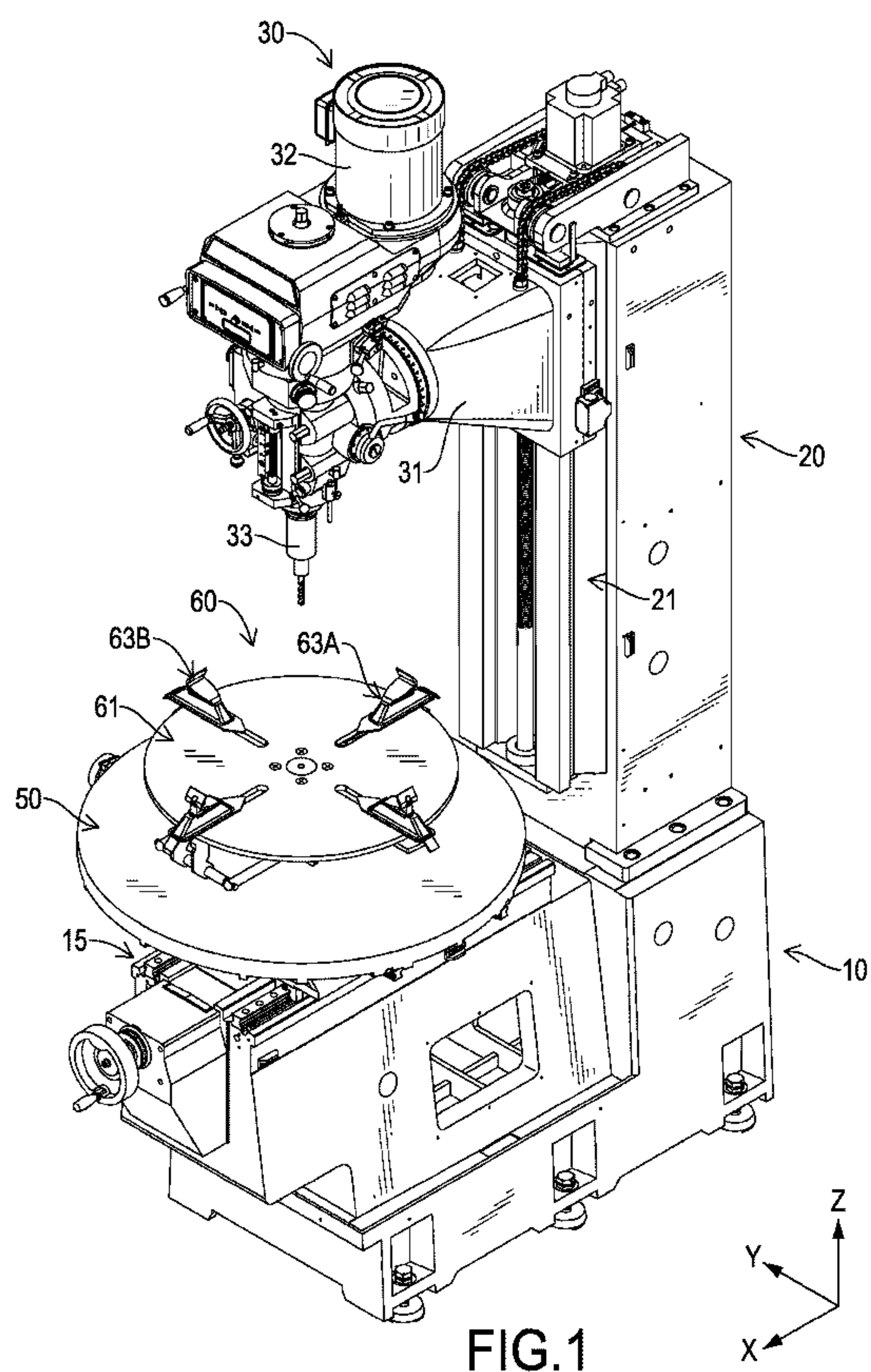
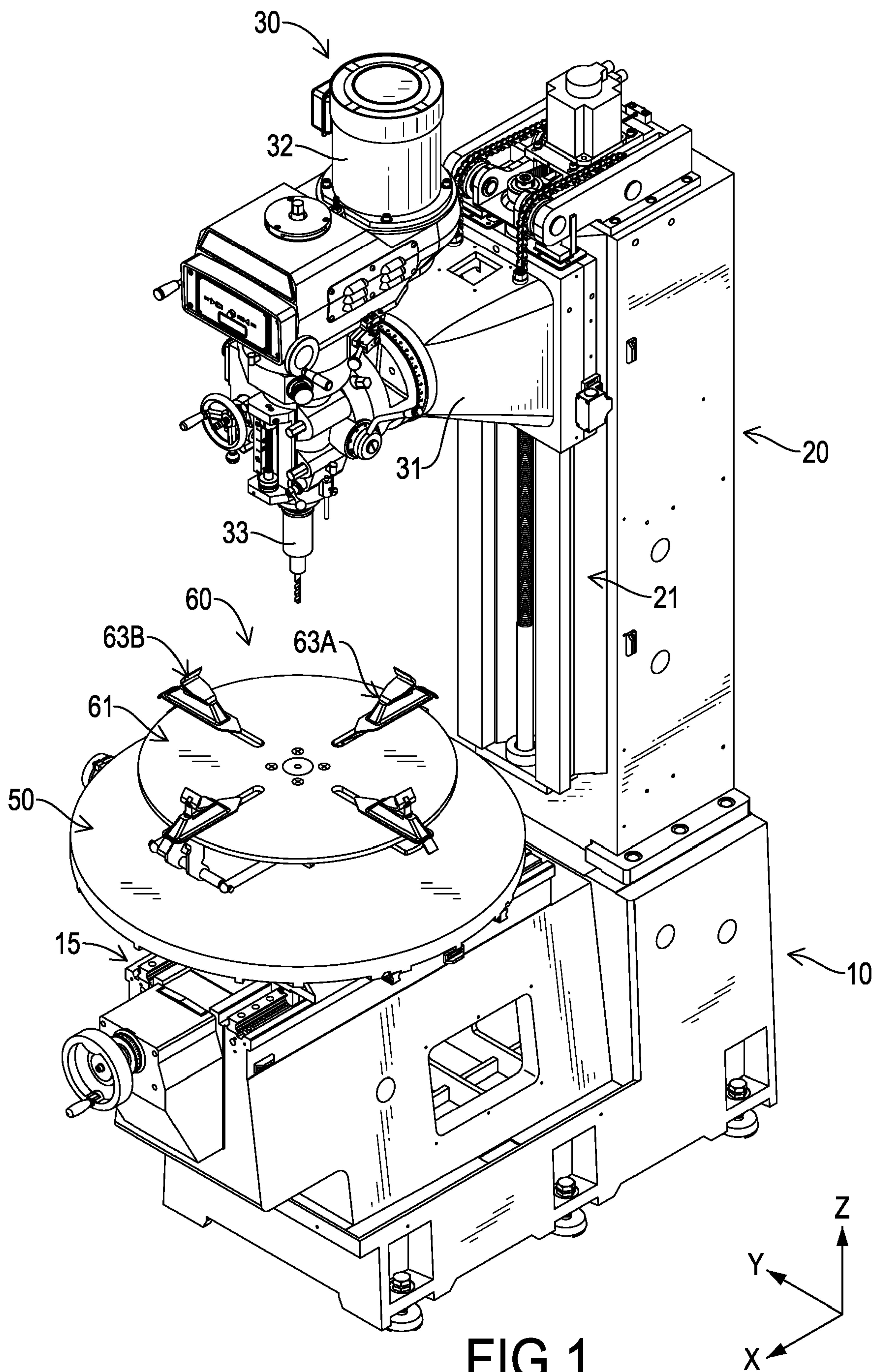


