

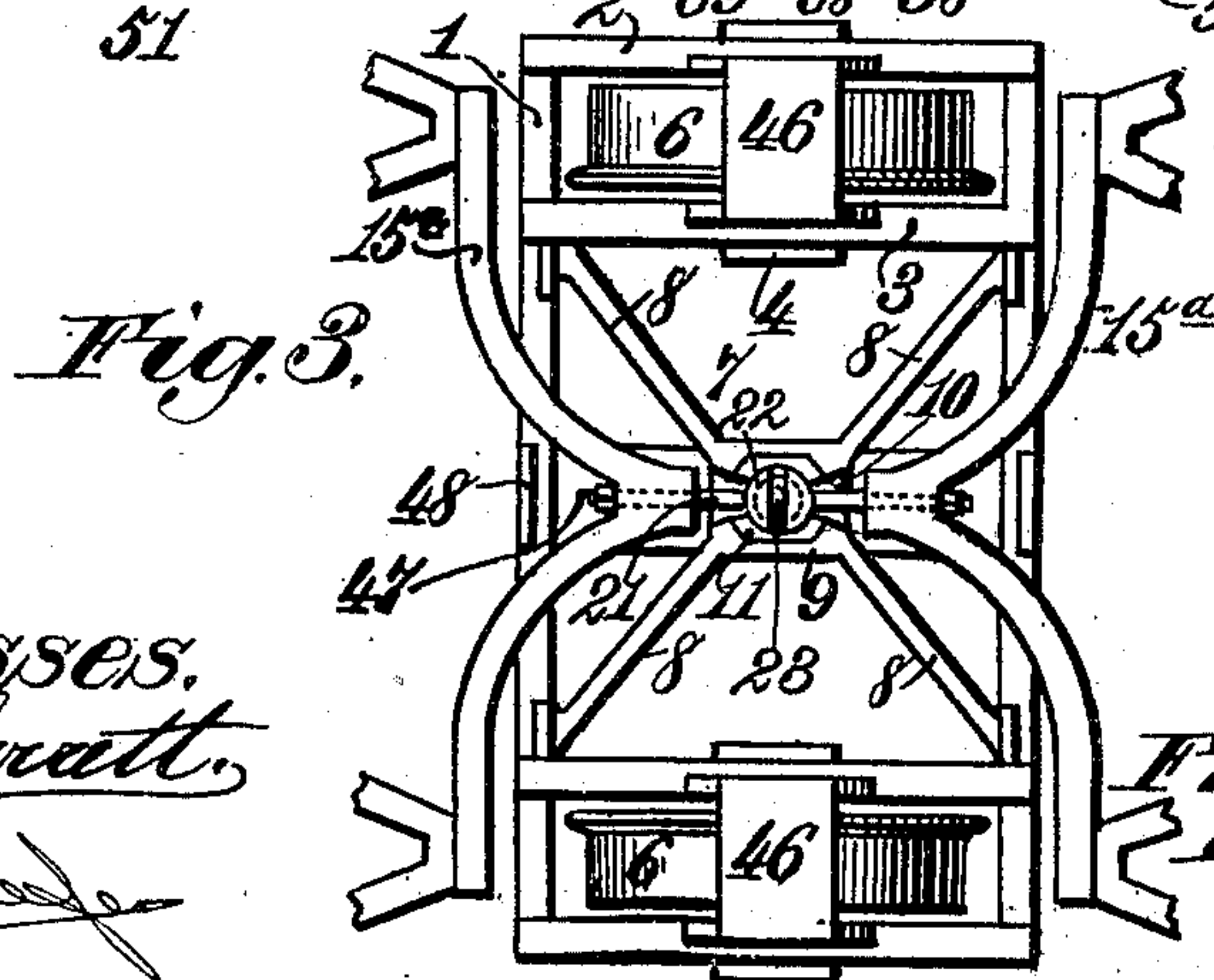
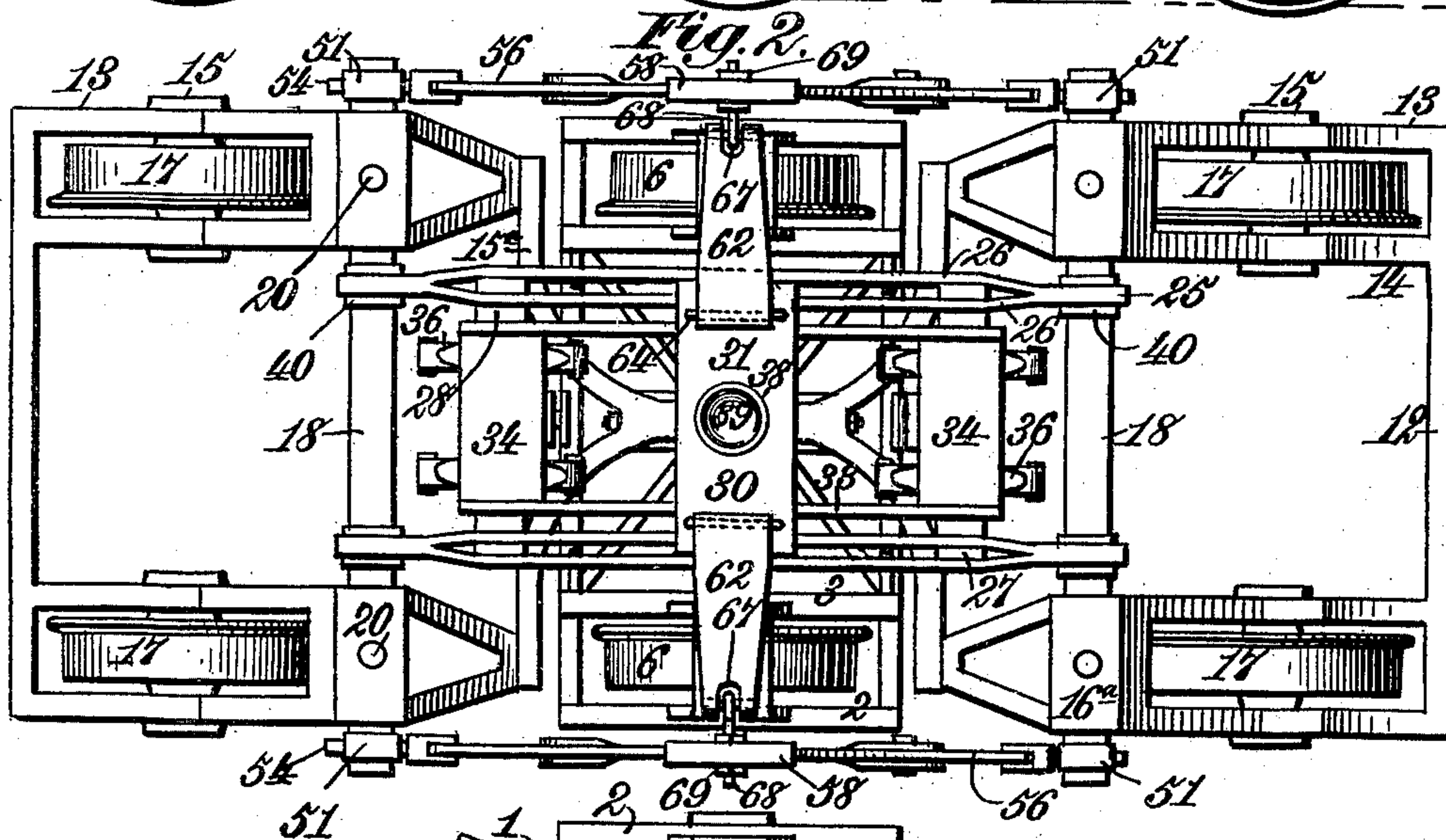
