Sept. 19, 1950 L. PIERCE 2,523,140

ARC BOX HOLDING SPRING

Filed Feb. 21, 1948 2 Sheets-Sheet 1

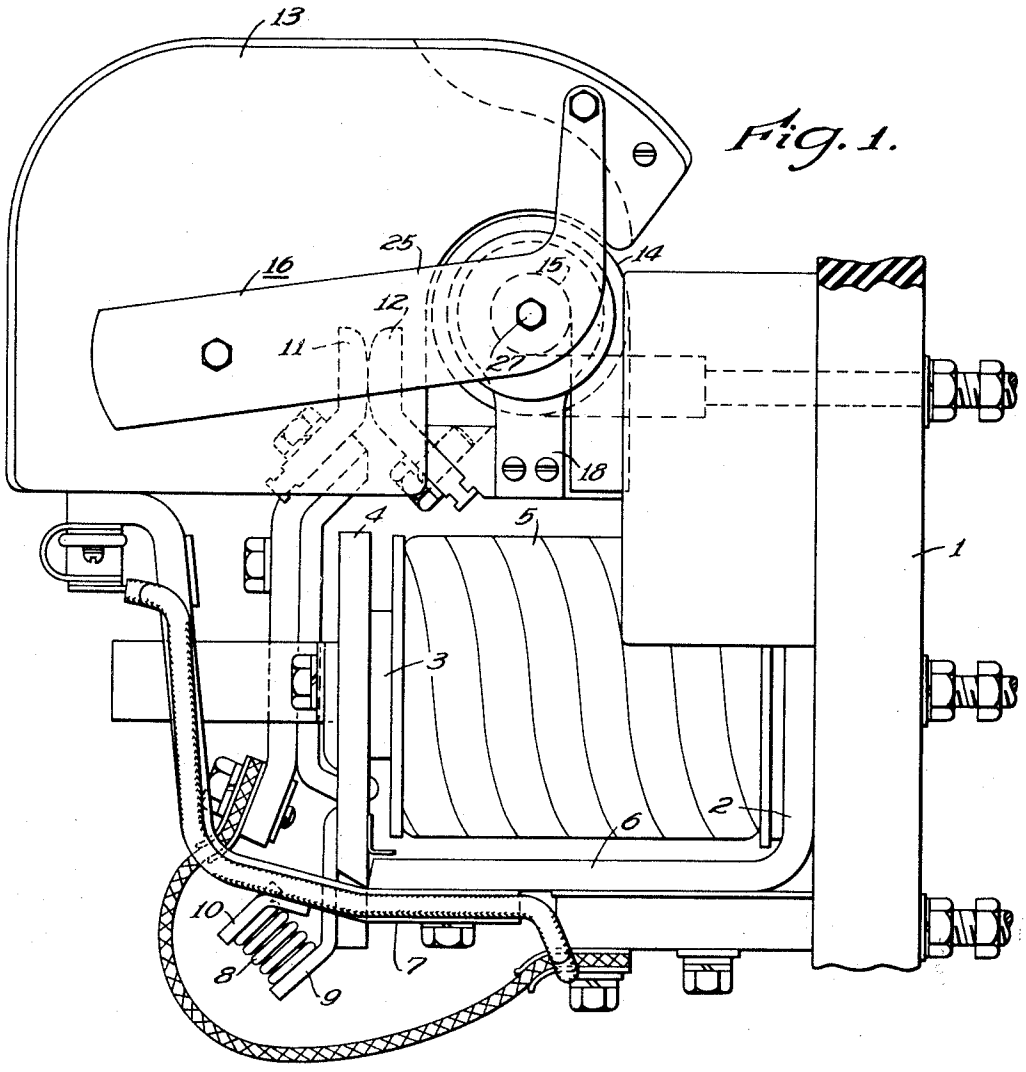


Fig. 1.

WITNESSES:

Robert Baird

Rw. b. Goore

INVENTOR

Lawrence Pierce.

BY

Paul E. Friedemann

ATTORNEY

Sept. 19, 1950 L. PIERCE 2,523,140

ARC BOX HOLDING SPRING

Filed Feb. 21, 1948 2 Sheets-Sheet 2

Fig. 2.

