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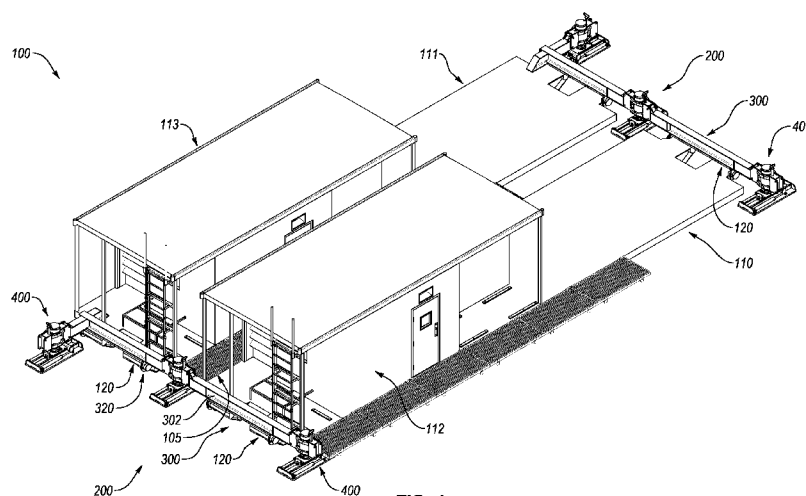


FIG. 1

(57) **Abstract:** A system for moving equipment is disclosed. The system may include a platform having opposing first and second ends. A first roll end may be located at the first end of the platform. A first beam may be coupled to the first roll end at the first end of the platform. The system may also include a first mover coupled to the coupler. The first mover may include a first head, a first lift, and a first horizontal actuator. The first head may be coupled to the first beam and the first lift. The first lift may be coupled to the first horizontal actuator and the first mover may be configured to lift the platform vertically and move the platform horizontally.

SYSTEMS, METHODS, AND APPARATUSES FOR MOVING EQUIPMENT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to United States Provisional Application 62/222,398 filed September 23, 2015, the entirety of which is incorporated by reference.

TECHNICAL FIELD

[0002] Some embodiments described herein generally relate to systems, methods, and apparatuses for moving heavy equipment. Some embodiments herein generally relate to systems, methods, and apparatuses for moving oil field equipment on skids.

BACKGROUND

[0003] In the drilling of oil and gas wells, multiple wells may be drilled on a single oilfield site. Each of the multiple wells may be as little as a few feet away from each other to as much as several hundred feet apart. When drilling multiple wells at a single oilfield site, the drilling equipment is moved from the location of the one well to the location of each subsequent well.

[0004] Moving oilfield equipment may involve costly and time-consuming processes such as disconnecting and dismantling oilfield equipment, renting moving equipment such as large cranes and specialized trucks to lift and move the oilfield equipment, additional manpower to operate such equipment, and additional logistical and planning to coordinate such moves. Furthermore, dismantling and moving oilfield equipment increases the risk of damage to the equipment.

[0005] Some oilfield equipment, for example, backyard equipment such as mud tanks, electrical generation equipment, and other oilfield equipment may be affixed to oilfield skids that may remain in one location during the drilling of multiple wells, while other equipment, such as the oil drilling mast, may be moved from one well location to another. In such instances, long electrical cabling, hydraulic lines, mud piping, and other couplings may connect the transportable equipment such as the oil drilling mast to the stationary oilfield equipment. Such connections create losses such as electrical losses and/or fluid pressure losses that may be

compensated for by increased power usage and using larger equipment than would otherwise be used.

SUMMARY

[0006] This summary is provided to introduce a selection of concepts that are further described below in the detailed description. This summary is not intended to identify key or essential features of the claimed subject matter, nor is it intended to be used as an aid in limiting the scope of the claimed subject matter.

[0007] A system for moving equipment is disclosed. The system may include a platform having opposing first and second ends. A first roll end may be located at the first end of the platform. A first beam may be coupled to the first roll end at the first end of the platform. The system may also include a first mover coupled to the coupler. The first mover may include a first head, a first lift, and a first horizontal actuator. The first head may be coupled to the first beam and the first lift. The first lift may be coupled to the first horizontal actuator and the first mover may be configured to lift the platform vertically and move the platform horizontally.

[0008] A method for moving equipment is disclosed. The method may include coupling a beam to a platform. The platform may have opposing first and second ends. The beam may be coupled to the first end of the platform and the beam may have opposing third and fourth ends. The method may also include coupling a mover to the third end of the beam. The mover may include a head, a lift, and a horizontal actuator. The head may be coupled to the beam and the lift while the lift may be coupled to the horizontal actuator. The method may also include lifting the platform by extending the lift and moving the platform horizontally by activating the horizontal actuator in a first direction.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0009] In the drawings, sizes, shapes, and relative positions of elements are not drawn to scale. For example, the shapes of various elements and angles are not drawn to scale, and some of these elements may have been arbitrarily enlarged and positioned to improve drawing legibility.

[0010] FIG. 1 depicts an isometric view of an oilfield skid and building system and associated moving system, according to one or more embodiments disclosed herein;

[0011] FIG. 2 depicts a detailed view of an end of an oilfield skid and associated moving system and a portion of the process for moving an oilfield skid, according to one or more embodiments disclosed herein;

[0012] FIG. 3 depicts a detailed view of an oilfield skid and associated moving system, according to one or more embodiments disclosed herein;

[0013] FIG. 4 depicts an isometric view of a lift and roll system, according to one or more embodiments disclosed herein;

[0014] FIG. 5 depicts a detailed view of an end of an oilfield skid and associated moving system and a portion of the process for moving an oilfield skid, according to one or more embodiments disclosed herein;

[0015] FIG. 6 depicts a partial plan view of an end of an oilfield skid and associated moving system and a portion of the process for moving an oilfield skid of FIG. 5, according to one or more embodiments disclosed herein;

[0016] FIG. 7 depicts a detailed view of an end of an oilfield skid and associated moving system and a portion of the process for moving an oilfield skid, according to one or more embodiments disclosed herein;

[0017] FIG. 8 depicts a partial plan view of an end of an oilfield skid and associated moving system and a portion of the process for moving an oilfield skid of FIG. 7, according to one or more embodiments disclosed herein;

[0018] FIG. 9 depicts a detailed view of an end of an oilfield skid and associated moving system and a portion of the process for moving an oilfield skid, according to one or more embodiments disclosed herein;

[0019] FIG. 10 depicts a detailed view of an end of an oilfield skid and associated moving system and a portion of the process for moving an oilfield skid, according to one or more embodiments disclosed herein;

[0020] FIG. 11 depicts a detailed view of an end of an oilfield skid and associated moving system and a portion of the process for moving an oilfield skid, according to one or more embodiments disclosed herein;

[0021] FIG. 12 depicts a side view of a motorized wheel lift and roll system, according to one or more embodiments disclosed herein; and

[0022] FIG. 13 depicts a side view of a motorized wheel lift and roll system, according to one or more embodiments disclosed herein.

DETAILED DESCRIPTION

[0023] FIG. 1 depicts an oilfield skid and equipment system 100 and associated transport system 200. The oilfield skid and equipment system 100 includes two platforms 110, 111, commonly referred to as oilfield skids, and oilfield equipment 112, 113 mounted to the platforms 110, 111. The equipment 112, 113, may include one or more of various types of oilfield equipment such as buildings for housing personnel, control rooms, pumps, generators, fluid storage tanks, equipment storage, and other oilfield equipment.

[0024] In some embodiments, two or more platforms 110, 111 may be joined or otherwise coupled together to form a single structure. For example, in the embodiment shown in FIG. 1, a catwalk 105 couples the platform 110 to the platform 111. The platforms 110, 111 may be moved jointly or separately from one well location to another well location. If each of the platforms 110, 111 are to be moved separately, then they may be decoupled from each other for relocation. The platforms 110, 111 may also include a roll end 120 at each of two opposing ends of the platforms 110, 111. The roll end 120 will be described in greater detail below.

[0025] In the embodiment shown in FIG. 1, the transport system 200 moves both platforms 110, 111, as a single unit. The transport system 200 includes one or more movers 400 coupled to the platforms 110, 111 via couplers 300. The movers 400 lift the platforms 110, 111, move platforms 110, 111 a horizontal distance along the ground, and then set the platforms 110, 111 back down. In some embodiments the movers 400 may lift the platforms 110, 111 at a first well location, move the platforms 110, 111 from the first well location to a second well location, and then set the platforms back down. In some embodiments, the movers 400 lift the platforms 110, 111 at a first well location, move the platforms a short distance, less than the distance to the second well location, set the platforms 110, 111 back down, then a portion of the mover 400 may be reset and an iterative processes of lifting, moving, setting down, and resetting the mover 400 may be repeated until the platforms 110, 111 arrive at the second well

location. In some embodiments, as described below, the movers 400 may transport the platforms 110, 111 in a straight line or they may turn and/or rotate the platforms 110, 111 as part of the moving process.

[0026] The couplers 300 may include a support structure, such as a beam 302 that couples to both the movers 400 and one or more of the platforms 110, 111. The coupler 300 may also include a connector 320 that engages with a portion of one of the platforms 110, 111. For example, as shown in FIG. 1, the connector 320 engages with the roll ends 120 of the platforms 110, 111.

[0027] Additional structure and operation of oilfield skid and equipment system 100 and associated transport system 200 are now described with reference to FIGS. 2-11. FIG. 2 shows a detailed view of two couplers 300 attached to the ends of the platforms 110, 111. The couplers 300 may include a beam 302 with two opposing ends 304, 305. As shown in FIG. 2, the beam 302 may be an I-beam in the central portion of the beam 302 with a box beam structure at the ends 304, 305.

