Nov. 27, 1934. E. RITZ, JR 1,982,483

GRINDING MACHINE

Filed Nov. 23, 1929 3 Sheets-Sheet 1

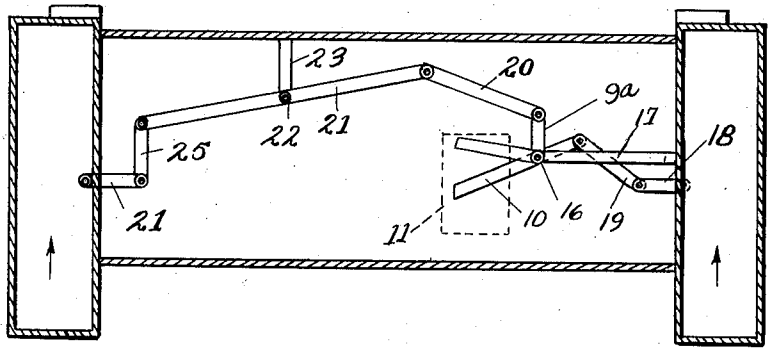


Fig. 1.

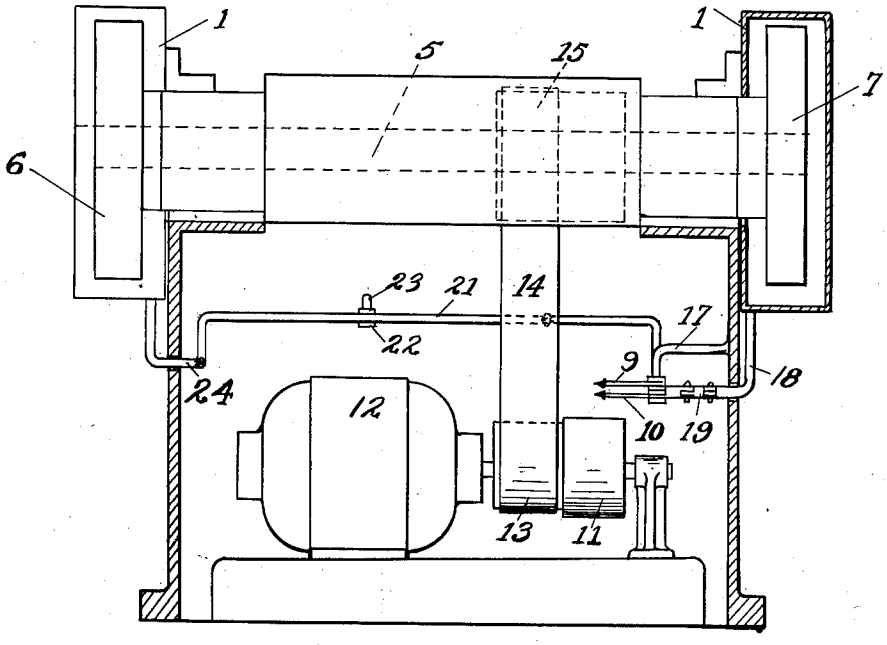


Fig. 2.

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GRINDING MACHINE

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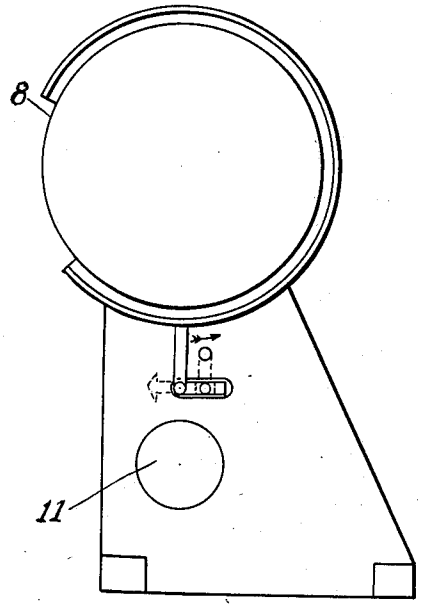


Fig. 3.

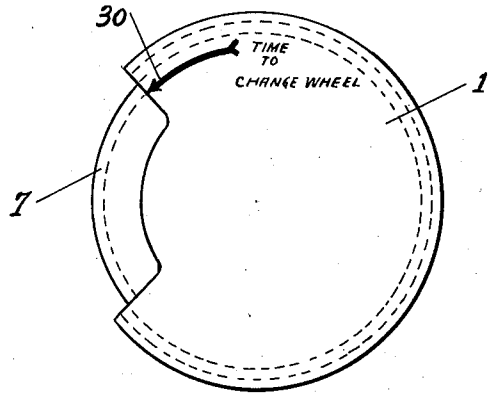


Fig. 4.

