Feb. 20, 1923. 1,445,676.

F. M. FURBER.
GRINDING MACHINE.
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Fig. 2.

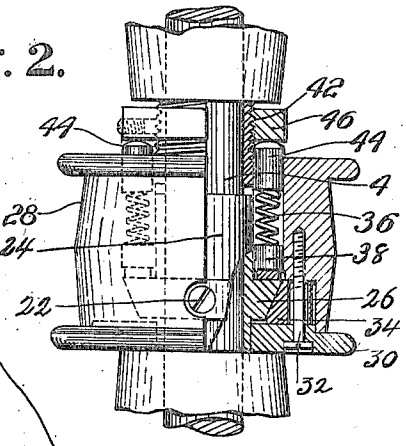


Fig. 1.

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FREDERICK M. FURBER, OF REVERE, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

GRINDING MACHINE.

Application filed February 19, 1921. Serial No. 446,343.

To all whom it may concern:

Be it known that I, FREDERICK M. FURBER, a citizen of the United States, residing at Revere, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Grinding Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings indicating like parts in the several figures.

This invention relates to grinding machines and is herein shown as embodied in a machine for grinding or sharpening the teeth of rotary cutters such as are used, for example, for trimming the edges of boot and shoe soles.

Cutters used for this and similar purposes are circular in peripheral outline, and include a plurality of evenly spaced teeth, the ends of which are formed to present cutting edges that correspond to the desired transverse contour of the edge of the work, and each tooth is backed off at a slight angle to the direction of its motion in order to give the cutter the clearance necessary to enable the teeth to cut. If in sharpening these cutters, the faces of some of the teeth are pressed too firmly against the grinder, the teeth are apt to be "burned" or overground. Hence the radial length of the teeth will be caused to vary correspondingly, and the proper temper of the cutting edges will not be maintained.

An object of this invention is to avoid such inaccuracy in the grinding of these cutters and to produce a grinding machine which will grind all the teeth of a cutter to the same extent without "burning," and thus to maintain the true periphery and temper of the cutter.

A feature of the invention consists in the combination with a grinding wheel, of a cutter support, a driving member, and driving connections between the driving member and the grinding wheel, the effectiveness of said connections being controlled by the pressure of the cutter against the wheel. In the form of my invention selected for illustration, the driving connections are frictional and normally maintained by springs which are arranged to yield when a predetermined pressure of the work against the wheel is exceeded.

Although the invention has been shown as embodied in a machine for grinding the teeth of rotary cutters, it is within the province of the invention to grind any object where the grinding pressure should be limited to a predetermined amount. Furthermore, the invention is in no way limited to the use of the radial face of the wheel for grinding the work.

Referring to the drawings,—

Fig. 1 is a to plan view, partly in section, of my improved grinding apparatus; and

Fig. 2 is a similar view of a portion of a modified form of my invention.

A grinding wheel 2, having a flat working face, is secured to one end of a drive shaft 4 rotatable and, under certain conditions, longitudinally movable in bearings 6 and 8 rising from a stand 10. To support a cutter for grinding, a bracket 14 is angularly and longitudinally adjustable on a lug 12 projecting forwardly from the frame. The outer end of the bracket carries a cutter-supporting plate 16, which may be mounted for sliding movement toward and from the grinding wheel in any usual way, in order that the teeth may be presented to the wheel successively for grinding. This support 16 may also be mounted for angular adjustment in order to vary the angle between the axis of the cuttter and the plane of the cutting faces of the teeth. Projecting from the plate 16 is a stud 18, which enters the axial bore in a cutter, one of the teeth 20 of which is indicated in a grinding position in Fig. 1.

