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SAFETY DEVICE FOR MACHINE TOOLS

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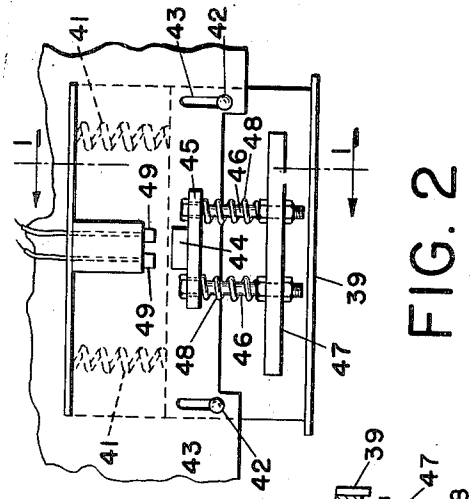


FIG. 2

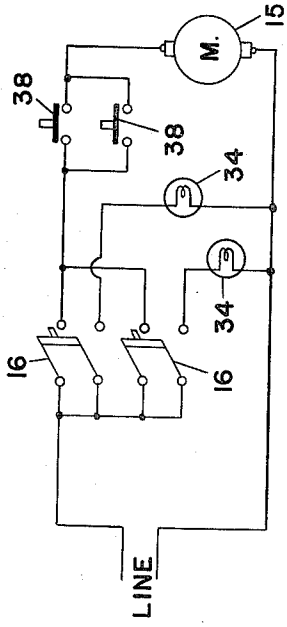


FIG. 3

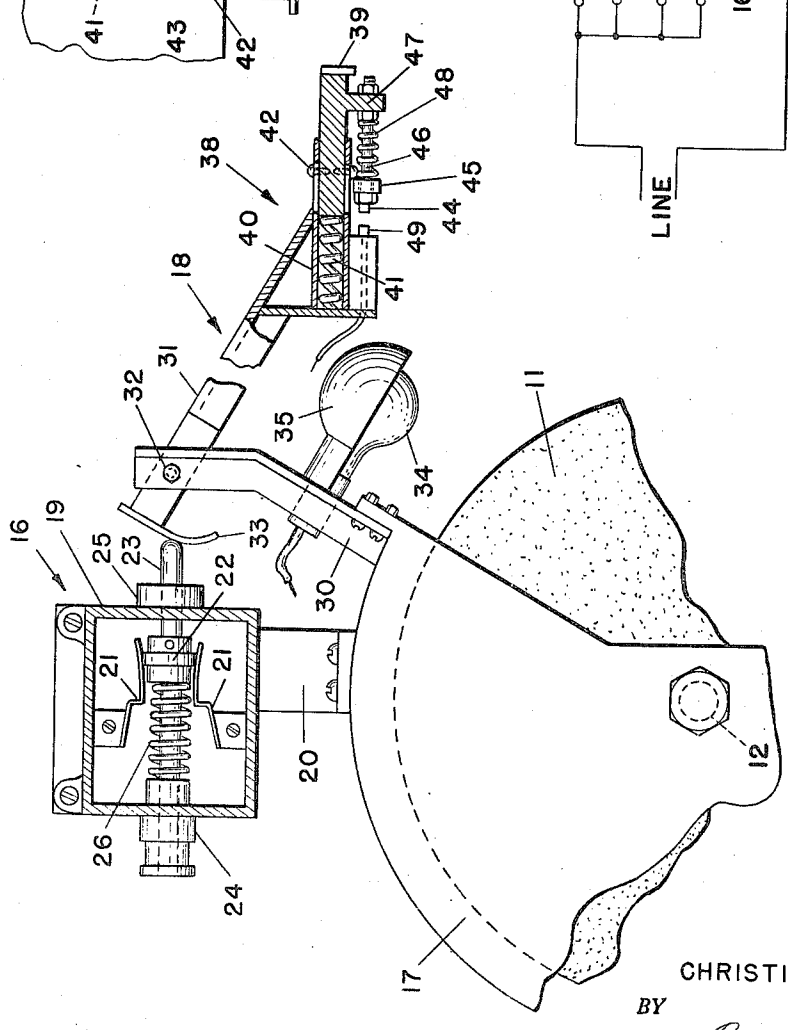


FIG. 1

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SAFETY DEVICE FOR MACHINE TOOLS

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6 Claims. (Cl. 192—133)

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This invention pertains to the art of machine tools, and it comprises a new safety device operable to protect the user of the machine.

Although the device of this invention is of more general application, the disclosed embodiment comprises a grinding machine, particularly a machine of the type termed a bench grinder.

