3 Sheets—Sheet 1.

J. A. WOODBURY.

Car Wheel and Axle.

No. 87,746. Patented March 9, 1869.

Fig. 1.

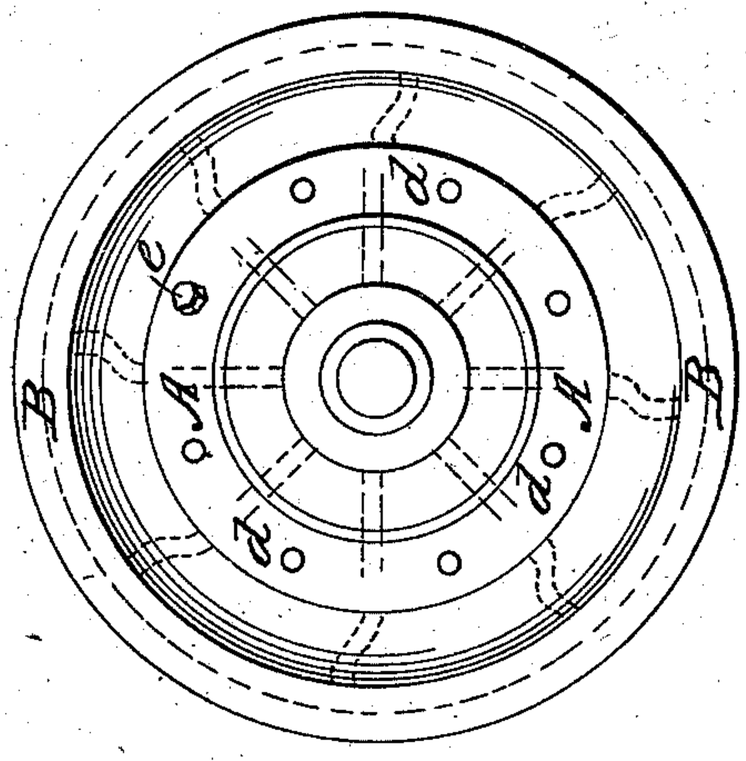


Fig. 2.

