(No Model.) 5 Sheets—Sheet 1.

J. N. WEIKLY.

CAR TRUCK.

No. 388,095. Patented Aug. 21, 1888.

Fig. 1.

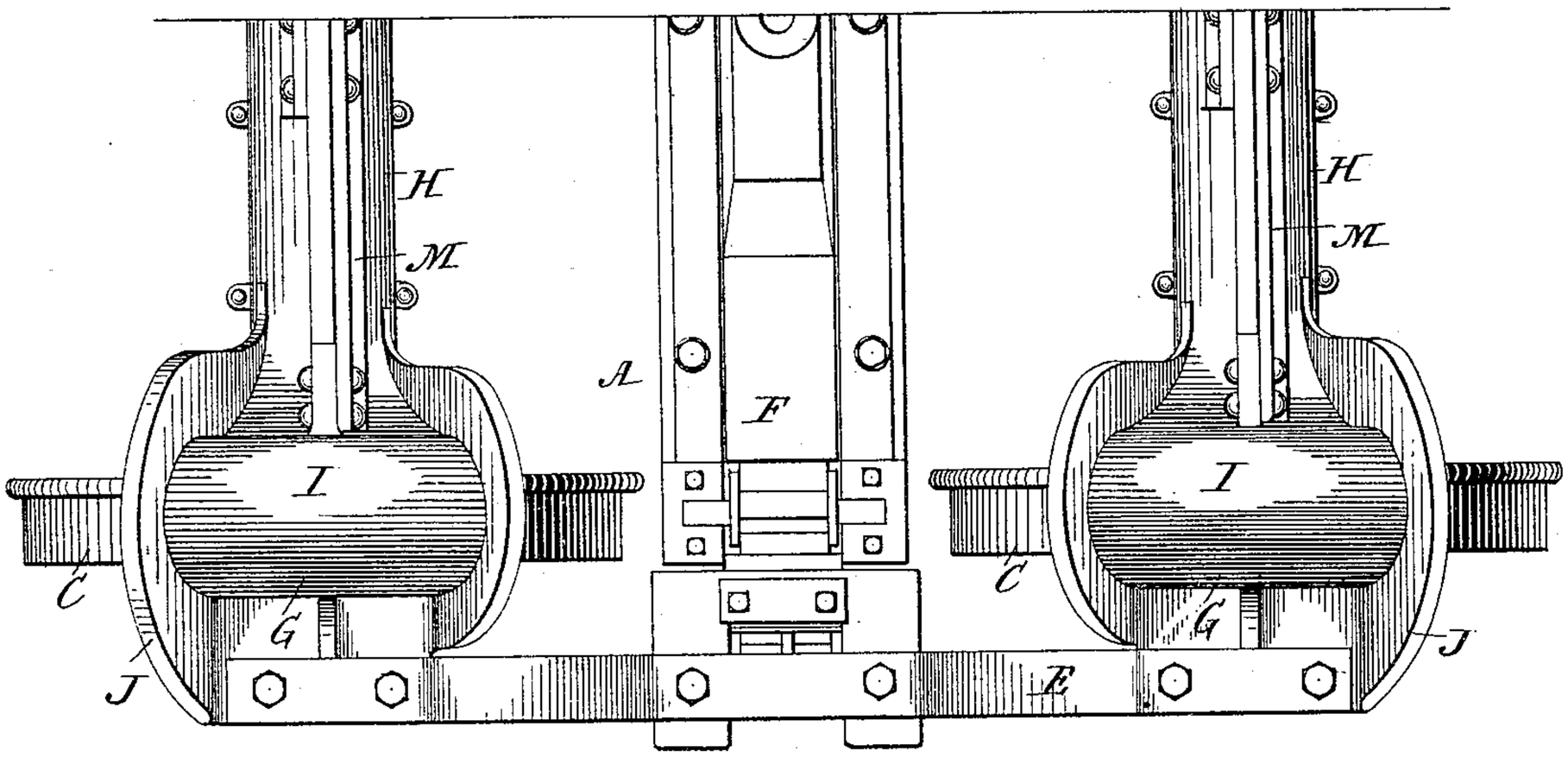
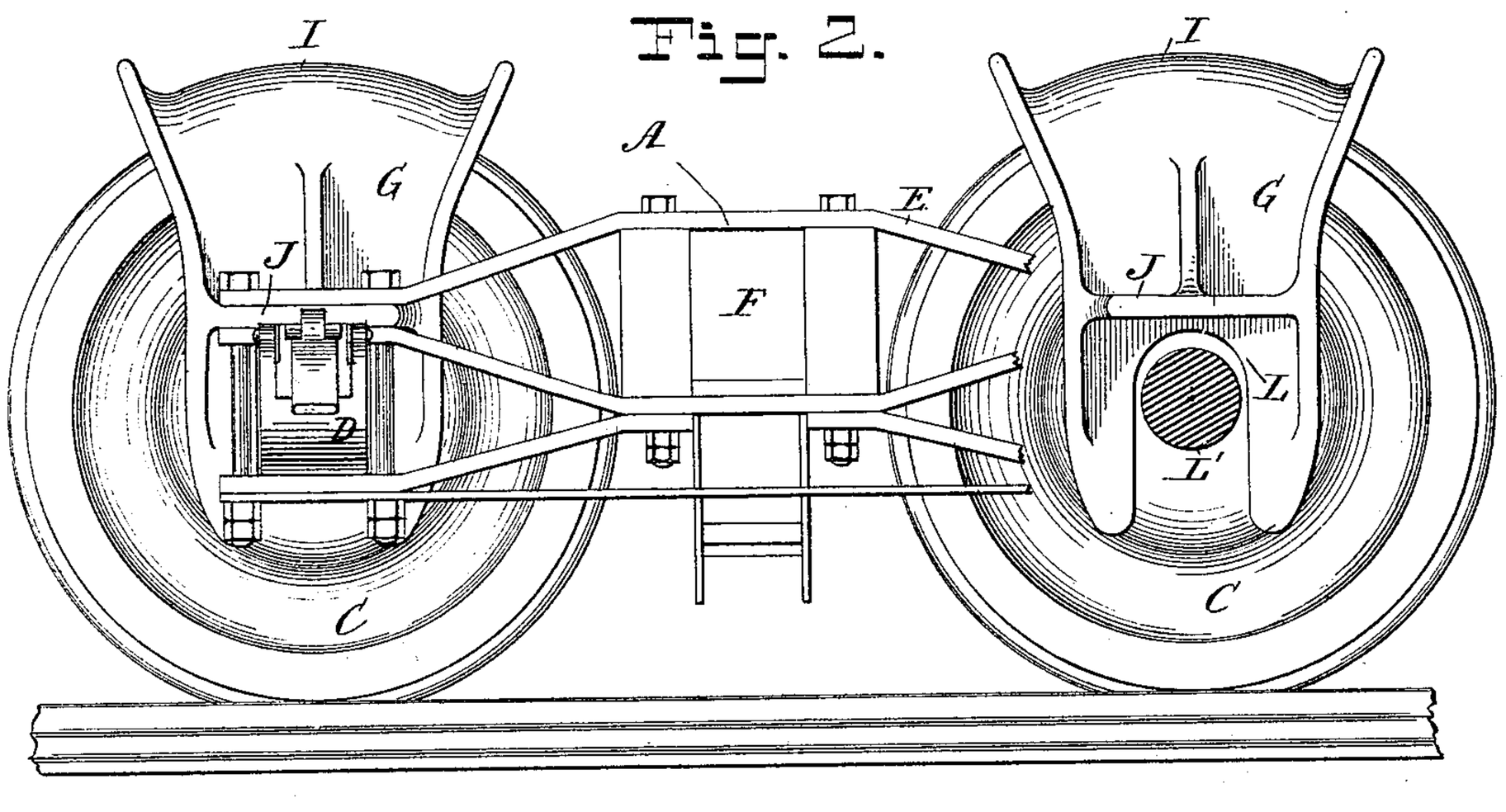


Fig. 2.