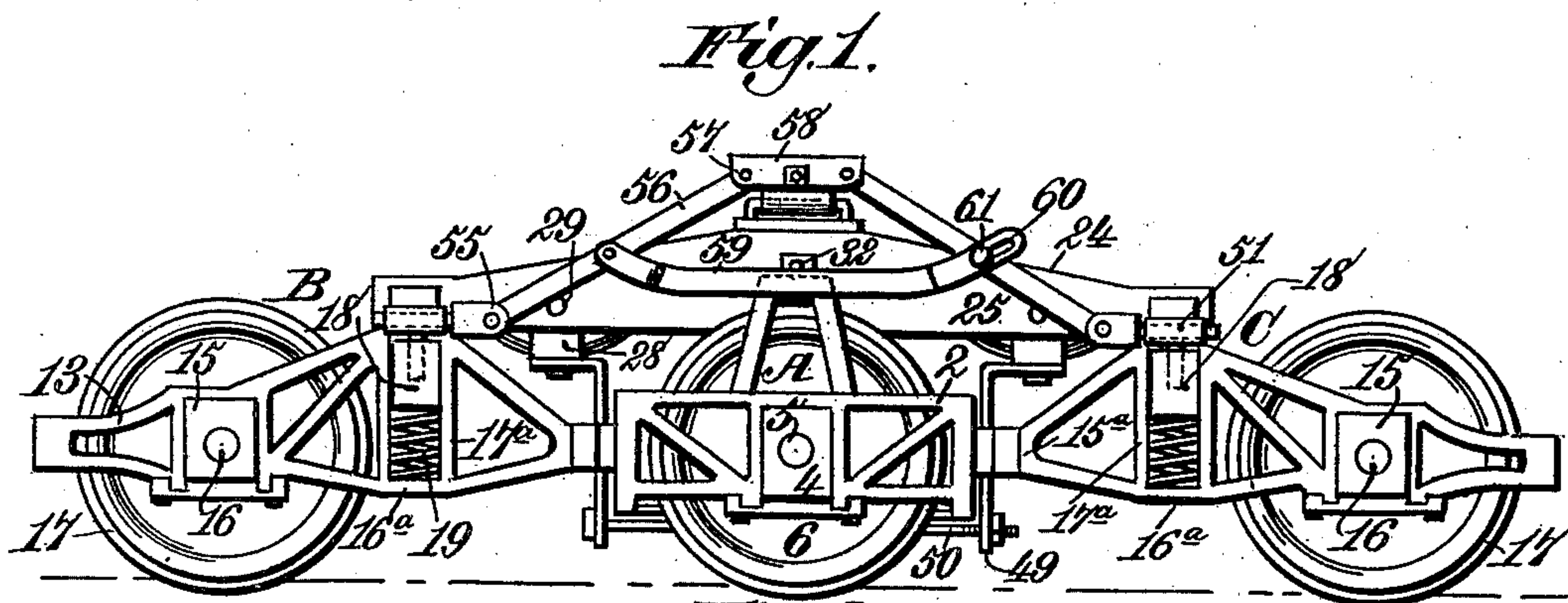
No. 693,672.