[0028] Each of the ends 304, 305 may include a coupling 308. In some embodiments, for example as shown in FIG. 2, the coupling 308 may include two plates 313. The plates 313-1, 313-2 may include apertures 314 for receiving a fastener 315. In some embodiments, each pair of plates 313-1, 313-2 at an end 304, 305 may be parallel to each other.

[0029] An aperture 314-1 of a first plate 313-1 corresponds to an aperture 314-2 in a second plate 313-2. The apertures 314-1, 314-2 may have a central axis along the length of the apertures 314-1, 314-2 through the plates 313-1, 313-2. Corresponding apertures 314-1, 314-2 may have central axes that are coincident with each other. Such corresponding apertures 314-1, 314-2 may allow a fastener 315, such as a pin, to pass through and engage with a pair of corresponding apertures 314-1, 314-2.

[0030] The coupler 300 may also include an extended end 306; for example, as shown in FIG. 2. The extended end 306 protrudes out from an end 305 of the platform 111. In some embodiments, the extended end 306 may extend perpendicularly from the longitudinal axis of the beam 302.

[0031] The extended end 306 may allow for the coupling of a mover 400 in some embodiments. For example, if the platform 111 were located next to a wall or another platform

that was not connected to the platform 111, then there may not be room to place a mover 400 between the platform 111 and, for example, the wall. The extended end 306 allows the mover to be placed in a location between the sides 108, 109 of the platform 111. The extended end 306 may also include a coupler 308 with associated apertures 314 in plates 313-1, 313-2 and one or more fasteners 315.

[0032] FIG. 3 shows a detailed view of the connector 320 that couples the beam 302 of the coupler 300 to the platform 111. The connector 320 may be hinged and include a fixed member 324 joined to a movable member 322 by a pivot 326. The moveable member 322 may be positionable between an open position in which the connector 320 may receive a tube 122 and a closed position in which the fixed member 324 and the movable member 322 form an aperture 329 that surrounds and couples to the tube 122. The tube 122 may be integrated with the roll end 120 of the platform 111.

[0033] The pivot 326 may include a pivot pin 328 and corresponding apertures 327 and the fixed member 324 and the movable member 322 on the front side of the tube 122. The connector 320 may include a second pivot 326 on a back side of the tube 122. In some embodiments, the pins 328 of the pivots 326 may be removable such that the fixed portion of the connector 320 is set on the tube 122 and the movable member 322 of the connector 320 is then installed and held in place around the bottom of the tube 122 by the pins 328 to complete the aperture 329 and couple the beam 302 to the roll end 120.

[0034] Roll ends, such as the roll end 120, are used on platforms and other oilfield equipment to facilitate their rough movement by dragging platforms by or on their roll ends. The roll end 120 may form an end of a skid 114. The skids 114 may extend under the platform 110 up to the tube 122. The skids 114 may form a protective structure beneath and at the ends of the platforms 110, 111 and protect the platform when it is in use, for example, when it is dragged along the ground.

[0035] In some embodiments, the connector 320 may include the fixed member 324 without the movable member 322. The fixed portion may extend at least partially around and underneath the tube 122 of the roll end 120 and may have a hook shape. While a connector 320 that includes a movable member 322 pinned to a fixed member 324 to create a complete aperture 329 may positively capture the tube 122, a coupler with a hook-shaped fixed portion

may not positively engage the tube 122. Instead, the hook may engage with the tube 122 during the lifting portion of the moving sequence described below with respect to FIG. 7.

[0036] FIG. 4 shows a detailed view of an embodiment of a mover 400. The mover 400 includes a lift 430 for vertical movement. The lift is coupled to the head 426 at a first end and coupled to a horizontal actuator 440 via an intermediate plate 450 at a second end. The lift 430 may be a linear actuator.

[0037] The lift 430 raises and lowers the foot 442 relative to the head 426. The lift 430 shown in FIG. 4 is a linear actuator, specifically, a hydraulic linear actuator. In some embodiments, the linear actuator may be of another type, for example, the linear actuator may be a jackscrew, a threaded rod and follower, or other type of linear actuator.

[0038] The head 426 of the mover 400 includes one or more plates 422-1, 422-2 attached to a rotary actuator 428. The rotary actuator 428 rotates the lift 430, the foot 442, and/or the horizontal actuator 440 relative to the head 426 of the mover 400. The plates 422-1, 422-2 include apertures 424. The head 426 may be a weldment, casting, or other design.

[0039] The apertures 424 may be formed through the plates 422-1, 422-2 and may receive a fastener, such as fastener 315, to attach the mover 400 to the coupler 300, see, for example, FIG. 5. In addition, a first aperture 424-1 of a first plate 422-1 may correspond to a second aperture 424-2 in a second plate 422-2. The apertures 424-1, 424-2 may have a central axis along the length of each of the apertures 424-1, 424-2 through the plates 422-1, 422-2. Corresponding apertures 424-1, 424-2 may have central axes that are coincident with each other. Such corresponding apertures 424-1, 424-2 may allow a fastener such as the fastener 315, which may be a pin, to pass through and engage a pair of corresponding apertures 424-1, 424-2.

[0040] The horizontal actuator 440 is configured to translate the foot 442 laterally/horizontally with respect to the head 426 and lift 430. The horizontal actuator 440 may translate the foot 442 via a linear actuator 460. As shown in FIG. 4 the linear actuator may be a hydraulic linear actuator that includes a rod such as the piston 464, and a cylinder, such as the cylinder 462. In some embodiments, the linear actuator may be of another type, for example, the linear actuator may be a jackscrew, a threaded rod and follower, or other type of linear actuator.

[0041] The linear actuator 460 includes a movable end 448 that is attached to the intermediate plate 450 and a stationary end 466 that is attached to the foot 442. As the

piston 464 extends and retracts from the cylinder 462, the movable end 448 of the actuator 460 and the intermediate plate 450 also move, thereby moving the foot relative to the intermediate plate 450 and the rest of the mover 400, including the head 426.

[0042] The horizontal actuator 440 may also include one or more tracks 444 that extend between the ends 446, 448 of the horizontal actuator 440. The intermediate plate 450 may include a guide 452 that rides between and/or engages with one or more of the tracks 444. The guide 452 and tracks 444 may add stability to the movement of the foot 442 with respect to the head 426.

[0043] In some embodiments, for example, as described below with respect to FIGS. 12 and 13, the horizontal actuator 440 may include a motorized wheel assembly.

[0044] The horizontal actuator 440 is coupled to the lift 430 and head 426 via the intermediate plate 450.

[0045] FIG. 5 shows the movers 400 coupled to the couplers 300. A portion of the process for moving the platforms 110, 111 is also described with reference to FIG. 5. To attach the mover 400 to the couplers 300, the head 426 of the mover 400 is attached to the ends 304, 305 of the coupler 300. In particular, the apertures 424 of the plates 422-1, 422-2 are aligned with corresponding apertures 314 of the coupling 308. Aligning apertures 424 with apertures 314 may include aligning the central axis of one of the apertures 424 with a central axis of one of the apertures 314. Aligning the central axes of the apertures 314, 424 may include orienting the head 426 with the coupler 300 such that the central axis of the apertures 314, 424 are coincident with each other.

[0046] A fastener, such as the fastener 315, may be placed through a set of aligned apertures 314, 424 to attach the mover 400 to the couplers 300. As shown in FIG. 5, the mover 400 may be coupled to one or more couplers 300. For example, the mover 400 is coupled to two couplers 300, one each on either side of the head 426.

[0047] The mover 600, shown in FIG. 5, is coupled to the extended end 306 of the coupler 300. The head 626 of the mover 600 is rotated 90 degrees with respect to the head 426 of the mover 400. By rotating the head 626 of the mover 600, the foot 642 of the mover 600 is aligned with the foot 442 of the mover 400 even though the head 626 of the mover 600 is not aligned with the head 426 of the mover 400.

[0048] FIG. 6 shows a side view of a portion of the oilfield skid and equipment system 100. In FIG. 6, the movers 400, 600 and their respective lifts 430, 630 are shown in their retracted positions. In such a position, the feet 442, 642 are lifted off the ground 10 while the skid 114 of the platform 110 is resting on the ground 10.

[0049] With reference to FIGS. 7 and 8, a portion of the process for moving the platforms 110, 111 is also described. The lifts 430, 630 are extended in a direction 12, which may be, for example, a vertical downward direction. When the feet 442, 642 are extended to push against the ground 10, the platforms 110, 111 move in a direction 14, which may be in a vertically upward direction, off of the ground 10. The other movers 400 attached to the platforms 110, 111 may also extend their respective lifts 430 in coordination with each other, to aid in raising the platforms 110, 111 as a single unit.

[0050] With the platforms 110, 111 lifted off the ground 10, the platforms 110, 111 may be moved horizontally. Horizontal movement may be accomplished by stroking the linear actuators 460, 660 of the movers 400, 600. For example, as shown in FIG. 9, the linear actuator 660 is stroked to retract piston 664 into cylinder 662. This moves the head 626 in a direction 16. The head 626, being coupled to the coupler 300, which is coupled to the platform 111, also moves the platform 111 in the direction 16. The other movers 400 attached to the platforms 110, 111 may also stroke their respective linear actuators 460 in coordination with each other, to aid in moving the platforms 110, 111 as a single unit.

