

May 24, 1927.

E. BRYANT

1,630,164

MECHANICAL MOVEMENT

Filed May 8, 1926

Fig. 1.

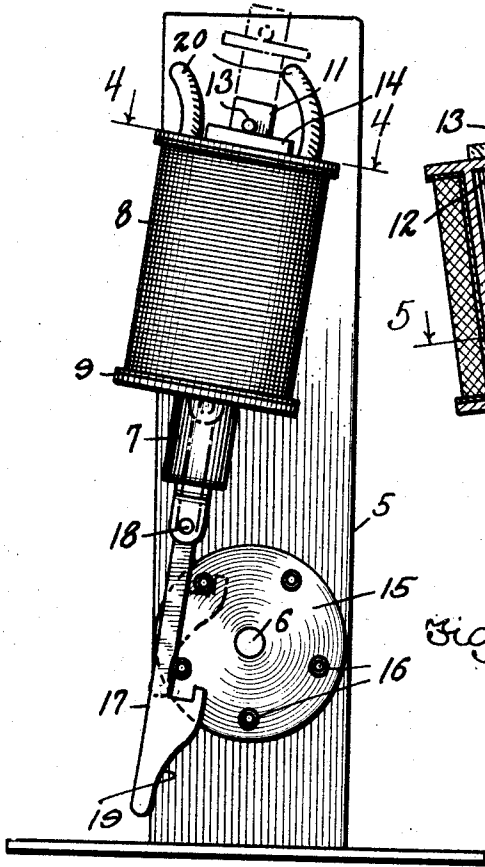


Fig. 2.

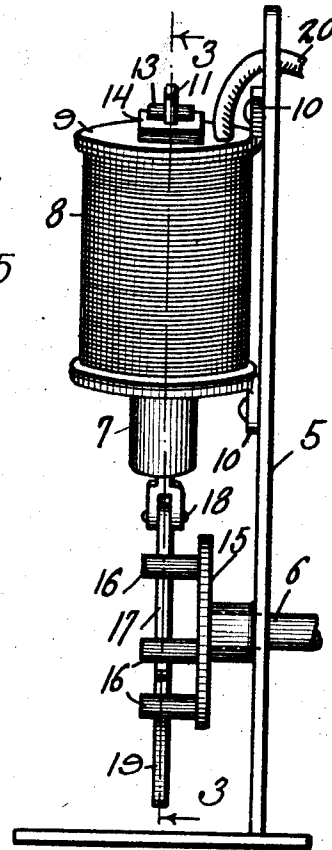


Fig. 3.

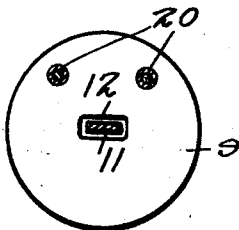


Fig. 4.

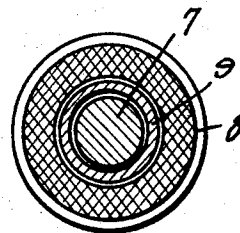


Fig. 5.

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UNITED STATES PATENT OFFICE.

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MECHANICAL MOVEMENT.

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This invention relates to certain new and useful improvements in mechanical movements, and has more particular reference to a simple, durable and efficient means for imparting intermittent or step by step rotation to a shaft of various machinery.

A further object is to provide means for converting reciprocatory motion into intermittent or step by step rotary motion whereby such intermittent or step by step rotary motion may be caused with respect to a shaft to be driven constantly in one direction, by the use of a reciprocating motor.

With the above general objects in view, and others that will become apparent as the nature of the invention is better understood, the same consists in the novel form, combination and arrangement of parts hereinafter more fully described, shown in the accompanying drawing and claimed.

In the drawing, wherein like reference characters indicate corresponding parts throughout the several views,

Figure 1 is a front elevational view of a device constructed in accordance with the present invention;

Figure 2 is a side elevational view thereof looking toward the left of Figure 1;

Figure 3 is a longitudinal section taken substantially upon line 3—3 of Figure 2;

Figure 4 is a transverse section of the motor taken upon line 4—4 of Figure 1; and

Figure 5 is a transverse sectional view taken upon line 5—5 of Figure 3.