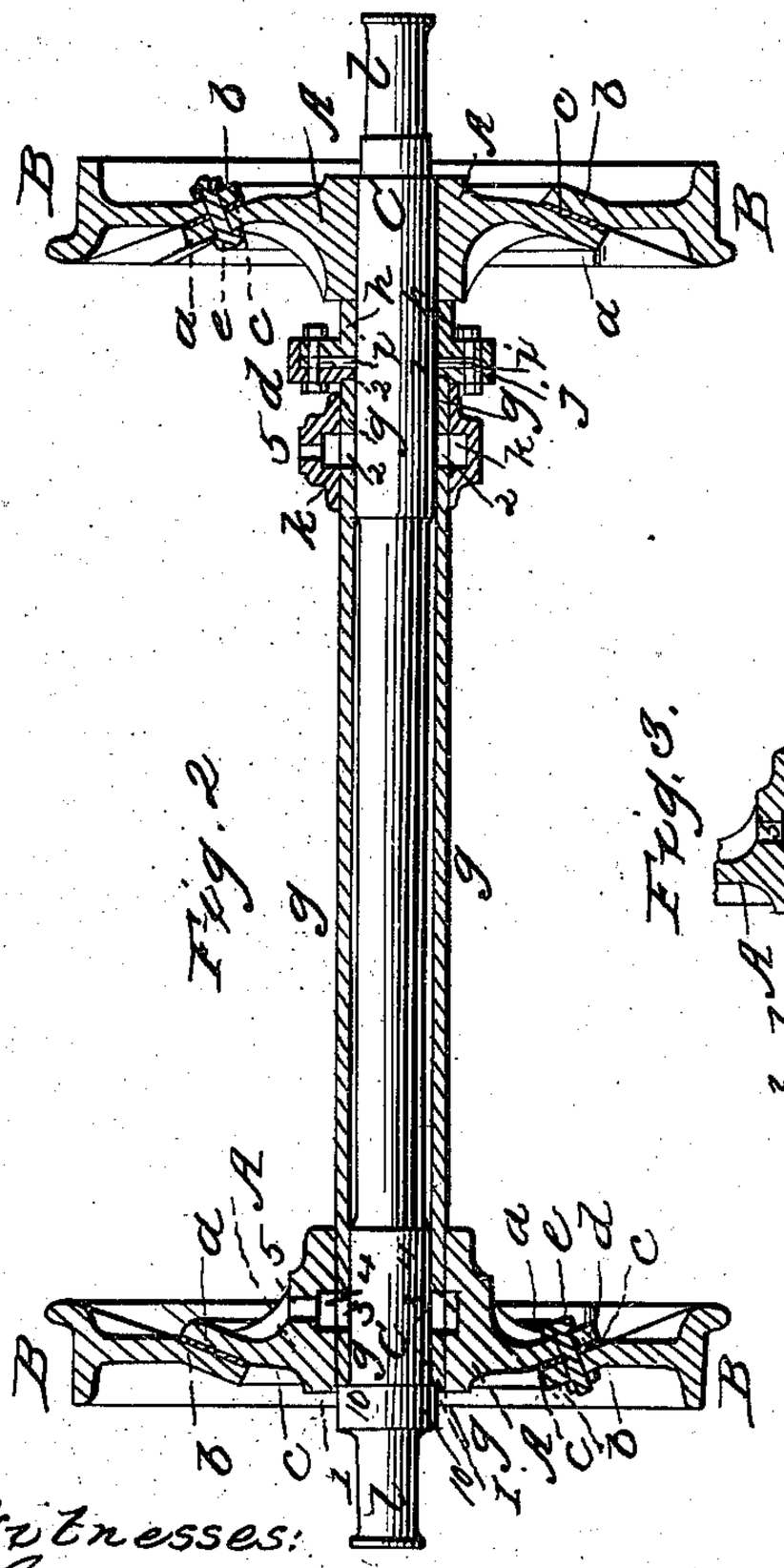


Fig. 3.

