No. 796,733. PATENTED AUG. 8, 1905.

W. F. KIESEL, JR.

CAR TRUCK.

APPLICATION FILED FEB. 4, 1905.

4 SHEETS—SHEET 1.

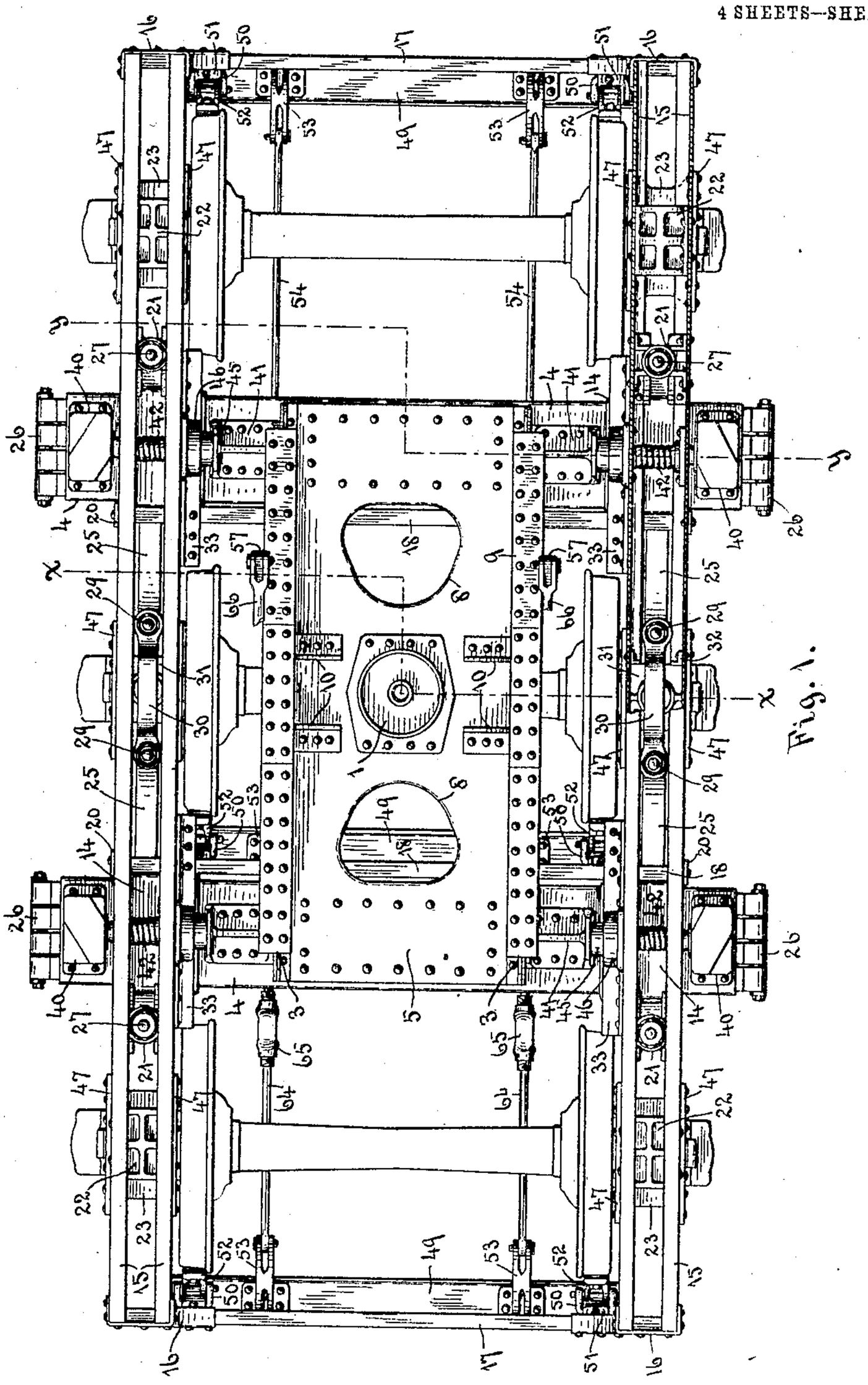

Fig. 1.

WITNESSES:

M. E. Verbeck.

INVENTOR

William F. Kiesel Jr.

BY

Eugene Owen

ATTORNEY

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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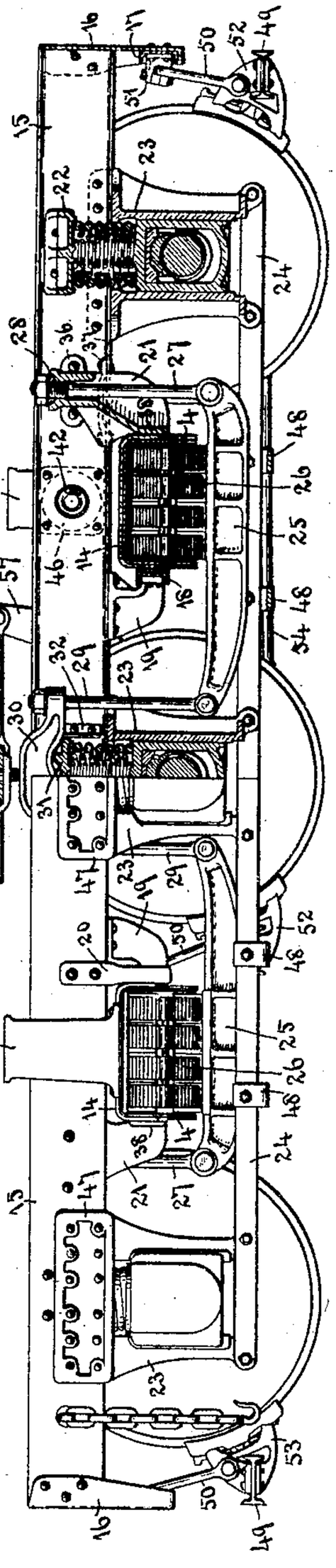

Fig. 2.

