No. 883,024. PATENTED MAR. 24, 1908.

G. A. HUMPERT.

MECHANICAL MOVEMENT.

APPLICATION FILED MAY 6, 1907.

4 SHEETS—SHEET 1.

Fig. 1.

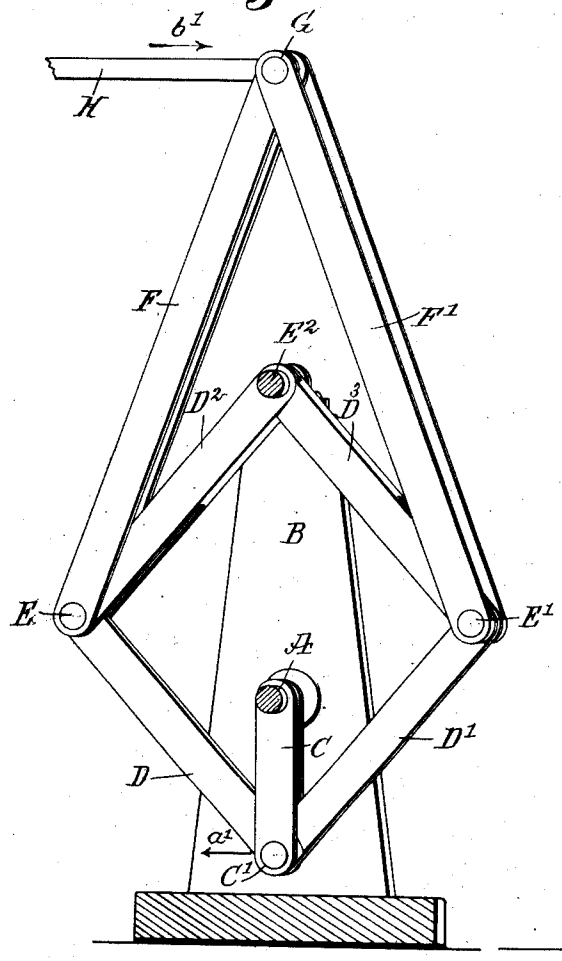
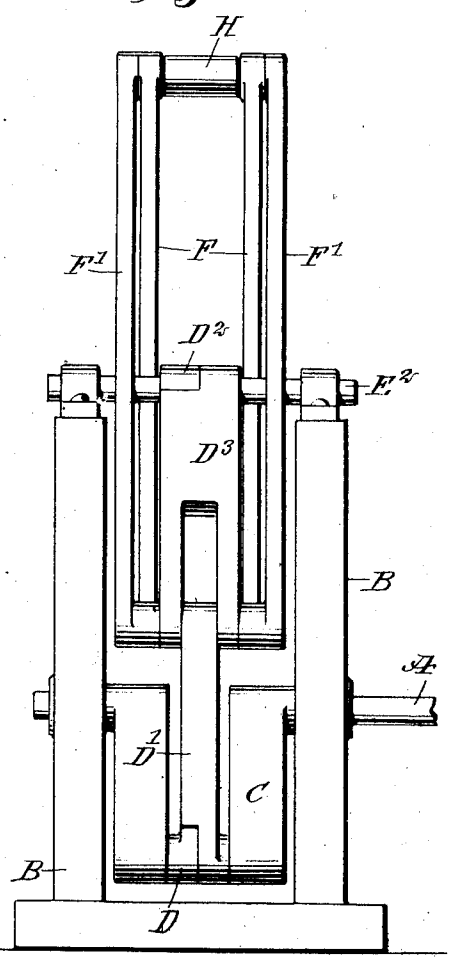


Fig. 2.



WITNESSES

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4 SHEETS—SHEET 2.

Fig. 3.

