(No Model.)

R. H. ISBELL.

MECHANICAL MOVEMENT.

No. 366,774. Patented July 19, 1887.

Fig. 1.

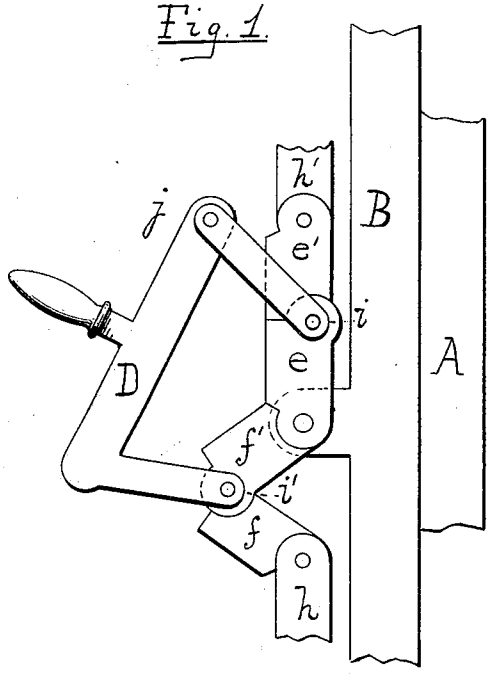


Fig. 2.

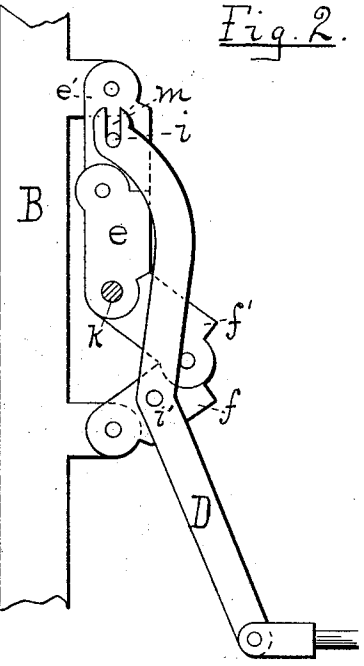
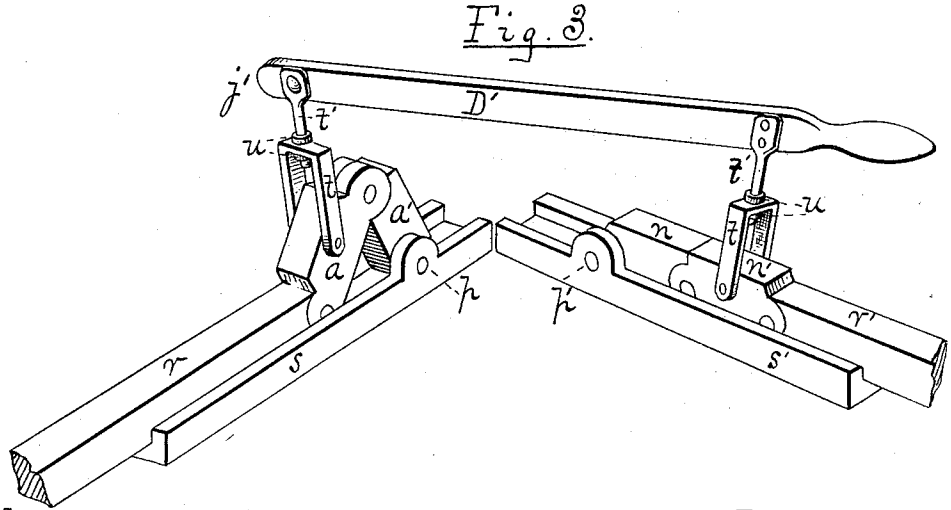


Fig. 3.



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UNITED STATES PATENT OFFICE.

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MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 366,774, dated July 19, 1887.

Application filed May 12, 1887. Serial No. 238,018. (No model.)

To all whom it may concern:

Be it known that I, ROBERT H. ISBELL, a citizen of the United States, residing at the city and county of New York, in the State of New York, have invented a new and useful Mechanical Device for the Operating and Locking of Movable Parts, of which the following is a specification.

My invention is a new device or mechanical movement applicable to all sorts of machines and in all kinds of situations wherever the following objects are to be attained: the moving of a certain part from one certain position to another, or moving and locking it automatically in one of those positions, or in both alternately, or the moving of two parts alternately between two given positions, or moving and locking them alternately in one of the two positions. It may be used, for instance, in a lock for doors, safes, car-couplings, windows, &c.; as a device to be used in connection with any machine driven by power, by which a belt or gear-wheel may be shifted to apply or cast off the power; in a press, machine for heading rivets, or other machine in which two parts are alternately presented to be acted upon, and in a great variety of other situations involving the functions described.

It consists of two knee-joints in combination with a single connecting-bar pivoted to them, by which they are simultaneously operated. Each of the knee-joints is connected at one of its ends with some stationary part, against which it bears, and at the other end with the part to be moved, and is pivoted directly or indirectly to the actuating-bar at some point upon the knee-joint between its ends. The principle of operation is that each of the pivots by which the actuating-bar is attached to a knee-joint acts as the fulcrum in moving the other knee-joint, and the principle of locking is that when a knee-joint is extended in a straight line the part to which it is attached is locked in position against any force acting in that line. There are various methods of applying the principle of the invention, several of which are herein shown and described.

In the accompanying drawings, in which the same letters indicate like parts, Figure 1 is a plan of the device with the adjacent ends of the knee-joints attached to the moving part and the outer ends to a stationary part. Fig. 2 is a plan of the device with the adjacent ends attached to the stationary part and the outer ends to the moving part. Fig. 3 is a perspective view illustrating two modifications—viz., the moving of two parts alternately and action of the knee-joints in different planes.