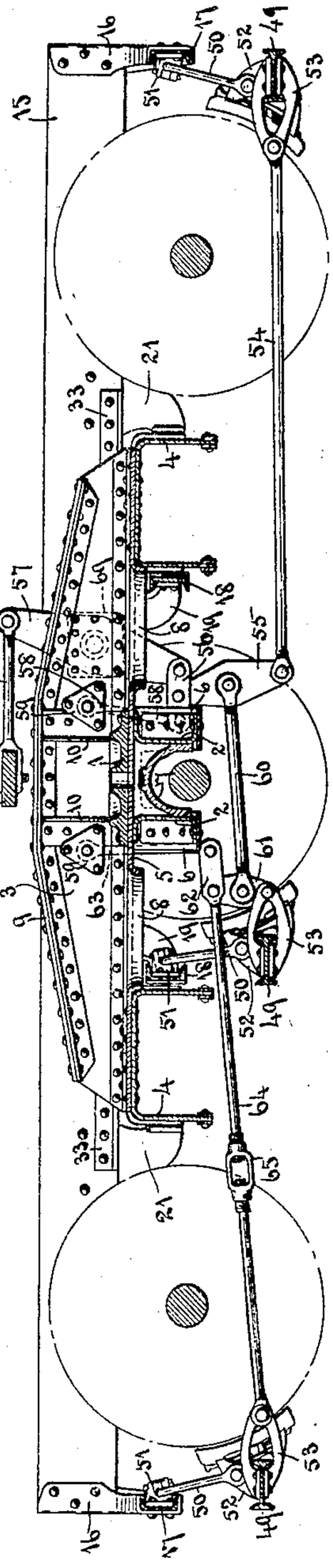

Fig. 3.

WITNESSES:

A. S. Dixon

M. E. Verbeck.

INVENTOR

William F. Kiesel, Jr.

BY

Eugene Dixon

ATTORNEY

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS. WASHINGTON, D. C.

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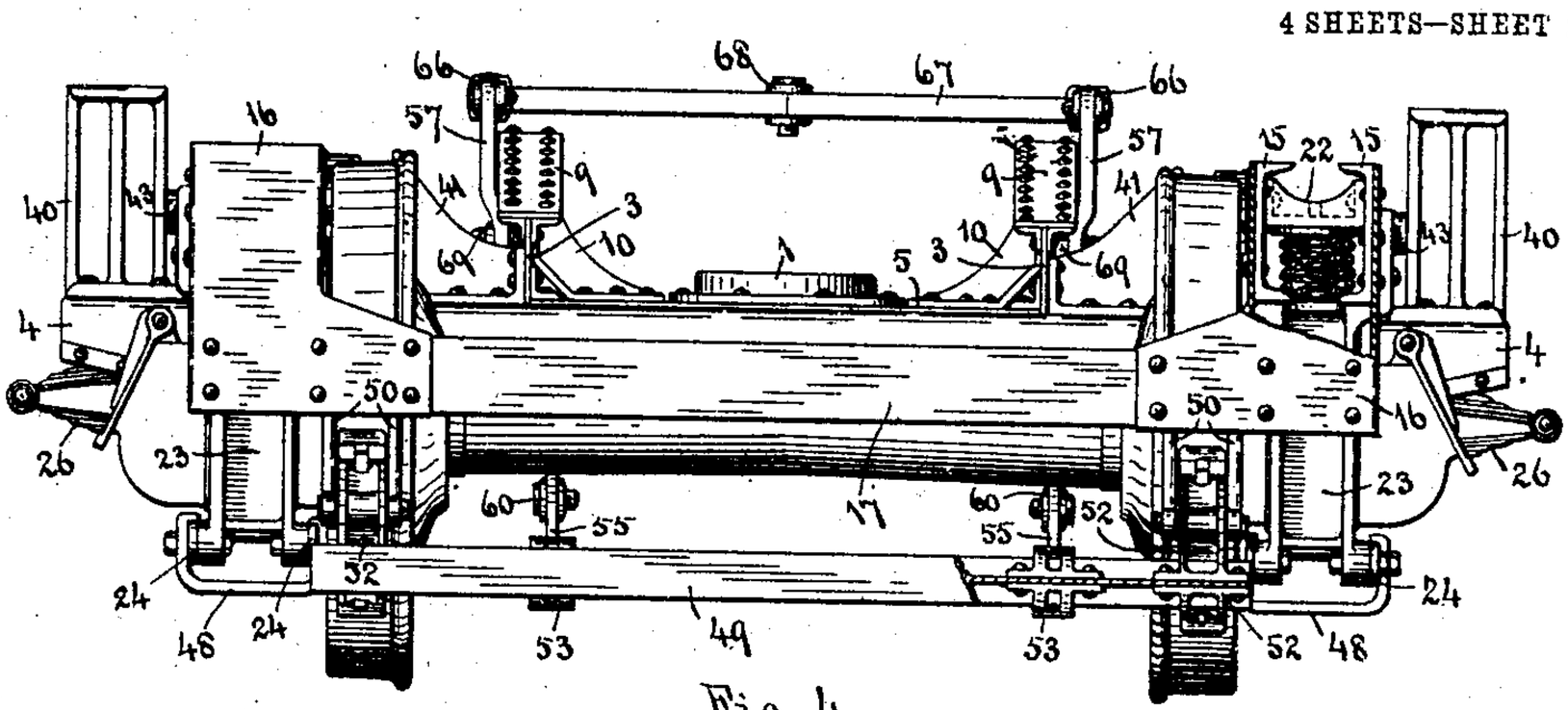

Fig. 4.