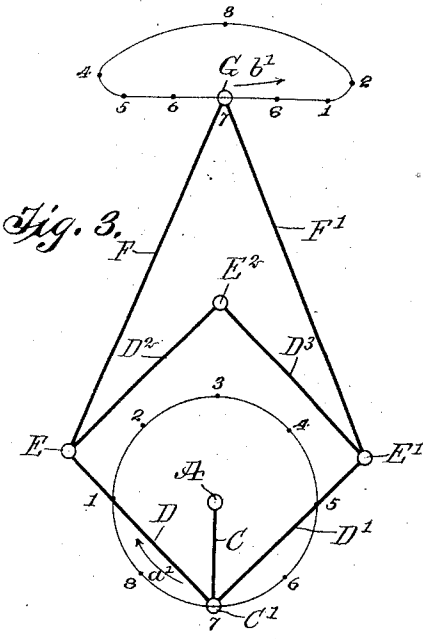


Fig. 4.

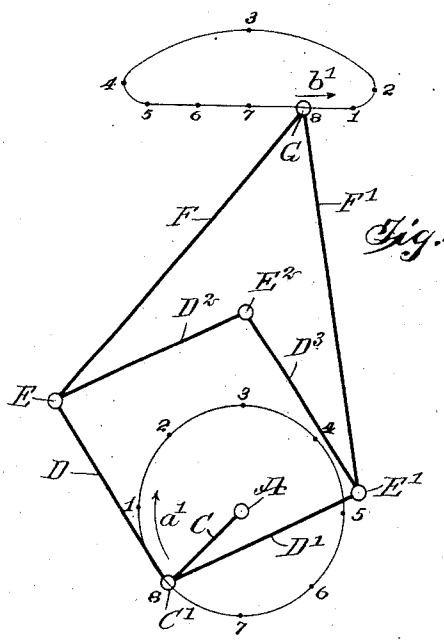


Fig. 5.

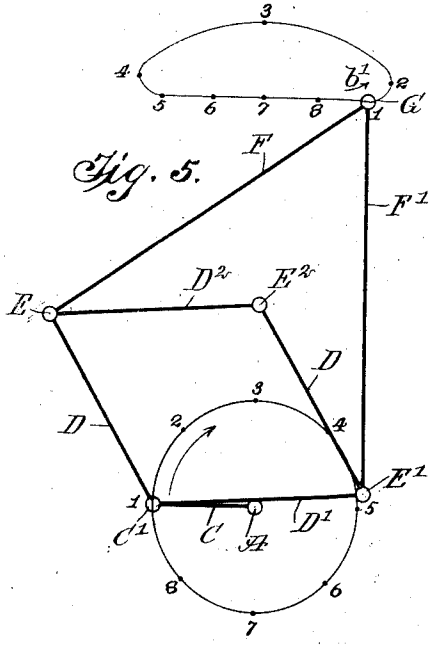
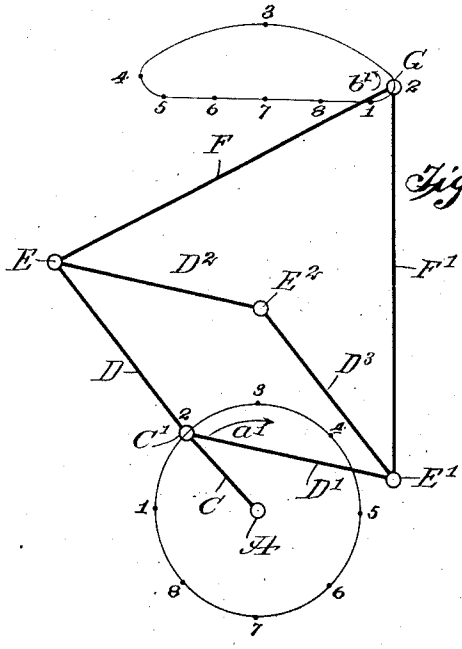


Fig. 6.



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4 SHEETS—SHEET 3.

Fig. 7.

