June 3, 1930. T. R. COOK ET AL 1,761,708

MINE HOIST ALARM SWITCH

Original Filed March 24, 1927

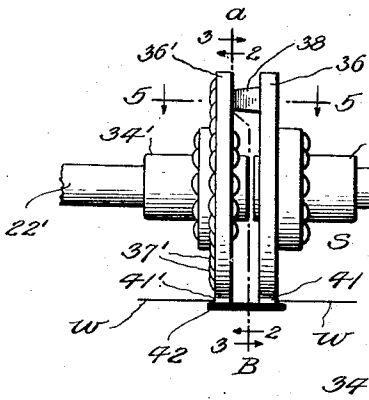


FIG. 1

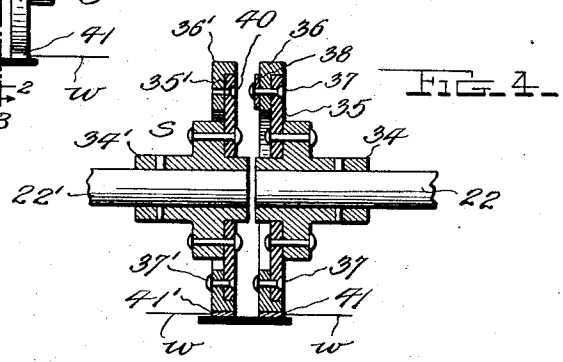
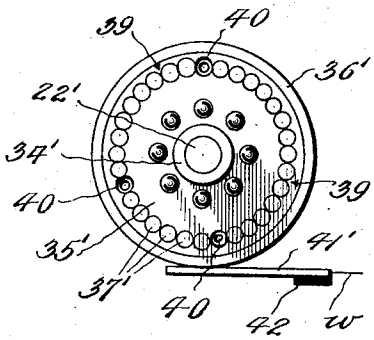


FIG. 4

FIG. 2



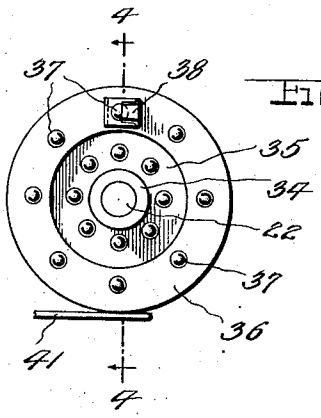


FIG. 3

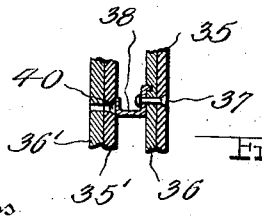


FIG. 5

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UNITED STATES PATENT OFFICE

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MINE-HOIST ALARM SWITCH

Original application filed March 24, 1927, Serial No. 178,052. Divided and this application filed December 22, 1927. Serial No. 241,896.

Mine hoists commonly embody two drums for simultaneously operating two cages in opposite directions, one drum being secured to a driven shaft of the hoisting engine or motor, while the other drum is clutched to the shaft, permitting relative turning of the two drums to set the hoist for operation at different levels, though normally said drums are constrained to rotate synchronously at uniform speed. Two cage position indicators and two safety hoist-stopping mechanisms are commonly controlled by the two drums, and in case of slippage or breakage of any parts between the drums and said indicators and mechanisms, or if the operator does not clutch the loose drum to the shaft in the proper predetermined relation with the fixed drum, the indicators give incorrect readings and the safety mechanism will not function as intended. Hence, a great hazard of danger exists and severe accidents are not in frequent.

It is the object of our invention to provide a novel and advantageous form of circuit-closing switch adapted to effect automatic actuation of an alarm (audible or visible) in case of such occurrences as those above set forth.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a side elevation of the switch.

Fig. 2 is a vertical sectional view on line A—B of Fig. 1 looking in the direction of the arrows 2—2.

Fig. 3 is a view cut on the same plane as Fig. 2 but looking in the direction of the arrows 3—3.

Fig. 4 is a vertical sectional view on line 4—4 of Fig. 3.

Fig. 5 is a detail sectional view on line 5—5 of Fig. 1.

In the drawings above briefly described, 22 and 22′ denote two axially alined shafts for connection with the two hoisting drums to be driven synchronously therewith, and S denotes a switch on the adjacent ends of said shafts, which switch remains idle as long as these shafts rotate uniformly, but comes into play to close the circuit of an alarm, in case of any relative turning of said shafts, caused by relative turning of the hoisting drums from any cause. Switch S is preferably constructed in the manner herein specifically described.

34 and 34′ denote two metal hubs suitably secured upon the adjacent ends of the shafts 22—22′. Concentric with these hubs and riveted or otherwise secured thereto, are two disks 35 and 35′, formed of insulating material. At the peripheral portions of these disks, contact rings 36 and 36′ are provided, and fasteners such as rivets 37—37′ secure said rings to the disks 35 and 35′ respectively. One of the fasteners 37 attaches a brush 38 to the ring 36, and only a sufficient number of these fasteners are employed to effectively secure this ring to the disk 35. The fasteners 37′ however, are disposed in arcuate groups as seen in Fig. 3, the fasteners of each group being preferably in contact with each other, establishing arcuate contacts 39. These arcuate contacts 39 form portions of a circular track upon which the brush 38 may travel, the remainder of this track being formed by spaces or dead spots 40 between said arcuate contacts 39.

