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SAFETY GUARD FOR ABRASIVE WHEELS

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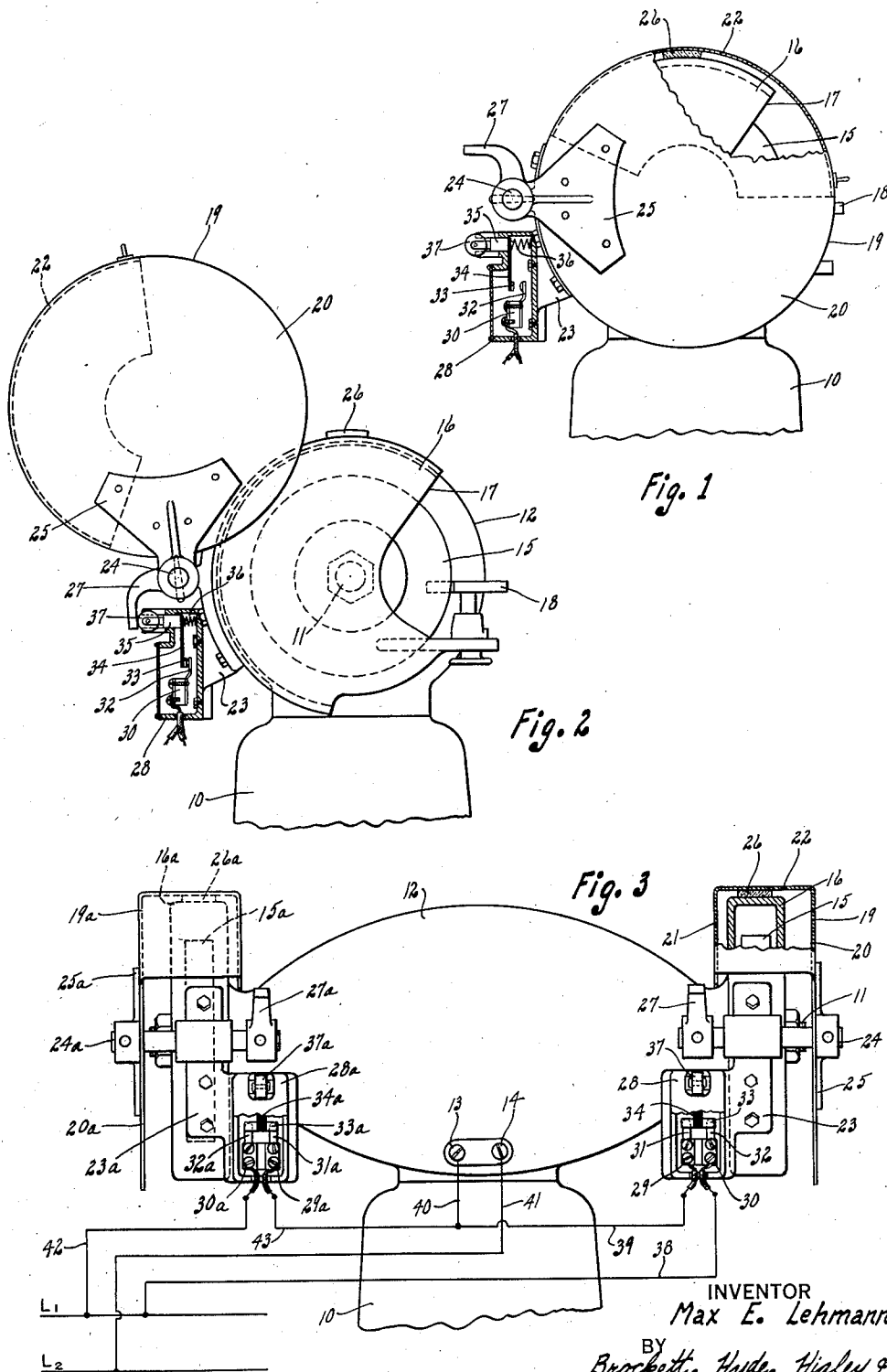


Fig. 1

Fig. 2

Fig. 3

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SAFETY GUARD FOR ABRASIVE WHEELS

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8 Claims. (Cl. 51—268)

This invention relates to a safety guard for abrasive wheels and the like, and more particularly to a guard adapted to act as a protection against contact with the wheel after active use has ceased, when the power has been shut off and the stored energy in the wheel continues its rotation.

An object of the invention is to provide a safety guard adapted to substantially completely enclose an abrasive wheel whereby to prevent accidental contact with the wheel during the period following the disconnection of the power source and while the wheel is still rotating at a fairly high rate of speed due to its momentum.

Another object of the invention is to provide in a power operated abrasive wheel a power circuit for energizing the power means, and means for opening and closing the power circuit by the manipulation of a guard. More particularly, such a guard is arranged to close the power circuit when the guard is moved to its open position and to open or break the circuit when the guard is moved to its closed or guarding position.

