(No Model.) 2 Sheets—Sheet 1.

C. D. JENNEY.

RHEOSTAT.

No. 452,574. Patented May 19, 1891.

Fig. 1.

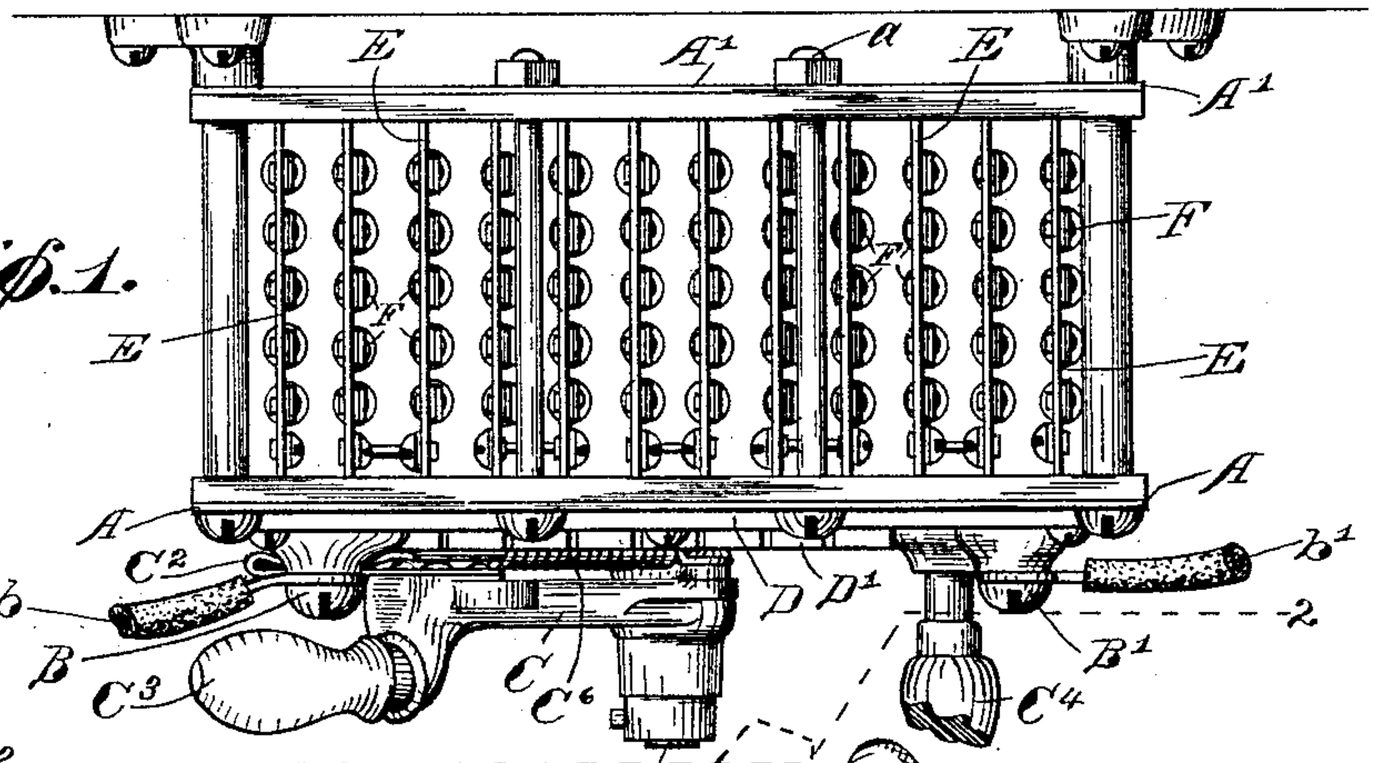


Fig. 2.

