AGRICULTURAL HARVESTER TRANSMISSION SYSTEMS AND METHODS

ABSTRACT

[0040] In one embodiment, a system includes a harvester assembly configured to be coupled to a drivetrain of an agricultural vehicle to facilitate conversion of the agricultural vehicle into a harvester. The harvester assembly comprises a platform configured to support an operator, one or more harvester levers supported on the platform, and a mounting bracket. The mounting bracket is configured to couple to a transmission housing supporting a transmission of the drivetrain of the agricultural vehicle. A plurality of cables is configured to extend from the one or more harvester levers to one or more transmission levers extending from the transmission housing to enable the operator to adjust a gear ratio of the transmission via the one or more harvester levers.

CLAIMS:

1. A system, comprising:

a harvester assembly configured to be coupled to a drivetrain of an agricultural vehicle to facilitate conversion of the agricultural vehicle into a harvester, wherein the harvester assembly comprises:

a platform configured to support an operator;

one or more harvester levers supported on the platform;

a mounting bracket configured to couple to a transmission housing supporting a transmission of the drivetrain of the agricultural vehicle; and

a plurality of cables configured to extend from the one or more harvester levers to one or more transmission levers extending from the transmission housing to enable the operator to adjust a gear ratio of the transmission via the one or more harvester levers.

2. The system of claim 1, wherein the mounting bracket comprises a plurality of cable-supporting brackets each configured to support a respective cable of the plurality of cables.

3. The system of claim 2, wherein the mounting bracket is configured support the plurality of cables in a position vertically above the transmission housing to enable the plurality of cables to couple to and to transmit force to the one or more transmission levers.

4. The system of claim 1, wherein the one or more levers comprise a gear shift lever and a range shift lever.

5. The system of claim 4, wherein the plurality of cables comprise two cables that are configured to extend from the gear shift lever to a first transmission lever of the one or more transmission levers and two cables that are configured to extend from the range shift lever to a second transmission lever of the one or more transmission levers.

6. A method of converting an agricultural vehicle into a harvester, comprising:

disconnecting a first tractor lever from a first transmission lever of a transmission of the agricultural vehicle;

coupling a platform configured to support an operator to a frame supporting the transmission of the agricultural vehicle, wherein the platform supports a first harvester lever; and

coupling the first harvester lever to the first transmission lever using a cable system to enable the operator to adjust a gear ratio of the transmission by manipulating the first harvester lever.

7. The method of claim 6, wherein the first transmission lever extends from a housing surrounding the transmission, and the first tractor lever is configured to directly connect to the first transmission lever to enable the operator to adjust the gear ratio of the transmission by manipulating the first tractor lever.

8. The method of claim 6, comprising coupling a mounting bracket to a transmission housing that supports the transmission, extending a plurality of cables of the cable system from the first harvester lever toward the first transmission lever, and supporting a respective end portion of each of the plurality of cables on the mounting bracket.

9. The method of claim 8, comprising coupling the respective end portions of each of the plurality of cables to an attachment bracket coupled to an upper end portion of a transmission coupler that contacts the first transmission lever.

10. The method of claim 6, comprising:

disconnecting a second tractor lever from a second transmission lever of the transmission of the agricultural vehicle; and

coupling a second harvester lever supported on the platform to the second transmission lever using the cable system to enable the operator to adjust a range of the transmission by manipulating the second harvester lever.

AGRICULTURAL HARVESTER TRANSMISSION SYSTEMS AND METHODS

BACKGROUND

[0001] The disclosure relates generally to agricultural vehicles, and more specifically, to agricultural harvester transmission systems and methods.

[0002] Generally, harvesters include multiple drums distributed across a width of the harvester. Each drum is configured to harvest crops along a row as the harvester moves across a field. For example, a drum of a cotton harvester may include a rotor with spindles that revolve about the rotor to remove cotton bolls from cotton plants. The harvested goods (e.g., cotton) and other agricultural materials (e.g., chaff, foliage) may be directed through outlets to a bin, baler, or to the field. However, typical self-propelled harvesters may be large and/or expensive.

BRIEF DESCRIPTION

[0003] In one embodiment, a system includes a harvester assembly configured to be coupled to a drivetrain of an agricultural vehicle to facilitate conversion of the agricultural vehicle into a harvester. The harvester assembly includes a platform configured to support an operator, one or more harvester levers supported on the platform, and a mounting bracket. The mounting bracket is configured to couple to a transmission housing supporting a transmission of the drivetrain of the agricultural vehicle. A plurality of cables is configured to extend from the one or more harvester levers to one or more transmission levers extending from the transmission housing to enable the operator to adjust a gear ratio of the transmission via the one or more harvester levers.

[0004] In one embodiment, a method of converting an agricultural vehicle into a harvester includes disconnecting a first tractor lever from a first transmission lever of a transmission of an agricultural vehicle and coupling a platform configured to support an operator to a frame supporting the transmission of the agricultural vehicle. The platform supports a first harvester lever. The method also includes coupling the

first harvester lever to the first transmission lever using a cable system to enable the operator to adjust a gear ratio of the transmission by manipulating the first harvester lever.

