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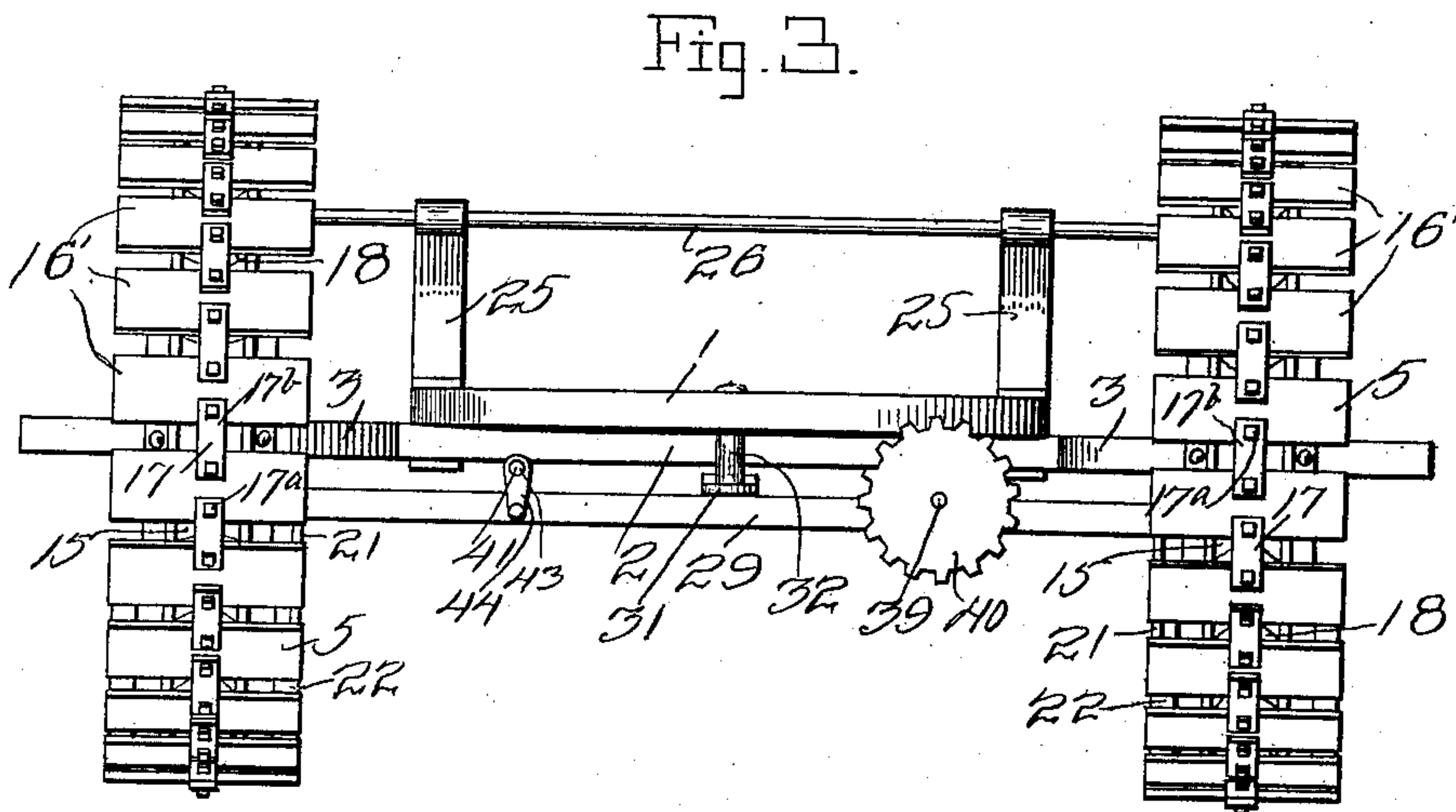
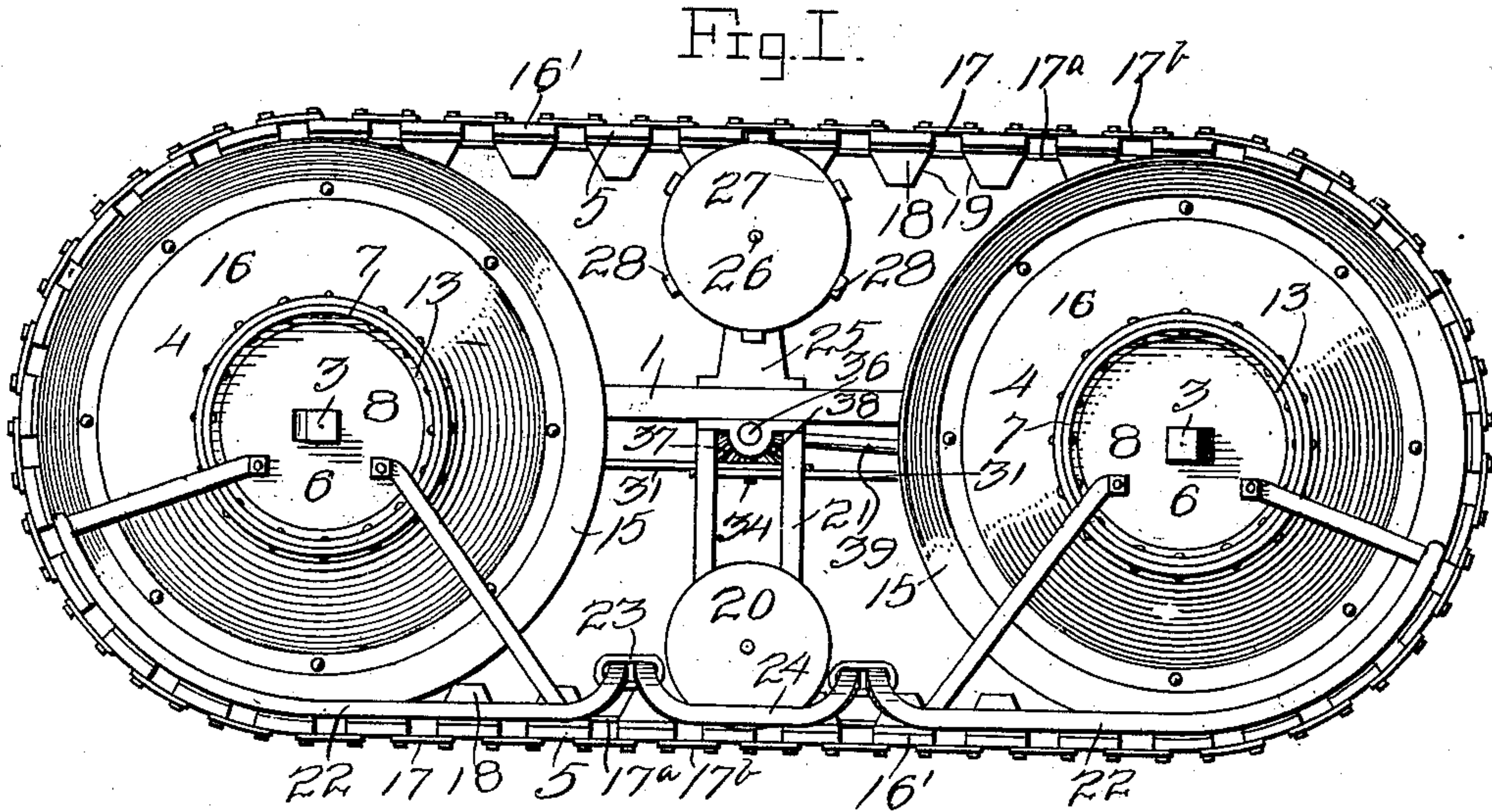
PATENTED MAR. 15, 1904.