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(No Model.) 5 Sheets—Sheet 2.

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Fig. 3.

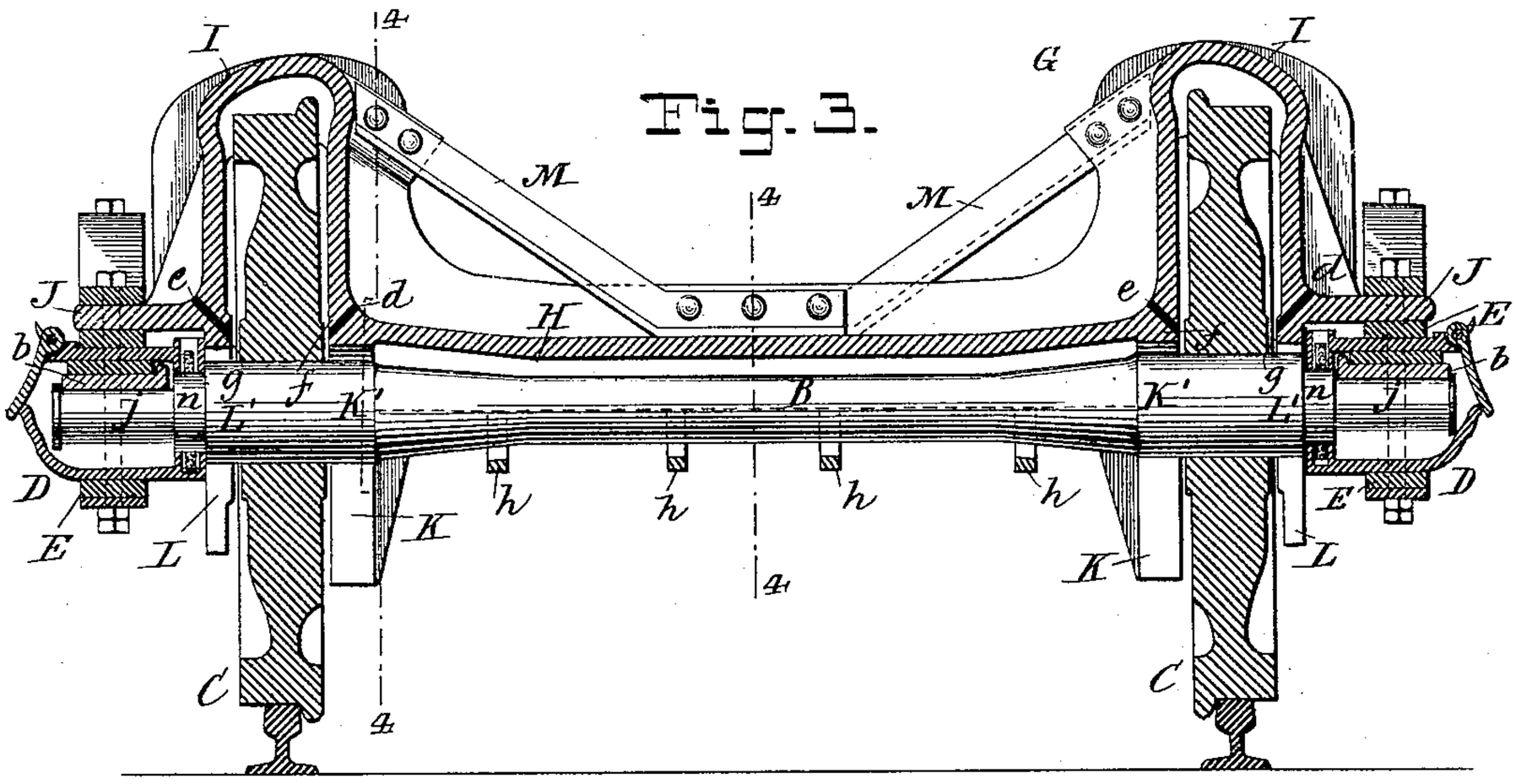
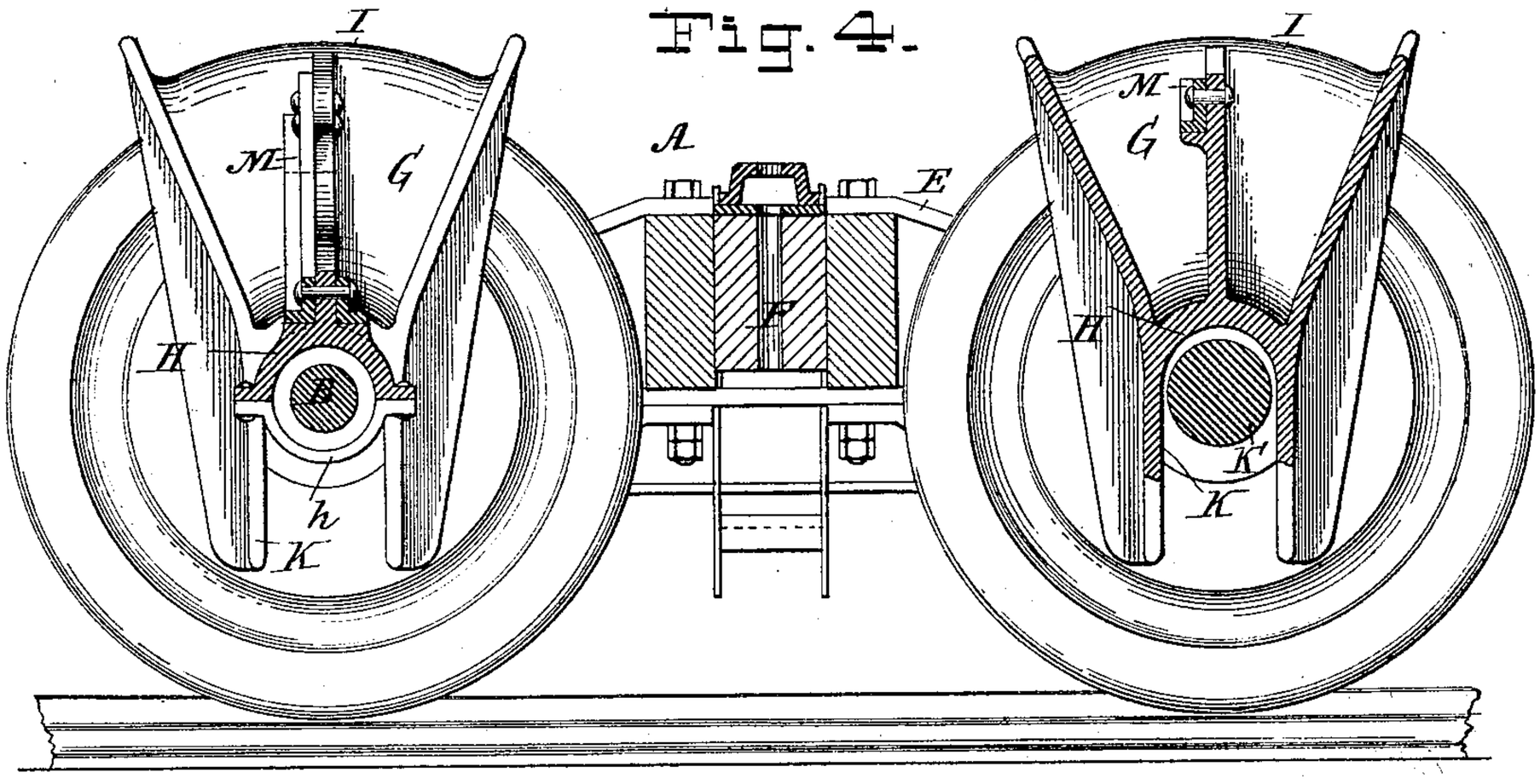


Fig. 4.