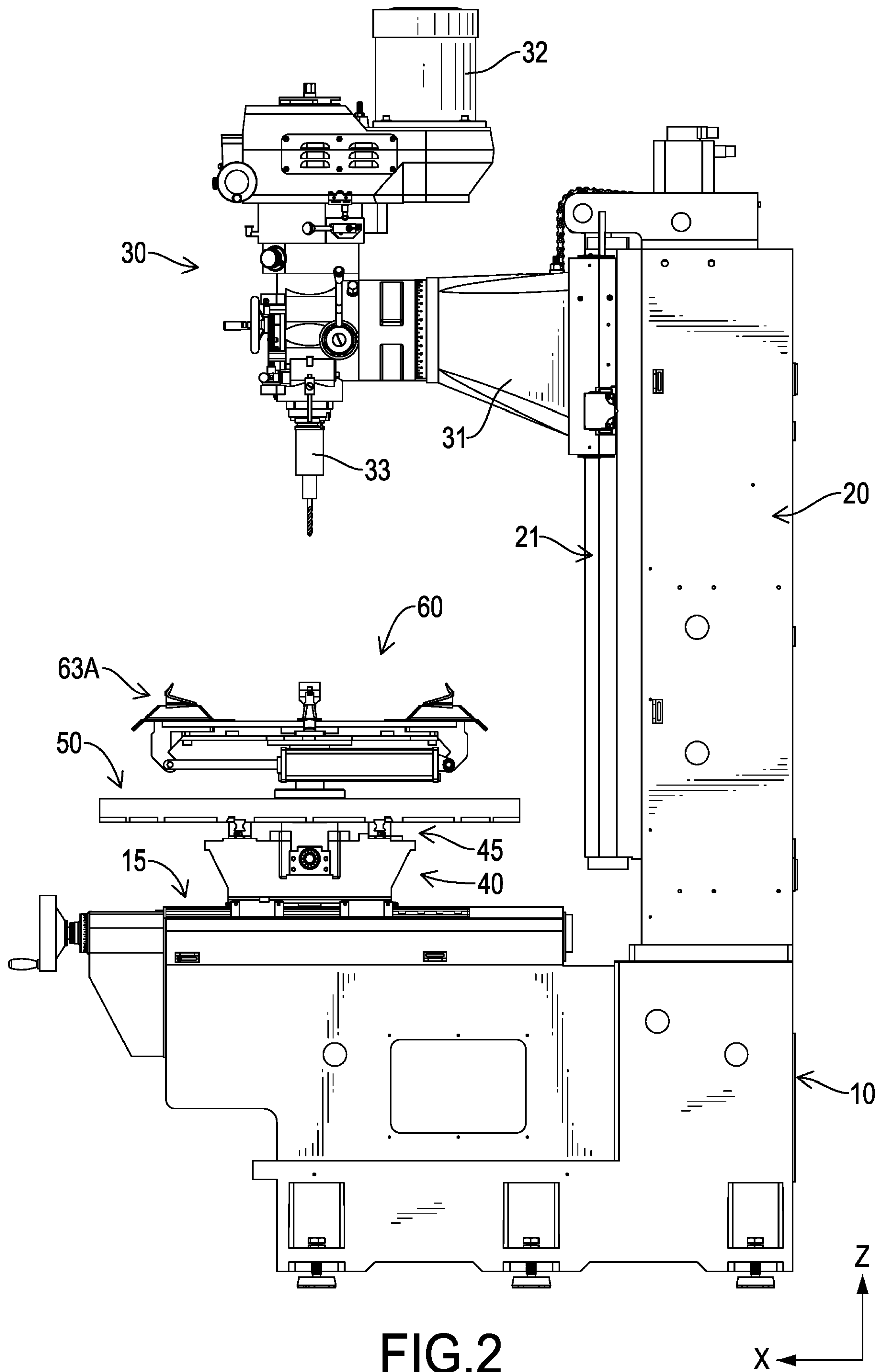
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(22) Date of Filing:	18.12.2018	(56) Documents Cited:	CN 107443104 ACN 103273123 BCN 105880655 A
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(54) Title of the Invention: Rim drilling and milling machine
Abstract Title: Rim drilling and milling machine

(57) The machine includes a column 20 having a vertical rail unit 21, fixed on a base 10. A turret 30 is perpendicularly and slidably connected with the rail unit. A saddle (40, Figure 2) is horizontally and linearly slidably connected with the base. A table 50 is horizontally and linearly slidably connected with the saddle. A fixture unit 60 fixed on top of the table has a foundation 61 mounted on the table, having a first radial direction and a second, perpendicular radial direction. Four clamping seats are defined as two first clamping seats 63A and two second clamping seats 63B. The first clamping seats are slidably mounted in opposite positions on the foundation in the first direction. The second clamping seats are slidably mounted in opposite positions on the foundation in the second direction. The machine may be used to stably clamp e.g. a wheel rim (70, Figure 10). The fixture unit may include a linkage unit (67, Figure 7) with a rotatably mounted linkage seat 671 connected to four linking rods 673, connected respectively to the clamping seats.







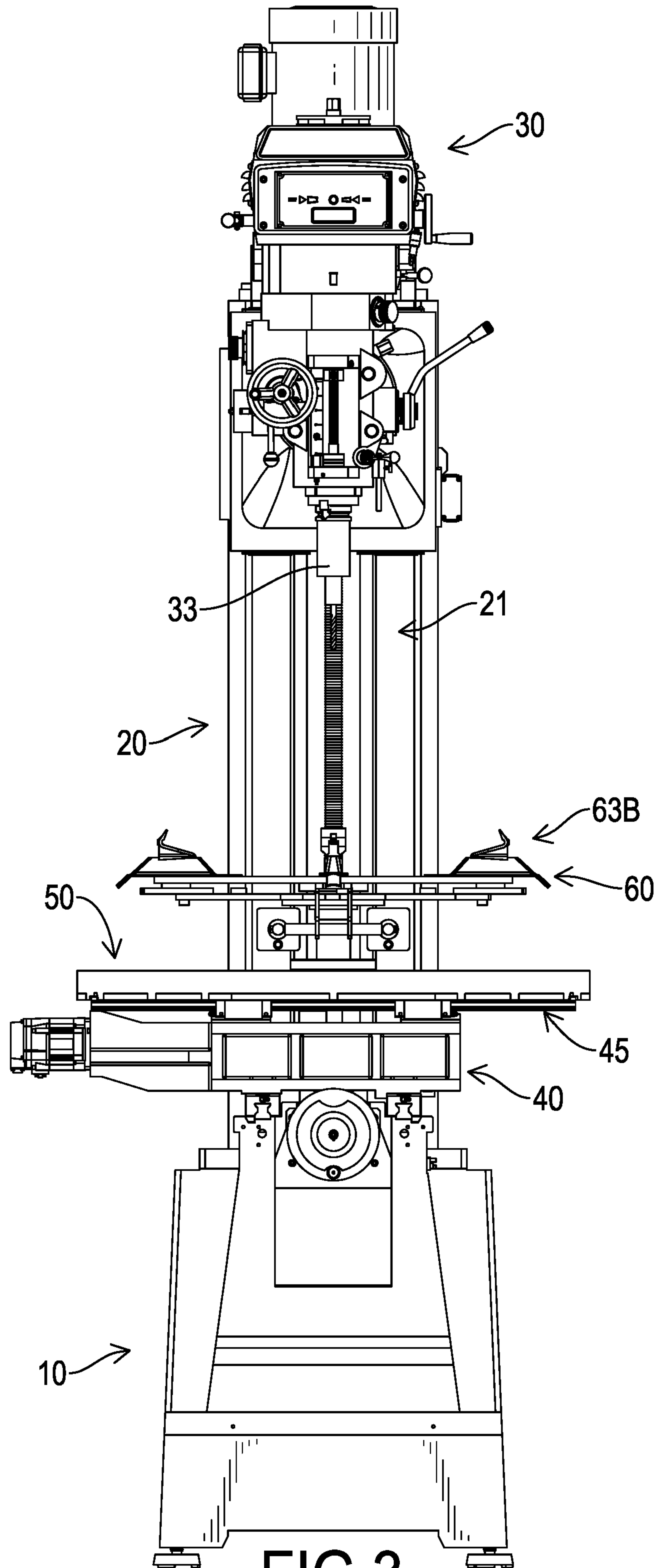
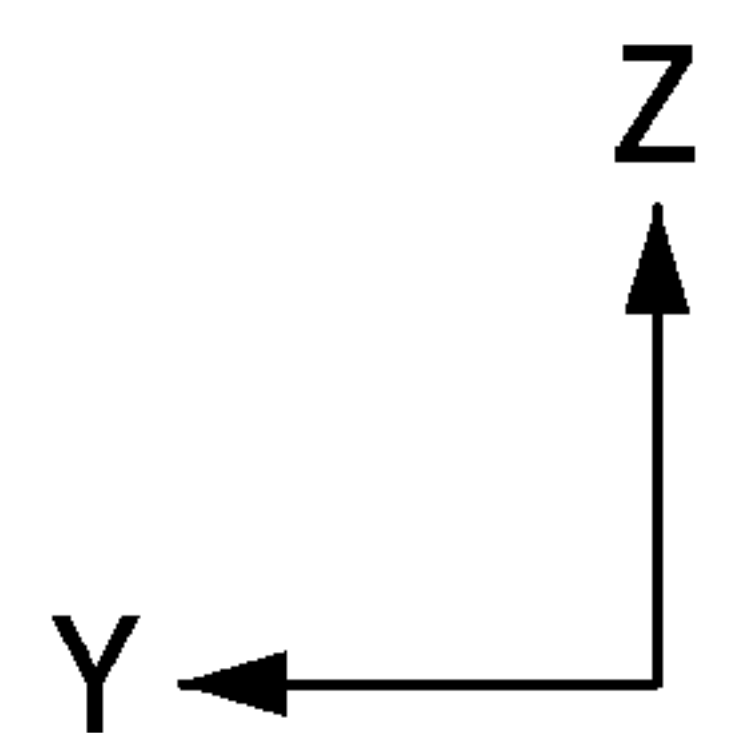