[0051] With the linear actuator 660 stroked in a retracted position, the platforms 110, 111 are lowered to ground as shown in FIG. 10. As the lifts 430, 630 are retracted, the platforms 110, 111 move in a direction 20, which may be a vertically downward direction, until the skid 114 of the platforms 110, 111 rest against the ground 10. Once the platforms 110, 111 rest against the ground 10, the continued retraction of the lifts 430, 460 cause the feet 442, 462 to lift off the ground in a direction 18, which may be a vertically upward direction.

[0052] With the feet 442, 642 in a retracted position and lifted off the ground 10, the linear actuators 460, 660 may be extended to reset the position of the feet 442, 642 back into their original position. As shown in FIG. 11, the feet 442, 642 are translated in a direction 22 to move them back into their starting position, for example, as also shown in FIG. 5. From this position,

the process depicted in FIG. 6-11 may be repeated to move the platforms 110, 111 to a new drilling location.

[0053] Although depicted as moving in a single direction that is along the length of the platforms 110, 111, the movers 400, 600 may rotate their respective feet 442, 642 in other directions. By rotating the feet 442, 642, the direction of movement of the platforms 110, 111 is changed, allowing the platforms to turn and travel in both curved and straight lines.

[0054] FIGS. 12 and 13 depict another embodiment of a mover. The mover 500 includes many of the features of the mover 400 described above. For example, the mover 500 includes a head 526, with a rotational actuator 528 to rotate the head relative to the horizontal actuator 540. The head also includes plates 522 with apertures 524 for coupling to couplers 300. The mover 500 also includes a lift 530 that moves the head 526 in a vertical direction relative to horizontal actuator 540.

[0055] Instead of using a linear actuator 460 attached to a foot 442, as depicted in FIG. 4, the horizontal actuator 540 of the mover 500 includes a drive unit 543 attached to wheels 546 to aid in moving the mover 500 horizontally along the ground. In some embodiments, for example as shown in FIG. 5, a plate 550 may be attached to a drive unit 543. The drive unit 543 may be an electric motor, a hydraulic motor, or other type of motor, which may be coupled to the wheels 546 via a transmission and/or differential. In some embodiments the drive unit 543 may be directly coupled to one or more axles 544, which are then coupled to the wheels 546.

[0056] When one or more movers 500 are attached to one or more platforms, such as platforms 110, 111, the movers 500 may lift the platforms at a first well location, move the platforms 110, 111 to a second well location, and set the platforms 110, 111 down at the second well location without multiple lift, move, set down, operations that may be used when the movers 400 are used. The movers 500 may also use their rotary actuators 528 to rotate their respective heads 526 to turn or rotate the platforms 110, 111 while the platforms 110, 111 are lifted off the ground and even during horizontal movement of the platforms 110, 111.

[0057] A few example embodiments have been described in detail above; however, those skilled in the art will readily appreciate that many modifications are possible in the example embodiments without materially departing from the scope of the present disclosure or the appended claims. Accordingly, such modifications are intended to be included in the scope of

this disclosure. Likewise, while the disclosure herein contains many specifics, these specifics should not be construed as limiting the scope of the disclosure or of any of the appended claims, but merely as providing information pertinent to one or more specific embodiments that may fall within the scope of the disclosure and the appended claims. Any described features from the various embodiments disclosed may be employed in combination. In addition, other embodiments of the present disclosure may also be devised which lie within the scope of the disclosure and the appended claims. Additions, deletions and modifications to the embodiments that fall within the meaning and scopes of the claims are to be embraced by the claims.

[0058] Certain embodiments and features may have been described using a set of numerical upper limits and a set of numerical lower limits. It should be appreciated that ranges including the combination of any two values, e.g., the combination of any lower value with any upper value, the combination of any two lower values, or the combination of any two upper values are contemplated. Certain lower limits, upper limits and ranges may appear in one or more claims below. Numerical values are “about” or “approximately” the indicated value, and take into account experimental error, tolerances in manufacturing or operational processes, and other variations that would be expected by a person having ordinary skill in the art.

[0059] The various embodiments described above can be combined to provide further embodiments. These and other changes can be made to the embodiments in light of the above-detailed description. In general, in the following claims, the terms used should not be construed to limit the claims to the specific embodiments disclosed in the specification and the claims, but should be construed to include other possible embodiments along with the full scope of equivalents to which such claims are entitled. Accordingly, the claims are not limited by the disclosure.

CLAIMS

1. A system for moving equipment, comprising:
 - a platform having opposing first and second ends;
 - a first roll end at the first end of the platform;
 - a first beam coupled to the first roll end at the first end of the platform;
 - a first mover coupled to the first beam and including a first head, a first lift, and a first horizontal actuator, wherein the first head couples the first beam to the first lift, the first lift is coupled to the first horizontal actuator, and the first mover is configured to lift the platform vertically and move the platform horizontally.
2. The system of claim 1, further comprising:
 - a second roll end at the second end of the platform;
 - a second coupler coupled to the second roll end at the second end of the platform;
 - a second mover coupled to the second coupler and including a second head, a second lift, and a second horizontal actuator, the second head coupled to the second coupler and the second lift, the second lift further coupled to the second horizontal actuator, the second mover configured to lift the platform vertically and move the platform horizontally.
3. The system of claim 1, wherein the first horizontal actuator includes a foot and a linear actuator, the linear actuator coupling the first lift to the foot, the linear actuator configured to move the foot horizontally with respect to a surface on which the foot is placed.
4. The system of claim 1, wherein the first horizontal actuator includes a motor, a wheel, and an axle, the motor being coupled to the first lift and the axle coupling the wheel to the motor, the motor configured to rotate the wheel and move the platform horizontally with respect to a surface on which the wheel is placed.

5. The system of claim 1, further comprising:
a tube integrated with the first roll end;
a coupling attached to the first beam, the coupling including a fixed member affixed to the first beam and a moveable member pivotably coupled to the fixed member, the moveable member rotatably coupled to the fixed member.

6. The system of claim 5, wherein the moveable member of the first beam is positionable between an open position and a closed position, in the open position the first beam is configured to receive the tube, in the closed position the movable member and the fixed member form an aperture that surrounds and is engaged with the tube, coupling the first beam to the tube.

7. The system of claim 3, wherein the first head of the first mover includes a first rotary actuator configured to rotate the foot with respect to the first head.

8. The system of claim 1, wherein the first head of the first mover includes at least a first pair of apertures and the first beam includes at least a second pair of apertures, the first pair of apertures and the second pair of apertures configured to align with each other to receive a fastener, the fastener coupling the first mover to the first beam.

9. A method for moving equipment, comprising:
coupling a beam to a platform, the platform having opposing first and second ends, the beam being coupled to the first end of the platform, the beam having opposing third and fourth ends;
coupling a mover to the third end of the beam, the mover including a head, a lift, and a horizontal actuator, the head coupled to the beam and the lift, the lift coupled to the horizontal actuator;
lifting the platform by extending the lift; and
moving the platform horizontally by activating the horizontal actuator in a first direction.

10. The method of claim 9, wherein the first end of the platform includes a roll end and coupling the beam to the platform includes coupling the beam to the roll end.

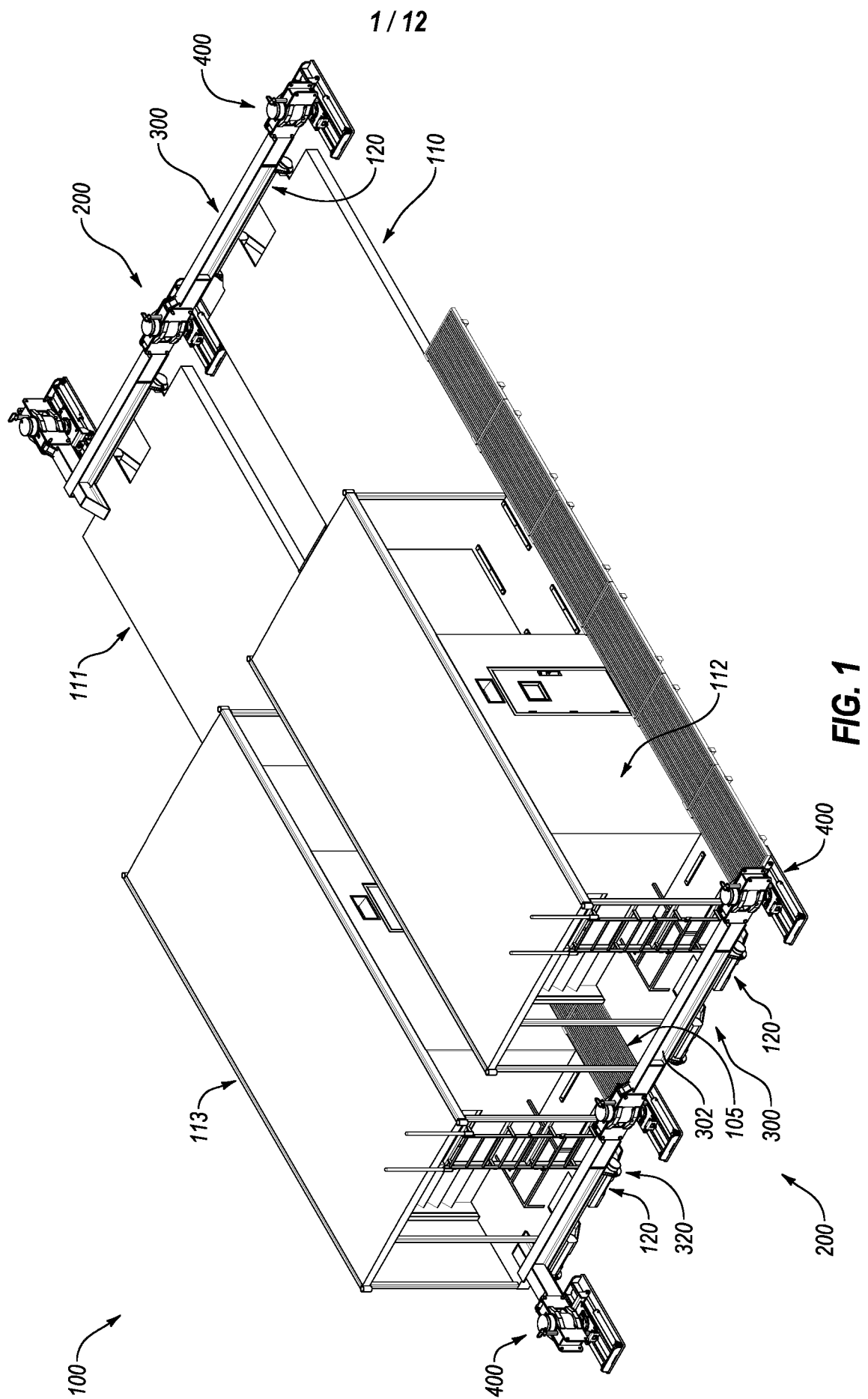
11. The method of claim 9, further comprising:
lowering the platform by retracting the lift.