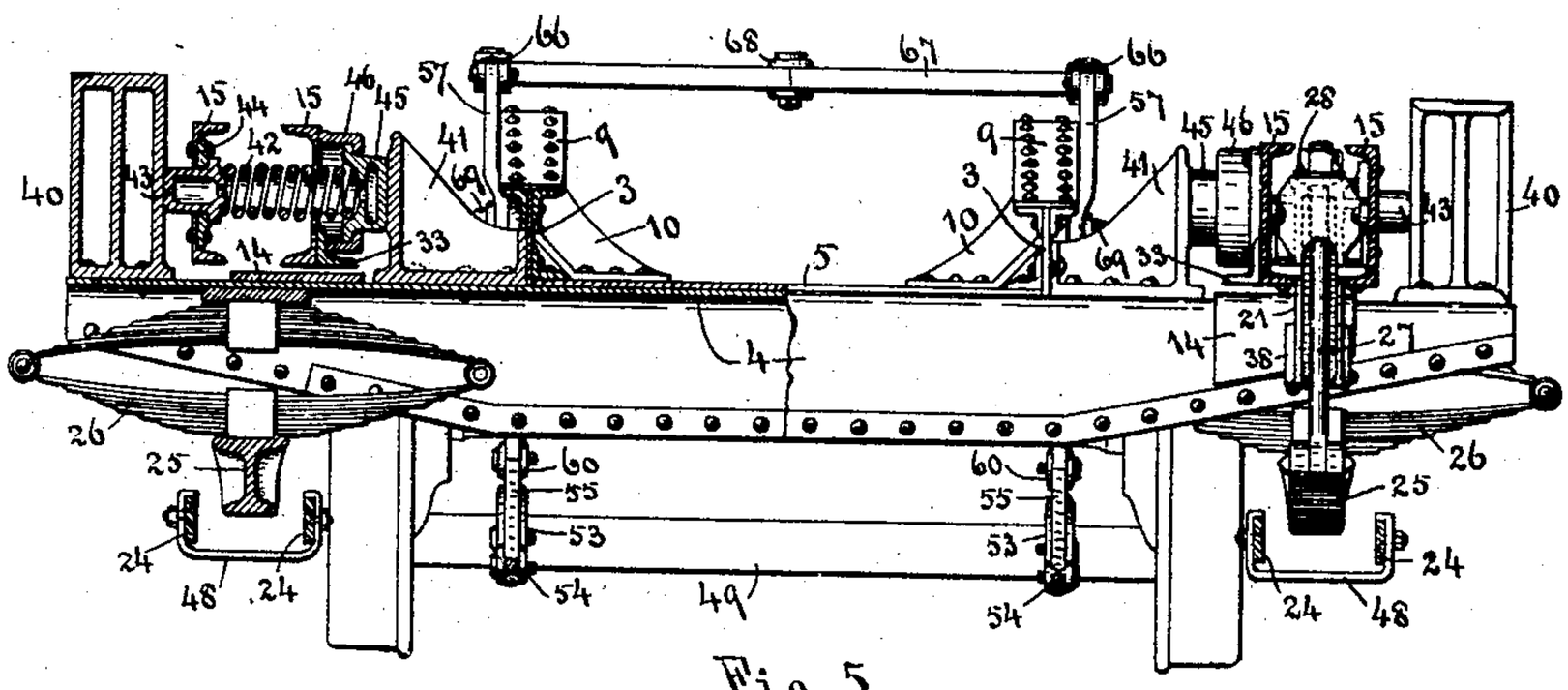

Fig. 5.

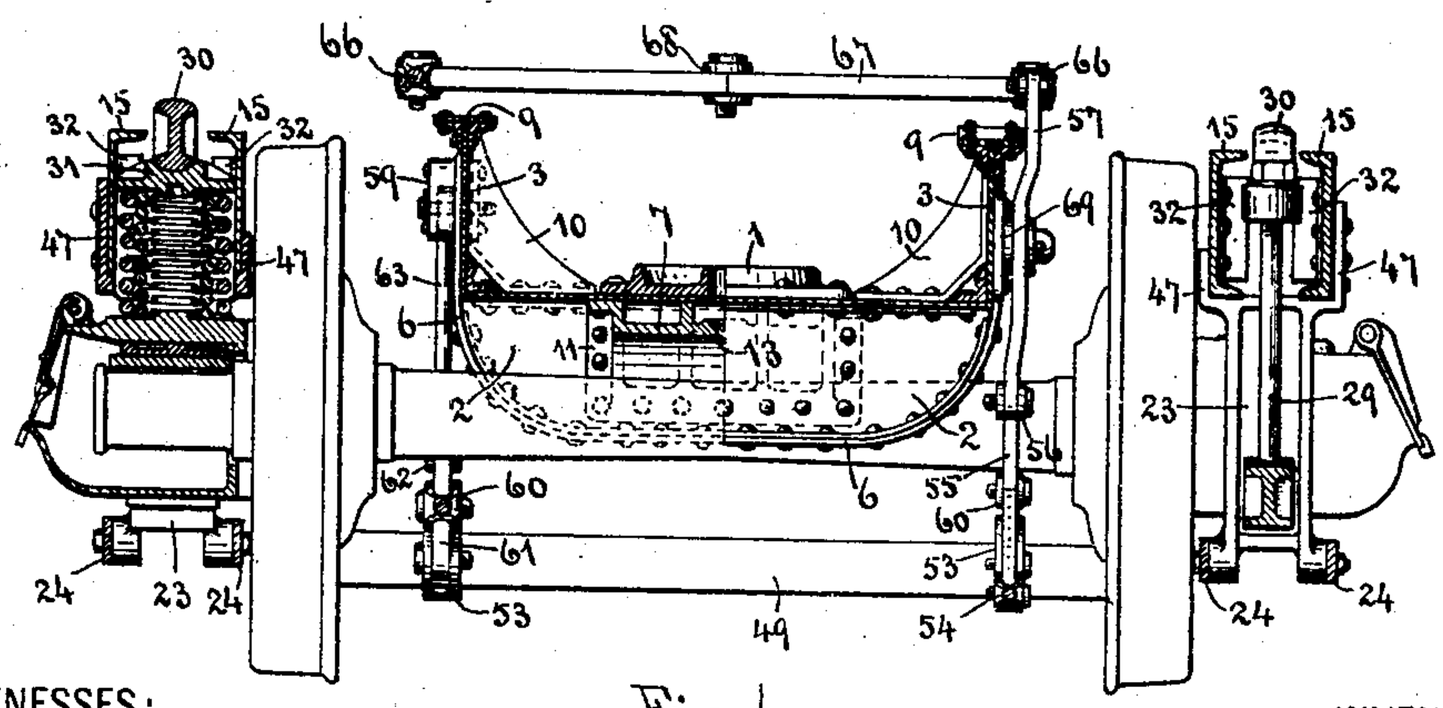

Fig. 6.

WITNESSES:

A. D. Diven

M. E. Verbeck.

INVENTOR

William F. Kiesel, Jr.

