

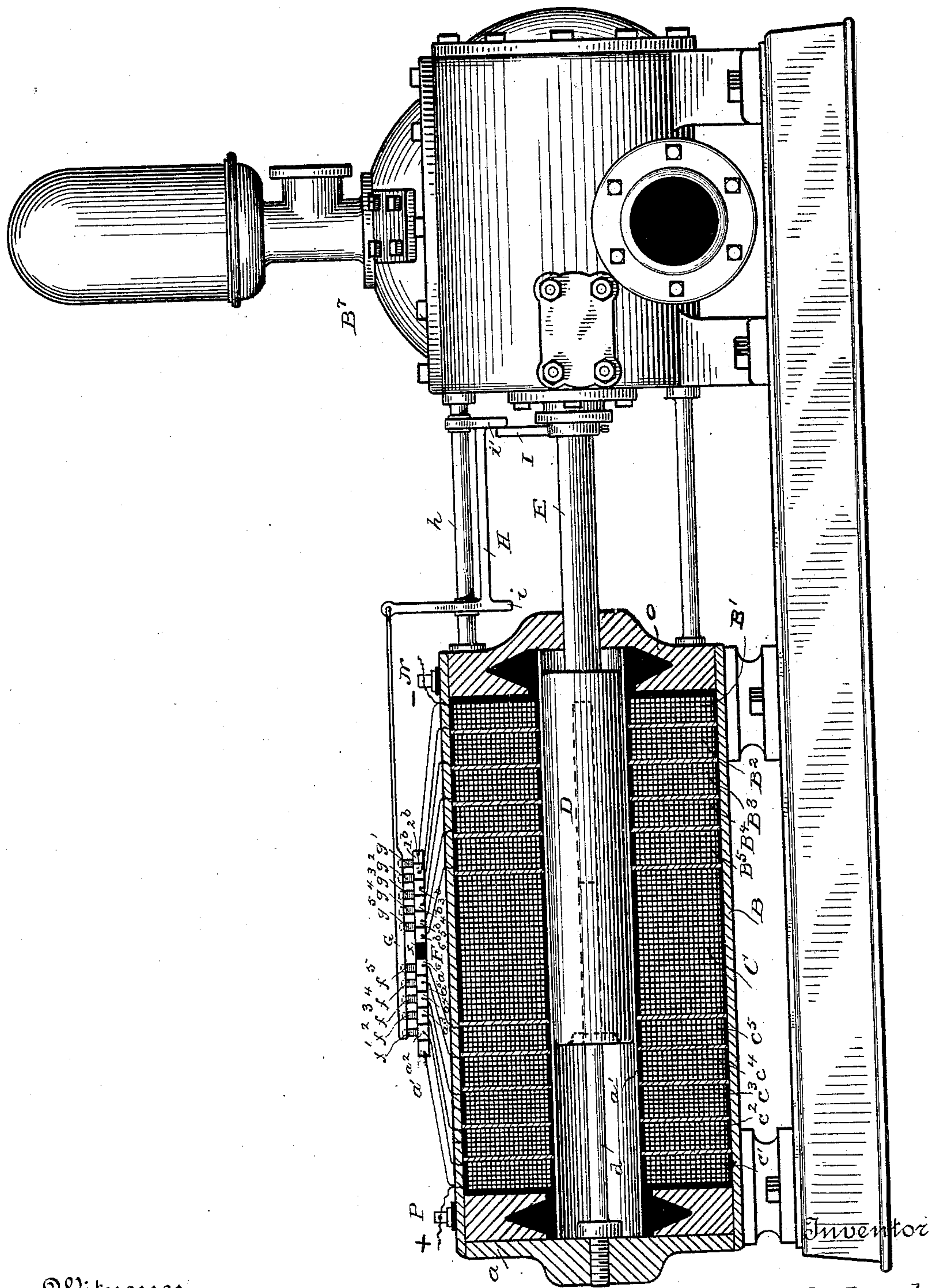
(No Model.)

C. J. VAN DEPOELE.

ELECTRO MAGNETIC RECIPROCATING PUMPING ENGINE.

No. 467,450.

Patented Jan. 19, 1892.



Witnesses

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CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

ELECTRO-MAGNETIC RECIPROCATING PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 467,450, dated January 19, 1892.

Application filed March 19, 1891. Serial No. 385,689. (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 Electro-Magnetic Reciprocating Pumping-Engines, of which the following is a description, reference being had to the accompanying drawing, and to the letters and figures of reference marked thereon.

My invention relates to improvements in reciprocating electro-magnetic engines. In the present instance the invention is illustrated and described in connection with a pump, to the operation of which it is particularly applicable. Certain features of the invention may, however, be applied to many other purposes.

