(No Model.) 2 Sheets—Sheet 1.

R. C. LEEDHAM.

MECHANICAL MOVEMENT.

No. 467,012. Patented Jan. 12, 1892.

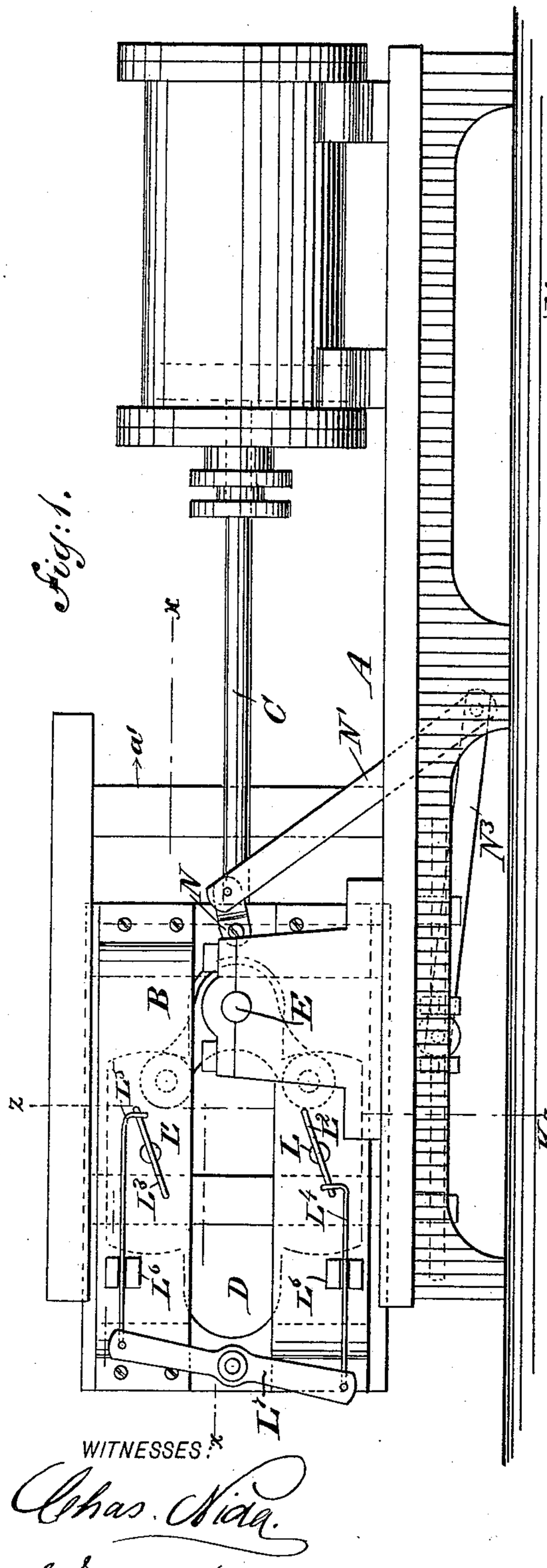

Fig: 1.