BY

Eugene Diven

ATTORNEY

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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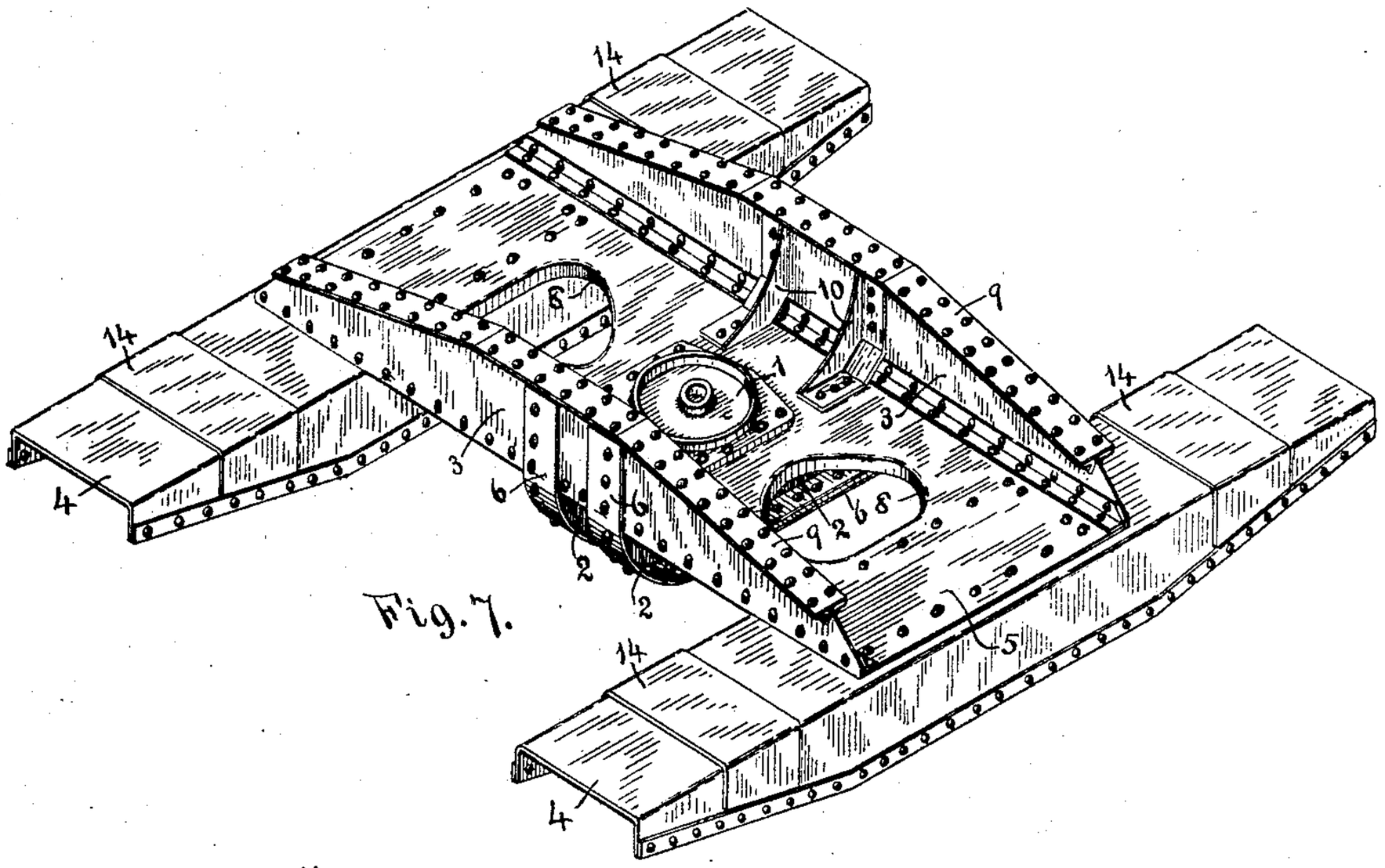

Fig. 7.

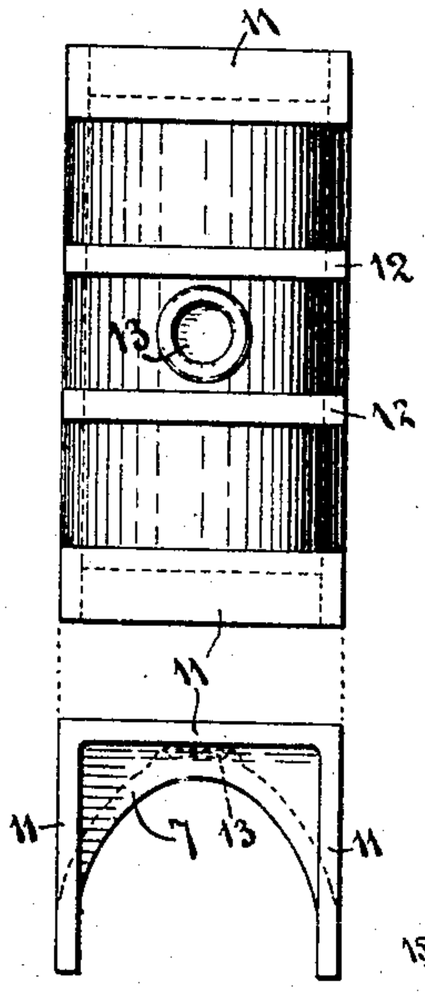

Fig. 8.

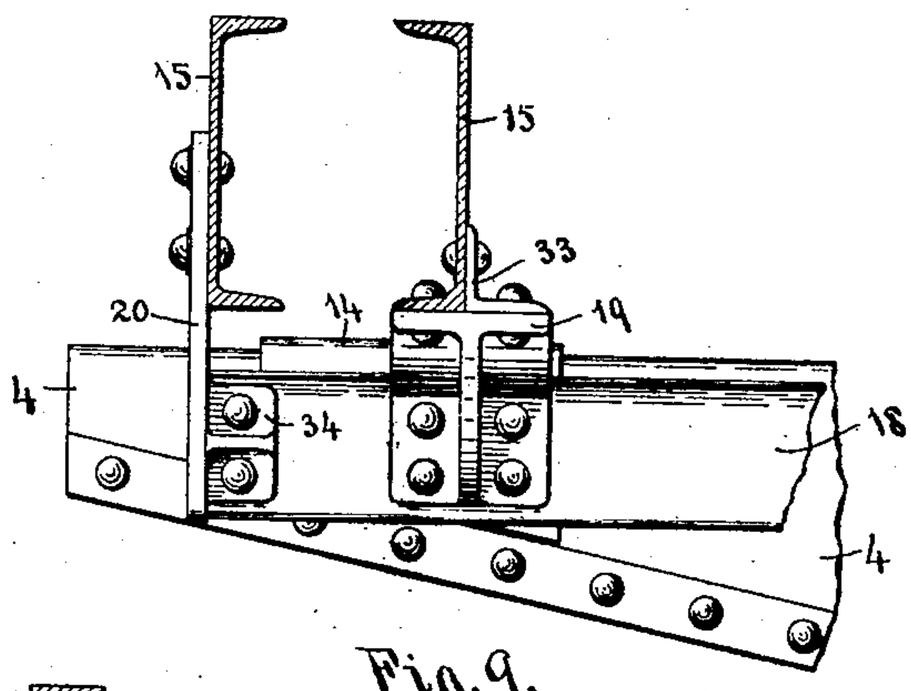

Fig. 9.

