

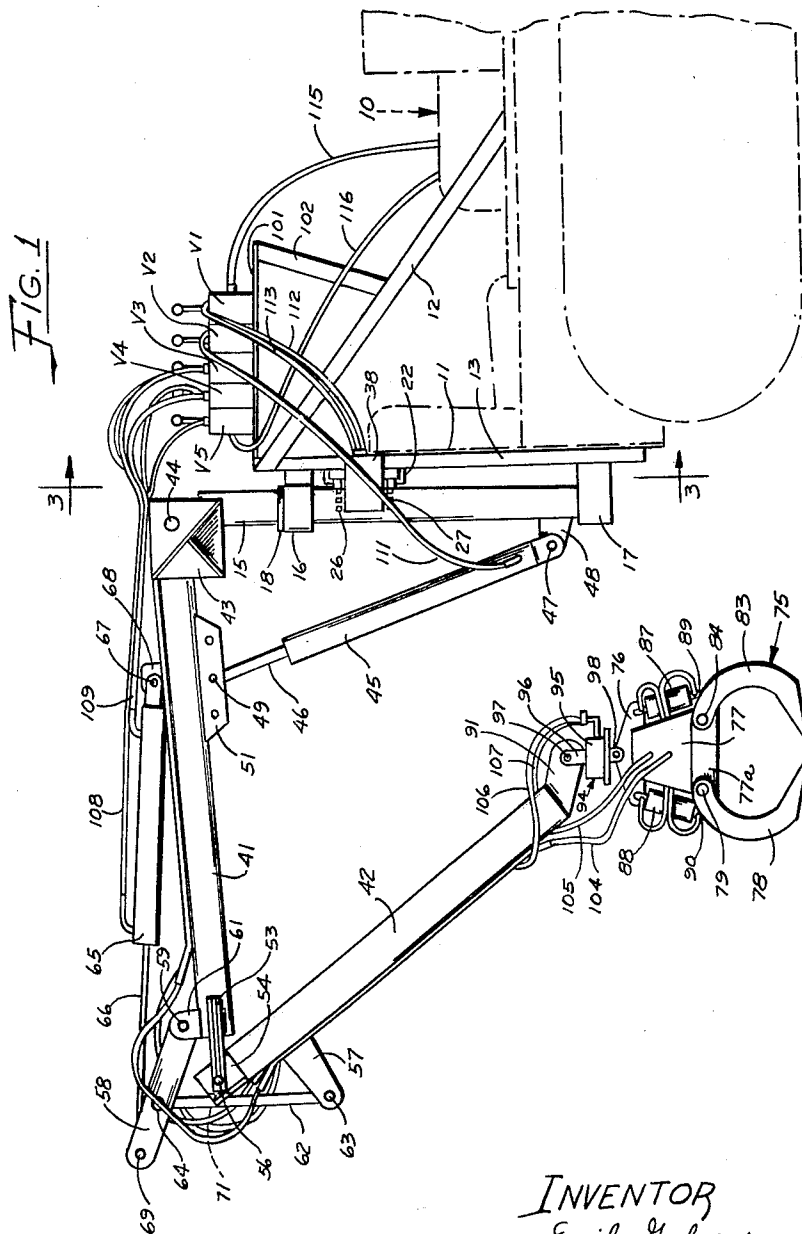
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E. GAFNER
PULP WOOD LOADER

