

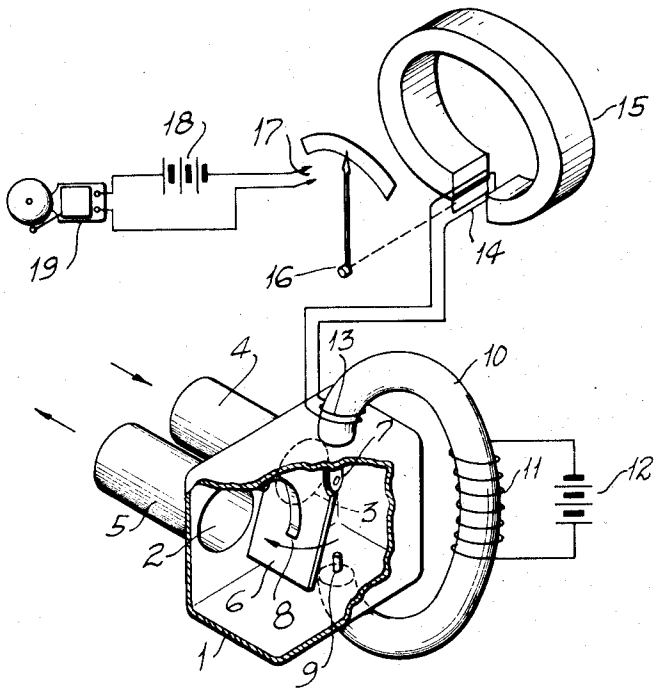
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FLUID FLOW CIRCUIT CONTROL

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FLUID FLOW CIRCUIT CONTROL

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3 Claims. (Cl. 177—311)

My invention pertains to fluid flow circuit controllers employed with fluid cooled electron discharge devices used in high power radio transmission circuits.

5 In the use of electron discharge devices of the fluid cooled anode type it is essential to provide a continuous fluid flow around the anode in order to dissipate the heat created. This cooling fluid is usually provided through a conduit, such as
10 a length of rubber hose, or glass tubing, connected with means for providing fluid circulation, such as a pump. During the operation of such an electron discharge device of the fluid cooled type it is important that the cooling medium be kept constantly circulating. Failure of
15 circulation results in damage to the electron discharge device and necessitates costly replacement.

20 One of the objects of my invention consists in providing means for positively and instantaneously controlling a protective or alarm circuit in accordance with conditions of fluid circulation.

25 A further object comprises producing a fluid flow circuit controller actuated by fluid pressure for controlling a circuit and which does not employ a mechanical agency for the transfer of motion from the interior of a fluid flow channel to an external contactor or other electrical device.

30 I accomplish these and other desirable objects in a novel fluid flow circuit controller employing a movable member actuated by fluid flow for affecting a magnetic field for controlling an external circuit.

35 In the drawing I have schematically represented one embodiment of my invention showing a perspective view of a fluid flow housing and an electrical circuit employed therewith in accordance with my system.

40 Referring to the drawing in detail, there is provided a fluid tight housing 1, having two orifices 2 and 3 in one wall thereof. Pipes 4 and 5 are fitted to these orifices to provide for the circulation of cooling fluid through the housing 1
45 in accordance with the direction indicated by the arrows. The pipes 4 and 5 may be inserted in the usual fluid circulation line connected with a fluid cooled anode type of electron discharge device and fluid circulation pump associated
50 therewith. The housing 1 is preferably composed of an insulating material so that the resistance affect of the fluid flow line away from the high potential anode, will be uninterrupted.

55 In accordance with my invention, I provide a vane 6 hinged from pivots 7 secured in a central

portion of the top wall of the housing 1. A resilient member 8 is also provided in the top wall of the housing 1 and exerts a force against the vane 6 for normally maintaining the same in a position against a stop pin 9 when no fluid is
60 flowing through the housing 1.

A C-shaped field member 10 of magnetic material is provided having the open ends thereof adjacent to housing 1 along the plane of the vane 6 when it rests against the pin 9. The vane
65 6 is composed of a suitable substance such as soft iron and serves as an armature for completing the magnetic circuit between the ends of field member 10.

A winding 11 is provided on the field member 70 10 to form an electromagnet and is connected with a battery 12 for producing an electromagnetic field traversing the housing 1 principally in the area occupied by the vane 6 when in the position at rest against the pin 9.