The operator of a bench grinder conventionally stands in front of the rotating abrasive wheel thereof, and he feeds the work to the wheel manually. Particles of the piece and of the abrasive are thrown from the wheel, and there is danger that the operator will become injured thereby. It is a purpose of the present invention to avoid such injury to the operator.

The present application is a continuation in part of my co-pending application, Serial No. 608,807, filed August 3, 1945 now abandoned.

The device of my co-pending application comprises a shield, specifically in the form of a transparent panel, which is manually positionable into and out of guard position and operable when moved into guard position to connect power to the abrasive wheel. Actuation of the shield to connect the power places it in position between the abrasive wheel and the operator, whereby it protects the operator from flying particles.

The present invention comprises an abutment member, positioned where the operator actuates it incident to operating the machine. The abutment member is actuated to complete connection of the abrasive wheel with its power source and thereby power the machine, actuation of the abutment member being accomplished by the operator stationing himself to work the machine. In the case of the power source being an electric motor, the power-control means is a motor switch. A shield is provided similar to the shield of my co-pending application hereinbefore referred to, which operates a line switch to connect the power source when it is moved into guard position. The shield of the present invention carries the motor switch, so positioned that it is actuated by the operator automatically by the operator assuming his natural position for operating the machine, but the motor switch is out of position to be engaged by the operator when the shield is up out of guard position.

When the operator discontinues working the machine, the circuit through the motor switch is automatically opened. If the operator inadvertently touches the abrasive wheel, he instinctively jerks away, and in doing so he automatically opens the motor switch and shuts off the power by the act of disengaging the abutment member.

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An electric light is also provided to illuminate the wheel, and a light switch is provided operable to be in closed condition to illuminate the work whenever the machine is operated.

A fuller understanding of the principles of the invention, and details of the preferred embodiment disclosed, will be derived from the accompanying drawings. In the drawings:

Fig. 1 is a fragmentary side elevation of a bench grinder embodying the present invention, a portion thereof being a section taken on line 1—1 of Fig. 2;

Fig. 2 is an elevation of the motor activating switch, the view being upwardly in Fig. 1; and

Fig. 3 is a wiring diagram of an electrical circuit for the invention.

The machine illustrated in Fig. 1, to which the invention is applied, comprises a bench grinder, which includes one or more grinding wheels 11, mounted to rotate with the shaft 12. Suitable power means are provided to drive the shaft 12, such as the electric motor 15 indicated in Fig. 3. In accordance with prior-art practice, the shaft 12 can be the motor shaft, which supports a grinding wheel or some other form of abrasive or buffing wheel mounted on each of its ends. The structure appearing in Fig. 1, and described with reference to Fig. 1, is a single abrasive wheel with its appurtenances. In practice there can be two similar structures mounted at opposite ends of the shaft 12.

A line switch 16, mounted on a stationary portion of the machine, for example on the wheel guard 17, is positioned for operation by the shield 18 to connect the power source. The line switch can be the same as is disclosed in the hereinbefore referred to co-pending application, Serial No. 608,807. The preferred embodiment shown comprises a switch housing 19, supported by the bracket 20, mounted on the wheel guard 17. Fixed terminals 21 are provided, preferably of the opposed-spring-contact type, and the contact member 22 is movable into and out of engagement with the terminals 21. The contact member 22 is attached to the plunger 23 which is slidable longitudinally in the guides 24 and 25 in the end walls of the housing 19. The plunger 23 is spring actuated by compression spring 26 to move the contact member 22 out of engagement with the terminals 21.

The shield 18 is supported by the bracket 30 which is mounted on the guard 17. The shield

comprises a panel 31 of glass or other suitable material, and is mounted to pivot at 32, its movement being downwardly into guard position and upwardly to idle position. At one end the panel 31 carries an abutment shoe 33, which is positioned to engage and actuate the plunger 23 against the action of the spring 26 whenever the shield 18 is moved into its lower guard position.

The light 34 is preferably provided to illuminate the work and the wheel when the machine tool is being used. The light 34 can be mounted in any suitable manner, for example as shown on the bracket 30, and the light shield 35 can be provided as shown.

The shield 31 carries the motor switch 38 at its forward end. The switch 38 embodies the abutment member 39, which is positioned where it is engaged by the body or torso of the operator when he naturally stations himself to operate the machine.

The abutment number 39 is mounted to slide in the frame 43, preferably formed integral with the forward edge of the panel 31, the abutment member being projected to its outermost position by the springs 41, and held positioned by the locating pins 42 which ride in the guideways 43.

Attached to the abutment member 39 to move therewith is the electrical contact 44 which, in the disclosed embodiment, is fixed to the dielectric block 45. The block is mounted to slide on the pins 46 which are attached to the bracket 47 forming part of the abutment member 39. The springs 48 hold the block 45 and the contact 44 in projected position along the pins 46, as illustrated in Fig. 2.

