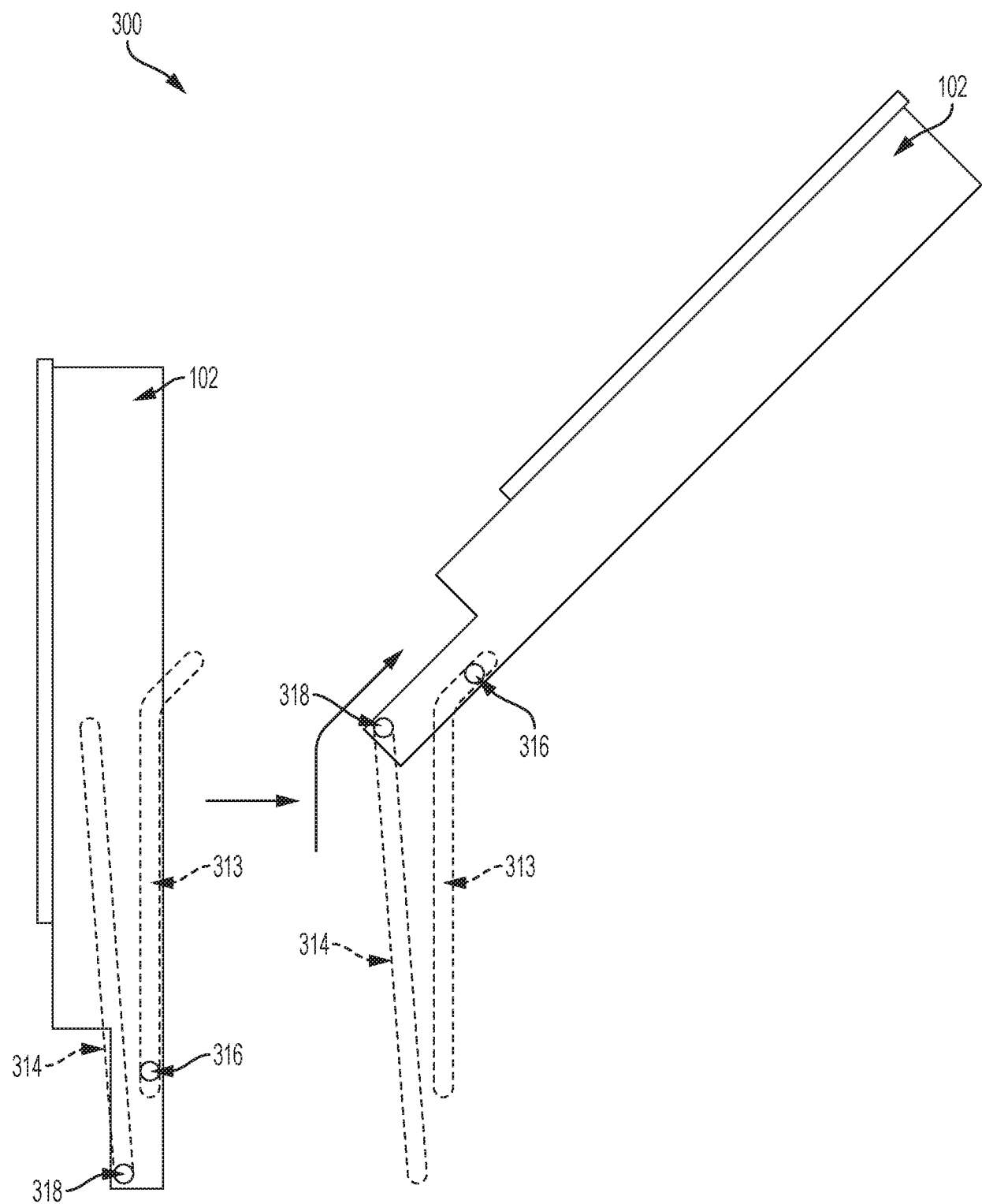


FIG. 3

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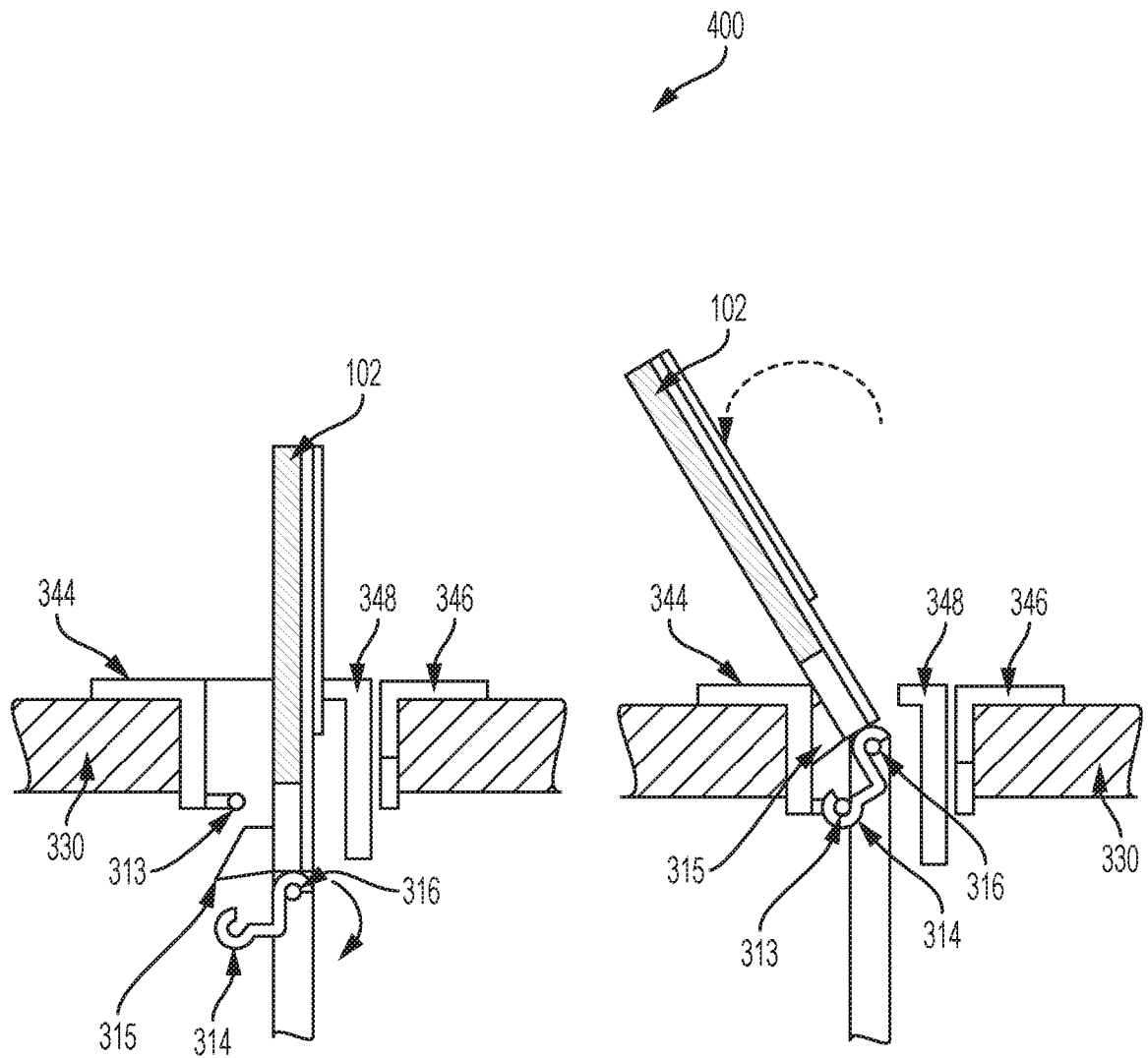