DRAWINGS

[0005] These and other features, aspects, and advantages of the present disclosure will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

[0006] FIG. 1 is a perspective view of a harvester configured to harvest rows of a crop, in accordance with an embodiment of the present disclosure;

[0007] FIG. 2 is a side view of a harvester assembly and a tractor assembly that may be coupled to one another to form the harvester of FIG. 1, in accordance with an embodiment of the present disclosure;

[0008] FIG. 3 is a perspective view of a transmission system that may be used in the harvester of FIG. 1, in accordance with an embodiment of the present disclosure;

[0009] FIG. 4 is a perspective view of a portion of the transmission system of FIG. 3 taken within line 4-4, in accordance with an embodiment of the present disclosure;

[0010] FIG. 5 is a perspective view of a mounting bracket and that may be part of the transmission system of FIG. 3, in accordance with an embodiment of the present disclosure;

[0011] FIG. 6 is a method of converting an agricultural vehicle into the harvester of FIG. 1, in accordance with an embodiment of the present disclosure;

DETAILED DESCRIPTION

[0012] One or more specific embodiments of the present disclosure will be described below. In an effort to provide a concise description of these embodiments, all features

of an actual implementation may not be described in the specification. It should be appreciated that in the development of any such actual implementation, as in any engineering or design project, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which may vary from one implementation to another. Moreover, it should be appreciated that such a development effort might be complex and time consuming, but would nevertheless be a routine undertaking of design, fabrication, and manufacture for those of ordinary skill having the benefit of this disclosure.

[0013] When introducing elements of various embodiments of the present disclosure, the articles "a," "an," "the," and "said" are intended to mean that there are one or more of the elements. The terms "comprising," "including," and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements.

[0014] A harvester collects agricultural product and separates portions of the agricultural product into harvested goods (e.g., cotton) and other agricultural materials (e.g., chaff, foliage), as the harvester travels across an agricultural field. The harvested goods and the other agricultural materials are discharged into outlets, such as a harvested goods outlet and a discharge outlet, respectively. Some typical self-propelled harvesters may be large and/or expensive. Thus, the disclosed embodiments provide a system that facilitates conversion or modification of another agricultural or work vehicle into a harvester. For example, a tractor may be used throughout the year to carry out various farming operations. As harvesting season approaches, an operator (e.g., farmer) may modify the tractor, such as by coupling harvester components (e.g., one or more drums, a bin, a cabin) to certain tractor components (e.g., chassis supporting wheels, engine, transmission, heating ventilation and air conditioning [HVAC] system, and radiator), to form a harvester (e.g., a tractor-mounted harvester or a modified tractor) that may be used to carry out harvesting operations. When the harvesting season ends, the operator may separate the harvester components from the tractor components, and the tractor may again be utilized to carry out the various farming operations. Advantageously, the disclosed

embodiments may facilitate efficient construction of a relatively small and/or low cost harvester (e.g., compared to some typical self-propelled harvesters) that also enables higher harvesting capacity and/or increased output of harvested goods compared to harvesting crops by hand, for example.

[0015] While the present disclosure illustrates embodiments of a harvester that includes harvesting components and tractor components to facilitate discussion, it should be understood that the harvester may include components of any of a variety of agricultural or work vehicles, such as trucks, utility vehicles, or the like. For example, harvester components may be coupled to components of a truck to form a harvester.

[0016] Turning now to the drawings, FIG. 1 is a perspective view of an embodiment of a harvester 10 (e.g., a tractor-mounted harvester or a modified tractor) configured to harvest rows of a crop in an agricultural field. To facilitate discussion, the harvester 10 and its components may be described with reference to a longitudinal axis or direction 12, a vertical axis or direction 14, and a lateral axis or direction 16.

[0017] As shown, the harvester 10 includes multiple drums 18 (e.g., harvesting heads) that utilize one or more rotors to separate harvested goods (e.g., cotton or other agricultural product) from other agricultural materials (e.g., chaff, foliage, stems, debris). The harvester 10 may include an air system configured to direct the harvested goods through a conduit 20 to a bin 22 (e.g., basket or baler). In some embodiments, the bin 22 may be configured to move (e.g., pivot or rotate) to transfer the harvested goods out of the bin 22 (e.g., to another container or to the agricultural field). In some embodiments, the other agricultural materials may be deposited onto the agricultural field beneath and/or behind the harvester 10.

[0018] As shown, the harvester 10 also includes a platform 24 (e.g., cabin) configured to support and/or to house an operator. In the illustrated embodiment, the platform 24 supports one or more levers 26 (e.g., harvester levers) which may enable the operator to adjust a range and/or a gear of the harvester 10. As shown, the bin 22 and the platform 24 are supported on a frame 28 (e.g., harvester frame or chassis).

Various other components (e.g., the drums 18 and the conduit 20) may be supported by and/or coupled to the frame 28 to complete the harvester 10. In the illustrated embodiment, the frame 28 supports or includes a cover assembly 30 (e.g., cage assembly) that is configured to cover (e.g., surround or protect) various components (e.g., engine, transmission, HVAC system, radiator), which are supported on a frame 32 (e.g., tractor frame or chassis). In operation, the harvester 10 may be driven in a direction of travel 40 through the agricultural field using forward wheels 42 and rear wheels 44.

[0019] As discussed above, the harvester 10 may include harvester components and tractor components. For example, in the illustrated embodiment, the forward wheels 42, the rear wheels 44, the frame 32, and various components supported on the frame 32 (e.g., engine, transmission, HVAC system, radiator) may form a tractor assembly 48 (e.g., tractor drivetrain assembly) that may be used as part of a tractor (e.g., an unmodified tractor). The drums 18, the conduits 20, the bin 22, the platform 24, the one or more levers 26, the frame 28, and/or the cover assembly 30 may be part of a harvester assembly 52 (e.g., harvester kit or conversion kit) that may be coupled to the tractor assembly 48 to create or to build the harvester 10. Thus, at certain times of the year, the operator may utilize the tractor assembly 48 as part of the tractor to carry out various agricultural operations. However, during a harvesting season, the operator may separate the tractor assembly 48 from other tractor components of the tractor, and then the operator may combine the tractor assembly 48 with the harvester assembly 52 to build the harvester 10 to carry out harvesting operations. At the conclusion of the harvesting season, the operator may separate the tractor assembly 48 from the harvester assembly 52, and then reassemble the tractor components on the tractor assembly 48 to form the tractor to resume the various agricultural operations.