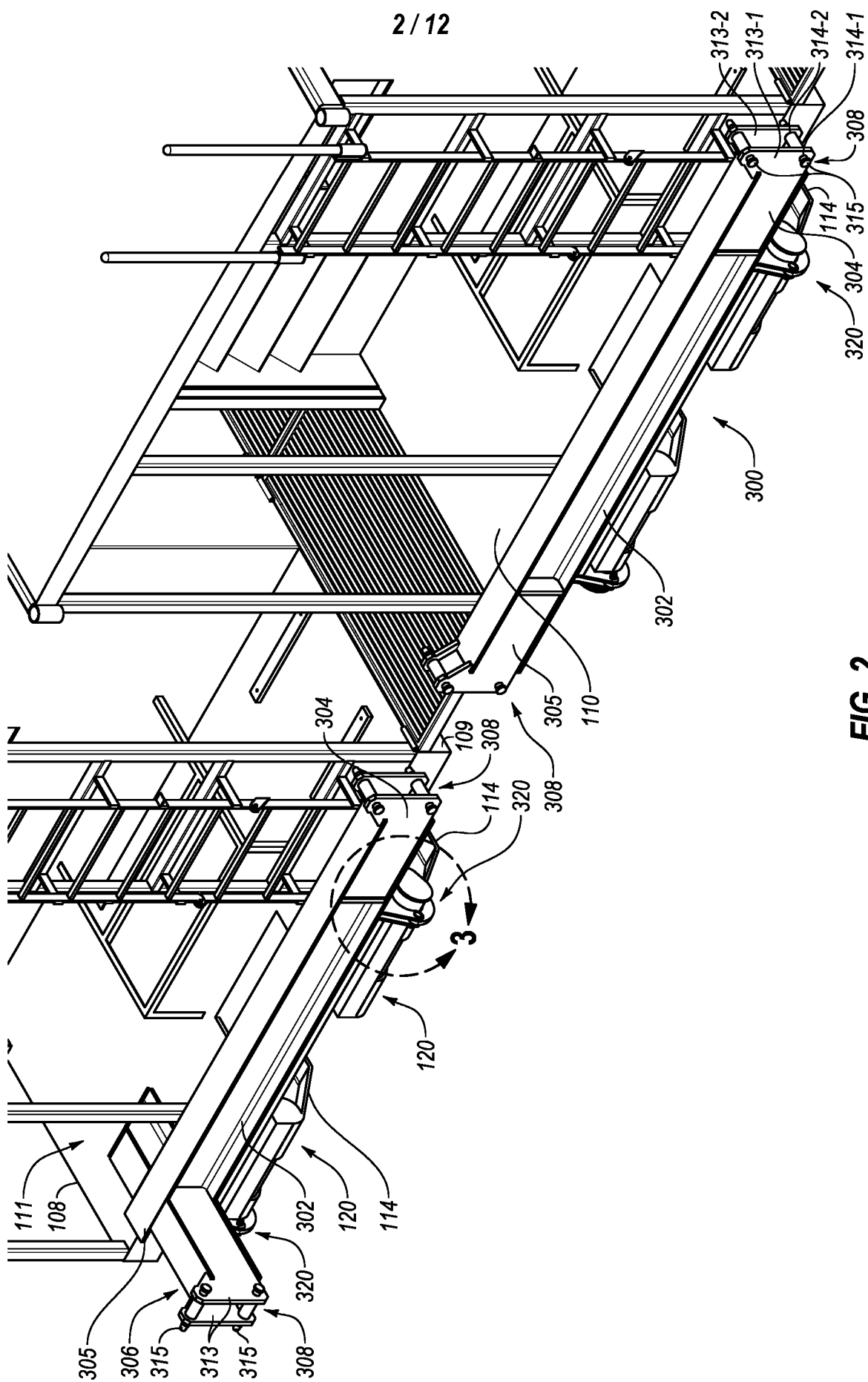
12. The method of claim 11, wherein the horizontal actuator includes a foot and a linear actuator and moving the platform horizontally by activating the horizontal actuator in a first direction actuating the linear actuator to move the foot in a first direction relative to the head of the mover from a first position to a second position.

13. The method of claim 12, further comprising:
resetting the mover by actuating the linear actuator to move the foot in a second direction relative to the head of the mover from the second position to the first position, the second direction being opposite the first direction; and
lowering the platform by retracting the lift.

14. The method of claim 10, wherein the roll end includes a tube and the beam includes a hinged coupler that includes a fixed portion joined to a movable portion by a pivot, and coupling the beam to the roll end includes positioning the hinged coupler in a closed position wherein the fixed portion and the movable portion form an aperture that surrounds and couples the tube.

15. The method of claim 9, wherein a head of the platform includes a rotary actuator configured to rotate the foot relative to the head of the mover and further comprising:
rotating the platform by actuating the rotary actuator and rotating the foot relative to the head of the mover.