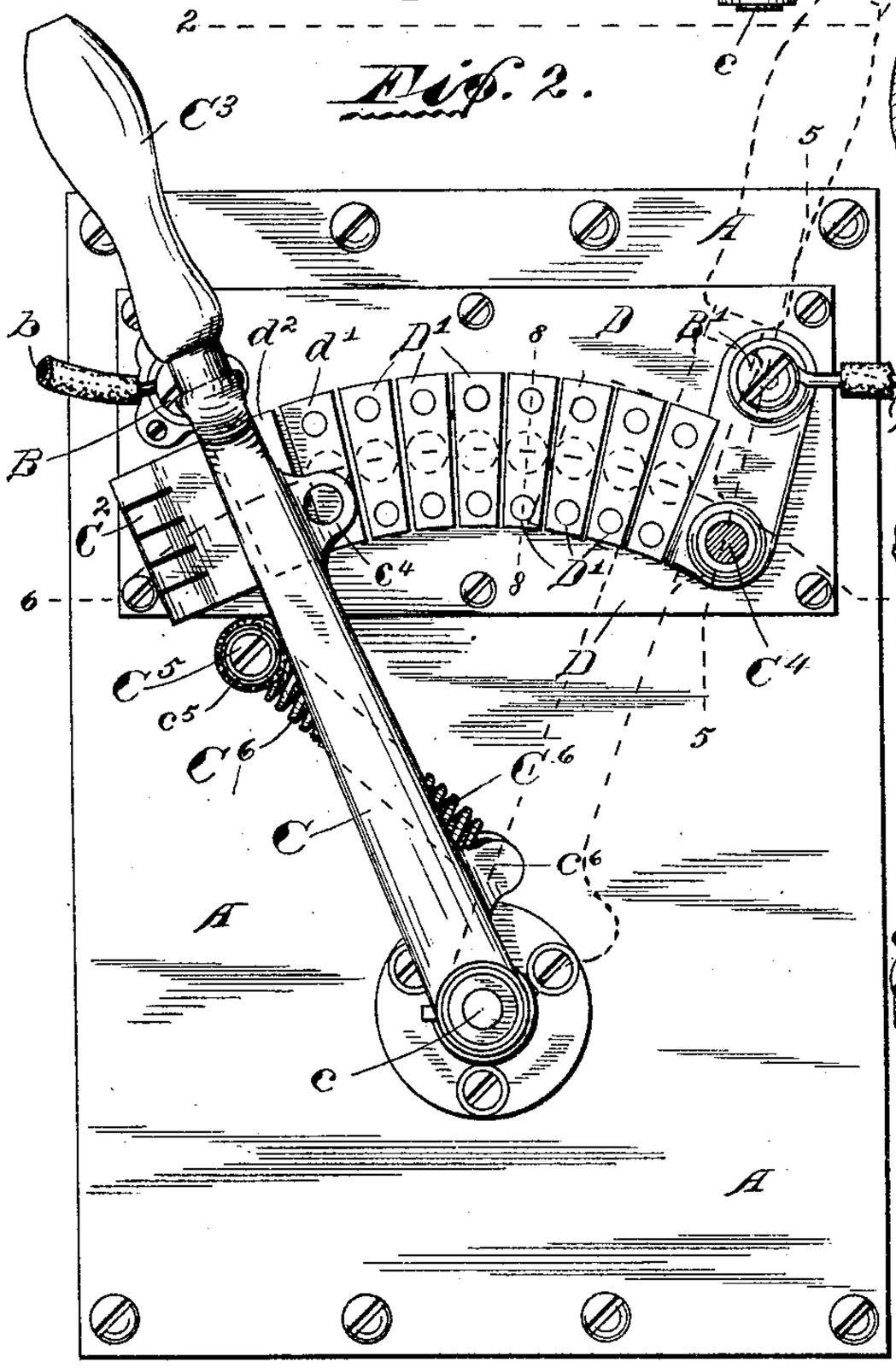