FIG. 4

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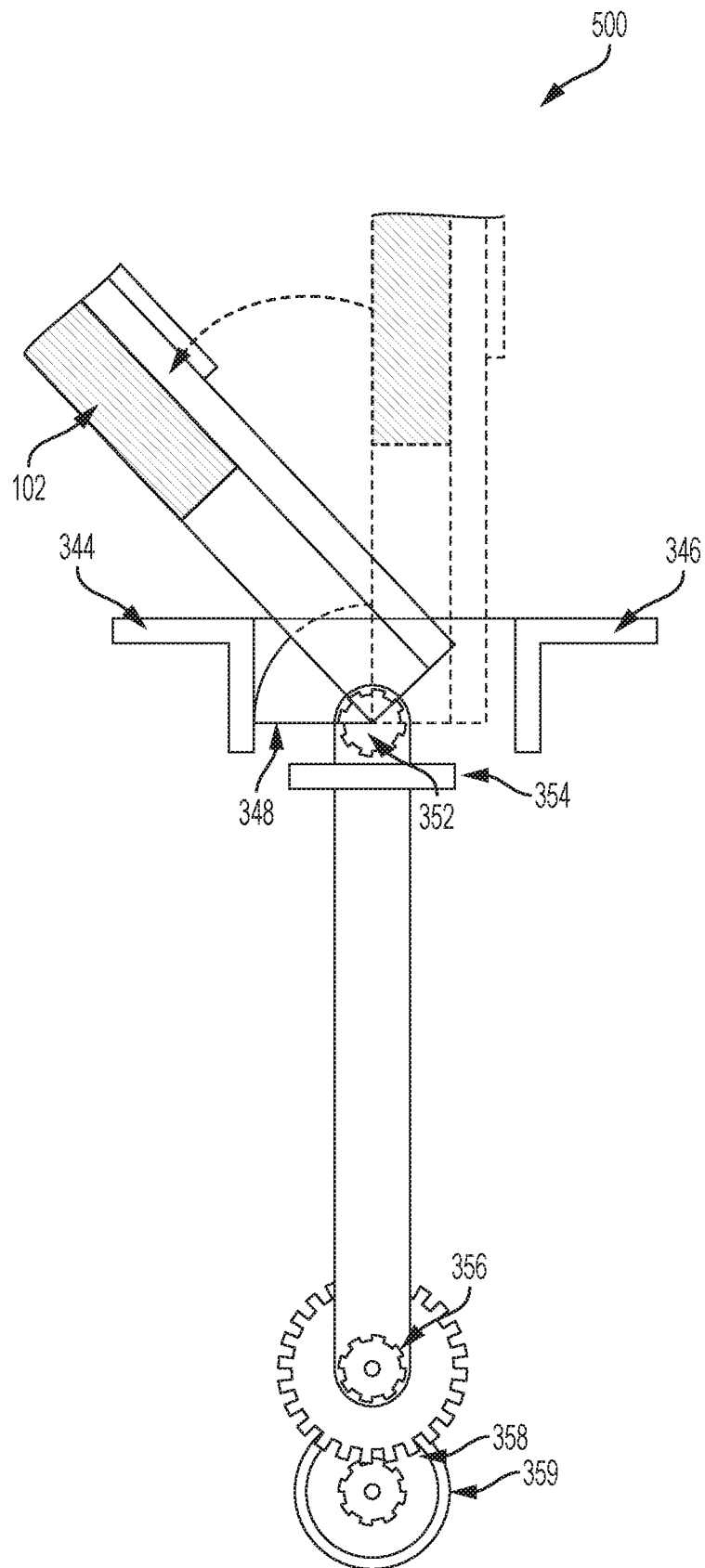