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No. 388,095. Patented Aug. 21, 1888.

Fig. 5.

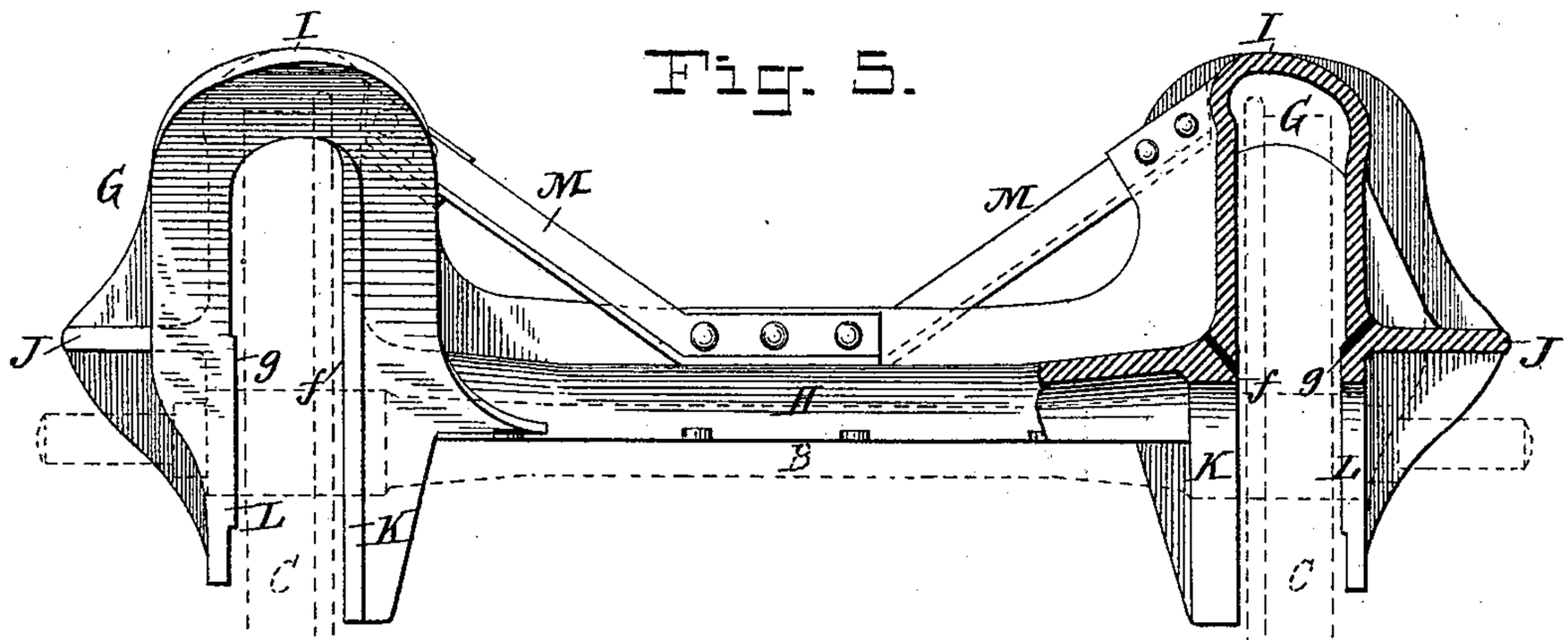


Fig. 6.

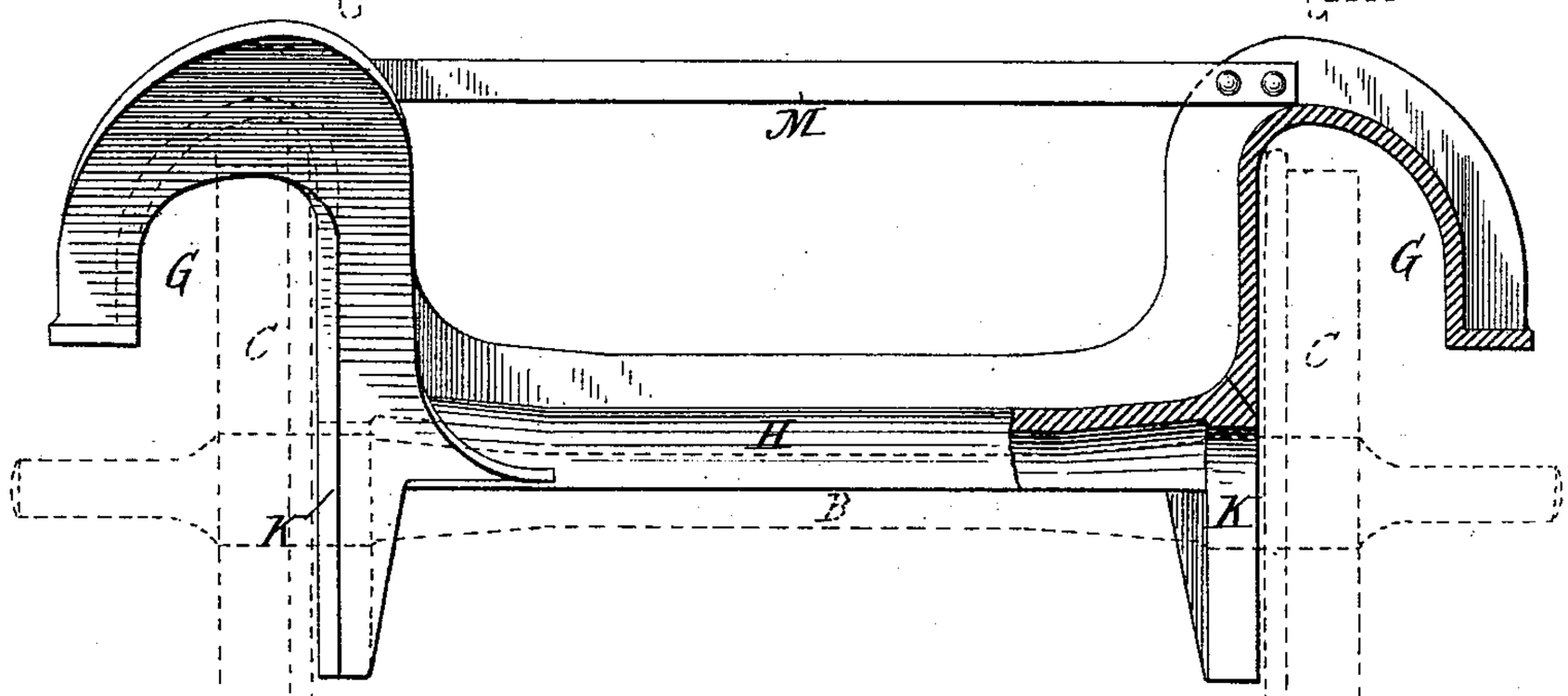
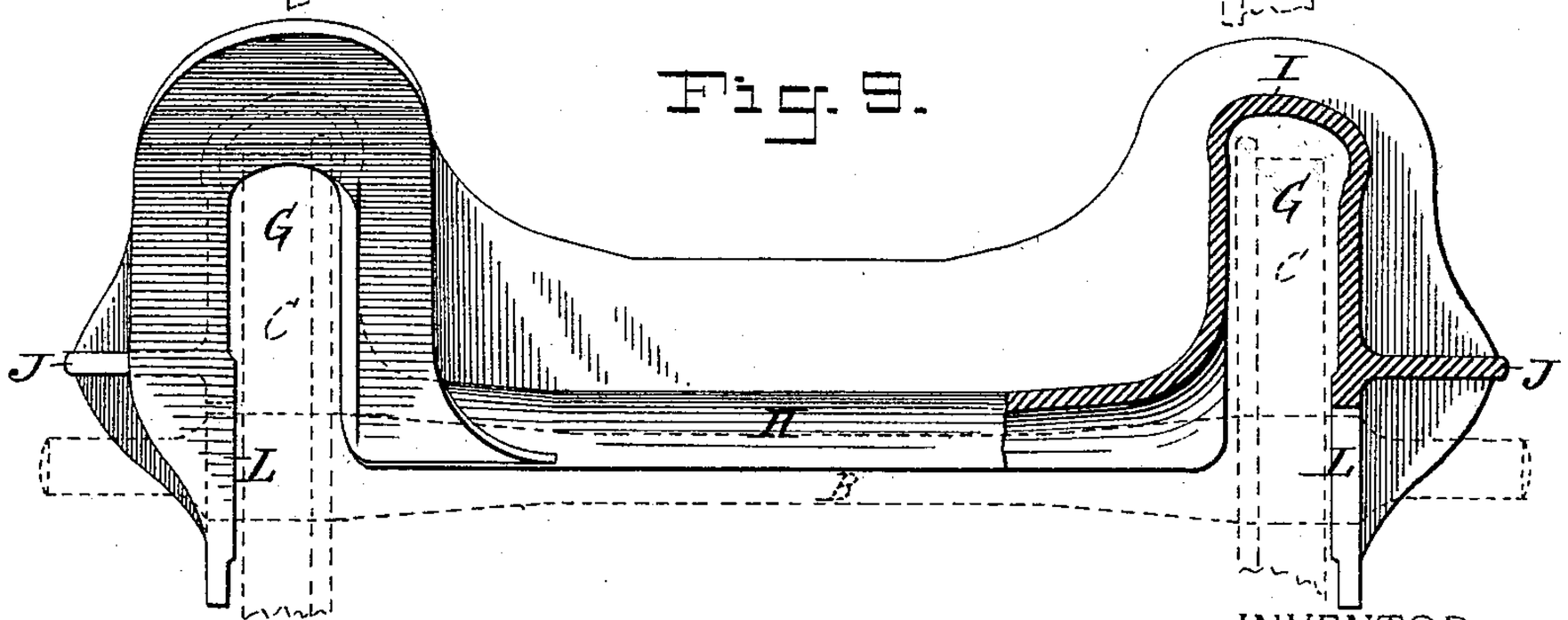