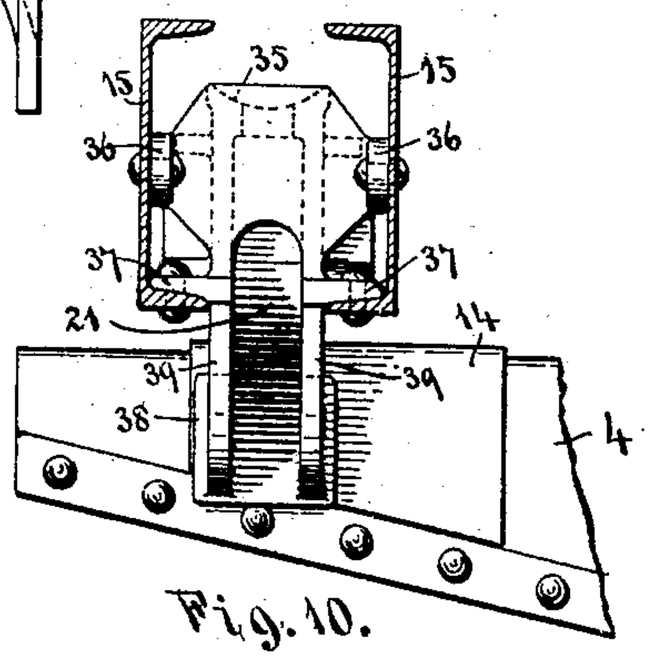

Fig. 10.

WITNESSES:

A. S. Diven

M. E. Verbeck.

INVENTOR

William F. Kiesel, Jr.

BY

Eugene Diven

ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM F. KIESEL, JR., OF ALTOONA, PENNSYLVANIA.

CAR-TRUCK.

No. 796,733. Specification of Letters Patent. Patented Aug. 8, 1905.

Application filed February 4, 1905. Serial No. 244,101.

To all whom it may concern:

Be it known that I, WILLIAM F. KIESEL, Jr., a citizen of the United States, residing at Altoona, in the county of Blair and State of Pennsylvania, have invented certain new and useful Improvements in Car-Trucks, of which the following is a specification.

This invention relates more particularly to improvements in six-wheel trucks for railway-cars.

The objects of my improvements are to provide a truck of this character which will be adapted for use in connection with cars having deep center sills, where it is rendered necessary to place the center plate as near the top of the center axle as possible. With the old methods of construction this dropping of the center sills to a position near the axles is impossible, and in this respect my invention comprises a radical departure from present methods of car-truck construction.

Other objects contemplated within the scope of my improvements comprise provisions for greater flexibility of the spring-rigging, modifications in the hanging of the elliptic springs, enabling me to do away with spring-planks, raising the elliptic springs to prevent interference with station-platforms and other obstructions, a simplified arrangement of the brake-rigging, and spring resistances for the bolster against both vertical and lateral motion.

A further object is to provide an all-metal construction so arranged and built up as to accomplish a decrease in the weight of the truck while maintaining full strength in all parts by the judicious location of hangers and distribution of metal, and a final object is the conversion of the wheel-pieces into equalizers.

I accomplish these objects by arranging and constructing the several parts of the truck in the manner illustrated in the accompanying drawings, in which—

Figure 1 represents a plan view of my improved six-wheel car-truck with a section of one of the wheel-pieces broken away to show the parts contained between the members thereof; Fig. 2, a side elevation of the same with parts broken away for one-half the length of the truck to show the arrangement of parts between the members of the wheel-pieces; Fig. 3, a central longitudinal vertical section of the truck; Fig. 4, an end elevation thereof with parts broken away to show details of construction; Figs. 5 and 6, transverse vertical sections on the lines *y y* and *x x*, respectively, in Fig. 1; Fig. 7, an isometric view of the bolster detached from the other parts of the truck, and Figs. 8, 9, and 10 illustrations of certain details of construction.

Like numerals indicate like parts in the several views.

The bolster construction comprises a center plate 1, supported on two transverse girders 2, placed on each side of the center axle and extending across underneath two longitudinal girders 3, which in turn rest upon the top of two transverse girders 4, the latter girders constituting the "spring-beams" of the truck. These spring-beams are formed of metal plates bent to the shape of an inverted **U** and of a width sufficient to permit the supporting elliptic springs to be positioned between the vertical members thereof. These vertical members are reinforced along their lower edges by light flat bars riveted thereto and are inclined upward at the ends to cut out unnecessary weight. Between the longitudinal girders 3 is a horizontal plate 5, secured to the lower edges of said girders by angle-bars riveted thereto, said plate extending over and being riveted to the top of the spring-beams. The center plate 1 rests upon this horizontal plate, and the rivets by which it is secured in place pass through the horizontal plate and the outturned flanges formed at the top of the transverse girders 2, as shown in the sectional view in Fig. 3. These transverse girders 2 also have flanges at the bottom and extending up the ends at each side of the bolster, the ends being curved upwardly to meet the sides of the longitudinal girders 3. Cover-plates 6 pass around and are riveted to the flanges of the transverse girders and pass upwardly along the outside of the longitudinal girders 3, to which they are also riveted. Underneath the center plate and between the transverse girders 2 is a casting 7, arched over the center axle to allow for the rise and fall of the bolster over said axle. It is provided with end flanges 11, by which it is riveted to the transverse girders and to the horizontal plate, and with intermediate ribs 12 to further brace and support the center plate. A socket at 13 receives the end of the king-bolt. Gusset-plates or brackets 10 are riveted to the horizontal plate and longitudinal girders opposite the cover-plates 6 to stiffen and support the longitudinal girders, and the top edges of said girders are provided with cover-plates 9, riveted thereto by means of angle-bars. The plate 5 is lightened be-

tween the spring-beams and central transverse girders by cutting away portions thereof at 8, the edges of said cut-away portions being flanged downwardly in order to stiffen the plate between girders. It will be understood that instead of using the specially-formed plates for the transverse and longitudinal beams and girders, as herein described, all of said beams or girders may be replaced or built up by eye-beams, channels, or other forms of structural iron and still come within the scope of my invention. The assembled bolster as so constructed, by reason of the horizontal plate between girders, is made so rigid that it will remain squared under all conditions and will thereby also keep the truck-frame squared. The bolster is also made to fit over and around the center axle without interfering therewith and without extending it so low that it will interfere with the brake-rigging. Tie connections for the bolster passing under the center axle have been dispensed with, so that the center axle can be removed without interfering with the integrity of the parts of the bolster.

