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ARTICULATED CHAIN.

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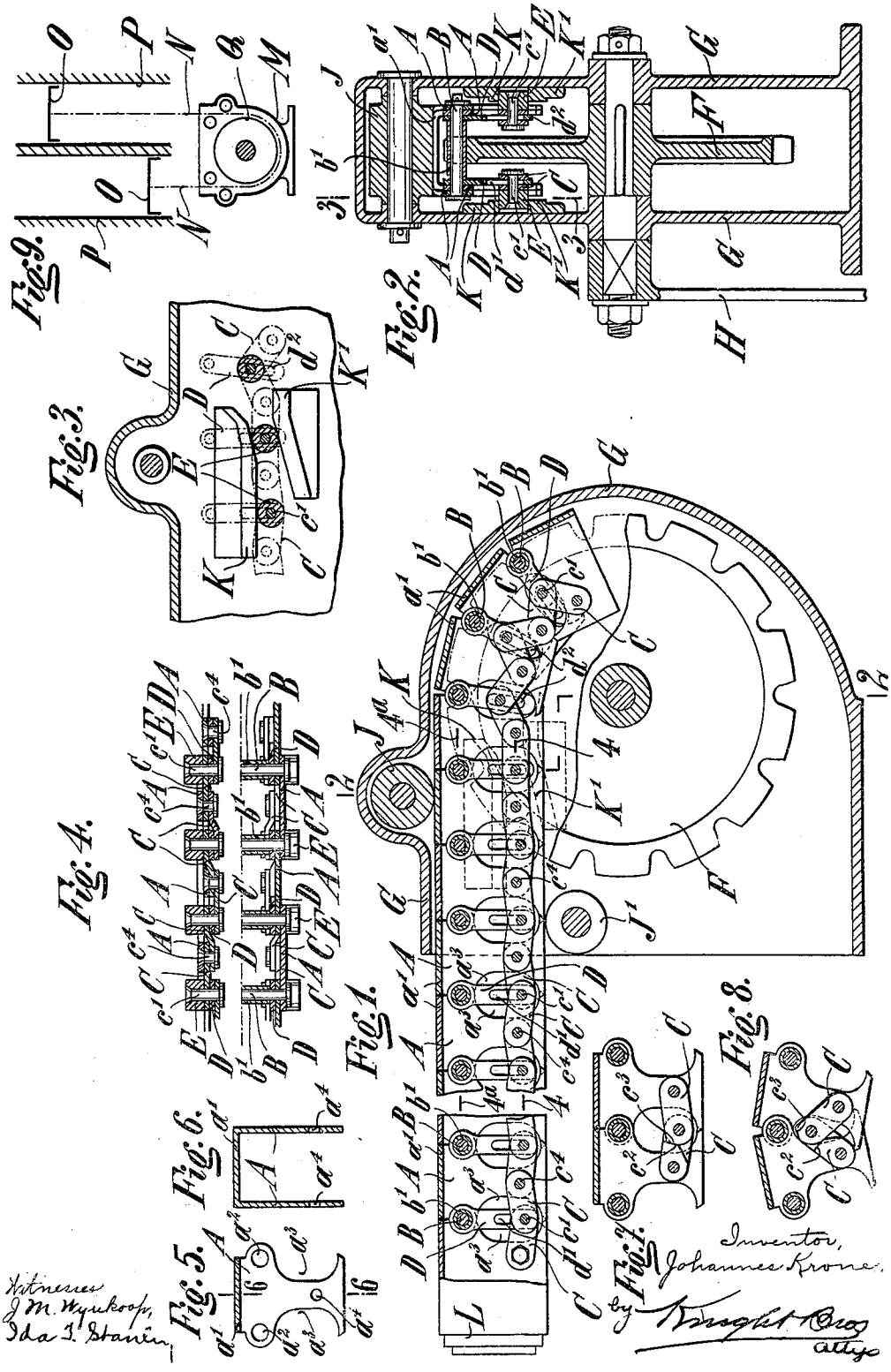

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ARTICULATED CHAIN.