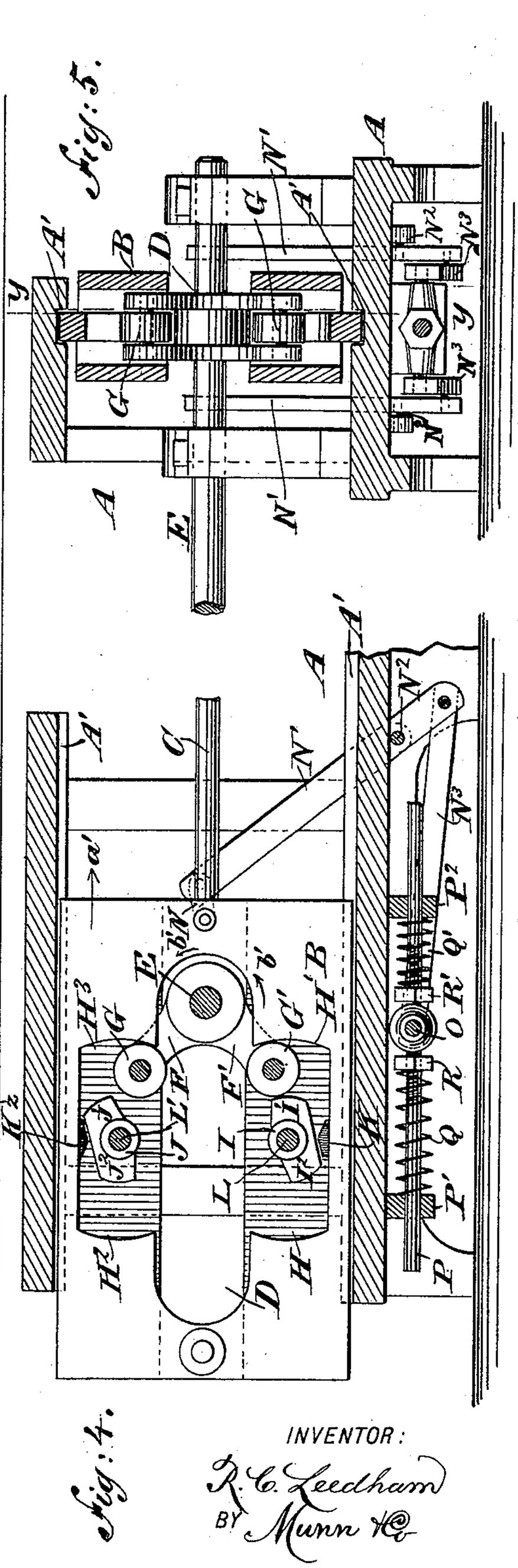

Fig: 2.

Fig: 4.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

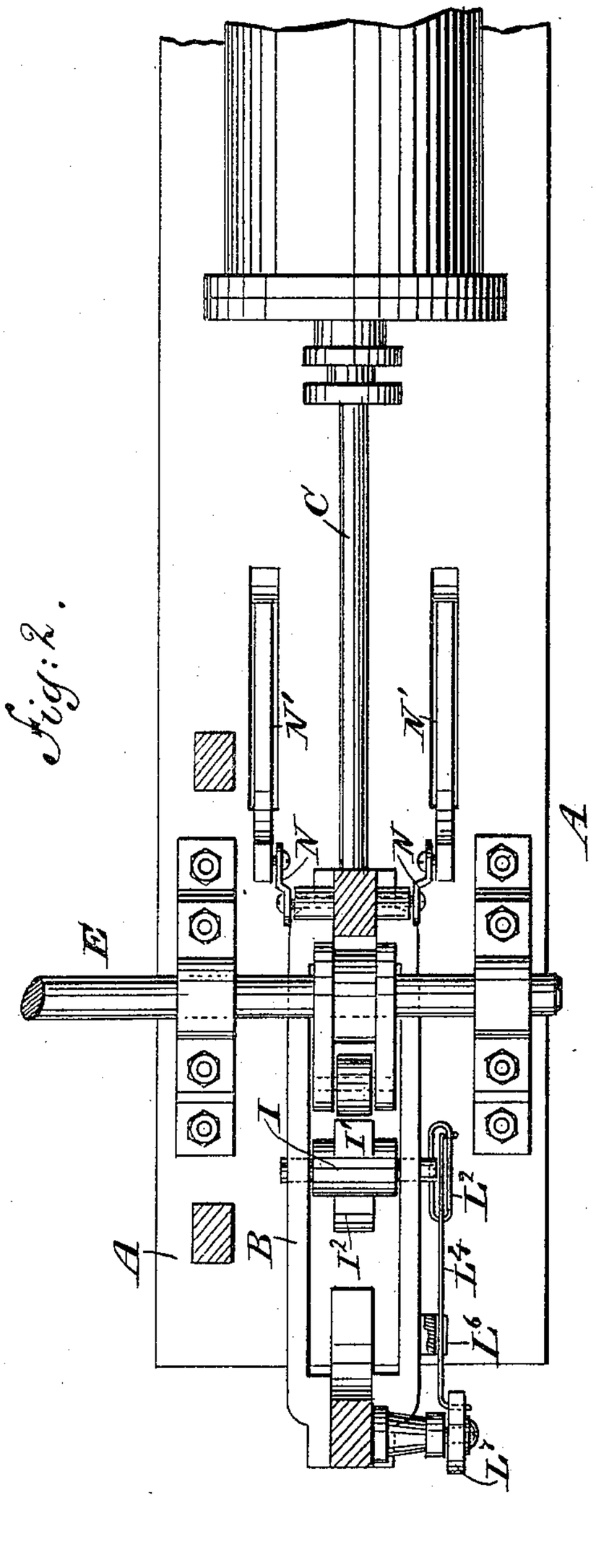
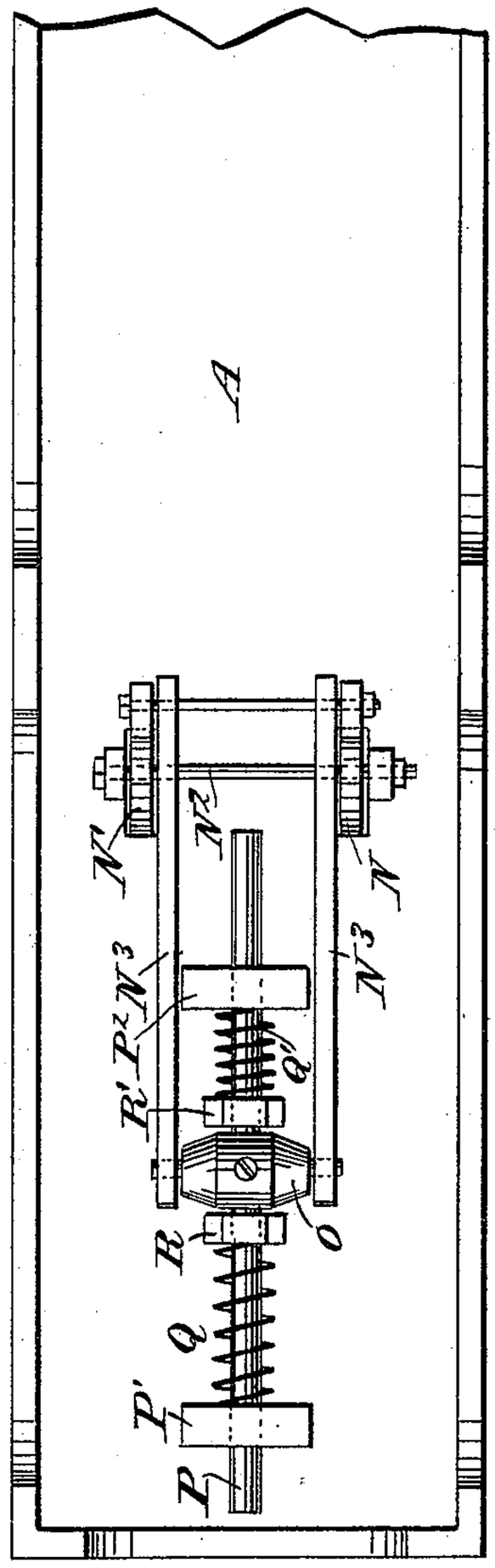