The accompanying drawing is a view in elevation showing a pump and an electro-magnetic reciprocating engine combined therewith and arranged to operate the same, the engine being partly in longitudinal section to show the circuits and connections.

A is a reciprocating electro-magnetic engine.

B is a pump of any desired construction, the piston of which is connected with the reciprocating plunger of the engine A.

The engine A comprises a number of solenoidal coils connected together in series and contained within an iron envelope or shell B, which is provided with ends or heads a b , within which the coils are inclosed and protected. A diamagnetic tube a' is fitted within the coils and an iron plunger D is arranged to be reciprocated within the tube a' under the influence of the motor-coil. The piston-rod E of the pump B is connected directly with the plunger D, and for convenience of operation a guide-rod d is secured within the tube a' and arranged to sustain the plunger D centrally therein.

The motor-coils are divided into three sets—that is to say, the central coil C and a series of smaller coils B' B^2 B^3 B^4 B^5 at one end, and a set of smaller coils c' c^2 c^3 c^4 c^5 at the other end.

P N represent the outside terminals of the entire set of coils and are connected with a suitable source of continuous current.

In the operation of the machine a current flows constantly through the central coil C, imparting powerful magnetism to the plunger D, and also magnetizing the iron envelope of the machine while the said current is alternately directed through the opposing sets of end coils, thereby shifting the field of force and causing the plunger to be attracted first in one direction and then in the other. This is in the present instance effected as follows: A commutator F is provided with two sets of insulated contacts a' a^2 a^3 a^4 a^5 a^6 , which are connected with the coils c' c^2 c^3 c^4 c^5 and C. A second similar set of contacts 1^b 2^b 3^b 4^b 5^b 6^b is connected with the coils B' B^2 B^3 B^4 B^5 and the opposite extremity of the coil C. The sets of contacts are each insulated from each other, and, furthermore, separated centrally by a block of insulation f . A contact-carrying bar G is provided with two sets of contact blocks or brushes g' g^2 g^3 g^4 g^5 and f' f^2 f^3 f^4 f^5 , said moving contacts being so arranged and disposed relatively to the contacts upon the commutator F that when in one position—for instance, as seen in the drawing—the contacts f' f^2 , &c., will be upon the sections a^2 a^3 , &c., while the contacts g' , &c., will straddle the sections 1^b 2^b , &c., short-circuiting them and affording a path for the current from the extremity of coil C by way of the contact devices to the negative binding-post and to line, thus rendering the central coil C and the end coils c' c^2 , &c., active, and the coils B' B^2 , &c., inactive. It will be apparent that a very small movement of the bar G and the two sets of contact-blocks will suffice to alternately short-circuit the sets of end coils, thereby causing reciprocation of the plunger D. Furthermore, the sectional coils at each end of the machine are all made as nearly as possible of the same resistance, and therefore the shifting of the current from one to the other will be accompanied by very little, if any, injurious sparking. As a convenient means of actuating the bar G, it is connected with a sliding frame H, which is sustained and guided upon a frame-rod h between the engines. The extremities of the frame H are provided with downward projections i i' , which are in the path of a tappet I, carried by the piston-rod E. The tappet I is adjust-

ably fixed upon the piston-rod and arranged to engage the projections *i i'* near the extremities of its movement, and thereby to shift the contact blocks or brushes over the distance
5 of the width of one of the segments of the commutator F, thereby alternately short-circuiting one set of the end coils and continuously operating the machine. It will, furthermore, be apparent that the circuit-changing
10 devices are not actuated until the end of each stroke, and that, therefore, the full power of the engine is imparted to the plunger D throughout its entire movement in either direction.

15 Obviously the mechanical structure herein described may be varied in various minor respects without departing from the invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—
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1. An electro-magnetic reciprocating pumping-engine comprising a plurality of sets of motor-coils, a magnetic plunger adapted to be reciprocated therethrough, a coil for magnetizing said plunger, and means carried by
25 the plunger for alternately shifting the current from one set of end or motor coils to the other.

2. An electro-magnetic reciprocating engine comprising three sets of motor-coils and
30 contacts therefor, one constantly-energized motor-coil, and two motor-coils energized in alternation, a magnetic plunger adapted to be reciprocated through the coils, moving contact devices for alternately short-circuiting
35 one of the sets of motor-coils, and means carried by the plunger for moving the contact devices at or near the end of each stroke.

3. An electric pumping-engine comprising a central coil and a set of sectional coils at
40 each end thereof, a magnetic plunger adapted to be reciprocated through said coils, contacts connected with the coils, moving contact devices engaging said contacts and adapted to short-circuit one set of end coils, and means
45 actuated by the moving plunger for shifting the contact devices at or near the termination of each stroke, and thereby shifting the current from one set of end coils to the other.

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

CHAS. J. VAN DEPOELE.

Witnesses:

JOHN W. GIBBONEY,
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