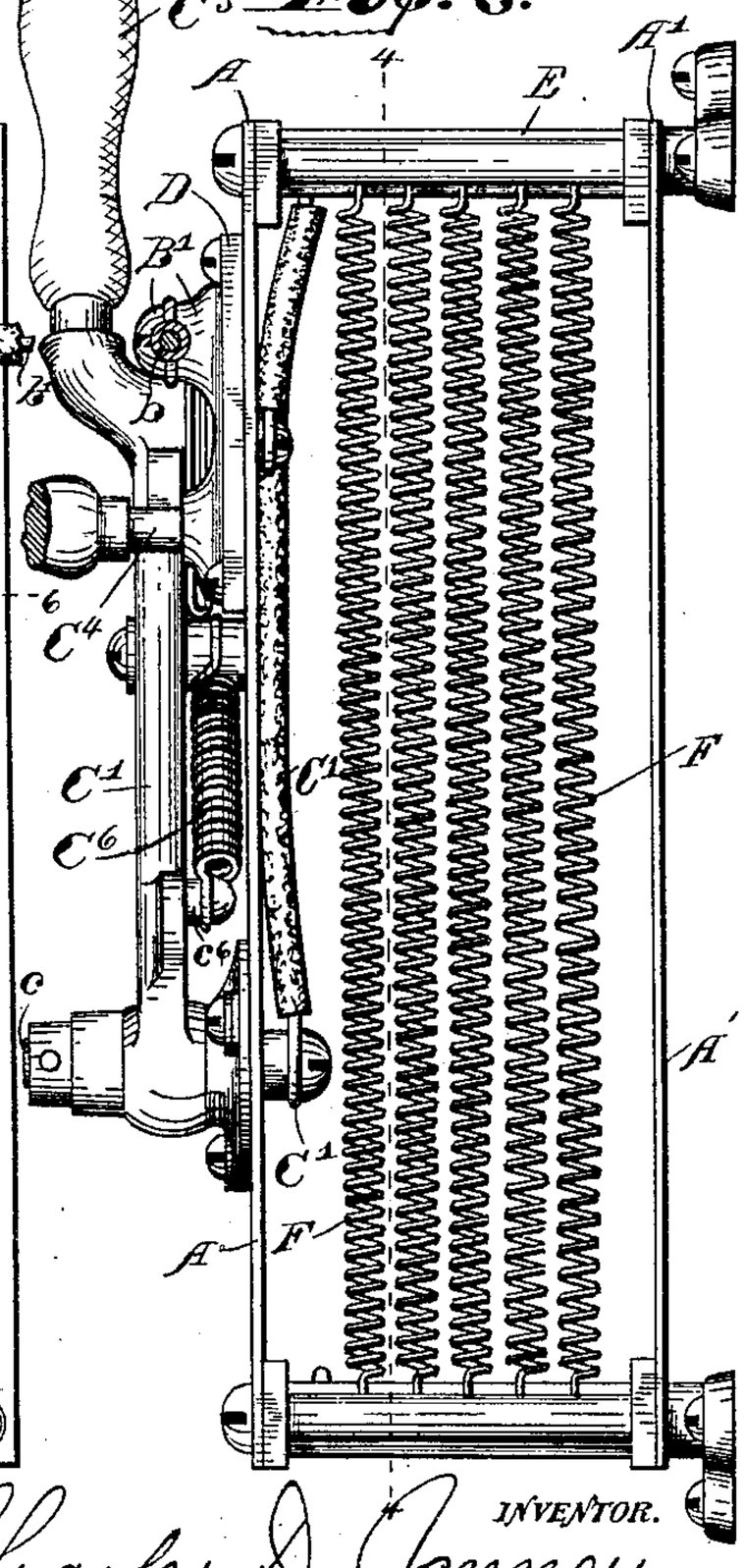


