May 31, 1949. E. C. FIELDING 2,471,561

GUARD FOR GRINDING MACHINES AND THE LIKE

Filed Sept. 20, 1946 2 Sheets-Sheet 1

Fig. 1.

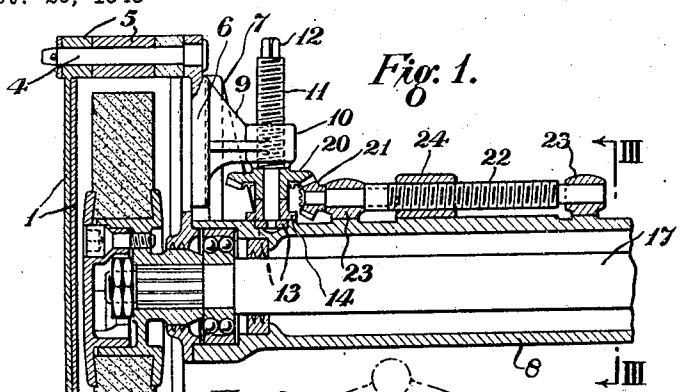


Fig. 2.

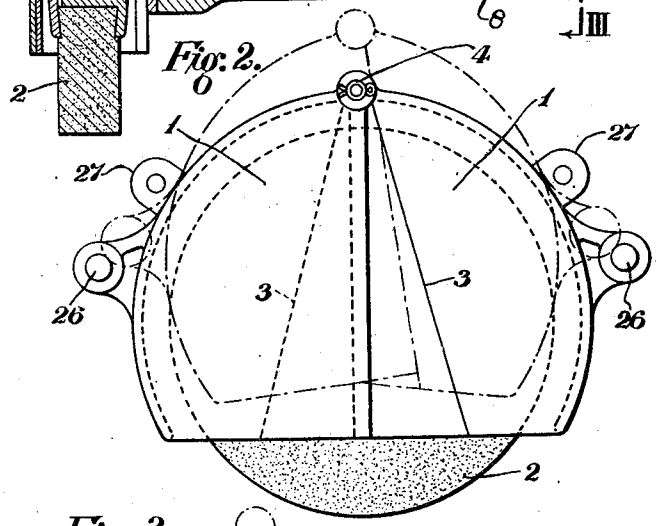
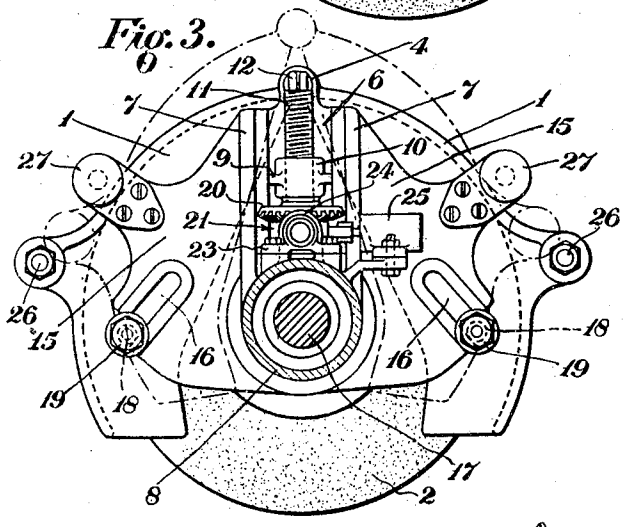


Fig. 3.



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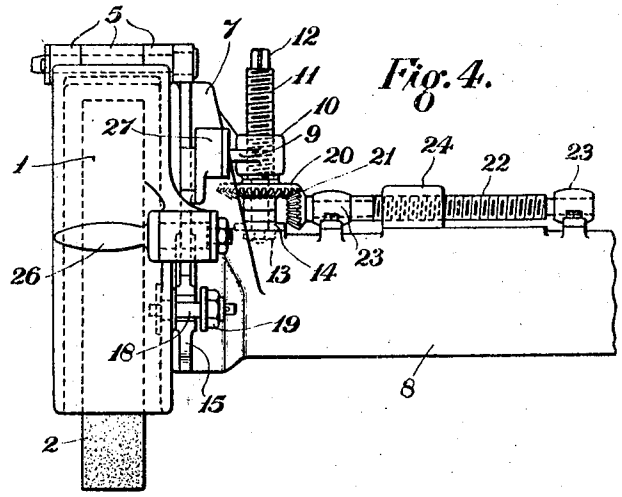

Fig. 4.