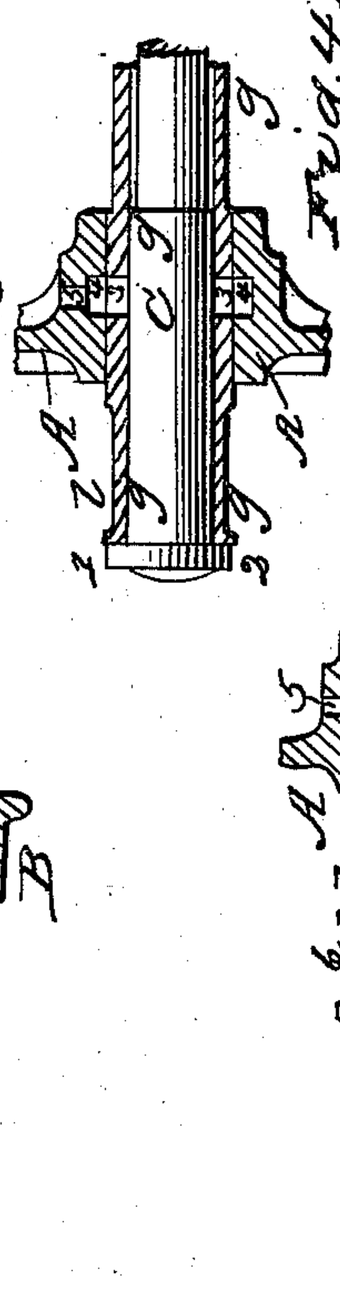
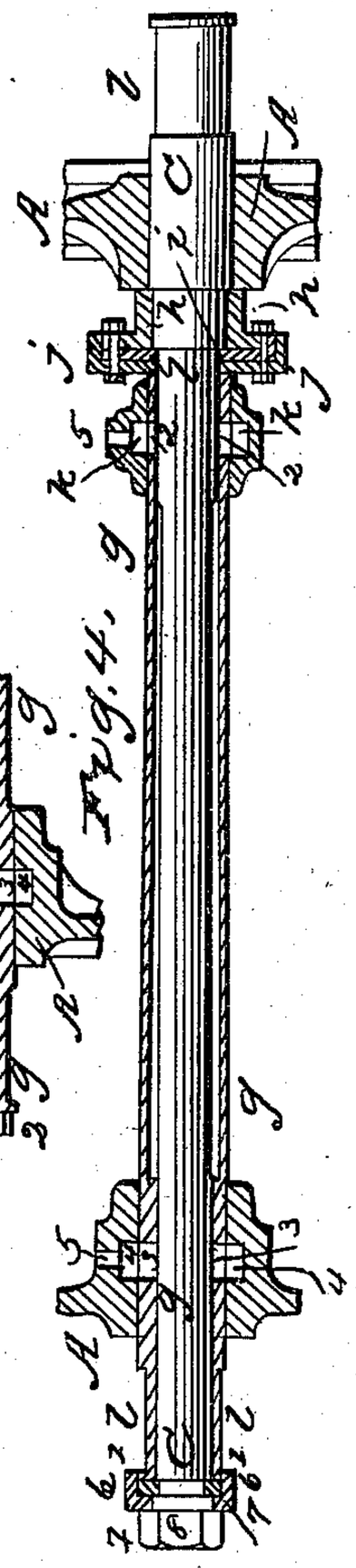