Patented Feb. 18, 1902.

F. F. SHAFFER.
RAILWAY CAR TRUCK.
(Application filed Oct. 22, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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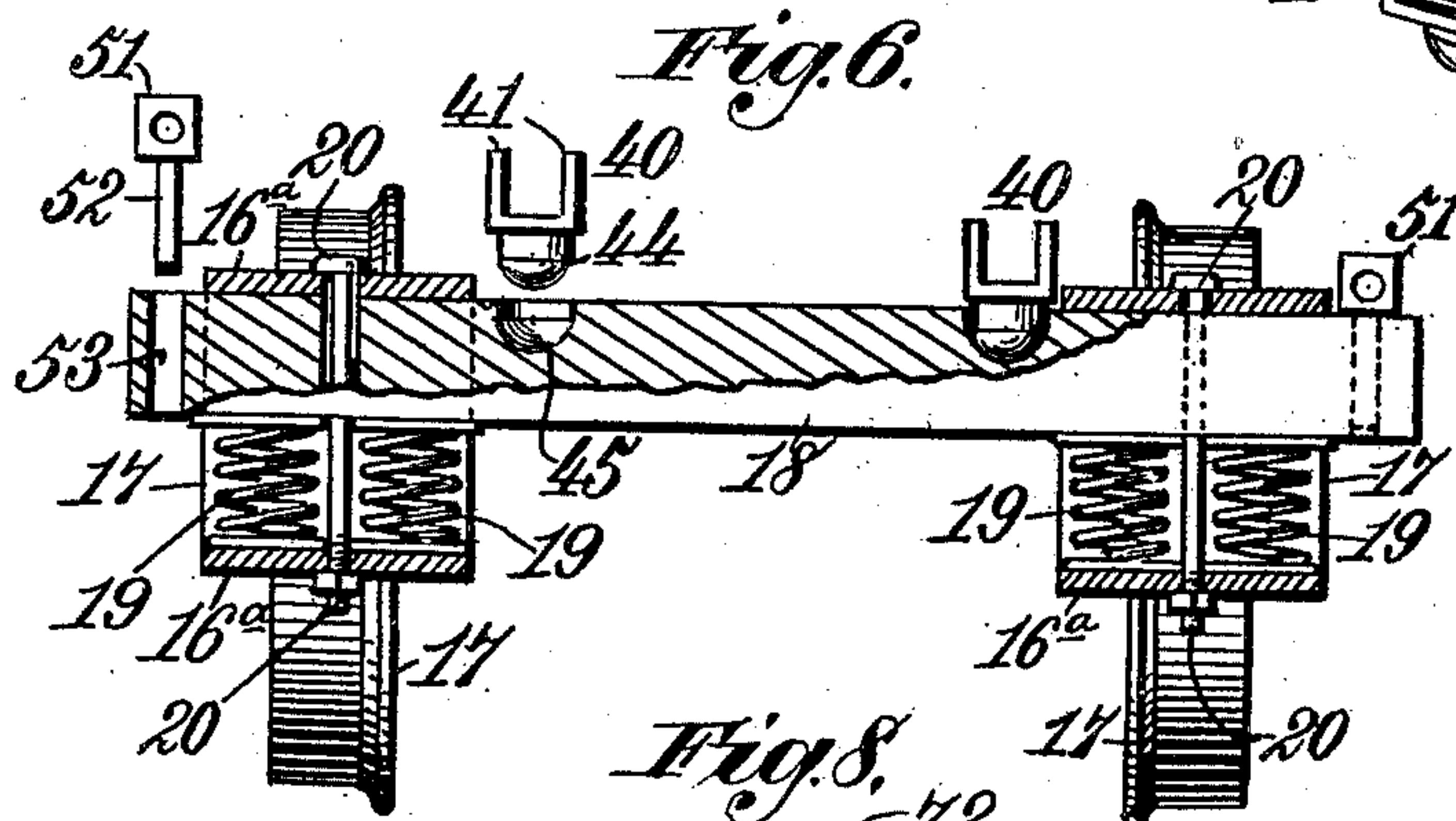