FIG. 5A

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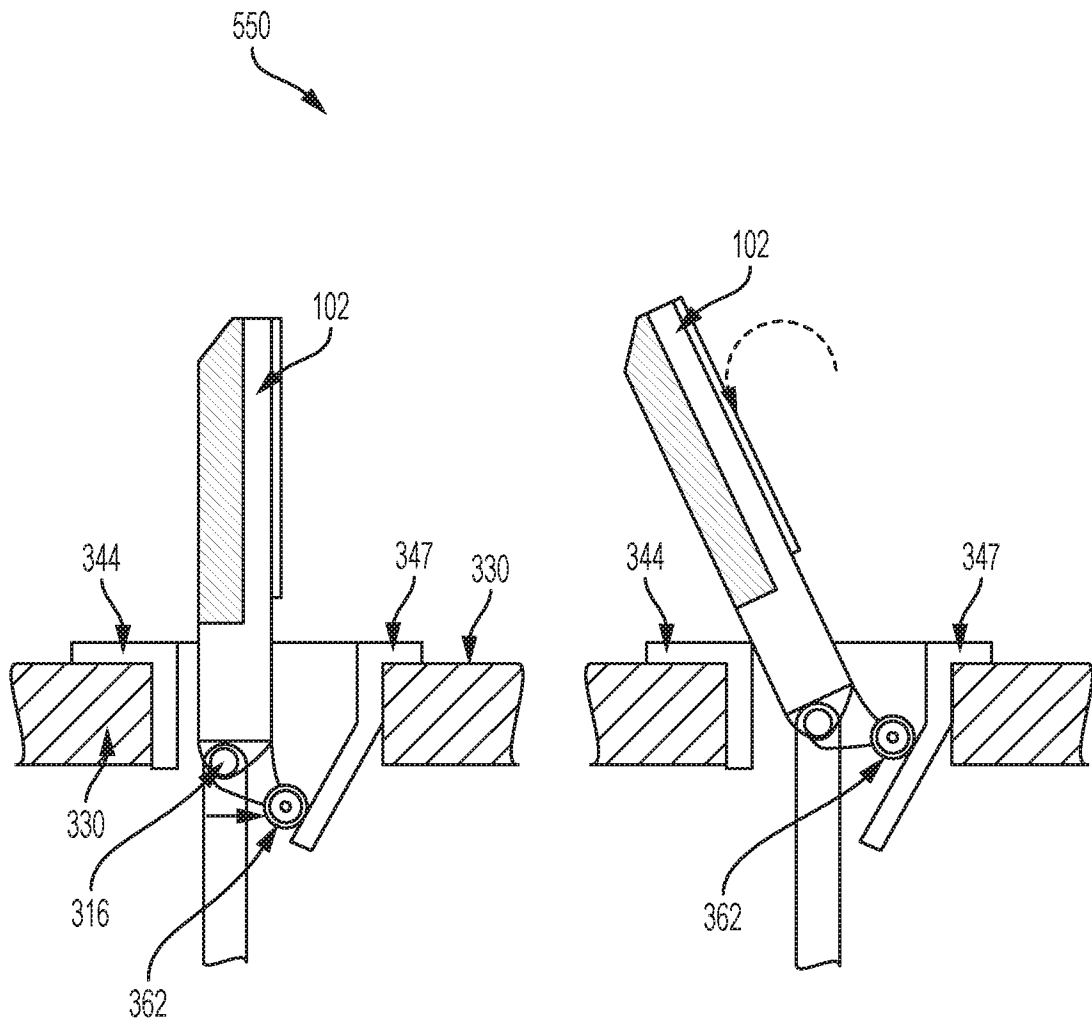