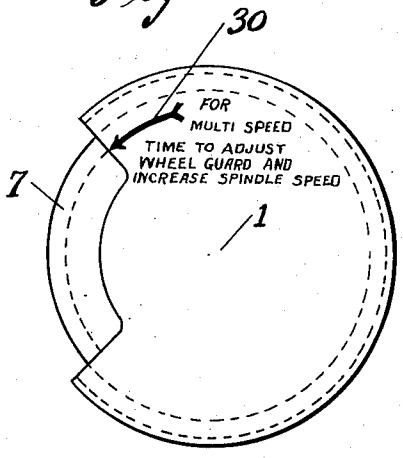


Fig. 5.

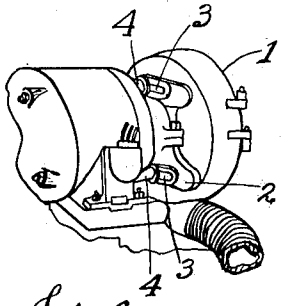


Fig. 6.

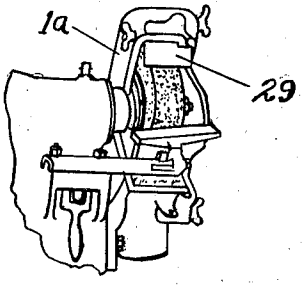


Fig. 7.

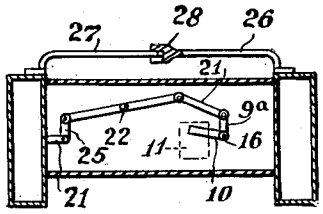


Fig. 1a.

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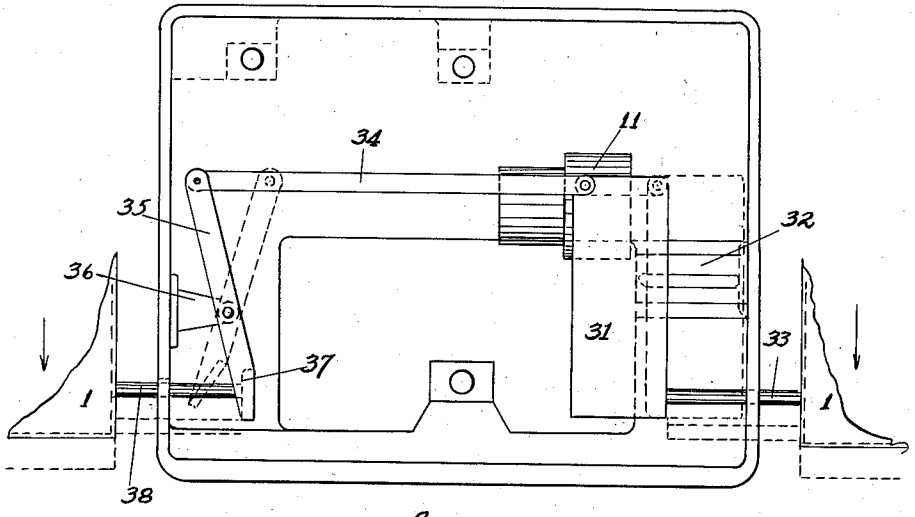


Fig. 8.