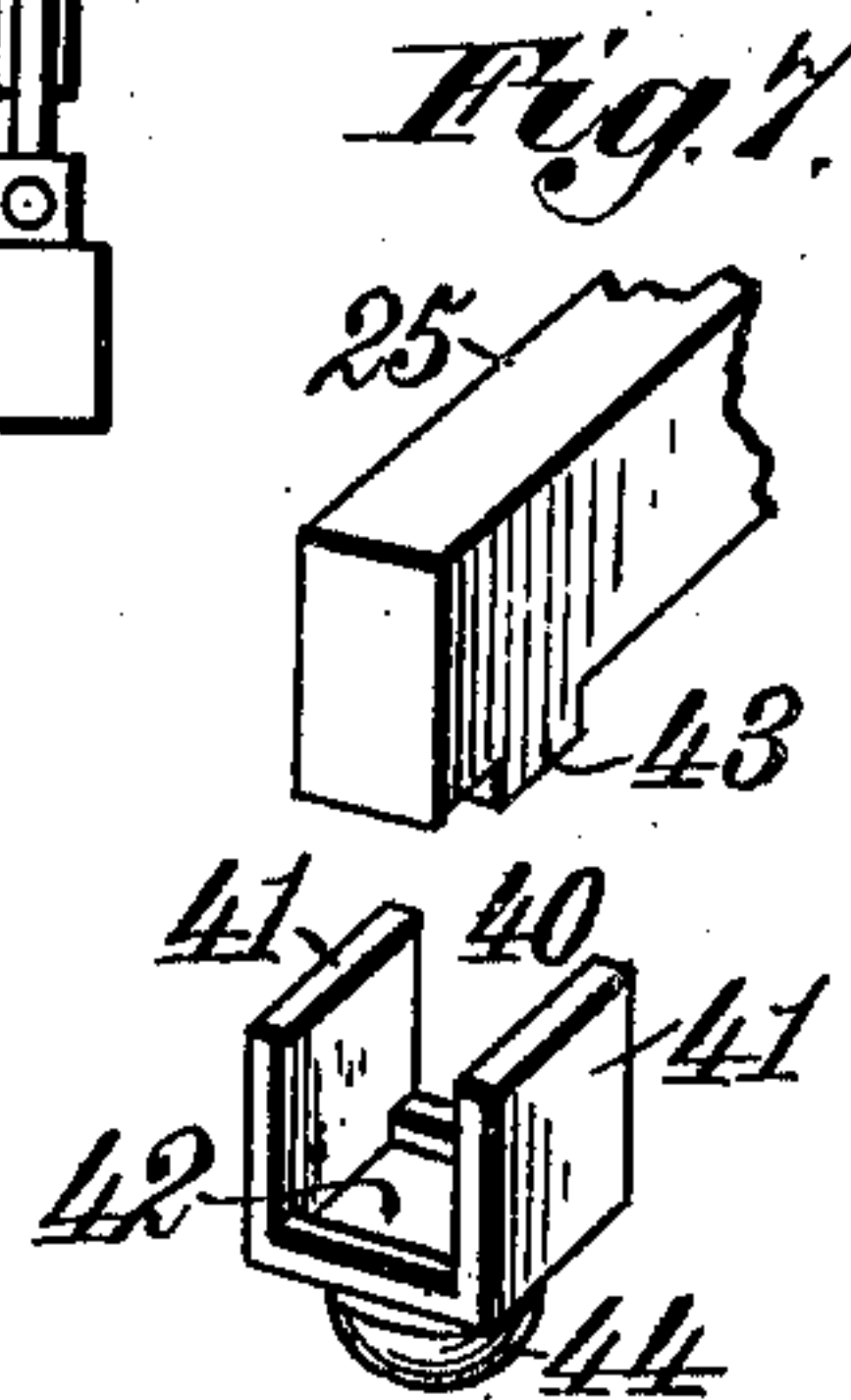
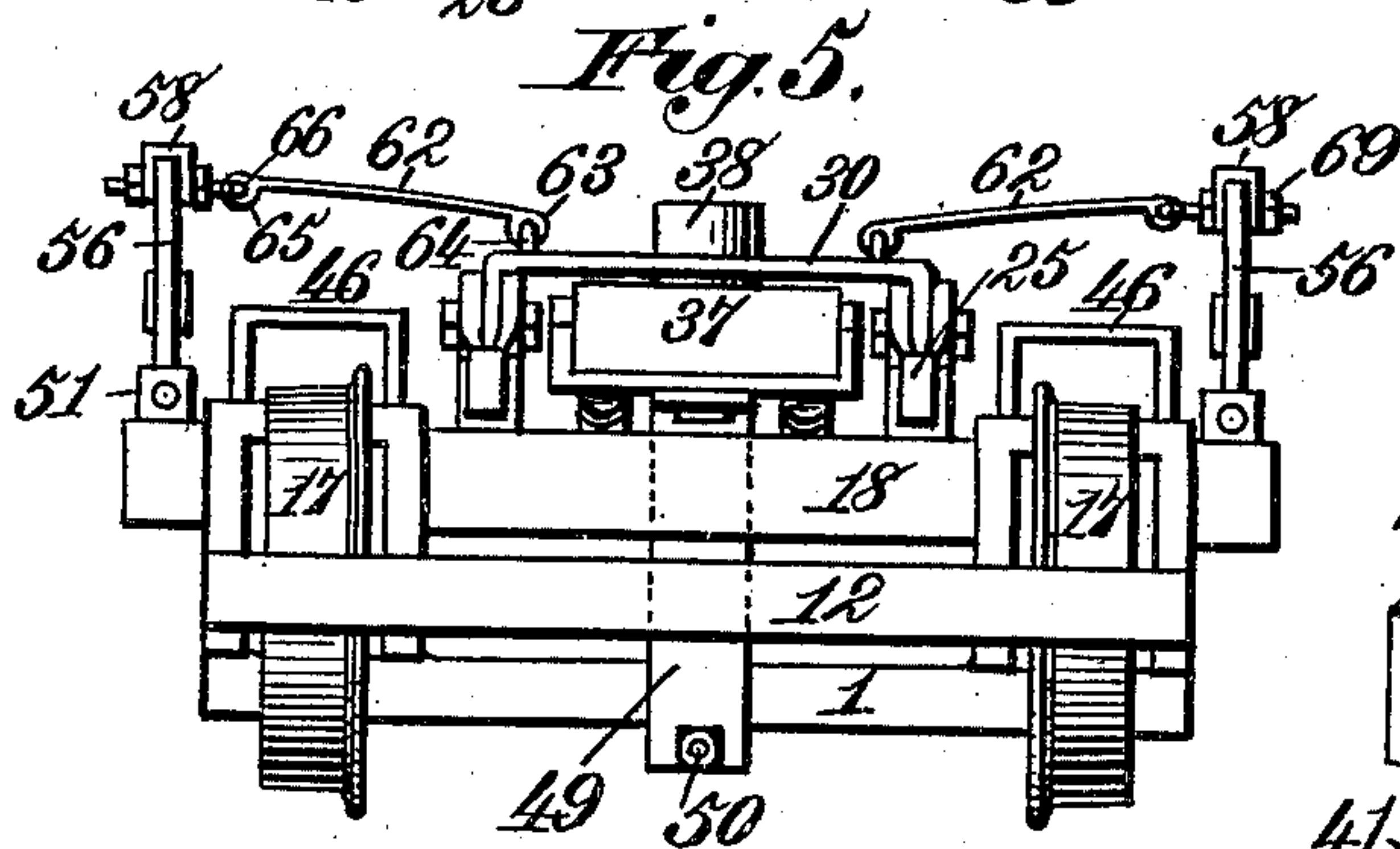
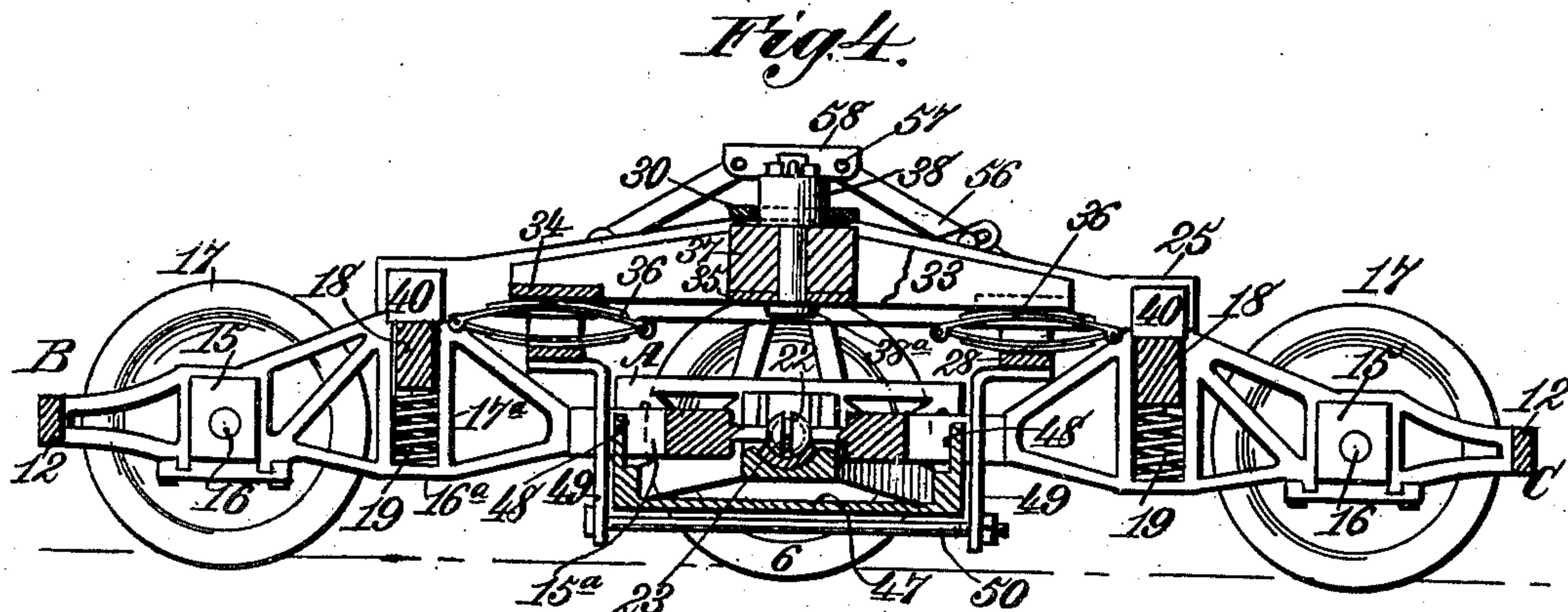
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(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

