C. KNOWLES.

WHEEL GUARD FOR GRINDING MACHINES.

APPLICATION FILED FEB. 26, 1921.

1,405,922.

Patented Feb. 7, 1922.

2 SHEETS—SHEET 1.

FIG. 1

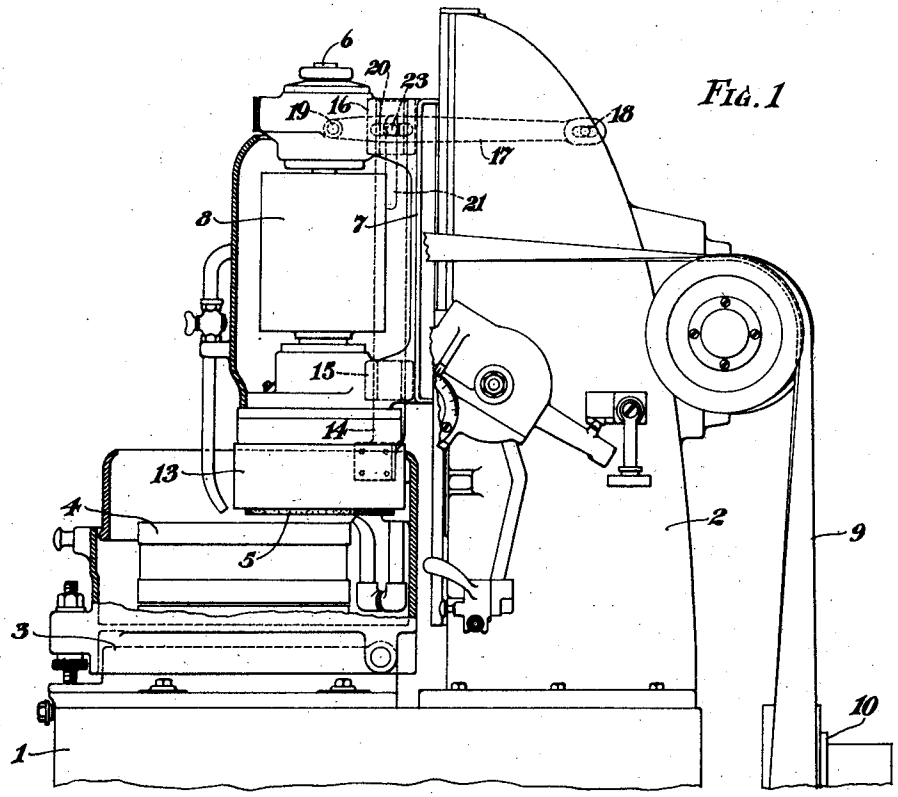