H. BECKWITH.
TRACTION ENGINE.

APPLICATION FILED AUG. 24, 1903.

NO MODEL.

4 SHEETS-SHEET 1.



Witnesses

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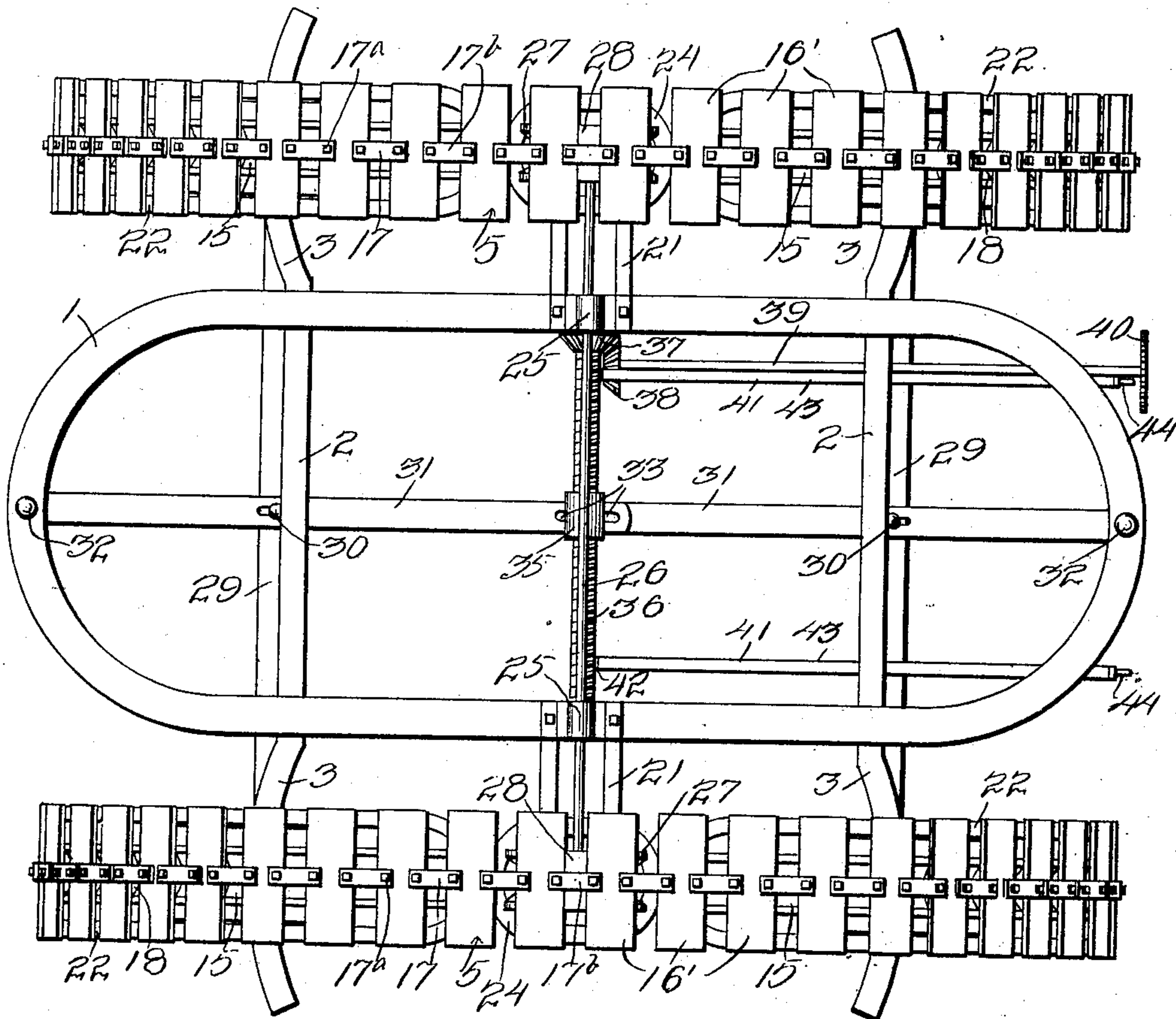
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4 SHEETS—SHEET 2.