Fig. 3.



WITNESSES.

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PER Charles D. Jenney,
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ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

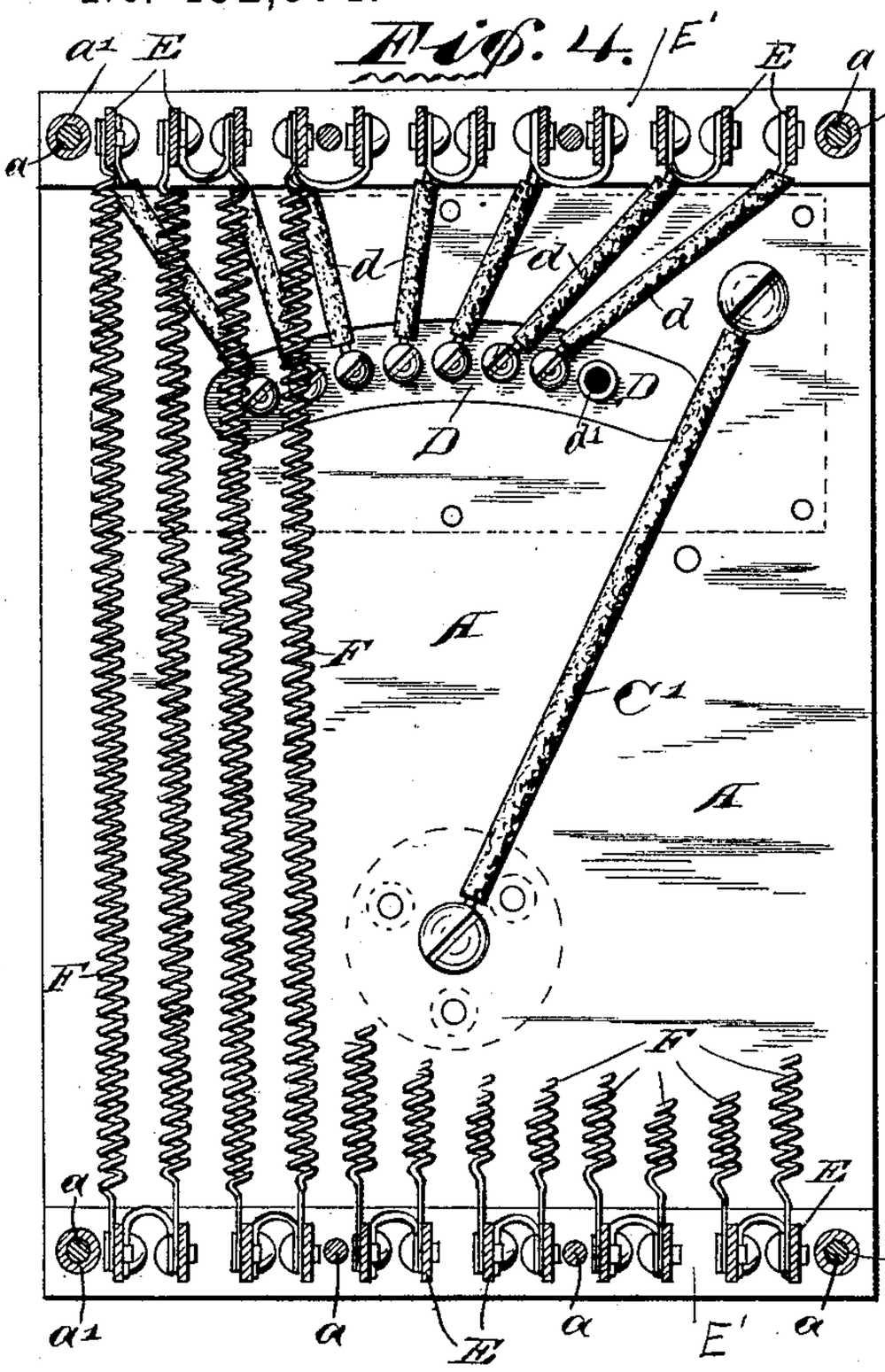

Fig. 5.

