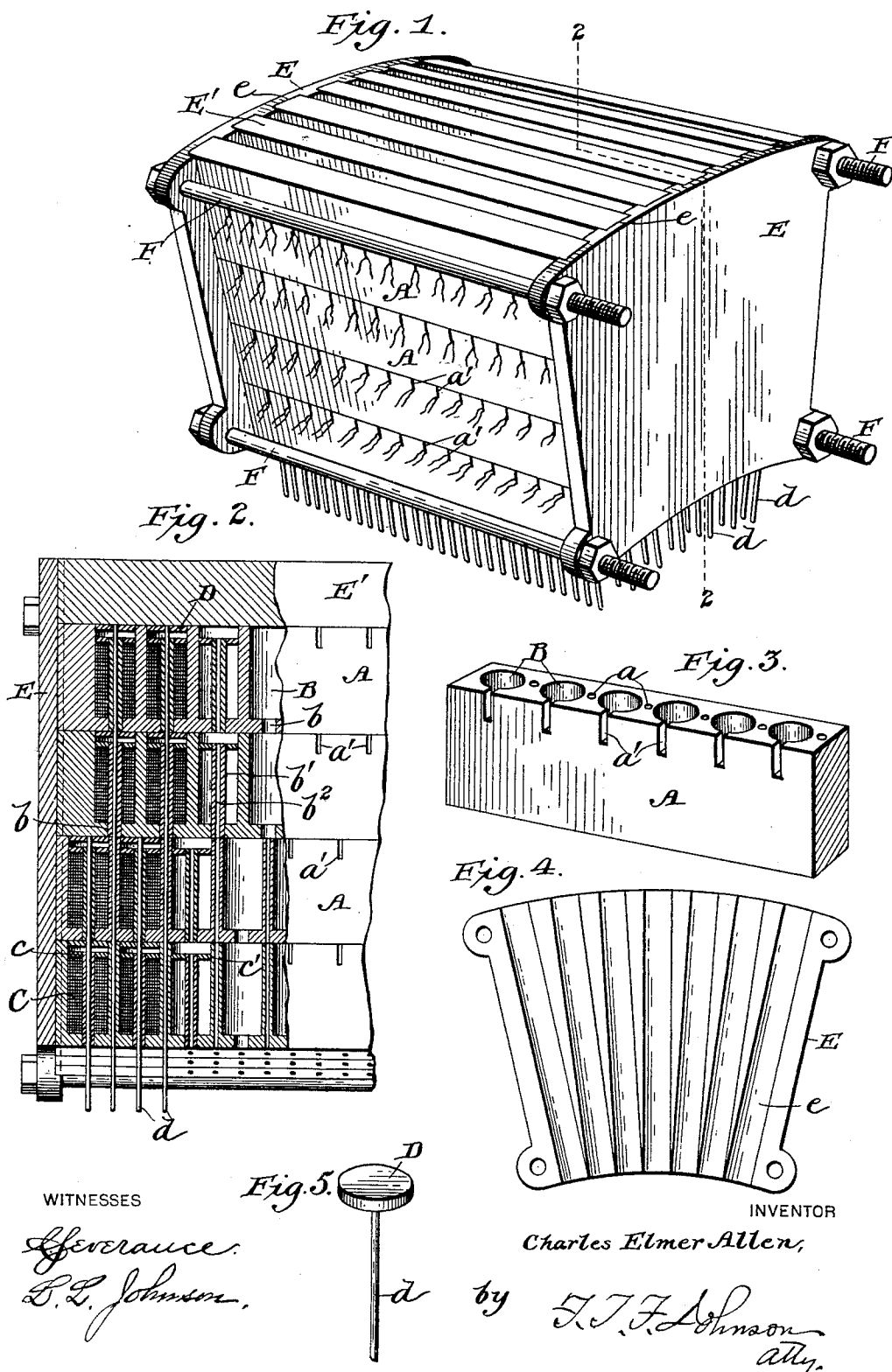


(No Model.)

C. E. ALLEN.
BANK OF ELECTROMAGNETS.

No. 562,564.

Patented June 23, 1896.



UNITED STATES PATENT OFFICE.

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BANK OF ELECTROMAGNETS.

SPECIFICATION forming part of Letters Patent No. 562,564, dated June 23, 1896.

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To all whom it may concern:

Be it known that I, CHARLES ELMER ALLEN, a citizen of the United States, residing at Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Banks of Electromagnets; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in banks of electromagnets, and has for its object the assemblage of a large number of electromagnetic thrusts in an assigned space. This object is accomplished by a peculiar and novel banking of special magnets.

The bank consists of a number of iron-clad magnets, or sets of iron-clad magnets, arranged one behind the other, or in tandem, in such manner that the magnetic pull of two or more magnets is converted into one mechanical thrust. These magnets consist of soft-iron claddings, which I call for convenience "staves" or "blades" of the bank, each of these staves or blades being so constructed that a number of electromagnetic bobbins can be incased therein, the cores of said bobbins being firmly secured to said staves in such manner that the cores will constitute one leg of an electromagnet, and the surrounding metal of the blade or stave the other leg or pole. These staves or blades are arranged in sets one behind the other in such manner that the armature-stem of one magnet will thrust the armature of the magnet immediately preceding it forward. The sets of staves or blades are so arranged with reference to each other that the armature-stems of one set will pass through holes or openings in the sets of staves or blades immediately in front, but will not interfere in any way with the magnets in said staves. Instead of passing through openings in the sets of staves they may pass between the sets of staves. Any number of these staves or sets of staves can be assembled in bank as

may be desired, and held in position by any suitable means.