The truck-frame consists of two wheel-pieces, each comprising two channel-bars 15, with their flanged sides turned toward each other, and four cross-braces, one each at the ends of the truck at 17 and one each between the center girders and the spring-beams at 18. All of these cross-braces must be positioned below the level of the bottom flanges of the wheel-pieces in order to clear the low center sills of the car. To accomplish this, I secure the end cross-braces 17 to the wheel-pieces by means of the flanged plates 16. The intermediate cross-braces 18 are secured to the wheel-pieces by means of the brackets 19, which are riveted to the under side of the flanges of the inside members of the wheel-pieces and to a reinforcing angle-bar 33, attached to said members at this point for this and another purpose, which will appear later. The outside members of the wheel-pieces are secured to the cross-braces 18 by means of castings 20, provided with a foot-piece 34, riveted to the ends of the braces. This construction is shown in Fig. 9 of the drawings, and it will be seen that by reason of it the members of the wheel-pieces are firmly bound together at these intermediate points and prevented from twisting. The cross-braces 17 and 18 are preferably light channel-bars, although I do not restrict myself in this respect.

The pedestals 23 are located under the wheel-pieces and are provided with vertical flanges 47, which embrace the outer and inner sides of the wheel-pieces and firmly bind the members of said pieces together at these points. The lower flanges of the wheel-pieces are cut away over the axle-boxes to allow for the passage of the helical supporting-springs which are located between the members of the wheel-pieces, said members being reinforced where they are cut away by the pedestals and their vertical flanges. The wheel-pieces rest upon the springs, which rise from the axle-boxes at the ends of the truck, the spring-caps 22 being riveted between the members of the wheel-pieces at these points. The pedestals at the bottom are connected by pairs of tie-bars 24, running from one end pedestal to the other on each side with space left between the members of each pair of ties to permit a jack to be applied directly under the axle-boxes, so that the boxes can be raised without disturbing the pedestal-ties for the removal of the axle-bearings. There is also room between these pedestal-ties for the equalizers 25, which support the elliptic springs, and the ties also support the safety-guards 48, which are located under said equalizers.

The spring-beams of the bolster rest upon four nests of elliptic springs 26, each of said nests of springs being supported upon an equalizer 25, having a ratio of two to one. The short ends of these equalizers are hung from the wheel-pieces by means of hangers 27, supported at the upper end in castings 21, riveted between the members of the wheel-pieces, and the long ends of the equalizers are connected to short equalizers 30, located over the center box-springs by means of the hangers 29. The short equalizers 30 rest upon spring-caps 31, which in turn are supported by the helical springs rising from the center axle-boxes. These spring-caps are free to move vertically between the members of the wheel-pieces, vertical angle-bars 32 being riveted inside of said wheel-pieces to form guides therefor. It will therefore be seen that the center box-springs, spring-caps, and short equalizers are in no way attached to the wheel-pieces, but have independent vertical motions with respect thereto governed only by the rise and fall of the center axle-boxes and the deflection of the box-springs. From an inspection of Fig. 2 it will be seen that each wheel-piece acts as an equalizer between the two end boxes, transferring to each of said boxes the load carried by the hanger connected to the short end of the equalizers 25.

Two-thirds of the load carried on each side of the truck is transferred through the equalizers to the wheel-pieces and thence to the end boxes through the helical springs. The other one-third is transferred directly to the center box through the medium of the short equalizers 30 and the helical springs of the center axle-boxes without passing in any way through the frame.

In order to allow for the rocking motion of the small equalizers 30 upon the spring-caps 31, due to the relative motions sidewise between the wheel-pieces and bolster and to the end play of the large equalizers 25, I provide a ball-and-socket bearing between the equalizers and the spring-caps. The equalizer

hangers 27 are provided with ball-and-socket washers 28 at the top of castings 21 to give them freedom of motion sidewise and endwise, the hangers passing through said washers and being held thereon by nuts or other suitable means.

To allow for the side motion of the bolster relatively to the wheel-pieces, the spring-beams are equipped with abutments 40 and 41 at each side of the wheel-pieces, and helical springs 42 are positioned between followers 43 and 45, which engage the faces of said abutments. The followers 43 pass through holes in the outer members of the wheel-pieces and through reinforcing and guide plates 44 riveted thereto. The springs pass through the inside members of the wheel-pieces into engagement with the followers 45, which engage the abutments 41. These followers 45 are guided in chambered castings 46, riveted to the inner side of the wheel-pieces, and said wheel-pieces are strengthened at this point in addition to the castings 46 by the angle-bars 33, which are riveted along the lower edge of the wheel-piece channels. The outer abutments 40 also perform the function of side bearings for the car-body, the upper surface of said abutments being formed to receive the bearing-plates attached to the under side of the car-frame, as will appear more clearly from an inspection of Fig. 1. As the equalizer-hangers are all provided with ball-and-socket washers, they are permitted to swing sidewise when the bolster moves relatively to the wheel-pieces. The side-motion springs 42 also act to return the bolster to central position. By this arrangement I render a spring-plank unnecessary.

In order to prevent longitudinal motion of the bolster with reference to the wheel-pieces, I so arrange the castings 21 and the brackets 19 that they will form guides for the outer ends of the spring-beams, within which said beams can only have vertical movement with relation to the wheel-pieces. At these points on the spring-beams I provide saddle-plates 14, which act as chafing-plates against the castings which guide the bolster and also pass over the top of the spring-beams to stiffen the top support for the elliptic springs, thereby preventing deflection in the spring-beams due to the weight transference and strains at these points. I do not, however, limit myself to the use of these saddle-plates, as I may use simply separate chafing-plates attached to the sides of the spring-beams. To form these vertical guides for the spring-beams, I provide the castings 21 with flanged foot-pieces 38, which pass across between the vertical arms 39, which depend from the body of the casting, said castings being riveted to the sides and bottom flanges of the wheel-pieces by means of the ears 36 and the horizontal flanges 37, this construction being shown more clearly in Fig. 10 of the drawings.

At 35 the casting is provided with a concave socket to receive the convex washer 28 for the hangers 27.

The guides on the opposite sides of the beams are formed by the side faces of the transverse braces 18, said faces being reinforced, if desired, by plates opposite the chafing-plates 14, as indicated in the sectional portion of Fig. 2.