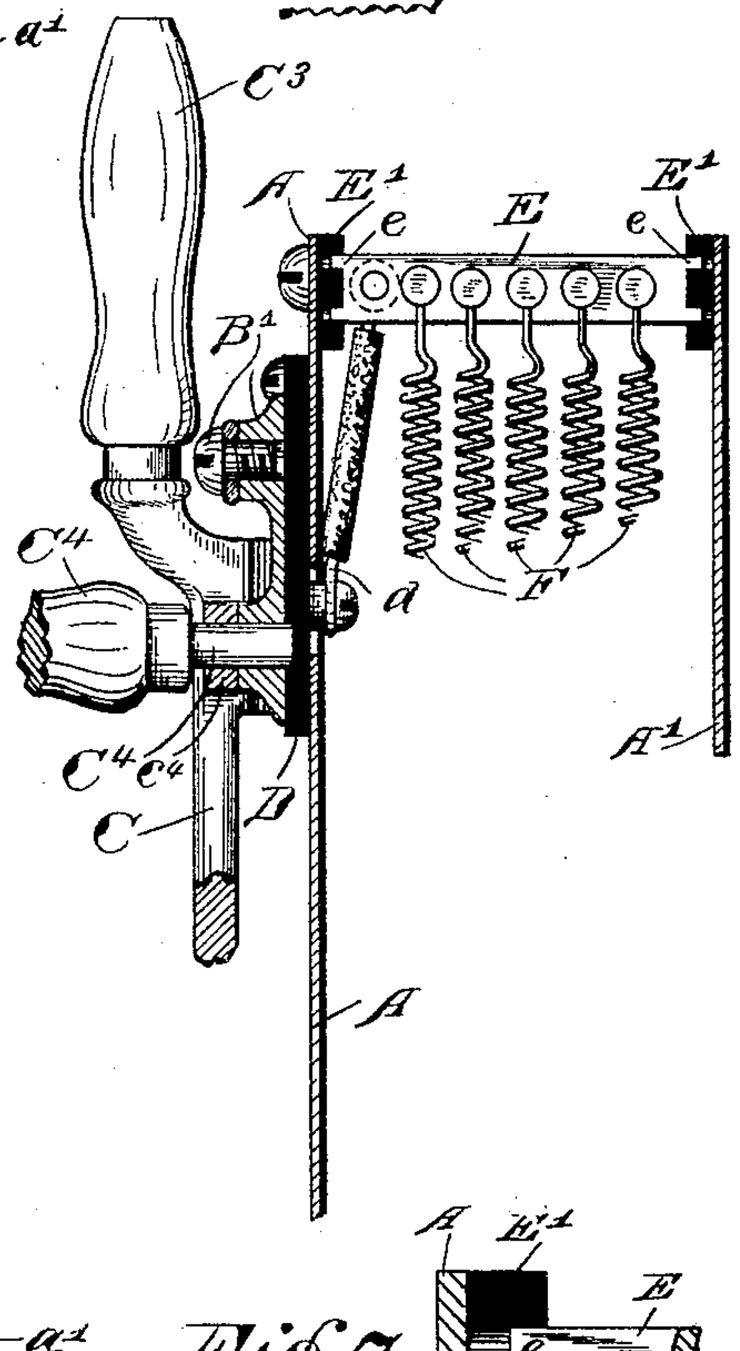

Fig. 7.

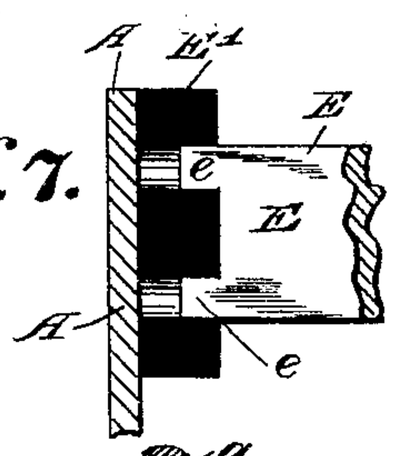

Fig. 6.