When the abutment member 39 is actuated longitudinally of the guideways 43, against tension of the springs 41, the contact 46 is pushed into engagement with the terminals 49, which closes electrical circuit across the terminals, and thereby powers the machine. After contact 44 engages the terminals 49, the springs 48 are compressed during continued travel of the abutment member, the travel being limited by the length of the guideways 43. Compression of the springs 48 predetermines the force of contact of 44 across the terminals 49. When the abutment member 39 is released, the springs 41 actuate it to its forward inactive position, operating to open circuit across the terminals 49 to thereby disconnect the power of motor 15.

Fig. 3 illustrates a wiring diagram for a bench grinder having two wheels 11, which, according to conventional practice, are mounted at opposite ends of the common shaft 12, Fig. 1. There is a line switch 16 for each wheel 11, operated to connect the power source by lowering the shield 31 of Fig. 1 to guard position. A light 34 for each wheel is in circuit with the switches 16, to be lit by either switch whenever its incident shield 31 is lowered into guard position.

Each shield 31 also comprises a motor switch 38, which is located at the front edge of the shield, as illustrated in Fig. 1. When the shield 31 is lowered into guard position by the operator, its switch 38 occupies a position in the path of the operator. When the operator stations himself to operate the machine, the abutment member 39 is engaged by some portion of his body, for example by his torso, the engagement operating to close the motor switch 38 incident to the wheel 11 to be operated, the wheel 11 being powered thereby. There are two motor switches 38 operable to complete the circuit of motor 15, the two switches 38 being available for alternative operation, depending upon which wheel 11 the operator desires to power and use.

By the present invention, the machine is incapable of being operated until and unless the shield 31 is lowered into guard position illustrated in Fig. 1, to close the line switch 16. In this position of the shield 31 the operator is effectively guarded against being injured by flying particles thrown from the machine. In addition, the motor drive of the machine is energized only when the operator has stationed himself to use the machine for machining. Unless and until the operator stations himself for operating the machine, the motor switch 38 is open. When the machine is in operation, if the operator is hurt, for example by inadvertently touching the wheel 11, he naturally jumps away from the machine and opens the motor switch 38. This affords protection against serious injury resulting from the machine continuing to run. The motor switch 38 also operates to disconnect the motor drive automatically when the operator is not using the machine.

The specification and accompanying drawings disclose a structure constituting a practical embodiment of the principles of the invention. The invention is not limited to the specific structure disclosed, the scope of the invention being determined by the accompanying claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. In a safety device for a power-driven hand-operated machine, a shield movable into guard position between the machine and the operator thereof and alternatively movable out of guard position, a power control mechanism operable to connect a power source by the shield being moved into guard position and alternatively operable to disconnect the power source by the shield being moved out of guard position, the shield when in guard position extending away from the machine and the outward edge thereof being then located for engagement by the body of the operator stationed for operating the machine, an operating control mechanism mounted at the outward edge of the shield and being operable when the shield is in guard position to power the machine by the body of the machine operator pressing against it.

2. In a safety device as defined in claim 1, a light positioned to illuminate the machine, the power control mechanism operating to turn the light on or off by the shield being moved respectively to and from guard position.

3. In a safety device for an electric-motor-driven hand-operated machine, a shield movable into guard position between the machine and the operator thereof and alternatively movable out of guard position, a line switch for the motor operable to closed position by the shield being moved into guard position and alternatively operable to open position by the shield being moved out of guard position, the shield when in guard position extending away from the machine and the outward edge thereof being then located for engagement by the body of the machine operator stationed to operate the machine, an operating switch at the outward edge of the guard and being operated to closed position by the body of the machine operator pressing against it.

4. In a safety device as defined in claim 3, an

electric light positioned to illuminate the machine, the light being in circuit with the line switch to be turned on and off by the shield being moved respectively to and from guard position.

5. In a safety device for an electric-motor-driven bench grinder, a shield movable into guard position between the grinding wheel and the machine operator and alternatively movable out of guard position, a line switch for the motor operable to closed position by the shield being moved into guard position and alternatively operable to open condition by the shield being moved out of guard position, the shield when in guard position extending away from the grinder and the outward edge thereof being then located for engagement by the body of the operator stationed for operating the grinder, an operating switch at the outward edge of the shield and being operated to respective closed and open conditions by the body of the machine operator being respectively

pressed into and moved out of engagement therewith.

6. In a safety device as defined in claim 5, an electric light positioned to illuminate the grinding wheel, the light being in circuit with the line switch to be turned on and off by the shield being moved respectively to and from guard position.

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