

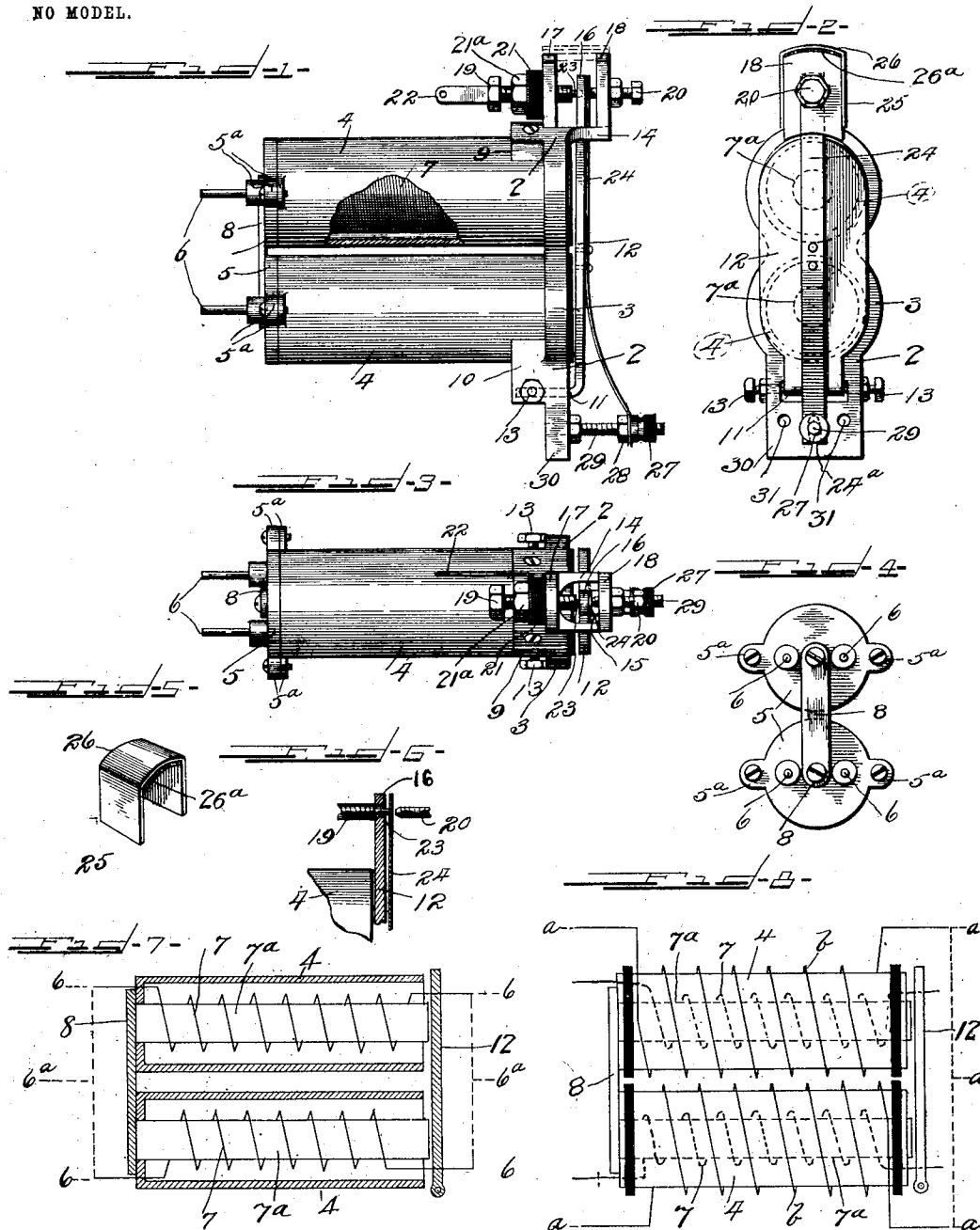
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H. P. CLAUSEN.
RELAY.

APPLICATION FILED APR. 1, 1901.

NO MODEL.



WITNESSES

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RELAY.

SPECIFICATION forming part of Letters Patent No. 753,956, dated March 8, 1904.

Application filed April 1, 1901. Serial No. 53,766. (No model.)

To all whom it may concern:

Be it known that I, HENRY P. CLAUSEN, a citizen of the United States of America, and a resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Relays, of which the following is a specification.

My invention relates to relays, and while in some of its features it is of general application in others it relates more particularly to the kind known as "double tubular coil relays."

