W. H. ODELL.

Improvement in Electro-Magnetic Engines.

No. 129,857. Patented July 23, 1872.

Fig. 1

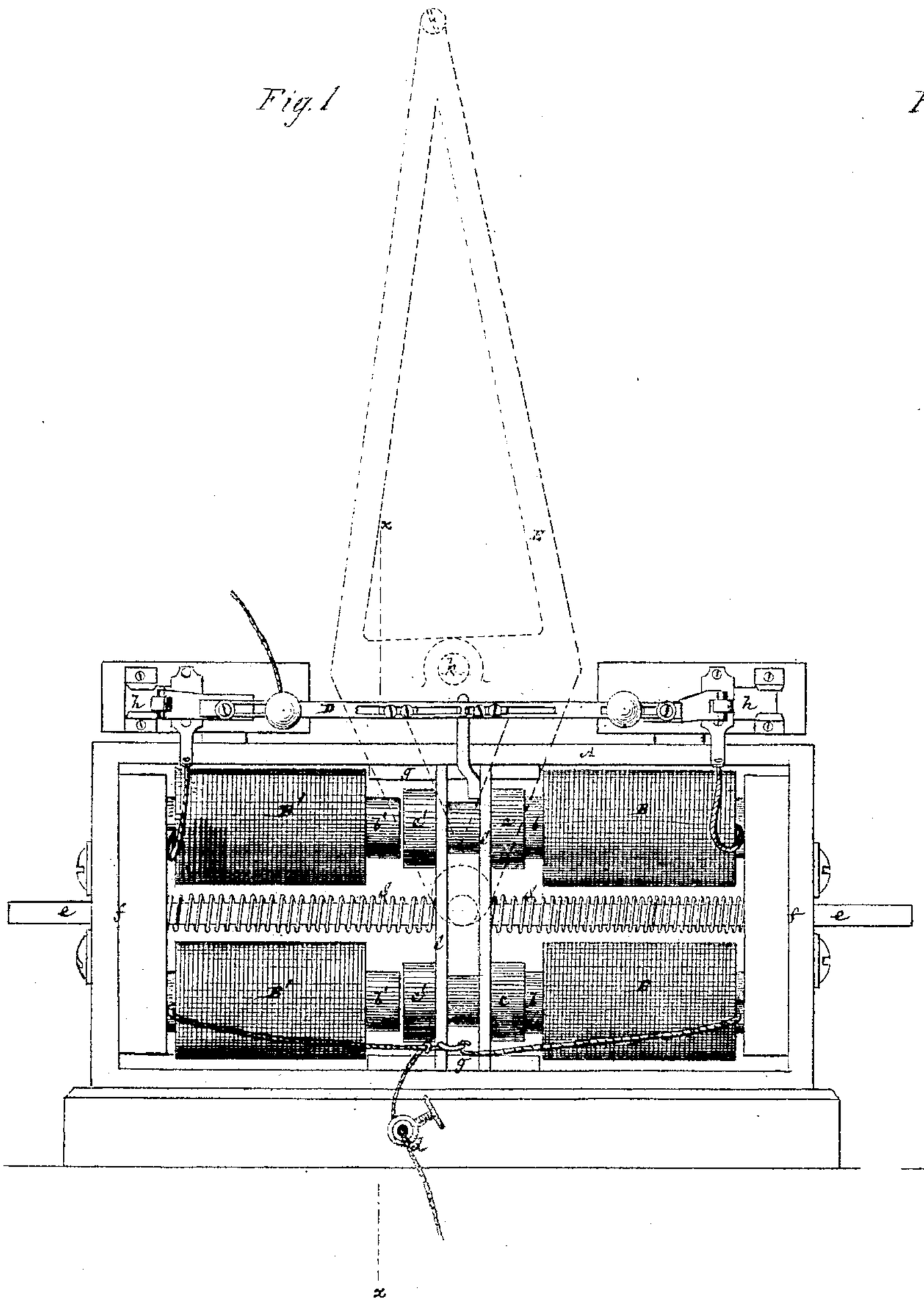
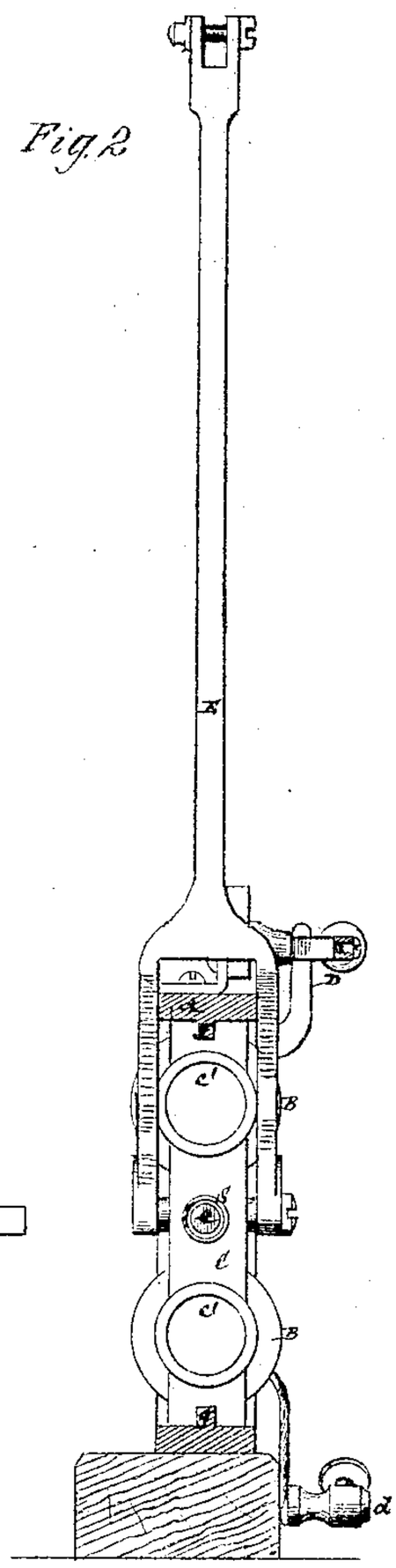