2,914,203

Filed Jan. 9, 1958

2 Sheets-Sheet 1



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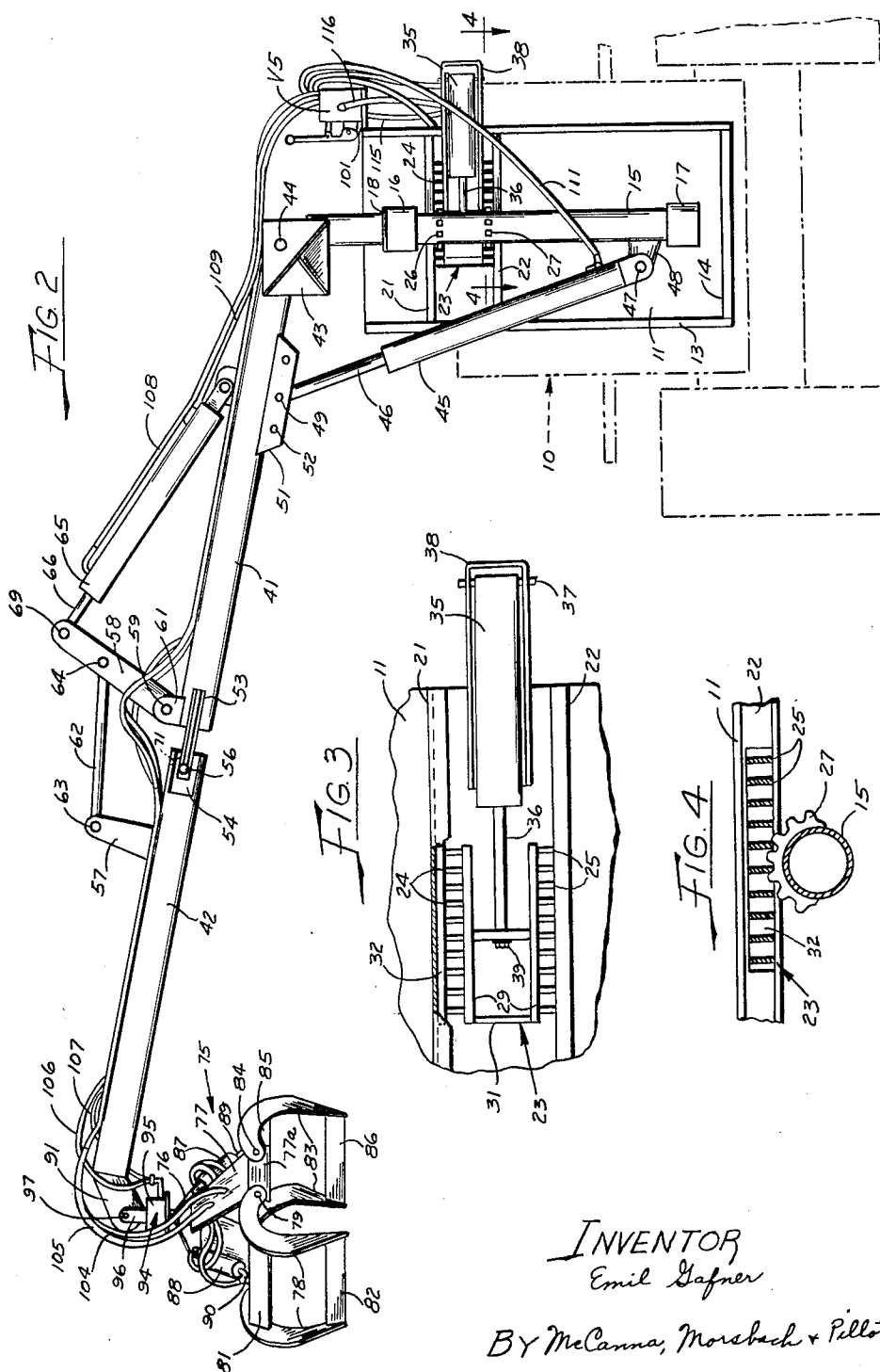
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1

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PULP WOOD LOADER

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7 Claims. (Cl. 214-147)

This invention relates to a loading device and particularly to a device adapted for attachment to a tractor for loading pulp wood and the like.

An important object of this invention is to provide a loading device having a material handling claw thereon and which loading device is manipulable to permit the claw to pick up and discharge material at points relatively close to the tractor as well as at points remote therefrom.

A more particular object of this invention is to provide a material loading device having a multiple section or split boom construction and an improved apparatus for swinging the boom sections relative to each other to move the outer section through a wide arc and enable handling material relatively close to the tractor as well as remotely therefrom.

Another object of this invention is to provide a pulp wood loading device having a multiple section boom and an improved apparatus for swinging the sections relative to each other through a wide arc and which apparatus is located at the upper side of the boom sections so as to not interfere with the pulp wood in the pulp wood handling claws attached to the outer boom section.

