H. SAWYER.

OVERHEAD TRAVELING CRANE.

APPLICATION FILED APR. 14, 1909.

944,054. **Patented Dec. 21, 1909.**

4 SHEETS—SHEET 1.

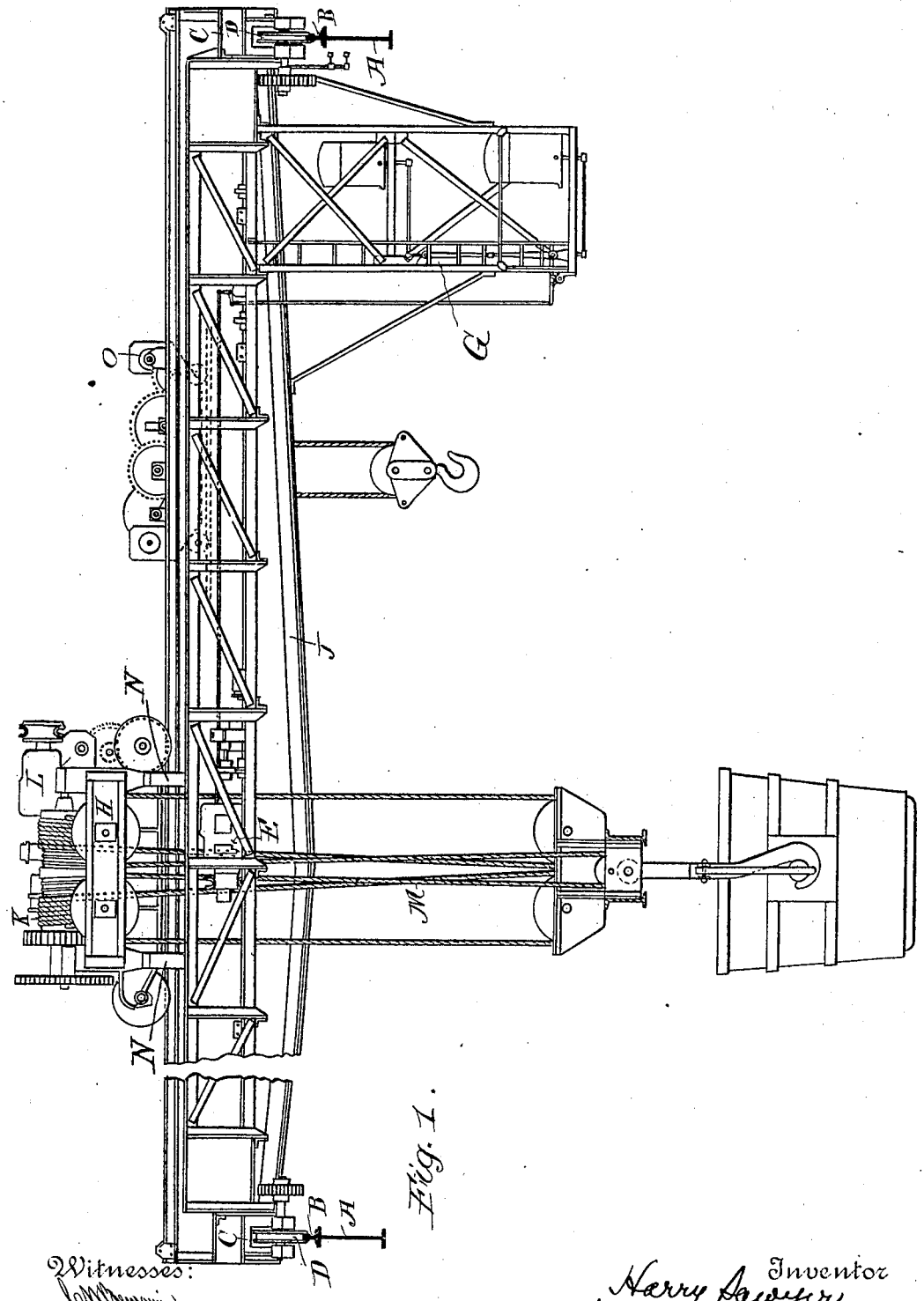

Fig. 1.