Fig. 9.



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(No Model.) 5 Sheets—Sheet 4.

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CAR TRUCK.

No. 388,095. Patented Aug. 21, 1888.

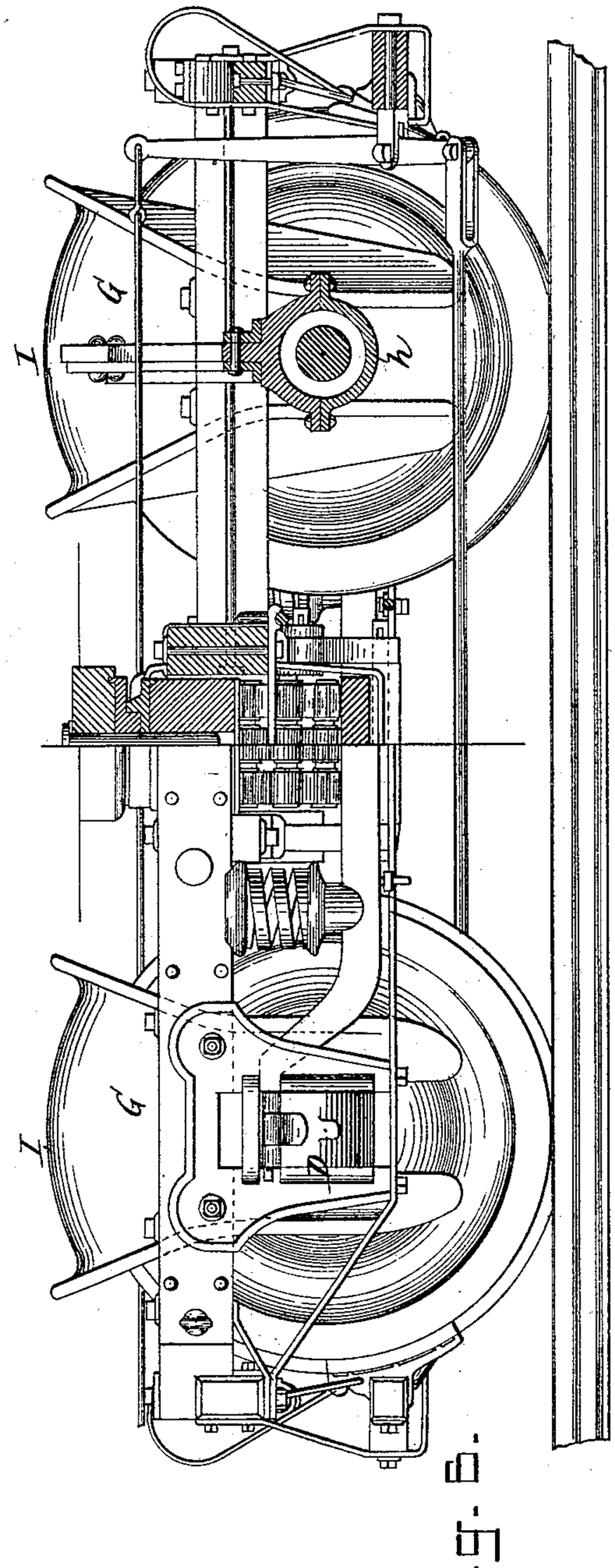

Fig. 6.

