

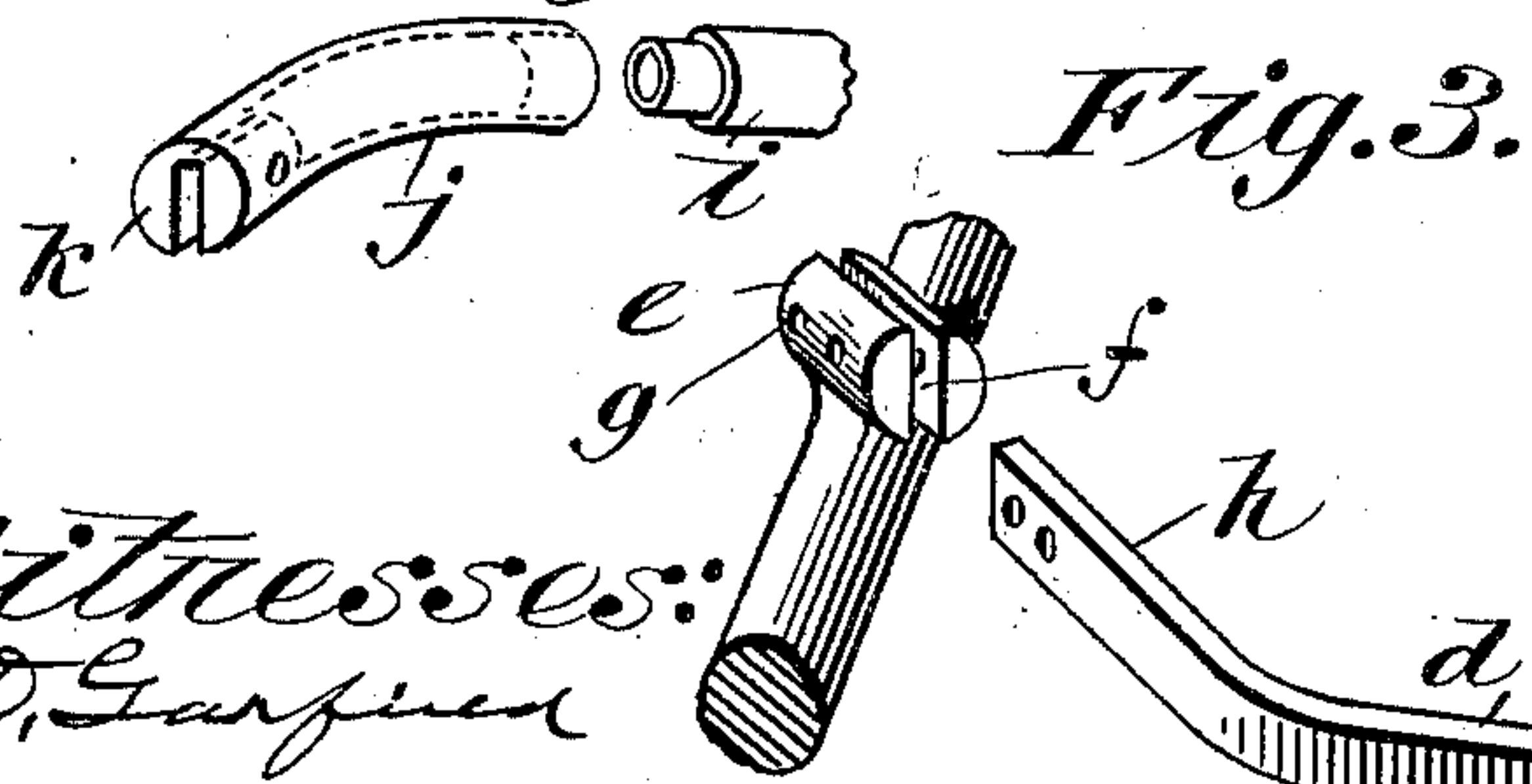
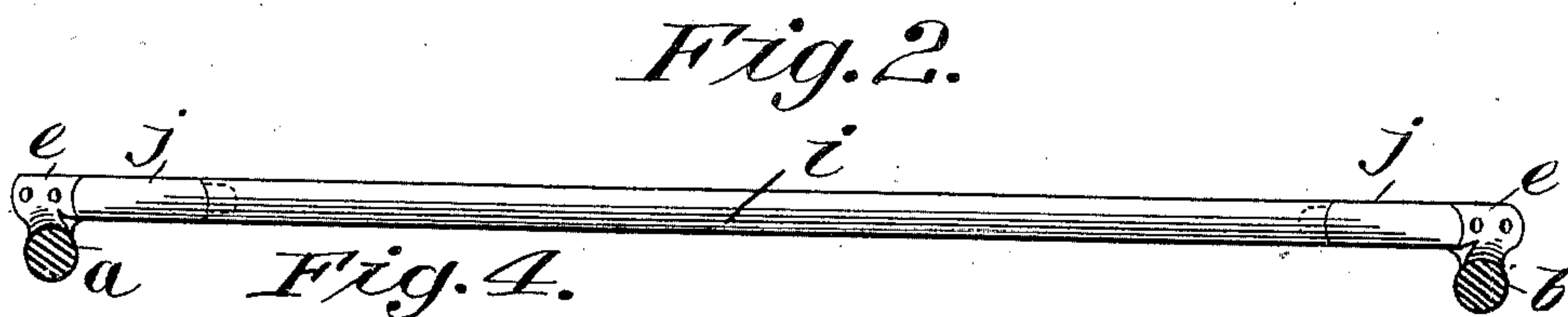