Witnesses:

J. Klein

Inventor

Harry Sawyer

By his Attorney

Samuel E. Darby

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

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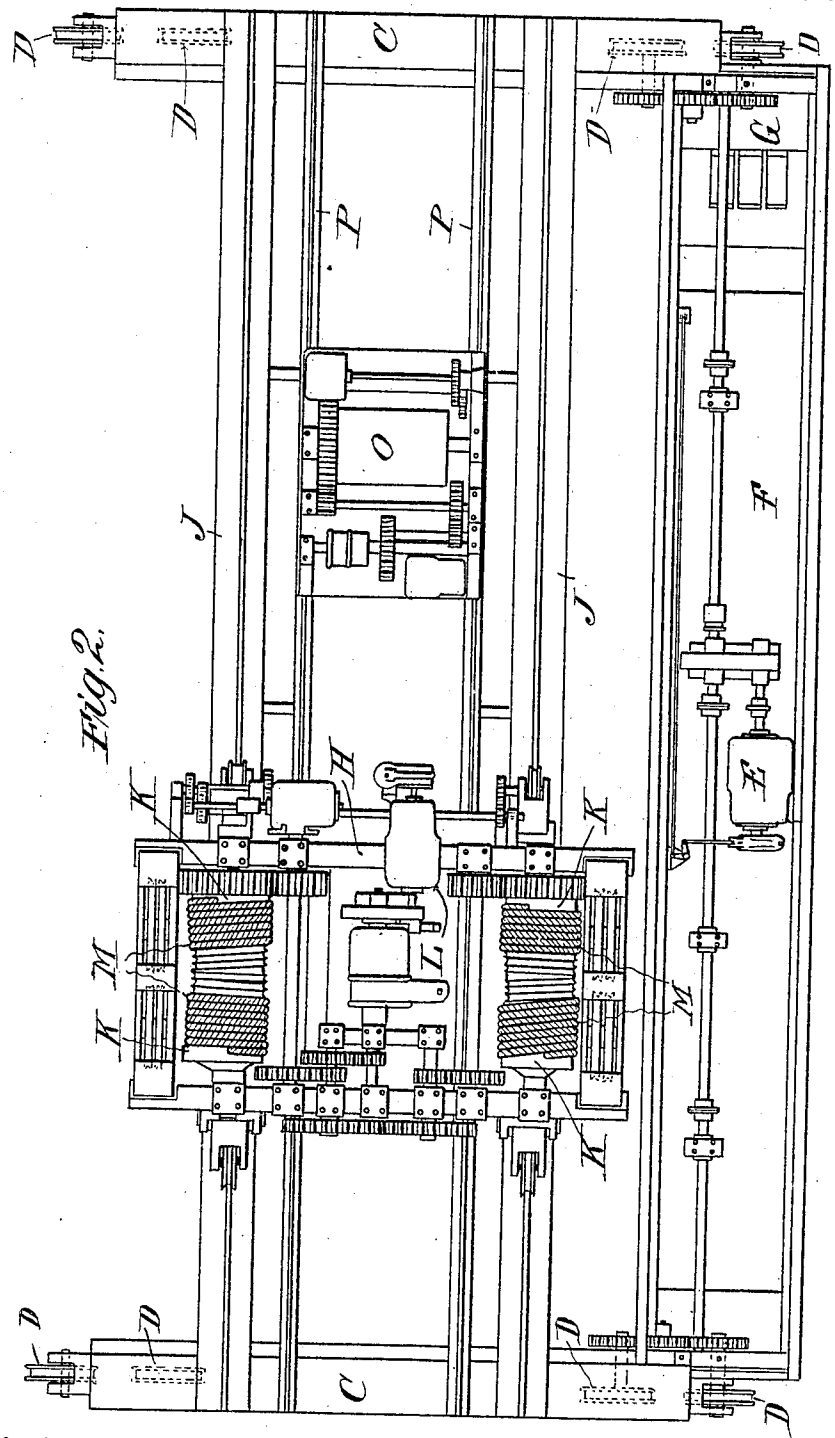

Fig. 2.