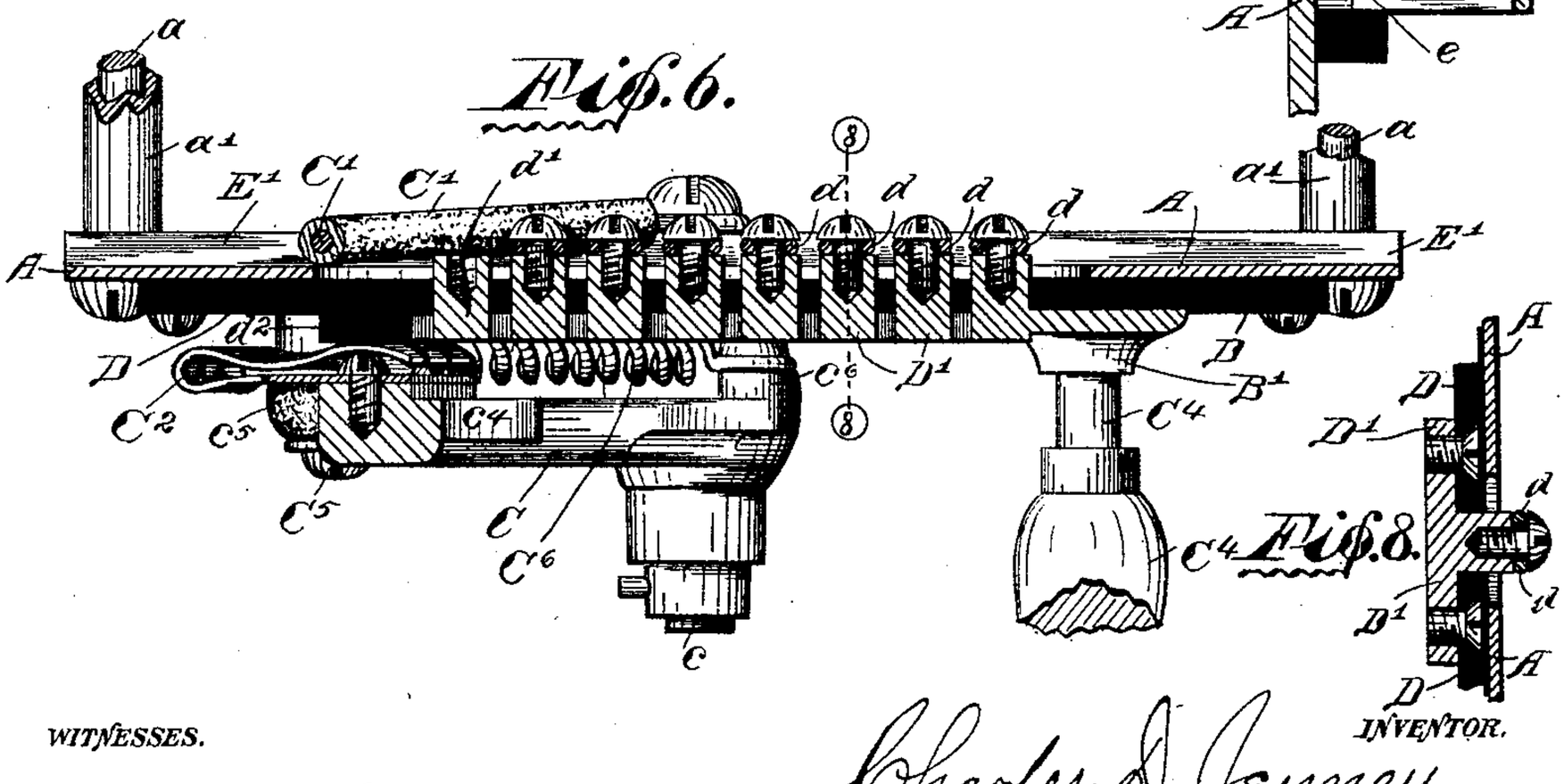

Fig. 8.

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UNITED STATES PATENT OFFICE.

CHARLES D. JENNEY, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE JENNEY ELECTRIC MOTOR COMPANY, OF SAME PLACE.

RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 452,574, dated May 19, 1891.

Application filed June 14, 1890. Serial No. 355,457. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. JENNEY, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Rheostats, of which the following is a specification.

The object of my said invention is to produce a rheostat for use with dynamo-electric machines and motors which shall be simple and inexpensive in construction, efficient in operation, and which shall embody a large radiating-surface in proportion to the resistance developed, as will be hereinafter more particularly described and claimed.

Referring to the accompanying drawings, which are made a part hereof, and on which similar letters of reference indicate similar parts, Figure 1 is a top or plan view of a rheostat embodying my said invention; Fig. 2, a front elevation of the same; Fig. 3, a side or edge elevation; Fig. 4, a vertical sectional view looking toward the left from the dotted lines 4 4 in Fig. 3; Fig. 5, a detail sectional view looking toward the left from the dotted line 5 5 in Fig. 2, when the lever or shifting-bar is moved to that one of its extreme positions which it occupies when the resistance is entirely "cut out," and also showing the form of one of the cross-bars to which the resistance-coils are connected; Fig. 6, a sectional view through the front plate and parts immediately connected thereto, on an enlarged scale, looking downwardly from the dotted line 6 6 in Fig. 2; Fig. 7, a detail view similar to a portion of Fig. 5, also on an enlarged scale, showing the method of mounting the cross-bars carrying the resistance-coils more plainly; and Fig. 8 a detail sectional view, on an enlarged scale, on the dotted line 8 8 in Fig. 2.