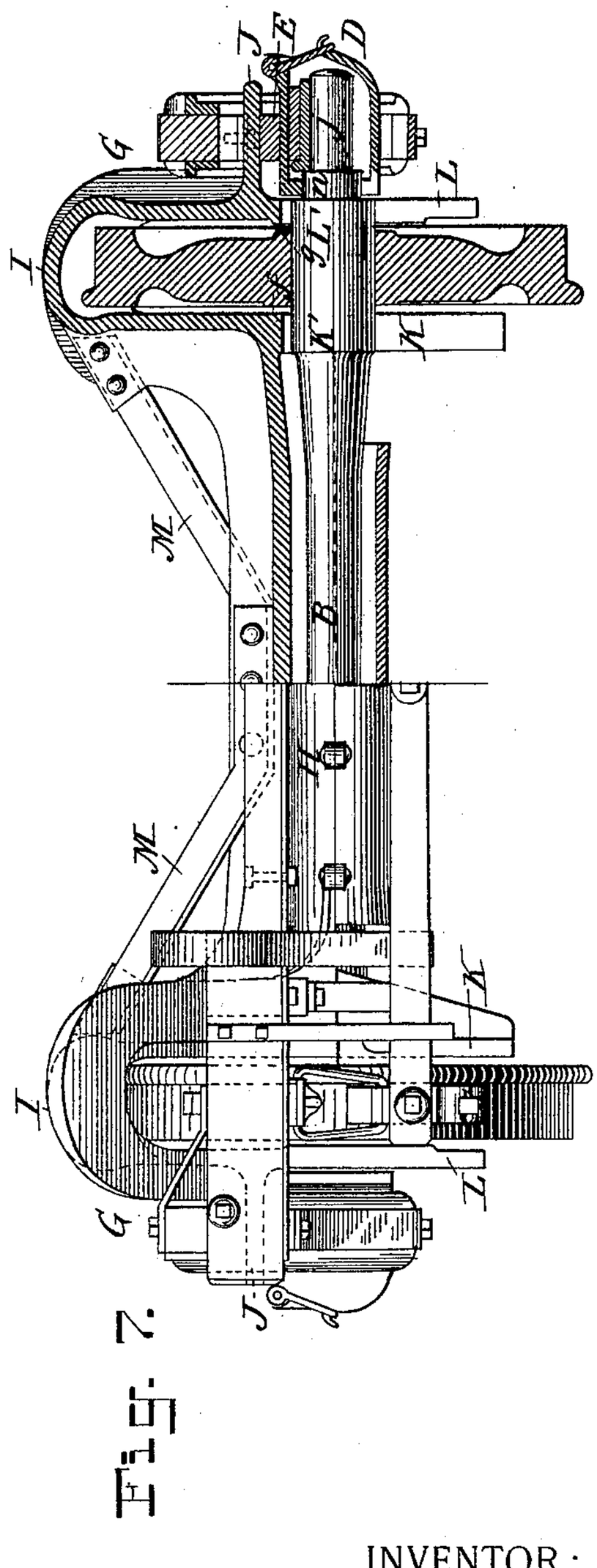

Fig. 7.

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CAR TRUCK.

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Fig. 10.

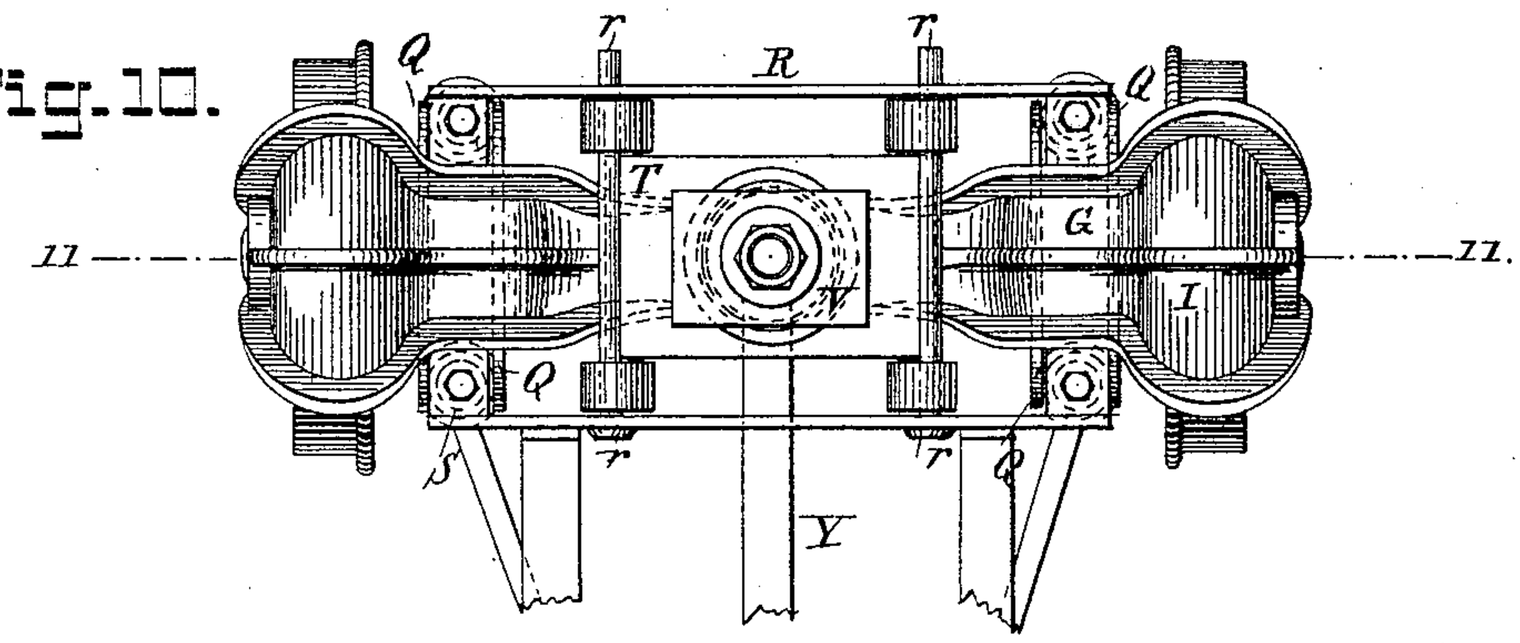


Fig. 11.

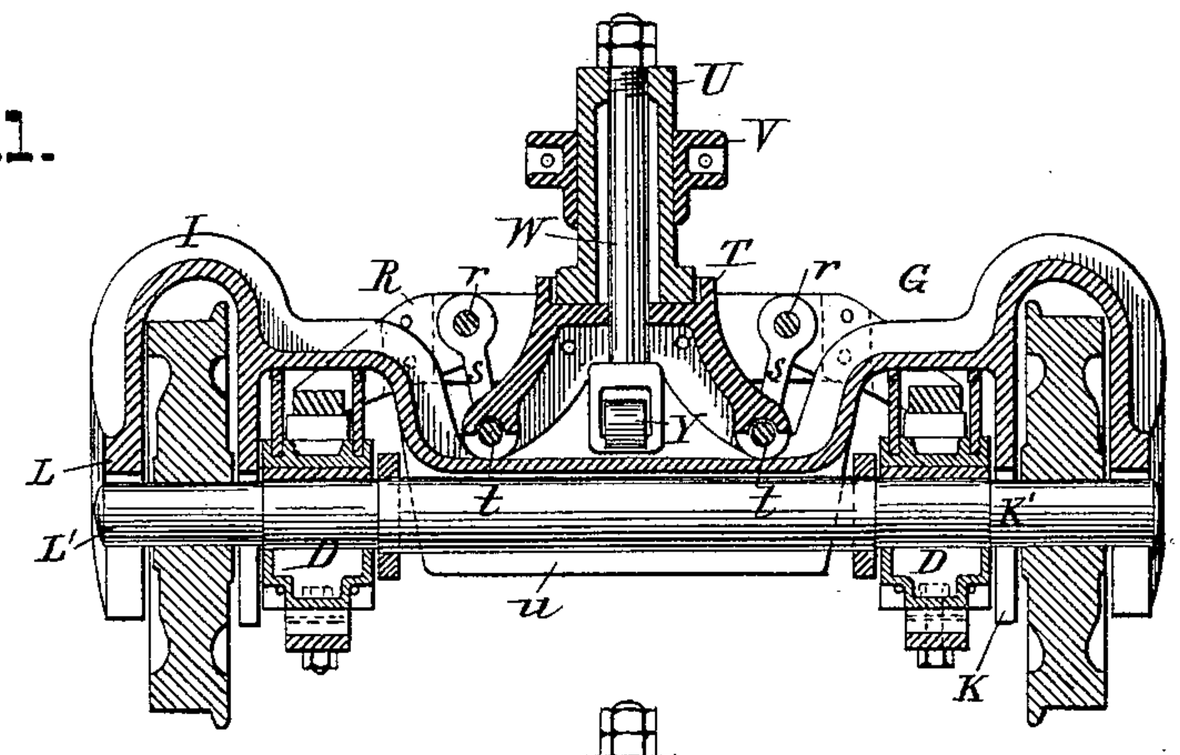


Fig. 12.