932,034. Specification of Letters Patent. Patented Aug. 24, 1909.

Application filed October 29, 1908. Serial No. 460,142.

To all whom it may concern:

Be it known that I, JOHANNES KRONE, a subject of the Emperor of Germany, and a resident of Essen-on-the-Ruhr, Germany, have invented certain new and useful Improvements in Articulated Chains, of which the following is a specification.

This invention relates to an articulated chain which is secured against transverse bending while in its projected position. Articulated chains of this kind are used in the arts, for example, of ammunition rammers and ammunition hoists.

In the accompanying drawings:—Figure 1 is a vertical longitudinal section of an ammunition rammer in which is employed, one embodiment of the articulated chain constituting the subject-matter of the present invention; Fig. 2 is a section on the line 2—2 of Fig. 1, seen from the left; Fig. 3 is a section on the line 3—3 of Fig. 2, seen from the right; Fig. 4 is a horizontal section through the chain, the upper portion of the figure being taken on the line 4—4 and the lower portion on the line 4^a—4^a of Fig. 1; Fig. 5 is a longitudinal section through one of the chain members; Fig. 6 is a section on the line 6—6 of Fig. 5; Fig. 7 is a longitudinal sectional detail view corresponding to Fig. 1, showing a somewhat modified embodiment of a portion of the ammunition rammer; Fig. 8 is a sectional view corresponding to Fig. 7, showing the parts in different positions; Fig. 9 is a schematic representation of a double ammunition hoist provided with the articulated chain constituting the subject of the present invention.

The embodiment of ammunition rammer illustrated in Figs. 1 to 6 will be first described.

The articulated chain of the ammunition rammer, which carries the ramming plate L, is guided around the chain wheel F which is journaled in the housing G of the ammunition rammer, and adapted to be driven by a crank H (Fig. 2). In addition to the chain wheel F, two guiding rollers J J^1 are mounted in the rammer housing G. These guiding rollers which serve the purpose of extending the chain members as they leave the chain wheel F, during the running out of the chain, are so arranged, as shown in the drawing, that one (J) lies above and the other (J^1) lies beneath the chain.

The individual members of the chain of the ammunition rammer, constitute U-shaped bodies of alternately varying width and consist, each, of two side walls A and a connecting stay a^1 (see particularly Figs. 5 and 6). The members of the chain are connected together in such manner, by means of bolts B and the bore a^2 provided in the side walls A of the chain members, that the side walls of the smaller members engage between the side walls of the broader members. Arranged upon that portion of each bolt B which lies between the side walls A, is a roller b^1, which serves the purpose of reducing friction between the chain and the chain wheel F, as well as to brace the overlapping side walls A of the chain members against one another. The side walls A are each provided with two recesses a^3 so arranged that the opposed recesses of each two adjacent side walls constitute an oval opening, the purpose of which will be later explained. The side walls of those members which constitute the ends of the chain are provided with the recess a^3 on one side only.

Each two adjacent chain members are provided with spreading means movable into and out of spreading relation to said members to render the chain either rigid or flexible according to the position thereof; and these spreading means are so constructed and arranged that they are moved into and out of spreading relation to the chain members by engagement with deflecting means past which the chain moves, their movement into spreading relation being effected by the running out of the chain and their movement out of such position being effected by the running in of the chain. To accomplish these ends I have selected, for purposes of illustration in the present case, the following instrumentalities: Each two adjacent chain members are so connected together by links C, that the chain members together with the links, constitute an articulated quadrangle. The links C are pivotally secured to the side walls A of the chain members through the medium of bolts c^4, for which corresponding bores a^4 are provided in said side walls (Figs. 5 and 6). The dimensions of the links C as also the positions of their pivots a^4 c^4 are so designed, that, when the chain is stretched the links approach a straight line, and when the chain is coiled, said links form an acute angle with each other. Moreover, the arrange-