Difficulty is often experienced in relays in the armature sticking to its magnet and refusing to fall when the magnet is deenergized. This may arise from a variety of causes, but mainly from the residual magnetism in the magnet shells and cores, the armature if allowed to make contact with magnet-cores often "freezing," as it is called, to the cores and from the fusing or welding action between the circuit-closing arm carried by the armature and its contact, which latter alone or in combination with the residual magnetism or freezing effect often entirely prevents the return of the armature to its retracted position. Again, the contacts have proven a source of trouble to keep clean and free from dust and dirt. It has also been long desired to produce a relay with which a variety of circuit combinations could be had and which necessitated but a single armature and substantially but one set of magnets so far at least as their mechanical parts, as cores, shells, &c., were concerned.

My invention has for its object the provision of a relay which shall obviate all the aforesaid objections and embody the desired features, which shall be simple and consists of few parts, cheap to manufacture, durable, and efficient in operation.

It therefore preferably consists in a structure having a single armature and two magnets adapted to actuate the same either jointly or singly and as a further improvement placing coils upon the shells of these magnets and connecting their inclosed ends with a soft-iron bar, whereby the shells act as cores for said outside windings. A novel adjusting spring

and contact are applied to the armature, together with means to effectually prevent both said residual magnetism and fusing or welding effects, and a further means for obtaining a dust-proof covering for the contacts.

The invention further consists in the novel details of construction, parts, and combinations of parts hereinafter fully described, and particularly set forth in the appended claims, reference being had to the accompanying drawings, forming a part hereof, in which the same reference characters designate like parts throughout the several views, and in which—

Figure 1 is a side elevation of the improvement. Fig. 2 is a front end elevation. Fig. 3 is a top plan view. Fig. 4 is a rear end view of the magnets. Fig. 5 is a perspective view of the dust-proof contact-cover. Fig. 6 is a detail view of the contacts. Fig. 7 is a diagram of the circuits with no coils outside the shells, and Fig. 8 is a diagram showing the magnet provided with both inside and outside coils.

In the figures the numeral 2 designates a support, preferably a brass or composition casting, having the circular rings 3, in which the open ends of the shells 4 of the magnets are secured and by which they are supported, the rear ends of said shells 4 being inclosed by the circular plates 5, secured thereto by screws in the ears 5^a on both parts and through which the insulated terminals 6 of the coils 7 project, and which are connected by the transverse bar 8, secured by screws thereto and to the cores 7^a of the coils 7. The casting 2 is provided with rearwardly-extending projections 9 and 10 at top and bottom, through both of which screws may be inserted into the shells 4. This lower extension 10 is apertured or transversely slotted, as seen in Fig. 2, in which aperture or slot the lower end 11 of the armature 12, which consists of a portion bent at right angles to the body 12, is pivoted upon the screws 13, which may have set or lock nuts in the usual way. As shown in Fig. 2, this portion of the armature is narrower than the main portion, and, as appears in Fig. 1, it is pivoted a considerable distance inward from the center line, which causes gravity to act

strongly upon the same to retract it. The upper end of the casting carries a forwardly-extending portion 14, having a hole 15, Fig. 3, therein, through which the narrowed upwardly-projecting arm 16 of the armature 12 passes and vibrates. On both sides of the opening 15 rise the arms 17 and 18 at suitable distances from the end of the armature lever or arm 16 and in which the contact-screws 19 and 20, provided with set-nuts, are held and adapted to be adjusted. Either or both contact-screws may be insulated; but, as shown, only the screw 19 is so supported and is arranged to pass through a block 21, insulated from the standard or arm 17, and beneath the set-nut 21^a in this screw a connecting-washer 22 is clamped, which provides an easy method of connecting the circuit-wires thereto. The particularly novel features of these contacts are more clearly shown in Fig. 6. Here the stationary contacts 19 and 20 are shown, together with the armature-lever 16 and part of one shell 4. It will be seen, however, that the contact 19 is shouldered and has the reduced end or pin 23, which is longer than the thickness of the metal of arm 16, the latter having a concentric aperture about the pin 23, so as not to touch it, but small enough to strike against the shoulder of 19. A spring 24 is secured substantially midway of the armature 12 and is adapted to strike the pin 24 when the armature is attracted. The action and adjustment is this: The contact 19 is so adjusted that the armature 12 cannot quite touch the ends of the shells 4 or the cores, a clearance of about one one-thousandth of an inch being sufficient to prevent the residual magnetism from sticking the armature. When the armature is attracted, the end 16 strikes 19 and spring 24 the pin 23, which raises the spring, as shown. If there is any fusing or welding action due to sparking at the make and break of the circuit, it is confined to the contact of pin 23 and spring 24; but when the magnet is deenergized the armature immediately starts back, owing to the fact that there can be no freezing of the armature to the magnet-cores as well as to the spring action of the contact on the armature and any other spring that may be provided, and as it flies back it strikes the spring a rap and with all its momentum, the sticking between the spring 24 and pin 23 is overcome, and the armature is carried back. The lever therefore does not stick from either of the causes and greater certainty of action is secured. To secure further protection from failure, the contacts are covered by a small U-shaped cover or shield 25, lined in its curved portion 26 with felt or similar substance and adapted to slide down over the arms 17 and 18 to the horizontal portion 14, the felt serving to secure a dust-tight joint at the top.

