Dec. 9, 1930. F. E. GARDNER 1,784,231

GRINDING MACHINE

Filed March 24, 1924

Fig. 1.

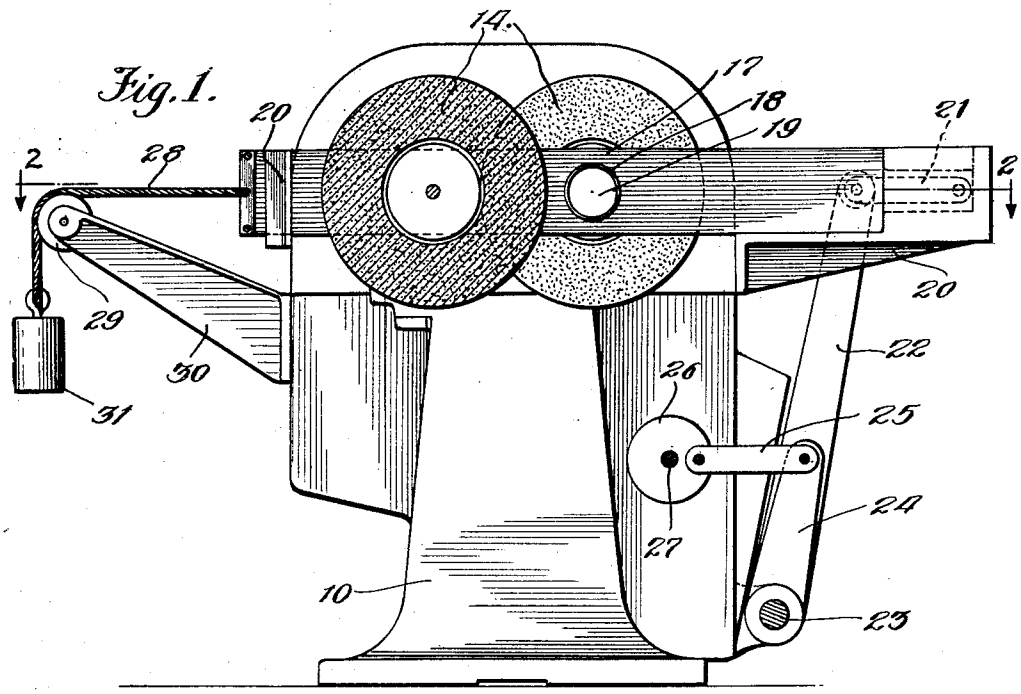
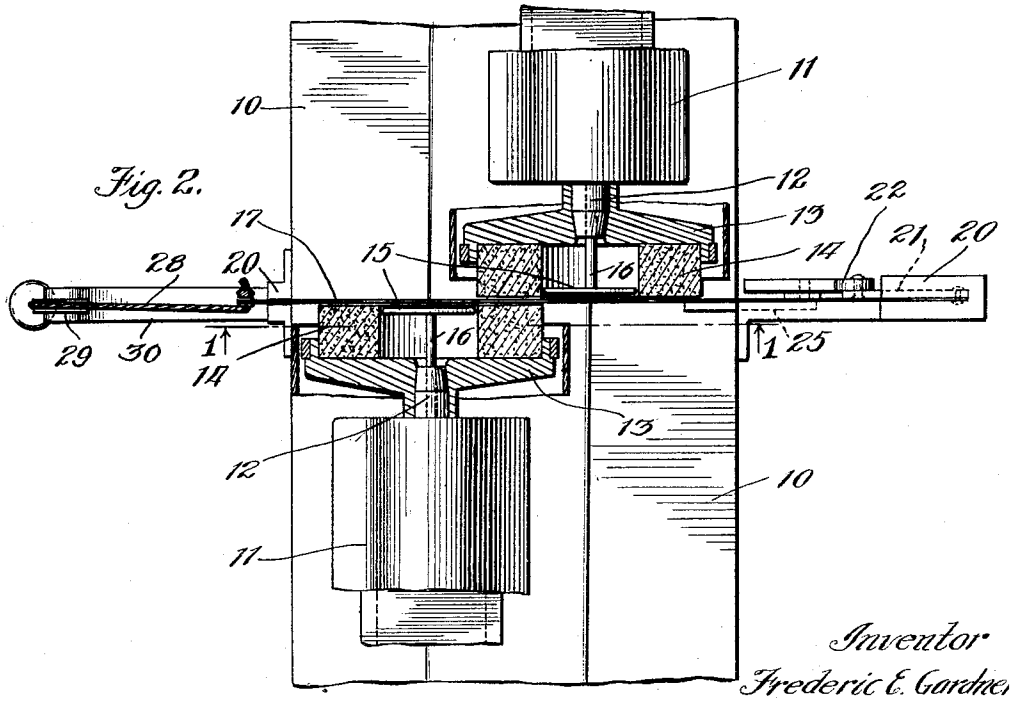