FIG.3



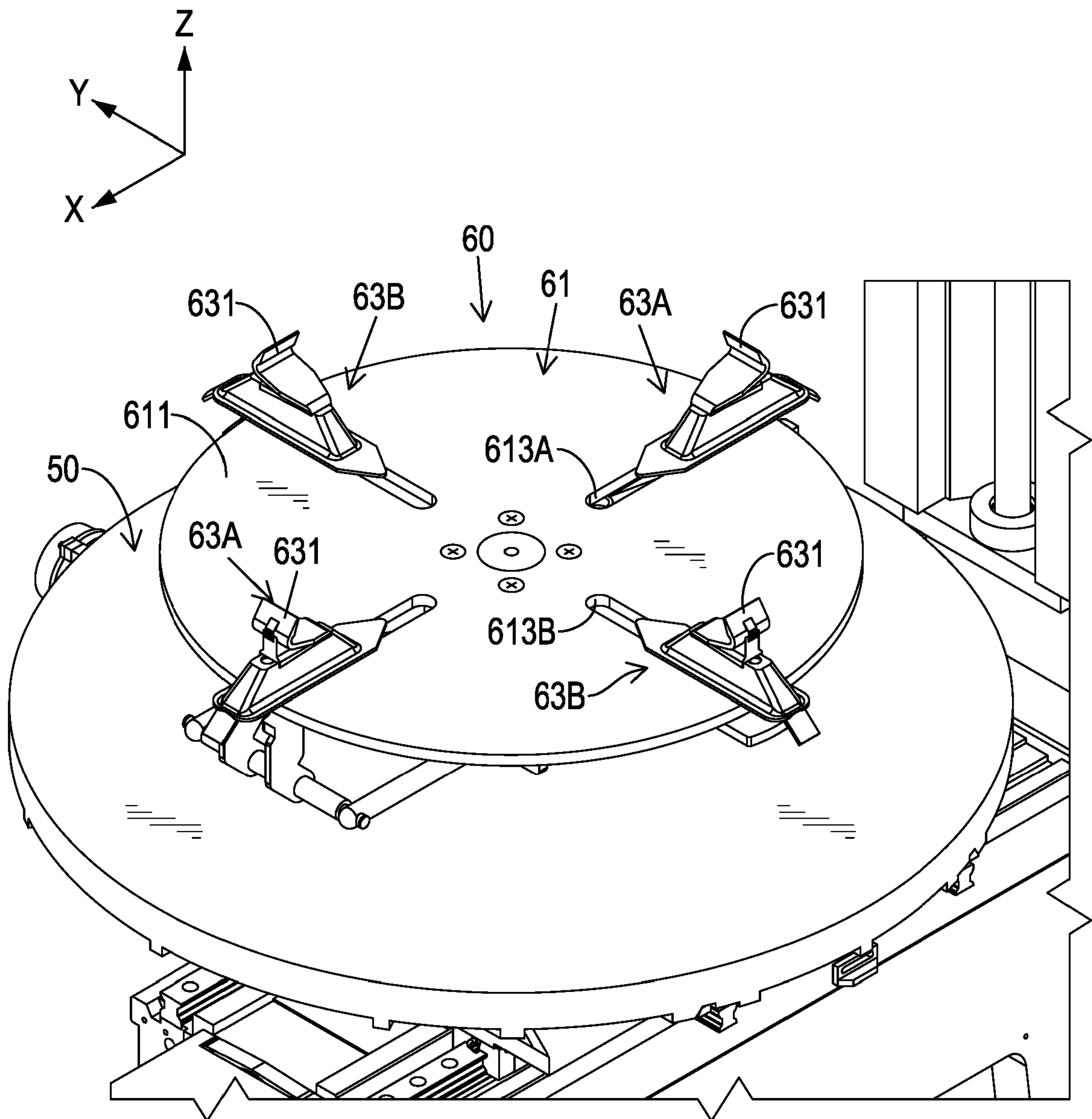


FIG.4

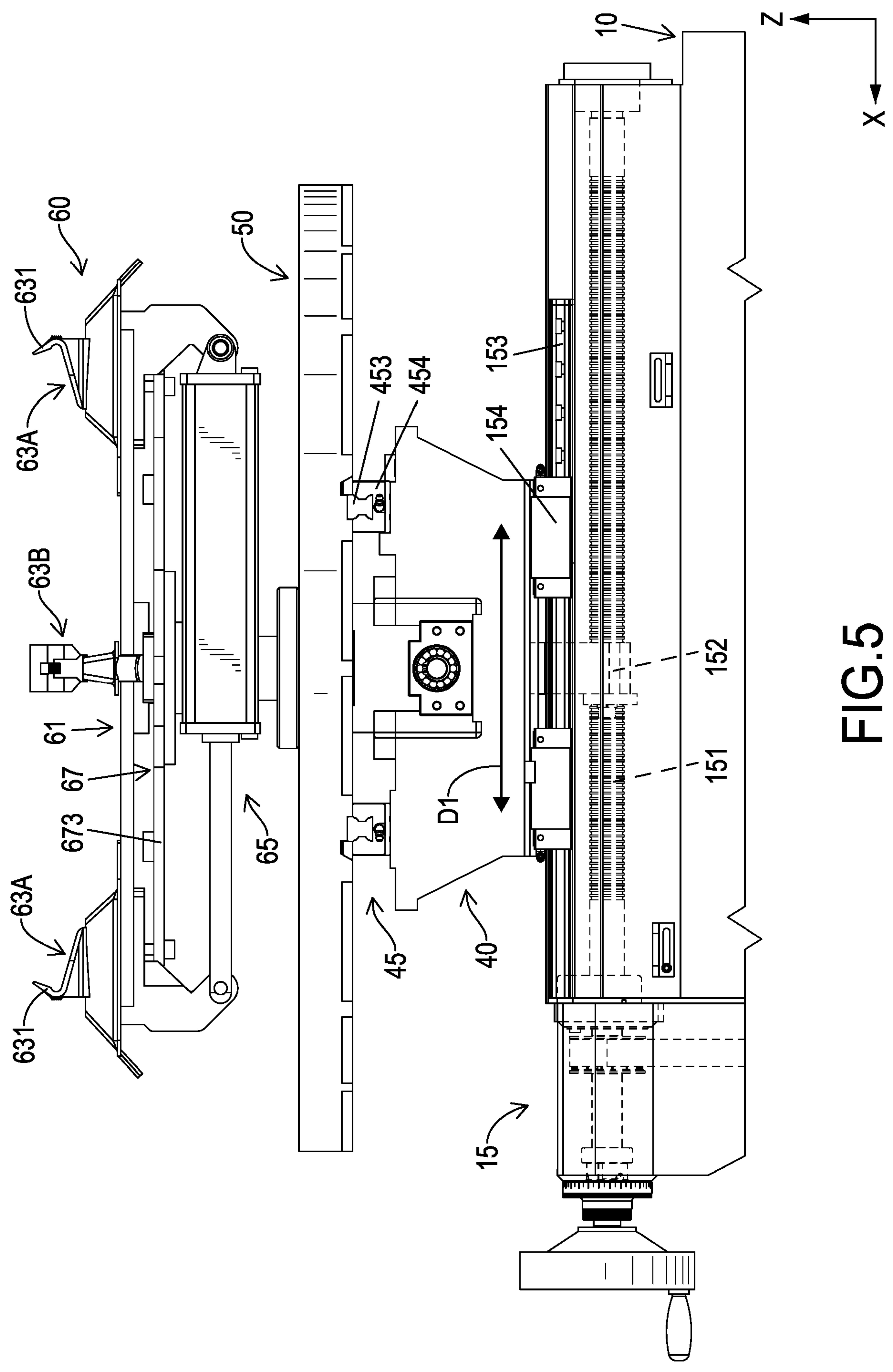