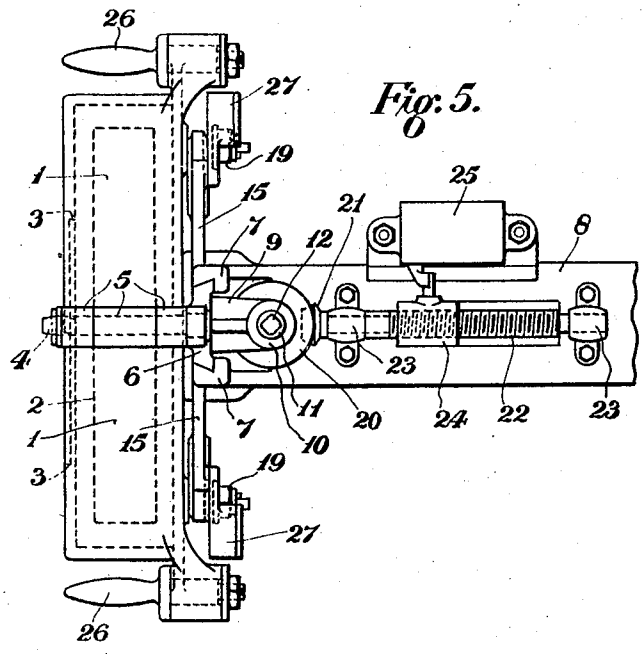

Fig. 5.

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GUARD FOR GRINDING MACHINES AND THE LIKE

Edgar Charles Fielding, Walsall, England

Application September 20, 1946, Serial No. 698,188
In Great Britain October 25, 1945

5 Claims. (Cl. 51—269)

1

This invention relates to guards for grinding wheels and the like, including circular saws and other wheel or disc-like circular abrasive or cutting members, such as cut-off discs or wheels made of abrasive material or of steel.

One of the objects of the present invention is to provide an improved guard which can be readily adjusted to suit the size of the wheel or disc that it is desired to protect.

Another object is to provide an adjustable guard for a power-driven grinding wheel or the like which will effectively safeguard operatives against accidents, such as whilst changing a wheel or disc or in the event of a wheel bursting.

A further object is to provide an adjustable guard which will enable a wheel or disc to be easily changed.

A still further object is to ensure that the grinding wheel or the like cannot be put into operation unless the guard is in its working position.

Another object is to ensure, by the adjustment of the guard, a substantially constant peripheral speed of the grinding wheel or the like as the diameter of the wheel wears down, or when a wheel of a different diameter is substituted, thereby ensuring maximum efficiency with various wheel diameters.

According to the invention, a guard for a grinding wheel or the like comprises two overlapping half covers or hood members hingedly mounted upon a common pivot-pin and having a pin-and-slot engagement with a relatively stationary part, in combination with a screw device for moving the pivot-pin inwards or outwards whereby the pin-and-slot engagement causes the covers or hood members to be opened out or closed in as required. The pivot-pin may be carried by a slide guided in a stationary part and carrying a nut engaged by a screw. The guard members may carry pins engaging cam slots in a stationary part; or may have cam slots engaged by pins on the stationary part. In either case the slots may be open at one end so that the pins can be disengaged therefrom, by operation of the screw device, to enable the guard members to be raised or thrown back when the wheel is to be changed. If the wheel is operated by an electric motor, the operation of the screw device can be arranged to cause a trip switch to come into action to break the circuit if and when the pins are caused to leave the slots. Also, by the operation of the screw device to vary the effective size of the guard to suit the wheel diameter, the peripheral speed of the wheel can be maintained

2

constant by suitably controlling the driving motor. To achieve these results, the screw device may, as it is rotated, convey motion to a control shaft which may operate a trip switch and/or operate means for automatically controlling the speed of the motor.