Ordinarily the operator presses the cutting face of a tooth to the grinding wheel, using his judgment and skill as to the amount of pressure which should be exerted. It is difficult to present all the teeth of the grinder with the same pressure, and an unskilled operator is especially likely to press some of the teeth too hard or too long against the wheel. This is likely to "burn" or overgrind the teeth and consequently destroy their temper and vary their length. To prevent these undesirable results, the grinder is mounted to yield and then stop its rotation whenever a certain predetermined pressure is exceeded. As shown, there is secured

to the drive shaft 4 by a set screw 22, a sleeve 24 having a conical portion 26. Surrounding this portion of the shaft is a driving pulley having a main portion 28 and a detachable flange 30 secured by screws 32 to the main portion. Secured within the pulley by the screws 32 is a plate or ring 34, having a conical surface which is complemental to the conical surface 26 above mentioned. These surfaces are normally maintained in frictional engagement by springs 36 inserted in sockets in the pulley. The springs bear at one end against sliding plungers 38, which in turn bear against a ring 40 surrounding the sleeve 24 and contacting with a shoulder on the sleeve. By housing the described parts within the pulley, they are protected from dust and grit, and cannot be readily interferred with by an unintelligent operative to avoid proper grinding.

In operation the operator turns the cutter by hand and presents the teeth successively to the radial face of the grinder. If the pressure exceeds a certain predetermined amount which depends on the tension of the springs 36, the shaft 4 will be moved longitudinally, and the conical surface 26 will slip relatively to the corresponding surface of the ring 34. This slows down or stops the grinding wheel which remains at rest as long as an excessive pressure is maintained.

Whenever it is desired to grind cutters having teeth the cutting surfaces of which are smaller in area, it may be desirable to lessen the pressure which may be exerted against the grinder. In the form shown in Fig. 2, therefore, the pulley is provided with a threaded extension 42 and with apertures in which slide plungers 44 which bear against the springs 36. These plungers 44 may be adjusted simultaneously to vary the tension of the springs by means of a nut 46 threaded on the extension 42.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a cutter grinding machine, in combination, a grinding wheel, a cutter support, a driving member, driving connections between the driving member and the grinding wheel, and means normally maintaining the effectiveness of said connections and arranged to yield under predetermined pressure of the cutter against the wheel to render said connections ineffective to drive the wheel.

2. In a grinding machine, in combination, a grinding wheel, a drive shaft therefor, a driving pulley surrounding the shaft, frictional connections between the driving pulley and the drive shaft, and means constructed and arranged to permit disengagement of the frictional connections under predetermined pressure of the work against the grinding wheel.

3. In a machine of the class described, in combination, a frame, a drive shaft mounted to slide and rotate in the frame, an abrading wheel secured to the drive shaft, a driving pulley, and driving connections between the pulley and the shaft, said connections being disengaged by longitudinal movement of the shaft under predetermined pressure of the work against the wheel.

4. In a grinding machine, in combination, a grinding wheel, a shaft secured to the wheel, a pulley surrounding the shaft, interengaging frictional surfaces on the shaft and the pulley enclosed within the latter, and a spring for normally holding the frictional surfaces in engagement and yieldable under predetermined pressure of the work against the wheel.

5. In a grinding machine, in combination, a grinding wheel, a drive shaft, a member secured to the shaft and having a conical portion, a driving pulley having a co-operating conical portion and springs for holding the conical portions in frictional engagement but adapted to yield when their tension is exceeded by the pressure of the work against the wheel.

6. In a grinding machine, in combination, a frame, a drive shaft mounted to slide and rotate in the frame, a driven wheel having a radial abrading face, a driving member, and yielding connections between the driving member and the drive shaft adapted to become inoperative upon longitudinal movement of the shaft under predetermined pressure of the work against the abrading face of the wheel.

7. In a machine of the class described, in combination, a frame, a drive shaft mounted to slide and rotate in the frame, an abrading wheel secured to the shaft, a driving pulley, interengaging frictional surfaces on the shaft and the pulley, and means for constantly urging the drive shaft longitudinally to maintain frictional engagement, said means being yieldable under predetermined pressure of the work against the wheel to disengage the frictional surfaces.

8. In a machine of the class described, in combination, a grinding wheel, a drive shaft therefor, a driving member, frictional connections between the driving member and the drive shaft, resilient means for normally maintaining said frictional connections, and means for varying the tension of said resilient means.

In testimony whereof I have signed my name to this specification.

FREDERICK M. FURBER.