FIG. 5

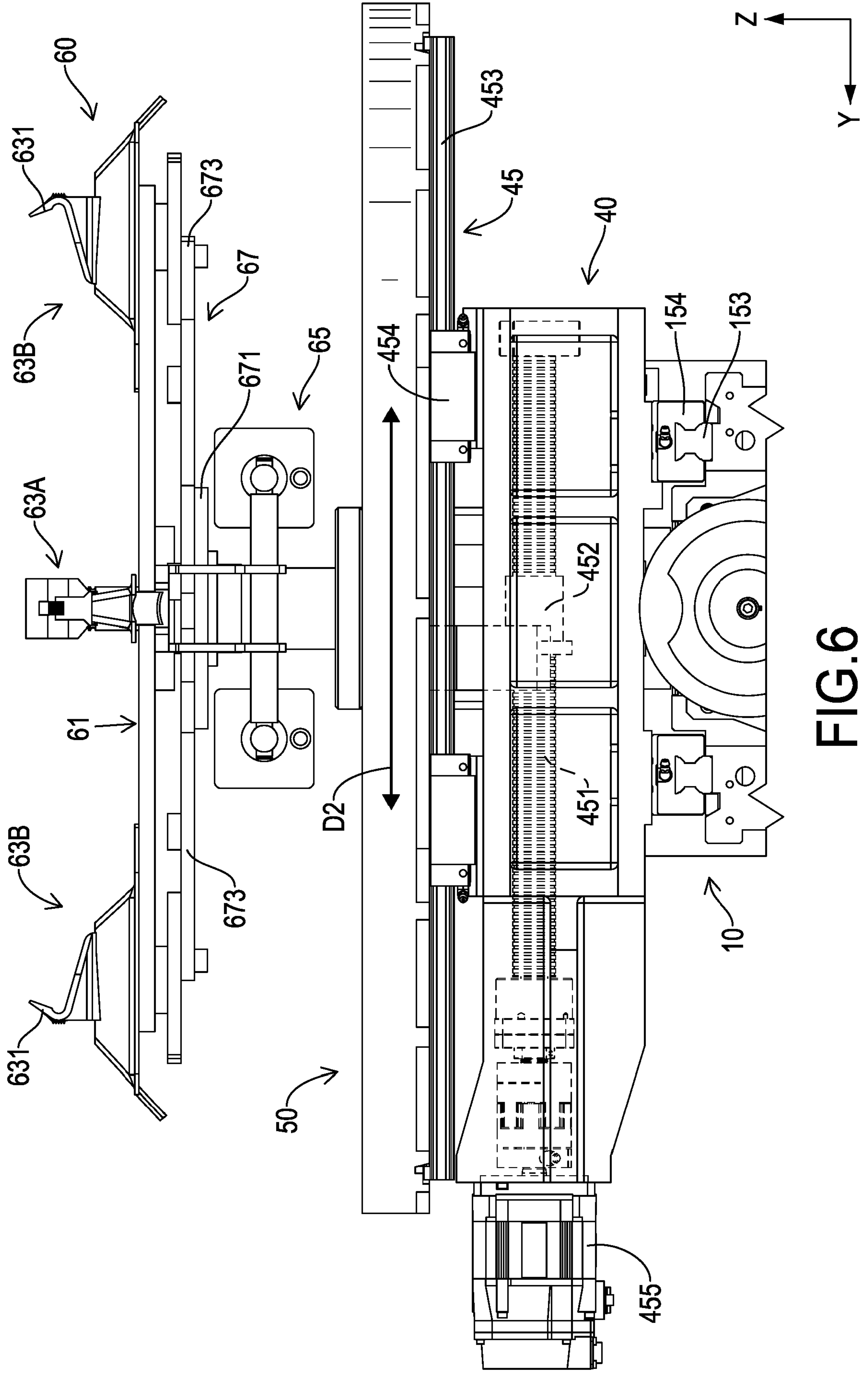


FIG. 6

