(No Model.) 3 Sheets—Sheet 1.

A. B. WILLCOX.

MECHANICAL MOVEMENT.

No. 458,347. Patented Aug. 25, 1891.

Fig. 2

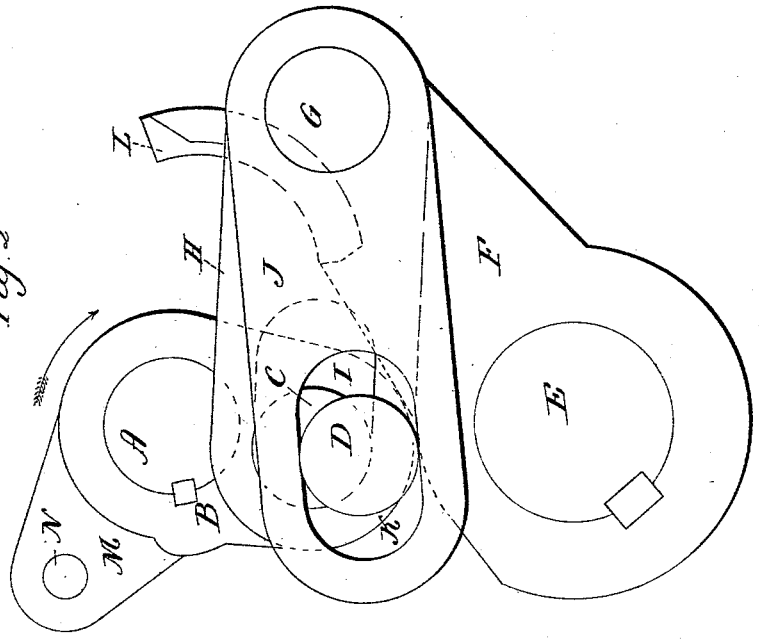

Fig. 1

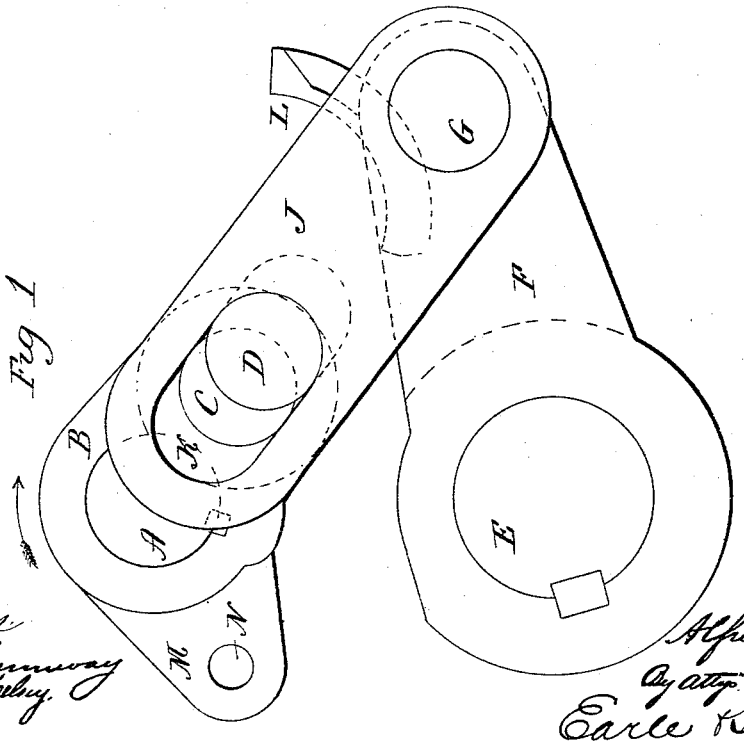

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Fig 4