Fig. 3.



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UNITED STATES PATENT OFFICE.

RUSSEL CLINTON LEEDHAM, OF TRINIDAD, COLORADO.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 467,012, dated January 12, 1892.

Application filed April 4, 1891. Serial No. 387,593. (No model.)

To all whom it may concern:

Be it known that I, RUSSEL CLINTON LEEDHAM, of Trinidad, in the county of Las Animas and State of Colorado, have invented a new and Improved Mechanical Movement, of which the following is a full, clear, and exact description.

The invention relates to that class of mechanical movements in which a reciprocating motion is changed to a rotary one.

The object of the invention is to provide a new and improved mechanical movement which is simple and durable in construction, avoids dead-center positions, reduces friction to a minimum, and can be readily adapted to all kinds of machines.

The invention consists of arms secured on a driving-shaft and adapted to be engaged by an upper and lower set of abutments held on the reciprocating cross-head.

The invention also consists of a reversible double lug arranged between the abutments of the cross-head.

The invention further consists of certain parts and details and combinations of the same, as will be hereinafter fully described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement as applied. Fig. 2 is a sectional plan view of the same on the line *x x* of Fig. 1. Fig. 3 is an inverted plan view of the same. Fig. 4 is a sectional side elevation of the improvement on the line *y y* of Fig. 5, and Fig. 5 is a transverse section of the same on the line *z z* of Fig. 1.

The frame A, on which the mechanical movement is arranged, is of suitable construction and formed with guideways A′, in which is fitted to slide a cross-head B, connected in the usual manner with a rod C of the machine, imparting a reciprocating motion to the said cross-head. The latter is formed with a transversely-extending slot D, through which passes the driving-shaft E, to which are fastened at right angles to each other the arms F and F′, carrying on their outer ends friction-rollers G and G′, respectively. The latter are adapted to abut against abutments H H′ and H^2 H^3, arranged in the upper and lower parts of the cross-head B, as is plainly illustrated in Fig. 4. The edges of the abutments H, H′, H^2, and H^3 are slightly curved, so as to permit easy rolling of the friction-rollers G and G′.