FIG. 2

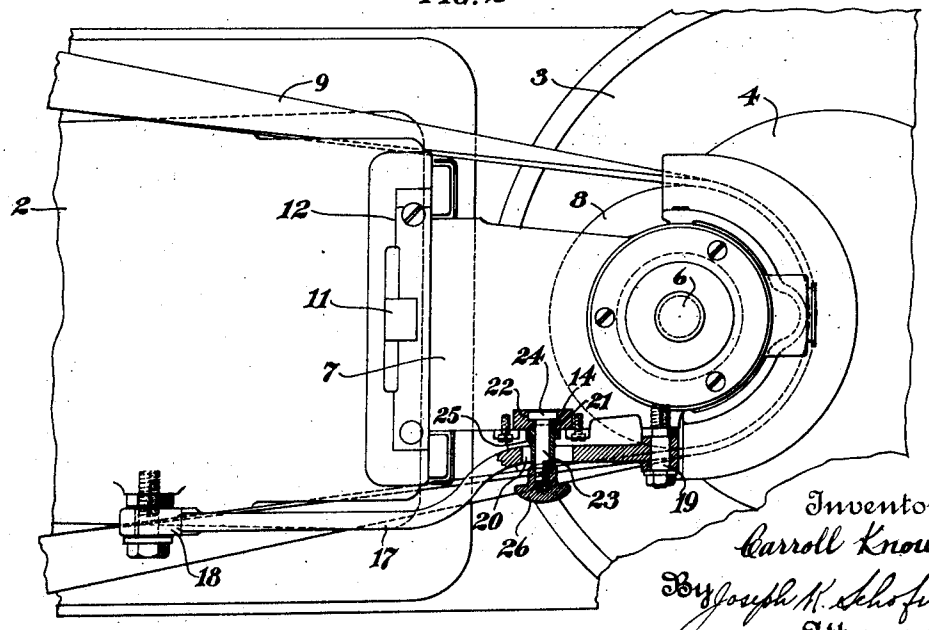

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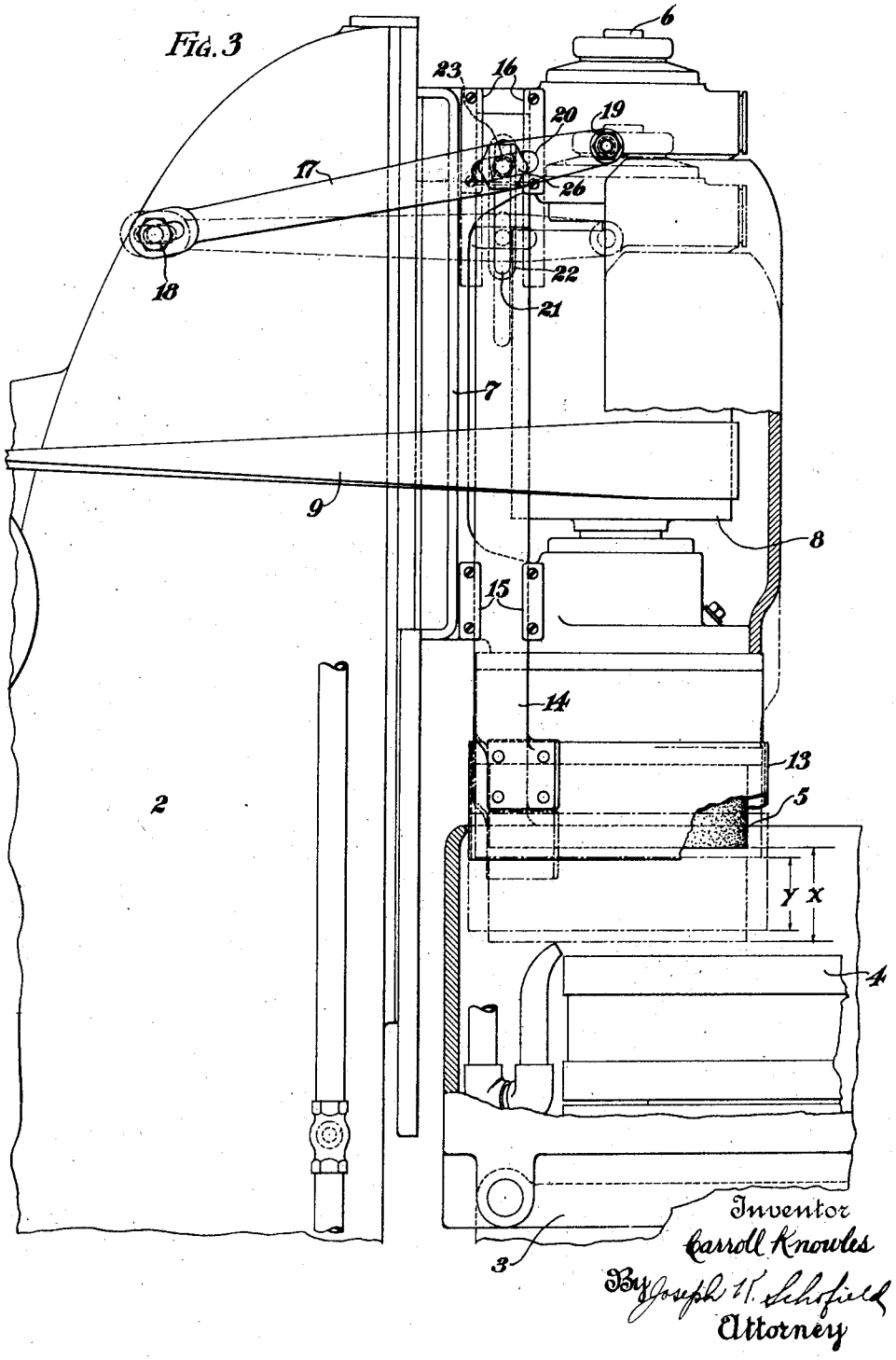
FIG. 3