Witnesses:

W. M. Benjamin

J. C. Klein

Inventor

Harry Sawyer

By his Attorney

Samuel E. Darby

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

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4 SHEETS—SHEET 3.

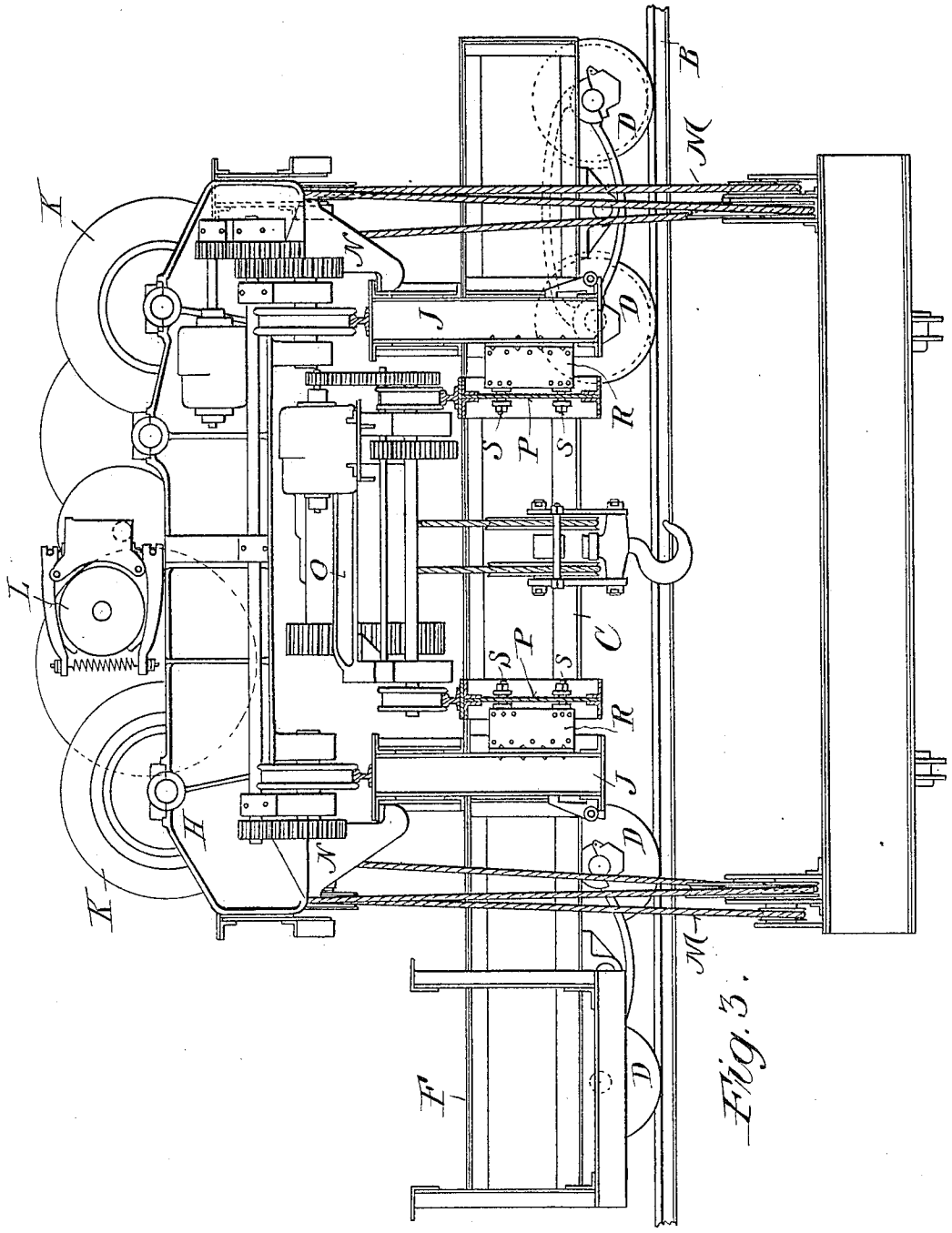

Fig. 3.