[0020] It should be appreciated that although two drums 18 are shown in FIG. 1, that the harvester 10 may have any suitable number of drums 18, such as 1, 2, 3, 4, 5, 6, or more drums 18. It should also be appreciated that the harvester 10 may include tracks in place of front wheels 42 and/or rear wheels 44.

[0021] FIG. 2 is a side view of the tractor assembly 48 and the harvester assembly 52 that may be coupled to one another to form the harvester 10, in accordance with an embodiment of the present disclosure. As shown, the tractor assembly 48 includes the forward wheels 42, the rear wheels 44, the frame 32, and various components supported on the frame 32, such as an engine 70, a transmission 72, an HVAC system 74, and a radiator 76. When the tractor assembly 48 is not coupled to the harvester assembly 52, the tractor assembly 48 may be coupled to various other tractor components 46 (e.g., tractor cover, tractor platform 47, one or more tractor levers 49), to form a tractor 50 (e.g., an unmodified tractor) and to enable the tractor 50 to move in a forward direction of travel 54 to carry out various agricultural operations.

[0022] As shown, the harvester assembly 52 includes the drums 18, the conduits 20, the bin 22, the platform 24, the one or more levers 26, the frame 28, and the cover assembly 30, among other components. The harvester assembly 52 may be coupled to the tractor assembly 48 (e.g., via fasteners, such as bolts or screws) to form the harvester 10. The harvester assembly 52 may be coupled to the tractor assembly 48 via any of a variety of processes or steps. For example, in some embodiments, the harvester assembly 52 is partially assembled or fully assembled (e.g., as shown), and then subsequently coupled or mounted onto the tractor assembly 48 to form the harvester 10. In some embodiments, the components of the harvester assembly 52 may be coupled individually and/or sequentially to the tractor assembly 48. For example, the frame 28 of the harvester assembly 52 may be coupled to the frame 32 of the tractor assembly 48, then the cover assembly 30 may be coupled to the frame 28, then the bin 22 may be coupled to the frame 28, then the platform 24 may be coupled to the frame 28, and so on. In some embodiments, the one or more levers 26 may be coupled (e.g., via cables, linkages, or wires) to corresponding components of the tractor assembly 48 during assembly of the harvester 10 to facilitate operation of the harvester 10. For example, the operator may extend cables between the one or more levers 26 to the transmission 72 to enable the operator to shift the range and/or the gear using the one or more levers 26.

[0023] FIG. 3 is a perspective view of an embodiment of a portion a transmission system 77 of the harvester 10. The transmission system 77 may include the one or

more levers 26 supported on the platform 24 and the transmission 72 supported on the frame 32 of the tractor assembly 48, as well as a cable system 78 that extends between and couples the one or more levers 26 to the transmission 72. The platform 24 may house the operator and controls for the harvester 10. The transmission 72 of the tractor assembly 48 may include one or more transmission levers 80 that extend from a transmission housing 82 and/or that are used to operate the transmission 72 (e.g., shift range and/or gear). The transmission levers 80 may be adjusted through the cable system 78, which transmits force from the one or more levers 26 of the harvester assembly 52 to the transmission levers 80. As discussed in more detail below, cables 104 of the cable system 78 may consist of an outer sleeve encasing a wire enabling transfer of tensile as well as compressive forces and/or torsional or twist forces. Thus, in operation, the operator of the harvester 10 may persuade the one or more levers 26 on the platform 24 to move in either a longitudinal direction 12 or lateral direction 16 by pushing or pulling on the one or more levers 26, and the cable system 78 may transmit the pushing or pulling force (e.g., through compression or tension of the cables 104) from the one or more levers 26 in the harvester assembly 52 to the transmission levers 80 at the transmission 72 of the tractor assembly 48. In some embodiments, the operator of the harvester 10 may persuade the one or more levers 26 on the platform 24 to move and/or rotate, and the cable system 78 may transmit a torsional or twisting force (e.g., through rotation of the wire) from the one or more levers 26 in the harvester assembly 52 to rotate the transmission levers 80 at the transmission 72 of the tractor assembly 48. In the illustrated embodiment, the one or more levers 26 do not contact or have a direct connection to the transmission levers 80, although the transmission levers 80 may be configured to contact and/or have a direct connection to the tractors levers 49 used to operate the tractor 50 (FIG. 2). For example, when the tractor assembly 48 is utilized as part of the tractor 50, one or more tractor levers 49 may be supported on the tractor platform 47 and positioned proximate to and/or vertically above the transmission 72, thereby enabling the one or more tractor levers 49 to contact and/or directly connect to the transmission levers 80. However, when the tractor assembly 48 is utilized as part of the harvester 10, the one or more levers 26 may be positioned on the platform 24 and positioned distal from and/or forward of the transmission 72, and the cable system 78 is then utilized to

couple the one or more levers 26 to the transmission levers 80. In some embodiments, the tractor levers 49 may be moved or repositioned (e.g., onto the platform 24) to be reused as the one or more levers 26. Advantageously, in this embodiment, the cable system 78 may enable positioning or relocation of the one or more levers 26 at desired areas of the harvester 10, such as the platform 24 that provides the operator a view forward of the harvester 10, while the operator may still control the transmission 72 of the tractor assembly 48 using the one or more levers 26 from such a location. As shown, the cable system 78 may contain multiple cables 104, such as a first cable 84, a second cable 86, a third cable 88, and a fourth cable 90. The lengths of the first cable 84, the second cable 86, the third cable 88, and the fourth cable 90 may be the same or different for each, and may be 1, 2, 3, 4, 5, or more meters to connect the transmission levers 80 to the one or more levers 26 on the harvester assembly 52. The transmission levers 80 may be coupled directly to the cable system 78 (**FIG.** 4) or indirectly using one or more intermediate links between the transmission levers 80 and the cable system 78.