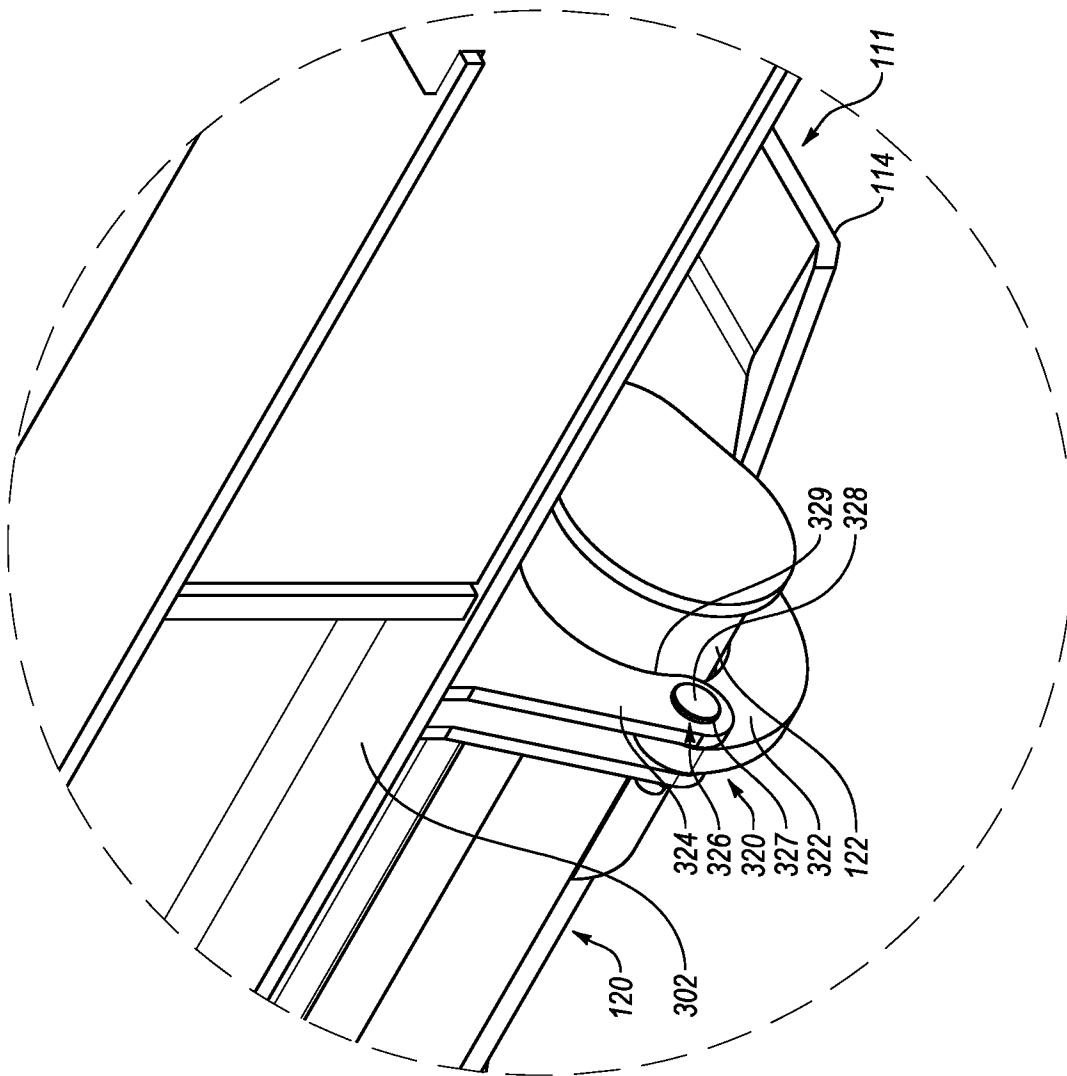
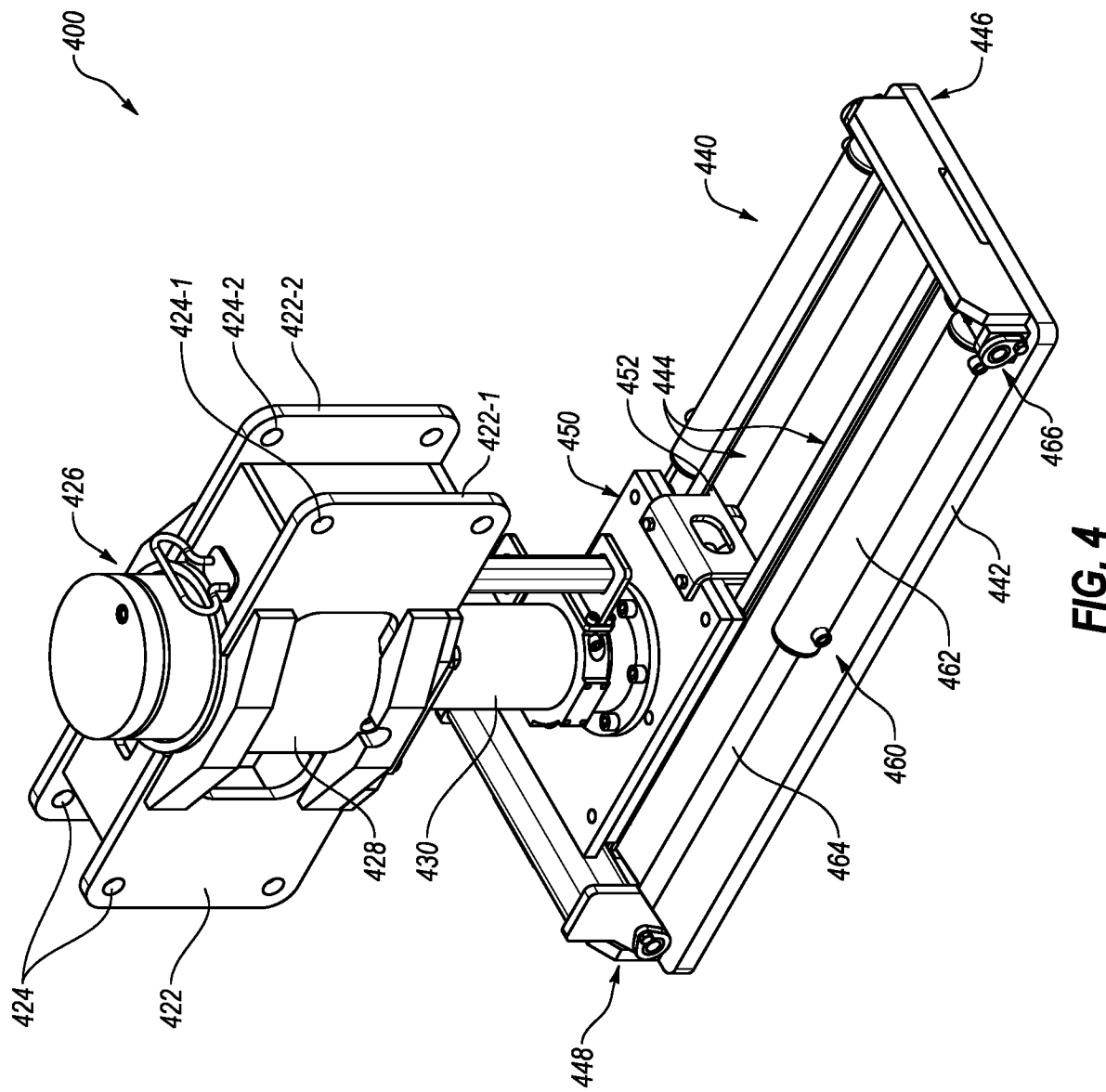


FIG. 3



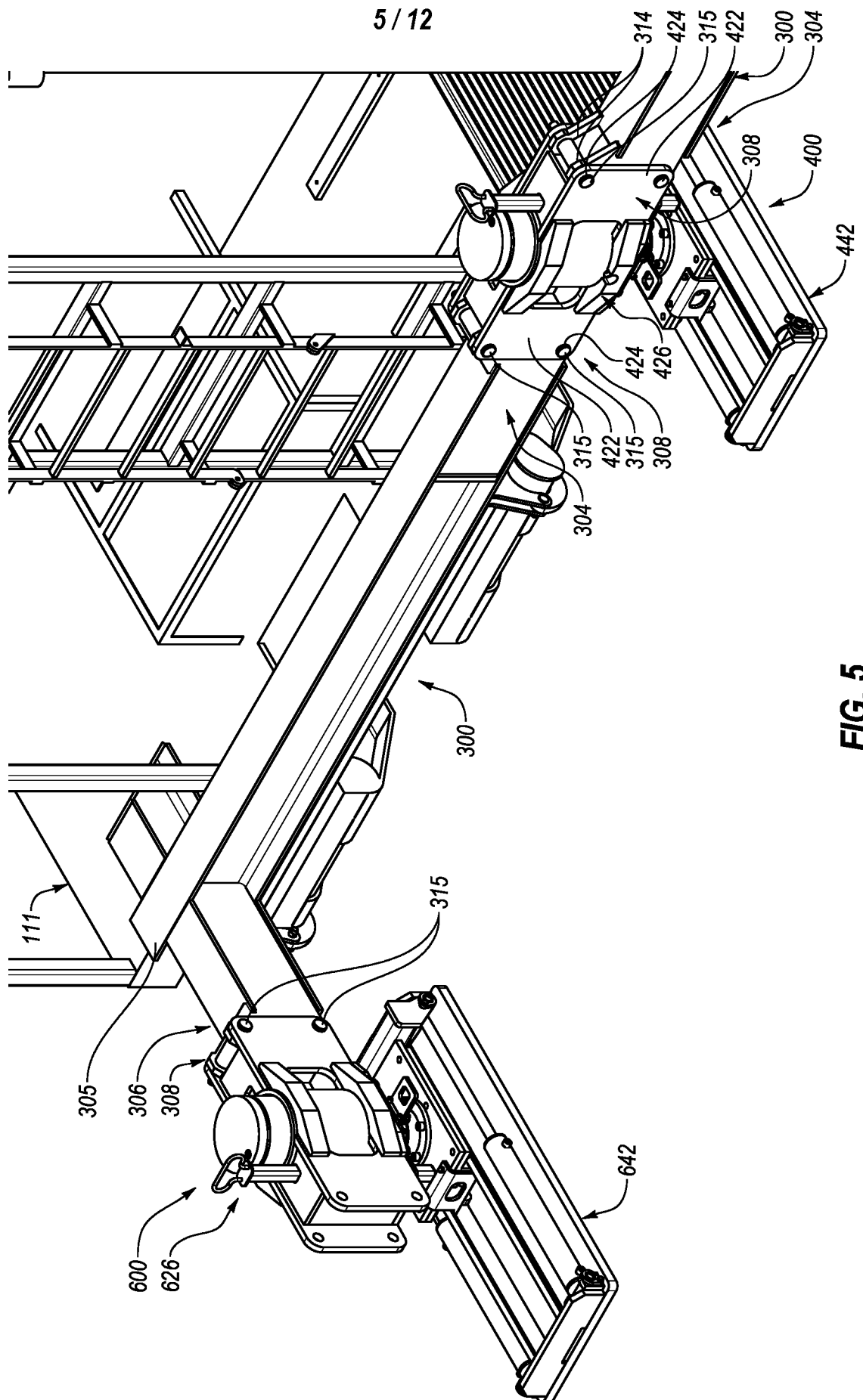
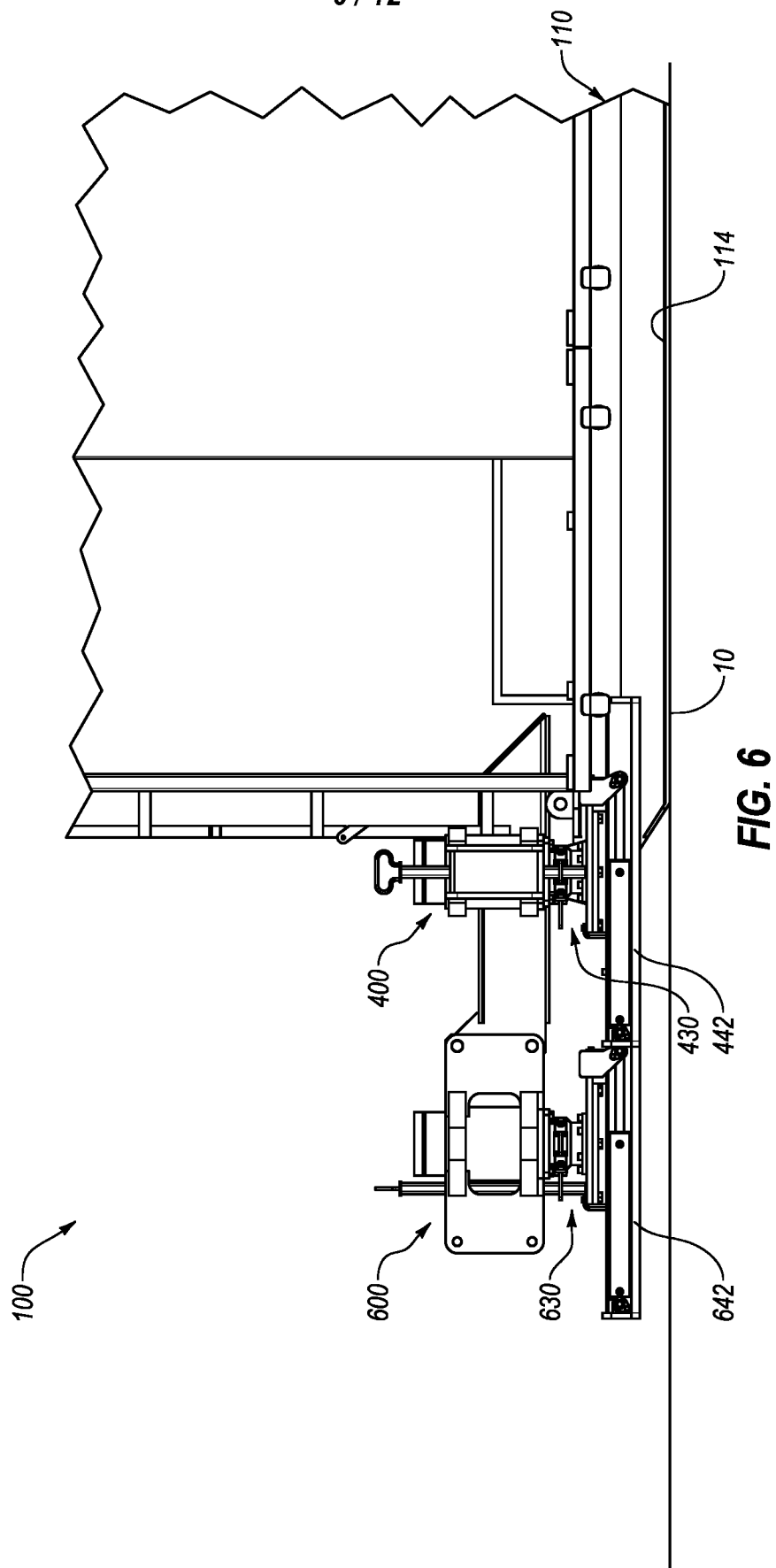