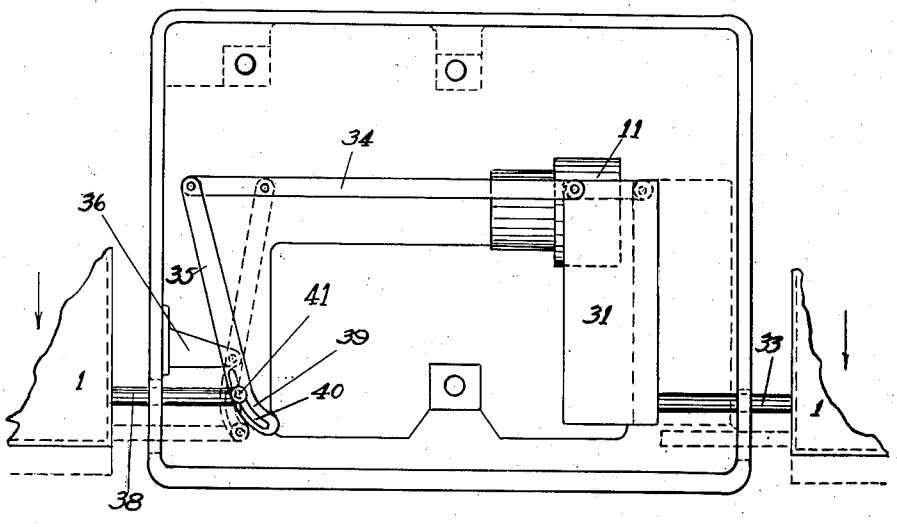


Fig. 9.

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Patented Nov. 27, 1934 1,982,483

UNITED STATES PATENT OFFICE

1,982,483

GRINDING MACHINE

Emil Ritz, Jr., Mount Healthy, Ohio, assignor to The Hisey-Wolf Machine Company, Cincinnati, Ohio, a partnership composed of Walter J. Friedlander and John W. Friedlander

Application November 23, 1929, Serial No. 409,400

4 Claims. (Cl. 51—166)

My invention is related to grinding machines especially adapted and fitted for use with modern high speed grinding wheels. The object of my invention is to provide means whereby operations with high speed grinders may be made both more efficient and safer as will hereinafter be described.

As is well known the modern high speed grinding wheel has a certain optimum surface or peripheral speed for best results. If the speed falls very much below this optimum, the efficiency of the grinding wheel is very greatly impaired, whereas if the speed is increased very much beyond it, there is distinct danger of an explosion or flying apart of the wheel which is disastrous in its results. When a high speed grinding wheel is operated at a fixed speed which is the best for a new wheel of that particular kind and size, as the wheel wears away and consequently decreases in diameter its effective peripheral speed will become less, and its grinding efficiency therefore diminished. Consequently grinding machines have been made which are adjustable as to speed so that the revolutions of the grinding wheel per minute may be increased as the wheel wears away. Ordinarily this is done by providing upon the drive shaft a plurality of sizes of driving pulleys or sprockets so that when a speed change is desired, a belt or other driving means may be shifted. Speed changes may of course, be otherwise produced.

There has however, so far as I am aware, never been provided any positive means inherent in the grinder for indicating when a speed change is desirable, and the operator has had to judge the desirability of a speed change by the efficiency of his grinding, or by a measurement of the wheel, which usually necessitates a removal of the guard. Objects of my invention therefore are to provide a positive indication when a change of speed is desirable as well as safety means to prevent the application of too high a speed to a grinding wheel.

These and other objects of my invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that certain construction and arrangement of parts of which I shall now describe a preferred embodiment and certain modifications, it being understood that other embodiments may equally fall within the spirit of my invention, and that modifications in the specific structures shown may be made without departing from the spirit of it. Reference is made to the drawings accompanying this application.

In the drawings:

Figure 1 is a diagrammatic plan of a double grinder equipped with my safety mechanism.

Figure 1a is a diagrammatic plan view of a modification of the construction shown in Figure 1.

Figure 2 is an elevation thereof.

Figure 3 is a side view also semi-diagrammatic of a double grinder embodying my invention.

Figure 4 is an elevation of a wheel guard equipped with my indicating means.

Figure 5 is a view of a wheel guard equipped with my indicating means and adapted for use in a double grinder such as that shown in Figure 2.

Figure 6 is a detail of a portion of the grinder showing a guard equipped with a hinged gate or shutter.

Figure 7 is a view of a portion of a grinder equipped with a sliding guard.

Figure 8 is a semi-diagrammatic showing of a grinder with safety mechanism locked by both guards, the guards being independently movable.

Figure 9 is a modified form of the device of Figure 8.

In the broad aspects of my invention I provide means upon the guard or upon a member which is part of or affixed to the housing to indicate by the size of the wheel the time to change wheels or change speeds, according to whether a single speed or multispeed machine is being used; and I provide in multispeed machines, safety means which prevents the changing of the speed excepting when the grinding wheel has been so far reduced in diameter as to make the speeding up of the wheel safe.

The latter means I shall describe first.

Grinding machines are ordinarily provided with guards which either move bodily or have portions which may be moved when the wheel is worn down in size.

In Figure 6 I have shown a grinding machine having a guard 1 with a guard holder 2 having slots 3 through which operate the bolts 4 by means of which the guard is fastened to the holder. Thus the guard may be slid away from the operator as the wheel diminishes in size.