The brake-rigging consists of an independent triple brake for each side of the truck. Each independent rigging takes hold of the brake-beams near their outer ends, being operated in common by a horizontal equalizer-bar 67, which passes transversely across over the center plate, and consequently over or through the depressed center sills of the car, where they rest upon the center plate. The brake-beams 49 consist of rolled bars, the I or deck beam form being preferred for this purpose. The beams are supported from the cross-braces 17 at each end and from one of the intermediate cross-braces 18 by means of inverted-U-shaped shackles 50, hung from castings 51, riveted to the cross-braces, and coupled at their lower ends to the brake-heads 52. The brake-heads are of a skeleton form, with arms which pass over and under the web of the beams 49, where they are provided with oppositely-disposed flanges, which are riveted together with the web of the brake-beams between. The tension-rods 54, 60, and 64 are coupled to the brake-beams by means of fulcrum-pieces 53, which are of skeleton form, with arms passing over and under the flanges of the brake-beams, and provided with flanges to engage each side of the web of the beams, so that these parts can be slipped over and under the end of the beam and the flanges sprung together and riveted in place in the same manner as the brake-heads. These tension-rod fulcrum-pieces are placed quite close to the brake-heads, thereby avoiding the excessive bending strains now existing in brake-beams as used in connection with brake-riggings of the old type. The hanger-supports for the shackles 50 are provided with vertical flanges for attaching them to the cross-braces and with two outwardly-projecting horizontal flanges extending above and below the horizontal portion of the shackles to take the outward and downward strains passing through them. Bolts pass through the horizontal flanges of these hanger-supports to prevent the hangers from slipping out.

The tension-rods on each side of the truck are coupled to levers 55, which in turn are coupled to links 56, which pass across from the lower extremity of the main levers 57 to the lower ends of the hangers 58, the upper ends of which are coupled to pins which pass through triangular pivot-blocks 59, riveted to the outer side of the horizontal girders 3.

(See left-hand side of Fig. 6.) The main levers 57 are coupled by links 66 to the equalizer-bar 67 at each side of the bolster-frame, said levers 57 being pivoted upon pins projecting from plates 69, riveted to the outer sides of the horizontal girders 3. (See right-hand side of Fig. 6.) From the levers 55 the tension-rods 60 pass to short levers 61, which are coupled at one end to the fulcrum-pieces 53, attached to the center brake-beam, and at the upper end to the end of the tension-rods 64, which run to the brake-beam at the other end of the truck. These tension-rods 64 are extended past the levers 61 at 62, where they are coupled to the ends of the hangers 63, these hangers 63 being shown at the left in Fig. 6 of the drawings. They are coupled to the sides of the girders 3 by pivot-plates riveted thereto in the same manner as described in connection with the hangers 58. In order to properly adjust the brake-beams so as to bring the brake-shoes into engagement simultaneously with all the wheels, the tension-rods 64 are provided with turnbuckles at 65. The equalizer-bar 67 is connected to the brake-operating system by means of a link or connecting-rod 68, coupled to the center of the bar, and it will be understood from an inspection of Fig. 3 that in the operation of setting the brakes a pull to the left on the equalizer-bar will throw the main brake-levers 57 from right to left, thereby acting, through the levers 55, to draw tension-rods 54 and 60 toward one another after the brakes are set against the end wheels to the right, the tension-rods 60 then acting, through the levers 61, to draw the tension-rods 64 to the right to set the brakes against the left-hand wheels after the brakes have been set on the center wheels. The setting of the brake-shoes against the six wheels of the truck is practically simultaneous.

Variations in the forms of the several parts which go to make up the truck and in the manner of assembling and building them up may be made without departing from the spirit of my invention. The center plate may be set higher upon the bolster, and the bolster-girders may be altered to comply with the requirements of different underframes in the cars to which the trucks may be applied.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a car-truck, a bolster comprising spring-beams joined together by spaced longitudinal girders, transverse girders joining the longitudinal girders between beams, said transverse girders being spaced apart with a clear opening below to receive one of the truck-axles, and a center plate resting upon the transverse girders.

2. In a car-truck, a bolster comprising spring-beams joined together by spaced longitudinal plate-girders, and a center plate supported centrally in the space between the girders on a level with the top of the spring-beams.

3. In a car-truck, a bolster comprising two spring-beams, longitudinal plate-girders spanning the space between beams, transverse girders joining the longitudinal girders between the spring-beams, and a center plate supported by the transverse girders on a level with the top of the spring-beams.

4. In a car-truck, a bolster comprising two spring-beams, longitudinal girders spanning the space between beams, a horizontal plate filling the space between girders and beams and rigidly united thereto, transverse girders joining the longitudinal girders between beams, and a center plate supported by the transverse girders.

5. In a car-truck, a bolster comprising two spring-beams, longitudinal girders spanning the space between beams with their ends resting upon the top of the beams, a horizontal plate filling the space between girders and beams and rigidly united thereto, transverse girders passing across between the longitudinal girders below said plate, and a center plate supported by the transverse girders.

6. In a car-truck, a bolster comprising two spring-beams, longitudinal girders spanning the space between beams with their ends resting upon the top of the beams, transverse girders hung below and joining the longitudinal girders between the spring-beams, and a center plate supported by the transverse girders.

7. In a car-truck, a bolster comprising two spring-beams, longitudinal plate-girders spanning the space between beams, transverse girders joining the longitudinal girders between the spring-beams, an arched center support between the transverse girders, and a center plate resting upon said support.

8. In a car-truck, a bolster comprising two spring-beams, longitudinal girders spanning the space between beams, transverse girders joining the longitudinal girders between the spring-beams, an arched center support provided with end flanges, cross-ribs and a central socket fastened centrally between the transverse girders, and a center plate resting upon said support.

9. In a car-truck, a bolster comprising two spring-beams, longitudinal girders spanning the space between beams with their ends resting upon the top of the beams, a horizontal plate joined to the top of the beams and to the bottom of the longitudinal girders, transverse girders below said plate formed by vertical plates joined thereto, with cover-plates passing around their side and bottom edges and up the sides of the longitudinal girders, an arched center support between the transverse girders, and a center plate resting upon said support.

10. In a car-truck, a bolster comprising two spring-beams, longitudinal girders spanning the space between beams, transverse girders

hung between the longitudinal girders and formed by vertical plates with cover-plates passing around the side and bottom edges and up the sides of the longitudinal girders, and a center plate supported by the transverse girders.

11. In a car-truck, a bolster comprising two spring-beams resembling an inverted U in cross-section, longitudinal girders spanning the space between beams, a horizontal plate in the space between said girders, said plate and girders having their ends united to the crown of the spring-beams, transverse girders between the longitudinal girders below the plate, and a center plate supported thereby.

12. In a car-truck, a bolster comprising two spring-beams resembling an inverted U in cross-section, longitudinal girders spanning the space between beams, transverse girders joined to the longitudinal girders, an arched center support between the transverse girders, and a center plate resting thereon.

13. In a car-truck, a bolster comprising two spring-beams resembling an inverted U in cross-section, longitudinal girders spanning the space between beams, and a center plate supported between said girders.