Fig. 2.



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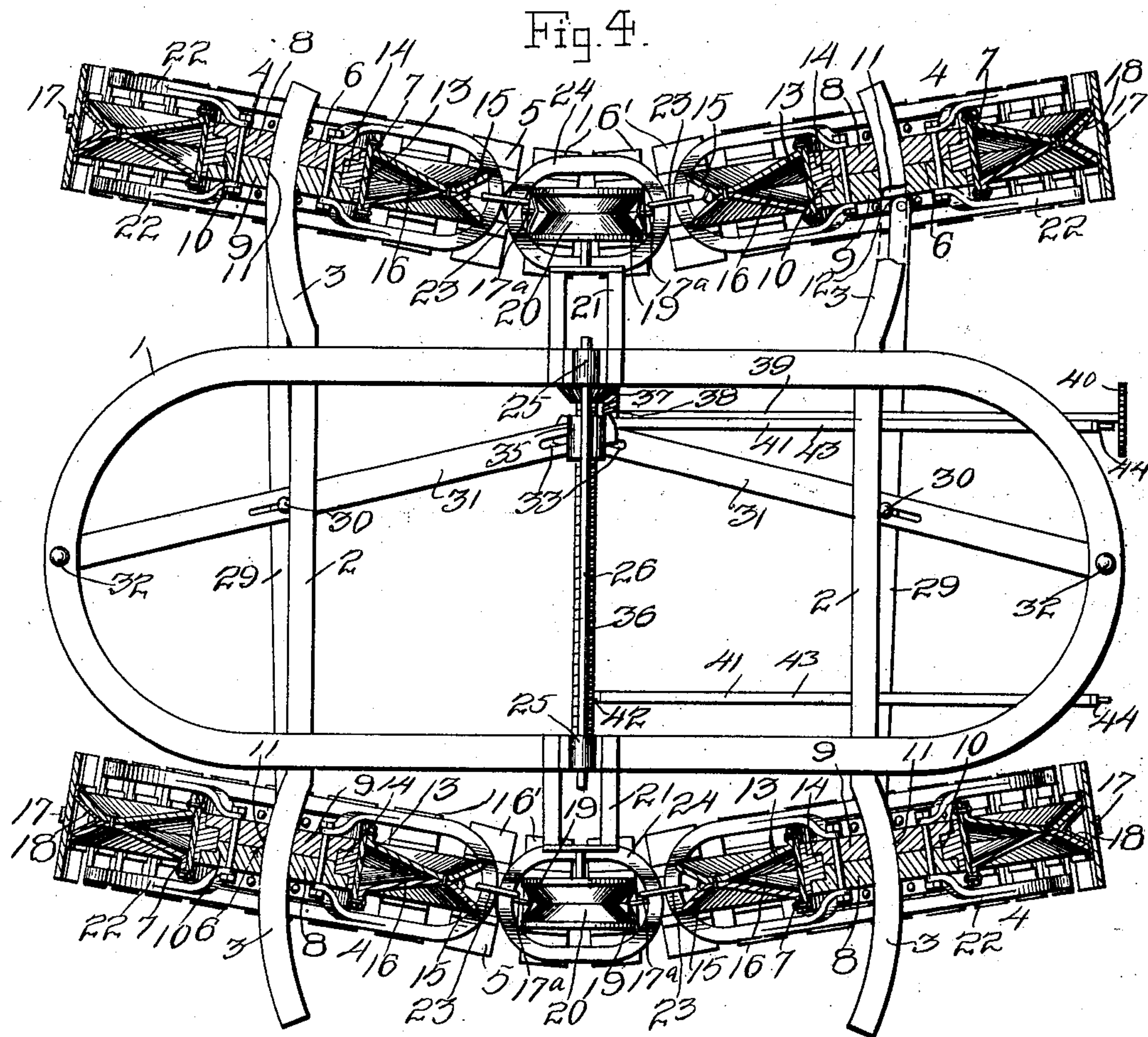
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4 SHEETS—SHEET 3.