Witnesses:

Inventor

Harry Sawyer

By his Attorney

Samuel E. Darby

H. SAWYER.

OVERHEAD TRAVELING CRANE.

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4 SHEETS—SHEET 4.

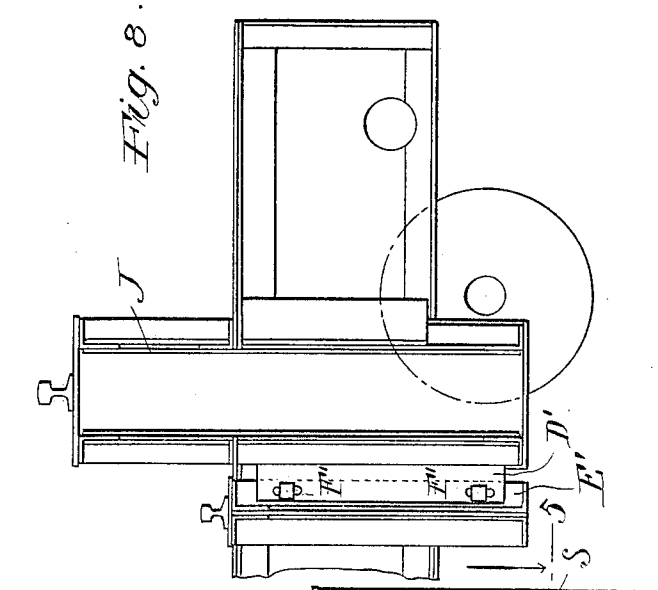

Fig. 8.

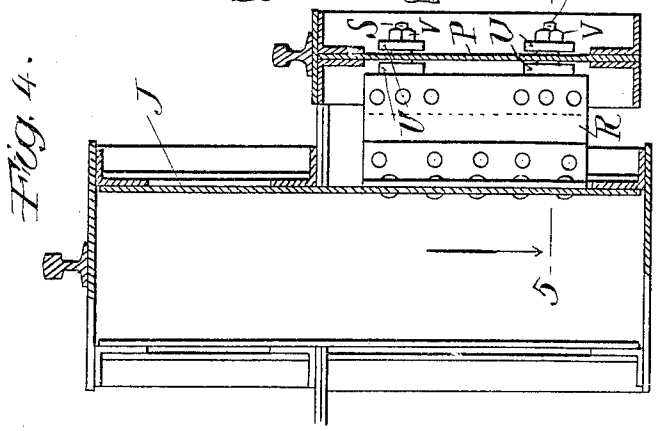

Fig. 4.

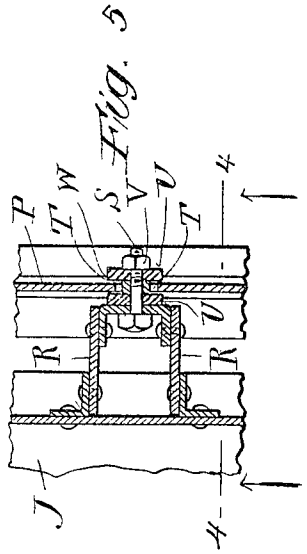

Fig. 5.

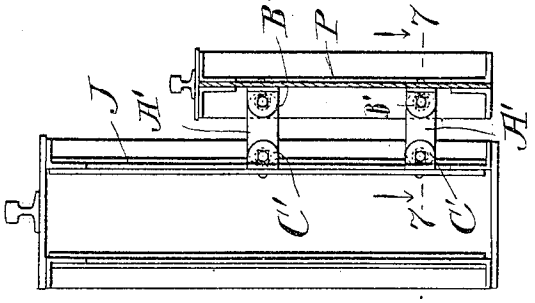

Fig. 6.

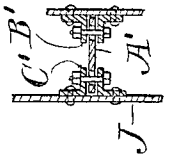

Fig. 7.

Witnesses:

L. M. Benjamin

J. C. Clair

Inventor

Harry Sawyer

By his Attorney

Samuel E. Darby

UNITED STATES PATENT OFFICE.