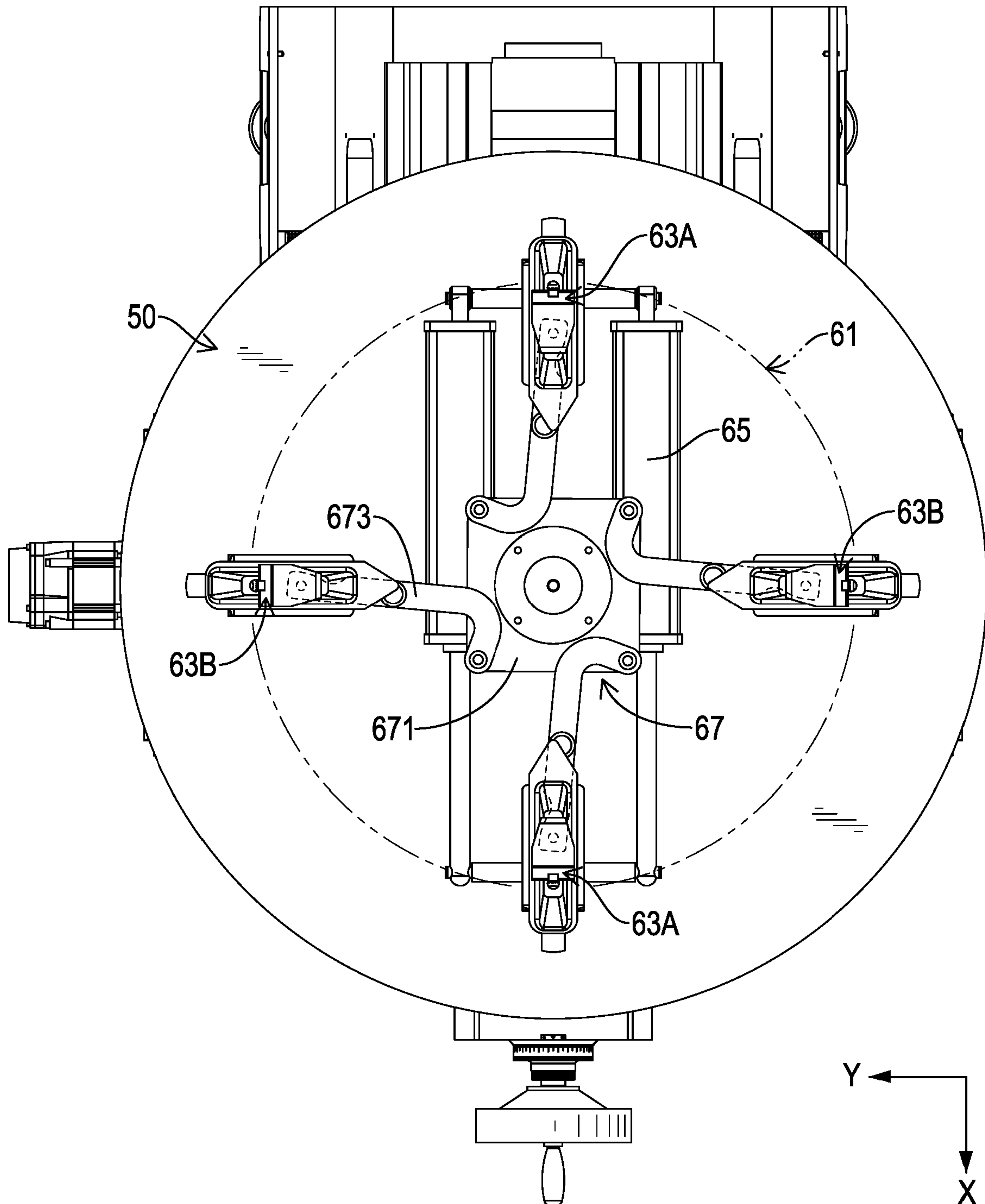


FIG.7

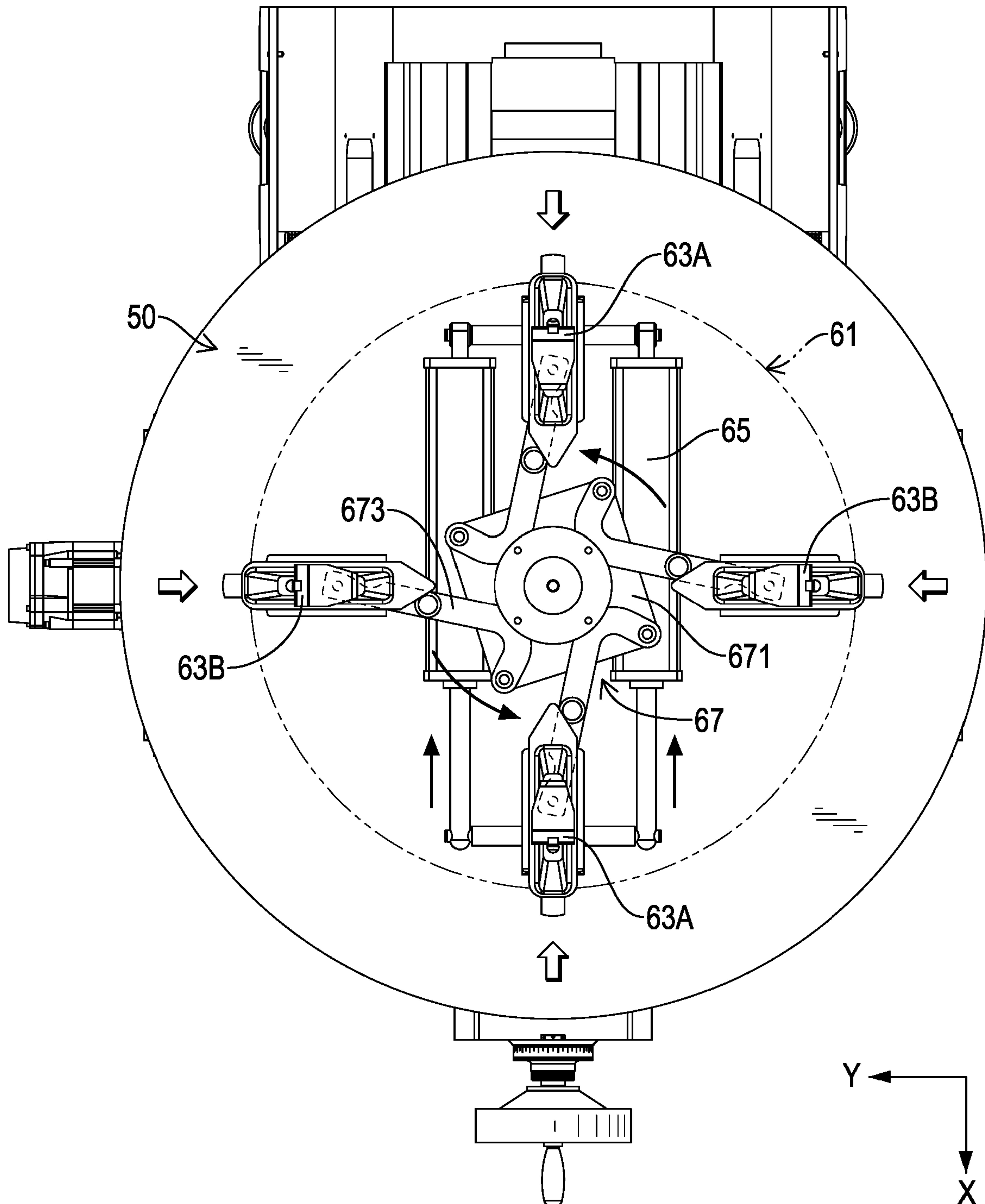


FIG.8