Witnesses

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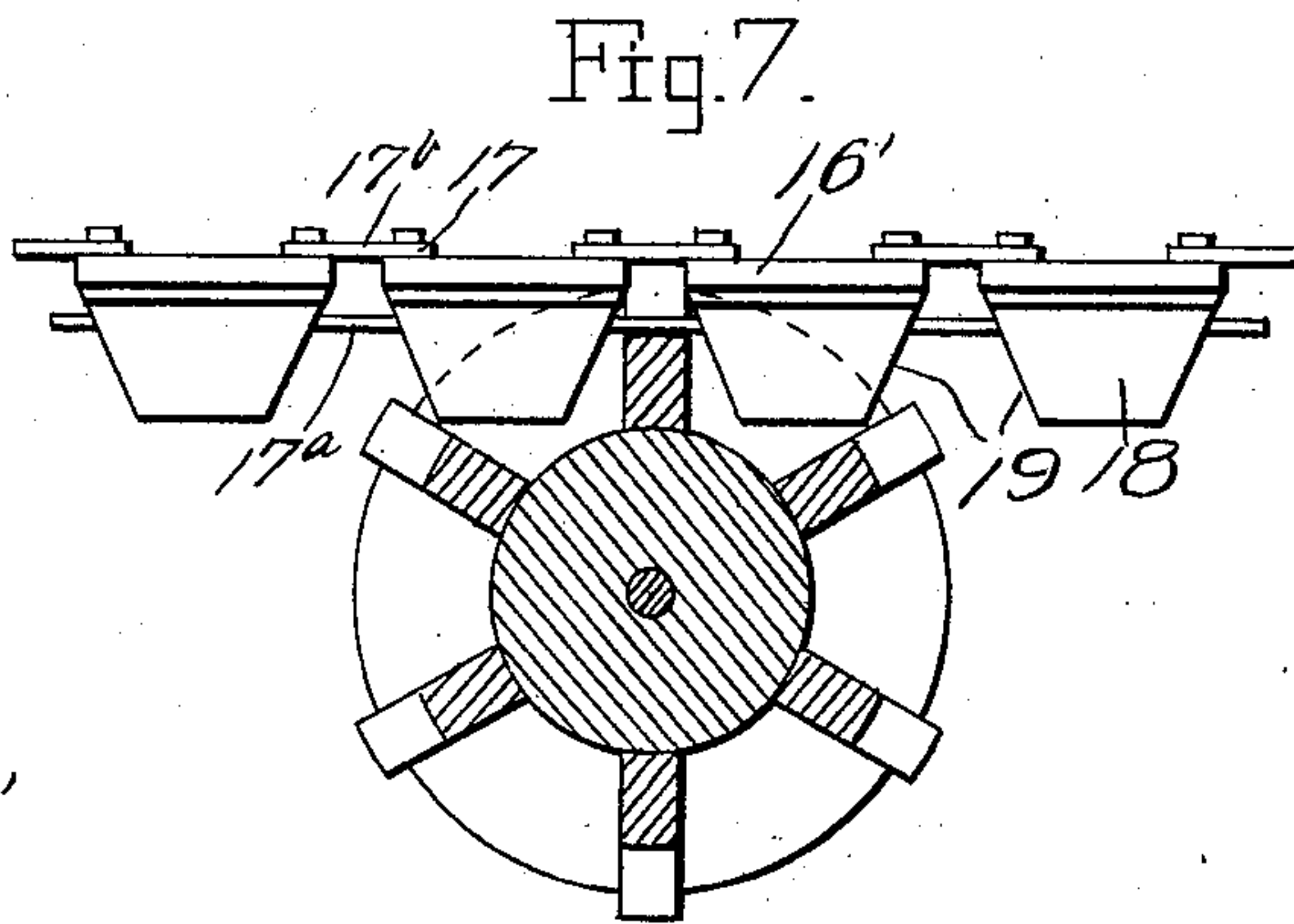
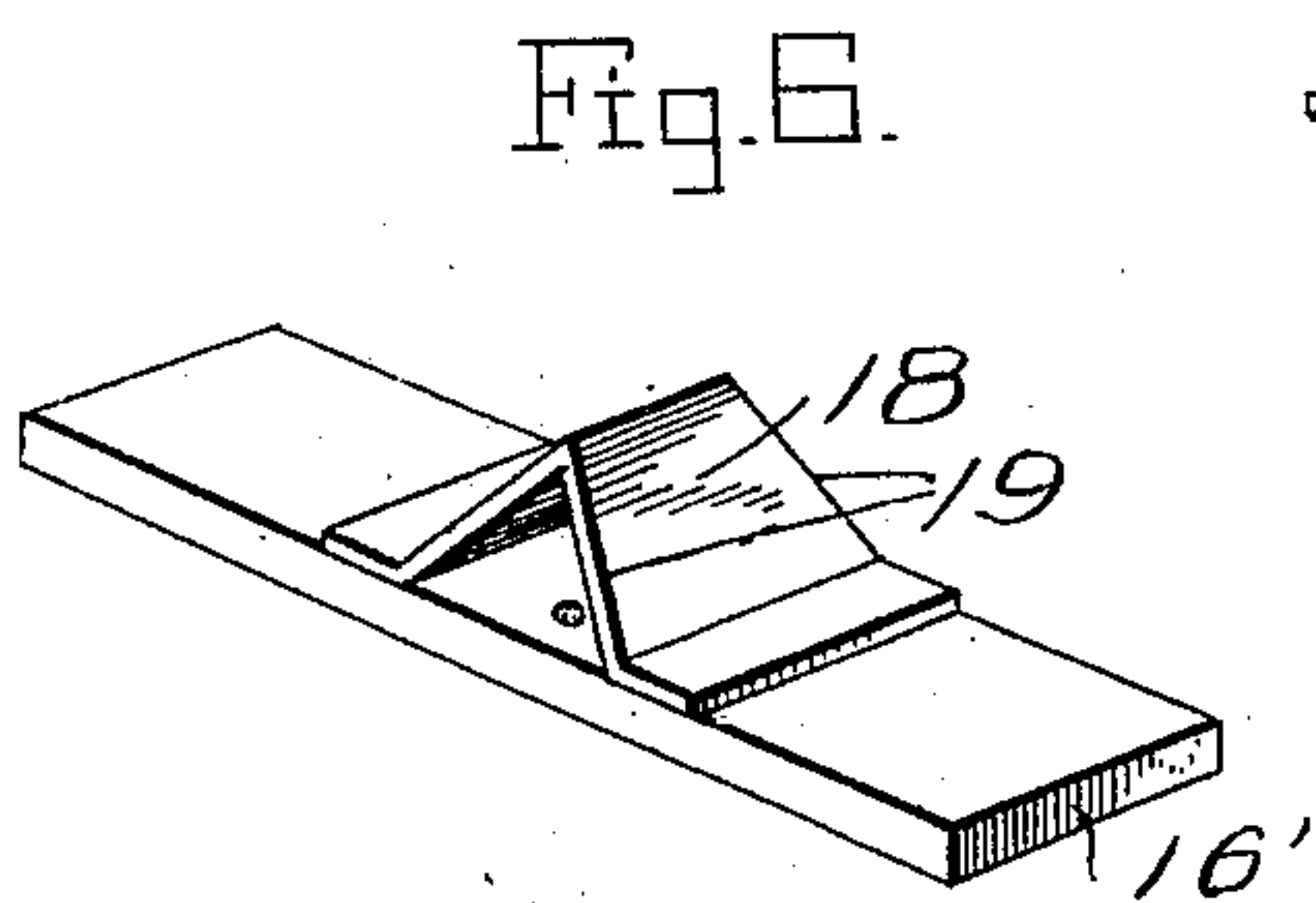