[**0024**] The one or more levers 26 of the harvester assembly 52 may include a range selector 92 and a gear selector 94. In one embodiment, when viewed in the direction of travel 40 of the harvester 10, the range selector 92 may be positioned on the right side 96 of the harvester platform 24 and the gear selector 94 may be positioned on the left side 98 of the harvester platform 24. In another embodiment, when viewed in the direction of travel 40 of the harvester 10, the range selector 92 may be positioned on the left side 98 of the harvester platform 24 and the gear selector 94 may be positioned on the right side 96 of the harvester platform 24. In some embodiments, both the range selector 92 and gear selector 94 may be mounted on the same side of the platform 24. The one or more levers 26 of the harvester assembly 52 may be configured to move in the longitudinal direction 12 and the lateral direction 16. An upper end 100 (e.g., first end) of the cable system 78 may be coupled to the one or more levers 26 of the harvester assembly 52, and the lower end 102 (e.g., second end) of the cable system 78 may be coupled to the transmission levers 80 of the tractor assembly 48. In some embodiments, each cable 104 of the cable system 78 may be configured to transmit the motion of one axis of movement

(e.g., longitudinal 12 or lateral 16) of each of the one or more levers 26. For example, in the illustrated embodiment, the lateral 16 motion of the range selector 92 may apply a force of tension or compression on the second cable 86, which may transmit the force to one of the transmission levers 80 to adjust the range of the transmission 72.

[0025] FIG. 4 provides a detailed view of a portion of the transmission system 77 of FIG.3 taken within line 4-4. The transmission levers 80 may include a range input 110 and a gear input 112. The range input 110 and gear input 112 may protrude vertically 14 from the transmission housing 82 of the transmission 72 and may be spaced along the longitudinal direction 12 (e.g., one behind another), along the lateral direction 16 (e.g., one to the right or left of another), or a combination of both. In some embodiments, there may be two cables 104 that extend from the range selector 92 to one of the transmission levers 80 (e.g., the range input 110), and two cables 104 that extend from the gear selector 94 to another of the transmission levers 80 (e.g., the gear input 112). In the illustrated embodiment, each transmission lever 80 may have one cable 104 coupled to it along the longitudinal direction 12 and one cable 104 coupled to it along the lateral direction 16. In the illustrated embodiment, the cables 104 may induce a force on the transmission levers 80 parallel to their coupling direction (e.g. longitudinal 12 or lateral 16), such that the transmission levers 80 may be driven to move or remain stationary along that axis.

[0026] In an embodiment, the upper end 100 of the first cable 84 may be coupled to the range selector 92, such that longitudinal motion 12 of the range selector 92 induces longitudinal motion 12 of the range input 110 coupled to the lower end 102 of the first cable 84. In an embodiment, the upper end 100 of the second cable 86 may be coupled to the range selector 92, such that lateral motion 16 of the range selector 92 induces lateral 16 motion of the range input 110 coupled to the lower end 102 of the second cable 86. In an embodiment, the upper end 100 of the third cable 88 may be coupled to the gear selector 94, such that longitudinal motion 12 of the gear selector induces longitudinal motion 12 of the gear input 112 coupled to the lower end 102 of the third cable 88. In an embodiment, the upper end 100 of the fourth cable 90 may be coupled to the gear selector 94 such that lateral motion 16 of the gear selector 94

induces lateral motion 16 of the gear input 112 coupled to the lower end 102 of the fourth cable 90. Thus, the motion of the range selector 92 and the gear selector 94 on the platform 24 adjusts the range input 110 and the gear input 112 of the tractor transmission 72, enabling the operator to control the transmission 72 via the range selector 92 and gear selector 94. The first cable 84, the second cable 86, the third cable 88, and the fourth cable 90 may extend between the one or more levers 26 of the harvester assembly 52 and the transmission levers 80 in any suitable configuration that enables control of the transmission 72 of the tractor assembly 48 from the platform 24 of the harvester 10.

[0027] The cables 104 of the cable system 78 may be coupled to the tractor assembly 48 by a mounting bracket 120. The mounting bracket 120 may be coupled (e.g., via fasteners, such as bolts or screws) to the transmission housing 82 of the transmission 72, the frame 32, and/or other components of the tractor assembly 48. The mounting bracket 120 may be shaped to position the cables 104 of the cable system 78 horizontally (e.g., in the longitudinal direction 12 or lateral direction 16) above the transmission 72, or at an angle relative to the horizontal plane. The cables 104 may be positioned at the same vertical 14 height as the protruding transmission levers 80, such that the cables 104 may extend and couple to the transmission levers 80 via transmission couplers 122.

[0028] FIG. 5 shows a detailed view of an embodiment of the mounting bracket 120 and accessory components. The mounting bracket 120 may contain 1, 2, 3, 4, or more holes 124 configured to receive fasteners to couple the mounting bracket 120 to the tractor assembly 48. The holes 124 may be circular or elongated to allow for positioning adjustments when coupling the mounting bracket 120 to the tractor assembly 48. In one embodiment, one or more secondary brackets 126 supporting one or more cable fasteners 128 (e.g., cable-supporting brackets) may be affixed to the mounting bracket 120. The secondary brackets 126 may be coupled to the mounting bracket 120 through fasteners, such as bolts, and/or via additional means of attachment (e.g., such as welding). Similarly, the cable fasteners 128 may be coupled to the secondary brackets 126 through fasteners, such as bolts, and/or additional means of attachment. The cable fasteners 128 may contact and outer sleeve 142 of the

cables 104, such that the cables 104 may extend and connect to the transmission couplers 122. The cable fasteners 128 may be positioned to enable the one or more cables 104 to transmit motion in the longitudinal direction 12 and to transmit motion in the lateral direction 16.