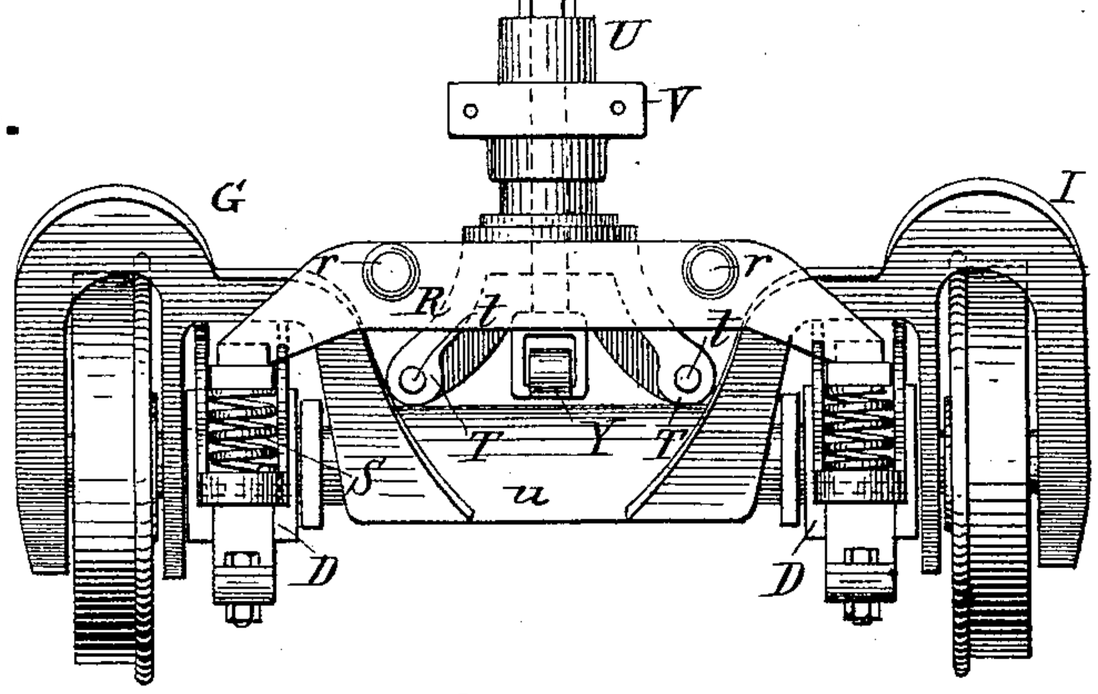
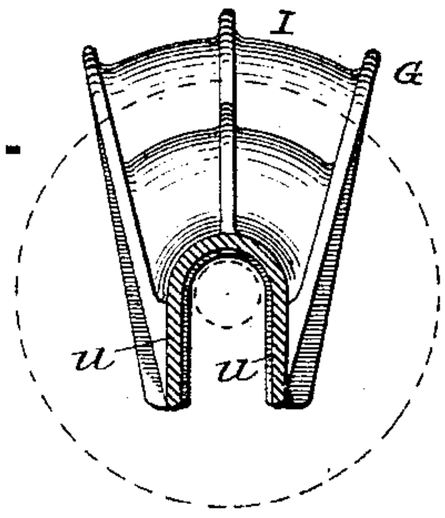


Fig. 13.



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UNITED STATES PATENT OFFICE.

JAMES N. WEIKLY, OF PHILLIPSBURG, NEW JERSEY.

CAR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 388,095, dated August 21, 1888.

Application filed July 28, 1887. Serial No. 245,475. (No model.)

To all whom it may concern:

Be it known that I, JAMES N. WEIKLY, a citizen of the United States, residing at Phillipsburg, in the county of Warren and State of New Jersey, have invented certain new and useful Improvements in the Running-Gear of Railway-Cars, of which the following is a specification.

This invention relates to improvements in the trucks, axles, and wheels of railway-cars or carriages. Its objects are to strengthen and perfect these parts, to increase the economy of their maintenance, to prevent accidents, and to avoid the derailment of the car in case of breakage of an axle or the loosening of a wheel.

According to my invention I construct the truck with what I call a "safety-frame" or "bridge," which extends over and parallel with each of the axles and serves to strengthen the truck and to prevent displacement of the wheels and axle in case of breakage. I make the axle with a cylindrical portion on each side of and close to the wheel, which constitutes what I term a "supernumerary journal," and I construct the safety-frame with what I term "supernumerary bearings," which normally are slightly out of contact with these journals, but which in case of breakage of the axle fall into contact with the supernumerary journals and constitute themselves emergency-bearings therefor, continuing to hold the broken axle and wheels in place beneath the car until an opportunity is found for replacing them. The safety-frames are arched over the wheels and closely embrace them, being formed with bearing-surfaces which take the thrust of the axle by impingement against corresponding bearing-surfaces at the hubs of the wheels, and thus relieve the brasses in the axle-boxes from the duty of resisting this thrust, thereby reducing wear of the brasses and of the collars at the ends of the journals and preventing hot boxes. The wheels are specially constructed to adapt them to co-operate with the safety-frame.

In the accompanying drawings, Figure 1 is a half-plan of a car-truck provided with my invention. Fig. 2 is a side elevation thereof, the frame and box being removed at one side, showing the axle in section through the supernumerary journal. Fig. 3 is a longitudinal vertical mid-section through the wheels and safety-frame cut in the plane of the axis of one of the axles. Fig. 4 is a section cut transversely of the axles in the plane of the line 4 4 in Fig. 1. Fig. 5 is a side elevation of one of the safety-frames removed. The foregoing figures illustrate my invention as applied to a standard truck for freight-cars. Fig. 6 is a side elevation of a truck for a passenger-car provided with my invention. Fig. 7 is a longitudinal vertical section thereof cut in the plane of the axis of one of the axles. Fig. 8 is a side elevation, partly in section, of a modified construction of safety-frame. Fig. 9 is a similar view of another modified construction. Figs. 10 to 13 illustrate my invention as applied to the pony-truck of a locomotive. Fig. 10 is a plan of the truck. Fig. 11 is a vertical axial section cut in the plane of the line 11 11 in Fig. 10. Fig. 12 is a front elevation, and Fig. 13 is a transverse section of the safety-frame cut through its middle.

Referring to the drawings, letter A designates the truck as a whole, being in all respects of the usual construction, except as hereinafter specified.

B B are the axles; C C, the wheels; D D, the usual axle-boxes; E E, the usual truss-frames, forming part of the truck and serving to connect the boxes with the bolster, and F the bolster.

G G are the safety-frames. These frames extend from one side to the other of the truck over the respective axles. Each frame consists of a central portion, H, between the wheels; of arches I I, extending up over the wheels; of flanges J J at its opposite ends, by means of which it is connected to the truck, and of supernumerary bearings K K inside of the wheels and L L outside thereof. The middle portion, H, is channeled or half-round in cross-section, as shown in Fig. 4, so that it forms a hood partially inclosing the middle portion of the axle. The arches I I form continuations of the middle portion and extend over the wheels, embracing them somewhat closely, but allowing, nevertheless, a clear space for their free rotation and for the amount of lateral thrust usually permitted. To insure lightness and strength, the several parts of the

safety-frame are preferably formed with webs and ribs or flanges, substantially in the manner shown. The entire safety-frame should be made of one piece of wrought-iron, which should be carefully forged in order to give it the utmost possible strength. It is preferably stiffened by means of diagonal braces M M, which may be forged in one piece with it, but which are preferably rolled separately of angle-iron and fastened to it by rivets or bolts. The flanges J J are inserted in and bolted to the truss-frames E E of the truck, entering them over the boxes D D.