FRANCIS F. SHAFFER, OF CUMBERLAND, MARYLAND.

RAILWAY-CAR TRUCK.

SPECIFICATION forming part of Letters Patent No. 693,672, dated February 18, 1902.

Application filed October 22, 1901. Serial No. 79,599. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS F. SHAFFER, a citizen of the United States, residing at Cumberland, in the county of Allegany and State of Maryland, have invented new and useful Improvements in Railway - Car Trucks, of which the following is a specification.

This invention relates to railway-car trucks, and has for its object, first, to provide an improved sectional truck the sections of which are flexibly connected together in such manner that the car may readily turn sharp curves at a high speed with perfect safety and with slight wear on the wheel-flanges and rails.

It also has for its object to so construct such trucks that the weight of the car will be equally supported on all the wheels.

It has for another object to provide improved means for automatically maintaining the equipoise of the car in turning curves.

Finally, it has certain other objects in view, which will hereinafter be made apparent.

To these several ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a view in side elevation of my improved truck. Fig. 2 is a top plan view. Fig. 3 is a top plan view of the central section and the inner ends of the end sections, the bed-frame or platform being removed. Fig. 4 is a vertical central sectional view of the truck. Fig. 5 is a view in end elevation. Fig. 6 is a detail sectional view illustrating one of the bolsters and its spring-supports and the shoes carried by the bolster, and Fig. 7 is a detail view of one of said shoes and one end of one of the bed-frame or platform beams. Fig. 8 is a detail view illustrating a modified construction of the means employed for supporting the sides of the car.

In constructing my improved truck I make it in three independent sections, respectively indicated by the letters A, B, and C, the letter A indicating the central section and the letters B and C the end sections. The central section A comprises a rigid rectangular frame consisting of two side beams 1 and end beams 2, transverse beams 3 being arranged

between the side beams 1 a suitable distance from the end beams 2 and parallel with the latter. The frame is preferably made of metal and the parts described cast in one integral structure; but this is not essential. The beams 2 and 3 form supports for journal-boxes 4, of usual construction, in which are journaled axles 5, each having mounted thereon a car-wheel 6. As will be observed, each car-wheel will thus be mounted on an independent axle, and the wheels are thus enabled to turn independently of one another, whereby in turning curves each wheel will rotate no faster or slower than is actually necessary, thereby avoiding the grinding action of the wheels on the rails which always occurs in such case where the wheels are rigidly mounted in pairs on an axle common to both. Supported centrally in the frame is a spider 7, consisting of four arms or webs 8, disposed at approximately right angles to one another and united at their outer ends to the side beams 1 of the frame and converging at their inner ends and terminating in a hollow boss or boxing 9. The spider may be either cast integrally with the frame or may be bolted or otherwise suitably fastened thereto. The front and rear sides of the boss or boxing 9 are vertically slotted, as at 10, and removably fitted in said boxing is a brass or bearing-block 11, of Babbitt or other suitable antifriction metal, for the purpose hereinafter explained.

The truck-sections B and C are exact duplicates of one another, and the description of one of them therefore will suffice for both. Each of said sections consists of a frame comprising a transverse beam 12, to each end of which are connected the ends of two parallel beams 13 and 14, which form supports for journal-boxes 15. In each pair of journal-boxes 15 is journaled an axle 16, on which is rigidly mounted a car-wheel 17, the two car-wheels being independently rotatable in the manner before described. As clearly shown in the drawings, the beams 13 and 14 are of skeleton formation for the sake of lightness, and said beams at their ends opposed to the transverse beam 12 are connected to the ends of a yoke 15^a. Each pair of beams 13 and 14 between the car-wheel 17 and the end of the yoke 15^a is formed with horizontal webs 16^a and vertical braces 17^a, which form a hous-

ing, and in said housings are fitted the ends of a transverse bolster 18, which is adapted to have a free vertical movement therein. The ends of the bolster rest on coiled springs 19, which are fitted in the housings between the ends of the bolster and the lowermost webs 16^a of the housings, whereby the bolsters are yieldingly supported in place. The bolsters are held against endwise displacement by bolts 20, that pass through the webs 16^a and through the ends of the bolster, the arrangement being such that while the bolster is prevented from moving longitudinally in the housings by said bolts they nevertheless are free to move vertically therein to the extent such movement will be permitted by the springs. Fixed centrally in the end of the yoke 15^a is a pin or shank 21, terminating at its outer end in a cup-shaped head 22. The shanks 21 of the two sections B and C fit loosely in the slots 10 of the boss or boxing 9, carried by the central section A, the heads 22 of said shanks resting on the bearing-block 11 and inclosing between them an antifric-tion steel ball 23. As shown, the bearing-block consists of a rectangular metallic block arranged to closely fit the boxing and having a concave upper side on which the cup-shaped heads 22 are adapted to freely and easily move in every direction. Said heads and the interposed antifric-tion ball 23 constitute a species of universal ball-bearing joint which will flexibly connect the two sections B and C to the section A and to each other, or, in other words, the sections B and C will readily assume different angular positions relatively to the central section A and to one another.

It will be observed from the foregoing description that each of the sections B and C is supported at one end by the car-axles 16 and at its other end by the boss or boxing 9, carried centrally by the central section A in line with the axles 5, and as the bolsters 18 support the car, as will presently be explained, the weight of the car will be sustained by the axles of the respective sections A, B, and C. As clearly shown in the drawings, the bolsters are supported on the sections B and C at points distant from the axle 16 substantially equal to one-third the distance between said axles and the axles 5. Hence it follows that two-thirds of the weight supported by each bolster will be sustained by one pair of the axles 16 and one-third by the axles 5; but as the axles 5 sustain one-third of the weight supported by each bolster it follows that each pair of axles 5 and 16 will support an equal weight, or one-third of the entire weight supported by the truck, thereby equally distributing the weight upon all the axles.

The car is supported on the bolsters in the following manner: Straddling said bolsters is a bed-frame or platform 24, constructed and supported on the bolsters as follows: The numeral 25 indicates two parallel longitudinal beams, each preferably consisting of two