In Figure 2 I have shown a double grinder having a shaft 5 to which are attached wheels 6 and 7 on either end thereof. Guards 1 cover these wheels and are slidable to or away from the operator. As shown in Figure 3, the guards

have a front opening 8 giving access to the wheel.

While the wheel remains of full size, the guard cannot of course, be moved. As the wheel is worn down, grinding cannot be done with the utmost efficiency unless the guard be moved. Hence the operator will move the guard from time to time as may be required.

I utilize these facts in effecting the operation of my safety mechanism and I connect operatively to the guards means which inhibit the speeding up of the drive unless the guards be moved, the safety factor lying in the fact that the guards cannot be moved so as to permit a change in speed so long as the wheels are above a certain size.

The means which I use may be varied considerably as desired. A convenient construction is shown in Figures 1, 2 and 3 and comprises interfering members 9 and 10 which are adapted in one position to permit and in another position to inhibit the placing of a belt upon the pulley 11. In the type of drive shown, the motor 12 is equipped with a pulley having two portions 11 and 13. 11 being larger, is of course, the high speed drive. Normally the belt 14 connects the portion of the drive pulley 13 with the drive pulley 15. To change to a higher speed, the belt must of course be shifted to the pulley portion 11.

Conveniently the interfering members 9 and 10 are made in the form of rods pivoted as at 16 to a bracket 17 attached to the frame. A member 18 is attached to the right hand guard and is connected with the interfering member 10 by a link 19. As shown in the several figures, this construction will cause the member 10 to move backwardly into an interfering position as the guard is moved forward, and to move forwardly into a noninterfering position as the guard is moved backward.

Similarly the interfering member 9 is connected to the left hand guard by an appropriate system of levers or the like which are adapted to perform the same function. In the instance shown the interfering member 9 is in the form of a bell crank having an angular portion 9a connected by means of a link 20 to a lever 21 pivoted as at 22 to a bracket 23 attached to the frame. A bracket 24 is attached to the guard and connected by means of a link 25 to the lever 21. Thus as the left hand guard is moved backwardly, the member 9 will be brought into noninterfering position.

It will be observed that both guards must be moved backwardly in order to permit the shifting of the belt 14 to the drive pulley portion 11 and the consequent speeding up of the machine. Consequently it will not be possible to change the speed on the machine to drive at a higher peripheral speed a worn wheel on one end of the shaft while the wheel on the other end of the shaft is of such a diameter as to make the more rapid speed unsafe.

Modifications in my invention will of course suggest themselves to those skilled in the art without departing from the scope thereof. A different arrangement of the levers is possible, and where a drive is made having more than one speed change in pulley portions, the action of the interfering members 9 and 10 or 31 may be made progressive with regard to the several possible speed changes. That is to say by a shaping of the members 9 and 10 or 31, they may be caused to move with a certain movement of the guards sufficiently to permit a shifting of the belt to a second pulley stage and with a certain additional movement of the guards, sufficient to permit the shifting of the belt to a third pulley stage, and so on. With different types of speed changing mechanisms, different inhibitive means may be employed as will be obvious, and further where speed changes are provided, they may be arranged to be operated by a movement of the guards. Further, I can eliminate one set of levers and inhibitory means entirely and provide with equal safety for a somewhat more flexible operation by causing one of the guards to operate the safety mechanism and providing means whereby if that guard is moved back the other must be moved back also. Thus as shown in Figure 1a, I may eliminate the mechanism comprising members 10, 18 and 19, and I may attach to the right hand guard, a member 26 and to the left hand guard a member 27. The first of these members engages the end of the other in a socket 28 which is open upon one side. Thus in the operation of a machine, if the wheel on the right hand end of the machine wears away fastest, the right hand guard may be moved back as desired, but no speed change will be possible. As the left hand wheel is worn away, the left hand guard will be moved back and when moved back far enough, a speed change may be made; but the left hand guard may not be moved back without carrying with it the right hand guard. Thus if either of the wheels is too large to render a change of speed safe, it will be large enough to inhibit the speed change.

Still another modification is shown in Figures 8 and 9. Here the member which blocks the changing of the belt is a plate 31 slidably mounted upon a bracket 32 affixed to the frame of the machine. This plate, in the position shown, lies in the way of a belt passing over the larger or high speed motor pulley 11. When a shift is to be made to a higher speed, the plate 31 must in this instance be moved to the right. The guard of the right grinding wheel has a post 33 affixed to it and extending through a suitable slot in the frame and abutting the plate 31 in the position shown. This post will move backward with the guard, and when in the position of the dotted lines, will no longer prevent the sidewise movement of the plate.