HARRY SAWYER, OF MUSKEGON, MICHIGAN.

OVERHEAD TRAVELING CRANE.

944,054. Specification of Letters Patent. **Patented Dec. 21, 1909.**

Application filed April 14, 1909. Serial No. 489,873.

To all whom it may concern:

Be it known that I, HARRY SAWYER, a citizen of the United States, residing at Muskegon, in the county of Muskegon, State of Michigan, have made a certain new and useful Invention in Overhead Traveling Cranes, of which the following is a specification.

My invention relates to overhead traveling cranes, and particularly to that class which employs both a main hoisting trolley and an auxiliary hoisting trolley.

The object of the invention is to provide a construction of crane wherein the entire strains of the main and auxiliary trolleys are respectively carried on independent girders which are mounted for free relative vertical vibration but which are braced against relative lateral vibration or movement.

A further object is to provide a construction of crane of the class referred to which is efficient and compact and which permits ready access to the auxiliary trolley.

A further object is to provide a construction of crane of the class referred to wherein the hoisting cables of the main trolley are suspended outside the supporting girders but in such manner and relation as not to interfere or to come in contact with the controller cage, and which does not impose upon the trolley undue twisting or tipping strain in case the cable on one side or the other should part or give way.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings and to the various views and reference signs appearing thereon, Figure 1, is a view in side elevation of a traveling crane structure embodying the principles of my invention. Fig. 2, is a top plan view. Fig. 3, is a view in transverse section. Fig. 4, is a detail view in transverse section on the line 4, 4, Fig. 5, looking in the direction of the arrows, and showing one form of connection between the supporting girders of the main and auxiliary trolleys, and embodying the principles of my invention. Fig. 5, is a broken detail view in section on the line 5, 5, Fig. 4, looking in the direction of the arrows. Fig. 6, is a view similar to Fig. 4, showing another form of connection embraced within the scope of my invention. Fig. 7, is a broken detail view in section on the line 7, 7, Fig. 6, looking in the direction of the arrows. Fig. 8, is a view similar to Figs. 4 and 6, showing still another modification embodying the principles of my invention.

The same part is designated by the same reference sign wherever it occurs throughout the several views.

In the drawing, reference sign A, designates supporting girders for the track rails B, on which the bridge of the crane travels. The bridge consists of the end carriages or frames C, carrying the supporting wheels D, which operate on the track rails B, to shift the crane from one point to another along the girders A. Any suitably arranged and controlled power mechanism may be employed for effecting the shifting of the crane bridge. I have shown a motor E for this purpose, said motor being carried on a platform F, carried by a supplemental framing, and on which framing is also carried the cage G, from which the apparatus may be controlled. If desired, and as shown, the supplemental framing and the platform carried thereby may be sufficiently offset from the side of the adjacent girder of the crane bridge structure to permit the hoisting cables depending or suspended from the corresponding side of the main trolley, to operate freely therebetween, as will be more fully explained hereinafter.

It is obvious that the crane shifting motor as well as the supporting frame therefor, may have any other convenient construction and arrangement without departure from the spirit or scope of my invention. The construction and arrangement shown and described, however, is simple, affords accessibility to the parts, and is efficient for the purpose.

Supported at their ends upon the bridge carriages C, are the girders upon which the trolleys are carried. In the form shown, the main trolley H, is carried on wheels operating on track rails supported by the girders J, in the usual manner. The main trolley H, carries the usual hoisting drums K, and motor L, the hoisting cables M, being ar-

ranged to depend from the drums outside of the girders J, as most clearly shown in Figs. 2 and 3, the cable on one side of the main trolley depending between the girder J, on that side of the bridge, and the supplemental framing and platform which carry the drive motor E, as above noted, while this arrangement of the hoisting cables is preferred my invention as defined in the claims is not to be limited or restricted in this respect.

