

A. BOETCHER.
MAGNETIC APPARATUS.

No. 578,673.

Patented Mar. 9, 1897.

FIG. 1.

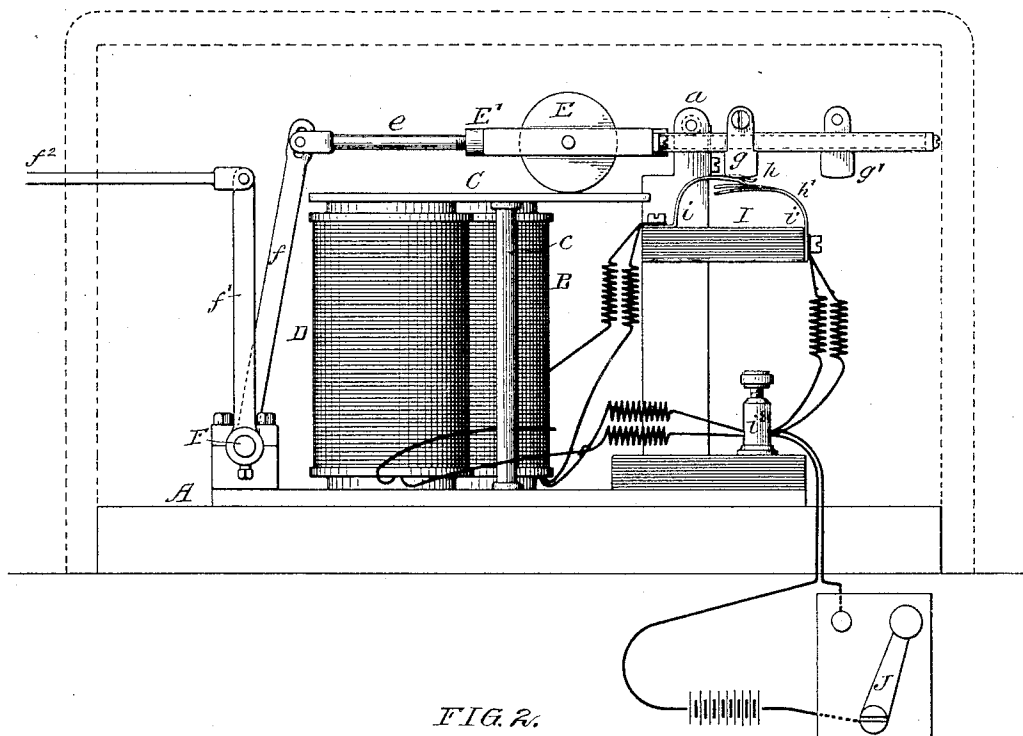
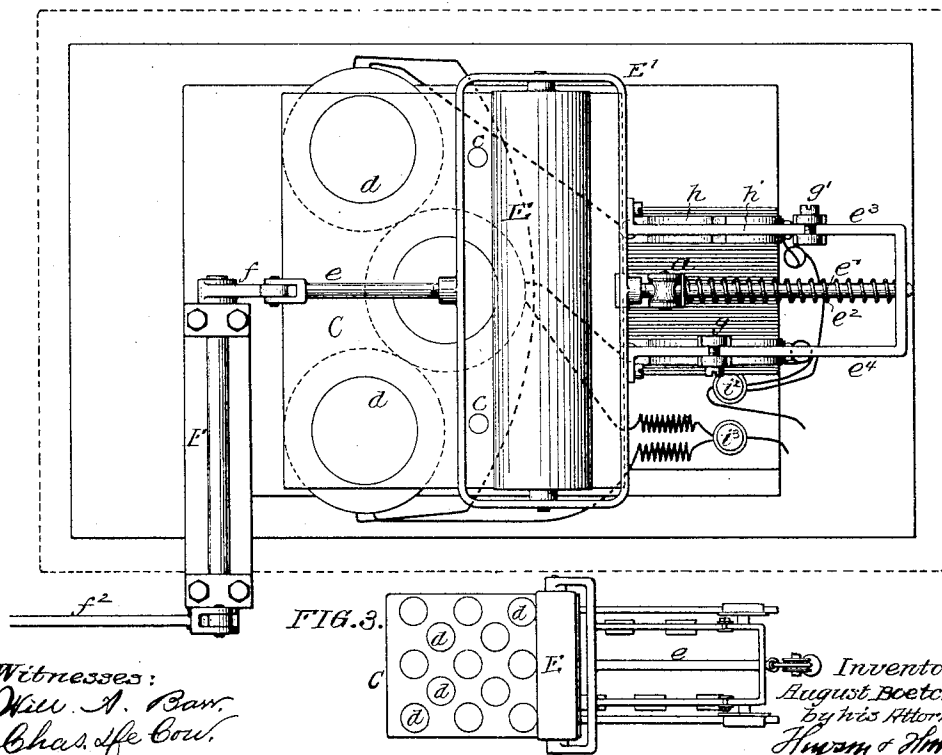
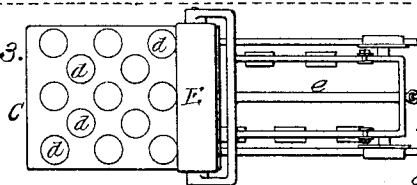


FIG. 2.