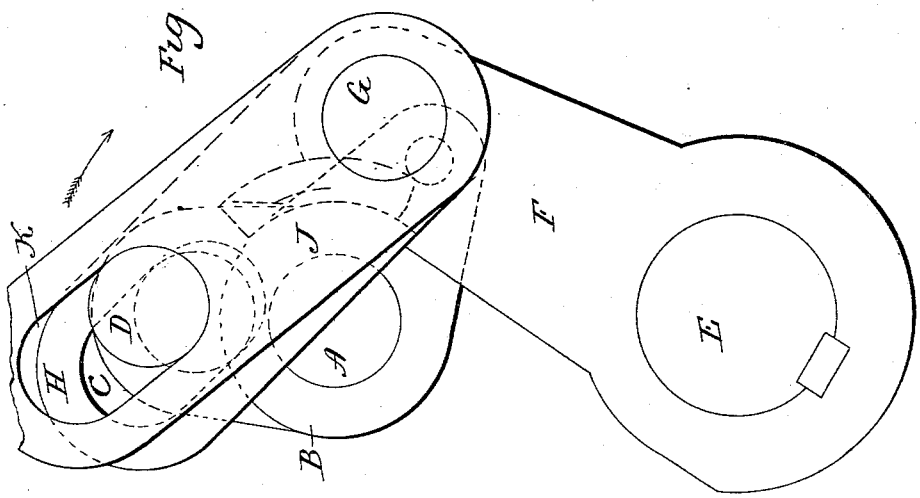
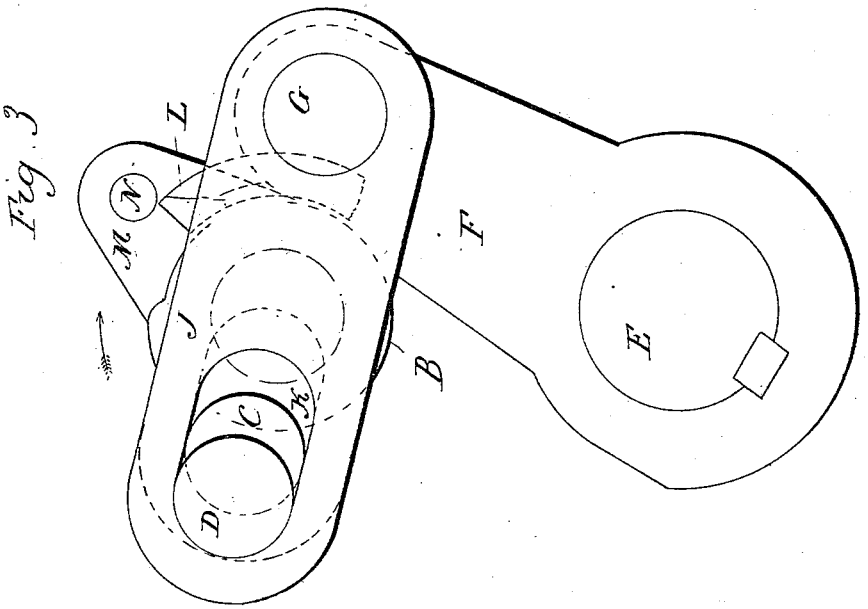


Fig 3



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(No Model.) 3 Sheets—Sheet 3.

A. B. WILLCOX.

MECHANICAL MOVEMENT.