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UNITED STATES PATENT OFFICE.

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WHEEL GUARD FOR GRINDING MACHINES.

1,405,922. Specification of Letters Patent. Patented Feb. 7, 1922.

Application filed February 26, 1921. Serial No. 448,189.

To all whom it may concern:

Be it known that I, CARROLL KNOWLES, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Wheel Guards for Grinding Machines, of which the following is a specification.

This invention relates to grinding machines and particularly to the grinding wheel guard in its relation to the wheel.

In vertical surface grinders, such as is illustrated in the drawing herewith, the grinding wheel in operation must necessarily extend below the guard surrounding the wheel in order to engage the work. However, when the wheel is raised away from the work support for inspecting the work or for chucking a new piece of work, there is no necessity for the wheel to extend below the guard, and such position thereof is dangerous to the operator since the wheel is rotating at high speed. The present invention has for its primary object the provision of means for automatically moving the guard relative to the grinding wheel in such manner that in its downward position adjacent the work the grinding wheel will extend below the guard and in its upward position the grinding wheel will be entirely enclosed within the guard. Another and more specific object of the invention is to provide means, in addition to the automatic means, for adjusting the guard to different positions relative to the grinding wheel.

With the above and other objects in view which will appear as the description proceeds, the invention will now be described by reference to the drawings wherein:

Figure 1 is a fragmentary side elevation of a grinding machine embodying the present invention.

Fig. 2 is an enlarged fragmentary plan view thereof.

Fig. 3 is an enlarged fragmentary side elevation showing the invention more in detail.

Referring more specifically to the drawing, 1 indicates the base and 2 and 3 the upright and work support respectively of a vertical surface grinding machine. A chuck 4 preferably of the magnetic type, is illustrated as mounted on the table 3, and above the same is a grinding wheel 5 mounted on a vertical shaft 6. The shaft 6 is rotatably mounted in a vertically movable head or slide 7 and is driven by a pulley 8 thereon operated by a belt 9 from a driving pulley 10. The means, comprising a rack 11, for moving the head 7 vertically in its guideway 12 in the upright 2 comprises within itself no part of the present invention and therefore is not defined herein.

A guard 13 surrounds the grinding wheel and, as illustrated in Fig. 1, the wheel extends to a position slightly below the guard. The guard is supported on a member 14 guided for vertical movement in lower and upper guideways 15 and 16 on the head 7. Means is provided for engaging the member 14 to support the guard for movement synchronously with the vertical movement of the head and grinding wheel. As illustrated this mechanism comprises a lever or arm 17 pivoted at one end 18 to the upright 2 and at its other end 19 to the head 7. Intermediate its ends the arm is slotted at 20 to receive a bolt or other supporting means from the member 14. This means preferably supports the guard in an adjustable manner relative to the lever 17. As illustrated, the member 14 is slotted at 21 and countersunk at 22. A bolt 23 is adapted to extend through the slot and its head 24 to engage in the countersink. A bushing 25 is mounted on the bolt to engage the member 14 opposite the countersink and a knob 26 threadedly engaging the bolt is adapted to clamp the member 14 tightly between the head 24 and the bushing 25.