FIG. 5

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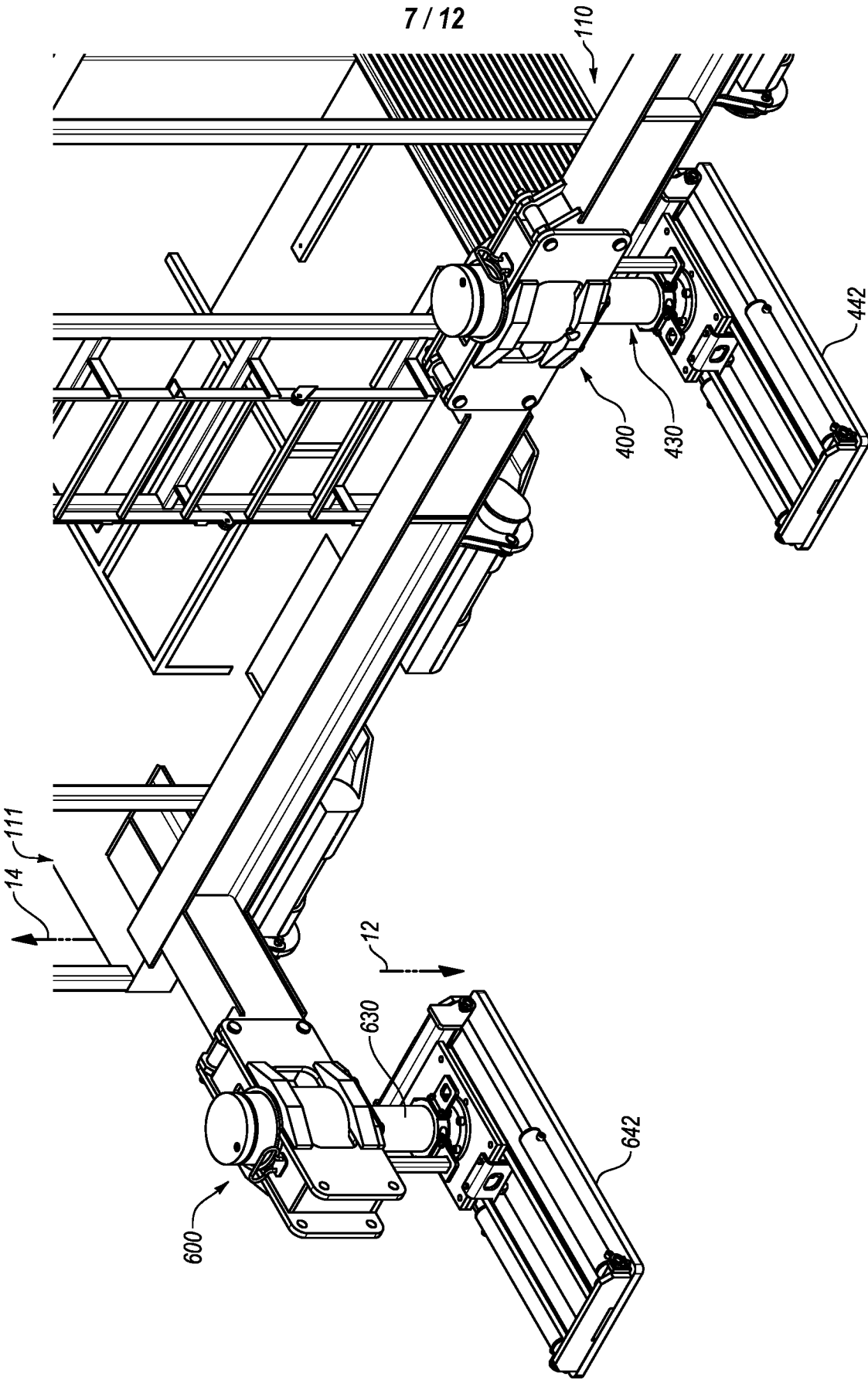
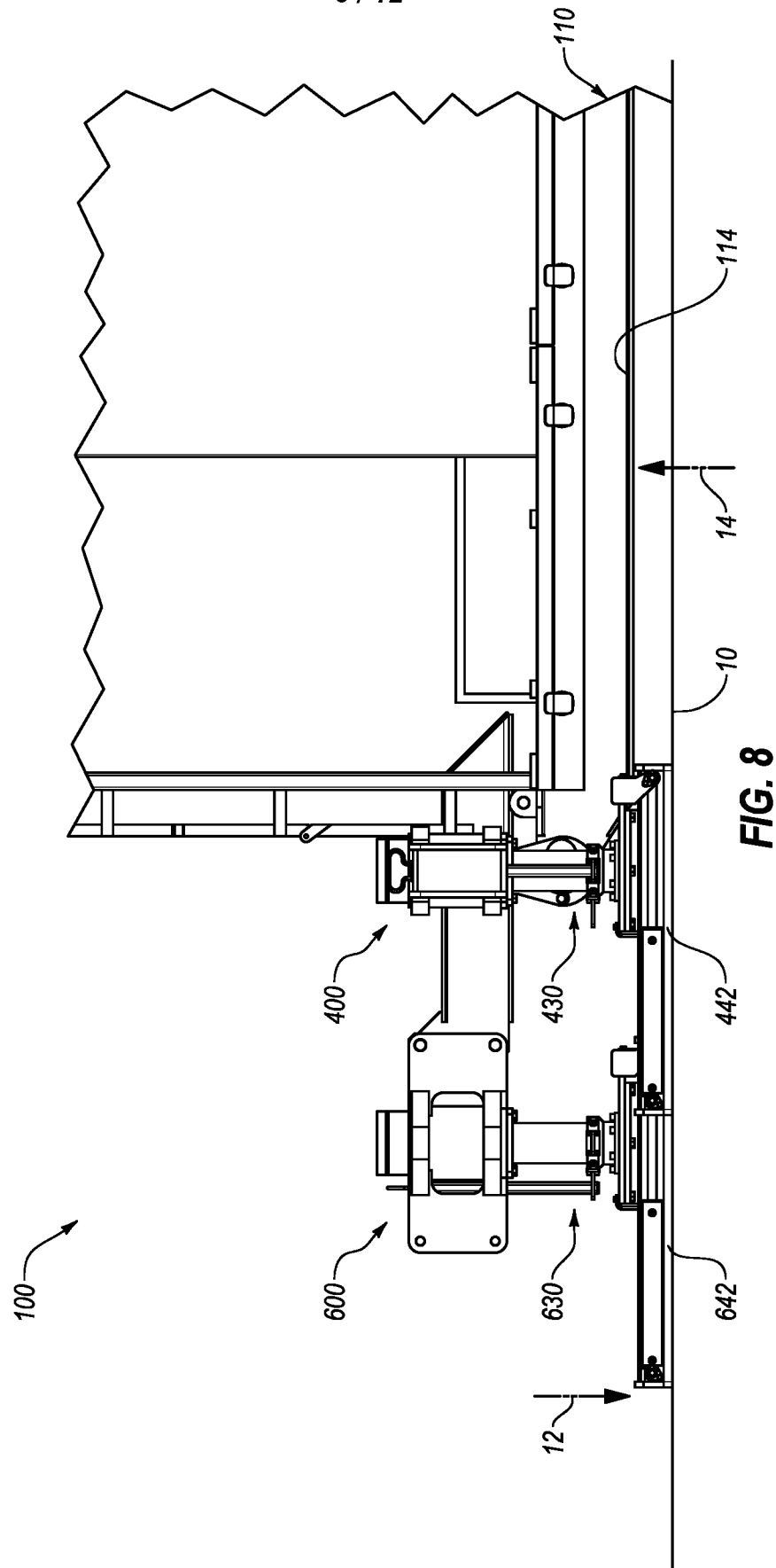