Fig. 2.



Inventor
Frederic E. Gardner
By Churchill, Parker & Carlson
Atty's.

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UNITED STATES PATENT OFFICE

FREDERIC E. GARDNER, OF BELOIT, WISCONSIN

GRINDING MACHINE

Application filed March 24, 1924. Serial No. 701,357.

This invention relates to an improvement in work carriers for machine tools, and has particular reference to an improved carrier for feeding thin work blanks between the opposed faces of a pair of operating elements.

I have shown the invention applied to a grinding machine similar in general arrangement and operation to the machine disclosed in my copending application Serial No. 474,585 filed June 3, 1921 (Patent No. 1,649,823, issued Nov. 22, 1927). In that machine, the work blanks are fed by a reciprocating carrier between the overlapping faces of two opposed grinding wheels arranged in offset relation. When grinding very thin work blanks, such as piston rings, thrust collars and the like, which are $\frac{1}{8}$ to $\frac{1}{16}$ of an inch in thickness, an extremely thin carrier is required. Heretofore, carriers if made too thin have generally been unsatisfactory in that they were flexible and would bend when subjected to an end push, thereby being forced into accidental contact with the grinding wheels, and resulting in a consequent warping, distortion, and weakening of the metal.

The primary object of the present invention therefore is to provide a work carrier for very thin blanks which will not flex or bend materially in operation.

A more detailed object is to provide a thin flexible work carrier for feeding blanks between the opposed faces of two or more operating elements, said carrier being under constant tension in any direction of movement, thereby preventing flexure or undue bending of said carrier against said operating element.

Ancillary objects and advantages will become apparent as the description proceeds.

In the accompanying drawings, Figure 1 is a fragmentary and partially diagrammatic view of a machine embodying the features of my invention, the view being partially in end elevation and partially in section along line 1—1 of Fig. 2.

Fig. 2 is a fragmentary sectional view taken in the plane of line 2—2 of Fig. 1, and showing a plan view of the carrier proper.

Referring to the drawings, the grinding machine comprises generally a main base 10 on the opposite ends of which a pair of spindle carriages 11 are mounted in offset relation. Two parallel spindles 12 are journaled in the carriages 11, and are driven by any suitable means (not shown). Heads 13 are secured to the adjacent ends of the spindles 12, and support a pair of annular grinding disks or wheels 14 which overlap to the extent of their annular width. The central apertures of the grinding wheels are closed by a pair of guards 15 which are adjustably supported by rods 16 extending through the spindles 12.

Work is periodically fed between the overlapping faces of the grinding wheels 14 by a carrier comprising a thin reciprocating strip 17 having an aperture or pocket 18 for holding the work blank 19. The strip 17 is suitably supported and guided at its opposite ends by brackets 20 secured to the machine base 10.