Fig. 2



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN ELECTRO-MAGNETIC ENGINES.

Specification forming part of Letters Patent No. **129,857**, dated July 23, 1872.

To all whom it may concern:

Be it known that I, WILLIAM H. ODELL, of Yonkers, in the county of Westchester and State of New York, have invented a new and useful Improvement in Electro-Magnetic Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a side elevation of an electro-magnetic engine constructed in accordance with my invention, and Fig. 2 a transverse section of the same at the line *x x* in Fig. 1.

Similar letters of reference indicate corresponding parts.

This invention relates to that class of electro-motors which employ the axial action or force of the electro-current as a mechanical agent or motive power, and in which the power is produced by the combination or united operation of helices with an axial bar or bars of iron, and a cut-off for alternately throwing the current of the battery upon opposite helices to regulate the motion of the axial bar or bars. My invention consists in a yoke arranged between or at right angles, or thereabout, with the cores of the helices or magnets, and carrying armatures on its exterior to produce a direct reciprocating motion between the magnets, said yoke serving as a means to communicate power from the motor. The invention also consists in a certain combination of inner and outer guides for the yoke, whereby it is restrained from canting and binding in the outer guides. The invention also consists in a combination, with the yoke, of springs arranged to throw the yoke into an intermediate position between the magnets whenever the electro-current is broken, and serving to reduce the inequality in the power of the motor throughout the stroke of the yoke.

In the accompanying drawing, A represents the frame of the engine, which may be of any suitable construction, and which carries a double set of helices or magnets, B B and B′ B′, at opposite ends of it, and upon which the current of the battery is alternately thrown for the stroke in opposite directions successively of a sliding yoke, C, arranged between the two sets of magnets, and at right angles, or thereabout, with the cores *b b* and *b′ b′* thereof, said yoke being provided with armatures *c c* and *c′ c′* on its exterior, for operation or reciprocating action in a direct or axial manner relatively to the magnets of the sliding yoke with its armatures. The two poles of the battery may be connected, the one with a screw-cup, *d*, and the other with a cut-off, D, for changing the direction of the current as required, said cut-off being actuated by the motor. The yoke C has two central stems, *e e*, which work through end guides *f f;* and it is further guided or steadied by constructing its ends to travel on and along inner guides or ways *g g*, which serve to keep the yoke from canting and from binding in the guides or ways *g g*. Arranged around the stems *e e* of the yoke are springs S S, which, when the current is broken, throw the yoke into an intermediate position between the magnets, thereby preventing the armatures from sticking at the close of the stroke of the yoke in opposite directions, and operating to reduce the inequality in the power of the motor throughout the stroke of the yoke by reason of the alternate compression and expansion of the springs as the yoke approaches the end of its travel in one direction and commences its return or opposite travel, such retarding and assisting spring-forces operating in an increasing ratio against the yoke as the power of either magnet increases, and afterward acting in a decreasing ratio to aid the yoke at the early portion of its stroke, and when the power of the acting-magnet is weakest. The cut-off D, by which the current is reversed to keep up the reciprocating action of the yoke, may be of any suitable construction; but it is here shown as consisting of a sliding bar, actuated by the yoke toward the close of its stroke, and provided with rollers on its ends, which rollers are alternately made to break the current at opposite ends by moving onto glass or other non-conducting plates *h h*. The yoke C constitutes a very simple and efficient means for communicating power from the motor. Thus it may either do so directly by arranging the wrist-pin of a crank or roller thereon within or between the yoke, and so communicate rotary motion to the shaft carrying the crank; or said yoke may be used to give motion to the one end of a beam, E, shown by dotted lines in Fig. 1, and by full

.ines in Fig. 2, said beam having its fulcrum at *k*, and admitting of the attachment of a pitman to its outer end for the purpose of communicating rotary motion to a crank or otherwise.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination, with the magnets B B′, of the reciprocating yoke C, provided with armatures on its reverse sides, and arranged between the magnets, for operation relatively thereto or cores *b b′* of the magnets substantially as specified.

2. The combination of the inner guides *g g* at the ends of the yoke C, the stems *e e*, the outer guides *f f*, and the magnets B B′, essentially as described.

3. The combination of the springs S S with the yoke C carrying the armatures and the magnets B B′, substantially as and for the purpose herein set forth.

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