Figure 1 of the accompanying drawings is a longitudinal section through a portion of a grinding-wheel unit provided with a guard in accordance with the present invention.

Figure 2 is a front elevation of the grinding wheel and guard.

Figure 3 is a transverse section on line III—III, Figure 1, showing the guard and wheel in rear elevation.

Figure 4 is a side elevation of the guard.

Figure 5 is a plan view.

Referring to the drawings, which show a convenient embodiment of the invention in connection with a guard for a grinding wheel, such as, for example, for the grinding wheel of a motor-driven grinding unit described in my copending application, Serial Number 698,187, which issued as Patent No. 2,435,622, dated February 10, 1948, the guard comprises two half covers or hood members 1, 1, of substantially quadrantal or segmental contour and of channel section, so as to embrace opposite sides of the wheel 2. The two covers 1 overlap down the middle of the front, the vertical edge portion of one lying and being adjustable within a rebate 3 (Figures 2 and 5) in the front face of the other. They are hinged at their upper ends upon a common pivot pin 4 which can be raised and lowered by a screw device, as hereinafter described, and the two covers together form a guard of segmental form rather less than a complete circle, so as to allow a working peripheral sector of the grinding wheel to be exposed below the bottom straight edge of the guard, as shown in Figure 2. The two guard members 1 are hinged upon the pivot pin 4 by means of interfitting hinge knuckles 5, and the pin extends forwardly from a vertical dovetail slide 6 mounted between dovetail guides formed by two relatively stationary bracket members 7 which are carried by the end of the tubular housing 8 of the grinding unit. The slide 6 has a rearwardly-extending arm or lug 9 provided with a boss 10 which is drilled and tapped to form a nut that receives a vertical adjusting screw 11 having a square upper end 12 to engage a key or handle for hand operation. The lower end of the screw 11 has a head or enlarged portion 13 rotatably mounted in a suitable stationary part, such as the housing 8 of the grinding unit, and

held down by any convenient means, such as a flange part 14, so that the screw can rotate but cannot move axially.

The guide brackets 7 for the slide are extended laterally, as shown in Figure 3, in the form of side plates or wings 15a of a stationary frame, being situated behind and parallel to the back of the wheel guard; and formed in these side plates 15 are two obliquely-disposed slots 16 having closed inner ends but open outer ends, the latter being at the edges of the plates. These slots 16 are provided one on either side of the axis of the grinding-wheel shaft 17 and converge in an upward direction, being substantially or nearly in alignment with the pivot-pin 4 of the guard. Each half-cover 1 of the guard is provided at the back with a rearwardly-extending screw-pin or stud 18 which normally engages the slot 16 in the corresponding side plate 15 of the stationary frame. By raising the slide 6 by means of the screw 11 the guard pivot-pin 4 may be elevated, as shown in Figures 2 and 3 by dotted lines, the half-covers 1 moving with it. The pins 18 on the backs of these half-covers are thereby lifted within their slots, and by co-operation with the oblique edges of these slots, which function as cam slots, the half-covers turn about their pivot and are closed in towards the wheel axis as the pins move up the slots, thus adapting the guard for use with a wheel of smaller diameter. On the other hand, when the screw 11 is turned in the reverse direction the slide 6 and pivot-pin 4 are lowered and the rear pins 18, by co-operation with the cam slots 16, cause the half-covers 1 to open out to suit a wheel of larger diameter. Thus, as a grinding wheel wears down, the guard can be adjusted from time to time to suit the altered size.

To enable a wheel to be easily removed the screw 11 can be operated to cause the pins 18 on the half-covers to leave the slots 16 through the open ends thereof, and the said half-covers can then be swung outwards clear of the wheel.

The said pins 18 on the half-covers are preferably screw-pins fitted with fixing nuts 19 which can be tightened up when the guard has been adjusted so as to draw the half-covers against the frame, thus preventing vibration.

