

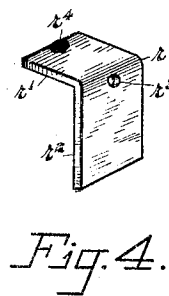
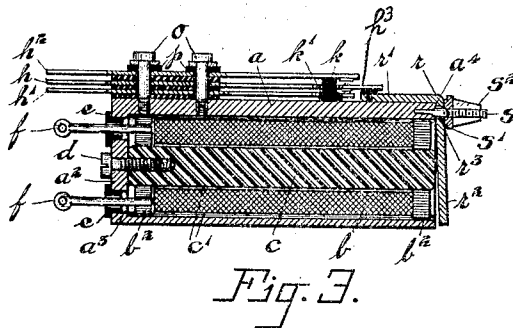
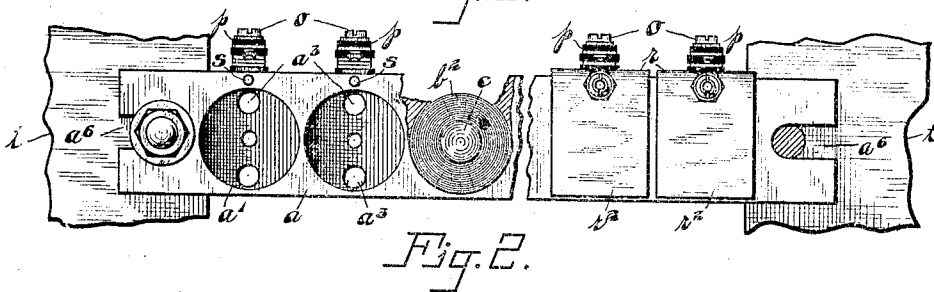
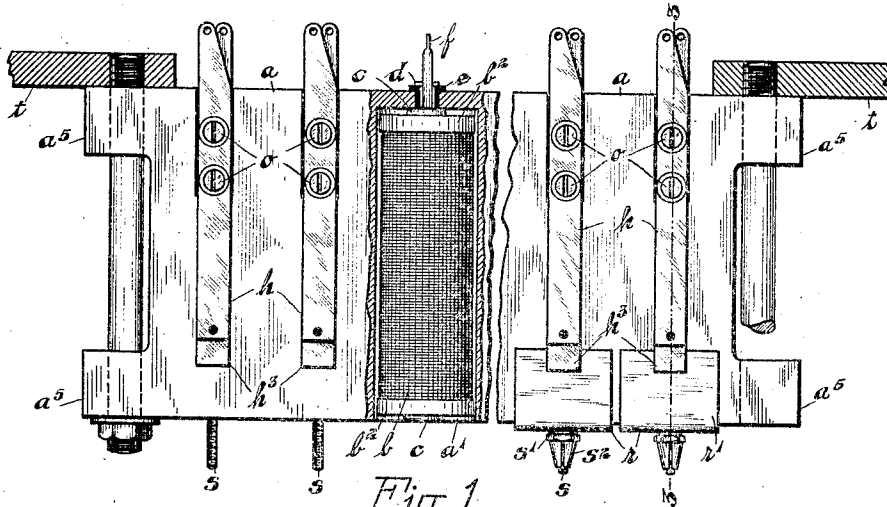
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PATENTED AUG. 7, 1906.

W. W. DEAN.

RELAY.

APPLICATION FILED JULY 31, 1901. RENEWED SEPT. 26, 1904.



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RELAY.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Relays, (Case No. 47,) of which the following is a specification.

My invention relates to improvements in electromagnetic devices generally, but more particularly to those devices that are adapted to be mounted in banks, rows, or series when installed for actual use. In some electrical installations the number of such devices used is very great, and it is therefore required to crowd them into as small a space as possible. For example, in telephone-exchanges these relays, which frequently number many thousands, are often located in a separate room where suitable racks are provided for them and upon which they are mounted side by side in rows and banks. It has been usual heretofore to construct and assemble such devices separately and then to either mount them one by one upon their supporting-racks or to secure them together in rows of a small number, which rows are then mounted upon the supporting-racks. In either case, however, a large amount of labor and expense is involved in thus separately making and assembling the devices and in mounting them upon their supporting-racks. Moreover, it is often necessary or desirable to inclose the said devices in separate sheet-iron shells or covers to prevent inductive effects between them, and these require further labor to make and mount in place.