FIG. 5B

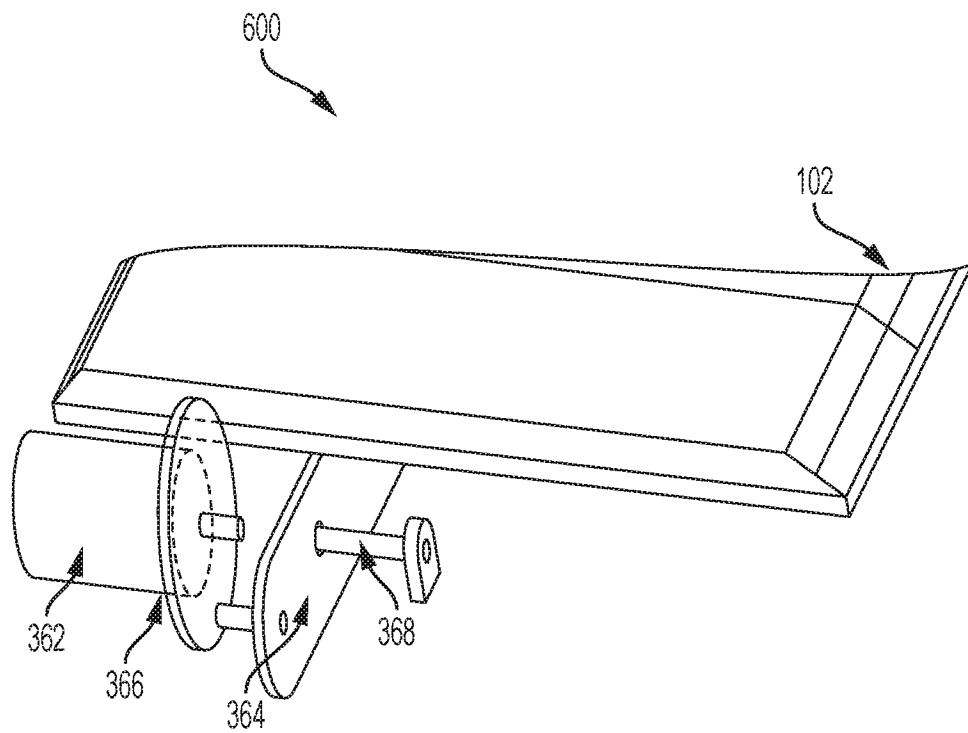


FIG. 6A

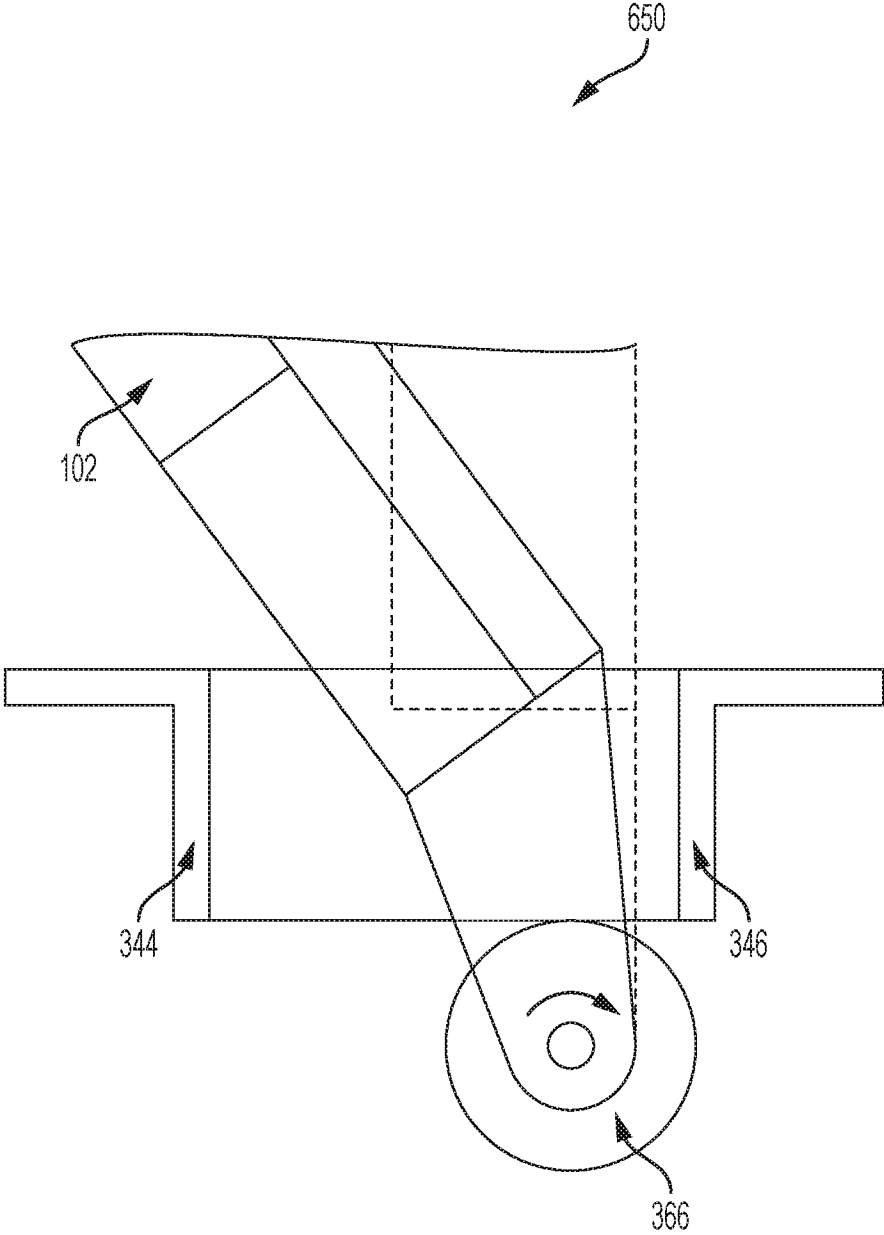


