(No Model.)

C. J. VAN DEPOELE.

ELECTRIC MOTOR RECIPROCATING ENGINE.

No. 445,102. Patented Jan. 20, 1891.

Fig. 1.

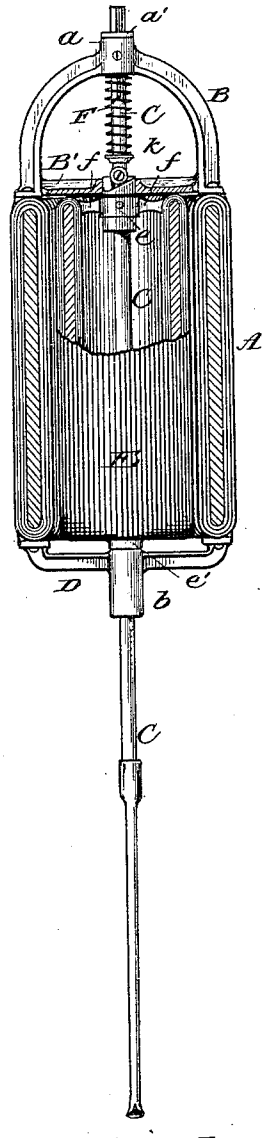


Fig. 2.

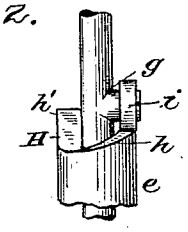


Fig. 3.

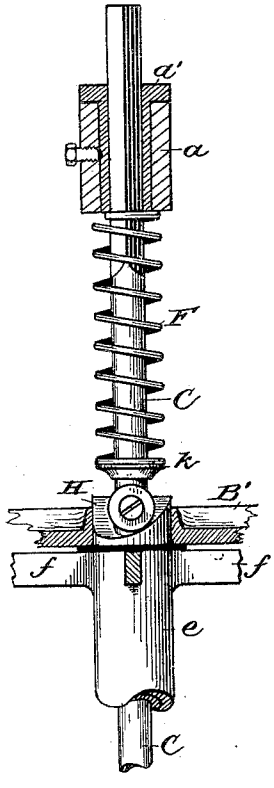


Fig. 4.

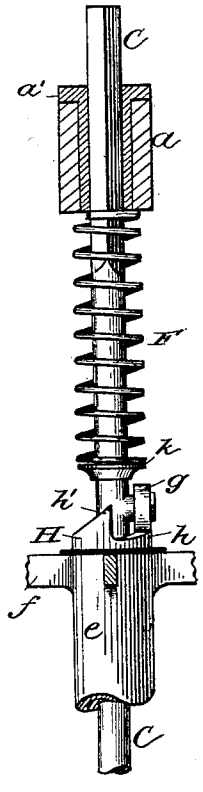


Fig. 5.



Witnesses
H. W. Lamb
C. L. Sturtevant

Inventor
Charles J. VanDepoele
By his Attorney
Frankland Jarman

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

ELECTRIC-MOTOR RECIPROCATING ENGINE.

SPECIFICATION forming part of Letters Patent No. 445,102, dated January 20, 1891.

Application filed April 18, 1890. Serial No. 348,547. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Electric-Motor Reciprocating Engines, of which the following is a description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to an improvement in reciprocating engines in which the power of a rotary motor is converted into a reciprocating motion through intermediate mechanism.

The object of my invention is to provide a device in which the reciprocating tool, which may be a drill, hammer, chisel, or the like, is in direct connection with the rotating part to which power is applied, thereby making a simple and effective machine, doing away with all intermediate power-transmitting devices.

The construction and arrangement of an apparatus embodying the invention will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal elevation showing the invention applied to a drilling-machine, the same being partly in section. Fig. 2 is an enlarged view of a portion of the reciprocating tool-stock and cam for imparting upward movement thereto. Figs. 3 and 4 are views at right angles to each other, showing the means for imparting the power-stroke to the tool. Fig. 5 shows a development of the rotating cam.

In the drawings, A represents the stationary part or exterior of the machine, consisting, as herein shown, of a stationary field-magnet. Bolted or otherwise secured at either end to the top of the field-magnet A and insulated therefrom is a yoke B, having a central bearing *a*, provided with a square opening through which passes the upper end of the drill-stock C, which is also squared at that portion, whereby rotary movement of the same is prevented. It must be understood that a circular opening with a feather or any other known means may be employed to prevent the drill-stock from turning under the influence of the operating devices; furthermore, that the bearing *a* may also carry any of the well-known mechanism for imparting a step-by-step rotary motion to the drill-stock C and tool carried thereby. The bearing *a* may be provided with a removable and, if desired, rotatable bushing *a'*. As seen in Figs. 1 and 3, the bushing *a'* is non-rotatable, being held by a set-screw. As seen in Fig. 4, however, the set-screw is omitted and may be replaced by a ratchet mechanism for controlling and limiting the rotation of the tool-holding part C; but this is not here illustrated, since it forms no part of the invention here claimed.