Referring more in detail to the drawing, 5 indicates a suitable frame or support through the lower portion of which is extended an end of the shaft 6 to which it is desired to impart an intermittent or step by step rotary motion. In accordance with the present invention a suitable reciprocating motor is rigidly mounted upon the frame 5 at a point above the shaft 6, so that its plunger 7 projects downwardly for operative connection with the shaft 6, as will presently become apparent. This motor is preferably in the nature of a solenoid whose coil or winding 8 is suitably provided upon a rigid supporting spool 9 within which the plunger or core 7 is reciprocable. The end flanges of the spool 9 may be equipped with ears 10 for facilitating rigid attachment of the solenoid to the frame 5 as shown, and rigid with and projecting upwardly from the upper end of the core 7 is a guide rod

11 which slidably projects through a guide slot 12 in the upper end of the spool 9, so as to effectively guide the core 7 and insure against binding of the same when in operation, due to the tilted or inclined position in which the solenoid is mounted as shown clearly in Figure 1.

As shown, the core 7 is quite heavy so as to effectively lower by gravity as soon as the coil 8 is de-energized, the core being adapted to be elevated upon energization of the coil to thereby complete the reciprocatory motion imparted to the core of the solenoid. However, it is obvious that the downward movement of the core may be assisted by spring means or the like if found necessary or desirable. The upper free end of the guide rod 11 is preferably provided with a cross pin 13 or other suitable stop member for engagement with the upper end of the spool 9 so as to limit the downward movement of the core 7. The shock caused by suddenly arresting the downward motion of the core 7 may be suitably cushioned or absorbed by providing a resilient washer or other suitable cushion element in the path of the stop pin 13 as indicated at 14, such washer being disposed against the upper end of the spool 9 and having the guide rod 14 freely slidable therethrough.

A disk or wheel 15 is fixed upon the adjacent end of the shaft 6, and this disk is provided at suitable regular intervals with rigid laterally projecting pins 16 adapted to be successively engaged by a ratchet pawl 17 which is pivoted at its upper end as at 18 to the lower end of the core 7 and which has a hook-shaped lower end portion which faces upwardly for driving engagement with the pins 16 when the core 7 is elevated by energization of the coil 8. The ratchet formation of the pawl 17 embraces the provision of a beveled inner side 19 on the lower end portion of said pawl, whereby, upon lowering of the core and the pawl the latter will ratchet past the adjacent pin 16 without turning the wheel 15 backward. This ratcheting action of the pawl when moving downwardly is permitted by reason of the fact that the pivot 18 permits the pawl to swing outwardly or away from the wheel 15. By reason of the fact that the solenoid is disposed at an inclination, the pawl 17 will tend to swing inwardly or toward the wheel 15 under the action of gravity so that its operative engagement with the pins 16

is insured without the use of extraneous means such as springs for actuating the pawl. The feed wires for the coil 8 are indicated generally at 20, and any suitable means may be associated therewith for causing the required energization and de-energization of the coil 8 alternately at the required intervals.

In operation, with the parts disposed as shown in the several views, the coil 8 will be suitably energized so as to attract the core 7 and cause the same to be elevated. When this takes place the hooked lower end of the pawl 17 will engage the adjacent one of the pins 16 disposed in the path of the same, and upon continued upward movement of the core 7 said pin will be moved upwardly so as to cause a partial rotation of the shaft 6. When the core 7 has reached its highest point of movement the rotation of the shaft 6 will cease, whereupon the coil 8 will be de-energized and the core allowed to immediately lower by gravity to its initial position in the operation outlined above as shown in Figure 1. In this operation, the next succeeding pin 16 of the wheel 15 has been moved into the path of the hooked end of pawl 17, but such pawl, in lowering again, will simply ratchet past this next succeeding pin due to the beveled side 19 provided on the lower end of said pawl. It is therefore apparent that the pawl will not cause backward rotation of shaft 6, but will return to a position for effective engagement with the aforesaid succeeding pin 16 upon a repeated energization of the coil 8, whereby another similar partial rotation of the shaft 6 will be caused in the same direction when the core 7 is again elevated.