slightly-arched metallic plates 26, rigidly bolted or riveted together, said plates at their opposite ends being welded or otherwise suitably secured together, as shown. Said beams 25 are rigidly united near their opposite ends by U-shaped hangers 28, each consisting of a strong metallic strap having its ends bent upward at right angles, as at 27, and inserted between the plates 26, to which they are firmly bolted or riveted, as at 29. Said beams are united at the center by a cross-brace 30, consisting of a U-shaped metallic plate 31, the ends of which are bent downward at right angles and are inserted between the plates 26, to which they are bolted by bolts 32. Arranged between the beams 25 is a pillow-beam consisting of two parallel metallic plates 33, united at their ends by transverse horizontal webs 34 and midway between their ends by a similar web 35, said webs being preferably formed integral with the plates 33. Longitudinal elliptic springs 36 are disposed between the end webs 34 of the pillow-beam and the hangers 28 and operate as yielding or elastic supports for said beam. Disposed between the central web 35 and the cross-brace 30 is a pillow-block 37, in which is fitted an upwardly-projecting pedestal 38, that projects loosely through a suitable aperture formed in the cross-brace 30 and is provided on its upper end with a cup-shaped or concave socket 39, in which is stepped the lower rounded end of the king-bolt or pintle attached to the bottom of the car-bolster, as usual. The pedestal passes through the pillow-block 37 and through the web 35 and has an enlargement head or nut 38^a on its lower end, which operates to hold the pedestal and pillow-block in place. The ends of the beams 25 rest loosely in shoes 40, each consisting of a casing having vertical sides 41 and open ends, as shown, the bottom of the casing having a recess 42 formed in its upper side, forming a tray or receptacle adapted to contain oil or other suitable lubricant. The ends of the beams 25 rest in said shoes between the vertical sides 41 thereof and are freely movable therein, and on the bottom of the ends of said beams are formed depending flanges or projections 43, that project down into the recesses 42 in the bottoms of the shoes. The projections 43 are of less length than said recesses in order to permit of the movement between the shoes and beams and act as guides which aid in maintaining the beams in place in the shoes. Each of the shoes is provided on its under side with a tenon 44, having a semispherical or rounded end which rests in a correspondingly-shaped concavity or socket 45, formed in the upper side of the bolster. In rounding a curve the tenons are free to turn in the sockets with but little friction, and by supplying the receptacles 42 in the shoes with oil the ends of the beams will likewise freely move in the shoes to accommodate themselves to the angular movement of the bolsters.

By means of the arrangement shown it will be readily seen that the weight of the car is supported by the bed-frame 24, which straddles the bolsters, and by the latter is equally distributed to the three truck-sections A, B, and C. When the car strikes a curve, the wheels 17 of the end truck-sections in following the curve shift said end truck-sections B and C laterally to one side, said sections turning about the boss or boxing 9 on the center of the central section as a center, and hence all the axles of the three truck-sections will be truly radial to the curve described by the rails, and hence the wheels will travel around the curve with a minimum of friction, wear, and resistance. This lateral shifting movement of the end truck-sections is permitted by flexibly connecting said sections centrally to the central section by the ball-and-socket joint, as stated, and by movably seating the ends of the bed-frame in the shoes, which in turn are rotatably supported on the bolsters, as before explained, and by pivotally connecting the car to the truck at but one single and central point. By thus shifting the end sections B and C laterally under the car toward the shorter or inner curve a firm and secure support for the car is thus interposed on the low side of the track, thus supplying an additional element of safety.

In practice inverted-U-shaped wheel-guards 46 are formed with or attached to the end beams 2 and 3 of the central section A and extend up vertically from the upper side of the latter and straddle the wheels 5 and guard the latter from any possible contact with the sides of the bed-frame. With a view also to strengthening the central section A, I cast with or fasten to the side beams 1 of said frame a central cross-beam 47, and I also provide the beams 1 with central vertical projections or standards 48, that project up between the sides of the yokes 15. Pendent from the hangers 28 are vertical arms 49, which respectively pass down in front and rear of the standards 48 and below the frame of the central section A and are rigidly connected together at their lower ends by a tie-rod 50. This arrangement guides and limits the vertical movement of the bed-frame on its springs.

In constructing railways it is the universal practice to make the outer rail on curves higher than the inner rail, so that the outer wheels will be raised higher than the inner wheels, so as to resist the centrifugal force of the car in rounding the curve and overcome the tendency of the car to leave the track. This usually results in causing the car to lean to one side toward the lower or inner rail, and in order to prevent such leaning of the car and to automatically maintain its equipoise I provide the following mechanism: Disposed between the ends of the bolsters carried by the end sections of the truck are toggle-lever mechanisms, constructed as follows, the mechanism on one side of the truck being the duplicate of that on the other, and a descrip-

tion of one will therefore suffice for both. Swiveled on each end of each bolster is a bearing comprising a sleeve 51, provided intermediate its ends with a pendent pintle 52, that is rotatably fitted in a vertical perforation or socket 53, formed in the bolster. Movably fitted in each sleeve is a rod or pin 54, which is provided at its inner end with a bifurcated head 55. Pivoted in each of the heads 55 is one end of a bar or lever 56, and the adjacent ends of each corresponding pair of said levers or of each pair of said levers on either side of the truck are pivoted, as at 57, to a cap 58, consisting of a metallic bar having an inverted-U shape in cross-section. Each two levers 56 thus connected together form a toggle-lever which is normally arched, as shown, and pivotally connected to one arm of each toggle-lever intermediate the ends thereof is one end of a link 59, the other end of said link being movably or loosely connected to the other arm or member of the toggle-lever in any suitable manner—as, for example, by slotting the end of the link, as at 60, and passing a pin 61 through said slot and through the arm of the toggle-lever. The caps 58 of the toggle-levers bear against the bottom of the car near each side of the latter, and in practice wear-plates (not shown) will be bolted to the under side of the car, against which the caps will impinge.

Normally or when the car is running on a straight portion of the track the bolsters will be perfectly parallel with each other, and the caps 58 will stand at the same height, so that the car will bear with equal weight on both caps, or, more properly speaking, will rest no appreciable portion of its weight on either cap. When the car strikes a curve, however, the end sections B and C assume angular positions relatively to the central section, as before explained, thereby causing the bolsters to lie radially to the curvature of the track. This causes the ends of the bolsters on the inner side of the curve to approach each other and the ends on the outer side of the curve to recede from each other. The sleeves 51 on the proximate ends of the bolsters move the heads 55 thereon toward one another, and thus fold the toggle-lever together, thereby elevating the cap 58 carried by said toggle-lever and raising that side of the car which is on the low side of the curve. At the same time the sleeves on the other ends of the bolsters have receded from one another with the bolsters, thereby permitting the toggle-lever on that side to unfold or spread apart, thus lowering the cap 51, carried thereby, and with it that side of the car which is on the high side of the curve. By such means the car is automatically held in a level position when rounding the curve, while at the same time permitting the wheels to follow the different pitch of the two rails to resist the centrifugal force of the car or the tendency to leave the track. The slotted links described operate to brace the members of the toggle-levers together and

also prevent the members thereof from becoming separated and drawing the rods or pins 54 entirely from the sleeves. In order to hold and brace the toggle-levers in their upright positions, the following means are provided: Pivotally attached to the opposite ends of the cross-brace 30 are the adjacent ends of two vertically-swinging arms 62, the outer or remote ends of said arms being pivotally connected to the caps 58. Said arms operate to prevent the toggle-levers from spreading apart or flexing inwardly and may be conveniently constructed as follows: Each of the arms may consist of a flat metallic plate, one end of which is bent to form an eye or loop 63, which loosely encircles a staple 64, the legs of said staple being loosely fitted in suitable perforations formed in the cross-brace 30. The opposite end of the plate is also bent to form a loop or eye 65, that encircles a pin 66 and is slotted, as at 67. The eye of an eye-bolt 68 is inserted in the slotted end of the plate, and the pin 66 is then driven into the loop 65 and through the eye of the bolt. The threaded end of the bolt is passed through a suitable aperture in the cap 58, and nuts 69 are screwed over said bolt on opposite sides of the cap. Such arrangement permits the ready attachment, removal, and adjustment of the arms and toggle-levers; but it will be manifest that the arms may be pivotally connected to the toggle-levers and bed-frame by various other means.