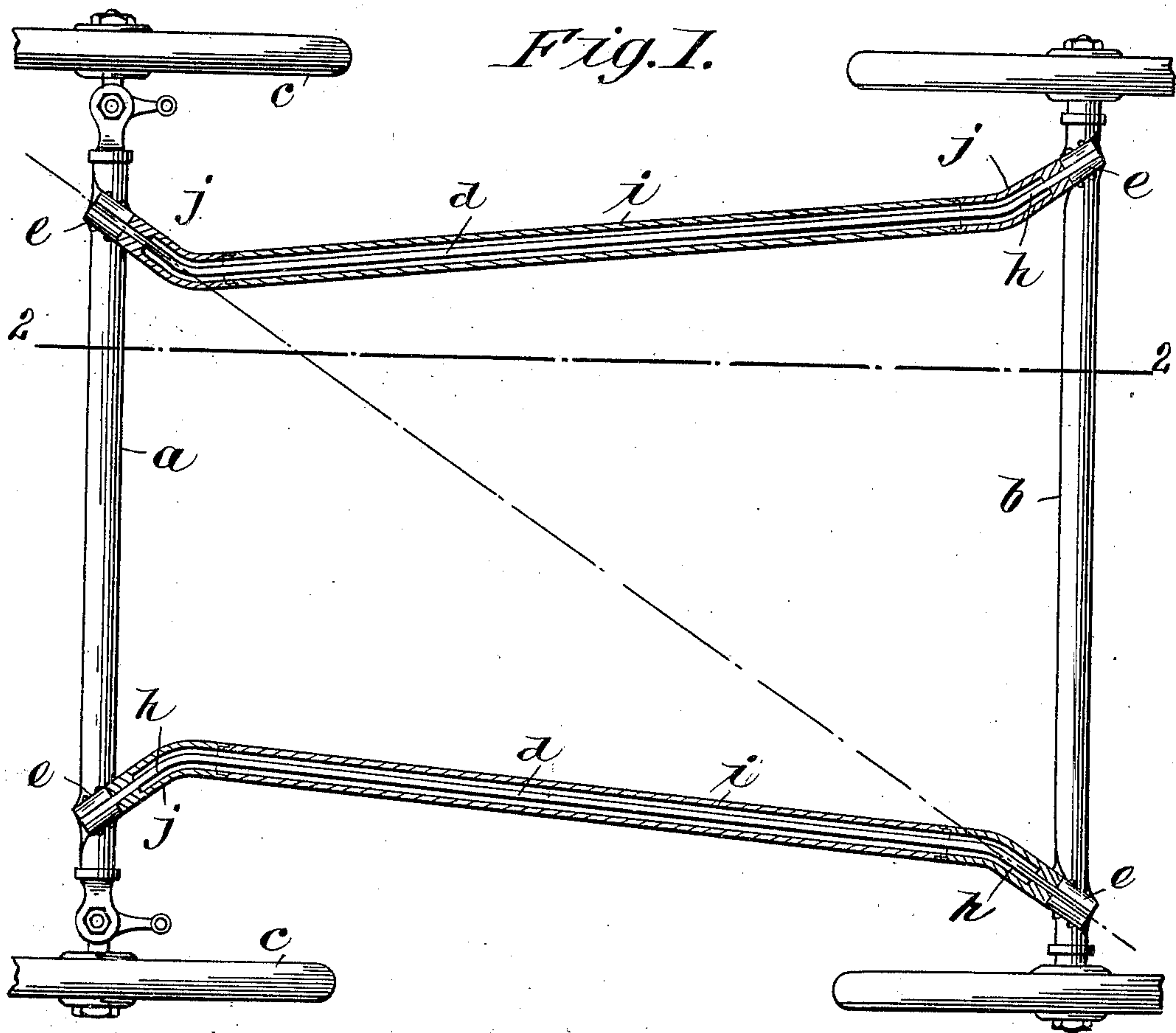
No. 672,428.