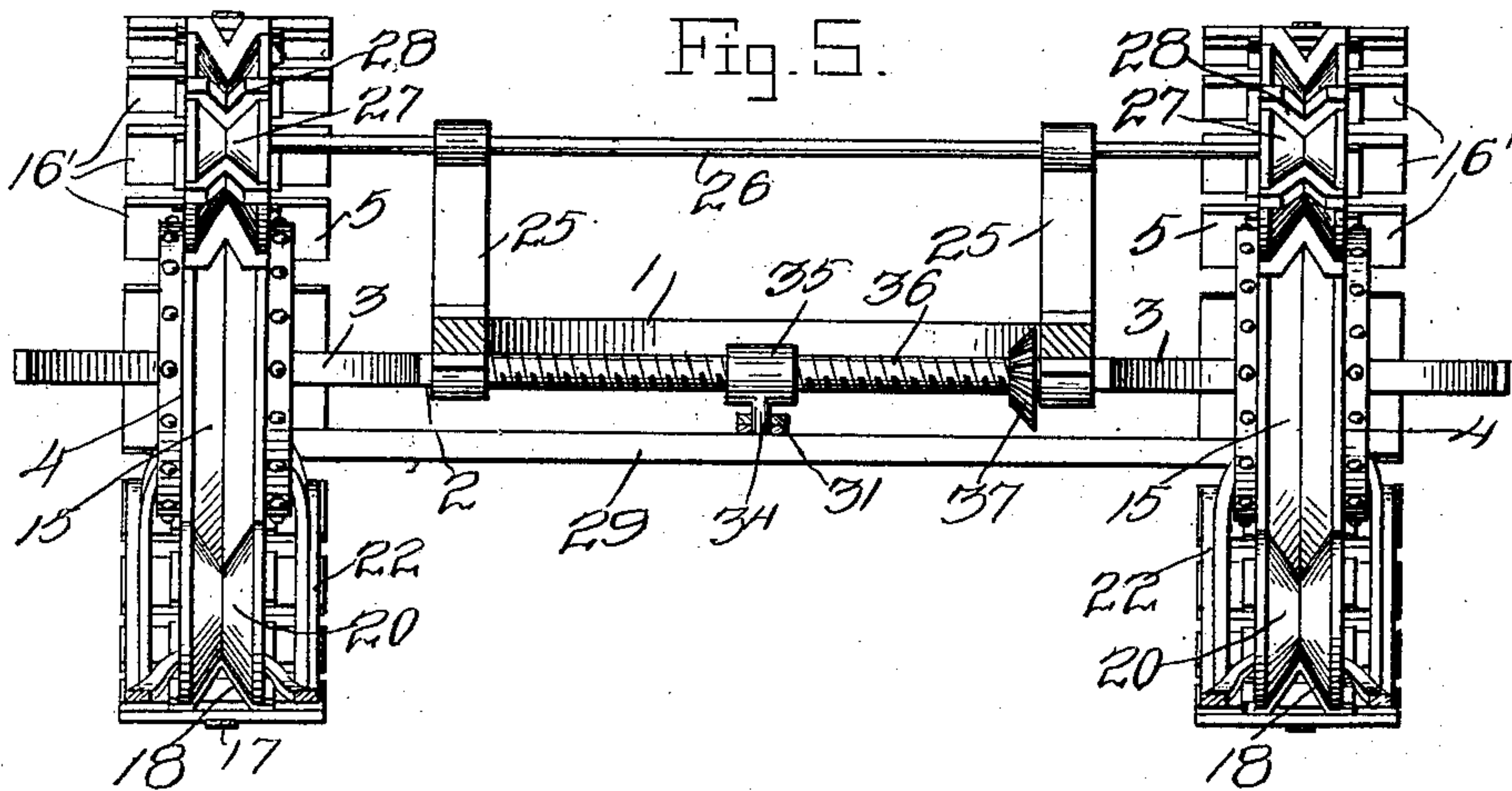
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NO MODEL.