In said drawings, the portions marked A A′ represent the front and rear plates of the frame of my improved rheostat; B B′, the binding-posts for the incoming and outgoing line-wires; C, the lever or shifting-bar; D, a plate of insulating material secured to the front plate A and carrying the segments D′; E, the bars to which the resistance-coils are connected, and F said resistance-coils.

The back and front plates A and A′ are simply ordinary pieces of sheet metal and of the appropriate size. They are secured together by bolts *a* passing through them, and the bolts located at the corners are further provided with shoulders, which are preferably formed by surrounding the bolts proper with short pieces of pipe *a*′, as shown most plainly in Figs. 4 and 6, and said front and back plates are thus held the proper distance apart. A segmental opening is cut in the plate A, as shown most plainly in Fig. 4, in order that the back side of the insulating-plate D may be exposed, so that the connections may be readily made to the contact-segments mounted on said insulating-plate. This is clearly illustrated in Figs. 6 and 8.

The binding-posts B and B′ are ordinary binding-posts, to which the incoming and outgoing line-wires *b* and *b*′ are connected, as shown and as will be readily understood.

The lever or shifting-bar C is mounted upon a pivot-bearing *c*, secured to the plate A, and is electrically connected with said bearing and by means of the connecting-wire C′ with the binding-post B of the incoming line-wire *b*. It passes up by the segments on the plate D, and is provided at that point with a contact spring or brush C^2, and terminates in the handle C^3, (which should be formed of insulating material,) by which it may may be operated. It has an ear or wing c^4, through which is a hole, whereby it can be held by means of the connecting handle or plug C^4 into electrical connection with the base of the binding-post B′, as shown in Fig. 5, and the resistance thus completely cut out. A stud C^5 is secured to the plate A at the other side of the resistance-box, which serves as a stop or buffer for the lever. This is preferably surrounded by a soft-rubber ring c^5 to render it more efficient for this purpose. This stud C^5 also serves as a point to which one end of a spring C^6 is secured, the other end of which is secured to a suitable projection c^6 on the lever C. This spring is arranged, as shown most plainly in Fig. 2, to throw the lever over against its buffer and hold it there, except when forcibly held in some other position. When in this position, as will be presently explained, the electric current is completely cut off, and such cutting off, as will be observed, is rendered automatic when the shifting-bar is released by the use of said spring.

The insulating-plate D is secured to the face of the plate A, as shown, and carries the binding-posts and also the contact-segments D′. To these segments all the resistance coils are connected by wires *d*, as shown most plainly in Fig. 4. It also carries a segment or block of insulating material d^2, upon which the contact-spring C^2 rests when the current is cut out, and preferably a "dead" segment *d′* interposed between the nearest one of the segment D′, and the insulating-block or rests d^2. As before stated, one segment (marked *d′*) is a dead segment without electrical connection. This I have found to be a very desirable arrangement for minimizing the sparking which usually results when the contact-spring passes off the segment which is connected with the wires, and which results from an arc being formed between the two last segments. With one dead segment, leaving two spaces for breaking contact, the arc is almost inappreciable and does no damage.

The cross-bars E are cut out of thin metal, preferably hoop-iron, and their ends are notched, as shown most plainly in Figs. 5 and 7, so that small projections *e* are left at the corners. Strips of insulating material E′ are secured to the plates A A′ at their top and bottom edges, and, as shown most plainly in Fig. 7, are provided with perforations corresponding in position to the projections on these bars E. Said projections are shorter than the thickness of these insulating-strips, and therefore when inserted in said perforations do not extend entirely through, and they are thus kept from contact with the plates A and A′, and therefore perfectly insulated from said plates. These bars are designed to support the ends of the wires forming the resistance-coils, and the connection is preferably made by plain puncturing and ordinary rivets. As shown most plainly in Fig. 4, these bars are looped together alternately at the top and bottom of the resistance-box in an ordinary and well-known manner.

The resistance-coils F are formed in the ordinary manner, except that they are formed in series instead of single sets, and the wires of which they are composed are of comparatively less cross-sectional area. Thus, instead of using a single wire sufficient to carry the current, I divide the material into a number of wires, (five are shown,) thus giving a much larger surface exposed to the air with the same amount of conductivity. By this means I am enabled to secure a construction in which the heat generated in the box will be rapidly thrown off, thus keeping the box comparatively cool, and, owing to the simple and inexpensive construction above described, at substantially the same cost as boxes with single sets of wires have heretofore been made.