It is one object of my invention to dispense with this separate making, assembling, covering, and mounting of the devices, which requires time, patience, labor, and expense, and to manufacture the inclosing shells or casings of a series of the magnets or relays in a single integral piece, which piece is adapted to form one pole for each magnet and as a support for all the working parts and to be mounted directly upon the framework of the supporting-rack, whereby the manufacture of the numerous separate pieces and the assembling of the separate devices, as well as their separate mounting, is dispensed with.

Other objects are the provision of an effi-

cient, economical, and durable device of the kind described that shall consist of but few and simple parts and be correspondingly easy and cheap to manufacture and install.

To the accomplishment of these objects and such others as may hereinafter appear the invention consists in the novel parts and combinations of parts hereinafter described, and particularly pointed out in the appended claims, reference being had to the accompanying drawings, forming a part of this specification, in which the same reference characters designate like parts throughout the several figures, and in which—

Figure 1 is a plan view of a series or row of relays embodying the invention. Fig. 2 is a front elevation of the same. Fig. 3 is a sectional view taken through the center of one of the relays. Fig. 4 is a perspective view of an armature of a relay.

In the figures the letter *a* indicates a bar which is preferably made of magnetic material, such as iron, and is provided with a number of transverse holes or bores *a'*, in which the magnet-coils *b* are adapted to be placed. Each bore or opening is provided with a core *c*, also of magnetic material, which may be secured to the bottom or rear wall *a''* of the hole or opening by means of a screw *d*. The coil *b* is of the usual construction and includes the paper or other covering *e'* between the coil proper and the core, as well as between the coil and the inner wall of the hole or bore *a'*. The insulating end pieces *b''* are also provided for the coil. The rear wall *a''* of the bar *a* is provided with apertures *a'''* in vertical alignment, in which insulating-bushings *e* are located and which prevent wires *f* from contacting with the shell. These wires form the stationary terminals of the magnet-coils, to which the ends of the coils are adapted to be secured, as by wrapping about the same and soldering thereto. These terminals extend into the rear end washer *b''* of the coil, to be thereby supported.

Upon the upper face of the bar *a* and above each magnet a set of springs is mounted, which comprises an upper and lower spring *h'* and *h''* and an intermediate spring *h'''*, the former being insulated from bar *a* by means of an insulating-strip at its rear end and an insulating-stud *k* at its forward end.

The head k' of this stud is enlarged and rests against the face of the plate a , while its shank is of the right size to fit snugly within a corresponding aperture in the spring h' and is thus held in position. A larger aperture is formed in the spring h'' , so that it may freely vibrate between the two springs h' and h'' . The free end of the spring h'' is adapted to rest upon the end of the shank of the insulating-stud k . These springs are insulated from each other by strips of insulation and from the screws o by insulating-bushings p . When the screws o are tightened, the set of springs is rigidly secured to the plate or bar a , while the free end of the spring h'' is adapted to be vibrated between the two springs h' and h'' , so as to contact with either.

At the forward end of the magnet an armature r is provided, which consists, as shown in Fig. 4, of a plate having the two portions r' and r'' bent at an angle to each other, which angle is slightly greater than a right angle. An aperture r' is provided in the arm r'' near the apex of the angle, through which a stud s , secured in the plate or bar a , is adapted to project. A nut s' is threaded upon the latter stud and has a split or slotted outer portion s'' , adapted to tightly engage the threaded portion of the pin s and to thereby lock the nut s' in any position upon the same. The aperture r'' is larger than the pin s , which allows the armature to slightly vibrate. At the rear end of the arm r' an insulating-stud r^1 is located, so that when the parts are in position the said stud is adapted to engage the free end of spring h^1 , which extends beyond the ends of its cooperating springs and to thereby lift the same from engagement with the spring h' and press it into engagement with the spring h'' . This armature, as seen from Fig. 3, pivots upon the edge a^1 of the bar a as a fulcrum and does not require the usual pin or pivot screws. When current is supplied to the coil b through the terminals f , the magnetic circuit is completed through the core c , rear wall a^2 , and the surrounding part of the bar or plate a to the front end of the magnet and is thence completed through the arm r^2 of the armature, which tends to shorten the path and lifts the arm r' to operate the springs. The whole of the arm r^2 is attracted and an especially strong magnet and positive movement is obtained. The presence of such a complete and short path for the magnetic lines prevents any cross-talk or other inductive interference between the several magnets. As many of these bores may be formed in a single bar as is wanted, and the bar may take any outward form or configuration desired, that shown being preferred. It is also preferred to make the bar a of cast-iron and to drill, ream, or bore out the holes or bores a' , which are first cored out in the casting, though it will be apparent that other modes of manu-