FIG. 6B

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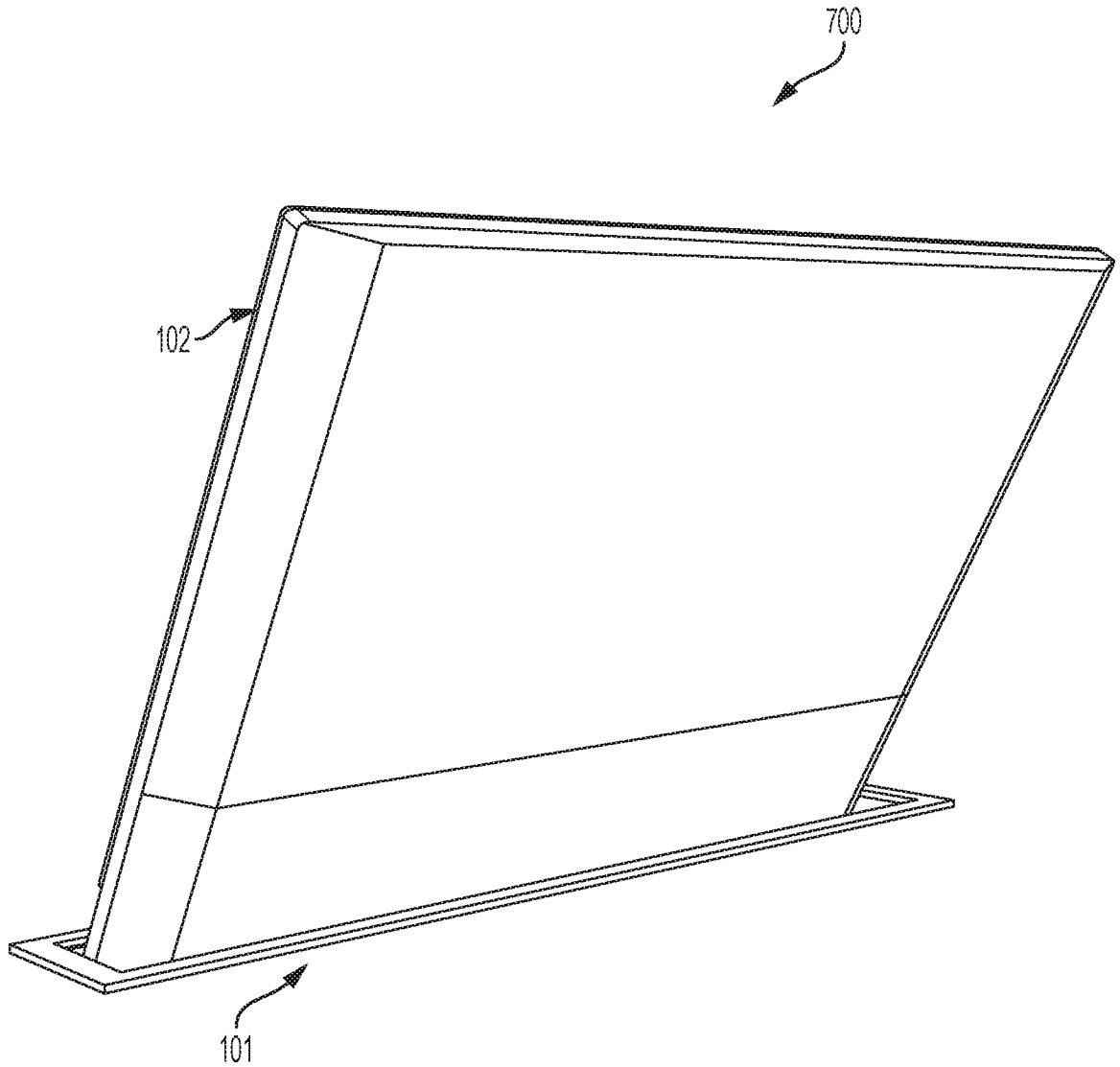