The supernumerary bearings K and L consist of forks, which are pendent from the safety-frame and which embrace the axle, although being out of contact with it. The inner supernumerary bearing, K, is clearly shown in Fig. 4, and the outer one, L, in Fig. 2.

The axle B is of larger diameter than usual where it passes through the wheels, is made cylindrical at these points, and its cylindrical portions extend to a slight distance beyond the wheels on each side thereof, in order to form the supernumerary journals K′ and L′, which correspond in position to the supernumerary bearings K and L. Between the supernumerary journals K′ K′ the axle tapers for a short distance toward the center, and its middle portion is cylindrical, or nearly so. Outside of the supernumerary journals L′ L′ the axle is reduced in diameter to form the necks *n n* for engagement with the usual dust-collars on the axle-boxes, and beyond these necks are the usual journals, *j j*, upon which rest the usual bearing caps or brasses, *b b*, through which the superincumbent weight is transmitted to the axles.

The supernumerary bearings are elevated sufficiently above the supernumerary journals to avoid all contact with them until some breakage occurs. This clearance is sufficient to allow for the wearing down of the brasses to their utmost, so that as the brasses wear, and the truck-frame consequently descends, it will not, even when the brasses are quite worn out, descend low enough to bring the supernumerary bearings down upon their journals; but upon the breaking of any part of the axle the truck-frame immediately drops until the supernumerary bearings rest upon the supernumerary journals, thereby holding the axle and wheels in place and permitting them to rotate without doing further damage and without danger to the train.

The breakage of axles usually occurs outside of the wheels and through the journal or the neck. Much less frequently an axle breaks between the wheels. In either case my safety-frame comes into play to provide temporary bearings for the broken axle and enable the train to continue on its way until some convenient point is reached where the disabled car can be run off onto a side track, whereupon the train may proceed, and subsequently the broken axle and its wheels may be removed by jacking up the truck, as usual, and be replaced by a new axle and wheels. Heretofore a breakage of this character has usually derailed the car and caused a serious accident; or, at the least, it has necessitated the immediate stopping of the train and the consequent blocking of the track until a wrecking force could be got to work. My invention not only entirely avoids the derailment of the train from this source, but even avoids the inconvenience of its stoppage and delay, and enables it to continue running at a fair rate of speed for a reasonable distance. The breakage of the axle close to the wheels in such manner as to destroy the supernumerary journals is almost impossible of occurrence by reason of the greatly-increased strength which is imparted to this part of the axle in consequence of its larger diameter.

The hubs of the wheels are faced off on opposite sides in order to make contact with thrust-bearings or bearing-faces *f* and *g* on the opposite sides of the arches. The clearance or play between these opposite faces and the wheel is slightly less than that provided in the axle-boxes between the ends of the brasses and the collars terminating the journals *j j*; hence the end-thrust is resisted by the bearing-faces *f g* and the wear of the brasses and collars is relieved. This construction almost entirely avoids the heating of axle-boxes, which is occasioned in nearly every instance by the grinding of the collar at the end of the journal into the brass. The heating of journals is not only a serious source of delay on railroads, but it often results in cutting off the journal, or at least in so damaging it as to necessitate removing and replacing the axle and wheels, as well as the renewing of the brasses.

It is obvious that some lateral motion or play must be allowed to prevent binding and enable the wheels to adjust themselves to the track in rounding curves and the like. My invention transfers the resistance to the thrust due to this play from the axle-boxes to the thrust-bearings on the safety-frames; hence there is no longer any necessity for collars on the axle-journals, and all wearing or cutting of the ends of the brasses is avoided. My invention, by thus equalizing the wear of the brasses, prolongs their life to at least four times its present duration, since as heretofore used they have had to be renewed on account of being cut by the collars before they were one-quarter worn out. The life of the axle-journals is also prolonged in a similar proportion, since their collars are protected from wear, and since the liability of their being cut by heating is so greatly reduced.

By limiting the endwise play positively by means of abutting thrust-bearings my invention prevents much of the twisting to which the frames of trucks and cars have heretofore been subjected. It also renders the truck-frame more rigid and durable, increasing its resistance to sudden and unusual shocks, and consequently prolonging its life and that of the car-body.

The middle portion, H, of the safety-frame not only forms a channel or partial hood which covers the axle, but it is provided at intervals with straps which pass beneath the axle, but without touching it, in order that in case of breakage the axle shall be unable to escape from the safety-frame, but shall be held within the hood H and caused to turn therein until an opportunity occurs to replace it. These straps *h h*, of which four are shown, are connected to the hood H by means of bolts which enter ears formed at the sides of the hood. Any suitable mechanical connection may be employed for uniting these straps to the hood. The straps may be of greater or less width and set at more or less frequent intervals, as may be preferred; or they may be replaced by a continuous trough or gutter-shaped shield, as shown in Fig. 7, which may be fastened against the under side of the hood, thereby forming a complete tube, in which the middle portion of the axle is inclosed.

The axle and wheels are connected to the safety-frame by letting the frame down upon them from above. It is to admit of this that the supernumerary bearings are made forked with their lower ends open. The wheels are also necessarily or preferably made of different shape from the customary car-wheel, as otherwise it would be difficult or impossible to cause the wheels to enter the arches I I of the safety-frame. The ordinary car-wheel has its hub and rim in two different planes, the rim projecting outwardly considerably beyond the hub. I construct the wheels with their hubs and rims or tires in substantially the same planes and of nearly the same width, as clearly shown in Fig. 3. With the exception of a slight projection at each side of the hub where it is faced off to form the thrust-bearings, the wheel is very nearly in one plane from its hub to its periphery on both its outer and inner faces. In other respects the particular construction of the wheel is not essential to my present invention.

The arches I I are made with a smooth web on the inner side adjacent to the wheel, and the clearance is sufficient to enable the wheel to turn freely under ordinary circumstances, and even in case of any ordinary breakage of the axle which should bring the supernumerary bearings into play; but in case of any unusual breakage of the axle, which would so far free the wheel as to enable it to tilt or cant far enough to leave the rail, the sides of the arch become useful in preventing this degree of tilting and the wheel will be confined within the arch and between the downwardly-projecting forks of the supernumerary bearings, and will thus be held upon the rail and the derailment of the car prevented. The wheel will in such case grind against the inner sides of the arch and forks; but this will do no harm if not continued beyond a reasonable time, and will serve as a means of discovering the accident. It is to thus embrace the wheel and form a guide for it, as extended as possible, that the forks of the supernumerary bearings are prolonged to the extent shown; otherwise they might be very short, extending scarcely below the center of the axle. The construction of the wheels with their sides flat and in a single plane also contributes largely to this result, as otherwise the bearing-surfaces in the frame would find no corresponding surfaces on the wheel with which they could engage.

My invention is applicable both for passenger and freight cars and for the trucks of locomotives. It may be applied to six-wheel trucks, such as are used under sleeping-coaches; but I anticipate that instead of being so used its use will result in the disuse of six-wheel trucks, which are subject to many and serious disadvantages. A four-wheel truck provided with my invention will have so much greater strength that it can be safely and advantageously substituted for the six-wheel truck, greatly to the improvement of the car.