Witnesses:
Will. A. Barr.
Chas. E. Cow.

FIG. 3.



Inventor:
August Boetcher
By his Attorneys
Hudson & Shuman

(No Model.)

2 Sheets—Sheet 2.

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FIG. 4.

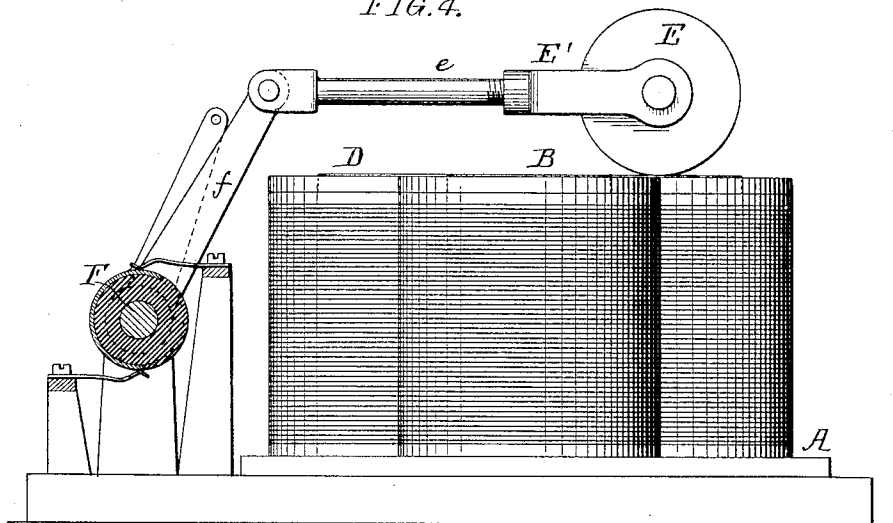
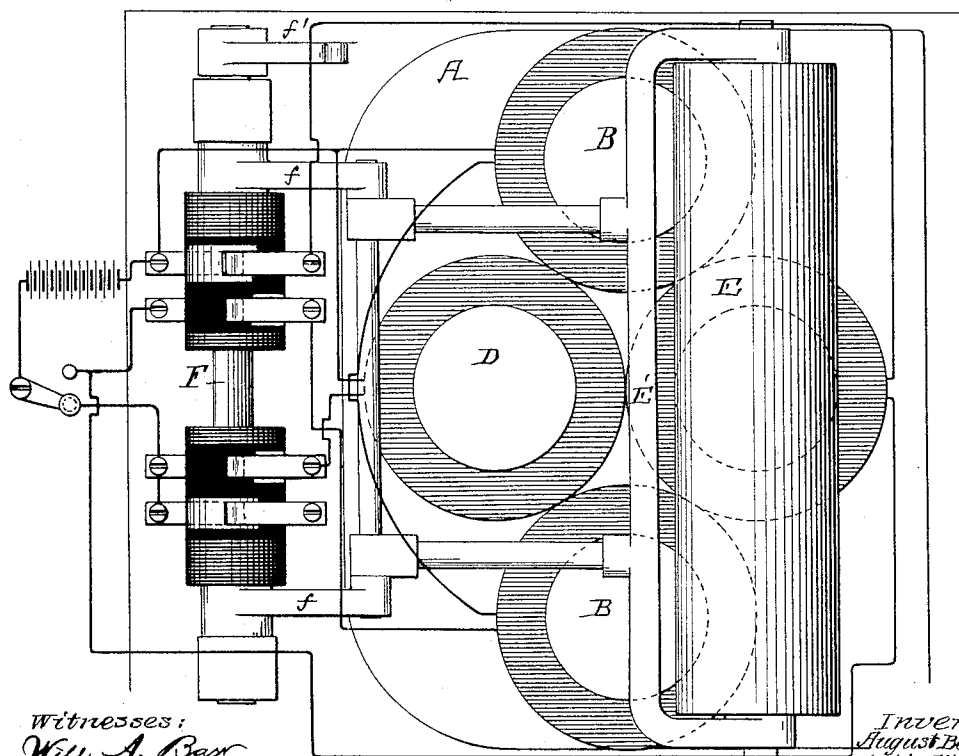


FIG. 5.



Witnesses:
Wm. A. Barr
Chas. H. Con.

Inventor:
August Boetcher
by his Attorneys
Howorn & Howorn

UNITED STATES PATENT OFFICE.

AUGUST BOETCHER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO FRANKLIN DUANE, OF NEW BRUNSWICK, NEW JERSEY.

MAGNETIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 578,673, dated March 9, 1897.

Application filed May 31, 1895. Serial No. 551,125. (No model.)

To all whom it may concern:

Be it known that I, AUGUST BOETCHER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Magnetic Apparatus, of which the following is a specification.

My invention relates to magnetic apparatus by which a long movement of the armature is attained for use in throwing switches and signals, for applying brakes to cars, and for other purposes.