FIG. 7

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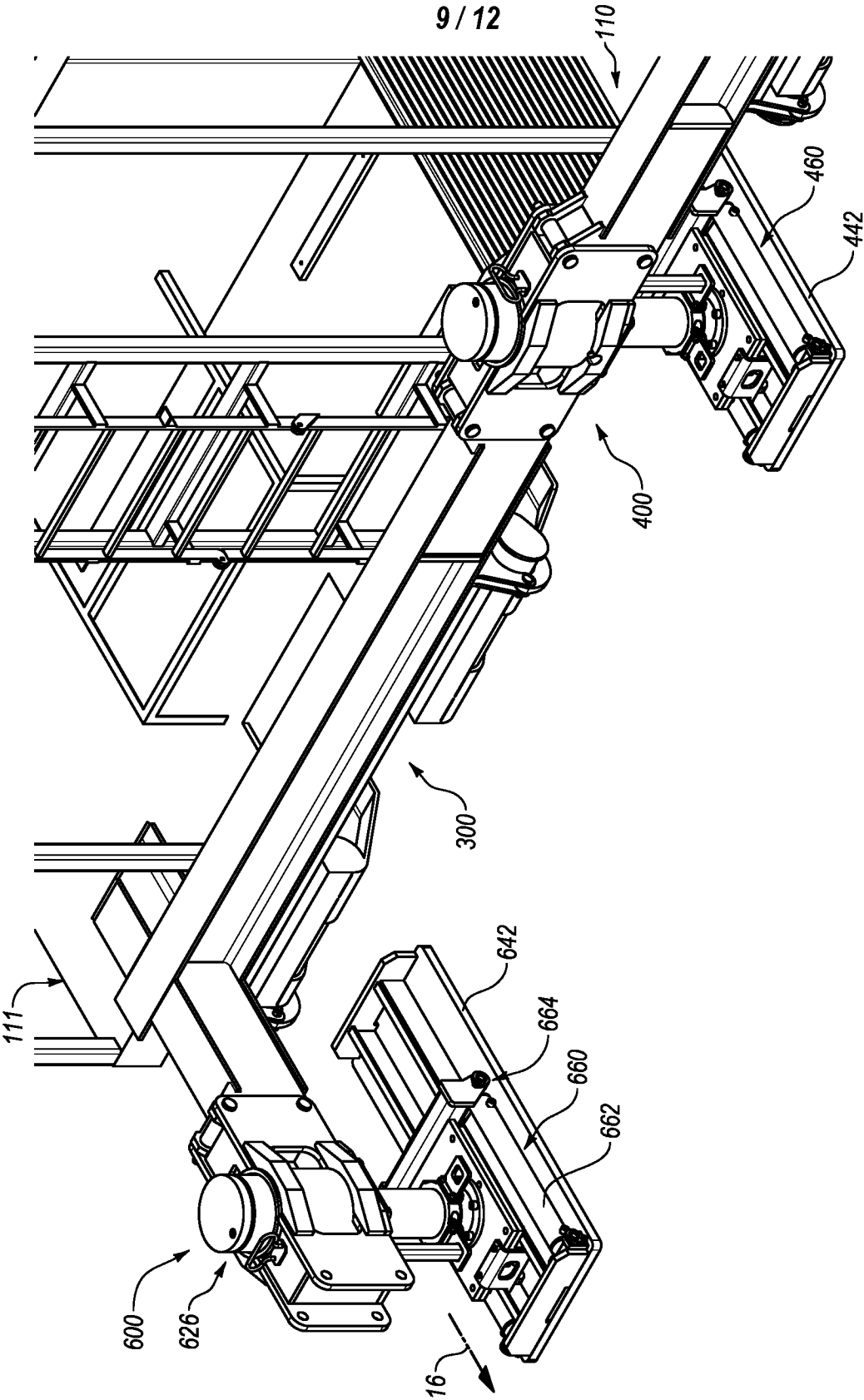