Patented Apr. 16, 1901.

J. H. BULLARD.
RUNNING FRAME FOR VEHICLES.

(Application filed Nov. 8, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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RUNNING-FRAME FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 672,428, dated April 16, 1901.

Application filed November 8, 1900. Serial No. 35,851. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. BULLARD, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Running-Frames for Vehicles, of which the following is a specification.

This invention relates to running-frames for vehicles of that type of which the construction shown in United States Letters Patent issued to H. P. Maxim on September 4, 1900, No. 657,430, is a good illustration; and the invention has for one object the construction of a running-frame which will permit of the free play in a vertical plane of any one of the four wheels carried on the axis thereof without bringing undue strain on the frame; and a further object of the invention lies in a construction having this object in view from which all loose joints have been eliminated.

The invention consists in the construction described in the specification, and more particularly pointed out in the claims forming part thereof.

In the drawings forming part of this specification, Figure 1 is a plan view, partly in section, of a running-frame embodying my invention. Fig. 2 is a longitudinal section on line 2 2, Fig. 1. Fig. 3 is a perspective view of a part of one of the axles of the frame and a portion of one of the side bars in separated relations. Fig. 4 shows a modification.

The running-frame shown in the drawings consists of two axles *a* and *b*, the latter being the rear axle. On the front axle *a*, as usual in this type of machines, the wheels *c* are adapted to swing independently of the axle, which, together with the side bars *d*, form a rigid rectangular construction. Near each end of the axle *a* and the axle *b* there is provided a boss *e*, which may be either rigidly attached to the frame or may form an integral part thereof. Said boss *e* is of cylindrical shape, preferably, and the axis of each one of said cylindrical bosses on one of said axles is in line with the axis of those bosses located on the opposite ends of the other axle of the frame. Said bosses are divided longitudinally on the line of their axes by a slot *f* and

