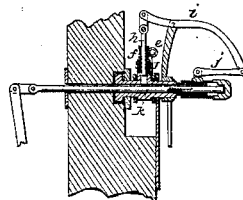
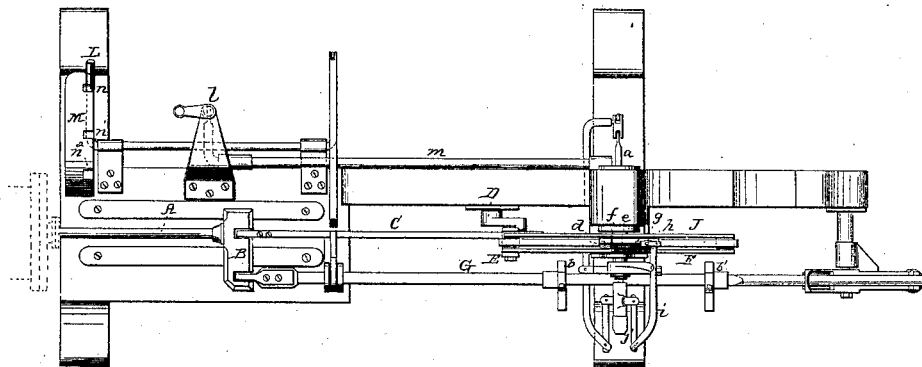
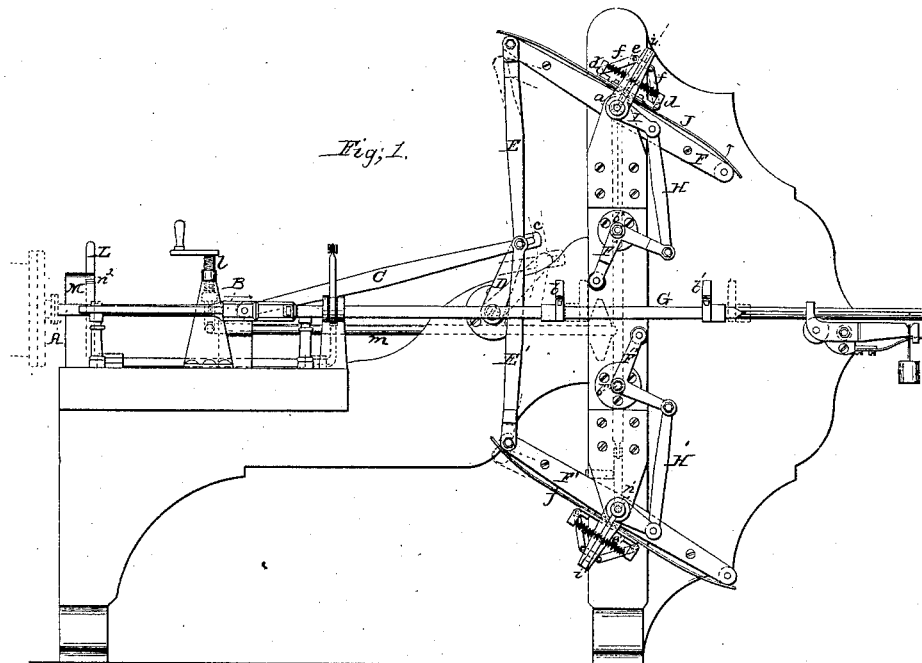


*J. J. Gorman,
Mechanical Movement.*

N^o 46,102.

Patented Jan. 31, 1865.



*Witnesses,
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UNITED STATES PATENT OFFICE.

JAMES J. GORMAN, OF CINCINNATI, OHIO.

IMPROVEMENT IN DEAD-CENTER LIFTS.

Specification forming part of Letters Patent No. 46,102, dated January 31, 1865.

To all whom it may concern:

Be it known that I, JAMES J. GORMAN, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and Improved Dead-Center Lift; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of this invention. Fig. 2 is a plan or top view of the same. Fig. 3 is a transverse vertical section of the same, the line *x x*, Fig. 1, indicating the plane of section.

Similar letters of reference indicate like parts.

The object of this invention is to prevent a crank from stopping at the dead-centers, and to produce a device by which the reciprocating motion of a steam-piston or other prime motor can be converted into continuous rotary motion without the necessity of a balance-wheel.

The power acting on the crank is transmitted to the same by means of two pitmen or connecting-rods, placed at right angles to each other, or nearly so, and applied to the crank in such a manner that either one or the other of the same acts on the crank under an angle of at least forty-five (45) degrees, and consequently the friction of the crank-shaft in its bearings is reduced and a larger percentage of power is obtained than by the ordinary arrangements designed for the same purpose.