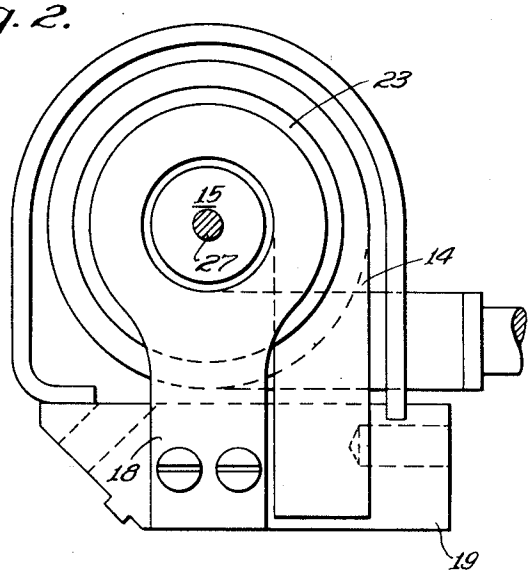
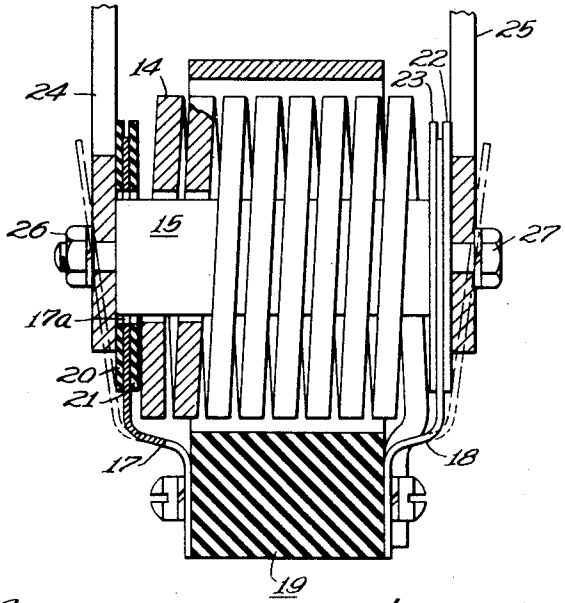


Fig. 3.



WITNESSES:

Robert C. Baird

Wm. C. Goodwin

INVENTOR

Lawrence Pierce.

BY

Paul E. Friedemann

ATTORNEY

Patented Sept. 19, 1950

2,523,140

UNITED STATES PATENT OFFICE

2,523,140

ARC BOX HOLDING SPRING

Lawrence Pierce, Edgewood, Pa., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application February 21, 1948, Serial No. 10,140

4 Claims. (Cl. 200—147)

1

My invention relates to electromagnetic contactors and more particularly to electromagnetic contactors using arc boxes for aiding in the blow out of the arc upon an interruption of current through the contacts disposed in the hollow of the arc box.

One broad object of my invention is to improve the mounting of the arc box.

A more specific object of my invention is the provision of friction type arc box holding means for holding the arc box of an electromagnetic contactor in any angular position to which it may be adjusted.

Other objects and advantages will become more apparent from a study of the following specification and the drawings forming part of the disclosure and in which drawings:

Figure 1 is a side view of a complete contactor provided with my invention;

Fig. 2 is an enlarged side view of the particular elements to which my invention is directed; and

Fig. 3 is an edge view of the subject matter shown in Fig. 2 but with certain parts broken away and the pivot portion of the arc box shown in position.

In Fig. 1 the supporting panel 1 provides the base for the L-shaped frame 2, the core 3 and the armature 4. The bottom surface of the horizontal leg 6 is provided with the bearing supports 7. The armature 4 has knife edge shoulders at each side near its lower end to engage the bearing supports, or plates 7 and the left-hand end of the horizontal leg 6 as shown.

The core 3 is mounted to be parallel to the bottom leg 6 and terminates at its free end in the same vertical plane as the knife edge shown at the left end of the horizontal leg 6. The core is provided with an energizing coil 5. When the coil 5 is energized, the armature 4 moves clockwise on its knife edge pivot to the position shown. The armature is biased to counterclockwise position by the spring 8. This spring is a compression spring disposed between the bracket 9 secured to the bottom of the armature 4 and the bracket 10 secured to the bearing plates 7.

The armature 4 carries the movable contacts 11 cooperating with the stationary contacts 12. These contacts are disposed in the arc box 13. It is common practice on contactors to have the blow-out coils 14 made of edge wound copper strap. The manufacturing process of the coils is such that a cylindrical hole is provided through the coil. In the contactor construction, a cylindrical core 15 of magnetic material is disposed in the hole. This core 15 carries the flux produced by the coil 14. Steel side plates 16 then

2

carry the flux to the desired location to produce a blow-out effect on the arc that is drawn on the separation of the contacts 11 and 12.

This round core 15, located in the axial region of the coil 14 and projecting beyond the ends of the coil 14, provides a very convenient place to hinge the arc box 13 so that it can be raised for the purpose of inspecting and replacing the contacts 11 and 12.

To pivotally mount the arc box on the core 15 usually results in excessive wear of the parts where the contacts 11 and 12 are subject to frequent and many operations as usually happens in many industrial uses of contactors. The type of assembly is not precise. The arc box is thus usually loose when new and if not loose then soon works itself loose in a short period of use. The continual vibration and movement incident to the operation of the contacts 11 and 12 causes wear of the arc box bearing surfaces, the core 15 and associated parts to such an extent that these elements have to be replaced. This looseness has a further disadvantage. When the arc box 13 is moved to its highest point, there is usually sufficient overhanging weight to cause it to fall back down. When the contacts are to be changed, the arc box must be blocked in the up position.

One still further object of my invention is to eliminate the disadvantages just pointed out.