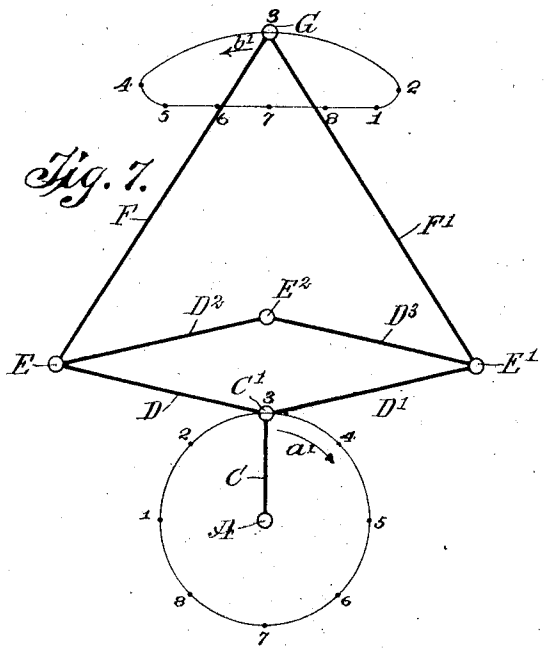


Fig. 8.

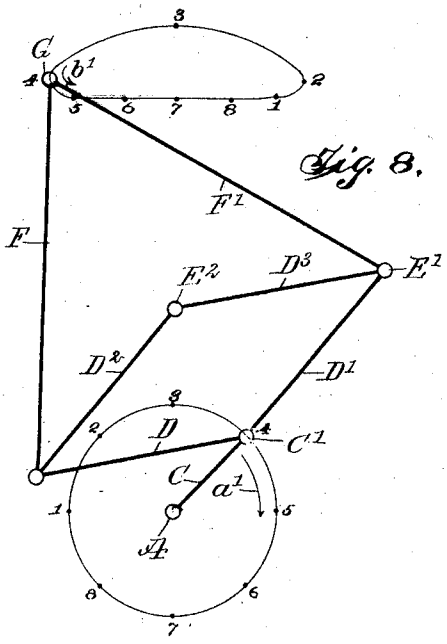


Fig. 9.

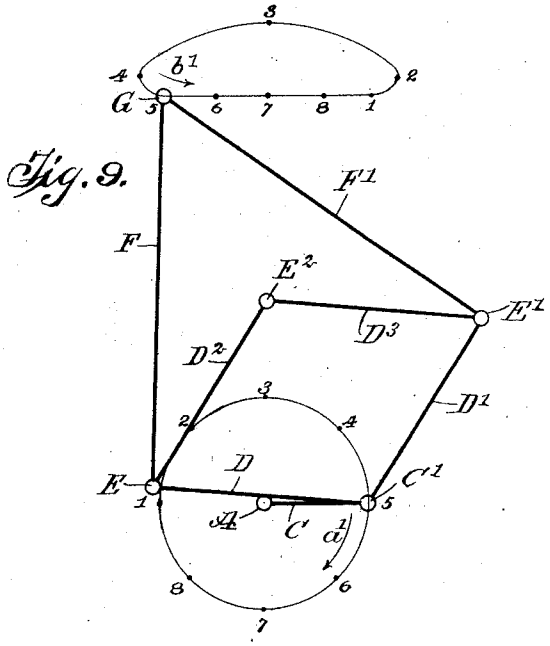
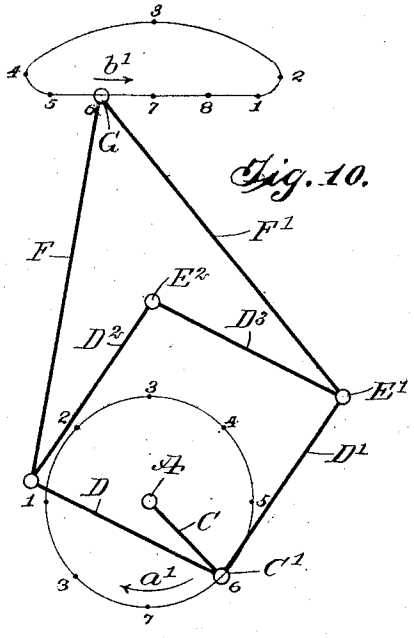


Fig. 10.



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4 SHEETS—SHEET 4.