Fig. 4.



Witnesses:

J. M. Brown
Edward Mason

Inventor:

James A. Woodbury
By Atty A. B. Stoughton

3 Sheets—Sheet 2.

J. A. WOODBURY.

Car Wheel and Axle.

No. 87,746. Patented March 9, 1869.

Fig. 8.

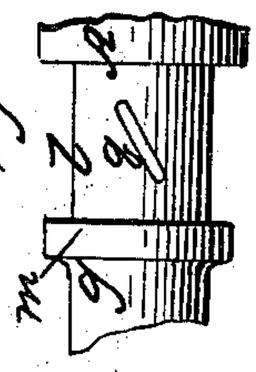


Fig. 6.

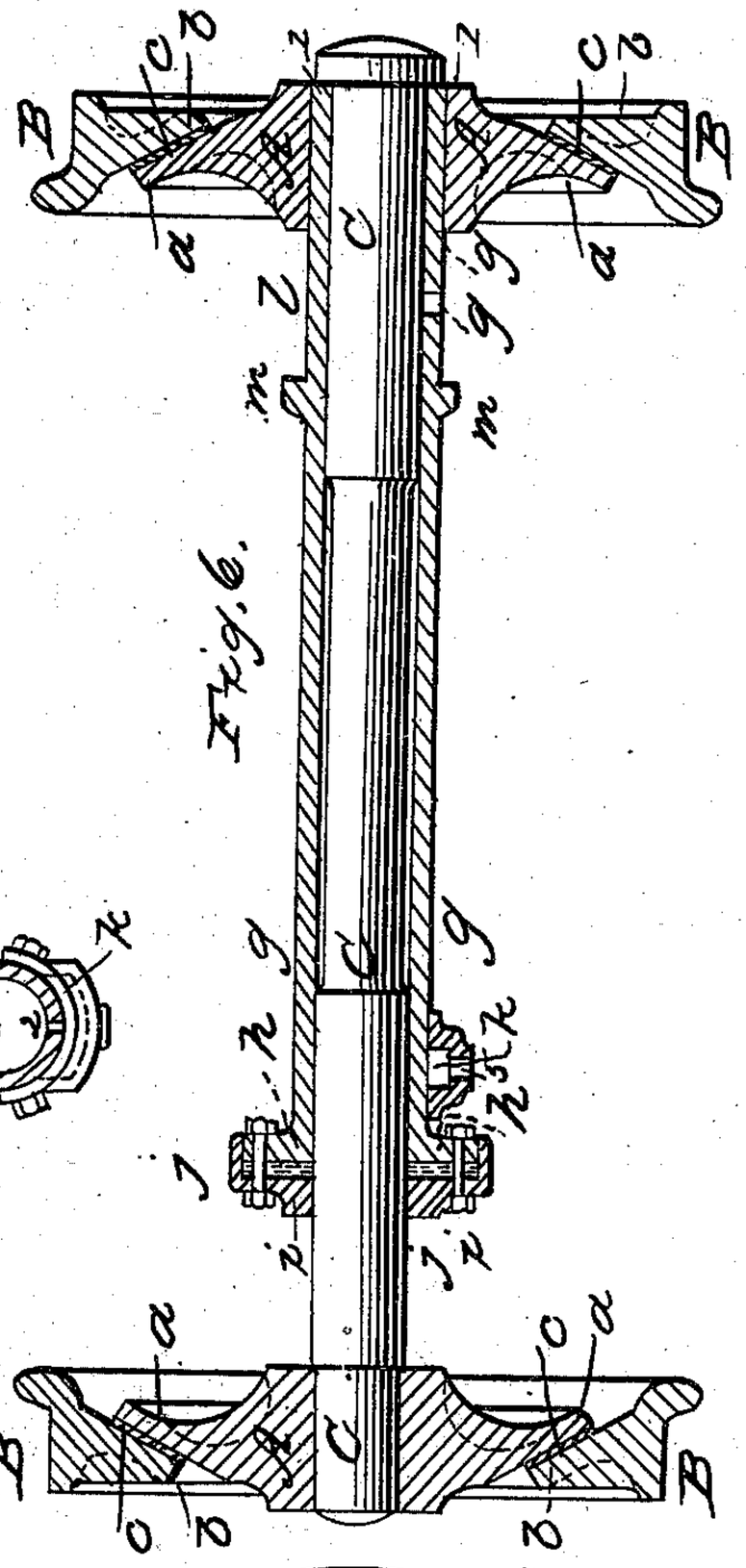


Fig. 7.

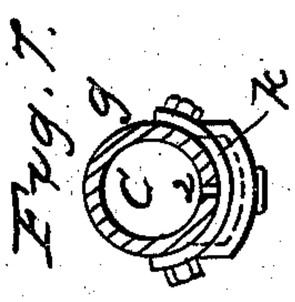
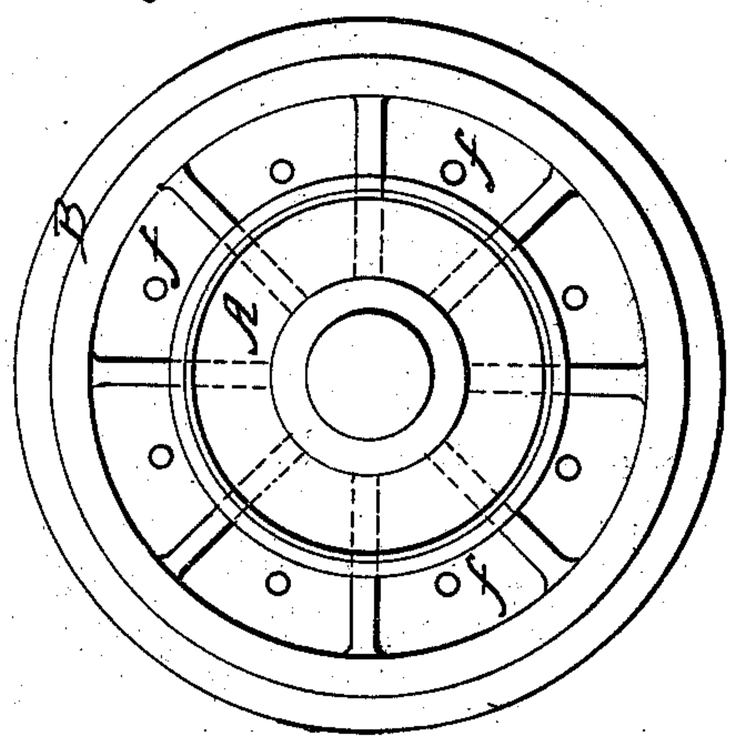


Fig. 5.