75 A small coil 13 is provided around the field member 10 as shown, and is connected with the moving coil 14 of a galvanometer generally indicated at 15 and including a pointer member 16
80 operated by the moving coil 14. The pointed member 16 and moving coil 14 are of the type having no restoring force and therefore assume and remain in any position as determined by current flowing in the moving coil 14.

In accordance with my invention, contacts 17 85 are provided adjacent one end of the arc swing of the pointer member 16 for completing a circuit through the battery 18 to an alarm bell 19. When the pointer member 16 is in engagement with the contacts 17 the circuit will be completed to the
90 bell 19 for sounding an alarm. It will, of course, be understood that other alarm devices or control circuits can be employed. For instance, the pointer member 16 may serve to close a circuit for operating relays to shut down the power supply to the associated electron discharge device.

The operation of my fluid flow circuit controller is as follows:

The battery 12 energizes winding 11 to produce a steady electromagnetic field traversing
100 the housing 1 in a path normally occupied by the vane 6. When the cooling fluid enters housing 1 by pipe 4 the vane 6 will be deflected against the force of the resilient member 8 to the position shown in the figure. The vane 6 being thus
105 moved amounts to the removal of a metallic circuit path between the ends of the field member 10 with the substitution of an air circuit path therefor. Such action produces a change in the reluctance of the magnetic circuit path and a
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corresponding change in the flux whereby an E. M. F. is generated in the small coil 13 for causing a current to flow in the moving coil 14. When a current flows in the coil 14 the pointer member 15 will be moved to a position out of engagement with the contacts 17. The pointer member 16 will remain in this position as long as the vane 6 is maintained in the position shown by the force of fluid circulating through the housing 1. Should the circulation of this fluid fail for any reason, such as the break-down of the circulating pump, the resilient member also magnetic attraction 8 will cause the vane 6 to be restored to a position at rest against the pin 9. The magnetic field between the ends of the field member 10 will also serve to restore the vane 6 to its initial position against the pin 9 and prevent "chattering" of the vane for low pressures of fluid in the housing 1. When the vane 6 moves into the electromagnetic circuit path the reluctance thereof will be again changed to produce a corresponding change in the flux whereby an E. M. F. will be generated in the coil 13 for causing a current to flow in the moving coil 14 but in an opposite direction. The pointer member 16 will now be actuated by the moving coil 14 to be moved back into a position in engagement with the contact member 17 for completing the alarm circuit.

It will now be apparent that I have provided a novel form of fluid flow circuit controller. One of the principal advantages to be derived from the use of my system resides in that no electrical contacts are used within the fluid chamber while, at the same time, no devices such as bellows or stuffing glands, are employed for transferring the force of the circulating fluid to mechanically actuate an external electrical device. Although I have shown a preferred embodiment of my fluid flow circuit control, I do not desire to be limited thereto except insofar as may be pointed out in the appended claims.

What I claim as new and original and desire to secure by Letters Patent of the United States is:

1. A fluid flow circuit controller comprising, a magnet, the poles of which are opposed to pro-

vide an air gap therebetween, a housing having an inlet and an outlet orifice and positioned in said air gap, a magnetic armature in the form of a vane positioned within said housing and pivoted therein between said inlet and outlet orifices and between said magnet poles for affecting the magnetic field in said air gap, a winding external of said housing and encircling said magnet near one pole thereof under control of changes in said magnetic field produced by motion of said armature therein and an electrically operated device connected with said winding.

2. A fluid flow circuit controller comprising, a magnet, the magnetic poles of which are opposed to form an air gap therebetween, a housing, composed of insulating material and provided with an inlet and an outlet orifice, positioned within said air gap, a magnetic armature member pivotally mounted internal of said housing between said inlet and outlet orifices and between said poles, said member being movable due to flow of fluid through said housing to modify the reluctance of said air gap in accordance with the flow of fluid through said housing, a winding external of said housing and encircling said electromagnet near one pole thereof and a control circuit connected with said winding.

3. A fluid flow circuit controller comprising, an electromagnet, the poles of which are opposed to form an air gap therebetween, a housing, composed of insulating material having inlet and outlet orifices, positioned within said air gap, a vane composed of magnetic material pivotally mounted internal of said housing between said inlet and outlet orifices and between said poles, a stop, a spring attached to said vane for normally holding said vane against said stop in a position reducing the magnetic reluctance of said air gap to a minimum value, said vane being movable due to flow of fluid through said housing to increase the reluctance of said air gap, a winding external of said housing and encircling said electromagnet near one pole thereof and a control circuit connected with said winding.

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