In order to apply spring tension to the armature 12 and to secure a good electrical con-

nection between the armature and its support, the hinge or pivots not always proving satisfactory, the spring-contact 24, which is riveted thereto, has a continuation which is extended below the armature and is there confined between a couple of nuts 27 and 28, adjustable back and forth upon the screw 29, secured in the downward extension 30 of the casting 2, a slot 24^a being provided in the lower end of the spring to fit loosely over the screw 29. By this spring a bias or set may be given the armature in either direction—that is, to open or close the same. Apertures 31 in the said lower part 30 may be utilized in securing the relay to some support.

The circuits of the inside coils 7 may be arranged as shown in Fig. 7 and with the terminals 6 6 and 6^a projecting, by means of which three circuit combinations can handily be made—viz., through each coil separately and both in parallel. If desired, the tubular shells 4 may be utilized as magnet-cores. In other words, suitable coils may be placed upon these shells, and by so doing the relay structure will involve solid magnets arranged within tubular magnets. It is obvious that this construction and arrangement is capable of affording opportunity for various circuit arrangements. For example, the other or outside coils 7, that are wound upon the shells 4, as illustrated in Fig. 8, may also be variously connected to advantage in series and each separately, thus constituting three different ways, so that it is apparent that with the two sets of coils the relay may be readily connected in six different ways or circuits with practically the same apparatus and space required for the ordinary horseshoe-magnet relay and each such circuit being capable of actuating the armature. In the case of Fig. 8 it will be noticed that the shells 4 act as cores for the outside coils, while the bar 8 completes the magnetic circuit therebetween.

Various changes may be made in the details of construction without departing from the spirit of my invention.

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

1. In a relay, the combination of an electromagnet, an armature for said magnet, a spring adapted and applied for holding said armature normally open, a portion of said spring being also adapted to serve as a flexible circuit-closing contact, and a stationary contact adapted and arranged to engage and bend said spring-contact away from the armature when the latter moves toward the magnet.

2. In a relay, the combination of an electromagnet, an armature normally away from said magnet, a flat spring having its middle portion secured to the back of said armature, a frame or body upon which said magnet and said armature are mounted, a binding-post for connecting one end of said spring with the said frame or body, the other end portion of

said spring serving as a flexible circuit-closing contact, and a stationary contact arranged to engage and bend said spring-contact away from the armature when the latter moves toward the magnet.

3. In a relay, the combination of an electromagnet, an armature for said magnet, a flat spring having its middle portion secured to the back of said armature, a frame or body serving as a support for said magnet and said armature, a binding-post connecting one end of said spring with said frame or body, the other end portion of said spring being adapted to serve as a flexible circuit-closing contact, a stop normally engaging said spring-contact and limiting the outward movement of said armature, and a stationary circuit-closing contact arranged to engage and bend said spring-contact away from the armature when the latter moves toward the magnet.

4. In a relay, the combination of an electromagnet, an armature for said magnet, a spring-contact secured to said armature and serving as a flexible circuit-closing contact, and a stationary circuit-closing contact having one portion adapted to engage and bend said spring-contact away from the armature when the latter moves toward the magnet, and said stationary contact having another portion serving as a stop to prevent the armature from touching the magnet.

5. In a relay, the combination of an electromagnet, a frame or body upon which said magnet is mounted, an armature pivotally supported on said frame or body, a flat spring secured to the back of said armature and serving as a flexible circuit-closing contact, an adjustable screw mounted upon said frame or body, the end portion of said screw being provided with a reduced end adapted to engage and bend said spring-contact away from the armature when the latter moves toward the magnet, and said screw also being provided with a shoulder which serves as a stop for preventing the armature from touching the magnet, and an adjustable screw for limiting the outward movement of said armature.