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Fig 6

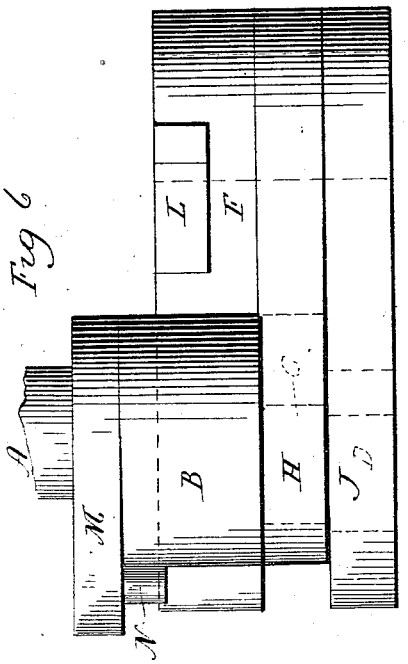


Fig. 7

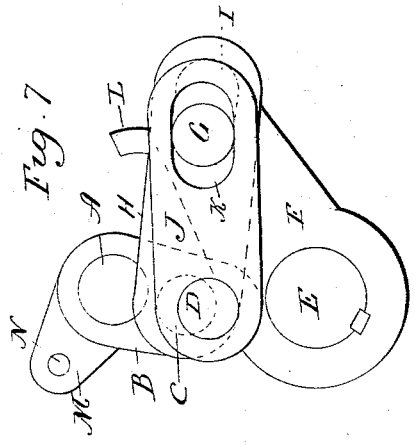
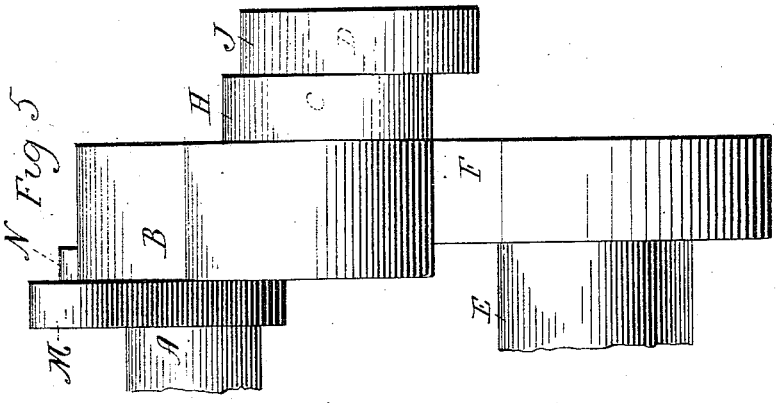


Fig 5



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UNITED STATES PATENT OFFICE.

ALFRED B. WILLCOX, OF CHICAGO, ILLINOIS.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 458,347, dated August 25, 1891.

Application filed May 18, 1891. Serial No. 393,227. (No model.)

To all whom it may concern:

Be it known that I, ALFRED B. WILLCOX, of Chicago, in the county of Cook and State of Illinois, have invented new Improvements in Mechanical Movements; and I do hereby declare the following, when taken in connection with accompanying three sheets of drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—Figure 1, a face view of the movement, showing the parts in what is termed the "down" position; Fig. 2, the same as Fig. 1, showing the parts in the position when the shaft is midway between its extreme movements; Fig. 3, the same as Fig. 1, representing the parts in the position as when the shaft is at its other extreme from Fig. 1; Fig. 4, the same as Fig. 1, representing the parts in the position as when the operating-shaft commences its return movement; Fig. 5, a side view of the apparatus looking from the left of Fig. 2; Fig. 6, a top view of the same; Fig. 7, a modification.

This invention relates to an improved device for a mechanical movement adapted for use in various machines in which a reciprocating or rotative movement is required with a rest or dwell for a predetermined length of time at one point of the movement. Such requirements are found in power-presses, punching-machines, power-shears, and mechanical feeds for various purposes. The mention of these will be sufficient to illustrate the general application of the movement, the object of the invention being to produce the rest or dwell while the rotative movement of the driving-shaft is continuous and uniform; and the invention consists in the construction and combination of elements, as hereinafter described and particularly recited in the claims.

A represents the driving-shaft to which a continuous rotation may be imparted in the direction indicated by the arrow. Made fast to the shaft and so as to revolve with it is a crank B, and on this crank two crank-pins C D are arranged, both being in the same radial line of the crank; but the pin D, more distant from the center of revolution than the pin C, and as clearly seen in Fig. 1.

