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ROTARY LIMIT SWITCH

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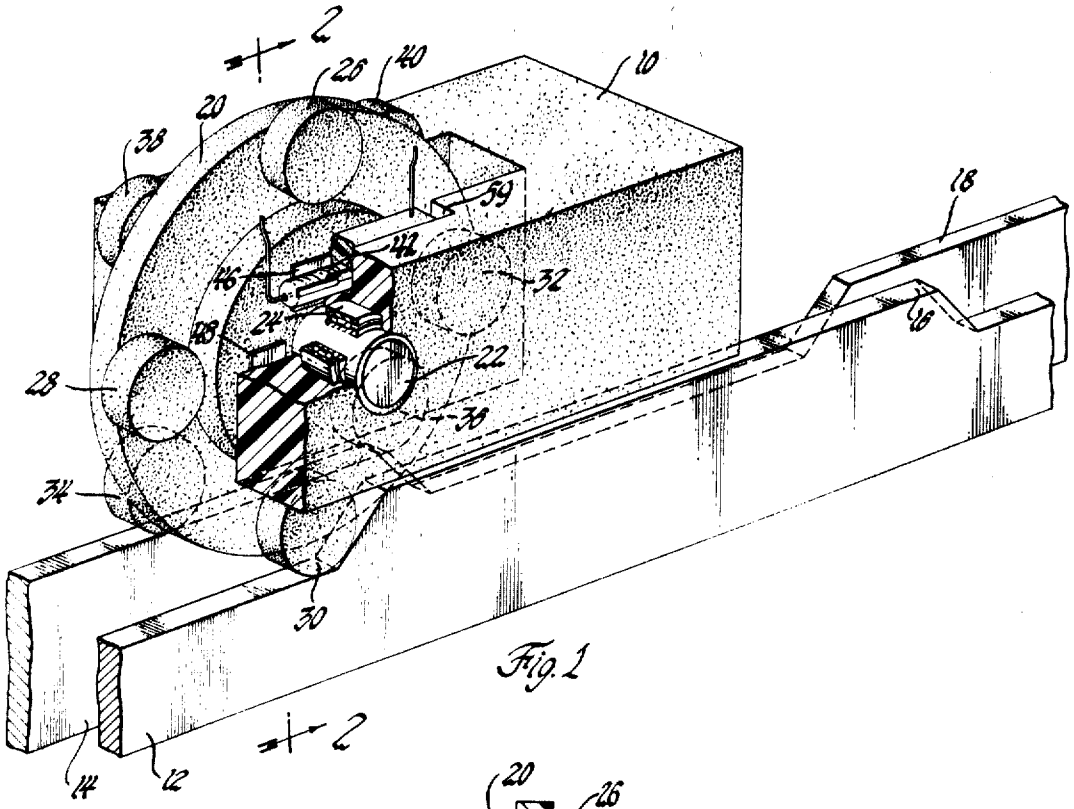


Fig. 1

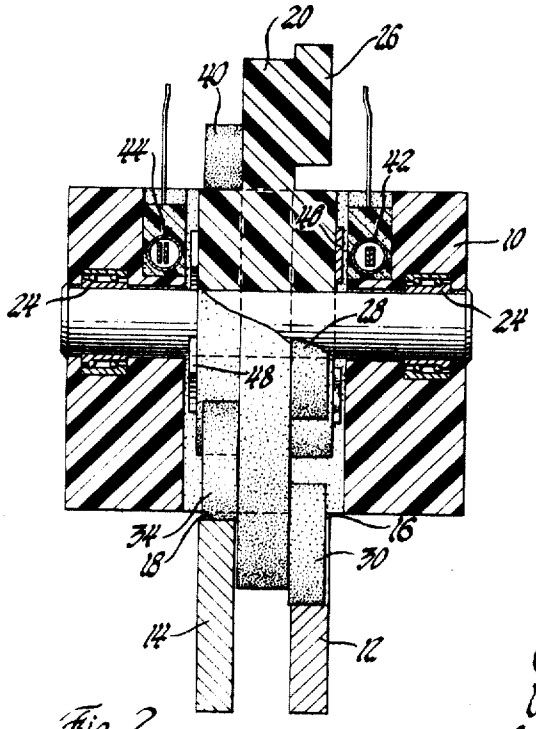


Fig. 2

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ROTARY LIMIT SWITCH

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ABSTRACT OF THE DISCLOSURE

In a preferred form, this disclosure relates to a limit switch for sensing linear movement of an object. The limit switch includes a stationary housing carrying one or more reed switches and positioning means rotatably supported by the housing and carrying magnets for actuating and de-actuating the reed switches when the magnets are positioned adjacent to and spaced from the reed switches, respectively. The positioning means is adapted to be engaged and rotated to effect actuation and de-actuation of the reed switches by the linearly movable object as the latter reaches an extreme limit of movement.

This invention relates to limit switches and more particularly to a limit switch assembly utilizing a circular cam follower to selectively position magnetic material near a reed switch to energize or deenergize electrical circuits as desired.