Between the two lower abutments H and H′ is arranged a lug I, having two ends I′ and I^2, rounded off at their outer edges and adapted to be engaged by the peripheries of the rollers G and G′. A similar lug J is arranged between the two upper abutments H^2 and H^3, and is also provided with two ends J′ and J^2, similar to the ends I′ and I^2. The lugs I and J are secured on transversely-extending shafts L and L′, respectively, mounted to turn in suitable bearings in the cross-head B.

One outer end of the shafts L and L′ carries loop L^2 or L^3, respectively, engaged by a hook on a rod L^4 or L^5, respectively, fitted to slide longitudinally in a suitable bearing L^6, formed on one outer side of the cross-head B. The two rods L^4 and L^5 are pivotally connected with the ends of a lever L^7, fulcrumed at its middle on the cross-head B. This lever L^7 is the reversing-lever and serves to change the positions of the lugs I and J, so as to reverse the movement of the driving-shaft E whenever desired.

In order to hold the lugs I and J in the proper positions, V-shaped projections K are secured in the cross-head B under and above the said lugs I and J, respectively, as is plainly illustrated in Fig. 4. The projections K are so arranged that the ends of the lugs are raised either on one or the other side of the said projection, as is plainly indicated in the figure mentioned.

The operation is as follows: When the reversing-lever L^7 is in the position shown in Fig. 1, the lugs I and J are so arranged that the end I′ of the lug I extends upwardly, while its other end I^2 is downward, as shown in Fig. 4. The lug J has its end J^2 extending downwardly, while its end J′ extends upwardly away from the center of the cross-head B. Now when the cross-head B is moved in the direction of the arrow *a′* then the friction-roller G′ of the arm F′ abuts against the upper end I′ of the lug I, so that the said arm

F′ is turned and a rotary motion is given to the shaft E in the direction of the arrow *b′*. This movement of the shaft E causes a downward swinging of the arm F, the friction-roller G of which is entirely unobstructed at this time in the upper part of the cross head B. The end I′ of the lug I will operate on the friction-roller G′ and the arm F′ until the cross-head B has made one-half of the return stroke in the direction of the arrow *a′*. At that time the friction-roller G has moved downward to be engaged by the abutment H, so that on the further movement of the cross-head B in the direction of the arrow *a′* the abutment H pushes on the friction-roller G, and thereby causes turning of the same and a consequent turning of the shaft E in the direction of the arrow *b′*. When the cross-head B is near the end of its return stroke, the other friction-roller G′ passes over the downwardly-extending end J^2 of the lug J, so that the latter is slightly turned until the said friction-roller is passed into the space between the end J^2 and the abutment H^2. The lug J is returned to its normal position by the spring action of the rod L^5 on the loop L^3. When the cross-head B now moves in the inverse direction of the arrow *a′*, the friction-roller G′ is engaged by the end J^2 of the lug J, so that on this forward stroke the lug J, acting with its end J^2 on the friction-roller G′, turns the arm F′, so as to revolve the shaft E in the direction of the arrow *b′*. The arm F, with its friction-roller G, now swings upward over the end I^2 of the lug I, as the said end I^2 is in a lowermost position and does not obstruct the friction-roller G. When the cross-head B has made about one-half of its return-stroke in the inverse direction of the arrow *a′*, then the friction-roller G is engaged by the abutment H^3, so that the said abutment pushes on the friction-roller and causes a further revolving of the shaft E in the direction of the arrow *b′*. When the cross-head B nears the end of its outer stroke in the inverse direction of the arrow *a′*, then the friction-roller G′ of the arm F′ passes over the raised end I′ of the lug I, thus slightly turning this lug to permit the friction-roller G′ to pass between the end I′ and the abutment H′, as is plainly shown in Fig. 4. The spring action of the rod L^4 on the loop L^2 returns the lug I immediately to its normal position, as shown in the said Fig. 4, after the friction-roller G′ has passed into the proper place between the end I′ and the abutment H′. The before-described operation is then repeated on the further movement of the cross-head B in the direction of the arrow *a′*. Thus it will be seen that when the lugs I and J are in the position shown in Fig. 4 movement is imparted to the friction-rollers G′ and G by the friction-roller G′ being first engaged by the end I′ of the lug I, then the friction-roller G engaged by the abutment H, then the friction-roller G′ engaged by the end J^2 of the lug J, and, finally, the friction-roller G engaged by the abutment H^3. Now if the operator reverses the position of the reversing-lever L^7 so as to change the positions of the lugs I and J then the reciprocating of the cross-head B causes a turning of the shaft E in the inverse direction of the arrow *b′*. The ends I^2 and J′ of the lugs I and J will then be in innermost positions, so that the end J′ first engages the friction-roller G when the cross-head B moves in the direction of the arrow *a′*. Then the friction-roller G′ is engaged by the abutment H^2, after which on the return stroke of the cross-head B the friction-roller G is engaged by the end I^2 of the lug I, and, finally, the friction-roller G′ is engaged by the abutment H′ at the completion of the full stroke, the arms F and F′ then being again in the position shown in Fig. 4.

