

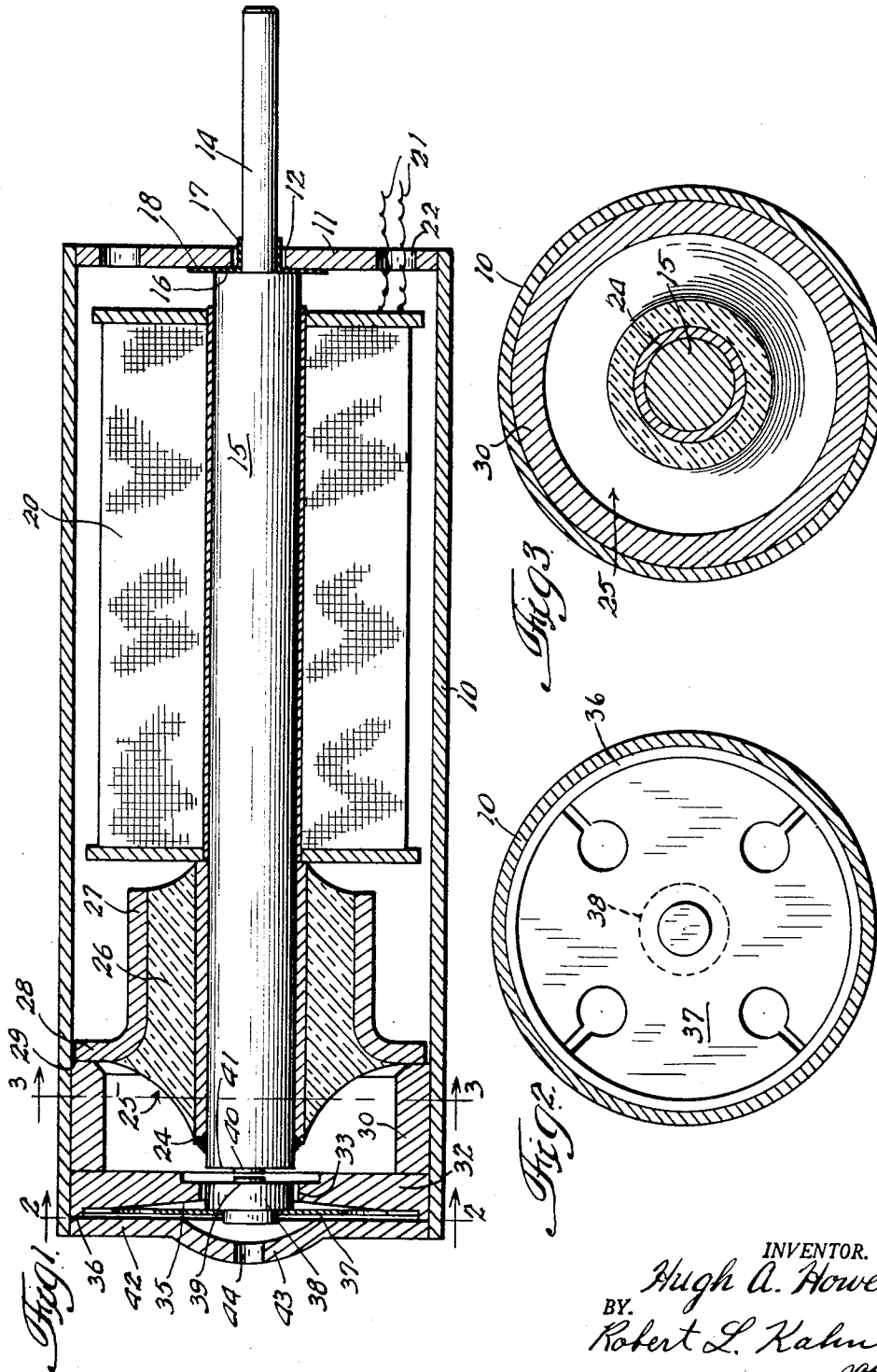
April 19, 1960

H. A. HOWELL

2,933,571

RELAY

Filed Nov. 7, 1958



INVENTOR.
Hugh A. Howell.
BY.
Robert L. Kahn.
Att.

1

2,933,571

RELAY

Hugh A. Howell, Berwyn, Ill., assignor to Oak Mfg. Co., Chicago, Ill., a corporation of Illinois

Application November 7, 1958, Serial No. 772,445

1 Claim. (Cl. 200-87)

This invention relates to a relay and more particularly to a relay construction which may be readily miniaturized.

This invention provides a novel relay construction which reduces to a minimum the number of parts required for assembly and which also makes possible a construction susceptible to high speed operation.

For a fuller understanding of the invention, reference will now be made to the drawing wherein—

Figure 1 is a longitudinal section of a relay embodying the present invention.

Figures 2 and 3 are sections along lines 2-2 and 3-3 of Figure 1, respectively.