Witnesses:

J. M. Bowen

Edward Masson

Inventor:

James A. Woodbury

By atty A. B. Stoughton

3 Sheets—Sheet 3.

J. A. WOODBURY.

Car Wheel and Axle.

No. 87,746. Patented March 9, 1869.

Fig. 10.

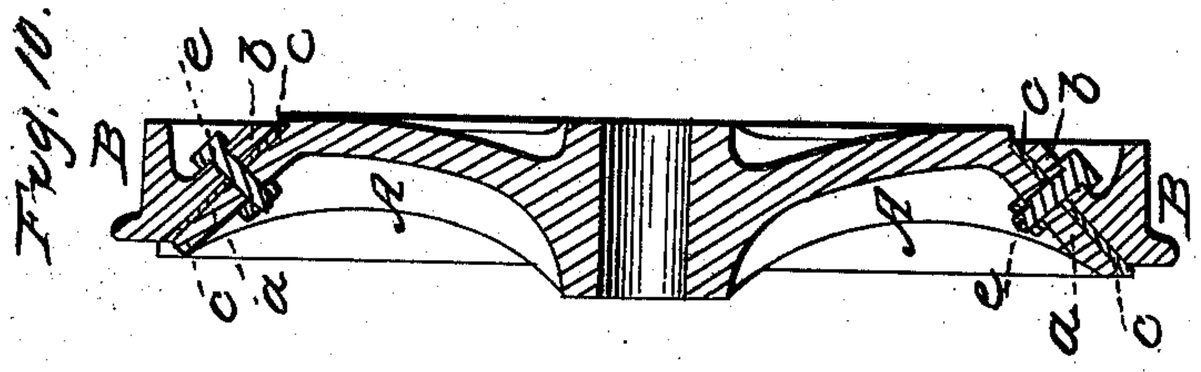
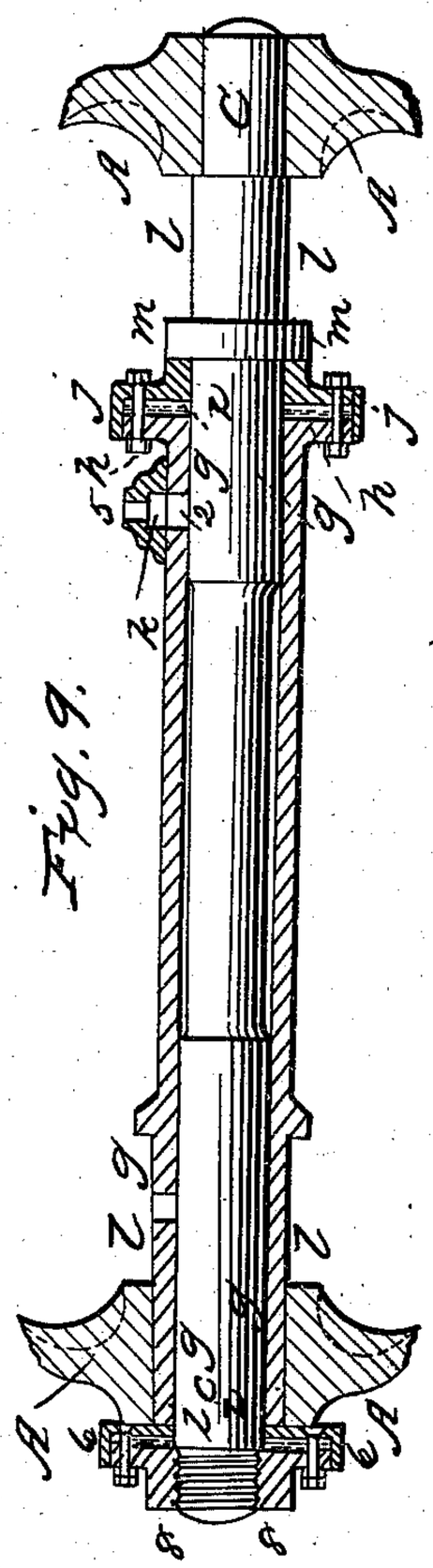


Fig. 9.