[0029] In one embodiment, the transmission couplers 122 include a range coupler 130 and a gear coupler 132. The range coupler 130 may be configured to couple (e.g., via interference fit and/or a fastener) to the range input 110 of the transmission 72 (FIG. 4), and the gear coupler 132 may be configured to couple (e.g., via interference fit and/or a fastener) to the gear input 112 of the transmission 72 (FIG. 4). For example, the range coupler 130 and/or the gear coupler 132 may be annular and/or may be configured to receive and/or fit over the range input 110 and/or the gear input 112, respectively. Thus, movement of the range coupler 130 and the gear coupler 132 may cause movement of the range input 110 to adjust the range of the harvester 10 and the gear input 112 to adjust the gear of the harvester 10, respectively.

[0030] The illustrated embodiment includes a first cable fastener 134, a second cable fastener 136, a third cable fastener 138 and a fourth cable fastener 140 supporting the first cable 84, the second cable 86, the third cable 88, and the fourth cable 90 respectively. In the illustrated embodiment, the cable fasteners 128 are oriented such that two cable fasteners 128 hold the lower ends 102 of the cables 104 in the longitudinal direction 12, and two cable fasteners 128 hold the lower ends of the cables 104 in the lateral direction 16. In the illustrated embodiment, each transmission coupler 122 (i.e., the range coupler 130 and the gear coupler 132) may be coupled to one cable 104 that can drive the transmission coupler 122 to move in the longitudinal direction 12 and one cable 104 that can drive the transmission coupler 122 to move in the lateral direction 16.

[0031] When the mounting bracket 120 is coupled to the transmission housing 82 and when the range coupler 130 and the gear coupler 132 are coupled to the range input 110 and the gear input 112, respectively, the mounting bracket 120 supports the cables 104 in a manner that enables the cables 104 to transmit force to drive the range input 110 and the gear input 112. For example, in the illustrated embodiment, the first

cable fastener 134 holds the first cable 84 in the longitudinal direction 12 (e.g., a central axis of the lower end 102 of the first cable 84 positioned between the first cable fastener 134 and the range coupler 130 is oriented along the longitudinal axis 12) and enables the first cable 84 to drive the range coupler 130 (and the range input 110) along the longitudinal axis 12. As shown, the second cable fastener 136 holds the second cable 86 in the lateral direction 16 (e.g., a central axis of the lower end 102 of the second cable 86 positioned between the second cable fastener 136 and the range coupler 130 is oriented along the lateral axis 16) and enables the second cable 86 to drive the range coupler 130 (and the range input 110) along the lateral axis 16. Thus, the operator may manipulate the one or more levers 26 on the platform 24 to place the first cable 84 and/or the second cable 86 in tension or compression, which causes the first cable 84 to drive the range coupler 130 (and the range input 110) to move along the longitudinal axis 12 and/or the second cable 84 to drive the range coupler 130 (and the range input 110) to move along the lateral axis 16, thereby adjusting the range of the harvester 10.

[0032] Similarly, in the illustrated embodiment, the third cable fastener 138 holds the third cable 88 in the longitudinal direction 12 (e.g., a central axis of the lower end 102 of the third cable 88 positioned between the third cable fastener 138 and the gear coupler 132 is oriented along the longitudinal axis 12) and enables the third cable 88 to drive the gear coupler 132 (and the gear input 112) along the longitudinal axis 12. As shown, the fourth cable fastener 140 holds the fourth cable 90 in the lateral direction 16 (e.g., a central axis of the lower end 102 of the fourth cable 90 positioned between the fourth cable fastener 140 and the gear coupler 132 is oriented along the longitudinal axis 12) and enables the fourth cable 90 to drive the gear coupler 132 (and the gear input 112) along the lateral axis 16. Thus, the operator may manipulate the one or more levers 26 on the platform 24 to place the third cable 88 and/or the fourth cable 90 in tension or compression, which causes the third cable 88 to drive the gear coupler 132 (and the gear input 112) to move along the longitudinal axis 12 and the fourth cable 90 to drive the gear coupler 132 (and the gear input 112) to move along the lateral axis 16, thereby adjusting the gear of the harvester 10.

[0033] In the illustrated embodiment, a first attachment bracket 137 is provided at an end of the range coupler 130, and a second attachment bracket 139 is provided at an end of the gear coupler 132. The first attachment bracket 137 and the second attachment bracket 139 may facilitate coupling the multiple cables 104 to the range coupler 130 and the gear coupler 132, respectively. For example, the second cable 86 couples to an upper portion (e.g., an upper vertically-facing surface) of the first attachment bracket 137, and the third cable 88 couples to a lower portion (e.g., a lower laterally-facing surface) of the second attachment bracket 139, which may enable the second cable 86 to overlap or cross over (e.g., at a location vertically above) the third cable 88 to enable the cable system 78 to couple the one or more levers 26 to the transmission levers 80 of the transmission 72 to facilitate construction of the transmission system 77 of the harvester 10.

[0034] Referring now to FIG. 6, a flow diagram of one embodiment of a method 150 for converting an agricultural vehicle (e.g., a tractor) into a harvester 10. The steps of the method 150 may be carried out in any suitable order, and steps may be omitted or added.

[0035] In step 152, one or more tractor levers 49 (e.g., gear sticks or shifters) are disconnected from the transmission 72 of the tractor assembly 48. In some embodiments, when the tractor assembly 48 is utilized as part of the tractor 50, the one or more tractor levers 49 may be supported on the tractor platform 47 that is coupled to the tractor assembly 48 to form the tractor 50, and the one or more tractor levers 49 may be utilized to shift a range and a gear as the tractor 50 travels across an agricultural field. The one or more tractor levers 49 may be separated from the tractor assembly 48, along with various other tractor components 46 to facilitate conversion of the tractor 50 into the harvester 10. When the one or more tractor levers 49 are separated from the tractor assembly 48, the transmission levers 80 may protrude from the transmission housing 82 of the transmission 72.