The operation is as follows: The electric current comes in over the incoming line-wire *b* through the binding-post B, thence by way of the wire C′ and the pivot *c* to the lever or shifting-bar C. When this shifting-bar is in the position shown by the full lines in Fig. 2, there is no electrical operation, as the contact-spring C^2 rests upon the insulating block or segment d^2. When, however, the shifting-bar is moved so that the contact-spring rests upon either of the segments D′, the current passes through the segment with which it is in contact and its connecting-wire *d* to that one of the resistance-coils with which said segment is connected, and thence through the remaining resistance-coils to the segment, which is connected to or formed integrally with the base of the binding-post B′, and thence out over the outgoing line-wire *b′*. If the shifting-bar is moved the full length of its sweep and the contact-spring rests upon the segment formed integrally with the binding-post B′, the electric current passes directly from said shifting-bar through said binding-post and out without passing through any of the resistance-coils. When it is desired to hold it in this position, the connecting handle or plug C^4 is inserted through the hole of the wing or ear c^4 on the shifting-bar and into a corresponding hole in the base of the binding-post B′, as shown. This plug, being closely fitted, forms, in addition, a very perfect electrical connection between these parts, relieving the contact-spring of the duty of carrying the entire current, which it would otherwise have to do. When it is desired to cut off the current and thus shut down the machine, it is only necessary to pull out this connecting handle or plug, when the spring C^6 will immediately act to throw the shifting-bar C back into the position shown by the full lines in Fig. 2, when, of course, as the contact-spring rests upon insulating material, the electric current is entirely cut off.

This rheostat, while adapted for use generally, is especially adapted for use in starting electric motors.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a rheostat, of the back and front plates of the frame, insulating-strips secured to said front and back plates at the top and bottom, a series of bars mounted thereon, and resistance-coils connected to said bars, substantially as set forth.

2. The combination, in a rheostat, of the front plate of the frame thereof, having an opening, a plate of insulating material secured to said plate over said opening, segments and binding-posts mounted on said insulating-plate, and a lever or shifting-bar also mounted on said front plate and passing up by said segments, the pivot whereof is electrically connected to one of said binding-posts, the other of said binding-posts and said segments being electrically connected to the resistance-coils, said resistance-coils, and supporting and connecting means therefor.

3. The combination, with the lever or shifting-bar of a rheostat, of a stud forming a buffer therefor and a spring connected at

one end to said stud and at the other to a projection on said shifting-bar, substantially as shown and described.

4. The combination, in a rheostat, of segments connected to the resistance-coils, said resistance-coils, a shifting-bar carrying a contact-spring arranged to swing over said segments, a binding-post with which the final one of said segments is connected, an ear on said shifting-bar having a hole and a corresponding hole in the base of said binding-post, and a plug adapted to pass through said two holes and thus both mechanically and electrically connect said shifting-bar and said binding-post, substantially as set forth.

5. The combination, in a rheostat, of the front and back sides of the frame, bars for carrying the resistance-coils, formed with projections on their ends, and strips of insulating material secured to the interior faces of said front and back plates and provided with perforations into which the projections on said bars enter, said projections being of a less length than the thickness of said insulating-strips, substantially as shown and described.

6. The combination, in a rheostat, of a frame, insulated cross-bars forming both supports for the resistance-coils and conductors by means of which the current is distributed through the series of coils, and a series of comparatively fine resistance-coils connected to said bars, and electrical connections between said bars alternately at one end and the other of the rheostat, whereby a comparatively large radiating-surface is secured in proportion to the conductivity of the coils.

7. The combination, in a rheostat, of the frame-work, insulated bars E, of low resistance, mounted on said frame-work, and a series of comparatively fine resistance-coils connected in multiple to said bars, which in turn are electrically connected in series, whereby in proportion to the cross-sectional area of the wires of the resistance-coils a large radiating-surface is secured.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 10th day of June, A. D. 1890.

CHARLES D. JENNEY. [L. S.]

Witnesses:
CHESTER BRADFORD,
E. W. BRADFORD.