The invention further consists in the novel construction of the magnets and their arrangement in bank, which is more particularly hereinafter described, illustrated in the drawings, and pointed out in the claims hereunto appended.

In the drawings, Figure 1 is a perspective view of my bank of electromagnets complete, showing the arrangement of the staves or sets of staves or magnets one upon or behind the other and held in proper position by means of heads. Fig. 2 is a sectional view taken on line 2 2, Fig. 1, showing the arrangement of the sets of staves in bank and the construction of the magnets in bank. Fig. 3 is a perspective view showing the construction of the stave or blade. Fig. 4 is a view of one of the heads, showing grooves or channels therein for receiving and holding in position the ends of the staves or blades; and Fig. 5 is a perspective view of an armature and stem of one of my special magnets.

Like letters indicate like parts in all the figures.

Referring to the drawings, A represents a soft-iron stave or blade provided with chambers B, having openings *a* in the sides thereof for a purpose hereinafter stated. In the bottom of the chamber B is a small opening *b*, into which is fitted and securely held a soft-iron core *b'* of a bobbin C.

c is a brass disk equal in diameter to the diameter of the chamber B, and has a central opening therein equal in diameter to the diameter of the core *b'*. This disk *c* is fitted into the chamber B upon the bobbin C and over the upper end of the core *b'*, as shown.

D is an armature of any suitable diameter to permit easy play in the end of the chamber B, and has secured centrally thereof and at right angles thereto a stem *d*, of brass or other suitable material. Running centrally and longitudinally through the core *b'* is a passage or channel *b''*, into which the stem *d* sets and slides, as is apparent.

When it is desired to form these staves or blades into banks, they are suitably arranged with their ends in the grooves *e* of the heads

E E, and are held in their proper and relative positions between said heads.

F F are rods that hold the heads to the rows or sets of blades or staves whereby the said blades or staves are held in proper relative position to each other.

F' is a block of wood or other suitable non-magnetic material placed upon the top set of blades or staves to close the chambers in the same and to also protect the armatures therein, as is evident.

In the drawings, Fig. 2, I have shown two sets of magnets, each set consisting of two magnetic staves or blades, arranged substantially as shown. It will be seen that the staves or blades forming a set are so placed that the channels in the cores of the individual magnets will be in a straight line with each other. This same condition will prevail no matter how many magnets there are in a single set. The top set, as shown in Fig. 2, it will be observed, has its individual magnets placed with respect to each other just as are the magnets in the lower set, and it will be further observed that the channels or passages in the cores of the individual magnets composing the top set are not in the same straight line, nor do they communicate in any way with the channels in the cores of the individual magnets of the lower set, but instead the channels or passages in the cores of the upper individual magnets are in line with and are virtually continuations of channels or passages which pass through the staves or blades between the chambers therein in the set which immediately precedes it, as shown in said Fig. 2. The stems *d* of the armatures are of greater length than the cores to which they belong and are so constructed for the purpose of imparting a thrust to or upon anything before them. The staves or blades may be separated from each other by leaving a small space between them, or they may have interposed between them pieces of wood or other non-magnetic material, if so desired.

In the staves or blades I have shown the chambers have bottoms with small openings therein in which the core of the bobbin is set and securely held. I may, however, if desired, form this chamber by drilling through the stave or blade and using therein a core having a soft-iron head to fit in the end thereof and securely hold the core in the chamber in its proper position. In the manufacture of the stave it may be found desirable to use the latter construction.

In Fig. 1 have shown the stave or blade banked radially, but do not confine myself to that precise form of banking or assemblage,

as the blades or staves may be arranged parallel, or in any other position that may be desirable or convenient to accomplish some particular result.

aa are openings or channels passing through the blades, as shown, and are for the purpose of receiving and guiding the forward ends of the stems of the sets of magnets immediately behind.

a' a' are wires passing to the bobbins in the chambers B.

Having described my invention, I claim—

1. A bank of electromagnets consisting of a number of staves or blades having magnetic cores therein arranged in sets of two or more, the said blades being so positioned with reference to each other that the magnetic cores therein will lie one behind the other in such manner as to convert the joint magnetic pull of corresponding magnets into a mechanical thrust, as set forth.

2. A bank of electromagnets consisting of a stave or blade, or sets of staves or blades, the said stave or staves having in suitable chambers therein soft-iron magnetic cores, the said cores forming one leg or pole of the individual magnet, and the stave or blade itself being a leg or pole common to each of the said individual magnets, as set forth.

3. Two or more electromagnets arranged in tandem and provided with armatures and hollow cores, the said armatures having stems secured thereto of greater length than the hollow cores of the magnets, the said magnets being so positioned with reference to each other that the end of the stem projecting from the hollow core of one magnet will be thrust against the armature of the magnet preceding for the purpose of converting the magnetic pull of the magnets, in tandem, into one mechanical thrust, as set forth.

4. A bank of electromagnets consisting of staves or blades arranged in sets one behind the other in such manner that the armature-stem of the magnet of one stave will thrust forward the armature of the magnet in the stave immediately preceding, as set forth.

5. A bank of electromagnets consisting of a number of sets of magnets one set arranged behind the other so that the armature-stems of one set will pass between and be independent of the magnets in the set preceding, as set forth.

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

CHARLES ELMER ALLEN.

Witnesses:

ARTHUR A. AVERILLE,
ELIZABETH S. HALL.