transversely pierced with one or more holes *g* to receive a bolt. The side frames proper (indicated by *d*) consist, preferably, of flat steel strips of suitable dimensions. Each end of said strips is so bent relative to the body portion thereof that when one end thereof is introduced into the slot *f* of the boss *e* of one axle and the opposite end introduced into the slot of the boss *e* of the other axle on the same side of the frame each of said bent ends (indicated by *h*) will lie in line with the slot *f* of that boss *e* diagonally opposite thereto, and the bent end of one bar will be in line with the bent end of the other bar diagonally opposite thereto. Both of the side bars *d* having their ends bent to the same angle and being secured in the bosses *e* by bolts passing through the holes *g* and holes in the ends of the side bars or by other suitable means, a substantially rectangular frame is produced, which in the plane of the frame is possessed of great rigidity, but which, owing to the peculiar shape of the side bars *d*, will permit any one of the four corners of said frame to be moved in a plane vertical to the plane of the frame as a whole to a very considerable degree. When one of the corners of said frame is so moved in a vertical plane, the bar *d* on that side of the frame on which that movement takes place is subjected to a twisting movement of greater or less extent, which tends to return the corner of the frame again to its true position in a plane with the body thereof. This characteristic gives to the frame when in motion over an uneven surface a very easy and spring-like action and tends to reduce to a minimum the jumping of the wheel in going over an obstruction. If desired, the side bars *d* may be inclosed in a tubular casing *i*, such as is shown in section in Fig. 1 and in side elevation in Fig. 2. In applying said casing to the side bars that portion thereof indicated by *j*, which fits over the bent ends *h* of the bar *d*, is preferably made in separate pieces, as shown in the drawings, which may be either secured to the bosses *e* or the bar *d* in any desirable manner, the main central portion *i* of the said casing being let into the open ends of the portions *j*, the whole being fitted closely between the bosses on the two axles, so as to prevent any rattling. The addition of the

tubular casing *i* adds additional rigidity to the frame to resist pressure brought to bear thereon in a line transverse to either of the axles; but it may be dispensed with, if desired.

The pieces *j* may, if desired, be made in the form of a forging or casting, such as is shown in Fig. 4, and be fitted over the bent end *h* of the bars and secured thereto by a pin, the engagement of the main portion *i* of the casing with the open end of said pieces *j* serving to keep the free end of the latter in proper position and prevent all rattling.

If the pieces *j* are formed of tubing, obviously the end thereof lying next to the boss *e* should preferably receive a bushing having a slot therein to receive the end of the bar. This bushing would in that case be represented by the thickened portion *k* of the piece shown in Fig. 4.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A running-frame for vehicles comprising front and rear axles and two torsionally-yielding side bars rigidly secured by their ends to said axles, a portion of each end of said bars being bent to lie in a line drawn diagonally from the end of the side bar on one axle to the opposite end of the other bar, on the other axle, substantially as described.

2. A running-frame for vehicles having substantially a rectangular form consisting of front and rear axles and two torsionally-yielding side bars rigidly secured by their ends to said axles near the ends of the latter, a portion of said side bars at each end thereof being bent near the point of its attachment to the axle, into line with the diagonally opposite end of the side bar on the opposite side of the frame, substantially as described.

3. A running-frame for vehicles comprising a front and rear axle and two flexible side

bars rigidly secured by their ends to said axle, said side bars, at or near the point of their attachment to the axle, having a portion of their length inclined to the remainder, whereby the movement of one end of one of said axles in a vertical plane will subject said side bars to a torsional strain, substantially as described.

4. A running-frame for vehicles consisting of front and rear axles and two side bars rigidly secured by their ends thereto near the ends of the latter, said bars consisting of flat spring-steel having a portion of their length at one end thereof bent into line with the diagonally opposite end of the opposite side bar, substantially as described.

5. A running-frame for vehicles comprising front and rear axles and two side bars capable of torsional flexure rigidly connected with said axles near their ends, whereby the latter are maintained in parallel relations one to the other, the ends of said side bars lying at an angle to the body thereof in a horizontal plane, whereby the movement of one end of one of the axles in a vertical plane may take place only against the torsional resistance of the side bar on that side of the frame, substantially as described.

6. A running-frame for vehicles comprising front and rear axles and two side bars capable of torsional flexure secured to said axles near their ends, whereby said axles are maintained in parallel relation one to the other, the ends of said axles being capable of movement in a plane at right angles to the plane of the frame, combined with a tubular casing for inclosing said side bars which casing is adapted to yield torsionally with said bars, substantially as described.

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