The dead spots 40 correspond to the different elevations at which the hoist may be set for operation, and at any setting of the hoist, the brush 38 normally engages one of these dead spots, at which time the circuit of the alarm is broken. In case of relative slippage or turning of the shafts 22—22′, the brush 38 engages one of the adjacent arcuate contacts 39 and the circuit for the alarm is then immediately completed.

Brushes 41—41′ contact with the rings 36 and 36′ respectively, and are suitably mounted on an insulating support 42, said brushes being connected electrically with the wires W. Thus, whenever the brush 38 engages one of the contacts 29, the current will flow from one wire to the other, through the brush 41, ring 36, brush 38, contact 39, ring 36′ and brush 41′, and such flow of current is used to operate the alarm.

With further reference to the dead spots

40, we will assume a shaft 800 feet deep. This shaft has a surface landing and landing levers below grounds, located at 300, 500 and 800 feet below the surface. The shaft accommodates two cages connected by the usual cables with the winding drums respectively, it being remembered that one of these drums is secured to a driven shaft while the other drum has a clutch connection with said shaft.

When installing the switch, it is not known exactly where the dead spots should occur. Therefore, in the initial manufacture of the switch, there will be no dead spots provided. Later, the location of each is known, upon installation of said switch. This location is determined in the following manner:— One of the cages is placed at the 800 foot level and the other at the dumping point above the surface of the ground. With the switch S now installed, it is an easy matter to determine the dead spot which should then engage the brush 38, and this dead spot is provided by punching out one of the rivets 37′. When the dead spot is provided as just described, the shafts 22 and the hoisting drums bear the proper relation for operating at the 800 foot level, and as long as the parts retain this proper relation, the switch will not come into play to operate the alarm. However, in case of any slippage or the like, causing relative rotation of the hoisting drums and consequent relative rotation of the shafts 22—22′, the switch immediately functions to complete the alarm circuit.

The second dead spot is obtained by positioning one cage at the 500 foot level and the other at the dumping point above the surface of the ground, this positioning being attained by effecting relative rotation of the hoisting drums in the required manner. When this proper positioning of the cages is obtained, and the loose drum is again clutched to the shaft, a second one of the rivets 27′ is removed, providing the second dead spot to co-act with the brush 38 when the hoist is set for operating at the 500 foot level. The third dead spot for the 300 foot level, is similarly located.

It is very unlikely that after changing the hoist from the 800 foot level to another level, the brush 38 would stop on the same dead spot, and the same applies to setting of the hoist for operation at other levels. Hence, it will be found that the number of dead spots necessary, almost invariably corresponds to the number of the levels at which the hoist must be set to operate.

Excellent results are obtainable from the general construction shown and described, and it is therefore preferably followed. However, within the scope of the invention as claimed, variations may of course be made.

We claim:—

1. An operating switch for a mine hoist slip indicator, comprising two axially alined rotatable members, a disk secured to one member and having a track concentric therewith and disposed at the side thereof toward the other member, said track consisting of arcuate contact portions and dead spots between them, said dead spots corresponding to the different levels at which the hoist must operate, a brush mounted on said other member for rotation bodily therewith, said brush normally engaging one of said dead spots, and current conducting means for said contact portions and said brush, said arcuate contact portions occupying substantially 360°, said dead spots being of infinitesimal dimension in degrees compared to the length of said arcuate contact portions.

2. A switch comprising two axially alined insulating disks and means for rotatably mounting the same, contact rings concentric with, the disks, fasteners securing the rings to the disks, a brush attached to one of said disks and rings by means of one of said fasteners, the fasteners for the other ring and disk constituting contacts for co-action with said brush upon relative rotation of the two disks, and current conducting brushes contacting with said rings.

3. In a switch, an insulating disk and means for rotatably mounting the same, a contact ring concentric with the disk, and fasteners of electrical conducting material securing said ring and disk together and constituting contacts, said contacts and said ring being adapted for engagement with brushes.

4. In a switch, an insulating disk and means for rotatably mounting the same, a contact ring concentric with the disk, metallic fasteners securing said ring and disk together, and a brush secured to the disk and ring by one of said fasteners, said brush being adapted for co-action with a contact, said ring being adapted for co-action with an extraneous brush.

5. A structure as specified in claim 3; said fasteners being disposed in groups, the heads of the fasteners of each group being disposed in contact with each other.

6. A switch having an elongated contact formed of contacting heads of fasteners, and an insulating carrier for said fasteners.

In testimony whereof we have hereunto affixed our signatures.

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THOMAS R. COOK.