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STEP-UP MECHANISM

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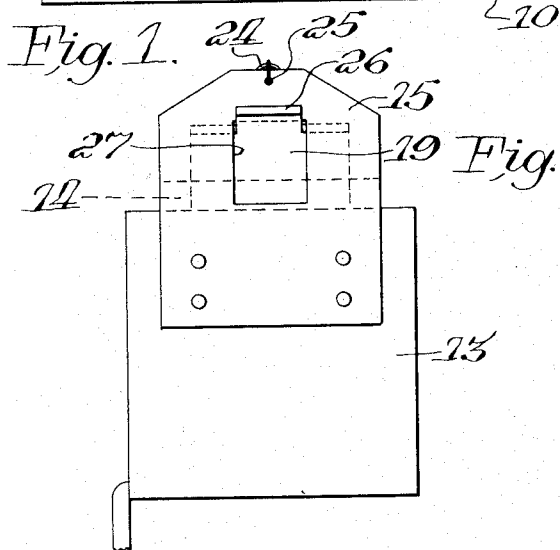
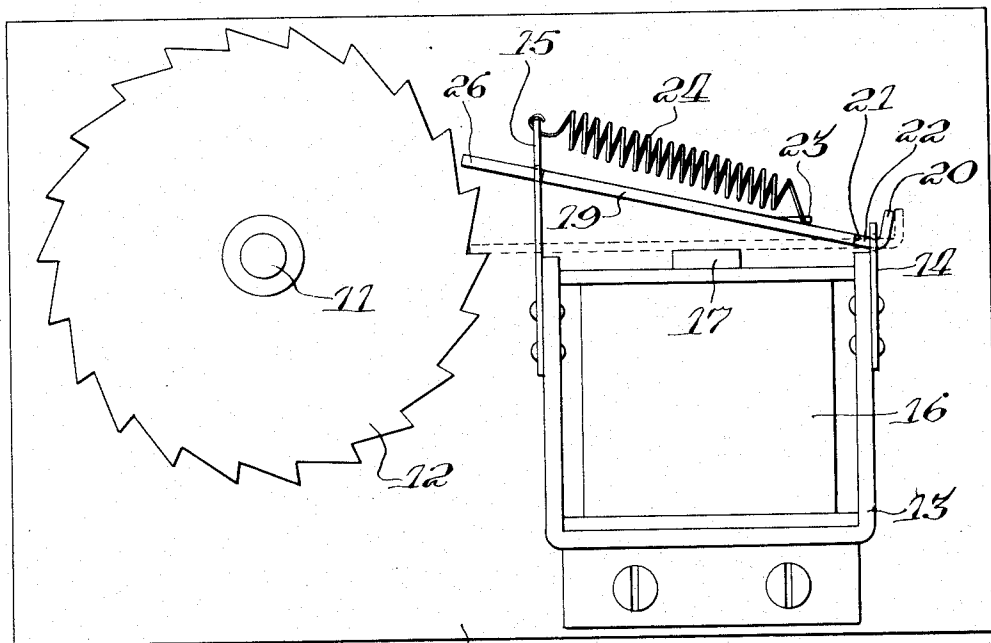
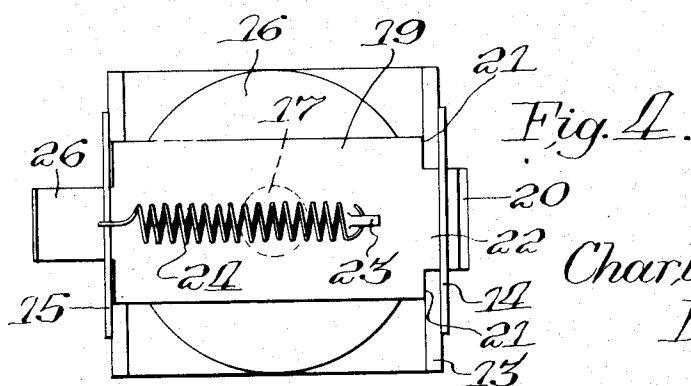
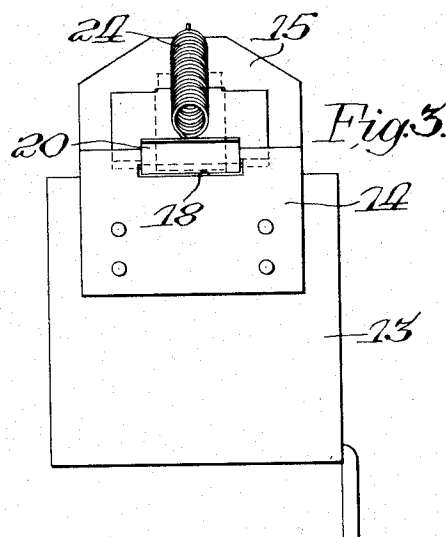