6. In a relay, the combination of an electromagnet, an armature pivoted at its lower end, a frame or body upon which said magnet and armature are mounted, two oppositely-arranged uprights rising from the upper portion of said frame or body, a flexible spring-contact mounted upon said armature, a screw-contact extending through one of said uprights and arranged to engage said spring-contact, a screw-stop extending through the other of said uprights, and a dust-proof cap adapted to slide down over said uprights and inclose said contacts.

7. In the relay, the combination of a pair of electromagnets having tubular cores, an electromagnet arranged within each tubular core, a bar serving as a common connection between the cores of both the inner and the outer magnets, an armature common to all of said mag-

nets, said armature having a flexible spring-contact, and a stationary contact adapted to engage and bend said spring-contact away from said armature when the latter moves toward the said magnets.

8. In a relay, the combination of tubular electromagnets, solid electromagnets arranged within said tubular electromagnets, a connecting-bar common to the core of both the tubular and solid magnets, an armature common to all of said magnets, a stop for limiting the outward movement of said armature, a circuit-closing contact mounted upon said armature, a frame or body upon which said magnets and said armature are mounted, a stationary contact mounted upon said frame or body, said stationary contact being adapted to engage the contact on the armature, and a spring for holding said armature normally away from said magnets.

9. In a relay, the combination of tubular electromagnets, solid electromagnets arranged concentrically within said tubular magnets, a bar arranged to connect both the tubular and solid cores of said magnets, an armature common to all of said magnets, a yielding circuit-closing contact mounted upon said armature, a frame or body upon which the magnets and the armature are mounted, an adjustable screw-contact extending through a portion of said frame or body, said adjustable contact being arranged to engage and oppose the forward movement of said yielding contact, a stop for preventing the armature from touching the magnets, a stop for limiting the outward movement of said armature, and a dust-proof covering applied and arranged to inclose the said contacts and stops.

10. In a relay, the combination of a pair of tubular cores, coils on said tubular cores, solid cores within said tubular cores, coils on said solid cores, a connecting-bar common to both the tubular and solid cores, an armature common to all of said cores, a flat spring having its middle portion secured to the back of said armature, a frame or body to which the tubular cores are secured, said armature having its lower end pivotally connected with same frame or body, a binding-post connecting one end of said spring with said frame or body, the other end of said spring being adapted to serve as a flexible circuit-closing contact, an adjustable circuit-closing contact extending through a portion of said frame or body, said adjustable circuit-closing contact being adapted to engage and bend said flexible contact away from the armature when the latter moves toward the magnet-cores, a stop for preventing said armature from touching said cores, an adjustable stop or screw-contact for limiting the outward movement of said armature, and a dust-proof covering for inclosing said stops and contacts.

11. In a relay, the combination of a suitable support, a pair of electromagnets mounted upon the said support, a vibratory armature

pivoted at its lower end, a pair of contact-screws mounted upon said support and arranged to limit the swing of said armature, a flat contact-spring secured to the back of the armature and having its upper end arranged to engage the said contact-screws, and a binding-post or the like secured to the lower portion of said support, and adapted to clamp and hold the lower end portion of said spring-contact, substantially as described.

12. In a relay, the combination with an operating-magnet, an armature therefor carrying a lever and having an aperture in its end, and a spring strip or contact secured to said armature and covering said aperture, a contact-stud having a reduced portion adapted to enter said aperture and raise said spring when the lever strikes the enlarged portion of the stud which is so adjusted that the armature cannot stick to the magnet, whereby when the magnet is deenergized the lever will be retracted and strike the strip to free it from the reduced portion of the contact-stud.

13. In a relay, a magnet, a support therefor at one end, stationary contacts at one end of said support, an armature for the magnet pivoted in said support and arranged in operative

relation to said contacts, a spring-contact secured to said armature and adapted to cooperate with the stationary contacts, said spring being prolonged beyond said armature, and means to secure said prolonged end to said support and to adjust the tension of the same so as to tend to retract or close said armature.

14. In a relay, the combination of two standards, contacts between and supported by said standards, an armature-lever also between said standards and cooperating with said contacts, and a U-shaped dust-proof cover adapted to slide down over and fit said standards.

15. In a relay, the combination of a magnet, a brass frame secured to one end of said magnet, an armature pivotally mounted on said frame, contacts associated with the upper end of said armature, and a dust-excluding cap removably mounted upon said frame and adapted to inclose said contacts.

Signed by me at Chicago, Cook county, Illinois, this 27th day of March, 1901.

HENRY P. CLAUSEN.

Witnesses:

CHAS. C. BULKLEY,
HARRY P. BAUMGARTNER.