Witnesses:

J. L. M. Brown

Edward Masson

Inventor:

James A. Woodbury

By Atty M. B. Stoughton

Unitеd States Patent Office.

JAMES A. WOODBURY, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 87,746, *dated March* 9, 1869.

IMPROVED CAR-WHEEL AND AXLE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JAMES A. WOODBURY, of Boston, in the county of Suffolk, and State of Massachusetts, have invented certain new and useful Improvements in Car-Wheels and Axles; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents an elevation of one of the wheels, from the flange-side thereof.

Figure 2 represents a vertical longitudinal section, taken through a pair of wheels, their sleeve, and parts connected thereto, the axle being represented in full, or as uncut.

Figures 3 and 4 represent modifications of the general plan, as shown in fig. 2.

Figure 5 represents an elevation of the wheel, from the side opposite to that where the flange is.

Figures 6, 7, 8, 9, and 10, represent modifications of the general plan of constructing, and uniting, and lubricating the axle and sleeve, as will be hereafter explained.

Similar letters of reference, where they occur in the several separate figures, denote like parts in all of the drawings.

I am aware that many forms of divided axles, and of axles and sleeves, and of portions of wheels that have motion independent of other parts of the same wheel, have been devised, for the purpose of allowing cars and engines to turn curves without the friction attendant upon stiff or fast axles and wheels; but the fact that no such contrivance has gone into general use is conclusive that nothing of a practical nature has as yet been offered or invented, however desirable and valuable it might and certainly would be.

Railroad-cars and engines continue to twist themselves around curves, cutting and wearing wheels and rails, and limiting the capacity of the whole road to the ability of such car or engine to get around a curve, as they have done since their first introduction.

Among the many contrivances essayed for relieving cars and trucks from this immense strain and friction in going around curves, none seemed capable of sustaining and resisting the strains upon them; and, though they may have embraced in them some of the principles that must be involved in any construction of wheels and axles for passing around curves without requiring the wheel on the outer rail to slip or twist on the axle, yet they failed in construction to such an extent as not to go into use; and, up to the present time, no practical construction of wheels and axle for the purpose has been developed or introduced.

I have invented and applied certain devices and remedies for the difficulties heretofore encountered in the construction of wheels and axles, that will allow one of the wheels, at times, to turn independent of its mate or fellow, so that I feel assured that I have overcome the difficulties heretofore encountered, and produced a practical and highly valuable invention and construction in such wheels and axles; and my invention may be readily distinguished from a very large class of wheels and axles designed for the purpose mentioned, by stating that I do not use a divided axle, nor a divided sleeve.

Both the axle and sleeve, in my construction, are made in one single piece.

When either the axle or the sleeve is cut or divided, it is so weakened that very great additional weight of metal must be applied, to strengthen such weakened point; and this added dead-weight, that must be perpetually hauled over the road, at the expense and loss of motive-power, renders any such construction impracticable.

My invention relates to the construction of the several parts of the wheel and axle, and their connected parts, as will be hereafter explained, and the manner in which I have united them, so as to resist or counteract the immense strains that car-wheels and their axles are liable to, and allow them to run on the curves of a railroad, without the cramping and friction incident to "fast" wheels and axles.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

A represents an interior, and B, an exterior portion of the car-wheels, as I propose to construct them.

On the portion A of the wheel there is a bevelled, diagonal, or oblique surface, *a*, projecting out of a true radial line or plane, and on the portion B there is a similarly-inclined or oblique surface, *b*, which two surfaces lap past each other; and between them is placed a ring of prepared rubber, *c*.