Yet another object of this invention is to provide a pulp wood loading device, in accordance with the foregoing objects, in which the boom sections are mounted for horizontal swinging movement and an improved apparatus is provided for swinging the boom sections relative to the tractor.

Yet another object of this invention is to provide an improved pulp wood loading device which is completely hydraulically operated to enable control thereof from a position at the tractor and which loader is of simple and economical construction.

These, together with various ancillary objects and advantages will be more readily appreciated as the same becomes better understood by reference to the following detailed description when taken in connection with the accompanying drawings wherein:

Figure 1 is a side elevational view of the loading device shown mounted on a tractor and with the outer boom section in a retracted position closely adjacent the tractor;

Fig. 2 is a rear elevational view of the loading device with the boom swung to a position extending transverse to the tractor and with the outer boom section in an extended position;

Fig. 3 is an enlarged fragmentary view taken on the plane 3-3 of Figure 1 and illustrating the apparatus for swinging the boom horizontally; and

Fig. 4 is an enlarged fragmentary horizontal sectional view through the mechanism for swinging the boom horizontally, taken on the plane 4-4 of Figure 2.

The loading device of the present invention is specifically adapted for attachment to a self propelled vehicle and is herein shown mounted on the rear end of a tractor 10 illustrated in phantom in Figures 1 and 2.

2

The attachment includes an upright support panel 11 which is affixed to the frame of the tractor and extends thereabove. Brace arms 12 are secured to the upper end of the panel and extend downwardly for attachment to the tractor to rigidly support the panel thereon. Reinforcing flanges 13 and 14 are provided along the side and bottom edges of the panel to rigidify the same. An upright post 15 is rotatably mounted in the upper and lower bearing rings 16 and 17 respectively, which rings are rigidly secured to the panel 11. A thrust collar 18 is provided on the post for engagement with the upper ring 16 to limit axial movement of the post.

As is apparent from Figure 1, the post is spaced laterally from the panel 11 and a mechanism is disposed therebetween for rotating the post to swing the boom horizontally. This mechanism includes spaced upper and lower guideways 21 and 22, herein shown in the form of angle iron bars, which are welded or otherwise rigidly secured to the panel 11. As best shown in Figures 3 and 4, a slide 23 is disposed in the guideways 21 and 22 and carries upper and lower sets of rack teeth 24 and 25 which are adapted to mesh with the vertically spaced gear sectors 26 and 27 on the post 15. In particular, the slide 23 includes an open frame having spaced side bars 29 and a plurality of cross bars 31. The rack teeth 24 and 25 are secured to the side bars 29 and spaced longitudinally therealong and slide bars 32 are welded to the outer ends of the rack teeth 24 and 25 to slidably support the same in the guideways 21 and 22.

A fluid operator is provided for reciprocating the slide 23, which operator includes the conventional cylinder 35 and rod 36. The cylinder 35 has one end thereof attached as by pins 37 to an open frame 38 which is welded to the panel 11 intermediate the guide rails 21 and 22. The rod 36 is fastened, as by a nut 39 to one of the cross members 31 of the slide 23 to thereby extend and retract the same under the control of the fluid operator. As is apparent from Figure 4, the rack teeth mesh with the gear sectors on the post 15 to thereby turn the latter in response to reciprocation of the slide.

The loading apparatus includes a split boom assembly including a first boom section 41 and a second boom section 42. The first section is mounted on the upper end of the post 15 for vertical swinging movement relative thereto and for this purpose there is provided a pair of spaced plates 43 which are welded to the upper end of the post and which guidably receive the end of the first section 41 therebetween. The latter is supported by a pivot pin 44 on the plates 43 for vertical swinging movement relative to the post. A fluid operator including a cylinder 45 and rod 46 is provided for selectively elevating and lowering the first boom section. As shown in Figures 1 and 2, the cylinder 45 has the lower end thereof pivoted by a pin 47 on an ear 48 affixed to the lower end of the post 15. The rod 46 is pivotally attached by a pin 49 to elongated brackets 51 affixed to the underside of the first boom section. The brackets 51 are preferably formed with a plurality of holes 52 therein adapted to receive the pin 49 to permit adjustment of the pivot point of the rod 36 therealong.