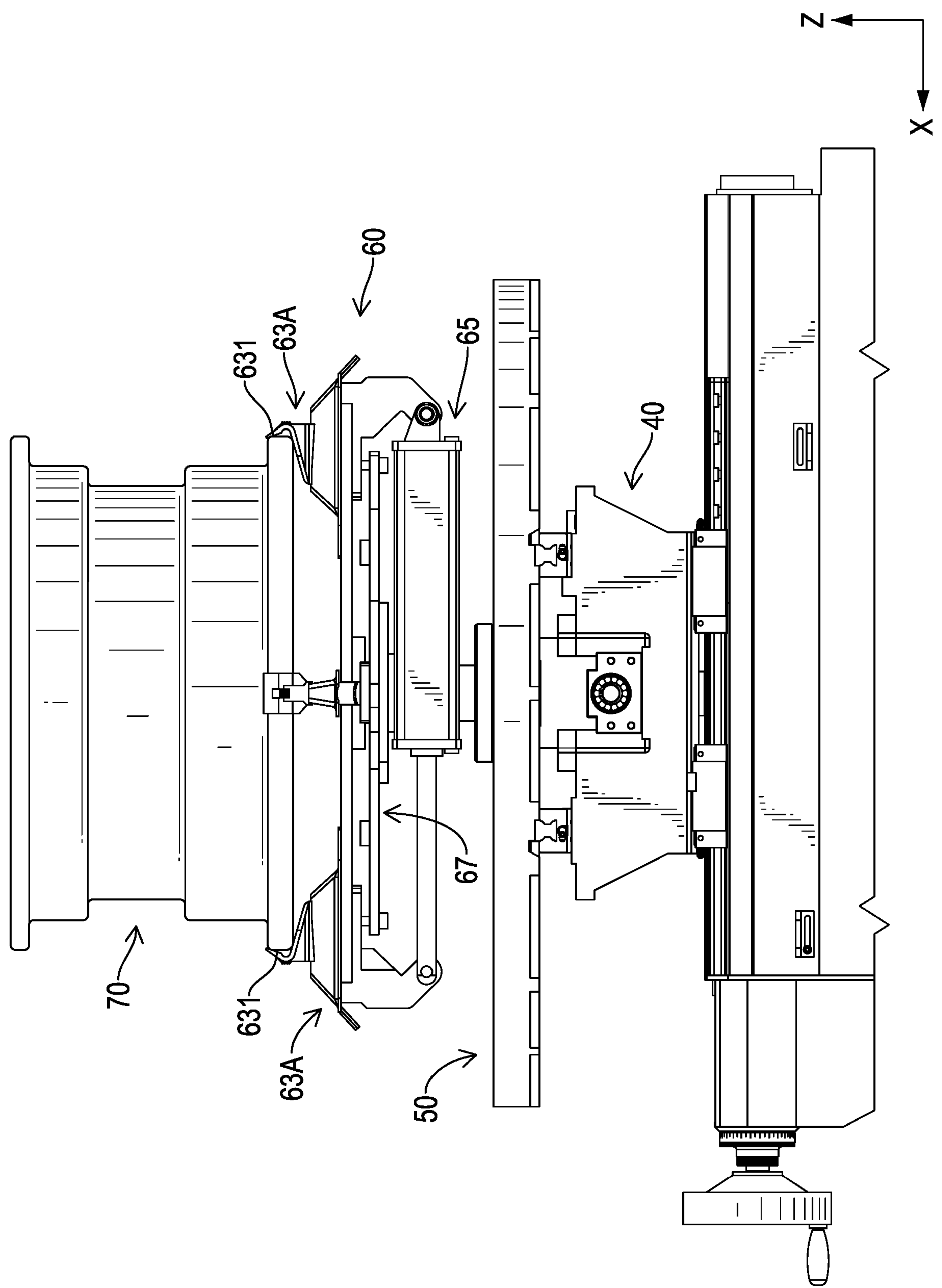
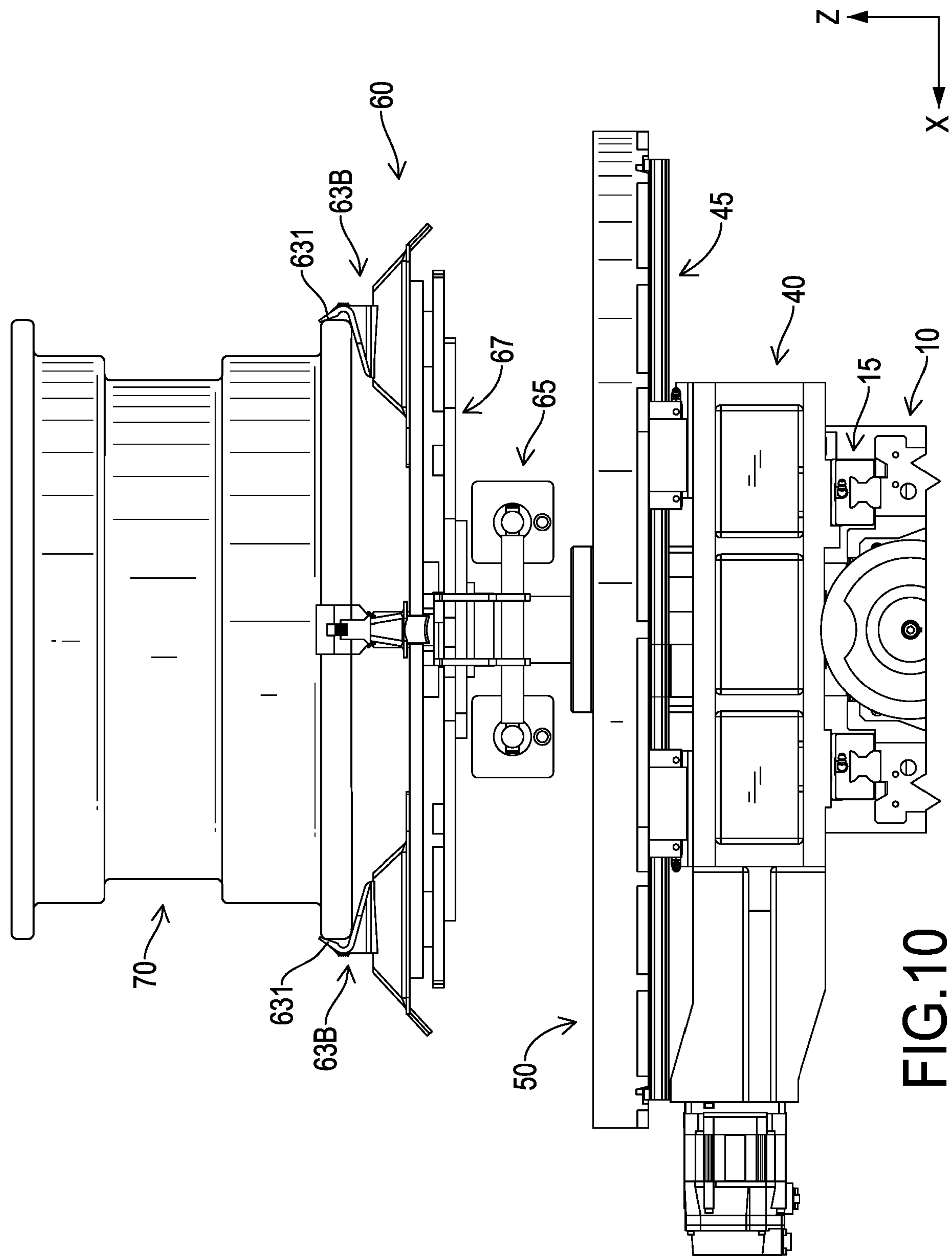