In order to form a cushion for the cross-head B, the following device is provided: The cross-head B is pivotally connected on each side by a link N with a lever N′, fulcrumed on the under side of the frame A at N^2, as is plainly shown in Figs. 3 and 4. Each of the levers N′ is pivotally connected at its lower end by a link N^3 with an arm O, secured at the middle of a shaft P, mounted to slide longitudinally in bearings P′ and P^2, fastened on the under side of the main frame A. Springs Q and Q′ are coiled on the shaft P on opposite sides of the arm O, the said springs abutting with their inner ends on nuts R and R′, respectively, screwing on the threaded portion of the said shaft. The outer ends of the springs Q and Q′ abut against the inner faces of the bearings P′ and P^2, respectively.

When the cross-head B is in a central position in the guideways A′, then the arm O extends midway between the bearings P′ and P^2. On the movement to either the right or left, the cross-head B causes, by the means described, a compression of either the spring Q or Q′, so that the cushion is formed toward the end of the stroke. It will be seen that the device is very simple and durable in construction, avoids all dead-center positions, and reduces friction to a minimum.

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

1. In a mechanical movement, the combination, with arms adapted to be secured on a driving-shaft, of a cross-head provided with an upper and lower set of abutments, and pivoted lugs held between each set of abutments, the latter as well as the said lugs being adapted to be engaged by the free ends of the said arms, substantially as shown and described.

2. In a mechanical movement, the combination, with a drive-shaft provided with arms, of a reciprocating cross-head provided with upper and lower sets of abutments and with pivoted and connected lugs between the abutments, substantially as and for the purpose set forth.

3. In a mechanical movement, the combi-

nation, with arms adapted to be secured on a driving-shaft, of a reciprocating cross-head provided with a transverse slot for the passage of the shaft, a set of upper and lower abutments formed on the said cross-head and adapted to be engaged by the free ends of the said arms, and a reversible lug held between each set of abutments and also adapted to be engaged by the ends of the said arms, substantially as shown and described.

4. In a mechanical movement, the combination, with arms adapted to be secured on a driving-shaft, of a reciprocating cross-head provided with a transverse slot for the passage of the shaft, a set of upper and lower abutments formed on the said cross-head and adapted to be engaged by the free ends of the said arms, a reversible lug held between each set of abutments and also adapted to be engaged by the ends of the said arms, and means, substantially as described, for reversing the positions of the said lugs to reverse the motion of the said driving-shaft, substantially as shown and described.

5. In a mechanical movement, the combination, with arms carrying friction-rollers and adapted to be secured on a driving-shaft, of a cross-head mounted to reciprocate and formed with a slot for the passage of the said shaft, two sets of abutments arranged on the said cross-head and adapted to be engaged by the said friction-rollers, and a spring-pressed double lug mounted to turn and arranged between each set of abutments, substantially as described.

6. In a mechanical movement, the combination, with arms carrying friction-rollers and adapted to be secured on a driving-shaft, of a cross-head mounted to reciprocate and formed with a slot for the passage of the said shaft, two sets of abutments arranged on the said cross-head and adapted to be engaged by the said friction-rollers, a spring-pressed double lug mounted to turn and arranged between each set of abutments, and means, substantially as described, for reversing the said double lugs simultaneously, substantially as shown and described.

7. In a mechanical movement, the combination, with a cross-head mounted to reciprocate, of a lever pivotally connected with the said cross-head, a link pivotally connected with the said lever, an arm pivotally connected with the said link, a shaft carrying the said arm, and springs held on the said shaft at opposite sides of the said arms, adapted to be alternately compressed on the forward and backward motion of the said cross-head, substantially as shown and described.

RUSSEL CLINTON LEEDHAM.

Witnesses:
WILLIAM LUTHER CROUCH,
SAMUEL A. GROSS.