From the foregoing description it is believed that the construction and operation as well as the advantages of the present invention will be readily understood and appreciated by those skilled in the art.

Minor changes may be made without departing from the spirit and scope of the invention as claimed.

What I claim as new is:—

1. A mechanical movement for converting reciprocating movement into step by step rotary movement, a rotatable shaft, a wheel fixed on said shaft and provided with spaced rigid laterally projecting pins, a reciprocating motor arranged above the axial center of the wheel having a reciprocable plunger normally arranged at one side of the axial center of the wheel, and a ratchet pawl pivoted to the plunger for successive engagement with the pins.

2. A device of the class described comprising a motor adapted to be rigidly mounted in an inclined position and having a reciprocable plunger, a rotatable shaft, a wheel fixed upon said shaft and provided with laterally projecting pins upon one side ar-

ranged in a circular series at regular intervals, and a ratchet pawl pivoted at one end to the plunger so as to normally tend to swing under the action of gravity in the plane of said wheel toward said pins.

3. A device of the class described comprising a motor adapted to be rigidly mounted in an inclined position and having a reciprocable plunger, a rotatable shaft, a wheel fixed upon said shaft and provided with laterally projecting pins upon one side arranged in a circular series at regular intervals, and a ratchet pawl pivoted at one end to the plunger so as to normally tend to swing under the action of gravity in the plane of said wheel toward said pins, said pawl having a hook-shaped end portion facing the plunger and provided with a beveled inner side below the hooked portion of the pawl and presented toward said pins.

4. A device of the class described comprising a solenoid adapted to be secured to a suitable support in an inclined position and having a core adapted to be elevated when attracted and adapted to automatically lower by gravity, a ratchet pawl pivotally attached at one end to the lower end of said core and having an upwardly facing hook portion and a beveled inner side below the latter, a shaft mounted for rotation, and a wheel adapted to be secured upon said shaft and provided with a series of uniformly spaced laterally projecting pins arranged in the path of movement of said pawl so as to be successively engaged by the hooked portion thereof when the core is elevated.

5. A device of the class described comprising a solenoid adapted to be secured to a suitable support in an inclined position and having a core adapted to be elevated when attracted and adapted to automatically lower by gravity, a ratchet pawl pivotally attached at one end to the lower end of said core and having an upwardly facing hook portion and a beveled inner side below the latter, a shaft mounted for rotation, and a wheel adapted to be secured upon said shaft and provided with a series of uniformly spaced laterally projecting pins arranged in the path of movement of said pawl so as to be successively engaged by the hooked portion thereof when the core is elevated, said solenoid embodying a spool having a winding thereon and within which the core is movable, an upwardly projecting axial guide rod rigid with the upper end of said core and slidably extending through the upper end of said spool for preventing binding of the core during its movements, and means to limit the downward movement of said core.

6. A device of the class described comprising a solenoid adapted to be secured to a suitable support in an inclined position and having a core adapted to be elevated when

attracted and adapted to automatically lower by gravity, a ratchet pawl pivotally attached at one end to the lower end of said core and having an upwardly facing hook portion and a beveled inner side below the latter, a shaft mounted for rotation, and a wheel adapted to be secured upon said shaft and provided with a series of uniformly spaced laterally projecting pins arranged in the path of movement of said pawl so as to be successively engaged by the hooked portion thereof when the core is elevated, said solenoid embodying a spool having a winding thereon and within which the core is movable, an upwardly projecting axial guide rod rigid with the upper end of said core and slidably extending through the upper end of said spool for preventing binding of the core during its movements, and means to limit the downward movement of said core, said means comprising a stop pin on the upper end of said guide rod, and a cushion element on the upper end of the spool engageable by said stop pin for absorbing shock incident to arresting downward movement of the core by said stop pin.

In testimony whereof I affix my signature.

ELMER BRYANT.