

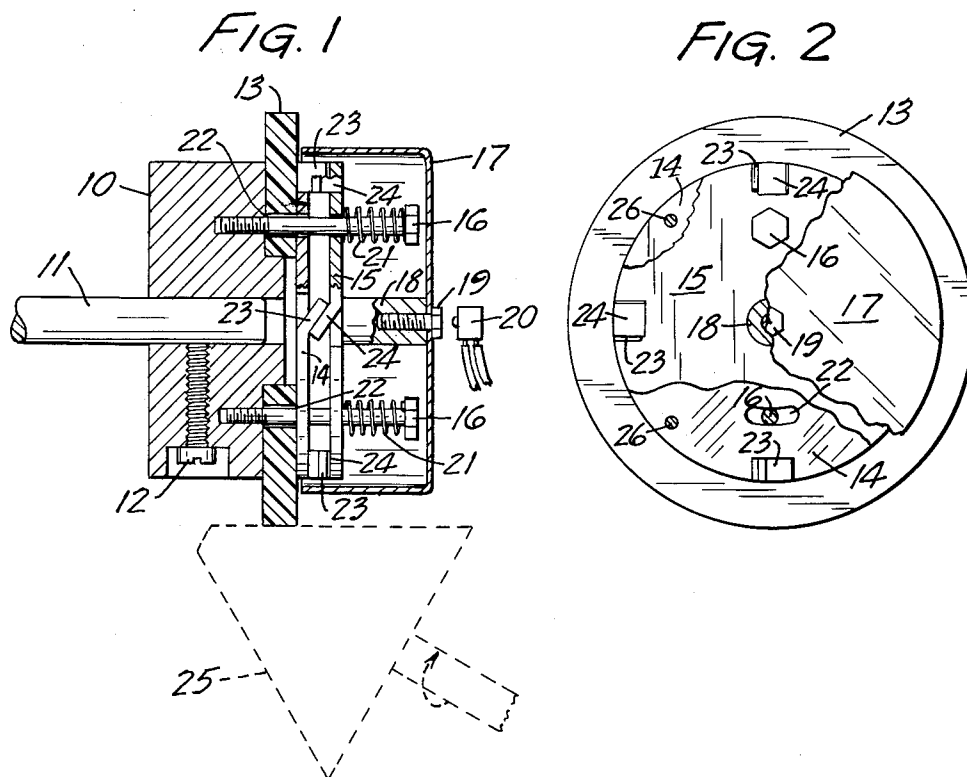
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J. J. FENNESSY

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OVERLOAD SWITCHING DEVICE

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INVENTOR
BY JOHN J. FENNESSY
Carpenter, Abbott, Rosenthal & Kinney
ATTORNEYS

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OVERLOAD SWITCHING DEVICE

John J. Fennessy, Rochester, N.Y., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn., a corporation of Delaware

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1 Claim. (Cl. 200—61.46)

This invention relates to switching devices, and is particularly concerned with mechanical switch means responsive to overload conditions for disconnecting a power supply or other actuating mechanism on the application of excessive loads.

The invention is of particular utility as an overload switching device in connection with thermocopying machines such as described in Kuhrmeyer et al. United States Patent No. 2,891,165, and in connection with such machines may be employed for example to open the lamp circuits and extinguish the lamp on the application of excessive load to the belt-moving apparatus. As a result, any resistance to belt motion caused by binding or sticking of copy-paper or printed original results in immediate extinguishing of the lamp supplying the copying radiation, thereby preventing excessive heating of any portion of the original, copy or machine components.

As illustrated in FIGURE 1 of the patent drawing in the Kuhrmeyer et al. patent, a roll 13 serves as a drive roll for a belt 10, for carrying the composite of copy-paper and printed original past the lamp 31 and through the copying machine. The roll 13 is ordinarily driven through an adjustable speed device in which a motor-driven drive cone rotates a friction disc attached to the shaft of the roll 13.

In the accompanying drawing, FIGURE 1 is an elevation, largely in section, of my overload switch device as built into the power input mechanism of such a copying machine, and FIGURE 2 is an end view, partially cut away to show location of parts, of the switch member of FIGURE 1.