E represents a shaft, to which an oscillating movement is given and from which the power to operate the mechanism is to be imparted. The axis of the shaft E is parallel with the axis of the shaft A, and from the shaft E an arm F projects in a plane parallel with the plane of the crank B, and, as here represented, the face of the arm F is in the same plane as the face of the crank B, as seen in Fig. 5. From the arm F a crank-pin G projects, the axis of which is parallel with the axis of the two pins C D and of a length substantially equal to the two pins C D. A connection is made between the pin C of the crank B with the pin G of the arm F by a connecting-rod H, the rod being provided with a predetermined extent of lost motion on one pin or the other, (here represented as by a slot I on the pin C,) the slot being of a width corresponding to the diameter of the pin C, but of a length greater than that of the diameter of the pin. A second connecting-rod J in like manner connects the crank-pin D with the pin G, the rod J being constructed with a slot K, in which the pin D works, and so that a predetermined extent of lost motion will be permitted between the crank-pin D and the pin G. The arm F is of somewhat greater length than the length of the crank B, and owing to the lost motion occasioned by the slots I K in the respective connecting-rods an oscillating movement only will be imparted to the arm F from the continuously-revolving crank B.

In Fig. 1 the arm F is represented as in its extreme down position. In this position the pins stand in a direct line between the center of the shaft A and the center of the crank-pin G, and the crank-pin D stands at the extreme lower end of the slot K, in which it works. At the same time the crank-pin C stands at the extreme upper end of the slot in which it works, so that in this position there is a positive engagement between the crank and the arm F in both directions, so that the arm F will be practically held firm—that is, will be forced to its down position by the pin D and prevented from passing beyond that position by the pin C. Starting from this point, Fig. 1, the shaft A, with its crank B, revolves in the direction indicated by the arrow, the crank-pin C, working against the end of its slot most distant

from the pin G of the arm F, will draw the arm F with the crank, as indicated in Fig. 2. At the same time the pin D has moved from the end of the slot nearest the pin G and is approaching the other extreme of its slot K. The position Fig. 2 is substantially midway between the two extremes of movement of the arm F. The crank B continues its revolution, as indicated in Fig. 3, until the centers of the pin G, the shaft A, and of the crank-pins C D again come into line, but with the pins C D upon the opposite side of the shaft A, and, as seen in Fig. 3, at this point the pin D has reached the outward extreme of its slot, while the pin C still remains in the same position in relation to its slot in which it started, and this is the extreme up position of the arm F. As the shaft A and crank continues the revolution from the position seen in Fig. 3, if the arm F be held firm, the pins C D of the crank will carry the links over with them; but the pins C D approach the pin G and recede from the extreme outer end of their respective slots, and, as seen in Fig. 4, this movement of the pins C D continuing, the pin D first reaching the extreme inner end of its slot, and until that point is reached neither of the crank-pins C D have any effect upon the arm F; but after the pin D comes into engagement with the inner end of its slot, as seen in Fig. 4, then the power of the revolving crank will be communicated to the arm through its link J to the arm F to commence a return swinging movement of the said arm F.

To hold the arm F firmly during the time in which the crank-pins are passing from the extreme outer end of the slot, so as to obtain a bearing upon the inner end of one of the slots, a segment L is made fast to the arm F, the outer surface of which is concentric to the shaft A when the arm is in the up position, as seen in Fig. 3. The crank B is constructed with a projection M, from which a pin or friction-roll N projects toward the links. The distance of the pin or roll N from the shaft A corresponds to the outer surface of the segments L when the arm is in the up position, as seen in Fig. 3, and the length of the segment L is such that as the arm reaches its extreme up position, as seen in Fig. 3, the pin N in the rotation of the shaft A will have just reached the upper end of the segment L, and continuing will pass onto that segment until the point when the crank-pins again commence their action upon the arm F is reached, and, as seen in Fig. 4, at this point the pin N escapes from the segment L. As the surface of the segment corresponds to the path of the inner surface of the pin N, that pin takes a bearing upon the face of the segment and rides upon that surface, thus holding the arm F firmly in the up position from the time the pin passes onto the segment, as seen in Fig. 3, until it escapes therefrom, as seen in Fig. 4.