As the cam slots 16 are substantially in line with the pivot-pin 4, any tendency for the half-covers to open is resisted by the pins exerting pressure on the sides of the slots in directions at right-angles to the said slots, and thus if a wheel bursts and the fragments strike the half-covers under centrifugal force, the opening of the guard will be effectively resisted by the pins, so that the fragments will be intercepted by the guard.

In order to ensure that the guard cannot be opened, for changing a wheel or otherwise, while the wheel is rotating, provision is made for automatically breaking the circuit of the driving motor when the adjusting screw is operated to such an extent as to cause the pins 18 on the half-covers to leave the slots as a preliminary to the said half-covers being swung outwards clear of the wheel. For this purpose the lower end of the adjusting screw 11 carries a bevel wheel 20 meshing with a bevel pinion 21 on a longitudinal control shaft 22 disposed parallel to the grinding-wheel shaft 17, being mounted in bearings 23 on the housing 8 of said shaft. This control shaft 22 is formed with a screw-thread on which is mounted a travelling nut 24 that is constrained against rotation by engaging a flat surface on the housing 8. When the adjusting screw 11 is operated to such an extent that the pins 18 on the half-covers are about to leave the cam slots 16, the said nut 24 on the control shaft is arranged to operate a trip switch 25 whereby the circuit of the driving motor which operates shaft 17 is broken and the grinding wheel therefore stopped. The adjusting screw 11 can then be further rotated to cause the pins to leave the slots, when the half-covers can be safely swung outwards by means of the handles 26 thereon so as to clear the stationary wheel. Push-button switches 27, 27 for respectively starting and stopping the motor may be mounted on the side plates 15, as shown in Figure 3.

The said control shaft 22 can also be utilized to control the speed of the driving motor to suit the prevailing diameter of the grinding wheel and thereby automatically maintain a substantially constant peripheral speed of the wheel. This arrangement ensures that, as the grinding wheel wears, the guard can be adjusted to suit the diameter of the wheel and, at the same time, the peripheral speed of the wheel is automatically adjusted to give maximum efficiency in grinding.

The method of speed control of the motor will depend upon the type of variable-speed motor that is employed. For example, if a self-contained A. C. motor with commutator is used, it is necessary to change the relative positions of the brushes on the commutator. In this case the control shaft 22 would be continued to a position adjacent the motor and there connected by suitable mechanical means to the brush-gear moving mechanism, in place of the usual hand-wheel brush control. By this arrangement, rotation of the control shaft, where the guard adjusting screw 11 is operated will automatically cause the relative position of the brushes on the motor commutator to be altered, thereby varying the speed of the motor. The initial setting of the brushes on the commutator would be such that the motor speed is thereafter automatically varied correctly to suit the diameter of the grinding wheel.

With a pole-changing A. C. motor, however, speed change would be effected by altering the number of pairs of magnetic poles, and to effect this operation the control shaft 22 would be arranged to operate a pole-changing switch which could be mounted on the housing 8 of the grinding-wheel driving shaft. This pole-changing switch would operate a contactor panel mounted separately from, but convenient to, the grinding unit, and the stator winding of the motor would be brought out to this contactor panel, which would be designed to change the connections as required. By this arrangement, any movement of the wheel-guard adjusting screw 11 would automatically operate the contactor panel and change the speed of the motor. Although the possible number of speed changes of this type of motor is limited, the speed changes could be predetermined to give maximum efficiency for various grinding wheel diameters.

With a direct-current shunt motor, speed regulation would be obtained by inserting a variable resistance in the shunt circuit, and this could be done by causing the control shaft 22 or the nut 24 thereon to operate a small contact panel to which a number of tappings have been brought from the resistance in the shunt circuit. By this means, any movement of the adjusting screw would automatically operate the contact

panel, thereby altering the resistance in the shunt circuit and thus varying the speed of the motor. The value of the resistance and the speed range of the motor would be predetermined to give maximum efficiency at various grinding-wheel diameters.