ment is so determined that in the stretched position of the chain, the axis extending from the center of the rammer plate L, longitudinally through the chain, passes between the axes of the bolts c^4 and B. The bolts c^1, each of which connects together two related links C, extend through the oval openings provided by the recesses a^3 hereinbefore referred to. Each bolt c^1 is directed by the slot d^1 of a guide D, which is hung from that one of the bolts B which is located above the bolt c^1. The slot d^1 permits the bolt c^1 to move freely toward the pivot bolt B, when the chain is wound upon the chain wheel F. The slots d^1 terminate at their lower ends in impact faces d^2 (Figs. 2 and 3) which are so arranged that the bolts c^1 impinge such faces when the chain is stretched, and thus assume a position in which the axes of said bolts c^1 are somewhat below the plane passing through the bolts c^4, and the links C are slightly deflected downward. So long as the links C retain their guarded position referred to, in which they lock the chain members in stretched or spread position, it is impossible, as will be readily understood, to break the joint in the direction of unlocking, by any longitudinal thrust imposed upon that portion of the chain projected beyond the housing, imposed either by the resistance of the ammunition being rammed or the inherent weight of the chain itself or any other force applied downward upon the chain. Even if the chain members were subjected to an upward force, said members can only swing relatively until the links C reach their dead point. Any further relative turning of the chain members is therefore precluded. Inasmuch as the links C are nearly in alinement with each other when the chain is stretched, any change in direction of the chain effected by an upwardly directed force, is so small that it can be neglected. The chain is therefore secured against bending in one direction, as well as in the other.

At the outer ends of the bolts c^1 are provided rollers E to enter two guide rails K K^1 (see especially Fig. 3) which are provided beneath the guide rollers J on the two inner sides of the rammer housing G. These guide rails are of such form that the links C, as the rollers travel along the guide rails K K^1, are forced beyond the dead point and into the previously described locking position, as the chain is run out, and as the chain is drawn in, they are forced out of the locking position into a position which permits winding the chain.

In the position of rest, the rammer chain is withdrawn until the rammer plate L lies closely against the rammer housing G.

In ramming ammunition, the chain is run out from the chain wheel by turning the hand crank H. Since, in this movement, the lower edges of the side walls A of the chain members pass over the guide rollers J^1, and the stays a^1 pass beneath the guide rollers J, the chain is induced to assume its stretched position. In changing to its stretched position, the bolts c^1 of the links C slide downward in the guides D so that the links C approach their dead points. Shortly before the links have reached their dead point, the rollers E impinge the upper guide rails K and are so directed by the latter, that the links C are deflected beyond their dead point until the bolts c^1 rest against the abutment faces d^2 of the slots d^1 of the guides D. In this position the locking means is secured against displacement by either the inherent weight of the protruding portion of the chain and by the resistance of the ammunition being rammed. The chain is therefore prevented from bending downward. Inasmuch as bending the chain upward is, as already explained, impossible, the projected portion of the chain constitutes a self-sustaining shaft rigid against bending in any direction.

If the rammer chain is withdrawn into the housing G, by rotating the driving wheel F in the reverse direction, the rollers E, while the chain is yet stretched, impinge against the under guide rails K^1 and will be thereby displaced upward such a distance that the links C will be deflected upward. The locking of the chain members is thereby released, so that the chain can wind around the chain wheel F. The bolts c^1 slide upward in the slots d^1 during this proceeding.

It will be observed that links C, in their construction and relation to the chain members A and to each other, constitute toggle levers having a limited movement beyond their dead center in one direction where they are in their locking position.

In Figs. 7 and 8, another embodiment of the articulated chain is illustrated. This embodiment differs from that first described in that the guides D, whose abutment faces d^1 are designed to hold the connecting bolts c^1 of each two correlated links, in the locking position, are omitted and the abutments serving to secure the links C, are arranged upon the links C. These abutments (c^2 and c^3) occupy such positions that they impinge each other in the locking position of the links shown in Fig. 7 and in this position secure the links against further deflection downward, while permitting a deflection upward, so that in winding the chain, the links may move unhindered to the angular relative position shown in Fig. 8.