A link 34 connects the plate with a lever 35 pivoted to a bracket 36 on the frame. This lever has a foot 37 which in Figure 8 lies against the end of a post 38 attached to the left hand guard. This post also extends through a suitable slot in the frame and is movable with the guard. In the position shown it blocks the clockwise movement of the lever 35, and thus, through the link 34, prevents movement of the plate 31 to the right. When the left hand guard has been moved back, the post 38, now in the position shown by dotted lines, uncovers the foot 37, permitting a clockwise movement of the lever which allows or effects the sliding of the plate 31. In this arrangement, both guards are free to move independently; but the plate 31 cannot be shifted to the right nor the speed changed from low to high until both guards have been shifted. The guards, of course, cannot be shifted until the grinding wheels have been worn away sufficiently to make a change of speed safe.

In Figure 9, a cam plate 39 is formed on the end of the lever 35, and carries a cam slot 40 in which rides a stud 41 on the post 38. Here a backward movement of the left hand guard will

operate positively to move the plate 31 to the right, and conversely, so long as the post 33 blocks the movement of the plate the left hand guard cannot be shifted. Thus one guard is adapted to effect the movement of the plate, while the other is adapted to block or allow the movement of both.

Certain types of grinders are equipped with stationary guards such as the guard 1ª in Figure 6. Such guards are cut away to a somewhat larger degree and they are provided with a hinged guard or gate member 29 which is adapted to be raised or lowered or otherwise moved as the wheel wears away. In such grinders I operate my inhibitory members 9 and 10 or 31 by the movements of gates 29 through an appropriate lever connection therebetween, and the same end is attained.

I contemplate the provision of indicating means upon a grinder or similar machine to show when the speed or the wheel must be changed. Upon the guard 1 surrounding the wheel 7 I provide a suitable index mark 30 accompanied by an appropriate legend as is shown in Figure 4 whereby the workman is enabled to gauge accurately the relative diameter of his wheel without having to make a special measurement thereof. In the type of machine having movable guards as shown in Figure 5, the same type of index 30 may be provided to indicate when the wheel guard or gate is to be shifted and the spindle speed increased. Where more than one change of speed is required, a plurality of such index marks may be provided.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a machine of the character described, in combination with a plurality of rotatable members subject to wear and motive means therefor, movable elements, the permissible extent of movement of which is governed by the degree of wear of respective ones of said members, a connection shiftable on the motive means for driving said members at different speeds, governing means comprising a part movable to prevent or permit shifting of said connection and comprising a lever and a link connecting said part and said lever, and extensions on said movable elements engageable, respectively, with said part and said lever, for blocking the movement of said governing means except upon a certain extent of movement of said movable element.

2. A grinding machine comprising a grinding wheel spindle, a grinding wheel on each end thereof, two independently movable contact members, each being movable towards and from the periphery of a wheel and limited in its movement by contact with the wheel, a speed control device for regulating the wheel speed including a shiftable belt, separate stop devices located in the path of shifting of said belt, and separate connections between each stop device and an associated contact member so arranged as to prevent shifting of the belt to increase the wheel speed until both contact members have been moved through predetermined distances towards the wheel centers.

3. A grinding machine comprising a base, a spindle rotatably mounted thereon, a grinding wheel on each end thereof, a contact member movable towards and from the periphery of each wheel and limited in its movement by contact with the wheel, a speed control device for regulating the wheel speed, including a shiftable belt and two separate pivotally mounted stops engageable with said belt, each being operatively connected to be rocked by movement of one of the contact members and so arranged that both of the stops must be rocked through a predetermined distance before the belt may be moved to increase the speed of the wheel.

4. A grinding machine comprising a base, a spindle rotatably mounted thereon, a grinding wheel on each end thereof, means for rotating the spindle, a contact member movable toward and from the periphery of each wheel and limited in its movement by contact with the wheel, a speed control device for regulating the wheel speed, including a shiftable belt, and two separate stops independently movable into or out of the path of the belt to prevent or permit movement thereof, each stop being operatively connected to be moved by one of the contact members and said parts being so arranged that both of the stops must be moved through a predetermined distance before the belt may be moved to increase the speed of the wheel.

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