The first and second boom sections 41 and 42 are conveniently formed of tubular stock and one end of the outer boom section 42 is pivotally attached to the outer end of the first boom section 41, for vertical swinging movement relative thereto. For this purpose, a pair of laterally spaced arms 53 are welded to opposite sides of the first boom section 41, and project outwardly of the end thereof. Plates 54 are welded to opposite sides of the second boom section 42 and a pivot pin 56 extends through the arms 53 and through the plates 54 and

3

outer boom section 42 to pivotally support the same on the arms.

The loading apparatus of the present invention is particularly designed for handling pulp wood and the like and, in accordance with the present invention, is arranged so as to be manipulable to pick up and discharge pulp wood from a point either closely adjacent the tractor or relatively remote therefrom. In addition, in the handling of elongated objects such as pulp wood, it is frequently necessary to angularly shift the position of the pulp wood while the same is supported on the loading device, to permit proper orientation of the pulp wood with the pile being loaded or unloaded. The present loader is also so arranged as to provide adequate clearance so as to permit the pulp wood carried by the loading device, to be rotated relative thereto.

In particular, the apparatus for swinging the outer boom 42 relative to the inner boom 41 is designed so as to permit the outer boom to be swung relative thereto through a wide arc. This apparatus for swinging the outer boom section includes an arm 57 which is rigidly secured to the outer boom section 42, intermediate the pivot point 56 and the free end thereof, which arm projects from the upper side of the outer boom section in the plane of movement thereof. A link 58 is pivotally mounted by a pin 59 on spaced ears 61 for movement relative to the first boom section about an axis parallel to the axis of the pin 56 which supports the outer boom section. The link 58 and the outer boom 41 are thus movable in the same plane, relative to the inner boom section 41. A tie rod 62 has one end thereof pivotally attached by a pin 63 to the outer end of the arm 57 and the other end thereof pivotally attached by a pin 64 to the link 58, intermediate the ends of the latter. A third fluid operator, including a cylinder 65 and a rod 66, is provided for swinging the link 58 and has one end thereof pivotally attached by a pin 67 to an ear 68 at the upper side of the outer boom section. The remote end of the rod 66 is attached by a pin 69 to the outer end of the link 58.

As is apparent from Figure 1, the fluid operator 65 can be extended to swing the outer boom section 42 and position the free end of the outer boom closely adjacent the tractor. The pivoted end of the outer boom 42 is notched, as indicated at 71, to receive the tie rod 62 when the outer boom section 42 is in the position shown in Figure 1. When the fluid operator 65 is retracted, the outer boom section is extended and may be moved to a position such as shown in Figure 2 aligned with the inner boom section 41, or, if desired, to a position in which the outer boom section extends above the inner boom section. It will also be noted that the fluid operator, the link 58 and the arm 57 are all located at the upper side of the inner and outer boom sections 41 and 42 so as to not interfere with the pulp wood being handled by the loading device.

A material handling mechanism is attached to the outer end of the boom 42. As herein illustrated, there is provided a pulp wood handling claw generally indicated by the numeral 75, which claw is adapted to be hydraulically operated. The claw includes an elongated frame plate 76 having relatively diverging arms secured thereto for supporting the movable claw members. More particularly, the arms include relatively diverging panels 77 having parallel portions 77a at the lower edge thereof. A first pair of arcuate claw members 78 are pivotally mounted by means of a rod 79 on the portion 77a. Tie bars 81 and 82 are welded to the claw members 78 and extend therebetween as shown in Figure 2. A second pair of arcuate claw members 83 are pivotally mounted on a rod 84 also attached to the relatively parallel portions 77a, and disposed in opposing relation to the first mentioned claw members to clamp the pulp wood logs therebetween. Tie bars 85 and 86 are secured to the claw members 83 and extend therebetween, as is also

4

shown in Figure 2. A pair of fluid operators including cylinders 87 and 88 having rods 89 and 90, respectively are provided for opening and closing the claws 78 and 83. In particular, one end of the cylinders 87 and 88 is pivotally attached to the ends of the frame plate 76 and the rods of the respective fluid operators are connected to the claws 83 and 78.