In FIGURE 1, a drum 10 is mounted at the end of a shaft 11 by means of a set screw 12, the shaft 11 representing the shaft of the drive roll 13 of a copying machine as described in the Kuhrmeyer et al. patent. A friction drive disc 13 is located adjacent the flat face of the drum 10 and is capable of restricted rotative movement thereagainst. A first deflection plate 14 is fastened by means of rivets 26 to, or forms a part of, the friction disc 13. A second deflection plate 15 is located adjacent the first deflection plate, being attached to the drum 10 through bolts 16 in a manner preventing relative radial motion but permitting axial motion against the compression afforded by springs 21. A cover 17 is mounted on a post 18 centrally attached to the deflection plate 15 by means of a screw 19, the head of which forms a contact point for a micro switch 20.

The friction disc 13 and attached first deflection plate 14 are provided with openings 22 at the location of each of bolts 16 to permit restricted radial movement with respect to the drum 10.

The first deflection plate 14 is provided with outwardly directed tabs 23, forming an obtuse angle with the direction of rotation as shown, and the second deflection plate 15 is similarly provided with corresponding oppositely inwardly directed tabs 24.

In operation, the springs 21 press the plate 15 against the plate 14 with sufficient force to cause rotation of the drum 10 and shaft 11 when torque is applied to the disc 13 through the drive cone 25. Some additional driving torque is provided by friction between the contacting faces of the disc 13 and the drum 10, which is of assistance in starting the machine. Under the stresses normally developed in the operation of the machine, the springs 21 will

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hold the two deflection plates in the approximate position indicated, with the screw 19 out of contact with the switch 20. The introduction of any additional mechanical resistance, causing a drag on the shaft 11 and drum 10, then results in radial movement between the drum and the disc 13 under the continued torque imparted by the cone 25, with the result that the tabs 23 slide against the tabs 24 and force the plate 15 away from the plate 14, thus also actuating the switch 20 and causing the lamp supplying the copying radiation to be extinguished. The same or a separate switch or relay then also disconnects the drive motor.

It will be recognized that the entire overload switch device thus described is compact and requires almost no additional space over that required by the drive assembly normally employed, consisting of the drum 10, disc 13 and drive cone 25. The switch is highly sensitive, a radial movement between disc 13 and drum 10 of less than four or five degrees of arc being all that is required to provide axial movement sufficient to operate the micro switch 20. Indeed, the axial movement is sufficient to operate additional mechanical linkage in place of or in addition to the micro switch, such mechanical linkage then requiring resetting in order to permit further operation of the copying machine.

As previously noted, the disc 13 is rotatable against the drum 10 under overload conditions, but the frictional contact between the two provides significant added torque which is useful in starting the operation of the copying machine without prematurely activating the overload switch.

The device of this invention is particularly useful for applications, such as that hereinabove described, involving variable speeds and particularly low speeds such as are obtained with the cone-drive mechanism as described. It will be appreciated that drive means other than a friction cone may equally well be employed, such means including belt or multiple gear drive, and that the device may be used in connection with other types of apparatus and for other purposes.

What is claimed is as follows:

A compact safety shut-off and power input device suitable for mounting in axially extended position at the end of a rotatable shaft, and comprising, in combination:

- (a) a rotary drum axially attachable to said shaft end and having a flat end face;
- (b) a power input disc having an inner flat face in frictional contact with said end face and having a peripheral edge surface for making frictional contact with a drive cone;
- (c) a deflection disc centered on and attached to said disc (b) and having a plurality of edge tabs extending outwardly from said disc (b) at an obtuse angle from the direction of rotation, said discs (b) and (c) being provided with a plurality of equally spaced arcuately extended slot-like perforations;
- (d) a pressure disc adjacent said deflection disc, having pressure-surfaces cooperatively positioned with respect to said tabs for imparting axial motion to said disc on relative rotational movement of said discs (c) and (d), having a plurality of bolt-hole perforations corresponding to said slot-like perforations, and having an axial cover-mounting extension;
- (e) bolt-like mounting means passing through the perforations in said discs and adjustably mounted in said drum;
- (f) spring means on each of said mounting means in position for urging said discs toward said drum;
- (g) cup-shaped cover means mounted on said extension; and
- (h) a switch contact element carried on said extension,

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located axially of said device and outwardly of said cover means.

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