It is clear that the projection of the chain may have not only a horizontal direction, but also an inclined, and when required, a vertical direction. Inasmuch as the direction of thrust of the chain can also be vertical, the opportunity is afforded for apply-

ing the chain constituting the subject-matter of this invention to ammunition hoists.

In Fig. 9 is shown schematically, a double ammunition hoist in which the chain forming the subject-matter of this invention is employed. The two stretches of chain represented by dotted lines N N, projected beyond the housing M by the chain wheel Q, carry conveying trays O designed to receive ammunition, fitted to travel up and down in two adjacent passage-ways. By turning the chain wheel Q, the one carrying tray will be elevated as the other is lowered.

The articulated chain constituting the subject-matter of this invention is distinguished from previously known chains secured against bending in either direction, by its great simplicity and availability.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:—

1. An articulated chain, having between each two adjoining members, a continuously connected spreading means movable into and out of spreading relation to said members, to render the chain either rigid or flexible.

2. In combination, an articulated chain having a continuously connected spreading means movable into and out of spreading relation to the links, and a mounting relatively to which said chain moves, having means engaging the spreading means to move them relatively to the links.

3. In combination, an articulated chain having a continuously connected spreading means movable into and out of spreading relation to the links, and a mounting relatively to which said chain moves, in two directions, having means engaging the spreading means to move them relatively to the links into spreading relation to render the chain rigid, upon movement of the chain in one direction, and out of such spreading relation, to render the chain flexible, upon movement of the chain in the other direction.

4. An articulated chain having each two adjacent members jointed together and also connected by links and forming by such connections an articulated quadrangle.

5. An articulated chain having each two adjacent members jointed together and also connected by links and forming by such connections an articulated quadrangle; the length and the positions of the links being such that when the chain is stretched, the links are approximately in a position of dead center.

6. An articulated chain having each two adjacent members jointed together and also connected by toggle links having their dimensions and points of connection with the members designed to bring the links approximately in a position of dead center when the chain is stretched, and having means for preventing deflection of the links beyond the locking position.

7. An articulated chain having each two adjacent members jointed together and also connected by toggle links having their dimensions and points of connection with the members designed to bring the links approximately in a position of dead center when the chain is stretched, and having means for preventing deflection of the links beyond the locking position, consisting of a guide in which the pivot which connects the links together travels, and by which said pivot is arrested when it reaches the desired locking position.

8. In an articulated chain the combination of the chain members connected together by hinge bolts, toggle links also connecting said members together in a plane remote from the hinge bolts, and guide arms supported from the hinge bolts of the members and having guides which receive the bolts that connect the toggle links together.

9. An apparatus for forwarding loads comprising a frame having a chain wheel journaled therein, an articulated chain coiling about said chain wheel, guides suitably mounted upon the frame of the chain wheel, and a pair of jointed toggle links interposed between each pair of chain members, in position to spread the chain members and secure the chain in stretched position; said toggle levers being adapted to engage the guides as the chain moves to and from the chain wheel for the purpose of moving the toggle levers from and to locking position.

10. An apparatus for forwarding loads comprising a chain wheel, an articulated chain adapted to bend around said chain wheel, suitably supported guides past which the chain moves to and from the chain wheel, and toggle levers arranged in spreading relation to each two adjacent members of the chain, constructed and arranged to impinge the guides and move the toggle levers to a position beyond their dead center and thereby spread the chain members to position corresponding to the stretched position of the chain, as said members move away from the chain wheel and to move the toggle links in the opposite direction to permit approach of the chain members as they move toward the chain wheel.

The foregoing specification signed at Barmen, Germany, this 17th day of September, 1908.

JOHANNES KRONE. [L. S.]

In presence of—

OTTO KÖNIG,

WM. WASHINGTON BRUNSWICK.