Where the hoisting cables are suspended from points outside of the girders they should be arranged to operate as close to the girders as possible so as to avoid the danger of tilting or canting the trolley sidewise in case one or the other of the cables should break under the strain of a load thereby imposing the entire weight of the load on the cable at the other side of the trolley. By arranging the cables in the manner described the tilting strain thrown upon the trolley by imposing the entire weight of the load on the cable at one side is exerted through a very short leverage and hence there is very little tendency to tilt or cant the trolley sidewise. In order to still further insure against any sidewise tilting movement the trolley may be provided with the brackets N, arranged to engage underneath flanges on the main girders J, as most clearly shown in Fig. 3.

The auxiliary trolley O, is supported on and operates along track rails carried by the auxiliary girders P, supported at their ends upon the bridge carriages C, and arranged between the main trolley supporting girders J. The girders J, and P, are of such relative heights that the main trolley readily operates over the auxiliary trolley without interference therewith. As is customary in apparatus of this class the hoisting mechanism of the main trolley is employed, especially in the case of ladle cranes, to raise the ladle while the hoisting mechanism of the auxiliary trolley is employed to engage the ladle and tilt the same to empty the contents thereof. Of course, the apparatus is well adapted and designed for other purposes.

In the arrangement of supporting track or rail girders, in accordance with the principles of my invention, the auxiliary girders P, are arranged inside the main girders J, and quite close to said main girders. It is important and among the principal objects of my invention, to provide such a construction and arrangement of girders as will permit the supporting girders for the main and auxiliary trolleys, respectively, to deflect or bend under their own respective loads without imposing any deflecting load upon the supporting girders of the other trolley. At the same time it is also necessary and important in accordance with the principles of my invention to provide means for efficiently supporting the main and auxiliary girders against relative lateral movement. In other words, I propose, in accordance with my invention, to provide such a construction and connection of girders for the main and auxiliary trolleys as will permit relative vertical movements of said girders, but which will not permit relative lateral movement thereof. Various constructions of connections between the main and auxiliary girders may be employed which will accomplish these objects and purposes, and I have shown and will now describe various arrangements embodying this idea, and therefore, as defined in the claims, my invention is not to be limited or restricted in its broadest scope to any specific construction or arrangement of interconnection between the main and auxiliary girders.

In Figs. 3, 4, and 5, I have shown one form of connection between proximate or adjacent members of the pairs of main and auxiliary girders, wherein a boxing construction indicated at R, is securely fastened or bolted to the web of the main girder J, this boxing carrying one or more bolts S, arranged to extend through vertical slots indicated at T, Fig. 5, in the web of the adjacent girder P. The collars U, and intermediate sleeve W, on the bolt S, enable the bolt, or, rather, the nut V, thereon to be tightened up without pinching the web of the auxiliary girder through which the bolt passes. The boxing R is preferably built up of structural steel plates, but the specific construction thereof is immaterial, the important thing being to secure such a connection between the girders J, and P, as will permit said girders to deflect vertically independently of each other, without permitting any relative lateral movements thereof, and, consequently, any load imposed upon one of these girders will not deflect or affect the other as would be the case if the girders were rigidly connected together, in which case an additional load is placed on one girder, by reason of having to take a portion of the load of the other girder, causing an undue tilting or twisting strain to be imposed. This objection is obviated in the construction above described, wherein the girders are permitted free relative vertical vibration or deflection. At the same time, however, the girders are efficiently braced, the one to the other, against any lateral vibration, thus forming a secure and efficient structure for the purpose intended. In Figs. 6, and 7, I have shown a modified construction of interconnection between the adjacent girders, wherein links A^1 are pivotally connected at the respective ends thereof to lugs B^1, C^1, on the girders P, and J, respectively. In this case the pivots of the links should be so constructed as to

permit the relative vertical deflection of the girders without permitting relative lateral deflection or movements thereof. In other words, sufficient lost motion in the pivotal connections of the links should be provided to permit the movements referred to.

In Fig. 8, I have shown another construction of interconnection between the girders embraced within the spirit and scope of my invention wherein metal flanges D^1, E^1, are secured to the girders J, P, respectively, and these flanges are provided with vertical elongated slots F^1, through which bolts may be passed, thus permitting the relative vertical deflection of the girders but preventing relative lateral movements thereof.