In Figs. 1 and 2, A is a fixed part. B is a movable part, intended to be moved up and down along A. D is the operating-bar, which I shall call herein the "actuating-lever," and $e\ e'$ and $f\ f'$ are the two knee-joints. In Fig. 1 the knee-joints are shown pivoted at the adjacent inner ends of the links e and f' to the movable part B and at the outer ends of the links e' and f to two fixed parts, h and h'. In Fig. 2 the adjacent inner ends of e and f' are pivoted upon the stationary part k (shown in the drawings as the section of a rod) and the outer ends of e' and f upon the movable part B. In each case the actuating-lever D is pivoted to the knee-joints at i and i'—in one case by means of arms, in the other case directly.

The operation is as follows: Taking Fig. 1 as an example, if, while the knee-joints are in the position shown, the handle of the lever D be moved downward, two forces are simultaneously applied to the knee-joints, one acting to the right upon the pivot i' and the other acting to the left upon the pivot i, which forces tend, respectively, to straighten the knee-joint $f\ f'$ and double $e\ e'$, thus co-operating to send the part B upward, since $h\ h'$ and A are fixed. i is the fulcrum from which $f\ f'$ is moved, and i' is the fulcrum from which $e\ e'$ is moved.

When the composing links of either knee-joint form a straight line, no power applied in that line against the movable part can move it. The straight line can only be broken by a reverse movement of the actuating-lever. Thus the part is unlocked from a given position, moved, and locked in the other given position by a single movement of a single lever and by a positive action. The hinge of the knee-joint may go a little beyond the straight line to make the lock more secure. The distance between i and i' is not a fixed distance, but varies as the knee-joints move. Allowance must be made for this in some way or the

device will not act. In the form shown in Fig. 1 this can be done by pivoting to D one of the arms by which it is connected to the knee-joints (see *j*) and leaving the other rigidly connected. In Fig. 2 this variation is allowed for by the slot *m*, in which the pivot upon the knee-joint moves.

Not only is it unnecessary to provide any other fulcrum for the actuating-lever D than its two pivotal points upon the respective knee-joints, but it is essential to any operative device comprising the combined knee-joints and a single actuating-lever that such lever shall not be pivoted upon any stationary part. The reason of this is evident when we consider that corresponding points upon the two knee-joints do not move at the same rate at any given moment, and hence that there is and can be no point upon the actuating-lever which is stationary. This is a vital principle involved in my invention.

A knee-joint exercises its greatest power when most nearly extended. A special feature of my invention in the forms of Figs. 1 and 2, distinguishing it from the operation of a single knee-joint, is that by a single mechanism this increased power is exercised both at the beginning and end of the stroke, and at the same time the power is more evenly distributed.

In Fig. 3 the knee-joints act in different planes and move separate parts. *a a'* and *n n'* are the two knee-joints, pivoted to stationary pivots at *p* and *p'* and to movable parts *r* and *r'*, respectively, *r* and *r'* being arranged to slide back and forth in the ways *s* and *s'*. Thus by the action of the actuating-lever D' the two parts *r* and *r'* are moved alternately between two given positions, and each is alternately locked in one of those positions. In this form the variation of distance between the pivotal points of the actuating-lever and knee-joints is allowed for in the same way as in Fig. 1, by pivoting one arm of the actuating-lever to it at *j'*, the other arm being rigidly affixed to it. Since the knee-joints act in different planes, the vertical plane of the lever continually changes, and this twisting movement must be allowed for in some way. In the drawings the two arms of the actuating-lever are shown as cylindrical in their upper parts and adapted to turn in the lower parts as the lever moves. *t* represents the part of the arm pivoted to the knee-joint; *t'*, the upper cylindrical part; and in the upper cross-piece of *t* is a round hole, in which *t'* turns. *u* are pieces affixed to *t'*, to rigidly connect *t* and *t'* vertically. It will be noticed that another difference in the operation of Fig. 3 from that of the other figures is that the knee-joints do not necessarily move simultaneously, but may instead move in succession. Thus, upon elevating the handle of D', *n n'* may double without moving *a a'*; but a further elevation of the handle will straighten the latter.

There are many variations of form which may be made without changing the principle of the invention. In Fig. 1 the links *e* and *f'* need not be pivoted together, but may be pivoted at separate points upon B. In any form the particular points at which the actuating-lever is to be attached to the knee-joints are not involved in the principle. It may be at the hinges. The nearer the hinge the greater the power obtained; but at the same time the greater the motion of the actuating-lever. This matter may be regulated according to the convenience or necessity of each case. There are two functions performed by the device—the moving and the locking; but they need not necessarily be combined. Thus, if the knee-joints are so arranged as not to quite come to a straight line, the device will be a shifting device alone, or the device may be used for the purpose of locking, while some other means are used to do the moving. All of the various forms are adapted to use by hand or with power.

The knee-joint is one of the old and elementary methods of converting one kind of motion into another, or of combining locking with reciprocating motion. So, also, a combination of knee-joints operated by levers fulcrumed upon stationary parts is old. Therefore I do not claim as my invention a single knee-joint in any method of operation, nor a combination of knee-joints operated by levers fulcrumed upon fixed parts.

I claim as my invention—

The combination of two knee-joints and an actuating-lever pivoted thereto and fulcrumed thereupon, substantially as described, as a means of moving parts to which it is attached back and forth between certain positions, or of locking them therein.

In witness whereof I have hereunto subscribed my name the 11th day of May, 1887.

ROBERT H. ISBELL.

Witnesses:

THOS. J. RITCH, Jr.,

SALTER S. CLARK.