Fig. 2.



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STEP-UP MECHANISM

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The invention relates to an improved step-up mechanism usable where a ratchet wheel is employed and intermittently rotated in a step by step manner for various uses in mechanical organizations.

In the past, an electromagnet has been used to move a pivoted armature, the latter being connected through linkage to swing a pivotally mounted pawl, the latter engaging the teeth of the ratchet wheel to turn same intermittently. Such mechanism worked very well, but is relatively complicated and costly since it involves quite a few parts. It is desirable to simplify this mechanism to lessen the cost thereof materially, and without jeopardizing the efficient operation thereof for the intended purposes.

Accordingly, the principal object of the invention is to provide an improved step-up mechanism.

Another object is to provide a much simplified form of step-up mechanism in which the armature of the electromagnet is disposed directly to engage the teeth of the ratchet wheel without the interposition of any intermediary parts or mechanism.

Another object is to provide an electromagnet having an armature which is both pivotally and slidably associated therewith and positioned directly to engage the teeth of a ratchet wheel to operate same.

Other important objects will become apparent to those skilled in this art as the disclosure is more fully made.

Briefly, these important objects are attained by providing an electromagnet carried by a bracket, the latter pivotally and slidably carrying an armature plate which is spring pulled to hold the armature away from the electromagnet core when the electromagnet is deenergized. The plate is extended through a portion of the bracket so that its free end is in a position directly to engage the teeth of a proximately positioned ratchet wheel, whereby to operate the latter, means being provided to limit the stroke of the armature plate and keep it in proper operative position in relation to the bracket, electromagnet and ratchet wheel. So much will suffice in presenting a general understanding of the improved step-up mechanism, a practicable form of which is illustrated in the accompanying sheet of drawings, wherein:

Figure 1 is a general side elevational view of the complete step-up mechanism assembly;

Figure 2 is an end elevational view of the electromagnet unit per se;

Figure 3 is an opposite end elevational view of the electromagnet unit; and,

Figure 4 is a top plan view thereof.

The step-up mechanism comprises a suitable support 10 which carries a horizontal shaft 11 on which is rotatably mounted a ratchet wheel 12. The improved step-up mechanism is designed to operate or step up, intermittently, this ratchet wheel, one step or tooth at a time.

Accordingly, the support 10, or some other support, carries a bracket 13 proximately to the ratchet wheel. On the bracket 13 is a vertical end plate 14 and an opposite higher end plate 15, both in this instance disposed vertically. The bracket 13 is U-shaped and carries an electromagnet 16 having an upright core 17. The wall 14 is provided with a horizontal slot 18 and in this slot is slidably and pivotally carried a flat armature plate 19 disposed over the core 17 as shown in Figure 1.

The end of the plate 19 adjacent the slot 18 and on the back side thereof is formed with an angularly bent, retainer end 20 and on the opposite side of the slot are stop shoulders 21 provided by narrowing the end in the form of a tongue 22. The plate 19 is formed on its top surface with a tang 23 to which is secured one end of a pull spring 24, the other end of which is secured to an opening 25 formed in the top edge of the plate 15, so that said spring creates a force normally tending to pull the armature plate 19 upwardly as in the full line position appearing in Figure 1, when the electromagnet is deenergized.

The opposite end of the plate 19, from its pivot end, is formed as a tongue extension 26, which protrudes through a large rectangular opening 27 formed in the end wall 15, said tongue being flat and positioned directly to engage the teeth of the proximately positioned ratchet wheel 12. The upper and lower edges of the opening 27 act as limit stops to limit the up and down movement of the plate 19 as the tongue 26 hits said edges in an obvious manner. Further the structure of the plate 19 in relation to the bracket end walls is such that the plate 19 will always maintain a proper position in relation to the bracket, electromagnet, and ratchet wheel. This is important since there is no fixed axis pivot for the armature plate 19 on the bracket 13 as in conventional constructions. This completes the details of construction and the operation will next be described.