In order to throw the crank over the dead-centers, a spring is applied which is gathered up as the crank approaches its dead-points, and which is connected with said crank in such a manner that it assists in throwing the same over the dead-points and prevents it turning in the wrong direction. A suitable mechanism applied to the spring serves to adjust the same according to the power which it is expected to exert, and a suitable reversing-gear serves to change the mechanism so that it can be made to work in either direction.

A represents a rod—such as the piston-rod of a steam-engine—to which a reciprocating motion is imparted by steam or any other competent power. This rod connects with the cross-head B, which is connected by a pitman, C, with

the crank D, to which a continuous rotary motion is to be imparted. In order to throw the crank over the dead-points, it connects by a pitman, E, with a working-beam, F, which oscillates on the shaft *a*. Said working-beam receives its motion partly by the action of the crank D and pitman E and partly by a bell-crank lever, F*, which has its fulcrum on a stud, *b**, and to which an oscillating motion is imparted by the action of tappets *b b'*, secured to a rod, G, which is connected to the cross-head B. If the cross-head moves in the direction of the arrow marked on it in Fig. 1 of the drawings, and when the crank has arrived in the position shown in red outlines in said figure, the tappet *b* comes in contact with the bell-crank lever F*, and as the rod G proceeds in the direction of said arrow the working-beam F turns in the direction of the arrow marked near it, and the pitman E acts on the crank D and urges the same on in the direction in which it travels. In order to allow the pitman E to act on the crank without interfering or being interfered with by the motion of the cross-head, the pitman C is provided with a slot, *c*, in its end, so as to permit the crank to advance independent of said pitman.

By referring to Fig. 1 of the drawings it will be observed that either one or the other of the two pitmen, C E, acts on the crank under an angle of forty-five degrees or more, and the friction in the bearings of the crank-shaft is thereby materially reduced.

The connection between the bell-crank lever F* and working-beam F is effected by the connecting-rod H, oscillating lever I, and spring J, and the several parts are so arranged that said spring J is gathered up or strained as the crank D approaches its dead-centers, and when the motion of the cross head stops the spring is brought into action and the crank is lifted over the dead-points without the assistance of a fly-wheel or other equivalent device. Without the spring the friction is reduced, but the dead-center is not avoided. The power of the spring is adjustable by means of sliding bearers *d*, which are connected to each other by a spring, *e*, that has a tendency to draw the same together, and by a pair of toggle-arms, *f*, by which said bearers can be spread. The toggle-arms are hinged to a slide, *g*, which moves up and down with a vertical rod, *h*, rising from the spring J, and said

slide connects by a working-beam, *i*, and link *j*, with the arbor or rod, *k*, that forms the fulcrum of the working-beam *F*, and to which a longitudinally sliding motion can be imparted by means of a screw, *l*, acting on an oscillating rod, *m*. The connection between the screw and rod *k* is made in such a manner that by turning said screw in one direction the rod *k* is moved out, and by turning the screw in the opposite direction the rod is drawn in. If said rod moves in the direction of the arrow marked on it in Fig. 3 of the drawings, the toggle-arms *F* are spread and the bearers *d* are moved apart, causing them to reduce the effective length of the spring *J*, and consequently to increase its tension; but if the rod *k* moves in the opposite direction, the bearers *d* contract and the tension of the spring *J* is reduced.

In order to be able to reverse the motion of the engine, the crank *D* connects also with a pitman, *E'*, working-beam *F'*, and so forth, as clearly shown in Fig. 1 of the drawings; and the rod *G* is arranged so that it can be turned, causing the tappets *b b'* to act either on the end of the bell-crank lever *F**, as shown in the drawings, or on the end of the bell-crank lever *F'**. The connection between this bell-crank lever and the working-beam *F'* is precisely the same as that between the bell-crank lever *F** and the working beam *F*, and the action of the spring *J'* throws the crank over the dead-centers in a direction opposite to that in which

the same is moved by the spring *J*. The reversing-gear is operated by a hand-lever, *L*, which is held in an arched segment, *M*, with three notches, *n n' n''*. If the lever is brought into the notch *n*, as shown in the drawings, the tappets *b b'* are in such a position that they actuate the working-beam *F*. If the lever is brought into the notch *n''*, the tappets actuate the working-beam *F'*, and the motion of the engine is reversed. If the lever is brought in the notch *n'*, the tappets do not come in contact with either of the bell-crank levers *F** *F'**, and the dead-center lift is thrown out of gear.

I claim as new and desire to secure by Letters Patent—

1. The reciprocating rod *G*, with tappets *b b'*, working-beam *F*, and pitman *E*, in combination with the pitman *C* and crank *D*, constructed and operating substantially as and for the purpose set forth.

2. Making the rod *G* reversible and combining it with working-beams *F F'*, pitmen *E E'*, and crank *D*, substantially as and for the purpose described.

3. The expansion-bearers *d d*, applied in combination with the spring *J*, pitman *E*, and crank *D*, substantially in the manner and for the purpose specified.

JAS. J. GORMAN.

Witnesses:

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