FIG.9



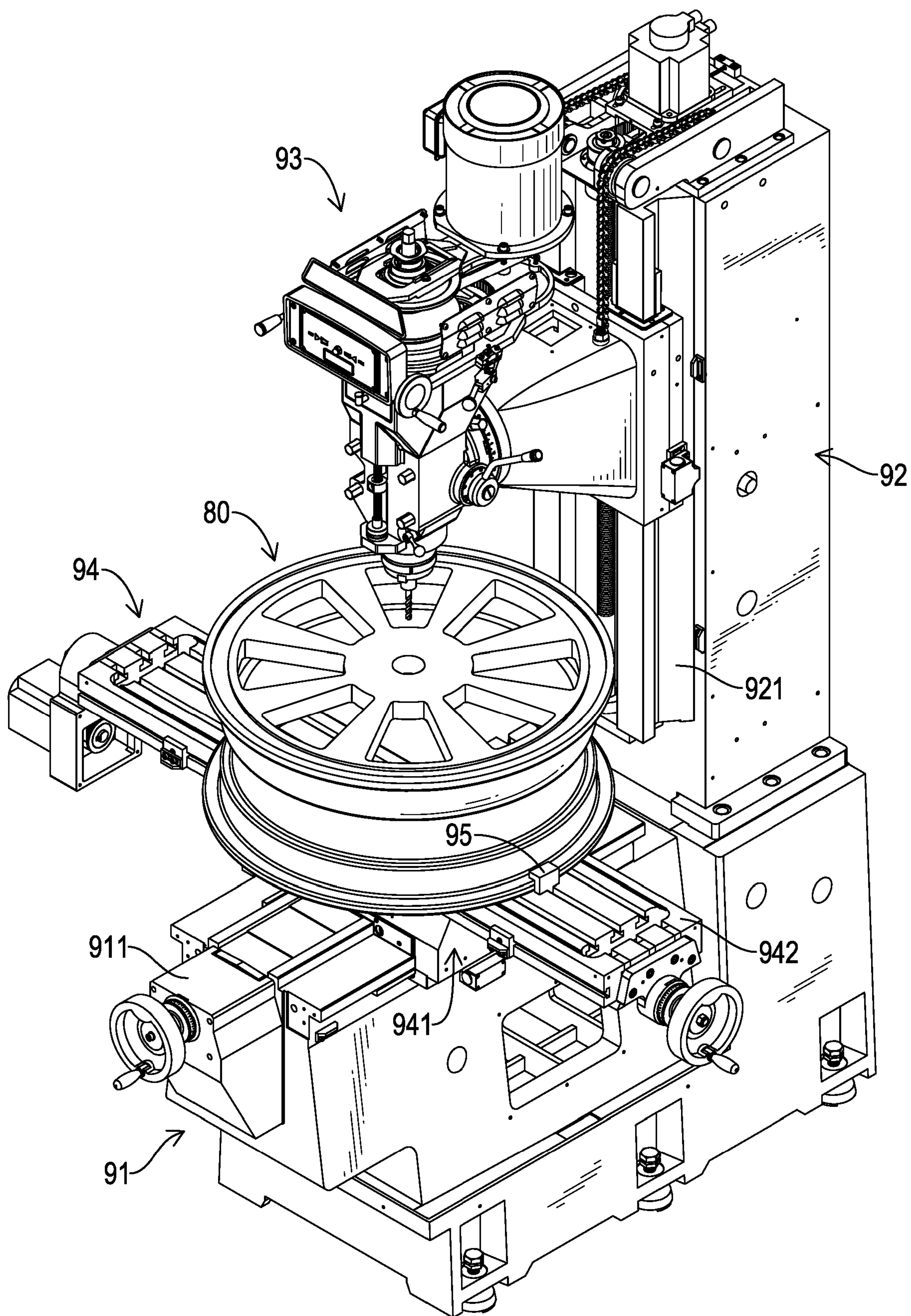


FIG.11
PRIOR ART

RIM DRILLING AND MILLING MACHINE

1. Field of the Invention

The present invention relates to a rim drilling and milling machine, and more particularly to a rim drilling and milling machine that has an excellent clamping stability by having four clamping seats to clamp at four equiangular points of a wheel rim.

2. Description of Related Art

With reference to Fig. 11, a conventional drilling and milling machine substantially has a base 91, a column 92, a turret 93, and a saddle unit 94. The base 91 has a first rail unit 911. The column 92 is fixed on the base 91, protrudes upward from the base 91, and has a vertical rail unit 921. The turret 93 is perpendicularly and slidably connected with the vertical rail unit 921. The saddle unit 94 has a saddle 941 and a table 942. The saddle 941 is slidably connected with the first rail unit 911. The table 942 is connected with the saddle 941, and is horizontally and linearly slidable relative to the saddle 941 along a direction perpendicular to the first rail unit 911.

When a wheel rim 80 is processed with the conventional drilling and milling machine, the wheel rim 80 is clamped by two clampers 95 mounted in the table 942. The position of the wheel rim 80 may be changed with the relative movement between the table 942 and the saddle 941 and the relative movement between the saddle 941 and the first rail unit 911. However, the conventional drilling and milling machine has a poor clamping stability, because the wheel rim 80 is only clamped by two clampers 95 which are arranged at a spaced interval along a longitudinal line of the table 942 to clamp diametrically opposite

sides of the wheel rim 80.

To overcome the shortcomings, the present invention tends to provide a rim drilling and milling machine to mitigate or obviate the aforementioned problems.

The main objective of the invention is to provide a drilling and milling machine for a wheel rim. The drilling and milling machine has four clamping seats, and the clamping seats can clamp at four equiangular points of a wheel rim to provide an excellent clamping stability.

The rim drilling and milling machine has a base, a column, a turret, a saddle, a table, and a fixture unit. The column is fixed on the base, protrudes upward from a top of the base, and has a vertical rail unit. The turret is perpendicularly and slidably connected with the vertical rail unit. The saddle is horizontally and linearly slidably connected with the base. The table is horizontally and linearly slidably connected with the saddle, and a sliding direction of the table is perpendicular to a sliding direction of the saddle. The fixture unit is fixed on a top of the table and has a foundation and four clamping seats. The foundation is mounted on the table and has a first radial direction and a second radial direction perpendicular to each other. The clamping seats are defined as two first clamping seats and two second clamping seats. The first clamping seats are slidably mounted on the foundation along the first radial direction and are disposed at positions diametrically opposite in the first radial direction of the foundation. The second clamping seats are slidably mounted on the foundation along the second radial direction and are disposed at positions diametrically opposite in the second direction of the foundation.

Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

IN THE DRAWINGS

Fig. 1 is a perspective view of a rim drilling and milling machine in accordance with the present invention;

Fig. 2 is a side view of the rim drilling and milling machine in Fig. 1;

Fig. 3 is an end view of the rim drilling and milling machine in Fig. 1;

Fig. 4 is an enlarged perspective view of the rim drilling and milling machine in Fig. 1;

Fig. 5 is an enlarged side view of the rim drilling and milling machine in Fig. 1;

Fig. 6 is an enlarged end view of the rim drilling and milling machine in Fig. 1;

Fig. 7 is an enlarged top view of the rim drilling and milling machine in Fig. 1;

Fig. 8 is an enlarged operational top view of the rim drilling and milling machine in Fig. 1;

Fig. 9 is an operational side view of the rim drilling and milling machine in Fig. 1 showing the clamp seats clamping a wheel rim;

Fig.10 is an operational end view of the rim drilling and milling machine in Fig. 9; and

Fig. 11 is a perspective view of a conventional drilling and milling machine.

With reference to Figs. 1 to 3, a rim drilling and milling machine in accordance with the present invention has a first axis X, a second axis Y, a third axis Z, a base 10, a column 20, a turret 30, a saddle 40, a table 50, and a fixture unit 60. The first axis X, the second axis Y, and the third axis Z are perpendicular to one another, and the third axis Z is vertical and perpendicular to the horizontal plane.

The column 20 is fixed on the base 10, protrudes upward from the top of the base 10, and has a vertical rail unit 21 extending along the third axis Z. The turret 30 is perpendicularly and slidably connected with the vertical rail unit 21 and has a sliding seat 31, a cutter driving unit 32, and a cutter 33. The sliding seat 31 is perpendicularly and slidably connected with the vertical rail unit 21. The cutter driving unit 32 is applied to drive the cutter 33 for processing a wheel rim.

With reference to Figs. 5 and 6, the saddle 40 is horizontally and linearly slidably connected with the base 10 along the first axis X and has a sliding direction D1 parallel to the first axis X, and a first rail unit 15 is connected with the base 10 and the saddle 40. The first rail unit 15 has a first threaded rod 151, a first threaded base 152, two first sliding rails 153 and multiple first sliding seats 154. The first threaded rod 151 and the first threaded base 152 are connected with each other by threading. The first threaded rod 151 is mounted on the base 10 along the first axis X, and the first threaded base 152 is fixed on the bottom of the saddle 40. The two first sliding rails 153 are respectively disposed on opposite sides of the first threaded rod 151 and are mounted on the base 10 along the first axis X. The first sliding seats 154 are slidably connected with the first sliding rails 153 and are fixed on the saddle 40. The relative

position between the saddle 40 and the base 10 along the first axis X can be adjusted with the rotation of the first threaded rod 151.