facture may be employed. So, too, the cores c may be otherwise mounted in the openings a' ; but the method shown is considered preferable. The bar may be used for any series of magnets, whether or not they are to be used as relays, and if used as relays they may have any desired arrangement of springs or sets of springs thereon. In order to mount the series of magnets in a rack, the lugs a^b are conveniently formed integral with the bar or plate a and are provided with apertures a^b , by means of which they can be secured to the parts t of the framework of the rack in which they are supported, whereby the usual built-up series and supports therefor is avoided. So far as some features of the invention are concerned this method of mounting is deemed to be independent of the particular construction of the magnets or of the use of the bar a as the inclosing shell of the magnets.

By means of the described construction a simple, cheap, durable, and efficient device is obtained. The iron bar is cheaply planed or dressed off on the four faces. The bores are simply reamed out and the cores are easily secured in place. The magnets are handily slipped in place, the springs secured on the outside of the bar, and the armatures hung upon the forward corner of the bar. When thus completed, the row or series of devices is conveniently and rapidly secured to the supporting-rack, which rack may also be more simply and easily constructed than is usual.

While the invention has been described with particular reference to the details of construction, I do not wish it to be so limited, as various changes, alterations, and modifications may be made therein and still come within its purview; but

What I do claim, and desire to secure by Letters Patent, is--

1. A metallic bar having a series of bores formed transversely therein and forming the inclosing shells of a plurality of magnet-coils, armatures for the magnets, and devices actuated by the armatures, substantially as described.

2. A plurality of magnets, comprising a bar of magnetic material having a plurality of independent holes or bores axially out of line with each other, a magnet-core within each hole or bore, an armature for each magnet, and devices actuated by the armatures, substantially as described.

3. The combination with a metallic bar having a plurality of separate bores axially out of line with each other, of a magnet-coil within each bore, armatures for the magnets, and parts actuated by the armature, said bar having lugs or projections, and a supporting-framework with which said lugs engage, substantially as described.

4. The combination with a bar of magnetic

material having a plurality of holes therein opening out at one face thereof, of a core within each said hole and secured to the bar, a magnet-coil on each core whereby the bar forms the magnetic shell of each magnet, armatures for the magnets, and parts actuated by the armatures, and means for securing said bar to the supporting-frame, substantially as described.

5 5. The combination with a bar of magnetic material having cylindrical holes formed therein side by side and part way through the same, of cores secured to the bottom wall of said holes, magnet-coils on said cores, armatures for the magnets, and parts actuated by the armatures, substantially as described.

6. The combination with a bar of magnetic material having transverse holes formed therein, of magnet-cores in said holes, and coils on said cores, said bar forming the inclosing shells of the magnets, armatures for the magnets, and parts actuated by the armatures, substantially as described.

7. The combination with a bar of magnetic material having holes or bores formed therein, of magnet-coils in said holes or bores, an armature for each coil supported on the exterior of said bar in front of the holes or bores, and parts actuated by the armature, substantially as described.

8. The combination with a bar of magnetic material having openings formed therein side by side, of cores located in said openings, magnet-coils on said cores and within the openings, armatures supported on the exterior of said bar and in front of said openings, and parts actuated by the armatures, substantially as described.

9. The combination with a bar of magnetic material having bores formed therein side by side, of magnet-coils located within the bores, a set of switch-contacts for each coil and mounted on said bar over each bore, and armatures for said magnets adapted to actuate said switch-contacts, substantially as described.

10. The combination with a bar of magnetic material having a series of holes formed therein side by side, of magnet-coils located within said holes, sets of contact-springs mounted on the face of said bar in proximity to said holes, armatures for said magnets secured to the said bar and adapted to engage said springs to actuate them, substantially as described.