Referring to the drawing, the relay comprises a general cylindrical housing 10 of ferromagnetic material. Housing 10 may have suitable thickness to function as part of the magnetic circuit of the relay. Housing 10 has end wall 11 of generally circular outline. End wall 11 is also of ferromagnetic material and is provided at the center thereof with aperture 12. Disposed within aperture 12 is ferromagnetic end portion 14 forming part of ferromagnetic core 15. End portion 15 has a reduced diameter so that shoulder 16 at the end of body portion 15 is provided. Inasmuch as core 15 and housing 10 are connected to the two relay contacts to be controlled, it is necessary to provide electrical insulation between these two parts although it is to be understood that both of these parts form part of a magnetic circuit.

Accordingly, insulation 17 and 18 is provided between the two ferromagnetic core portions. Thus, insulation portion 17 is disposed around reduced end portion 14 while insulation 18 is disposed between shoulder 16 of core portion 15 and the adjacent inner face of end wall 11.

Inasmuch as the nonmagnetic gap between the two parts of the ferromagnetic structure should be reduced to a minimum, it is possible to make insulation portions 17 and 18 of thin plastic sheet or of thin oiled paper or other similar material having good electrical insulation. In practice, the potential broken at the relay contacts will be relatively small, such as possibly 100 or 200 volts at the most and will have relatively low power so that the insulation may have a thickness of a few mils.

Disposed around core portion 15 is magnetizing winding 20 having leads 21 extending through aperture 22 in end wall 11 of the housing. Winding 20 may be disposed on a suitable bobbin.

Core portion 15 also has welded thereto thin sleeve 24 of metal such as copper or the like which may form part of a glass seal construction generally indicated by 25. Glass seal construction 25 includes a mass of glass 26 fused to the outside of sleeve 24 and to the inside of outer sleeve 27. Outer sleeve 27 may also be of copper or other metal.

Small glass seals including glass mass 26 and sleeves 24 and 27 are available on the market. Outer sleeve 27 has outwardly directed flange 28 supported at end 29

2

of sleeve 30 disposed on the inside of ferromagnetic housing 10. Sleeve 30 may be of metal or non-metal and is suitably attached to housing 10 to maintain the glass seal construction firmly in position.

Housing 10 has end wall 32 of ferromagnetic material disposed within the end of housing 10 and abutting against sleeve 30. End wall 32 is provided with circular aperture 33 at the center thereof. End wall 32 has the outer face shaped to provide inwardly dished surface 35 and peripheral flange 36. Resting within flange 36 and against the outer portion of dished surface 35 is spring spider or disc 37 of such material as spring steel, Phosphor bronze or of glass and the like. Spider 37 is preferably non-magnetic and may have cutouts to provide more flexibility and carries at the center thereof armature 38. The armature is attached to the spider in any desired fashion.

Inasmuch as armature 38 carries relay contact 39, electrical contact between armature 38 and grounded housing 10 is essential. Hence, if spider 37 is of insulating material, a flexible wire lead between armature 38 and end plate 32 or housing 10 must be provided.

Movable contact 39 cooperates with fixed contact 40 carried by the end of magnetic core portion 15. Fixed contact 40 is carried on pole face end 41 of core 15. The end of the housing adjacent the armature may be closed by plate 42 of any material. Plate 42 is dished outwardly at 43 to accommodate the movement of armature 38. Dished portion 43 is apertured at 44 so that armature 38 may be vibrated back and forth without excessive damping of trapped air.

Instead of a glass seal construction any other insulating support may be provided. However, a glass seal construction is preferred inasmuch as such a seal has excellent mechanical and electrical characteristics.

What is claimed is:

A relay construction comprising a cylindrical ferromagnetic housing having at the ends thereof ferromagnetic plates, a rod-shaped ferromagnetic core disposed within said housing and having a terminal portion extending through one end plate and having its other end portion extending up to the other end plate, said one end plate and core having clearance to accommodate electrical insulation with minimum nonmagnetic spacing therebetween, said end plates and housing being electrically and magnetically continuous, said core having its other end portion terminating in a pole face carrying a stationary electrical contact thereon, the opposing portion of said other end plate being cut out to accommodate a movable armature disc adapted to cooperate with said core pole face, said armature carrying a cooperating movable electrical contact, a spider for supporting said armature to be movable to and from said pole face, means providing a metallic electrical connection between said armature and housing, means for biasing said armature to a normal position away from said pole face, a winding within said housing and around said core for energizing said relay and a glass ring for insulatingly supporting said other end of said core in properly centered position with respect to said other end plate, said relay contact terminals being the housing and core terminal portion.

References Cited in the file of this patent

UNITED STATES PATENTS

1,700,314	Hartwig	Jan. 29, 1929
1,932,164	Petit	Oct. 24, 1933
2,009,892	Leece	July 30, 1935
2,036,295	Piffath	Apr. 7, 1936