FIG. 7

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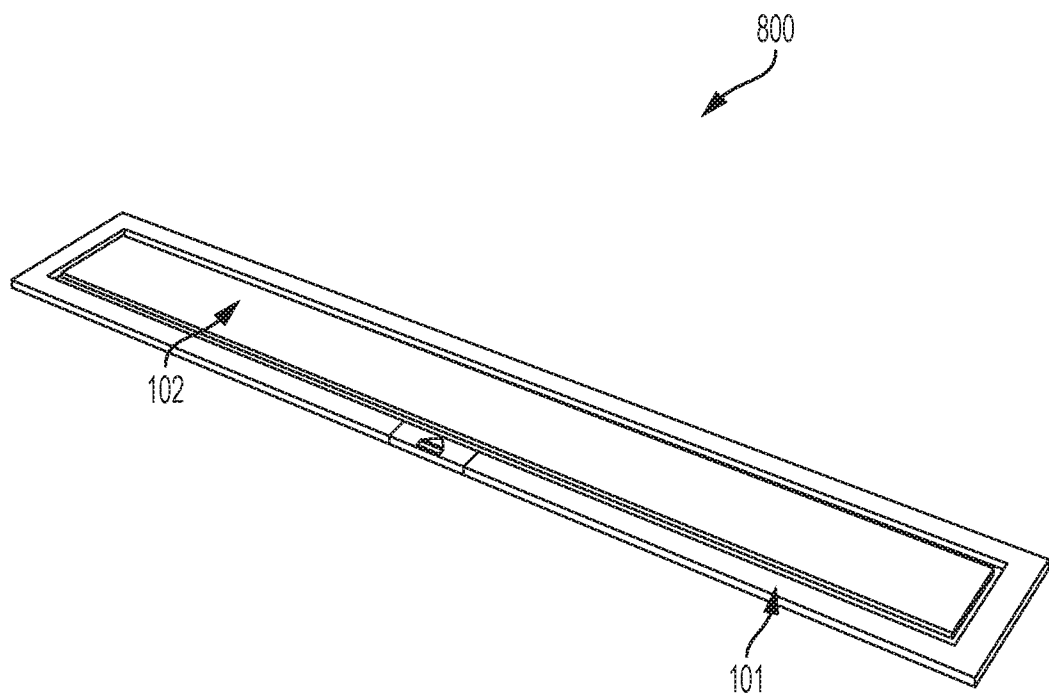


FIG. 8

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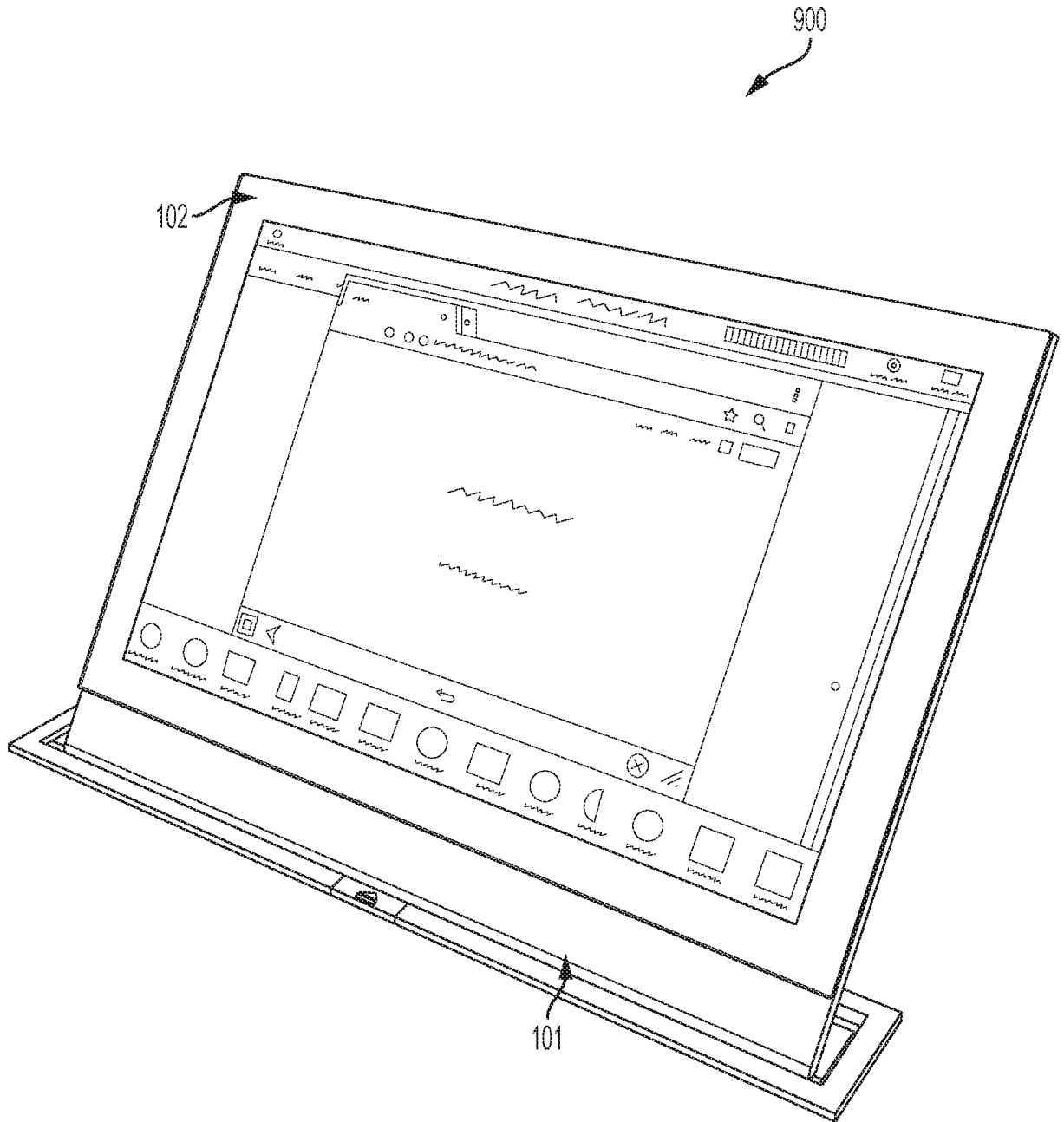