In certain types of machinery, it is important to energize and deenergize electrical circuits at a point in time corresponding to the amount of movement of a linear type generated in a portion of the machine. It is important in limit switch actuation that the switching be done very positively and that it occur at a precise point in the linear movement of the object. At the same time, machinery is generally constructed of electrically conductive material and, therefore, it is desirable to have electrical apparatus associated therewith completely insulated from the machine itself. It is also desirable in a switching function to utilize components for switching that will not readily deteriorate due to the environment in which they operate and which, consequently, are substantially maintenance free.

It is an object of the present invention to provide an improved limit switch assembly that is capable of sensing linear movement either at its extremes or at any point intermediate the extremes.

It is another object of the present invention to provide an improved limit switch utilizing sealed reed switches that are magnetically operated and which involves very little contact movement in undesirable environments.

It is still another object of the present invention to provide an improved limit switch assembly for use with machinery having linearly moving parts which allows the switching of associated circuitry at a predetermined point in travel of a linearly moving part of the machine while maintaining the machine completely insulated from electrical circuitry.

Further objects and advantages of the present invention will be apparent from the following description, references being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

IN THE DRAWINGS

FIGURE 1 is a perspective view of the limit switch assembly which is the subject of the present invention;

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1.

Referring to FIGURE 1, a switch support means **10** is carried in a fixed relationship with respect to movable members **12** and **14** of a machine, not shown. Members **12** and **14** move in unison and have cam surfaces **16** and **18** respectively formed thereon.

A rotary member **20** is substantially circular in shape and is journalled in support **10** by shaft **22**. Bearings **24** are carried on shaft **22** in order to facilitate the rotational movement of member **20**. Rollers **26**, **28**, **30** and **32** are carried on one side of rotary member **20** and near the periphery thereof. Rollers **26** through **32** extend beyond the periphery of member **20** in a manner allowing selective engagement thereof with cam surfaces **16**. Similarly, rollers **34**, **36**, **38** and **40** are carried on an opposite face of rotary member **20** and likewise extend past the periphery thereof to selectively engage cam surface **18**. The sets of rollers on either side of member **20** are so radially positioned that a roller is always in contact with cam surface **16** and a roller on an opposite side of cam member **20** is always in contact with cam surface **18**. This provides the stability that is characteristic of the present invention.

Referring to FIGURE 2, reed switches **42** and **44** are shown as carried by support **10** in a fixed manner with respect to rotary member **20**. Magnetic material designated by numerals **46** and **48** is carried by rotary member **20** and is moved into a position adjacent reed switches **42** and **44** at predetermined times during rotation of member **20** as determined by the relative position of the rollers on cam surfaces **16** and **18**. In this manner, the position of the rollers along cam surfaces **16** and **18** can be sensed and converted into an electrical function by the appropriate opening or closing of either reed switches **42** and **44**. It is obvious that any number of reed switches and magnetic materials could be positioned on the support **10** on rotary member **20** as desired in a given installation to provide almost limitless combinations of electrical functions.

It is quite obvious that in the present invention it is impossible to accidentally operate the electric switch and the switches cannot be tied in the operated position. In addition, unlimited overtravel of the movable members **12** and **14** is made possible without damage to the switch.

Another important feature of the present invention is that the bearing shaft and other moving conductive portions of the mechanism can be completely isolated from the electric contacts and wiring. The switch also enables the use of reed switches which operate in a controlled environment but which enables this advantageous use without the normal involvement of springs. Therefore, the present invention teaches a limit switch assembly which is very positive in its operation and which is virtually maintenance proof. Consequently, the present limit switch assembly is not beset by the normal problems associated with a limit switch operating in the environment in which a limit switch is expected to function.

While the embodiment of the present invention, as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is:

1. A limit switch assembly for sensing extremes of linear movement, said limit switch assembly comprising: switch support means carried in fixed relationship with respect to an object whose linear motion is to be sensed; switch positioning means rotatably carried by said switch support means; switch actuating means carried by said switch positioning means; reed switch means carried by said switch support means and positioned in an electrical circuit energizable when an object whose linear motion is to be sensed is at an extreme of movement; and switch

operating means carried by an object whose linear movement is to be sensed and engaging said switch positioning means during every portion of its linear movement, said switch operating means rotating said switch positioning means at predetermined points in the linear movement of the object whose movement is being sensed to move said switch actuating means in alignment with said reed switch means to selectively energize and deenergize electrical circuits.

2. A limit switch assembly for sensing the position of an object being linearly moved, said limit switch assembly comprising: a support member being fixed with respect to an object capable of being linearly moved; a substantially circular member being centrally journalled on said support member and including rollers peripherally carried on said circular member; magnetic material carried by said substantially circular member; reed switches carried by said support member in juxtaposed relation to said circular member; and cam means carried by the object capable of linear movement in engagement with said rollers, said cam means engaging said rollers during every

portion of linear movement thereof and selectively inducing rotational motion in said substantially circular member thereby positioning said magnetic material relative to said reed switches so that the reed switches are energized or deenergized depending on the area on said cam means engaging said rollers thereby sensing the amount of movement generated in the object whose linear movement is being sensed.

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