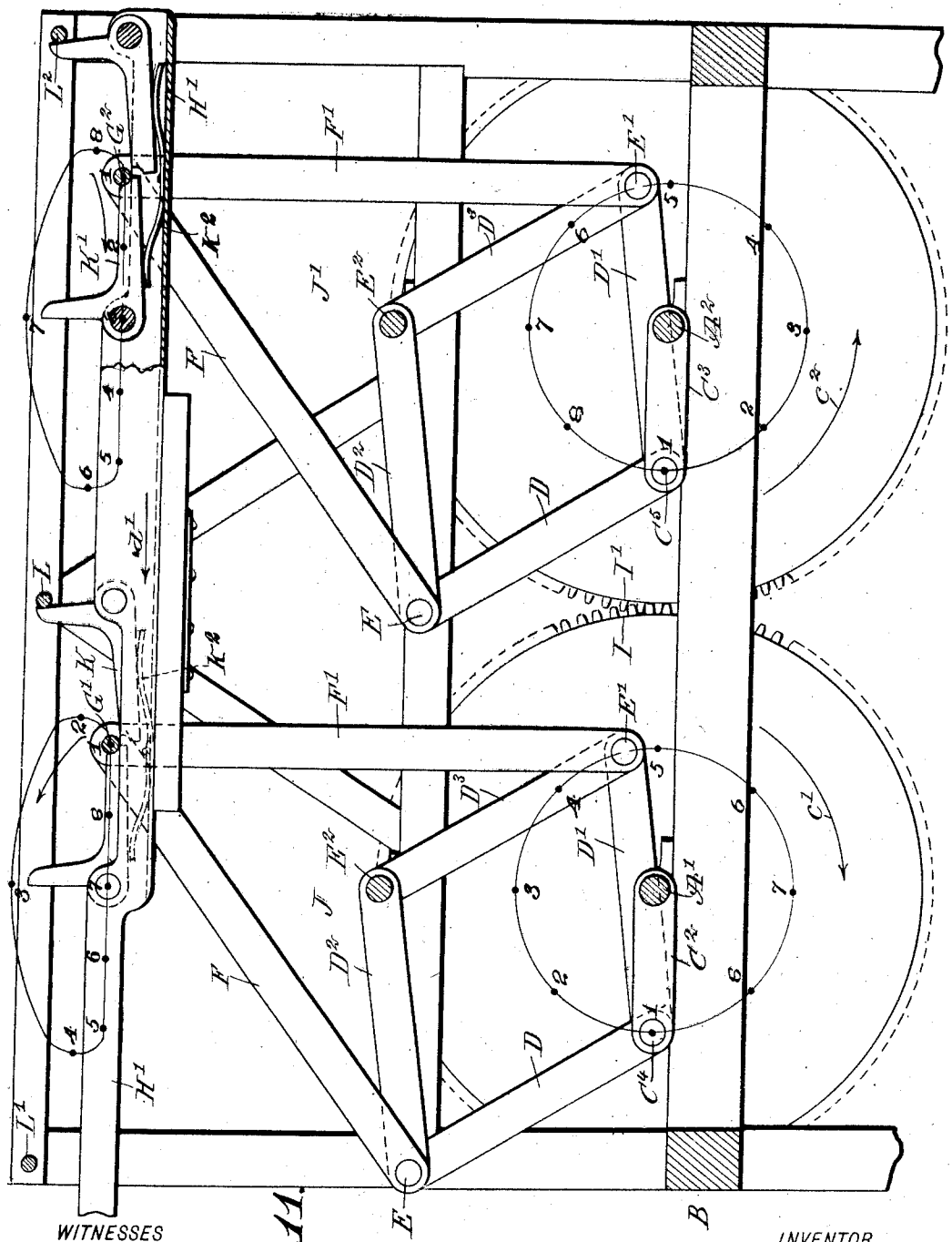


Fig. 4.

WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE A. HUMPERT, OF PITTSFIELD, ILLINOIS.

MECHANICAL MOVEMENT.

No. 883,024. Specification of Letters Patent. Patented March 24, 1908.

Application filed May 6, 1907. Serial No. 372,237.

To all whom it may concern:

Be it known that I, GEORGE A. HUMPERT, a citizen of the United States, and a resident of Pittsfield, in the county of Pike and State of Illinois, have invented a new and Improved Mechanical Movement, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved mechanical movement, more especially designed for converting reciprocating motion into rotary motion or vice versa, in such a manner that dead center positions are avoided, and the motion during the forward stroke or during the backward stroke or during both strokes, is even throughout.