[0036] In some embodiments, the tractor platform 47 may be rotated (e.g., from a first orientation facing the forward direction of travel 54 of the tractor 50 to a second orientation facing the forward direction of travel 40 of the harvester 10) and/or

repositioned (e.g., from a first position between a front axle supporting front wheels 44 and a rear axle supporting rear wheels 46 along the longitudinal axis 12 to a second position forward of the front axle along the longitudinal axis 12) to be reused as the platform 24 during operation of the harvester 10. Additionally or alternatively, in some embodiments, the one or more tractor levers 49 may be moved (e.g., from a first position between a front axle supporting front wheels 44 and a rear axle supporting rear wheels 46 along the longitudinal axis 12 and proximate to the transmission 72 to a second position forward of the front axle along the longitudinal axis 12 and distal from the transmission 72) to be reused as the one or more levers 26 during operation of the harvester 10. Such configurations may provide a cost savings, for example.

[0037] In step 154, the mounting bracket 120 may be coupled to the tractor assembly 48 by coupling it to the tractor frame 32, the transmission housing 82, or a combination of both. The mounting bracket 120 may contain round or oval holes 124, so that it may be positioned appropriately to align the cable system 78 with the transmission levers 80. In step 156, the harvester assembly 52 containing the platform 24 may be coupled to the tractor assembly 48. The platform 24 may house the operator who may operate the harvester 10. The platform 24 may support one or more levers 26. The one or more levers 26 may include the range selector 92 or the gear selector 94.

[0038] In step 158, the upper end 100 of the cable system 78 may be coupled to the one or more levers 26 on the platform 24, and the lower end 102 of the cable system 78 may be coupled to the one or more transmission levers 80 on the tractor assembly 48 via the mounting bracket 120 and transmission couplers 122. The motion of the one or more levers 26 may be converted to a tensile or compressive force in one or more cables 104 of the cable system 78 which induces motion of the one or more transmission levers 80. The cables 104 may be coupled to the tractor assembly 48 using the cable fasteners 128, which may be attached to the mounting bracket 120. In one embodiment, the cable fasteners 128 may be positioned in a manner to align the cables 104 either along the longitudinal axis 12 or lateral axis 16 with respect to the transmission levers 80. The one or more levers 26 on the platform 24 may then be used to actuate the one or more transmission levers 80 on the tractor assembly 48.

[0039] While only certain features of the disclosure have been illustrated and described herein, many modifications and changes will occur to those skilled in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the disclosure.