The claw assembly 75 is mounted on the free end of the outer boom section 42 for swinging movement relative thereto, in the plane of movement of the outer boom section so that the claw assembly always depends therefrom. In addition, the claw assembly is preferably rotatably supported to permit orientation of the claws with the pile of logs being loaded or unloaded. In particular, the boom section 42 has a nose portion 91 thereon which extends outwardly from the end thereof at an angle to the longitudinal axis of the boom section and a swivel type connector 94 is attached to the outer end of the nose 91 for supporting the claw 75 thereon. The connector 94 conveniently comprises a rotary hydraulic actuator, including a housing 95 and a clevis 96 which is secured thereto and is pivotally attached to the nose portion by a pin 97 for swinging movement in the plane of movement of the outer boom section 42. The rotary hydraulic actuator includes an output shaft 98 which is rotatable relative to the clevis 96, and which output shaft is attached to the frame plate 76 of the claw to thereby swingably and rotatably support the same on the outer boom section.

Thus, separate fluid operators are provided for swinging the boom horizontally; for elevating the first boom section 41; for swinging the second boom section relative to the first section; for opening and closing the jaws of the claw 75; and for rotating the claw assembly relative to the boom. The several instrumentalities are conveniently operated from a central control point, which, as shown in Figures 1 and 2, includes a series of valves designated V1—V5 mounted on a shelf 101 supported by the panel 11 and by a bracket 102. The fluid cylinders 87 and 88 are conveniently operated in unison and fluid is supplied thereto through conduits 104 and 105 under the control of valve V4. Fluid is supplied to the rotary hydraulic actuator 94 through conduits 106 and 107 under the control of valve V5, and fluid is supplied to the cylinder 65 through conduits 108 and 109 controlled by valve V3. Elevating and lowering of the first boom section is controlled by valve V2 which is arranged to selectively admit and withdraw fluid through conduit 111, connected to the lower end of the cylinder 45. Fluid is supplied to the cylinder 35 for swinging the boom sections horizontally, through valve V1 and conduits 112 and 113. As is apparent from Figs. 1 and 2, the valves V1—V5 are connected through conduits 115 and 116 to a fluid pump and reservoir (not shown).

From the foregoing it is thought that the operation of the device will be readily understood. However, it is to be noted that the split boom and the apparatus for swinging the outer boom section relative to the inner boom section is such as to permit movement of the outer section through a relatively wide arc to thereby permit positioning of the claw 75 either closely adjacent the tractor, or relatively remote therefrom, as required to pick up or discharge the pulp wood. In addition, the mechanism for swinging the outer boom section is located at the upper side thereof, as shown in Figure 2, so that the logs can be turned by manipulation of the rotary hydraulic actuator 95 to properly orient the claws relative to the pile being loaded or unloaded. Since the apparatus is disposed at the upper side of the boom sections, it is apparent that it does not interfere with the turning of the logs held by the claws 75.

I claim:

1. A loading device comprising a support, an upright post mounted on said support for rotation about the axis thereof, a multiple section boom having a first boom sec-

tion mounted on said post for vertical swinging movement relative thereto and a second boom section mounted on said first section for vertical swinging movement about a pivot axis adjacent the end of said first section, material handling means on the free end of said second boom section, means for elevating and lowering said first boom section, means for swinging said second boom section relative to said first section, said last mentioned means including an arm rigidly attached to said second boom section at a point intermediate the ends thereof and extending transverse thereto in the plane of movement of said second section, a link pivotally attached to said first section at a point spaced from the pivot axis of said second section for movement in the plane of movement of said second section, a stiff tie bar pivotally attached to said link and to said arm to swing the latter in response to movement of said link, and means attached to said link for pivoting the latter relative to said first boom section.