The invention consists of novel features and parts and combinations of the same, which will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional perspective view of the improvement in the form of a single element for transmitting a straight reciprocating motion only during the forward stroke and a curved movement during the return stroke; Fig. 2 is an edge view of the same; Figs. 3 to 10 are diagrammatic views, illustrating various positions assumed by the parts of the mechanical movement during a full forward and backward stroke, and Fig. 11 is a side elevation of the improvement arranged with two elements, for transmitting a straight even reciprocating motion during both the forward and return stroke.

As illustrated in Figs. 1 and 2, the single element is arranged as follows:

A crank shaft A is mounted to turn in suitable bearings on a frame B and the crank arm C of the crank shaft A has its wrist pin C′ pivotally connected with the links D, D′ extending upwardly in opposite directions, and pivotally connected by pivots E and E′ with similar links D^2, D^3 having a common pivot E^2 held on the main frame B. The pivots E and E′ are also connected with links F and F′ connected with each other by a pivot G engaged by a reciprocating means H of any approved construction. The links D, D′, D^2 and D^3 are of equal length, and the length of a link corresponds to the diameter of the circle traversed by the center of the wrist pin C′, that is, each link D, D′, D^2 or D^3 is twice the size of the crank arm C.

The pivot E^2 is in vertical alinement with the crank shaft A and the said pivot E^2 is a distance from the center of the crank shaft A corresponding to the length of one of the links D, D′, D^2 or D^3. The links F and F′ are of such lengths that when the element is in the position shown in Fig. 1, and C′ is in most distant alinement with A and E^2, a line be drawn through the centers of C′, A and E^2 extending upwards, then F and F′ being joined to E and E′ must pivot with G at their intersection of this line the same distance above E^2 as E^2 is above A. Or, in other words, F and F′ must be approximately one and thirteen-fifteenth times the length of the diameter of the cranks circuit. Now, assuming that a rotary motion is given to the crank shaft A in the direction of the arrow a', then a reciprocating motion is given to the pivot G and the reciprocating means H in the direction of the arrow b', in such a manner that during the time the wrist pin C′ travels in the lower half of its circuit, that is, from the point 5 by way of the points 6, 7 and 8 to the point 1, then the pivot G travels in a straight line extending through the points 5, 6, 7, 8, 1, as illustrated in Figs. 3, 4, 5, 9 and 10. It will be seen that the distances traveled by the wrist pin C′ from one point to the other corresponds to the distance of the travel of the pivot G to similar points in the straight line, that is, an even, straight reciprocating movement is given to the wrist pin G during the travel of the crank arm C in the lower half of its circuit. During the time the wrist pin C′ travels from the point 1 to the point 5 by way of the points 2, 3 and 4 in the upper half of the circle, the pivot G travels through the corresponding points 1, 2, 3, 4, 5 arranged in a curve, as plainly indicated in the upper end of Figs. 5, 6, 7, 8 and 9. In Figs. 3 to 10, inclusive, the different positions of the several parts of the mechanical movement are indicated so that the movement of the link mechanism described can be readily understood.

When it is desired to transmit an even, straight reciprocating movement during both the forward and the backward stroke, the two elements such as described above are used, as illustrated in Fig. 11. In this case the two crank shafts A′, A^2 are connected with each other by gear wheels I and I′, to.