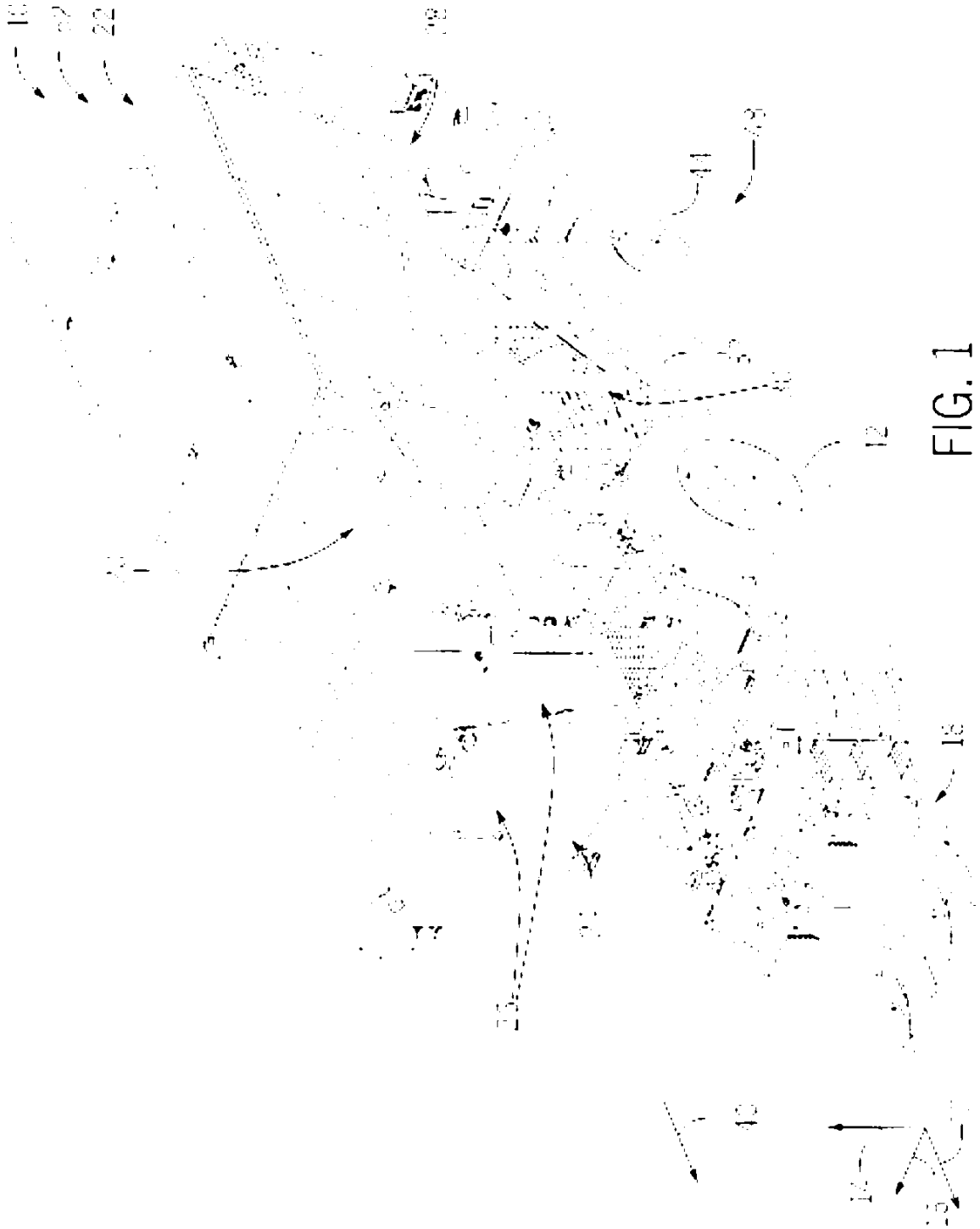

FIG. 1

KANCHAN VADEHRA
OF KAN AND KRISHME
AGENT FOR THE APPLICANT
AGENT NO.: IN/PA-393

FIG. 2

KANCHAN VADEHRA
OF KAN AND KRISHME
AGENT FOR THE APPLICANT
AGENT NO.: IN/PA-393

FIG. 3

KANCHAN VADEHRA
OF KAN AND KRISHME
AGENT FOR THE APPLICANT
AGENT NO.: IN/PA-393

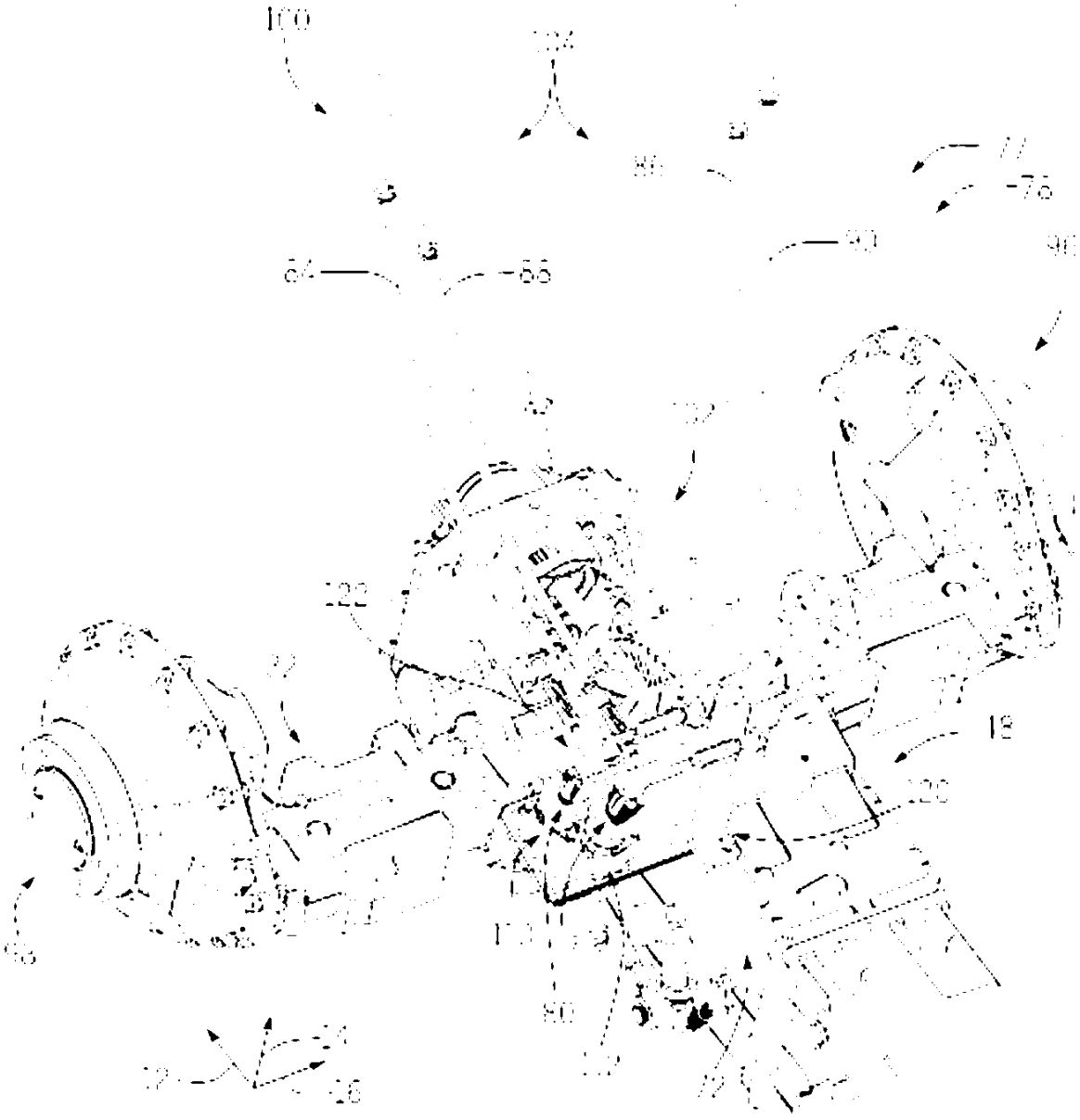