4 SHEETS—SHEET 4.



Witnesses

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UNITED STATES PATENT OFFICE.

HARVEY BECKWITH, OF OAKLAND, CALIFORNIA.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 754,409, dated March 15, 1904.

Application filed August 24, 1903. Serial No. 170,572. (No model.)

To all whom it may concern:

Be it known that I, HARVEY BECKWITH, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Traction-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in traction-engines or self-propelled vehicles adapted to carry a load of any description or to haul cars, sleds, or the like.

The invention consists in a machine of this character which is adapted to lay down and pick up its own track or road-bed as it moves along, or, in other words, the machine carries portable track-rails in the form of endless belts which both connect and drive the supporting-wheels and upon which said wheels run.

The invention further consists in providing novel means for propelling the machine and moving the flexible belts or track-rails and in providing means for steering and turning the machine.

The object of the invention is to provide a simple, strong, durable, and efficient machine of this character which is particularly adapted for traveling over muddy or sandy roads or over any soft or rough ground.

With this and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, as will be more fully described, and particularly pointed in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation of my improved traction-engine. Fig. 2 is a top plan view of the same. Fig. 3 is an end elevation. Fig. 4 is a horizontal sectional view showing the steering mechanism, supporting-wheels, and portable tracks in position for turning the machine. Fig. 5 is a vertical transverse sectional view taken through the center of the machine. Fig. 6 is a detail perspective view of the under side of one of the slats of the endless belts or tracks. Fig. 7 is a detail sectional view through one of the drive-wheels and a portion of its belt.

In the embodiment of my invention as illustrated in the accompanying drawings I provide a suitable frame 1, which is preferably of metal and rectangular in shape, with rounded corners. Secured transversely adjacent to the ends of the frame by suitable clamps are axles 2, the ends 3 of which are curved or arc-shaped and preferably square in cross-section. The two ends 3 upon the same side of the frame curve toward each other, and their degree of curvature is the arc of a circle formed by a radius which is equal to one-half the distance between the centers of the two ends upon the same side of the frame. Upon these curved ends of the axles supporting-wheels 4 are slidably mounted and connected by flexible endless belts 5, which connect and drive said wheels and also serve as movable track-rails for the same, as hereinafter described.

Each of the supporting-wheels comprises in its construction a sliding center bearing or spindle 6, upon which the wheel proper, 7, rotates. Said center bearing consists of two disks 8 and 9, which are bolted together to form an annular groove 10 between them, and they are also formed with a square arc-shaped opening 11, through which the square arc-shaped ends 3 of the axles project. Upon the inner disk of each bearing is an eye or apertured lug 12, the purpose of which will be hereinafter explained. Each of the wheels consists of a hub 13, provided with an inner annular rib or tongue 14, which is adapted to engage the groove 10 in the center bearing or spindle, and of a V-shaped periphery 15 and connecting-web 16, which are formed of two disks bolted or riveted together and to the hub 13. The endless belts 5, which pass about the two supporting-wheels upon each side of the frame, are adapted to engage the V-shaped peripheries 15 of said wheels.

The endless belts 5 consist of a plurality of slats 16', which are pivotally connected at their centers by links 17, which comprise U-shaped bolts 17^a, the ends of which are passed through apertures in the slats and are united by flat plates 17^b, as clearly shown in Fig. 7. The slats may be of any desired material, size, and construction, but are preferably flat rectangular wooden or metal strips of suitable length and

breadth. Secured transversely to the center of each slat upon its inner or under side is a V-shaped lug or block 18, having its ends beveled, as shown at 19 in Figs. 6 and 7. These V-shaped lugs or blocks 18 form the tread of the flexible moving track-rails 5, and the V-shaped grooves 15 in the peripheries of the wheels engage with and run upon the same.

In order to strengthen the lower stretches or runs of the belts or endless track-rails 5, which bear upon the road or ground, and in order to provide a pivot for the same when the machine is turned, as hereinafter described, I provide an idler-wheel 20 upon each side of the frame, which is disposed centrally between the supporting-wheels and is journaled upon a depending hanger or bracket 21, secured to the frame 1. The peripheries of these wheels 20 are formed with V-shaped grooves to engage the V-shaped lugs or blocks upon the belts. To further brace the lower portion of the belts or track-rails to limit their turning or twisting movement when passing over rough ground, I provide upon each side of the wheels curved braces 22, which are carried by the center bearings or spindles 6, to which they are secured by the bolts which fasten the parts 8 and 9 of said bearings together. The inner ends of said braces are loosely connected by links 23 to the opposite ends of brace-frames 24, secured to the lower ends of the brackets 21 and within which the wheels 20 are disposed.