Through the flange or projecting portion *a* of the central portion, there is made a series of holes, *d*, fig. 1, in which the screw-bolts *e* shall snugly fit; and through the flange or projection *b* of the exterior part of the wheel is made a series of holes, *f*, to match, in position, those, *d*, but somewhat larger than those, *d*, or larger than the bolts, *e*, that go through them, so that the outer portion of the wheel may have a little play on, or not take hard up against the bolts, when it receives its strains and jars, or blows, in traversing the rails, and thus expend much of such jar or strain upon the rubber, and relieve the central portion of the wheel A from the concussion.

The obliquity of the joint between the two portions A B is such that one and the same elastic packing will take both the vertical and the lateral jars or blows that come upon the wheel, and which cannot be the case where the rubber, or cushion, is either circumferential, or in a radial plane with the wheel.

The axle, as shown at C, fig. 2, I propose to make of the uniform size of axles calculated for specific duties or burdens, so that I do not impair the capacity of the axle; and the bearings, or journals, *l*, in this case, are of uniform size, and both upon the axle C, whilst one of the wheels, viz, that to the left of fig. 2, is placed on the sleeve *g*, and the other one, viz, that on the right of fig. 2, is set upon the axle C, which latter passes through said sleeve, and thus the two wheels may roll together, or independent of each other, when running upon curves.

Against the hub of the axle-wheel, there is fitted a flanged collar, *h*; and against the face of this collar is laid a rubber ring, *i*, or other elastic packing; and over the packing and the flanged collar is placed a cap, *j*, which is bolted firmly to the collar, and compressing and holding the packing in place.

By this device, the packing may be compressed to any requisite degree, without any pressure from the sleeve, and a metallic surface receives all the wear from friction, when the parts are put in operation.

The sleeve *g* abuts up against the cap *j*, and into a groove, or recess therein, as shown at 1, to prevent dust or grit from getting in between the axle and sleeve.

Near that end of the sleeve that abuts against the packing-box, there is secured, so as to turn with the sleeve, an oil-chamber, or reservoir, *k*, which may be filled with wicking, or waste, or any other absorbing-material, and then oil be poured therein, the oil reaching the surfaces between the sleeve and axle through slots 2 in the sleeve.

The other end of the axle and sleeve is lubricated through openings 3 in the sleeve, which communicate with an oil-chamber, 4, in the hub, which chamber, as well as that at *k*, may be filled from the exterior, through openings 5, which are afterward closed up tightly.

In fig. 3, I have shown a modification of my plan, in which both the wheel and the bearing *l* are on the sleeve *g*, though the solid, uncut axle C passes through the sleeve, as in the construction at fig. 2; and, in fig. 4, I have shown another modification, in which one wheel and one bearing are upon the sleeve *g*, and the other wheel and bearing are upon the axle C; but both bearings are of the same size.

In this modification, the end joint, between the axle and sleeve, is secured against the entrance of dust and grit by a cap, 6, and split ring, 7, or other suitable appliances, held on by a nut, 8, or other fastening.

The packing and lubrication are the same, substantially, as that in fig. 2, and the joints closed against dust in a similar way.

In figs. 6, 7, and 8, I have shown another modification of the construction of the axle and sleeve, and their connected parts, wherein the wheels are placed, respectively, at the extreme ends of the axle, and of the sleeve, and the bearings are inside of said wheels, so that there shall be a permanent and strong resisting-wall or abutment, by such interposed bearings, against the lateral or endwise jar or blow on the wheels.

In this case, as a head or flange, *m*, is wrought upon the sleeve *g*, over which the oil-box *k* could not be slipped, said oil-box is made separate from the sleeve *g*, and bolted to it, and need not surround the sleeve entirely, but it turns with the sleeve, and receives and supplies oil to the sleeve and axle in a similar way to that above mentioned; and the sleeve may have one or more oblique slots, 9, through it, where the bearings *l* come, and supply a lubricator through these, the oil-reservoir being in the box.