My safety-frames may be modified to a considerable extent without departing from my invention. For example, the outer supernumerary bearings may be omitted, as shown in Fig. 8, or the inner ones may be omitted, as shown in Fig. 9, although it is preferable to have the supernumerary bearings on both sides of the wheel. In the construction shown in Fig. 8 the flanges J J are designed to be fastened directly on top of the truss-frames E E over the axle-boxes, instead of entering between two members of the truss. The safety-frame may be braced in various ways—as, for example, by having a deep rib formed on it, as shown in Fig. 9, or by means of a longitudinal brace-bar extending across between the top of the arches, as shown in Fig. 8. The form of the safety-frame may be variously changed, so long as it is adapted to perform its essential functions, and it may be made of any suitable material and of one or any desired number of pieces suitably joined together.

One important advantage of my invention is that it forms a safeguard against the contingency of the loosening of the wheel upon the axle. In such case the thrust-bearings hold the wheel in its proper position and prevent its moving along the axle far enough to leave the rail. Thus the derailment of the car from this cause is prevented and a fruitful source of accidents is removed.

Suitable means will be provided for lubricating the thrust bearings *f g*. In Fig. 3 I have shown oil-holes *d e* leading to these bearings, through which they may be oiled. In practice oil-cups would be used communicating with these holes. I contemplate, however, providing washers of anti-friction material, which will be inserted between the wheels and the thrust-bearings, and which will afford all the lubrication that is necessary.

The portion of my invention which provides for the taking up of the end-thrust in the safety-frame, in order to relieve the bearing brasses of wear, need not necessarily be adopted in using the safety-frame. If this feature is

not used, the reciprocal thrust-bearings on the wheels and frame may be omitted; or these bearings may be used and the connection of the safety-frame with the truck may be a sliding connection instead of a rigid one—that is to say, the flanges J J will be inserted into recesses or pockets in the side trusses, E E, of the truck, and be permitted to slide therein in direction transversely of the car, instead of being bolted to the truss-frames. In such case the safety-frame will partake of the motion of the wheels and axle instead of the truck.

My invention is not confined in its application to four-wheel trucks, but is equally applicable to trucks carrying but one axle and pair of wheels, such as the so-called "pony-truck" frequently used on locomotives. Figs. 10 to 13 show it applied to such a truck. The supernumerary bearings are disposed outside and inside of each of the wheels, and the frame extends down and embraces the middle portion of the axle. The fact that the journal-boxes D D are placed within the wheels necessitates some change in the shape of the safety-frame, since it has to be arched or bridged over these boxes, as clearly shown in Figs. 11 and 12. In the construction of pony-trucks here shown, which is one that is in extensive use, two saddle bars or yokes, Q Q, rest at their middles upon the axle-box and extend down each side thereof, where their lower ends support the spiral springs S S. Two bars, R R, have their ends resting on these springs and extend across from one box to the other. Between them are cross-bars *r r*, from which hang links *s s*, carrying bars *t t*, and on the latter bars rests a saddle, T, on which is placed the usual tubular pillar, U, which passes freely through a socket-piece, V, which is clamped to the frame of the locomotive, which frame is not shown. From the top of the pillar U hangs the suspension-bar W, the lower end of which supports the front end of the weight-equalizing bar Y of the locomotive.

In view of the fact that the saddle T stands so close over the axle the safety-frame cannot be strengthened by ribs formed along the top of its middle portion; but in lieu thereof its tubular sides are carried downward, as shown at *u u* in Figs. 12 and 13, a sufficient distance to give it the requisite stiffness.

In applying my invention any kind of truck or equivalent mounting for the wheels may be employed. In the construction of my claims the word "truck," as used therein, is not to be understood as referring alone to the ordinary bogie-truck or pony-truck, but is intended to include as well any equivalent means of effecting a suitable connection between the wheels and axles and the car-body. For example, my invention may be applied to the construction of railway-carriage used in England and on the continent of Europe without any material change, although some structural modifications may be necessary, such as any skillful mechanic or engineer might readily design. As such cars are not used in this country, and as the means of application of my invention to them must be sufficiently obvious, I have not considered it necessary to illustrate the same.

I am aware that some crude attempts have been made prior to my invention to provide safety devices for the prevention of accident in case of the breakage of car-axles. For example, a construction has been patented wherein it was proposed to form the wheels with projecting hubs upon their inner sides to form what I should call "supernumerary journals," and to provide above these hubs short cross-beams extending longitudinally of the truck and hollowed out to clear these hubs and form what I would term "supernumerary bearings," designed to come into play in case of the breakage of the axle. A construction has also been patented wherein the axle is inclosed in a tube arranged concentrically around it, but out of contact with it, and clamped between two beams on opposite sides, which beams form part of the truck-frame, the intention being that in case the axle breaks, this tube will form a temporary bearing to prevent the derailment of the wheels. These constructions I believe to be imperfect and unadapted to perform their intended function, and an inefficient safeguard in case of any really serious accident. In no such construction heretofore devised, so far as I am aware, have the supernumerary journals been formed upon a frame constructed of wrought metal in substantially one piece, or in other manner equivalent thereto, and arranged transversely of the truck and extending over the axle parallel therewith and arched over the wheels.

I claim as my invention the following-defined improvements in the running-gear of railway-cars, substantially as hereinbefore specified, namely:

1. The combination, with a railway-car axle and wheels, of a metallic safety-frame consisting of arches over the wheels and an intermediate connecting part over the axle, and constructed with supernumerary bearings normally embracing the axle, but out of contact with it, and adapted in case of breakage to fall into contact therewith.

2. The combination, with a railway-truck, of a metallic safety-frame connected thereto, extending transversely thereof over the axle and wheels, and consisting of arches over the wheels and an intermediate connecting part over the axle, constructed in one piece and formed with supernumerary bearings normally embracing the axle, but out of contact with it, and adapted in case of breakage to fall into contact therewith.

3. The combination, with a railway-truck, of a safety-frame fixed thereto, extending transversely thereof over the axle and wheels, and constructed with supernumerary bearings just outside of the wheels, between them and the axle-boxes, normally embracing the axle, but out of contact with it, and adapted in case of breakage to fall into contact therewith.

4. The combination, with a railway-truck, of a safety-frame fixed thereto, extending over the axle and wheels, and constructed with arches over the wheels and an intermediate portion over the axle, and with supernumerary bearings on opposite sides of each of the wheels, said bearings normally embracing the axle, but out of contact with it, and adapted in case of breakage to fall into contact therewith.

5. A safety-frame for railway-trucks, consisting of arches to pass over the wheels, an intermediate connecting portion, and braces connecting with the upper parts of said arches to stiffen the frame.

6. A safety-frame for railway-trucks, consisting of arches over the wheels, an intermediate connecting portion, and forked supernumerary bearings forming downward continuations of the arches, and adapted to embrace the wheels while normally out of contact therewith.

7. The combination, with a railway-truck, of a safety-frame extending transversely thereof over the wheels and axle, and constructed with a channeled portion or hood extending over and partly inclosing the axle, with a strap connected thereto and passing beneath the axle.

8. A car-axle constructed with supernumerary journals outside of the wheels and between them and the usual journals.

9. A car-axle constructed of increased diameter where it passes through the wheels, and with this increased diameter extended to each side of the wheels a distance sufficient to constitute supernumerary journals in addition to the usual journals.

10. The combination, with a railway-truck, of a safety-frame extending over the axle and wheels, constructed with thrust-bearings adapted to limit the lateral movement of the wheels and axle relatively to the truck, thereby relieving the brasses of thrust.

11. The combination, with a railway-truck, of a safety-frame extending over the axle and wheels, constructed with thrust-bearings coming closely adjacent to and laterally facing the wheels, and adapted to limit the lateral play of the latter relatively to the truck, thereby relieving the brasses of thrust.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES N. WEIKLY.

Witnesses:

ARTHUR C. FRASER,

WILLIAM H. HANNAM.