In Fig. 8 I have illustrated a modified means for supporting the sides of the car against oscillating or swaying movement on its kingbolts or pintles. In the modified arrangement illustrated in said figure of the drawings solid arched bars 70 are substituted for the toggle-levers before described, the ends of said bars being provided with pins 54, that are movably fitted in the sleeves 51 in the same manner as the toggle-levers. Each of said arched bars is preferably stiffened and strengthened by an integral brace 71, which unites the inclined portions of said arched bar, as shown. The apexes 72 of the arched bars 70 bear against the under opposite sides of the car and prevent the latter from oscillating or swaying on its pivotal bearings 39. The arched bars, however, do not operate in any way to raise the low side of the car in turning a curve, as do the toggle-levers before described, said arched bars merely serving as supports for the sides of the car, as described.

I have described my improved truck as being applied to railway-cars, but it will be manifest that it may also be applied to street-cars, and by the term "railway-car truck" I wish to be understood as including street-cars and cars of every kind to which the invention is applicable.

Having described my invention, what I claim is—

65 1. In a railway-car truck, the combination with three wheeled sections, the end sections

being flexibly connected to the central section, of a frame or platform supported at its ends on the end sections and having both an oscillating and an endwise-sliding movement on the latter, and means carried by said frame or platform centrally over the central section for pivotally supporting the car, substantially as described.

2. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected centrally to the central section, of a car-supporting frame or platform supported at its ends on the end sections at points intermediate the wheels of the central and end sections and substantially one-third nearer the wheels of the end sections than the wheels of the central section, whereby the weight of the car is equally distributed on the wheels of all three sections, the ends of said car-supporting frame or platform having both an oscillating and endwise-sliding movement on the end sections, substantially as described.

3. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected at their adjacent ends centrally to the central section, of bolsters carried by and yieldingly supported on the end sections between the wheels of the end and central sections, and a car-supporting frame movably supported at its opposite ends on said bolsters, substantially as described.

4. In a railway-car truck, the combination with three wheeled sections, the inner ends of the end sections being supported on and pivotally connected centrally to the central section, of bolsters carried by and yieldingly supported on the end sections between the wheels of the end and central sections, and a car-supporting frame or platform movably supported at its opposite ends on said bolsters and provided centrally with means for pivotally connecting said frame or platform to the car, substantially as described.

5. In a railway-car truck, the combination with three wheeled sections, the central section being provided centrally with a hollow boss or boxing vertically slotted on its ends, of rods or pins attached to the inner ends of the end sections and each provided with a cup-shaped head, said rods or pins loosely resting in said slots and the cup-shaped heads loosely resting in the boss or boxing, and an antifriction-ball disposed between the concave faces of said cup-shaped heads, substantially as described.

6. In a railway-car truck, the combination with three wheeled sections, the central section being provided centrally with a hollow boss or boxing vertically slotted on its ends, and a brass removably fitted in said boss or boxing and having a concave upper face, of rods or pins attached to the inner ends of the end sections and each provided with a cup-shaped head, said rods or pins loosely resting in said slots and the cup-shaped heads loosely resting in the boss or boxing and on the

brass, and an antifriction-ball disposed between the concave faces of said cup-shaped heads, substantially as described.

7. In a railway-car truck, the combination of three wheeled sections, the end sections being flexibly connected centrally to the central section, and the wheels of each section being each mounted on an independent axle, substantially as described.

8. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected centrally to the central section, and the wheels of each section being each mounted on an independent axle, of a car-supporting frame or platform movably supported at its ends on the end sections at points intermediate the wheels of the end and central sections, substantially as described.

9. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected centrally to the central section, and the wheels of each section being mounted on an independent axle, of a car-supporting frame or platform movably supported at its ends on the end sections at points intermediate the wheels of the end and central sections, and a pivotal support for the car carried centrally by said frame or platform, substantially as described.

10. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected at their inner ends to the central section, of bolsters carried by the end sections between the wheels of the end and central sections, springs on which said bolsters rest, and a car-supporting frame or platform movably supported at its opposite ends on said bolsters, substantially as described.

11. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section, of housings carried by the end sections between the wheels of the end and central sections, springs arranged in said housings, bolsters fitted in the housings and resting on said springs, said bolsters being vertically movable in the housings, and a car-supporting frame or platform movably supported at its opposite ends on said bolsters, substantially as described.

12. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section, of housings carried by the end sections between the wheels of the end and central sections, springs arranged in said housings, bolsters fitted at their ends in the housings and resting on said springs, said bolsters being vertically movable in the housings, bolts passing vertically through the housings and loosely through the bolsters, and a car frame or platform movably supported at its opposite ends on said bolsters, substantially as described.

13. In a railway-car truck, the combination

with three wheeled sections, the end sections being flexibly connected to the central section, of bolsters carried by the end sections between the wheels of the end and central sections, a car-supporting frame or platform movably supported at its opposite ends on said bolsters, and having both an oscillating and endwise-sliding movement thereon, and a pivotal connection for the car yieldingly and centrally supported on said frame or platform, substantially as described.

14. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section, of bolsters carried by the end sections between the wheels of the end and central sections, a car-supporting frame or platform comprising two longitudinal and parallel beams rigidly connected together and movably supported at their ends on the bolsters, a pillow-beam yieldingly supported between said beams, and a pillow-block supported on the pillow-beam and provided with a pedestal on which the car is pivotally mounted, substantially as described.

15. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section, of bolsters carried by the end sections between the wheels of the end and central sections, a car-supporting frame or platform comprising two longitudinal and parallel beams rigidly connected together and movably supported at their ends on the bolsters, hangers pendent from said beams, springs carried by said hangers, a pillow-beam arranged between said beams and seated on said springs, and a pillow-block fixed centrally on the pillow-beam, and provided with a pedestal on which the car is pivotally mounted, substantially as described.

16. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section, of bolsters carried by the end sections between the wheels of the end and central sections, a car-supporting frame or platform comprising two longitudinal and parallel beams rigidly connected together and movably supported at their ends on the bolsters, hangers pendent from the ends of said beams, springs carried by said hangers, a pillow-beam seated at its ends on said springs and comprising two metallic plates rigidly united at their ends and center by connecting-webs, a pillow-block fixed on the central web, and a car-supporting pedestal fixed in the pillow-block and having a concave recess in its upper end in which the king-bolt of the car is stepped, substantially as described.

17. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section, of bolsters carried by the end sections, a car-supporting frame or platform comprising two longitudinal and parallel beams rigidly connected together and movably sup-

ported at their ends on the bolsters, hangers pendent from the ends of said beams, springs carried by said hangers, a pillow-beam seated at its ends on said springs and comprising
 5 two metallic plates rigidly united at their ends and center by connecting-webs, a pillow-block fixed on the central web, a cross-brace rigidly connected at its ends centrally to the parallel beams of the supporting frame or
 10 platform and centrally apertured, said cross-brace extending over the top of the pillow-block, and a car-supporting pedestal fixed in the pillow-block and projecting through the aperture in the cross-brace, substantially as
 15 described.

18. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section, of bolsters carried by the end sections
 20 and provided on their upper sides with concave sockets, shoes rotatably seated in said sockets and each consisting of an approximately U-shaped body portion having a pendent pintle rotatably seated in one of said
 25 sockets, and a car-supporting frame or platform provided with longitudinal beams the ends of which are slidably mounted in said shoes, substantially as described.

19. In a railway-car truck, the combination
 30 with three wheeled sections, the end sections being flexibly connected to the central section, of bolsters carried by the end sections and provided on their upper sides with concave sockets, shoes rotatably seated in said
 35 sockets and each consisting of an approximately U-shaped body portion provided with a recess on its upper side between its vertical walls to form an oil-receptacle, and provided on its under side with a pendent pintle rotatably seated in one of said sockets, and a
 40 car-supporting frame or platform provided with longitudinal beams the ends of which are slidably mounted in said shoes, said beams being provided on their under sides with projections that are movably seated in the recesses in the shoes, substantially as described.
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20. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section,
 50 of bolsters carried by the end sections between the wheels of the end and central sections, a car-supporting frame or platform comprising two longitudinal and parallel beams rigidly connected together and movably supported at their ends on the bolsters,
 55 a pillow-beam yieldingly supported between said beams and provided centrally with a pivot-rest for the car, arms pendent from said frame or platform and projecting below and
 60 in front and rear of the central section, and a tie-rod extending underneath the central section and fixed at its ends in said pendent arms, substantially as described.

21. In a railway-car truck, the combination
 65 with three wheeled sections, the end sections being flexibly connected to the central section, of a car-supporting frame or platform

movably supported at its ends on the end sections and provided centrally with a pivot-support for the car, of toggle-levers arranged
 70 on each side of the truck and connected at their ends with the end sections of the truck, said toggle-levers at their centers being arranged to engage the under side of the car on opposite sides of the longitudinal center thereof,
 75 of, whereby when the end sections assume angular positions relatively to the central section in rounding a curve, the toggle-lever on the inner side of the curve will be partially folded and operate to raise the corresponding side of the car, while the other toggle-lever will be spread out and lower its corresponding side of the car, substantially as described.
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22. In a railway-car truck, the combination
 85 with three wheeled sections, the end sections being flexibly connected to the central section, of a car-supporting frame or platform movably supported at its ends on the end sections and provided centrally with a pivot-support for the car, of toggle-levers arranged
 90 on each side of the truck and connected at their ends with the end sections of the truck, said toggle-levers at their centers being arranged to engage the under side of the car on opposite sides of the longitudinal center thereof, and links loosely connecting together the arms of each pair of toggle-levers, substantially as described.
 95

23. In a railway-car truck, the combination
 100 with three wheeled sections, the end sections being flexibly connected to the central section, of a car-supporting frame or platform movably supported at its ends on the end sections and provided centrally with a pivot-support for the car, of toggle-levers arranged
 105 on each side of the truck and connected at their ends with the end sections of the truck, said toggle-levers at their centers being arranged to engage the under side of the car on opposite sides of the longitudinal center thereof, and links each pivotally connected at one end to one member of the toggle-levers and connected by a pin-and-slot connection to the other member thereof, substantially as described.
 115

24. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section, of a car-supporting frame or platform
 120 movably supported at its ends on the end sections and provided centrally with a pivot-support for the car, of toggle-levers arranged on each side of the truck and connected at their ends with the end sections of the truck, said toggle-levers at their centers being arranged to engage the under side of the car on opposite sides of the longitudinal center thereof, and arms loosely connected to the upper ends of said toggle-levers and to the car-supporting frame, substantially as described.
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25. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central sec-

tion, of a car-supporting frame or platform movably supported at its ends on the end sections and provided centrally with a pivot-support for the car, of toggle-levers arranged on each side of the truck and connected at their ends with the end sections of the truck, said toggle-levers at their centers being arranged to engage the under side of the car on opposite sides of the longitudinal center thereof, and arms each pivoted at one end to the said frame or platform and at the other end adjustably connected to the upper end of one of the toggle-levers, substantially as described.

26. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central section, of a car-supporting frame or platform movably supported at its ends on the end sections and provided centrally with a pivot-support for the car, toggle-levers arranged on each side of the truck and connected at their ends with the end sections of the truck, said toggle-levers at their centers being arranged to engage the under side of the car on opposite sides of the longitudinal center thereof, and arms each detachably pivoted at one end to the said frame or platform and adjustably connected at the other end to the upper end of one of the toggle-levers, substantially as described.

27. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected to the central sec-

tion, of a car-supporting frame or platform movably supported at its ends on bolsters carried by the end sections and provided centrally with a pivot-support for the car, said bolsters being provided near their ends with vertical sockets, sleeves provided intermediate their ends with pintles journaled in said sockets, toggle-levers arranged on each side of the truck and provided at their ends with pivoted heads having rods or pins slidably fitted in said sleeves, said toggle-levers at their centers being arranged to engage the under side of the car on opposite sides of the longitudinal center thereof, substantially as described.

28. In a railway-car truck, the combination with three wheeled sections, the end sections being flexibly connected centrally to the central section, of a car-supporting frame or platform movably supported at its ends on the end sections at points intermediate the wheels of the end and central sections, a pivotal support for the car carried centrally by said frame or platform, and supports for the sides of the car supported at their ends by the end sections, substantially as described.

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

FRANCIS F. SHAFFER.

Witnesses:

BERNARD COYLE,
J. B. HUMBRID.