The electromagnet 16, of course, is disposed in an electric circuit with a source of energy and every time the circuit is closed and the electromagnet is energized, the core 17 attracts and

pulls the armature plate 19 downwardly, the plate pivoting in the slot 18 in the end wall 14. As the plate 19 thus swings downwardly the extended end 26 thereof engages a tooth on the wheel 12 to turn same one step, said plate shifting or sliding bodily endwise in the slot 18 and walls 14 and 15 so that the armature plate can readily accommodate itself to the tooth formations on the wheel 12. The end 20, shoulders 21 and opening 27 all cooperate to limit both endwise and pivotal movement of the plate 19 and the spring 24 acts when the magnet 16 is deenergized to restore the plate 19 to its normal position of rest shown in full lines in Figure 1.

It will now be seen that a simplified step-up mechanism has been provided for the purposes stated in accordance with the objects heretofore recited for the invention.

It is the intention to cover all changes and modifications not materially departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. In a step-up mechanism comprising a U-shaped bracket, the bight carrying an electromagnet and the legs carrying an armature plate therefor, said legs having openings for carrying opposite ends of the plate in a manner enabling the plate to have limited pivotal and endwise movement in the legs, one end of the plate being extended, and a ratchet wheel turnably carried adjacent the bracket and the extended end having direct engagement with the teeth of said ratchet wheel.

2. In a step-up mechanism, a support, a ratchet wheel turnably carried on the support, an electromagnetic device carried on the support adjacent the wheel, an armature plate member for the device having one end pivotally and slidably mounted while its other end extends toward the periphery of the ratchet wheel, said latter end being positioned directly to engage the teeth of the wheel and operate same, and a spring independent of the pivotal mounting of the plate member to hold the same disengaged from the ratchet teeth when the device is deenergized.

3. In a step-up mechanism, a support, a ratchet wheel turnably carried on the support, an electromagnetic device carried on the support adjacent the wheel, an armature comprising a rigid integral plate member for the device which member has one end positioned directly to engage the teeth of the wheel and operate same, means for pivotally and slidably supporting the opposite end of the member to associate the plate member

with the device, and a spring connected to the plate member to hold the plate member away from the device when the latter is deenergized, said spring being independent of the pivotal and slidable support mentioned.

4. In a step-up mechanism, a support, a bracket having spaced end walls and mounted on the support, an electromagnet carried by the bracket, an armature plate for the electromagnet having an end slidably and pivotally carried in a slot formed in one end wall, the opposite end of the plate being extended to pass through a slot formed in the other wall, and a ratchet wheel turnably carried on the support adjacent the bracket whereby the extended end of the plate may directly engage the teeth of the ratchet wheel to operate same when the electromagnet is energized.

5. In a step-up mechanism comprising a support, a bracket having spaced end walls carried on the support, an electromagnet carried by the bracket, an armature plate for the electromagnet, said plate carried in the walls of the bracket for pivotal and bodily endwise movement and having an end extended through an opening formed in one wall, and a ratchet wheel turnably mounted on the support and directly engageable by the extended end to be operated thereby.

6. In a step-up mechanism comprising a support and a bracket carried thereby having spaced end walls, an electromagnet carried by the bracket, an armature plate for the electromagnet, said plate carried in the walls of the bracket for pivotal and bodily endwise movement and having an end extended through an opening formed in one wall, a ratchet wheel turnably carried on the support in a position to be directly engaged and operated by said extended end, and means for limiting both the pivotal and endwise movements of the plate.

7. A step-up mechanism comprising a support, a ratchet wheel turnably carried thereby, an electromagnetic device also carried on said support and having an armature plate with one end directly engaging the teeth of the wheel to turn same, means to support the armature plate at its other end for both rotational and translational movements, means positively to control the range of translational movement, and a spring independent of the said armature supporting means and acting on the plate to hold same free of the wheel when the device is deenergized.

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