To eliminate the disadvantages pointed out, I mount a spring 17 on one side of the insulating block 19 and a second spring 18 on the other side of the block 19. The springs are flat and in the shape of an eyelet, that is, the spring 17 has the hole 17a for receiving the left-hand end of the core 15 and the spring 18 has a similar hole for receiving the right end of the core 15. Normally the springs tend to take the position shown in broken lines in Fig. 3.

The eyelet portions of the springs 17 and 18 are each provided with washers 20 and 21, and 22 and 23, respectively. The washers are of insulating material with the washers 21 and 23 being disposed in facing relation to the coil 14 and the washers 20 and 22, being on the outer surfaces of the springs, are disposed to engage the side walls 24 and 25, respectively, of the arc box 13.

In assembling the parts the springs 17 and 18 together with the washers on the springs, are forced together over the ends of the core 15. The arc box is then slipped over the springs and washers and then the bolt 27 is inserted in the core 15 and the nut 26 tightened to a given position.

The springs thus forced to the position shown most clearly in Fig. 3 exert outwardly directed forces against the inner surfaces of the arc boxes. The spring strength is so selected that the springs give sufficient holding force to eliminate the arc box and insulation wear after even millions of operations. The springs also provide enough braking force to hold the arc box up when raised to an up position. The inspection and replacement of the contacts 11 and 12 is thus facilitated because the arc box stays in the up position when adjusted to the up position. Further, by carefully selecting the spring strength, the forces acting on the arc box are not too great so that in the event the arc box is inadvertently left in the up position the vibration of the contactor upon operation will cause the arc box to creep to its down position.

While I have shown and described but one modification, I do not wish to be limited to the specific showing made but wish to be limited only by the scope of the claims hereto appended.

I claim as my invention:

1. In an electromagnetic contactor provided with an arc chute, in combination, a base, a pair of switch contacts, a blow-out coil, a core mounted in the blow-out coil, a pair of flat springs rigidly secured to the base, each of said springs having an eyelet type opening disposed over the respective core ends, an arc box having parallel side walls forced over the spring eyelets to pivotally engage the ends of the core, whereby said springs exert outwardly directed forces on the inner walls of the arc box to hold the box in any position of angular adjustment with reference to the base.

2. In an electromagnetic contactor having an arc chute for the contacts of the contactor, in combination, a frame element, a magnetic core mounted on the frame element, a blow-out coil disposed about the core, a flat spring having one rectangular end and a generally circular end, the circular end being provided with an eyelet, or opening, large enough to encompass the core, said spring having its rectangular end rigidly secured to the frame element and being so disposed that the end with the opening is disposed over one end of the core, a second spring identical in shape and function disposed at the other end of the core, an arc chute having parallel side walls which are pivotally mounted on the core, said generally circular spring ends being compressed to fit into the arc chute to thus produce outwardly directed forces on the inner surfaces of the side walls to thus frictionally hold the arc chute to any position of angular adjustment on the core, and thus with reference to the contacts.

3. In an electromagnetic contactor, in combination, an elongated frame element mounted to project horizontally from a suitable base, said frame element having vertical side walls, a flat spring rigidly secured at one end to one side wall, the other end of the spring terminating in an eyelet, a similar spring similarly mounted on the other side wall of the frame element, the mounting of the springs being such that the axes of the eyelets are substantially in alignment, a cylindrical magnetic core disposed between the eyelet ends of the springs so that the core axis is substantially in alignment with the eyelets, a blow-out coil disposed about the core, an arc chute having side walls pivotally mounted on the core, the mounting being such that the springs are deflected toward each other to be disposed about the core ends and to produce a frictional force on the inner surfaces of the side walls of the arc chute to thus hold the arc chute into any position of angular adjustment about the core.

4. In an electromagnetic contactor, in combination, an elongated frame element mounted to project horizontally from a suitable base, said frame element having vertical side walls, a flat spring rigidly secured at one end to one side wall, the other end of the spring terminating in an eyelet, a similar spring similarly mounted on the other side wall of the frame element, the mounting of the springs being such that the axes of the eyelets are substantially in alignment, a cylindrical magnetic core disposed between the eyelet ends of the springs so that the core axis is substantially in alignment with the eyelets, a blow-out coil disposed about the core, washers of insulating material secured to each side of each spring, an arc chute having side walls pivotally mounted on the core, the mounting being such that the springs are deflected toward each other to be disposed about the core ends so that the springs through the friction washers on the outside surfaces of the spring, produce a frictional force on the inner surfaces of the walls of the arc chute to thus hold the arc chute in any position of angular adjustment to which it may be adjusted.

LAWRENCE PIERCE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
969,193	Richards	Sept. 6, 1910
1,155,626	Steen	Oct. 5, 1915
1,266,548	Bradley	May 21, 1918
1,687,174	Mountford	Oct. 9, 1928
1,839,665	Ferris	Jan. 5, 1932
2,372,045	Armstrong	Mar. 20, 1945

OTHER REFERENCES

Instructions Geh—9A—CR 2800—1115 and 1126 D—C.

Shunt Contractors. General Electric Co. Nov. 1926. Pages 1 and 3 copy in 200—147X.