In practice, any desired number of interconnecting bolts or links may be employed, and therefore my invention is not to be limited in this respect. It is also obvious that many other forms of interconnection between the adjacent girders may be employed without departure from the spirit and scope of my invention as defined in the claims, the essential feature being in this respect the free and independent vertical deflection or movement of the girders without any relative lateral movement thereof.

By the construction above set forth it is necessary to make only the main girders rigid laterally, and this may be accomplished in the structure of the girder itself. The connection between the main girder and the auxiliary girder gives sufficient lateral support to the auxiliary girder to prevent lateral movement thereof, and, consequently, the auxiliary girders may be single web girders with comparatively narrow flanges, thus materially reducing the weight and cost of construction of the apparatus without sacrificing anything of strength or efficiency, while at the same time permitting ready access to the auxiliary trolley. Moreover, with the cage construction and arrangement together with the supplementary framing platform for carrying the bridge traverse mechanism, and by arranging the hoisting cables to depend outside of the main girders, the main trolley is permitted to travel the full length of the girders, without limiting such travel by the hoisting cables striking or coming in contact with the cage or other part.

Having now set forth the object and nature of my invention and various constructions embodying the principles thereof, and having described such constructions and the purpose, function and mode of operation thereof, what I claim as new and useful and of my own invention and desire to secure by Letters Patent is—

1. A crane having a bridge including main girders and auxiliary girders, a main hoisting trolley mounted upon the main girders, an auxiliary trolley mounted upon the auxiliary girders, and connection between said main and auxiliary girders to permit relative vertical deflecting movement, but preventing relative lateral movement thereof.

2. A crane having a bridge including main and auxiliary girders, arranged in pairs, the auxiliary girders being arranged inside the main girders, the adjacent members of said pairs respectively having connections with each other, said connections permitting relative vertical movement thereof, but preventing relative lateral movement and trolleys respectively carried by said pairs of girders.

3. A crane having a bridge including main and auxiliary girders, the auxiliary girders being arranged inside the main girders, and having connection thereto to permit relative vertical movement thereof, but preventing relative lateral movement, main and auxiliary trolleys operating on the said respective girders, the hoisting cables of the main trolley depending outside of the main girders.

4. A crane having a bridge including main girders, auxiliary girders, a main hoisting trolley mounted on the main girders, an auxiliary trolley mounted upon the auxiliary girders, the auxiliary girders being mounted between the main girders, and means connecting the same to the main girders, said means permitting vertical relative deflection of said girders, but preventing relative lateral movements thereof.

5. A crane having a bridge including main and auxiliary girders, the auxiliary girders being located intermediate the main girders, means connecting each auxiliary girder to the adjacent main girder, said means permitting relative vertical deflection of said girders, but preventing relative lateral movements thereof, a main trolley carried by the main girders, an auxiliary trolley carried by the auxiliary girders, the hoisting cables of the main girder depending outside of the main girders, and the hoisting cable of the auxiliary trolley depending between the auxiliary girders.

6. A crane having a bridge including main and auxiliary girders, each auxiliary girder being connected to the adjacent main girder to permit relative vertical deflection, but preventing relative lateral movements thereof, main and auxiliary trolleys operating on said girders respectively, and supplementary framing carried by the bridge but offset from said girders, traverse mechanism carried by said supplemental framing, the hoisting cable of the main trolley depending through the space intermediate the main girders and the supplementary framing.

7. A crane having a bridge including main and auxiliary girders, means connecting said girders to permit relative vertical movement, but preventing relative lateral movements thereof, a main trolley carried by the main girders, an auxiliary trolley carried by the auxiliary girders, the auxiliary gird-

ers being located between the main girders, the hoisting cables of the main trolley depending outside of the main girders, and safety brackets carried by the main trolley and engaging the main girders.

In testimony whereof I have hereunto set my hand in the presence of the subscribing witnesses, on this 3rd day of April A. D., 1909.

HARRY SAWYER.

Witnesses:
T. C. AKIN,
J. L. HAGA.