FIG. 9

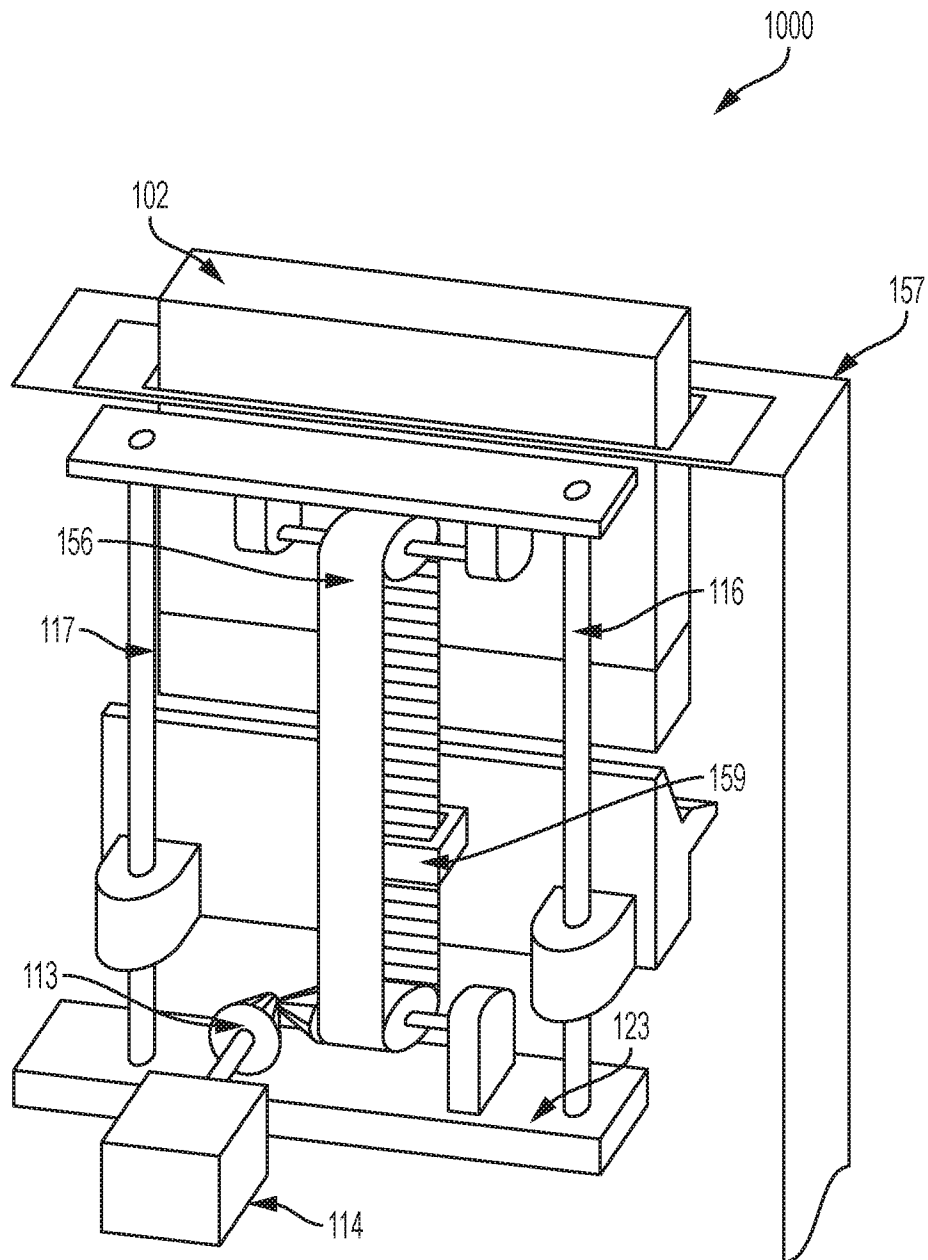


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 16/37924

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A47B 21/00, A47B 37/00 (2016.01) CPC - A47B 21/00, A47B 21/007, A47B 21/0073 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC (8): A47B21/*, A47B37/* (2016.01) CPC: A47B21/*, A47B37/*, A47B2021/*, A47B2037/*		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Patbase, Google (Web, Images, Scholar, Patents) Desk, cavity, hold, holding, track, table, raise, deploy, motor, drive, connect, rack, frame, support, display, screen, monitor, guide, bushing, rod, screw, lead, thread, attach, lower, hidden, slidably, housed, inline, 90, degree, right angle		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	WO 01/95763 A1 (TNCI UK LTD.) 20 December 2001 (20.12.2001) entire document, especially figs. 1-4, Title, Abstract, pg 4, 1-10, 23-27, pg 5, 1-23.	1, 2, 5, 11, 12, 15 ----- 16
X ---- Y	EP 1,776,900 A1 (Two Eyes Company B.V.) 25 April 2007 (25.04.2007) entire document, especially figs. 1-4B, Title, Abstract, para [0018]-[0023], [0025]-[0027], [0031]-[0033].	1, 11 ----- 1-4, 6, 11-14, 16
Y	"Connecting the Motor to the Threaded Rod" (Dan Regalia) 16 July 2013 (16.07.2013) <URL:https://www.youtube.com/watch?v=87lnatDEi24>, entire document.	2-4, 12-14, 16
Y	US 5,401,089 A (Inagaki et al.) 28 March 1995 (28.03.1995) entire document, especially, fig.1, 5, Title, Abstract, col 3, ln 3-22, 52-59.	1, 6, 11, 12-16
A	US 8,291,834 B2 (Romero Font) 23 October 2012 (23.11.2012) entire document.	1-6, 11-16
A	US 2009/0039743 A1 (Gevaert) 12 February 2009 (12.02.2009) entire document.	1-6, 11-16
A	US 4,766,422 A (Wolter et al.) 23 August 1988 (23.08.1988) entire document.	1-6, 11-16
A	EP 2105062 A1 (Michael Jaritz) 30 September 2009 (30.09.2009) entire document.	1-6, 11-16
☐ Further documents are listed in the continuation of Box C. ☐		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 20 October 2016	Date of mailing of the international search report 16 NOV 2016	
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 16/37924

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-6, 11-16 drawn to an apparatus for deploying a display screen from a housing having a tilting motor for tilting about a rotational axis when deployed (fig.1A-1B, 6B-6B).

Group II: Claims 1-2, 7, 11-12, 17 drawn to an apparatus for deploying a display screen from a housing having a two pin two track tilt mechanism wherein one track is uniform and the second track having a curved portion to permit tilting of the display when deployed (fig.3).

--See Extra Sheet--

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-6, 11-16

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 16/37924

-*Box III - Observations where unity of invention is lacking*-