The invention is more fully illustrated and described in the accompanying drawing and specification and the essential features are summarized in the claims.

In the drawing, Fig. 1 is a side elevation of an abrasive wheel unit, showing the safety guard in closed position; Fig. 2 is an elevation similar to Fig. 1, showing the guard in open position; while Fig. 3 is a rear view of the abrasive machine, showing the safety guards in closed position and the electric circuit for operating the machine.

It is the general practice to provide abrasive and grinding wheels with protective guards or hoods. These hoods are often of cast construction and house the wheel with the exception of a cut-out portion at the point where the member to be ground is presented to the wheel. Such hoods protect the operator from flying particles of abrasive or metal dust or other particles which might fly during the grinding operation. In such cases, the hood may be connected with an exhausting system. Another purpose of these hoods is to protect the operator from wheel explosion.

A wheel protected as described above is, nevertheless, a source of danger after the power has been shut off, as the wheels are often of considerable weight and travel at a high rate of speed due to the flywheel effect. During such a period of slowing down, persons standing near the wheel may come in contact therewith through an open portion of the hood or casing and thus receive injury. My invention provides an additional

guard so connected in the power circuit which causes the rotation of the wheel as to insure that the guard will be moved to a position where it substantially encloses the entire wheel when the power is cut off, and preferably so arranged that the power circuit is closed to start the rotation of the wheel when the guard is moved to its open position.

I have illustrated my guard as applied to a grinding machine having two abrasive wheels mounted on a common shaft, although it will be understood that the device is applicable to a single wheel. In the apparatus illustrated, a frame 10 supports a shaft 11 for rotation by means of an electrical motor indicated generally at 12. The terminals for the connection of power to this motor are indicated at 13 and 14. Upon the shaft 11 are mounted the abrasive wheels 15 and 15a. The protective devices about each of these two wheels are exactly alike and, therefore, that connected with wheel 15 will be described, the parts adjacent the opposite wheel being provided with similar characters with the suffix "a".

The customary protective hood 16, such as is often supplied to protect the operator from flying particles or from injury due to an exploding wheel, is securely fastened to the frame 10. A cut-out portion 17 is provided to permit access to the periphery of the grinding wheel and a rest 18 is provided for the support of the material to be ground. This arrangement is old in the art.

My invention provides an additional safety guard 19 comprising side members 20 and 21 and a peripheral member 22 so constructed as to substantially completely enclose the grinding wheel, especially the portion normally exposed by the opening 17 when the guard is in its completely closed position, as seen in Figs. 1 and 3. This guard is so mounted with relation to the frame that it is movable into its two positions shown in Figs. 1 and 2, namely, the closed or guarding position of Fig. 1; and the open or out-of-guarding position of Fig. 2. The mounting illustrated comprises a bracket 23 secured to the rear side of the protective hood 16 and supporting for oscillation a shaft 24. To the shaft is pinned a bracket 25 which is secured to the safety guard 19. A stop block 26 of leather, fiber or other suitable material is secured to the top of the protective hood to act as a cushion stop for the safety guard in its closed position.

An operative connection is provided between the safety guard and the power circuit for the

operating motor so as to control the opening and closing of said circuit by the moving of the guard between its two positions. The construction shown comprises an arm or finger 27 adapted to move with the guard 19 and in the form shown comprises a separate member pinned to the shaft 11.

The means for opening and closing the operating circuit of the motor in the present case comprises an electric switch 28 of known construction comprising binding posts 29 and 30 for two sides of an electric power circuit, and having fingers 31 and 32 adapted to be connected by a conductor bar 33 which is carried by an insulating arm 34. The conductor bar and insulating arm are guided for motion into and out of contact position by a plunger 35 reciprocally mounted in the upper portion of the switch casing and normally biased in its out-of-contact position by spring 36. The plunger is preferably provided with a roller 37 which is engageable by the arm 27 connected with the safety guard.

It will be apparent from the apparatus described that movement of the safety guard to its open position, as shown in Fig. 2, will cause the arm 27 to engage the roller 37 and move the conductor bar and associated parts into contact with the fingers 31 and 32, thus initiating operation of the motor and causing rotation of the abrasive wheel. It is also apparent that the only means for disconnecting the power circuit from the motor is to move the guard to its closed position, shown in Fig. 1, which permits the spring 35 to move the conductor bar outwardly or to the left as seen in Fig. 1, so as to break the contact between fingers 31 and 32 and shut off the power supply to the motor. I have so arranged the parts that the power circuit is not broken until the guard is moved sufficiently toward its closed or guarding position that its center of gravity is vertically forward of the shaft 24 so that thereafter gravity will insure the continuation of the movement of the guard toward closed position if the operator should release it at that point.

Operating circuits for the motor are shown diagrammatically in Fig. 3 where L1 and L2 are main supply lines, terminal 14 of the motor is connected by conduit 41 with L2 and the control switches indicated generally by 28 and 28a form connections in parallel between motor terminal 13 and L1.