In this modification, the bearings are not of the same size, and, in this particular, this plan is not deemed so good as where the bearings are of a uniform size.

The vertical poundings or jarrings of the wheels upon the rails, as well as the lateral strains, are first taken up and cushioned, or deadened, by the packin in the wheels, at *c*; and whatever other lateral jar may be communicated to the central portion of the wheel A, is taken up by the packing at *i*, between the axle and sleeve; and thus I relieve the wheels, axle, and sleeve of the strain and jar which heretofore have rendered this construction of independently-moving wheels impracticable.

The constant and certain lubrication of the bearing-surfaces, between the axle and sleeve, as well as the covering of the exposed joints between them, to prevent the entrance of dust and grit, and, as shown at 1, 1, 1, &c., are very important in the use of a fast and loose wheel on an axle and sleeve, or their equivalents.

The wheels are forced on to their axles or sleeve, as the case may be, by hydraulic pressure, in the usual way.

By reference to fig. 2, it will be seen that the lateral strain, what there is left of it after being cushioned or deadened on the elastic packing *c i*, comes against or upon the axle C; for, though it comes against the hub of the wheel on the right of that figure, that hub and wheel may be regarded as the axle, for it is united to the axle by means more certain and rigid than by shrinking it on, viz, by hydraulic pressure, that is more forcible than any jar that could come upon it by ordinary use on the rails.

The packing-box *h j* is substantially a part of the wheel, and the end of the sleeve *g* abuts against the packing-box, with just a "line" of play.

At the opposite end of the axle, the sleeve *g* abuts against a shoulder, 10, on the axle itself, so that, at both ends of the sleeve, firm bearing against lateral strain is provided for.

This lateral strain has been attempted to be resisted by loose collars, set-screws, and appliances other than the rigid parts of the structure itself. They have entirely failed, so much so as to render the whole thing useless.

This same characteristic, of rigid lateral resistance, pervades all the modifications herein described, for, even in fig. 6, where the packing-box is on the sleeve, and not abutting against the hub of the wheel, yet the journal-box occupies entirely the space between the packing-box and the hub, and thus passes the jar through itself, what there is of the jar, to the hub of the wheel.

In fig. 9, the same general form of construction is observed, and only differs from the others in having the packing *i* at each end of the sleeve, and allowing the latter to abut against a rigid collar, *m*, wrought upon the axle C, instead of abutting against the hub of the wheel.

Fig. 10 shows a modification of the diagonal or oblique joint, and interposed rubber cushion, between the centre and rim of the wheel. This modification is more applicable to driving-wheels for locomotives.

Having thus fully described my invention,

What I claim therein as new, and desire to secure by Letters Patent, is—

1. In combination with a wheel in two or more parts, the diagonal or oblique joint, and interposed packing, substantially as and for the purpose described.

2. Also, the combination of an elastic wheel with a sleeve, so made, that when used with an axle and wheel, it will turn independently of the latter, substantially as described.

3. Also, in combination with an axle and sleeve, each carrying and turning with its own wheel, an elastic bearing, for cushioning the endwise strain or jar, constructed substantially as described.

4. Also, the combination of an elastic wheel and axle, and an elastic wheel and sleeve, with a packing, interposed between them, to take up lateral jar, substantially as described.

5. Also, in combination with an axle and a sleeve, each carrying one of a pair of wheels, a revolving oil-box for containing a lubricating-material, and supplying it to the bearing-surfaces between said sleeve and axle, substantially as described.

6. Also, in combination with the bearings on the sleeve, the slot or slots 9, for admitting oil from the journal-box, through the sleeve, to the bearing-surfaces between the sleeve and axle, substantially as described.

7. Also, the covering of the exposed joints between the sleeve and axle, by an overlapping joint at each end, to prevent the admission of dust, grit, &c., substantially as described.

JAMES A. WOODBURY.

Witnesses:

A. B. STOUGHTON,
EDMUND MASSON.