In order to drive or propel the machine, I journal in suitable bearings 25 upon the top of frame 1, at its center, a transverse drive-shaft 26, upon the ends of which are drive-wheels 27, which engage the under side of the upper stretches or runs of the endless belts. Said drive-wheels have V-shaped peripheries, in which flanges or ribs 28 are formed to act as sprocket-teeth to enter between and engage the ends of the lugs of blocks 18 upon the belts 5, as clearly shown in Fig. 7 of the drawings. The drive-shaft 26 is geared to or connected up with a motor of any description, preferably a steam or gas engine, which may be mounted at any convenient point and in any desired manner upon the frame 1. A suitable reversing-clutch may also be provided to permit the drive-shaft to be rotated in either direction to move the machine forward or backward, and, if desired, the bearings of the drive-shaft may be made adjustable in order to take up any slack in the belts 5 and to vary their tension.

In order to steer and turn the machine, I provide means for simultaneously turning all the supporting-wheels and the belts or track-rails at angles with respect to the frame 1. To accomplish this, I connect together the two wheels 4 upon each axle by bars 29, the ends of which are bent at right angles and engaged in the apertured lugs 12 upon the center bear-

ings 6 of the wheels. At the centers of the bars 29 are pins or studs 30, which have a sliding engagement with elongated openings in levers 31, the outer ends of which are pivoted at 32 in the centers of the ends of the frame 1 upon its under side. The inner ends of these levers overlap and are formed with registering elongated openings or apertures 33, into which a stud or stem 34 of a screw-nut 35 projects and has a sliding movement. Said nut operates upon a transversely-disposed screw-rod 36, the ends of which are journaled in bearings secured to the under side of the frame 1. Adjacent to one end of said screw-rod is secured a beveled gear 37, which meshes with a similar gear 38 upon one end of a longitudinal shaft 39, mounted in bearings upon the under side of frame 1. To the rear end of said shaft 39 is secured a sprocket-wheel 40, which is adapted to be connected up with the engine-shaft or with any suitable power-shaft. It will be seen that when motion is imparted to the shaft 39 the screw-rod 36 will be rotated and the nut 35 will be moved along said screw-rod in either direction. The movement of the screw-rod will operate the levers, which will in turn move the connecting-bars 29 to slide the center bearings 6 upon the curved ends 3 of the axles. These ends 3 are so disposed, as previously stated, that all of the wheels will assume the desired angle and will of course carry the belts or track-rails 5 with them, as clearly shown in Fig. 4 of the drawings. The idler-wheels 20 and the drive-wheels 27 being upon each side of the machine and in engagement with the center of each of the stretches or runs of the belts will act as pivots for the portions of the belts which assume an angular position with respect to each other as the wheels are turned. Since said wheels are in the center and act as pivots, the turning or movement of the center bearings 6 of the wheels will cause neither slackness or increase tension in the belts 5.

Suitable clutch mechanism (not illustrated) may be provided for throwing the gearing which connects the shaft 39 and the engine-shaft into and out of operation. This clutch mechanism is ordinarily operated by hand; but, if desired, suitable trips may be provided upon each side of the machine to operate said clutch mechanism and throw the gearing out of operation when the nut 35 has reached the limit of its movement to either end of the screw-rod 36. These trips 41 consist of levers 42, secured upon rocking shafts or rods 43, which extend longitudinally to the end of the frame 1. The levers 42 are adapted to be engaged and operated by the nut 35, and suitable connections (not illustrated) may be provided between the said clutch mechanism and levers or arms 44 upon the rear ends of the shafts 43.

The operation of my invention will be readily understood from the foregoing description, taken in connection with the accompanying

drawings. By applying power to the drive-shaft 26 to rotate the same the belts 5 will be set in motion to move the machine either forwardly or rearwardly, as desired. Said
 5 belts, it will be observed, not only serve as drive-belts, but also act as moving track-rails upon which the supporting-wheels run, and thus the machine carries its own track or road-bed, which may be of any desired breadth to
 10 enable the machine to move over any kind of ground.

The machine may be readily steered and turned about to either side by applying power to the shaft 39, as previously described, and
 15 since all the wheels are turned at once quite a short turn may be made with the machine.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the prin-
 20 ciple or sacrificing any of the advantages of this invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

25 1. In a machine of the character described, the combination with a suitable frame having supporting-wheels, of endless belts surrounding the peripheries of said supporting-wheels and serving as moving track-rails for the same,
 30 means for imparting motion to said belts to drive said wheels, and means for turning said wheels and belts at angles with respect to the frame in order to steer the machine, substantially as described.

35 2. In a machine of the character described, the combination of a frame, axles carried by said frame and having arc-shaped ends, sliding spindles or bearings mounted upon said ends, supporting-wheels mounted to rotate
 40 upon said spindles, and means for shifting said spindles to turn the wheels at angles with respect to the frame, substantially as described.

45 3. In a machine of the character described the combination of a frame, axles carried by said frame and having arc-shaped ends, sliding spindles or bearings mounted upon said ends, supporting-wheels mounted to rotate upon said spindles, and means for shifting
 50 said spindles upon the arc-shaped ends of the axles, endless belts surrounding the peripheries of said wheels and serving as moving track-rails for the same, and means for driving said belts to propel the machine, substantially as described.