The drill-stock C carries a suitable drill or other tool. A second yoke D is secured to the lower end of said field-magnet. The yoke D has also a central bearing *b*, through which the drill-stock passes, the two bearings *a* and *b* serving to guide the tool-holder or drill-stock in its reciprocating movement. The yoke B is furthermore formed or provided with a centrally-apertured bar B', extending between its extremities.

E is the armature of the motor, sustained at each end in the usual manner by spiders *f f*, through which the drill-stock moves freely, the hubs *e e'* of the spiders forming bearings rotating freely upon the drill-stock. The hub *e* of the upper spider rests against the cross-bar B', and the hub *e'* of the lower spider against the lower bearing *b* of the yoke D, the armature being therefore held between the cross-bar B' and lower bearing *b*, and endwise movement thereof prevented. Anti-friction material may be placed between the hubs of the spiders and the parts with which they come in contact. It will be seen that by sleeving the armature upon the drill-stock it rotates freely thereon, while the drill-stock slides freely through said sleeve, but without turning, unless of course special means are provided for forcibly imparting a step-by-step rotary motion thereto.

The forward movement or power-stroke is imparted to the drill-stock C or tool-holder by a spring F, which is interposed between the hub of the upper spider and the bearing *a*, desirably encircling the drill-stock, the yoke B being of course made longer or shorter, in order to accommodate a spring of the desired power. The spring may rest at one end against the bearing *a* and at the other against a collar *k*, secured to the drill-stock C. The power of the motor is stored in the spring F by com-

pressing the same during the rotation of the armature E, and while the exact means for accomplishing this may be varied in other details I have shown what I find to be a desirable form. Upon the upper part of the hub *e* of the spider *f* is removably secured a cam H, which is provided with one or more cam-surfaces *h*, adapted to receive a projection *g* upon the drill-stock. The projection *g* on the drill-stock may be provided with an anti-friction roller for diminishing the friction between the cam-surfaces and the projection. When the armature E is rotating, the projection *g* upon the drill-stock will be forced up by the cam-surface *h*, thereby compressing the spring F, and when the projection *g* has passed the highest point *h'* upon the cam-surface it will be released, permitting the spring F to expand to impart a power-stroke to the drill-stock. By the continued rotation of the armature the spring F will be compressed and allowed to expand and reciprocating motion be imparted to the drill-stock and tool carried thereby.

Any desired number of reciprocations may be produced during each rotation of the armature, and the cam H may be formed with a plurality of cam-surfaces, as indicated in Fig. 5, although the remaining figures each show but a single cam-surface.

Any desired type of electric motor may be employed, although I prefer to use a motor of the induction type—that is to say, one in which no sectional commutators are required.

In view of the foregoing it will be apparent that the apparatus may be modified as to various details without departing from the spirit or nature of the invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A reciprocating engine comprising an electric motor the armature of which is revoluble within its field-magnet and sleeved upon a tool-stock adapted to be reciprocated through said armature and bearings for the tool-stock arranged to prevent end motion of the armature, substantially as described.

2. A reciprocating engine comprising an electric motor having a stationary part or field-magnet, a rotating part or armature revoluble therein, a tool-stock adapted to be reciprocated through said rotating part or armature, the latter being sleeved thereupon, a motor-spring acting upon and imparting the power-stroke to the tool-stock, and means carried by said rotating part or armature for alternately compressing and releasing the motor-spring, substantially as described.

3. A reciprocating engine comprising an electric motor having a stationary part or field-magnet, a rotating part or armature revoluble therein, a tool-stock adapted to be reciprocated through said rotating part or armature, the latter being sleeved thereupon, a motor-spring acting upon and imparting the power-stroke to the tool-holder, and means carried by the armature acting directly upon the tool-holder for alternately compressing and releasing the motor-spring, substantially as described.

4. A reciprocating engine comprising a reciprocated tool-stock and a motor-spring therefor, and a rotating electric motor having its armature rotatably mounted upon the tool-stock and provided with a cam for retracting the tool-stock and alternately compressing and releasing the motor-spring, substantially as described.

5. A reciprocating electric engine comprising an electric motor the armature of which is revoluble within its field-magnet and sleeved upon a reciprocated tool-stock, bearings sustaining the tool-stock and preventing end motion of the armature, a cam carried by said armature, and a motor-spring acting upon the tool-stock and alternately compressed and released by the rotation of the cam carried by the armature, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES J. VAN DEPOELE.

Witnesses:
S. G. HOPKINS,
FRANKLAND JANNUS.