In operation the member 14 is first adjusted by means of the mechanism in the vertical slot 21 to place the guard in the desired position relative to the grinding wheel. In such position the grinding wheel extends slightly below the guard when the wheel is lowered into work engaging position as illustrated in Fig. 1. As the head 7 is raised to draw the grind-wheel away from the work table to permit access to the work, the lever, being pivoted to the head at 19, is raised about its pivot 18. The member 14 and guard 13 are also raised with the lever, however the pivot 23 being nearer the center of rotation 18 than the pivot 19, the guard will be raised slower than the grinding wheel. In Fig. 3, the non-working or upward position of the mechanism is shown in full lines and the working or

downward position is shown in dot and dash lines. During this vertical movement of the head, the grinding wheel 5 is moved through a distance x and the guard 13 moves through a distance y. In its downward position the grinding wheel ordinarily projects approximately $\frac{1}{4}''$ without or below the guard, while in the upward position the grinding wheel extends a distance of $\frac{1}{2}''$ within the guard. It will therefore be seen that during the grinding operation the grinding wheel extends the desired distance from the guard 13 and during the time that the grinding wheel is removed from the work, the same is entirely covered by the guard in a manner to fully protect the operator.

What I claim is:

1. In a grinding machine, the combination of a work support, a grinding wheel adjacent the support, a guard adjacent the wheel, and means for automatically relatively positioning the guard and wheel whereby in the working position the wheel projects toward the work support without the guard and in the non-working position with the wheel removed from the work support, the wheel does not so project without the guard.

2. In a grinding machine, the combination of a horizontal work support, a grinding wheel rotatable on a vertical axis above the support, a guard surrounding the wheel, and means for automatically relatively positioning the guard and wheel whereby in the working position the wheel projects below the guard and in the non-working position with the wheel removed from the work support, the wheel does not project below the guard.

3. In a grinding machine, the combination of a work support, a grinding wheel adjacent the support, a guard adjacent the wheel, and automatic means for moving the guard away from the support at a diminished speed relative to the movement of the wheel as the wheel is moved away from the support.

4. In a grinding machine, the combination of a horizontal work support, a grinding wheel rotatable on a vertical axis above the support, a guard surrounding the wheel, and automatic means for moving the guard vertically away from the support at a diminished speed relative to the movement of the wheel as the wheel is moved vertically away from the support.

5. In a grinding machine, the combination of a horizontal work support, a grinding wheel rotatable on a vertical axis above the support, a guard surrounding the wheel, means whereby the guard may be adjusted vertically relative to the wheel, and automatic means for moving the guard vertically away from the support at a diminished speed relative to the movement of the wheel as the wheel is moved vertically away from the support.

6. In a grinding machine, the combination of a horizontal work support, a grinding wheel rotatable on a vertical axis above the support, a vertically movable head supporting the grinding wheel, a guard surrounding the wheel, and means operated by the vertical movement of the head for moving the guard away from the support at a diminished speed relative to the movement of the wheel as the head and wheel are moved away from the support.

7. In a grinding machine, the combination of a base, an upright and a work support mounted thereon, a grinding wheel rotatable on a vertical axis above the support, a vertically movable head supporting the grinding wheel, a guard adjacent the wheel, and a lever pivoted to the upright and operatively connected to the head and guard whereby the guard is moved away from the support at a diminished speed relative to the movement of the wheel as the head and wheel are moved vertically away from the support.

8. In a grinding machine, the combination of a base, an upright and a work support mounted thereon, a grinding wheel rotatable on a vertical axis above the support, a vertically movable head supporting the grinding wheel, a guard surrounding the wheel, a lever pivoted to the upright at one end and to the head at the other end and means connecting the guard to the lever intermediate its ends for vertical adjustment thereon, the arrangement being such that the vertical movement of the head and wheel away from the work support moves the guard synchronously therewith.

In testimony whereof, I hereto affix my signature.

CARROLL KNOWLES.