The object of my invention is to so construct the apparatus that the armature can be moved forward by cutting in or out a series of magnets arranged one in advance of the other; and I so construct the armature that it will roll over the cores of the magnets, the armature being connected to the switch, signal, brake, or other device to be moved.

In the accompanying drawings, Figure 1 is a side view of my improved magnetic apparatus. Fig. 2 is a plan view of the same. Fig. 3 is a plan view illustrating a modification. Fig. 4 is a side view of a form of the apparatus in which the armature is moved in both directions by magnetic attraction. Fig. 5 is a plan view of the device shown in Fig. 4.

Referring in the first instance to Figs. 1 and 2, A is the base of the apparatus, preferably of iron, and mounted on this base are the cores *b* and *d* of the magnets B and D. I have illustrated in Figs. 1 and 2 only three magnets, the magnets D D being in advance of the magnet B, but it will be understood that when an extended movement is required a series of magnets arranged in a single row or in pairs or sets, one in advance of another, may be used, as shown in Fig. 3, without departing from my invention.

Mounted on the magnets and supported by posts *c c* is a plate C of non-magnetic material, through which the cores of the magnets extend. Adapted to travel over the plate C is an armature E in the form of a roller, and this armature carries a frame E', having a rod *e*, connected to an arm *f* on a shaft F, this shaft being preferably provided with an arm *f'*, to which is attached a rod *f''*, connected to the apparatus or device to be operated, such, for instance, as a switch-point, signal-

lever of a switch and signal system for railways, or to the brake rod or rods of a car.

Projecting from the rear of the frame E' is a central rod *e'*, supported by a bearing *a*, and mounted on the rod is a coiled spring *e''*, which rests against the bearing *a*, the object of the spring being to return the armature E to its normal position, as shown in Fig. 2, as soon as the magnets are cut out of circuit.

On bars *e''* and *e'''* at each side of the rod *e'* are circuit-closers *g g'*, adjustably clamped to the bars, the circuit-closer *g* being set in advance of the circuit-closer *g'*.

On a block I beneath the bars *e''* and *e'''* are contact-plates *h h'* and *i i'*, the plates of each pair being insulated from each other. The plate *i'* is connected to a binding-post *i''*, which is connected to one terminal of the switch J of a battery or other generator of electricity, and the plate *i* is connected to the coils of the magnet B, which are also connected to a binding-post *i'''*, likewise connected to the battery, so that when the armature is in the position shown in Figs. 1 and 2 the magnet B will be magnetized when the battery-switch is closed.

The plate *h'* is connected to the binding-post *i''* and thence to the battery-switch, while the plate *h* is connected to the coils of the magnets D D, which are also connected to the battery through the post *i'''*, so that when the armature is attracted by the magnet B and moves a certain distance the magnets D D are magnetized and the armature moves still farther on being attracted by them. In the meantime the circuit-closer *g* has passed the plate *i*, breaking the circuit of the magnet B.

It will be seen that by increasing the number of magnets and circuit-closers and contacts a long movement of the armature will take place, and this movement will be communicated through the frame to the device to which it is coupled.

The switch J governs the battery-circuit, and by shifting the switch-arm the circuit to the magnets will be governed afterward by the circuit-closers carried by the armature, and when it is desired to return the armature to its normal position the switch-lever is so

turned as to cut out the magnets, when the armature will be returned to its normal position by the spring e^2 .

It will be understood that the arrangement of parts and the design of the frame will depend upon the special application of the apparatus.

In Figs. 4 and 5 I have shown a system in which the magnets are used to return the armature to its normal position by simply using a reversible circuit and a double switch, so that when the switch is adjusted to one position the magnets will draw the armature forward and when said switch is adjusted to the other position the magnets will return the armature to its normal position.

When the armature is thrown the full distance, the mechanism acted upon may be locked by a duplicate device operating a lock-bolt, so that it will be impossible to return the apparatus without first unlocking it by an independent device, this being used simply as a means of safety.

In large machines I may use a rock-shaft for the cut-out, as shown in Figs. 4 and 5, so that the spring-fingers forming the terminals may rest upon this shaft, and the shaft may be provided with a non-conducting sleeve on which are mounted a series of contact-plates, giving the same result as the device shown in Figs. 1 and 2.

I claim as my invention—

1. The combination in magnetic apparatus,

of the magnets B and D, the magnet D being so arranged in advance of the magnet B that the cores will overlap, a plain cylindrical armature, a frame in which the armature is mounted, circuit-closers operated by the armature whereby the armature will be attracted first by one magnet and then when above the core of said magnet will be attracted by the other magnet so as to give the armature a long movement in one direction, with means for returning the armature to its first position, substantially as described.

2. The combination in magnetic apparatus, of magnets B and D, the magnet D being so arranged in advance of the magnet B that the cores will overlap, a shaft, an arm connected to said shaft, a frame E' connected to said arm, a plain cylindrical armature mounted in bearings in the frame and adapted to roll over the ends of the cores of the magnets, with circuit-closers operated by the armature whereby the armature will be attracted first by one magnet and then by the other so as to give the armature a long movement, and means for returning the armature to its first position, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUST BOETCHER.

Witnesses:

HENRY HOWSON,
WILL A. BARR.