Group III: Claims 1-2, 8, 11-12, 18 drawn to an apparatus for deploying a display screen from a housing having a wedge disposed on the track and a round bar and hook tilt mechanism for tilting the display when deployed (fig.4).

Group IV: Claims 1-2, 9, 11-12, 19 drawn to an apparatus for deploying a display screen from a housing having a torsion spring, a ramp affixed to a surface of the display housing, a roller affixed to the torsion spring to secure a tilted position of the display when deployed (fig. 5B).

Group V: Claims 1-2, 10, 11-12, 20 drawn to an apparatus for deploying a display screen from a housing having a drive belt, a top sprocket affixed to the display and a second sprocket affixed to a tilt motor, said drive belt and motor causing rotation of the sprockets to tilt the display when deployed (fig. 5A).

Claims 1-2 and 11-12 are generic to Groups I-V

The inventions listed as Groups I-V do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Special Technical features

Groups I-V share the generic technical features of an apparatus comprising a display housing cavity, a display, a track mounted to the display and a lead screw disposed on the track which rotationally raises the track and display out of the housing cavity.

However, each of the Groups I-V include special technical features relating to different species of a tilting mechanism, wherein each of the special technical features of each species are provided in the descriptions of each group above. None of these special technical features are common to the other species, nor do they correspond to a special technical feature in the other species.

Common Technical Features

Groups I-V share the technical features of claim 1. Groups I-V are species of the generic independent claim 1, which does not provide any contribution over the prior art as it is anticipated by WO 01/95763 A1 to TNCI UK LTD. (hereinafter "TNCI").

As per claim 1, TNCI teaches an apparatus (10; fig.1), comprising:

a display housing cavity (see screen assembly 18 stored in casing having bas 12, upper casing 14 and support member 16; pg 4, 1-5; fig.1);

a display (18; fig.1);

a track mounted (71; fig.1) to the display (18) inside the display housing cavity (12, 14, 16); and

a lead screw (22; fig. 2-4) disposed on the track (71; fig.4) which rotationally raises the track (71) and the display (18) out of the display housing cavity (see figs. 2-4; pg 4, ln 23-27, pg 5, ln 12-15; wherein lead screw 22 has cross arm 46 which is driven by motor 30 to raise the track 70 and display 18 out of cavity 12, 14, 16).

As the common features were known in the art at the time of the invention, they cannot be considered special technical features that would otherwise unify the groups.

Therefore, Groups I-V lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.