The pin N having escaped from the segment, as seen in Fig. 4, the continued revolution of the shaft A through the pin D imparts the downward movement to the arm F until the extreme down position is reached, at which time the outer end of the slot I of the connecting-rod H will have come into engagement with the pin C, as seen in Fig. 1, and so that when that point is reached the upward movement of the arm F will immediately commence. The shaft A, making successive revolutions, will impart a corresponding vibratory movement to the arm F, and consequent oscillatory movement to the shaft E; but because of the lost motion between the crank of the shaft A and the arm F, the arm F will remain inactive during a portion of the revolution of the shaft A corresponding to the extent of the said lost motion, thus making the oscillatory movement of the shaft E intermittent. To illustrate the advantage of this dwell or rest in the oscillation of the shaft E, suppose it is to be applied to impart the vertical reciprocating movement to the slide of a power-press. The dwell or rest occurs when the press-slide is in its up position, thus giving time for the introduction or removal of work from below the slide, the slide descending to do its work and immediately returning, as if by the continuous movement of the crank. As another illustration, take power-shears, in which the blades are brought together by the downward movement and on the rise will rest for a time for the introduction of the new work. As another illustration, take a feeding device for various machines where an intermittent feed is required, the feed will be produced by the oscillation of the shaft E, and during the time of rest of that shaft the work will be performed upon the material fed. These illustrations will be sufficient to enable persons skilled in the art to which this invention pertains to apply it to the various purposes for which it is adapted. By making the slots of the two connecting-rods longer or shorter, the time of rest will be varied accordingly.

The employment of the segment as a means for holding the shaft E during its time of rest, is desirable, but not essential to the invention, as the friction or resistance to the movement of the shaft may be sufficient to retain it in its position from the time it reaches its up position until the crank-pins again come into action to return the shaft.

I have used the terms "upward" and "downward" as illustrating the operation of the machine but not to confine the invention to any particular direction of operation, as it will be evident that this movement may be applied to operate in any desired direction and for many purposes, circumstances alone governing the best or most desirable position in which the parts are to be relatively arranged.

It will be understood that the shaft A, while practically a continuously-revolving shaft, will be subject to engagement or disengagement of the power, as occasion may require—as, for illustration, in a power punching-press, which operates to produce successive punch-

ings so long as the shaft revolves; but the shaft is adapted to be stopped by the operator at any time, even between each operation, if so disposed or required. It will also be evident that the slot or lost motion of the connecting-rods may be made on the crank-pin G of the arm F instead of upon their respective crank-pins C D, if preferred, as illustrated in Fig. 7, and accomplish substantially the same result.

I claim—

1. The combination of a revolving shaft carrying a crank having two crank-pins in the same radial line, but one more distant from the center of motion than the other, an oscillating shaft, an arm projecting radially from said oscillating shaft and carrying a projecting crank-pin, and two connecting-rods arranged on the crank-pin of the said oscillating shaft, the said connecting-rods joined, respectively, to the two crank-pins of the revolving shaft, the said connecting-rods constructed for a predetermined length of lost motion between the crank-pin of the oscillating shaft and the two crank-pins of the revolving shaft, substantially as and for the purpose described.

2. The combination of a revolving shaft carrying a crank having two crank-pins in the same radial line, but one more distant from the center of motion than the other, an oscillating shaft, an arm projecting radially from said oscillating shaft and carrying a projecting crank-pin, two connecting-rods arranged on the crank-pin of the said oscillating shaft, the said connecting-rods joined, respectively, to the two crank-pins of the revolving shaft, the said connecting-rods constructed for a predetermined length of lost motion between the crank-pin of the oscillating shaft and the two crank-pins of the revolving shaft, the arm of the oscillating shaft constructed with a segment concentric with the axis of the driving-shaft, as the said arm of the oscillating shaft stands in its nearest position to the said revolving shaft, the length of the said segments corresponding to the time of the said lost motion, and the revolving shaft provided with a projecting pin corresponding to the outer surface of said segment and in the position relative to said segments, substantially as and for the purpose described.

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

ALFRED B. WILLCOX.

Witnesses:
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D. SHAKBAZ.