14. In a car-truck bolster, a spring-beam resembling an inverted U in cross-section with the vertical members spaced apart to receive the bolster-springs between them.

15. In a car-truck bolster, a spring-beam formed of a plate bent lengthwise to the shape of an inverted U and having its vertical members spaced apart to receive the bolster-springs between them.

16. In a car-truck, the combination, with the wheel-pieces, of a bolster hung below the wheel-pieces, and a center plate supported thereon below the bottom of the wheel-pieces.

17. In a car-truck, the combination with the wheel-pieces, of equalizers hung therefrom and adapted to equalize the strains acting upon the ends of the wheel-pieces, and a bolster mounted upon said equalizers.

18. In a car-truck, the combination, with the wheel-pieces, of equalizers hung therefrom and adapted to equalize the strains acting upon the ends of the wheel-pieces, and a bolster provided with spring-beams which project beneath the wheel-pieces, said beams being mounted upon springs resting upon said equalizers.

19. In a car-truck, the combination, with the wheel-pieces, of equalizers hung therefrom and adapted to equalize the strains acting upon the ends of the wheel-pieces, a bolster mounted upon said equalizers, and side-motion springs between the bolster and wheel-pieces.

20. In a car-truck, the combination, with the wheel-pieces and a bolster hung between them, of abutments on the bolster at each side of the wheel-pieces and side-motion springs mounted on the wheel-pieces between said abutments.

21. In a car-truck, the combination, with the wheel-pieces, of a bolster having spring-beams projecting underneath the wheel-pieces, abutments arising from said beams on each side of the wheel-pieces, followers mounted at each side of the wheel-pieces in engagement with said abutments, and springs between the followers.

22. In a car-truck, the combination, with the wheel-pieces, of a bolster having spring-beams provided with abutments at each side of the wheel-pieces, flanged followers projecting through apertures at each side of the wheel-pieces in engagement with said abutments, and springs between the followers.

23. In a car-truck, the combination, with the wheel-pieces, comprising pairs of longitudinal members spaced apart, and a bolster having spring-beams provided with abutments at each side of the wheel-pieces, of side-motion springs comprising the flanged followers 43 and 45 mounted in the guides 44 and 46 respectively attached to the wheel-piece members opposite the abutments, and the springs 42 between the followers, the wheel-piece members being apertured to permit the followers 43 and the spring to pass therethrough.

24. In a car-truck, the combination, with the wheel-pieces and a bolster having spring-beams projecting from underneath the wheel-pieces, of side bearings rising from the beams outside the wheel-pieces, one at each end of each spring-beam.

25. A six-wheel car-truck comprising wheel-pieces mounted upon springs resting on the end axle-boxes, central equalizers mounted on the center axle-boxes, intermediate equalizers suspended at one end from the central equalizers and at the other end from the wheel-pieces, and a bolster supported on springs resting on the intermediate equalizers.

26. A six-wheel car-truck comprising wheel-pieces mounted upon springs resting on the end axle-boxes, central equalizers mounted upon springs resting on the center axle-boxes, intermediate equalizers suspended at one end from the central equalizers and at the other end from the wheel-pieces, a bolster supported on springs resting on the intermediate equalizers, side-motion springs between the bolster and wheel-pieces, and rocking supports for the equalizers.

27. A six-wheel truck comprising wheel-pieces mounted upon springs resting on the end axle-boxes, a bolster having spring-beams projecting under the wheel-pieces, vertical guides for the spring-beams attached to the wheel-pieces, equalizers supported by the wheel-pieces and by springs resting on the center axle-boxes, and springs interposed between the equalizers and the spring-beams.

28. A six-wheel car-truck comprising wheel-pieces composed of pairs of longitudinal members spaced apart, pedestals for the axle-boxes suspended from the wheel-pieces and secured

to the members thereof by vertical flanges, springs between said members resting on the axle-boxes, spring-caps secured between said members over the end axle-boxes, spring-caps vertically movable between said members over the center axle-boxes, central equalizers mounted to rock on said center spring-caps, intermediate equalizers suspended at one end by hangers dropped from the ends of the central equalizers and at the other end by hangers dropped from supports fastened between the wheel-piece members, and a bolster having spring-beams supported on springs resting on the intermediate equalizers, said spring-beams being set between vertical guides attached to the wheel-pieces.

29. A car-truck frame comprising two wheel-pieces united by depressed cross-braces, in combination with a bolster below the wheel-pieces, said bolster resting on springs supported by equalizers which hang from the wheel-pieces between their end supports and rest upon central independent supports.

30. A car-truck frame comprising two wheel-pieces, each consisting of a pair of longitudinal members, flanged plates fastening said members together at the ends, cross-braces fastened to said plates below the wheel-pieces and intermediate cross-braces fastened to the members of the wheel-pieces by brackets hung from the under side thereof.

31. A car-truck frame comprising two wheel-pieces, each consisting of two parallel channels set with their flanged sides facing inward, flanged plates fastening said channels together at the ends, cross-braces consisting of lighter channels fastened to said plates below the wheel-pieces, and similar intermediate cross-braces fastened to the members of the wheel-pieces by brackets hung from the under side thereof.

32. The combination, with the wheel-piece channels, of flanged plates to fasten the ends of the channels together, said plates being provided below the channels with right-angled projections, and cross-braces having their ends secured to said projections.

33. The combination, with the wheel-piece channels and the intermediate cross-braces, of the brackets 19 by which the inside channels are secured to the cross-braces, and the side pieces 20 by which the outside channels are secured to said braces.

34. The combination, with the wheel-piece channels, of a combined hanger-support and bolster-guide having a bearing at the top for the head of the hanger, flanges at the sides by which to fasten it between the channels, and depending arms terminated by a vertical guide-plate.

35. The combination, with the wheel-piece channels, of the pedestals hung therefrom and having vertical flanges between which the channels are fastened.

36. In a car-truck, the combination, with a plurality of pedestals suspended from a wheel-piece, of longitudinal tie-bars coupling the lower ends of the pedestals together, said bars being positioned at the inner and outer sides of the pedestals, substantially as and for the purpose set forth.

37. In a six-wheel car-truck, the combination, with the three axles and the wheel-pieces supported thereon, of a bolster comprising spring-beams hung below the wheel-pieces between axles, longitudinal girders spanning the space between beams, depressed transverse girders passing across between the longitudinal girders at each side of the center axle, and a center plate resting upon the transverse girders over the center axle.

In testimony whereof I have affixed my signature in presence of two witnesses.

WILLIAM F. KIESEL, JR.

Witnesses:
U. S. DRAYER,
E. A. BORELL.