

DEVICE FOR CONVERTING MOTION.

Patented April 4, 1876.

The diagram illustrates a mechanical linkage system. It features two diamond-shaped linkages, each composed of four links connected at their vertices. The left diamond has a pivot point labeled 'K' at its leftmost vertex. The right diamond has a pivot point labeled 'G' at its rightmost vertex. A central rotating assembly is positioned between the two diamonds. This assembly includes a central shaft with a pin labeled 'A' passing through it. A rectangular block labeled 'B' is mounted on the shaft, and a circular component labeled 'C' is also part of the assembly. A dashed line indicates the axis of rotation. The entire system is shown within a rectangular frame.

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IMPROVEMENT IN DEVICES FOR CONVERTING MOTION.

Specification forming part of Letters Patent No. **175,805**, dated April 4, 1876; application filed February 21, 1876.

To all whom it may concern:

Be it known that I, CHARLES E. WILLIS, of the city, county, and State of New York, have invented a new and Improved Universal Cam-Motion, of which the following is a specification:

My invention relates to means for producing motion in any direction at the will of the operator—such, for example, as is required for the feed of a sewing-machine, to sew in any direction without turning the work, and for other like purposes. It consists of a cam in a tubular or other support capable of turning on its axis, and surrounded by a reciprocating ring, to any part of which the cam is presented by the turning of the tube, so as to be worked in any direction. The motion is transmitted in some cases from the cam by an arm to which one end of a bar is attached, which is mounted so as to both vibrate and reciprocate, and which works the feed or other device by its other end; but as this contrivance does not in all cases give the motion in straight lines I have devised a combination of compound parallel-bar mechanism with the cam, by which the feed or other device operated is moved in straight lines in all cases. The cam is in this case contrived in double form, by which it is worked positively in both directions without spring or weight; but it may be single and be worked in one direction by a spring.

Figure 1 is a sectional elevation of my improved universal cam mechanism, with the parallel-bar contrivance for transmitting the motion, taken on the line *x x* of Fig. 1. Fig. 2 is a top view of Fig. 1. Fig. 3 is a plan of the same, showing the arrangement of the single bar for transmitting the motion; and Fig. 4 is a section of Fig. 3, taken on line *y y*.

Similar letters of reference indicate corresponding parts.

A represents the cam, which is pivoted at B within the supporting-tube C, which is capable of turning freely on its axis; but the support need not necessarily be tubular. D is the ring or hollow cross-head for working the cam; it is fitted on the exterior of the tube so as to slide freely, and will in practice

be operated by any approved means. The projections E of the cam extend out through the slot F, one on each side of the ring, so as to be alternately worked out and in as the ring moves forward and backward along the curve G. The tube will have worm-gears or other devices connected with it for turning and setting, according to the direction it is wanted to work the cam, and an indicator may be applied to assist in adjusting it accurately. H is the arm for transmitting the motion from the cam, said arm being connected to one end of the lazy-tongs or parallel-bar contrivance I, fixed on a pivot at J, and designed to connect at its other end, K, with the feed or other device to be worked.

The parallel-bar mechanism will be used when more exact work is required; but for such as is not important in this respect a simple bar, L, will be used, said bar being arranged in a guide, M, in which it can slide lengthwise, the guide being fixed on a pivot, N, so that it can oscillate; or the bar may be fixed on the pivot N by a slot, O, without the guide.

When the bar L is to be used to work a feeder for sewing-machines it may be jointed, as at P, or in any other approved way, in order that it may rise and fall to allow of the up-and-down motion of the feeder, and it may be employed for giving that motion also by a cam, Q, if desired.

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

1. The combination of cam A, revolving support C, and reciprocating ring D, substantially as specified.

2. The reciprocating ring D, combined and arranged with double cam A, having two projections, E, substantially as specified.

3. The combination of the parallel-bar frame I and the variable cam A, substantially as specified.

CHAS. E. WILLIS.

Witnesses:

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