FIG. 9

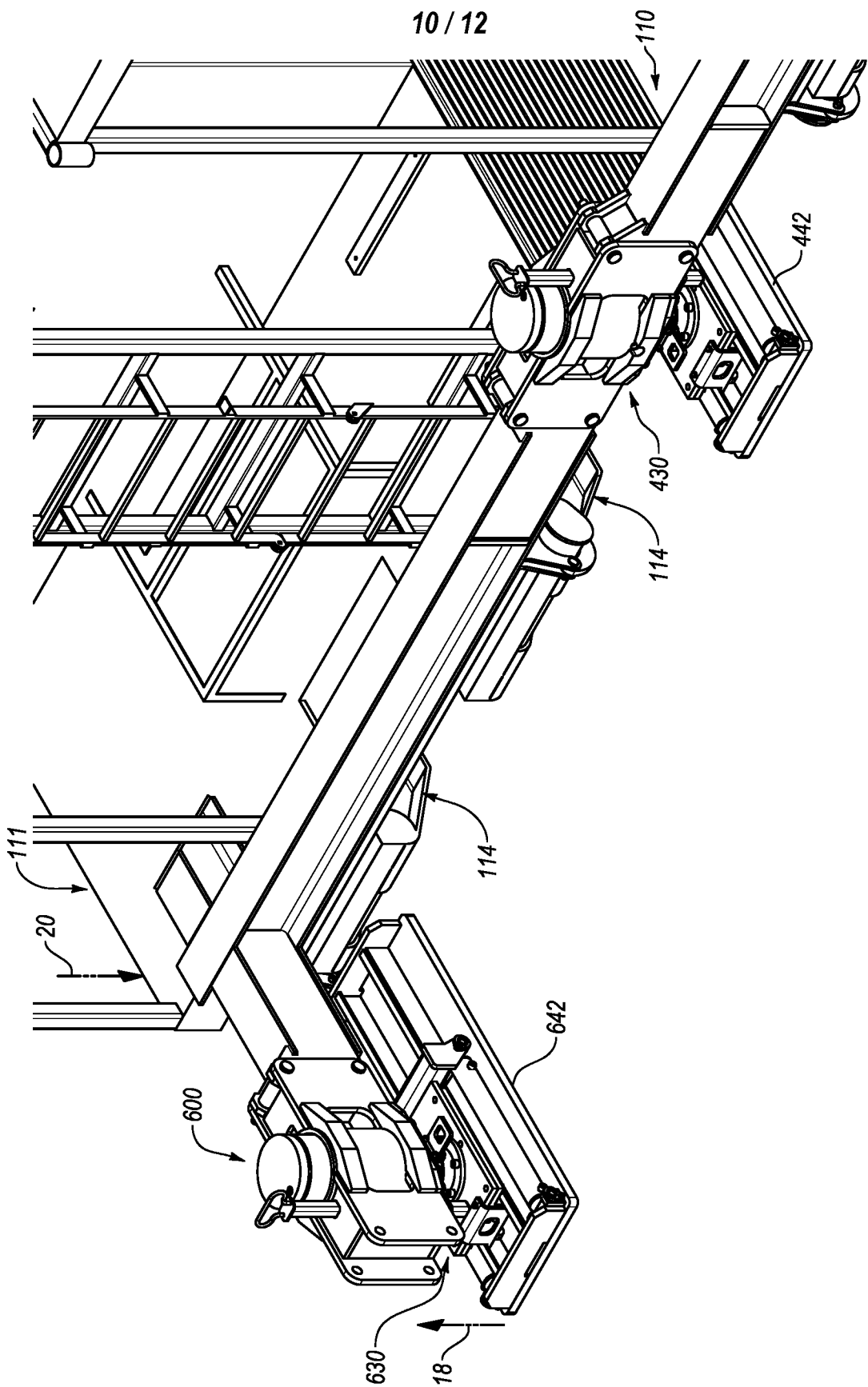


FIG. 10

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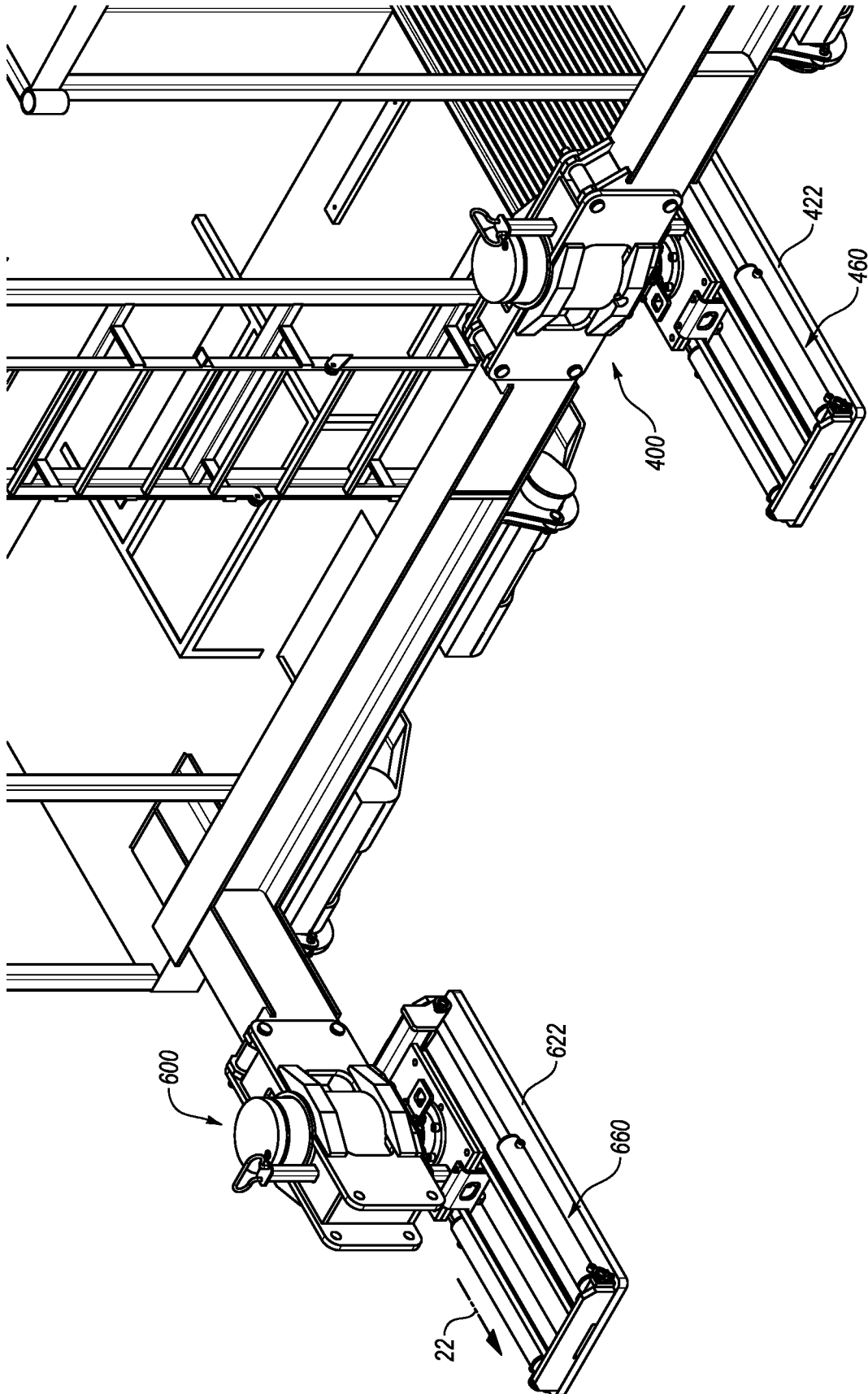


FIG. 11

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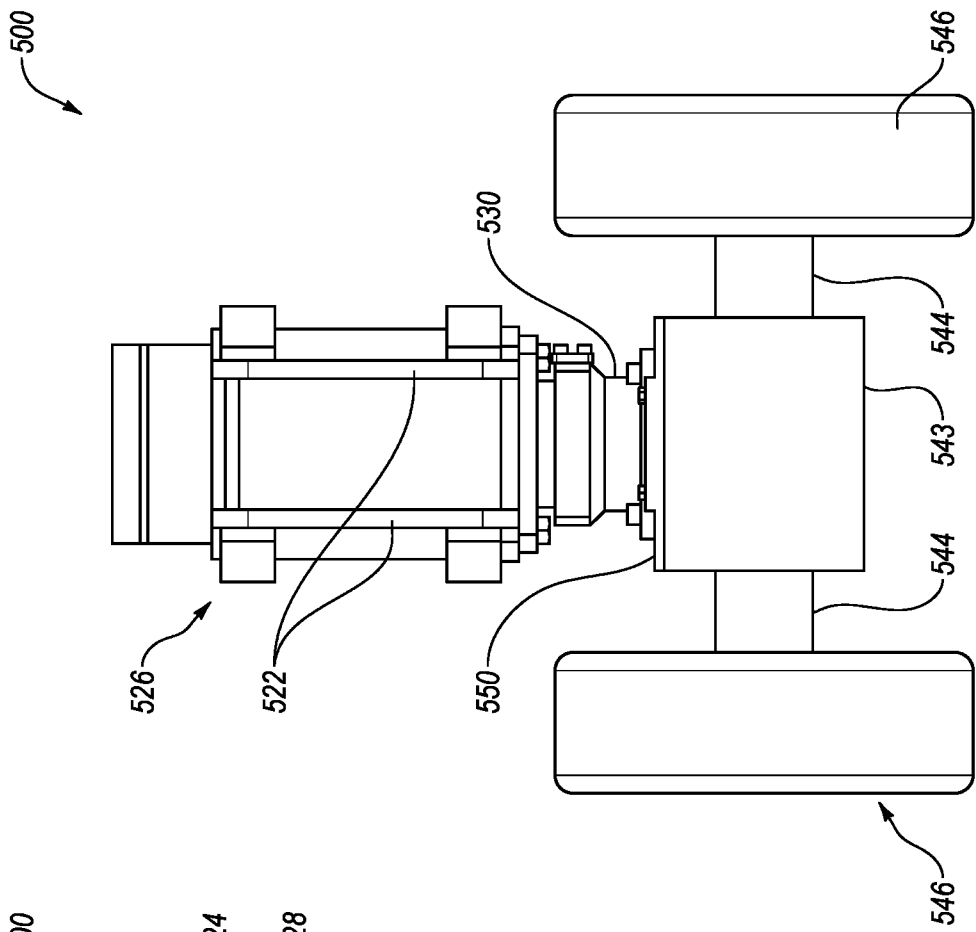


FIG. 13

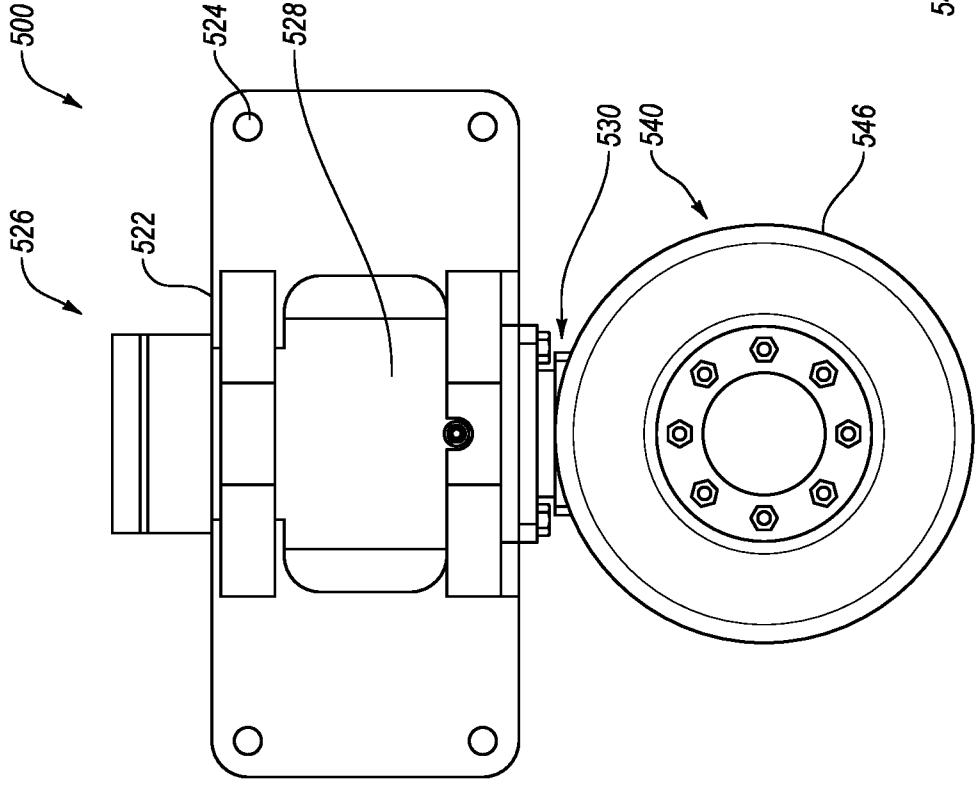


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/047112**A. CLASSIFICATION OF SUBJECT MATTER****E21B 41/00(2006.01)i, E21B 7/02(2006.01)i, E21B 15/00(2006.01)i**

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)

E21B 41/00; B62D 57/02; G05D 1/00; G09B 9/14; B62D 57/032; B21D 1/12; E01H 5/06; E21B 7/02; E21B 15/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords: oilfield, platform, mover, actuator, lift, beam and coupling

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6027342 A (BROWN, JEFF R.) 22 February 2000 See abstract, column 4, line 52 - column 6, line 37 and figures 2-8.	1-15
Y	US 9073588 B1 (ORION DRILLING COMPANY) 07 July 2015 See abstract, column 3, line 44 - column 6, line 50 and figures 1-8a.	1-15
Y	US 8755965 B1 (MCCLINTIC, FRANK) 17 June 2014 See abstract, column 10, lines 28-55 and figure 2.	4
A	US 6601430 B2 (MCCLELLAN, DANIEL) 05 August 2003 See abstract, claim 1 and figures 1-3.	1-15
A	US 2014-0064826 A1 (CLIFFORD, ERIC B.) 06 March 2014 See abstract, claim 1 and figures 1A-3C.	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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

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Date of the actual completion of the international search

14 November 2016 (14.11.2016)

Date of mailing of the international search report

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Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/047112

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		WO 03-031092 A1	17/04/2003
US 2014-0064826 A1	06/03/2014	None	