2. A loading device comprising a support, an upright post mounted on said support for rotation about the axis thereof, a multiple section boom having a first boom section mounted on said post for vertical swinging movement relative thereto and a second boom section mounted on said first section for vertical swinging movement about a pivot axis adjacent the end of said first section, material handling means on the free end of said second boom section, means for elevating and lowering said first boom section, means for swinging said second boom section relative to said first section, said last mentioned means including an arm rigidly attached to said second boom section at a point intermediate the ends thereof and extending transverse thereto in the plane of movement of said second section, a link pivotally attached to said first section at a point spaced from the pivot axis of said second section for movement in the plane of movement of said second section, a stiff tie bar having one end thereof pivotally attached to said arm and the other end thereof pivotally attached to said link intermediate the ends of the latter, and a fluid operator having one end pivotally attached to the upper side of said first boom section and the other end pivotally attached to the end of said link remote from said first boom section for pivoting said link relative to said first boom section to thereby swing the second section relative thereto.

3. A log loading device comprising a support, an upright post mounted on said support for rotation about the axis thereof, a multiple section boom having a first boom section mounted on said post adjacent the upper end thereof for vertical swinging movement relative thereto and a second boom section mounted on said first section for vertical swinging movement about a pivot axis adjacent the end of said first section, a claw assembly including a claw mounting frame and a pair of relatively movable claw elements mounted on said frame, means attaching said claw mounting frame to the free end of said second section for free swinging movement relative thereto, a first fluid pressure operator for moving said jaws relative to each other, means for elevating and lowering said first boom section, means for swinging said second section relative to said first section, said last mentioned means including an arm rigidly attached to the upper end of said second boom section at a point intermediate the ends thereof and extending transverse thereto in the plane of movement thereof, a link pivotally attached to the upper side of said first boom section at a point spaced from the pivot axis of said second section for movement in the plane of movement of said second section, a stiff tie bar pivotally attached to said link and to said arm for moving the second section in response to movement of said link, and a second fluid pressure operator connected to said first section and to said link for moving the latter.

4. The combination of claim 3 wherein said means attaching said claw mounting frame to said second section includes a rotary fluid actuator for selectively rotating said claw.

5. A loading device comprising a support, an upright post mounted on said support for rotation about the axis of said post, a multiple section boom including a first elongate boom section mounted on said post for vertical swinging movement relative thereto and a second elongate boom section mounted on said first section for vertical swinging movement about an axis adjacent the outer end of said first section, a first fluid operated means connected to said post and to said first boom section for elevating and lowering said first section, means for swinging said second section relative to said first section, said last mentioned means including an arm on said second section extending in the plane of movement thereof to a point laterally offset from the upper side of the second boom section, a link pivotally attached to the upper side of said first section at a point spaced a preselected distance from the pivot axis of said second section for movement in the plane of movement of said second section, a stiff tie bar pivotally attached at one end to said arm and at the other end to said link at a point spaced from the pivot axis of said link a distance greater than said preselected distance, and an hydraulic operator having one end pivoted to the upper side of said first boom section and the other end pivoted to said link for moving said link to swing said second section relative to said first section.

6. A loading device comprising a support, an upright post mounted on said support for rotation about the axis of said post, a multiple section boom including a first elongate boom section mounted on said post for vertical swinging movement relative thereto and a second elongate boom section mounted on said first section for vertical swinging movement about an axis adjacent the outer end of said first section, a first fluid operated means connected to said post and to said first boom section for elevating and lowering said first section, means for swinging said second section relative to said first section, said last mentioned means including an arm on said second section extending in the plane of movement thereof to a point laterally offset from the upper side of the second boom section, a link pivotally attached to the upper side of said first section at a point spaced a preselected distance from the pivot axis of said second section for movement in the plane of movement of said second section, a stiff tie bar pivotally attached at one end to said arm and at the other end to said link at a point spaced from the pivot axis of said link a distance greater than said preselected distance, and an hydraulic operator having one end pivoted to the upper side of said first boom section and the other end pivoted to said link at a point spaced outwardly of the connection of said tie bar thereto for moving said link to swing said second section relative to said first section.

7. The combination of claim 5 wherein said post is spaced laterally from said support, gear teeth on said post, a rack disposed between said post and said support and slidably mounted on the support in meshing engagement with the gear teeth, and a fluid pressure operating means for reciprocating said rack to rotate said post about its axis.

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