In operation, assuming that only one workman is operating the machine using wheel 15, he raises the guard 19 to the position of Fig. 2. In moving to this position arm 27 depresses plunger 35 which causes a connection between fingers 31 and 32 and completes a circuit from L1 through line 30, terminal 30, finger 32, conductor bar 33, finger 31, terminal 29, line 39, line 40, motor terminals 13, 14, and line 41 to L2.

When he has finished his grinding operation, he lowers the guard to the position shown in Fig. 1. This opens the circuit by releasing the plunger which permits spring 36 to disconnect the conductor bar 33 from fingers 31 and 32. In moving the guard to do this he must necessarily bring it forward past the center of shaft 11 and therefore must allow it to come to closed position, as in Fig. 1. Thus, the wheel assembly is enclosed and there is no possibility of contact with the wheel during the coasting period following the opening of the motor circuit.

If the wheel 15a is used instead of wheel 15, raising of the guard 19a makes a circuit to the motor from L1 through line 42, terminal 30a,

finger 32a, conductor bar 33a, finger 31a, terminal 29a, line 43, line 40, motor terminals 13, 14, and line 41 to L2.

If operators are working at both wheels, previously mentioned circuits are established to operate the motor. In this case, both guards are in the open position as shown in Fig. 2. When the operator at wheel 15a, for example, finishes his operation and closes the guard 19a, the wheels will continue to operate under power until the operator on wheel 15 finishes his operation and closes the guard 19. Or, in the other case, if operator on wheel 15 finishes first and closes guard 19, the wheels will continue to be driven until the operator on 15a has finished and closed the guard 19a.

I have thus provided a guard effective to prevent injury to persons making accidental contact with an abrasive wheel coasting at high speed after power has been disconnected. This guard may well be made of light construction, for instance, of sheet metal. The arrangement of parts is such that in order to disconnect the power source from the wheel driving motor, the guard must be moved to its closed or guarding position.

What I claim is:

1. In combination, an abrasive wheel rotatably mounted upon a frame, power means for rotating said wheel, a supply circuit for said power means, a control member for opening and closing said circuit, a guard mounted on said frame for movement into and out of guarding position, said guard in guarding position being adapted to substantially enclose said wheel, and operative connections between said guard and control member for causing movement of said member to circuit closing position when said guard moves out of guarding position and for causing movement of said member to circuit opening position when said guard moves into guarding position.

2. In combination, an abrasive wheel rotatably mounted upon a frame, electric motor means for rotating said wheel, an electric power circuit for operating said motor, a switch in said circuit, a guard adapted to enclose said wheel and movable to open and closed positions, an arm movable with said guard, and said arm being constructed and arranged to cause closing of said switch when said guard is moved to open position and to cause opening of said switch when said guard is moved to closed position.

3. In combination, two abrasive wheels rigidly mounted upon a shaft, power means for rotating said shaft, a supply circuit for said power means, two control members arranged in parallel for opening and closing said circuit, a guard for each wheel movable to open and closed position, each guard in closed position being adapted to enclose its wheel, each guard having an operative connection with one of said control members constructed and arranged to cause movement of the said control member to circuit closing position when the guard is moved to open position.

4. In combination, an abrasive wheel rotatably mounted upon a frame, means for rotating said wheel, a safety guard mounted on said frame for movement into and out of guarding position, said guard being constructed and arranged substantially to completely enclose said wheel when in guarding position, and means rendering said wheel rotating means operative only upon movement of the guard out of guarding position.

5. In combination, an abrasive wheel rotatably mounted upon a frame, means for rotating said

5 wheel, a safety guard mounted on said frame for
movement into and out of guarding position, said
guard being constructed and arranged substan-
tially to completely enclose said wheel when in
10 guarding position, and means rendering said
wheel rotating means inoperative upon move-
ment of the guard into guarding position.

15 6. In combination, an abrasive wheel rotatably
mounted upon a frame, means for rotating said
wheel, a safety guard mounted on said frame for
movement into and out of guarding position, said
guard being constructed and arranged substan-
tially to completely enclose said wheel when in
20 guarding position, means rendering said wheel
rotative means operative upon movement of said
guard out of operative position, said guard being
constructed and arranged to move automatically
to completely closed position after movement by
an operator to a partially closed position, and
means rendering said wheel rotating means in-

operative upon movement of said guard to said
partially closed position.

7. In combination, an abrasive wheel rotatably
mounted in a frame, electric motor means for
rotating said wheel, an electric power circuit for
operating said motor, a control switch for said
circuit, an operator-operated guard adapted to
enclose said wheel and pivotally mounted on a
shaft to the rear of said wheel, said guard being
movable about said shaft to open and closed posi-
tions, an arm rigid with said shaft, and said arm
and switch being so arranged that said arm closes
said switch when said guard is moved to open
position.

8. The combination of claim 7, in which said
guard and arm and switch are so arranged that
said arm opens said switch only when said guard
has been moved to such position that gravity will
complete its closing movement when the operator
releases said guard.

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