The table 50 is horizontally and linearly slidably connected with the saddle 40 along the second axis Y and has a sliding direction D2 perpendicular to the sliding direction D1 of the saddle 40 and parallel to the second axis Y, and a second rail unit 45 is connected with the table 50 and the saddle 40. The second rail unit 45 has a second threaded rod 451, a second threaded base 452, two second sliding rails 453, multiple second sliding seats 454, and a threaded rod driving unit 455. The second threaded rod 451 and the second threaded base 452 are connected with each other by threading. The second threaded rod 451 is mounted on the saddle 40 along the second axis Y, and the second threaded base 452 is fixed on the bottom of the table 50. The two second sliding rails 453 are respectively disposed on opposite sides of the second threaded rod 451 and are mounted on the table 50 along the second axis Y. The second sliding seats 454 are slidably connected with the second sliding rails 453 and are fixed on the saddle 40. The threaded rod driving unit 455 is mounted on an end of the second threaded rod 451, and is applied to drive the rotation of the second threaded rod 451 to adjust the relative position between the saddle 40 and the table 50 along the second axis Y.

With reference to Figs. 4 to 7, the fixture unit 60 is fixed on the top of the table 50 and has a foundation 61 and four clamping seats. The foundation 61 is fixed on the top of the table 50 and has a top plate 611, a first radial direction, and a second radial direction. The top plate 611 is a circular disc and is mounted on the top of the foundation 61. The first radial direction and the second radial

direction are perpendicular to each other. In this embodiment, the first radial direction is parallel to the first axis X, and the second radial direction is parallel to the second axis Y, but it is not limited thereto.

The four clamping seats are defined as two first clamping seats 63A and two second clamping seats 63B. The first clamping seats 63A are slidably mounted on the foundation 61 along the first radial direction, are respectively disposed at positions diametrically opposite in the first radial direction of the foundation 61, and protrude from the top plate 611. The second clamping seats 63B are slidably mounted on the foundation 61 along the second radial direction, are respectively disposed at positions diametrically opposite in the second radial direction of the foundation 61, and protrude from the top plate 611. Preferably, the foundation 61 has a first guide path 613A and a second guide path 613B. The first guide path 613A extends along the first radial direction and has two slots respectively formed in the top plate 611 respectively at diametrically opposite positions at the top plate 611 and extending along the first radial direction. The second guide path 613B extends along the second radial direction and has two slots respectively formed in the top plate 611 respectively at diametrically opposite positions at the top plate 611 and extending along the second radial direction. The first clamping seats 63A are respectively mounted in the slots of the first guide path 613A, and are slidable along the first guide path 613A. The second clamping seats 63B are respectively mounted in the slots of the second guide path 613B, and are slidable along the second guide path 613B.

Each clamping seat has a claw 631 protruding upward. With reference to Figs. 9 and 10, when clamping a wheel rim 70, the claws 631 of the two first

clamping seat 63A clamp at diametrically opposite positions on the wheel rim 70 along the first radial direction, and the claws 631 of the two second clamping seat 63B clamp at diametrically opposite positions on the wheel rim 70 along the second radial direction. The claws 631 clamp at four equiangular points on the wheel rim 70 to improve the clamping stability.

With reference to Figs. 5 to 7, preferably, the fixture unit 60 further has a linear driving unit 65 and a linkage unit 67. The linkage unit 67 has a linkage seat 671 and four linking rods 673. The linkage seat 671 is rotatably mounted on the foundation 61. The linking rods 673 are connected with the linkage seat 671 and are connected respectively to the clamping seats. The linear driving unit 65 may be a pressure cylinder, and is adjustable in longitudinal length along the first radial direction. Two ends of the linear driving unit 65 are connected respectively to the first clamping seats 63A. The linear driving unit 65 is applied to drive the relative movement of the first clamping seats 63A along the first radial direction.

With reference to Figs. 7 and 8, when decreasing the longitudinal length of the linear driving unit 65 along the first radial direction, the first clamping seats 63A are driven to slide toward each other by the linear driving unit 65. Thus, the linkage seat 671 is rotated by the linking rods 673 corresponding to the first clamping seats 63A, and the second clamping seats 63B are driven to slide toward each other by the linking rods 673 corresponding to the second clamping seats 63B. The relative positions of the first clamping seats 63A and the second clamping seats 63B are adjustable simultaneously with the linear driving unit 65, and can be adjusted to fit the size of the wheel rim 70, so as to clamp wheel rims

70 in different sizes.

The rim drilling and milling machine in accordance with the present invention has the following advantages and improvements:

1. The four clamping seats of the fixture unit 60 can clamp at four equiangular points on the wheel rim 70 to clamp the wheel rim 70 stably and tightly, and relative positions of the clamping seats are adjustable to fit with the wheel rims 70 in different sizes.
2. The position of the wheel rim 70 may be changed with the fixture unit 60 by relative movement between the saddle 40 and the base 10 along the first axis X and by relative movement between the saddle 40 and the table 50 along the second axis Y.
3. The fixture unit 60 further has the linkage unit 67, and the relative positions of the clamping seats can be adjusted simultaneously with the linkage unit 67.
4. The fixture unit 60 further has the linear driving unit 65, and the relative movements of the first clamping seats 63A can be driven simultaneously with the linear driving unit 65. The linear driving unit 65 may be further connected with the linkage unit 67 to simultaneously adjust the relative positions of the four clamping seats.

CLAIMES

1. A rim drilling and milling machine comprising:

a base (10);

a column (20) fixed on the base (10), protruding upward from a top of the base (10), and having a vertical rail unit (21);

a turret (30) perpendicularly and slidably connected with the vertical rail unit (21);

a saddle (40) horizontally and linearly slidably connected with the base (10) and having a sliding direction (D1);

a table (50) horizontally and linearly slidably connected with the saddle (40) and having a sliding direction (D2) perpendicular to the sliding direction (D1) of the saddle (40); and

a fixture unit (60) fixed on a top of the table (50) and having

a foundation (61) mounted on the table (50) and having

a first radial direction; and

a second radial direction perpendicular to the first radial direction; and

four clamping seats defined as two first clamping seats (63A) and two second clamping seats (63B), wherein

the first clamping seats (63A) are slidably mounted on the foundation (61) along the first radial direction and are respectively disposed at positions diametrically opposite in the first radial direction of the foundation (61); and

the second clamping seats (63B) are slidably mounted on the

foundation (61) along the second radial direction and are respectively disposed at positions diametrically opposite in the second direction of the foundation (61).

2. The rim drilling and milling machine as claimed in claim 1, wherein each clamping seat has a claw (631) protruding upward.

3. The rim drilling and milling machine as claimed in claim 2, wherein the foundation (61) of the fixture unit (60) has

a first guide path (613A) extending along the first radial direction; and

a second guide path (613B) extending along the second radial direction;

the first clamping seats (63A) are respectively connected with the first guide path (613A) at opposite positions on the first guide path (613A) and are slidable along the first guide path (613A); and

the second clamping seats (63B) are respectively connected with the second guide path (613B) at opposite positions on the second guide path (613B) and are slidable along the second guide path (613B).

4. The rim drilling and milling machine as claimed in any one of claims 1 to 3, wherein the fixture unit further has a linkage unit (67) having

a linkage seat (671) rotatably mounted on the foundation (61); and

four linking rods (673) connected with the linkage seat (671) and connected respectively to the clamping seats.

5. The rim drilling and milling machine as claimed in any one of claims 1 to 4, wherein the fixture unit (60) further has a linear driving unit (65) being adjustable in a longitudinal length of the linear driving unit (65) along the first radial direction and having two ends each connected to a respective one of the first clamping seats (63A).

6. The rim drilling and milling machine as claimed in claim 5, wherein the linear driving unit (65) is a pressure cylinder.



Application No: GB1820644.1

Examiner: Mr Ian Blackmore

Claims searched: 1-6

Date of search: 9 May 2019

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-6	CN107443104 A (WANG et al) see Figures 1-5
X	1-6	CN103273123 B (NIU) see Figures 1-5
X	1-6	CN105880655 A (GUO) see whole document

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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Worldwide search of patent documents classified in the following areas of the IPC

B23B; B23C; B23Q

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
B23B	0005/28	01/01/2006
B23Q	0003/06	01/01/2006
B23Q	0003/08	01/01/2006