cause the crank shafts to run in unison but in opposite directions, as indicated by the arrows c', c^2. The crank arms C^2, C^3 of the crank shafts A', A^2 are connected by their wrist pins C^4, C^5 with two link mechanisms J and J', similar to the one above described with reference to Figs. 1 and 10, that is, each link mechanism having the links D, D', D^2, D^3 and the links F, F' connected with each other by corresponding pivots G', G^2, as will be readily understood by reference to Fig. 11. The pivots G', G^2 alternately engage the reciprocating means H' by retaining devices K, K', in the form of L-shaped arms engaged by springs K^2, and adapted to be engaged by fixed pins L, L' and L^2 to trip the pivots G', G^2 at the end of the corresponding strokes of the reciprocating means H'. Thus, when the device is running, the pivot G' during the travel of the wrist pin C^4 through the points 1, 2, 3, 4 and 5, and during the travel of the wrist pin C^5 through the points 1, 2, 3, 4 and 5, a traveling motion of the pivots G', G^2 through the curved and straight lines takes place, that is, the pivot pin G' is out of engagement with the reciprocating means H' and travels in a curve, while the pivot pin G^2 is in engagement with the reciprocating means and pushes the reciprocating means in a straight line in the direction of the arrow d'. When the pivots G', G^2 reach the end of the forward stroke in the direction of the arrow d' then the pivot G' becomes connected with the reciprocating means H', while the pivot G^2 moves out of engagement with the reciprocating means H', and the pivot G' now imparts a return stroke to the reciprocating means H' by traveling in a straight line through the points 5, 6, 7, 8, 1, while the other pivot G^2 travels in a curved line through the points 5, 6, 7, 8, 1.

From the foregoing it will be seen that by the arrangement described the reciprocating motion is converted into a rotary motion, or the rotary motion is converted into reciprocating motion, in such a manner that dead center positions are avoided, and the motion during the forward stroke or during the backward stroke or during both strokes is even throughout, and consequently a proper transmission of the power is had.

The device may be used in various forms and hence I do not limit myself to any particular application of the device.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A mechanical movement comprising a crank shaft, a reciprocating member, and a link mechanism connecting the said reciprocating member with the crank arm of the said crank shaft, the link mechanism having a fixed fulcrum located between the crank shaft and the connection with the reciprocating member and the links of the link mechanism being arranged to cause an even straight travel in one direction of the reciprocating member corresponding to and during one-half revolution of the said crank shaft.

2. A mechanical movement comprising a crank shaft, a reciprocating member, and a link mechanism connecting the said reciprocating member with the crank arm of the said crank shaft, the link mechanism having a fixed fulcrum located between the crank shaft and the connection with the reciprocating member and the links of the link mechanism being arranged to cause an even straight travel in one direction of the reciprocating member corresponding to and during one-half revolution of the said crank shaft, the travel of the reciprocating member in the reverse direction being in a curve and irregular relative to the other half revolution of the crank shaft.

3. A mechanical movement comprising a reciprocating member, crank shafts geared together to run in opposite directions, link mechanisms independently connected with the reciprocating member and with the crank arms of the crank shafts, each link mechanism having a fixed fulcrum, and means for throwing the link mechanisms alternately out of engagement with the said reciprocating member at the ends of the forward and backward strokes of the said reciprocating member.

4. In a mechanical movement a crank shaft, a pair of links pivotally connected with the crank arm of the said crank shaft, a second pair of links having a common fixed pivot and pivotally connected with the said first pair of links, a third pair of links pivotally connected with the parts connecting the first and second pairs of links with each other, and a reciprocating member with which the pivot of the third pair of links engages.

5. In a mechanical movement a crank shaft, a pair of links pivotally connected with the crank arm of the said crank shaft, a second pair of links having a common fixed pivot and pivotally connected with the said first pair of links, the said links being alike in length, the latter corresponding to the diameter of the circle described by the said crank arm, and the said fixed pivot of the second pair of links being a distance from the center of the crank shaft corresponding to the length of one of the said links, a third pair of links pivotally connected with the pivots connecting the first and second pairs of links with each other, and a reciprocating member with which the pivot of the third pair of links engages.

6. A mechanical movement comprising crank shafts geared together to run in opposite directions, a reciprocating cross head having retainers, means for tripping the same, and link mechanisms connected with the crank arms of the said crank shafts and

swinging on a fixed fulcrum, the link mechanisms alternately engaging the retainers.

7. A mechanical movement comprising crank shafts geared together and to run in opposite directions, a reciprocating cross-head, pivoted and spring-pressed L-shaped retainers on the cross-head, fixed stops adapted to be engaged by said retainers, and link mechanisms connected with the crank arms of said crank shafts and swinging on a fixed fulcrum, the link mechanisms alternately engaging the said retainers.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE A. HUMPERT

Witnesses:
S. L. MORGAN,
ROSS MATTHEWS.