In general, any type of motor could be automatically controlled, for speed variation, from the wheel-guard adjusting screw 11 to suit the diameter of the grinding wheel that is in use at any time, so as to obtain maximum efficiency for various wheel diameters.

The application of the invention to an adjustable guard for circular saws or to rotary cut-off tools having a wheel or disc-like cutting member made either of abrasive material or of metal, differs in no essential respect from its application to a guard for a grinding wheel as hereinbefore described.

Instead of the guard members carrying pins engaging cam slots in a stationary part, they may have cam slots engaging pins on a stationary part.

I claim:

1. A guard for a grinding wheel or the like comprising two covers extending over the wheel, a common pivot upon which the two wheel-covers are pivotally mounted, the said pivot being disposed outwards of the wheel centre, a stationary part, cam slots in the stationary part, pins on the wheel-covers engaging the slots, the slots being disposed symmetrically on opposite sides of a plane containing the axes of the wheel and of the common pivot, and means for displacing said common pivot, the slots being so disposed and shaped that movement of the pivot with respect to the wheel centre causes the two wheel-covers to turn through equal angles about the said pivot, inwards or outwards, simultaneously.

2. A guard for a rotary member comprising two covers extending over the rotary member, a common pivot upon which the two covers are pivotally mounted, the said pivot being disposed outwards of the centre of the rotary member, a stationary part, pin-and-slot connections between the latter and the two covers, the slots of the pin-and-slot connections being inclined relatively to a plane containing the axis of the rotary member and the axis of the common pivot, and means for displacing said common pivot to cause the two covers to turn angularly about the same, inwards or outwards, simultaneously, the slots being open at one end so that the pins can be disengaged therefrom to enable the covers to be thrown back away from the rotary member.

3. A guard for a grinding wheel or the like comprising two covers extending over the wheel, a common pivot upon which the two wheel-covers are pivotally mounted, the said pivot being disposed outwards of the wheel centre, a stationary part, cam slots in the stationary part, pins on the wheel-covers engaging the slots, the slots being disposed symmetrically on opposite sides of a plane containing the axes of the wheel and common pivot, and means for displacing said common pivot, the slots being so disposed and shaped that movement of the pivot towards or away from the wheel centre causes the two wheel-covers to turn about the said pivot through equal angles, inwards or outwards, simultaneously, the said slots being open at one end so that the pins may be disengaged from the slots by moving the pivot sufficiently inwards towards the wheel centre, thereby enabling the covers to be thrown back away from the wheel.

4. A guard for a grinding wheel or the like comprising two covers extending over the wheel, a common pivot upon which the two wheel covers are pivotally mounted, the said pivot being disposed outwards of the wheel centre, a stationary part, pin-and-slot connections between said stationary part and the two wheel-covers, the slots of the pin-and-slot connections being obliquely disposed relatively to a plane containing the axis of the wheel and the axis of the common pivot, a slide carrying the pivot, a nut on the slide, a rotatable screw engaging the nut for moving the pivot towards or away from the wheel centre to cause the two wheel-covers to turn angularly about the pivot, inwards or outwards, simultaneously, a threaded control shaft driven by the nut-engaging screw, and a part actuated by the control shaft adapted to control a motor driving the wheel according to the positions of the wheel-covers.

5. A guard for a grinding wheel or the like comprising two overlapping half-covers extending over the wheel, a common pivot upon which the two half-covers are pivotally mounted, the said pivot being disposed outwards of the wheel centre, a stationary part, pin-and-slot connections between said stationary part and the two half-covers, the slots of the pin-an-slot connections being obliquely disposed relatively to a plane containing the axes of the wheel and common pivot, a slide carrying the pivot, a nut on the slide, a rotatable screw engaging the nut for moving the pivot towards or away from the wheel centre to cause the two half-covers to turn angularly about the pivot, inwards or outwards, simultaneously, a threaded control shaft driven by the nut-engaging screw, and a part actuated by the control shaft adapted to control a motor driving the grinding wheel according to the positions of the half-covers, the slots being each open at one end to permit of the pins being completely withdrawn from the slots by operating the screw so that the half-covers may be thrown back away from the wheel.

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