FIG. 4

KANCHAN VADEHRA
OF KAN AND KRISHME
AGENT FOR THE APPLICANT
AGENT NO.: IN/PA-393

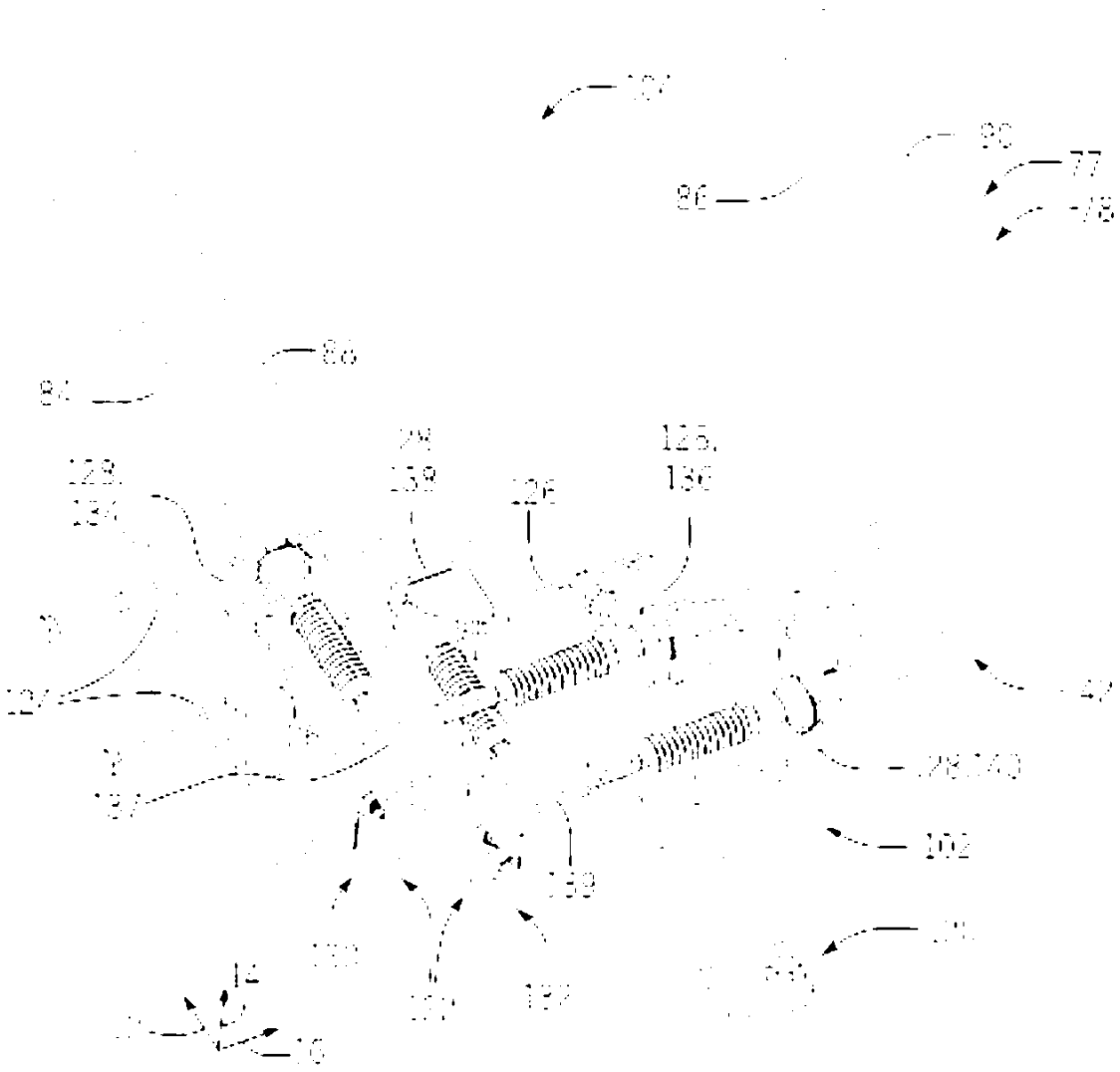

FIG. 5

KANCHAN VADEHRA
OF KAN AND KRISHME
AGENT FOR THE APPLICANT
AGENT NO.: IN/PA-393

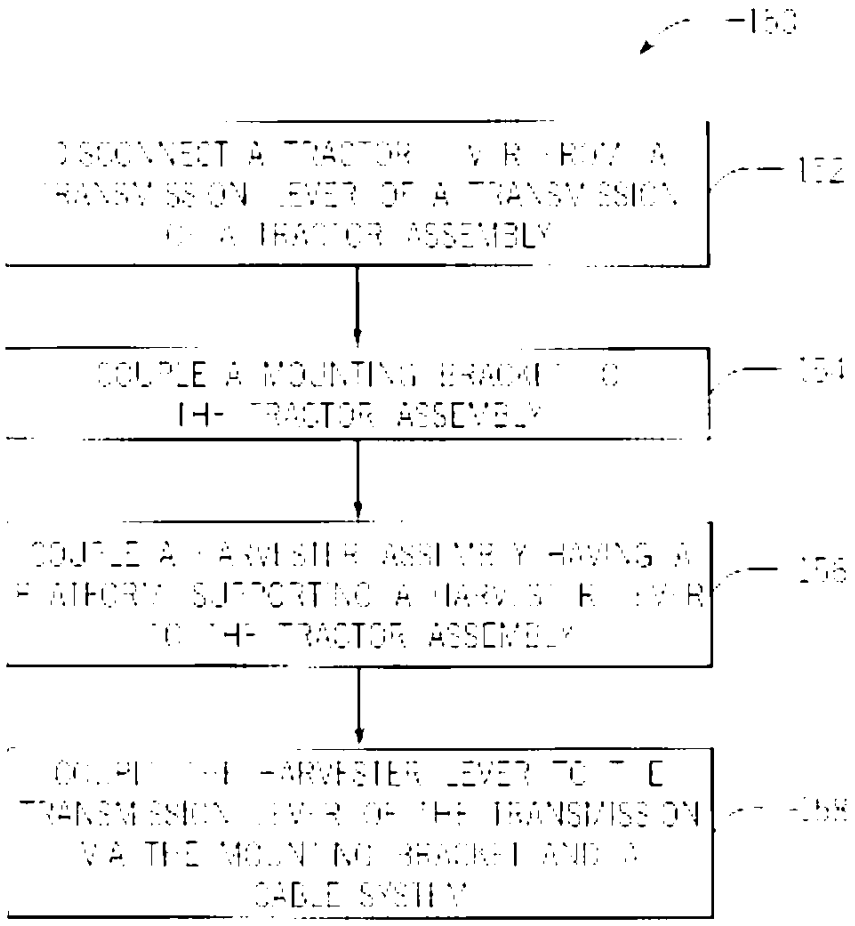

FIG. 6

KANCHAN VADEHRA
OF KAN AND KRISHME
AGENT FOR THE APPLICANT
AGENT NO.: IN/PA-393