Any suitable means may be provided for reciprocating the carrier. In the present instance, the driving end of the strip 17 is pivotally connected by a horizontal link 21 to the upper end of a vertical lever 22. The lever 22 is mounted at its lower end for oscillation upon a stationary shaft 23 on the base 10, and is formed rigid with a short lever arm 24 similarly mounted. At its upper end, the lever arm 24 is pivotally connected by a substantially horizontal link 25 to a power disk 26 mounted on a shaft 27. The shaft 27 is journaled in the base 10, and is driven by any suitable means (not shown). It will be seen that as the disk 26 revolves, the lever 22 will be oscillated and the strip 17 reciprocated, the rate of movement of each being the greatest while the work blank is passing between the wheels 14. The work blanks are inserted into the aperture 18 when the strip 17 is in an extreme position, and are ejected therefrom when the strip is in the other extreme position.

Means is provided for tensioning the strip 17 to prevent accidental contact thereof with the faces of the guiding wheels 14. In the present instance, a flexible cable 28 is secured to the free end of the strip 17, extends over a pulley 29 supported by an outwardly extending bracket 30 on the base 10, and carries a

weight 31 at its lower end. Any other suitable tensioning means may be employed if desired. It will be seen that I have provided a carrier which can be made of a thickness suitable for extremely thin work blanks, and which will be held taut throughout its reciprocation or movement, thereby preventing the carrier from contacting with the faces of the grinding wheels, and increasing its life. The carrier is simple in construction and efficient in operation.

While I have illustrated my invention with considerable particularity, it is to be understood that various modifications and alternative constructions may be made without departing from the spirit and scope of the invention as expressed in the appended claims.

I claim as my invention:

1. A grinding machine comprising, in combination, a base, a pair of annular grinding disks disposed in parallel relation and positioned to overlap to the extent of their radial depth, a relatively thin wide flexible work carrier mounted for reciprocation between said disks with the width parallel to the grinding faces of said disks, said work carrier being provided with an aperture for supporting a work blank, power means engaging one end of said carrier for periodically drawing the carrier outwardly in one direction, and yielding means engaging the opposite end of said carrier to oppose the action of said first mentioned means.

2. A grinding machine having, in combination, a base, a pair of annular grinding disks disposed in parallel relation and positioned to overlap to the extent of their radial depth, a thin flat flexible strip between said disks with the width of said strip parallel to the grinding faces, said strip being constructed to support a work blank, means on said base for guiding said strip in its reciprocation between said grinding disks, a weight secured to one end of said strip and tending continuously to draw said strip in one direction, and a power means engaging the other end of said strip and adapted to periodically draw said strip in the other direction whereby said strip is maintained taut to prevent flexure against the faces of said grinding disks.

3. A grinding machine having, in combination, a grinding element, a flexible flat strip mounted for reciprocation across the face of said element with the width of said strip being disposed toward said face, said strip being constructed to suitably carry a work blank, means cooperating with said strip to retain said work blank in position, means engaging one end of said strip and tending to draw the latter continuously in one direction, and power means engaging the other end of said strip for periodically moving said strip in the opposite direction whereby the strip is held taut to prevent flexure against the grinding face of said element.

4. A grinding machine having, in combination, an operating element, a thin flat flexible strip mounted for movement of its width across the face of said element, said strip being constructed to carry a work blank, yielding means engaging said strip and tending to pull said strip in one direction, and means engaging said strip and acting positively to control the position of said strip.

5. In a machine of the class described, in combination, a base, an operating element having a flat face mounted on said base, a thin flat flexible work carrier strip for carrying a work blank positioned for movement across said face, the width of said strip being presented to said face, means on said base for guiding said strip in its movement, a weight secured to one end of said strip and tending continuously to draw said strip in one direction across said face, and power means engaging the other end of said strip and adapted to periodically draw said strip in the other direction.

6. A machine of the character described having, in combination, a base, an operating element on said base, a thin flat work carrier strip positioned for reciprocatory movement across said operating element and having means for supporting the work, the flat of the strip being presented to said element, a pair of guide brackets supported on said base at opposite sides of said operating element for guiding said strip in its reciprocation, power means engaging one end of said strip, and yielding means engaging the other end of said strip and tending to move said strip in one direction.

In testimony whereof, I have hereunto affixed my signature.

FREDERIC E. GARDNER.