55 4. In a machine of the character described the combination of a frame, axles carried by said frame and having arc-shaped ends, sliding spindles or bearings mounted upon said ends, supporting-wheels mounted to rotate upon
 60 said spindles, bars connecting the sliding spindles, pivoted levers having a loose connection with said bars and means for operating said levers, substantially as described.

5. In a machine of the character described,

the combination of a frame, axles carried by 65 said frame and having arc-shaped ends, sliding spindles or bearings mounted upon said ends, supporting-wheels mounted to rotate upon said spindles, bars connecting the sliding spindles, pivoted levers having a loose connection 70 with said bars, a screw-rod upon said frame, a nut upon said screw-rod having a loose connection with said levers, and means for rotating said screw-rod, substantially as described.

6. In a machine of the character described, 75 the combination of a frame, axles carried by said frame and having arc-shaped ends, sliding spindles or bearings mounted upon said ends, supporting-wheels mounted to rotate upon said spindles, bars connecting the sliding spindles, pivoted levers having a loose connection 80 with said bars, a screw-rod upon said frame, a nut upon said screw-rod having a loose connection with said levers, means for rotating said screw-rod, endless belts surrounding the 85 peripheries of said supporting-wheels and serving as track-rails for the same, and means for driving said belts to propel the machine, substantially as described.

7. In a machine of the character described, 90 the combination of a frame, axles carried by said frame and having arc-shaped ends, spindles or bearings slidably mounted upon said ends and formed with grooved peripheries supporting-wheels formed with grooved periph- 95 eries and with annular ribs in their hub to engage said grooves in the spindles, endless belts surrounding said supporting-wheels and formed of linked slats having lugs or blocks adapted to engage the grooved peripheries of 100 the wheels, means for driving said belts, and means for adjusting said sliding spindles upon the arc-shaped ends of the axles, substantially as described.

8. In a machine of the character described, 105 the combination of a frame, axles carried by said frame and having arc-shaped ends, spindles or bearings slidably mounted upon said ends and formed with grooved peripheries supporting-wheels formed with grooved pe- 110 ripheries and with annular ribs in their hubs to engage said grooves in the spindles, endless belts surrounding said supporting-wheels and formed of linked slats having lugs or blocks adapted to engage the grooved peripheries of 115 the wheels, a drive-shaft, drive-wheels upon said shaft adapted to engage the lugs or blocks upon said belts, and means for adjusting said sliding spindles upon the arc-shaped ends of the axles, substantially as described. 120

9. In a machine of the character described, the combination of a frame, supporting-wheels for said frame formed with grooved periph- 125 eries, endless belts surrounding said supporting-wheels and formed of linked slats having lugs or blocks adapted to engage the grooved peripheries of said wheels, a drive-shaft, and drive-wheels upon said shaft adapted to en-

gage the lugs or blocks upon said belts to impart motion to the same and thereby propel the machine, substantially as described.

10. In a machine of the character described, 5 the combination of a frame, supporting-wheels for the same, endless belts surrounding the peripheries of said wheels and adapted to serve as moving track-rails for the same, and braces upon the side of said wheels adapted to limit 10 the turning or twisting of said belts, substantially as described.

11. In a machine of the character described, the combination of a frame, supporting-wheels 15 for the same, endless belts surrounding the peripheries of said wheels and adapted to serve as moving track-rails for the same, depending hangers or brackets upon said frame having bracing-frames at their lower ends, and braces upon each side of said wheels having a loose 20 connection with said bracing-frames, said braces and bracing-frames being adapted to limit the turning or twisting of the belts upon the ground, substantially as described.

12. In a machine of the character described, 25 the combination of a frame, axles carried by said frame and having arc-shaped ends, sliding spindles or bearings mounted upon said ends, means for adjusting said spindles upon said ends, supporting-wheels mounted to rotate 30 upon said spindles, endless belts surrounding the peripheries of said wheels, depending hangers upon said frame, wheels journaled in said hangers and engaging the centers of the lower stretches or runs of the belts, a shaft 35 journaled in bearings upon said frame, and wheels upon said shaft engaging the centers of the upper stretches or runs of the belts, said wheels upon the shaft and hangers being adapted to serve as pivots for the belts when the

sliding spindles are adjusted to steer the machine, substantially as described. 40

13. In a machine of the character described, the combination of a frame, axles carried by said frame and having arc-shaped ends, sliding 45 spindles or bearings mounted upon said ends, means for adjusting said spindles upon said ends, supporting-wheels mounted to rotate upon said spindles, endless belts surrounding the peripheries of said wheels, depending 50 hangers upon said frame, idler-wheels journaled in said hangers and engaging the centers of the lower stretches or runs of the belts, a drive-shaft journaled in bearings upon said frame, drive-wheels upon said shaft and engaging 55 the centers of the upper stretches or runs of the belts, a brace secured upon each side of the spindles or bearings of the supporting-wheels, and brace-frames secured upon the lower ends of said hangers and having a loose connection with said brace, substantially 60 as described.

14. A machine of the class described, having curved axles, wheels mounted thereon, and movable angularly and laterally and flexible 65 traction elements connecting said wheels.

15. A machine of the class described, having curved axles, supporting-wheels on said axles, movable laterally and angularly, and 70 traction-belts connecting said wheels, said belts being laterally flexible.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HARVEY BECKWITH.

Witnesses:

F. T. MERRITT,
W. A. KEENE.