11. The combination with a metallic bar having a row of holes therein, of a magnet-coil and a core in each hole, an armature for each hole pivoted upon the front part of said bar and having a portion extending across the edge of the bar in front of the hole and in position to be attracted by the coil and core, said armatures having a portion extending back over the bar, a set of switch-springs for each hole mounted upon the side of said bar

and extending forward into position to be actuated by said second portions of the armatures, substantially as described.

12. The combination with a plurality of magnet-coils arranged side by side in a row, the inclosing shells of said coils being cast integrally, of armatures for the magnets, and parts actuated by the armatures, substantially as described.

13. A cast-iron bar rectangular in cross-section having holes formed therein of a depth of nearly the width of the same, cores secured to the bottom walls of said holes and terminating flush with the front edge of the bar, magnet-coils on the cores, armatures pivoted at one corner of the bar and having a part extending across the holes in position to be attracted and another part extending back over the side of the bar, and switch-contacts actuated by said second part, substantially as described.

14. The combination with a bar of magnetic material having a series of holes formed therein side by side, of cores located in and fastened to said bar at the bottom of said holes, a magnet-coil on each said core, armatures pivoted on said bar in front of said holes and a set of switch-springs mounted on said bar over each hole and in position to be actuated by the corresponding armature, substantially as described.

15. The combination with a bar of magnetic material having a series of transverse holes formed therein side by side, of cores located in said holes and fastened to the bar at the bottom of the holes, a magnet-coil on each said core, an armature for each coil consisting of two arms at an angle to each other poised at said angle upon the corner of the bar and with one arm extending transversely across the edge of the bar in front of the magnet-coil and hole and the other extending back over the side of the bar, and a set of flat superposed switch-springs secured to the bar and extending into proximity with the bar with their free ends adjacent the said second arm of the armature and in position to be actuated thereby.

16. In a device of the class described; the combination with a bar of magnetic material having a plurality of rows of transverse holes formed therein, of electromagnet-coils fitting within said holes and incased by the said bar, armatures provided for the row of holes adjacent one edge of the bar, and parts actuated by said armatures, substantially as described.

17. In a device of the class described, the combination with a bar of magnetic material having a plurality of rows of transverse holes formed therein, of electromagnet-coils fitting within said holes and incased by the said bar, pivoted armatures provided for the row of holes adjacent one edge of the bar, and switch-springs mounted upon the side of the bar adjacent said holes and having their free ends

extending into proximity with said armatures in position to be actuated thereby, substantially as described.

18. In a device of the class described, the combination with a bar of magnetic material having a plurality of rows of transverse holes formed therein, electromagnet-coils in said holes, the row of holes adjacent one side of the bar being provided with armatures consisting of two arms bent at an angle to each other and poised at said angle upon the adjacent corner of the bar and with one arm extending transversely across in front of the hole and coil and the other arm extending back over the side of the bar, a set of switch-springs secured to the said side of the bar with their free ends adjacent the said second arm and in position to be actuated, thereby, substantially as described.

19. In a device of the class described, the combination with a bar of magnetic material having a plurality of rows of transverse holes therein, of electromagnetic coils in said holes, one of said rows of coils forming retardation-coils, and the other row of coils being provided with armatures; and parts actuated by said armatures, substantially as described.

20. The combination with a bar of mag-

netic material having a plurality of rows of transverse holes therein, of magnets in said holes, one of said rows of magnets constituting impedance-coils and the other row of magnets being provided with armatures, and parts actuated by said armatures, substantially as described.

21. In a device of the class described, the combination with a bar of magnetic material having a plurality of rows of transverse holes formed therein, of electromagnet-coils in said holes, some of said magnets forming retardation-coils, and other of said magnets being provided with armatures pivoted at the adjacent edge of the bar and having a part extending in front of said holes to be attracted by the coils therein and a part extending back over the side of the bar, and sets of switch-springs secured to the said side of the bar and extending into proximity with said latter armature parts and in position to be actuated thereby, substantially as described.

In witness whereof I hereunto subscribe my name in the presence of two witnesses.

WILLIAM W. DEAN.

Witnesses:

ROBERT LEWIS AMES,
JOSEPH C. BELDEN.