Feb. 7, 1928. 1,658,092

J. MILLER, JR

WORK FEED FIXTURE FOR GRINDING MACHINES

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Fig. 1a.

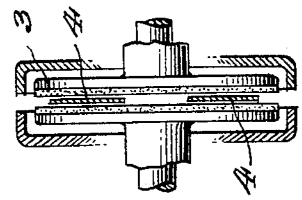

Fig. 1

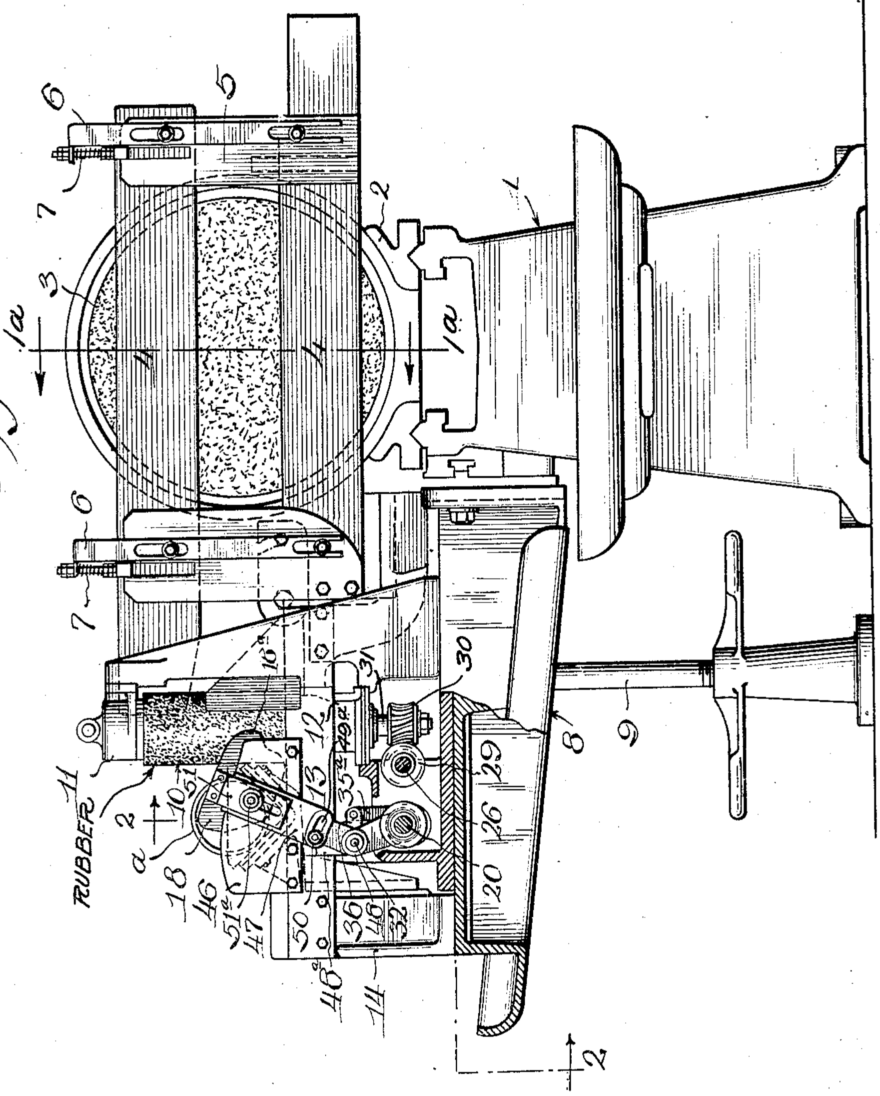

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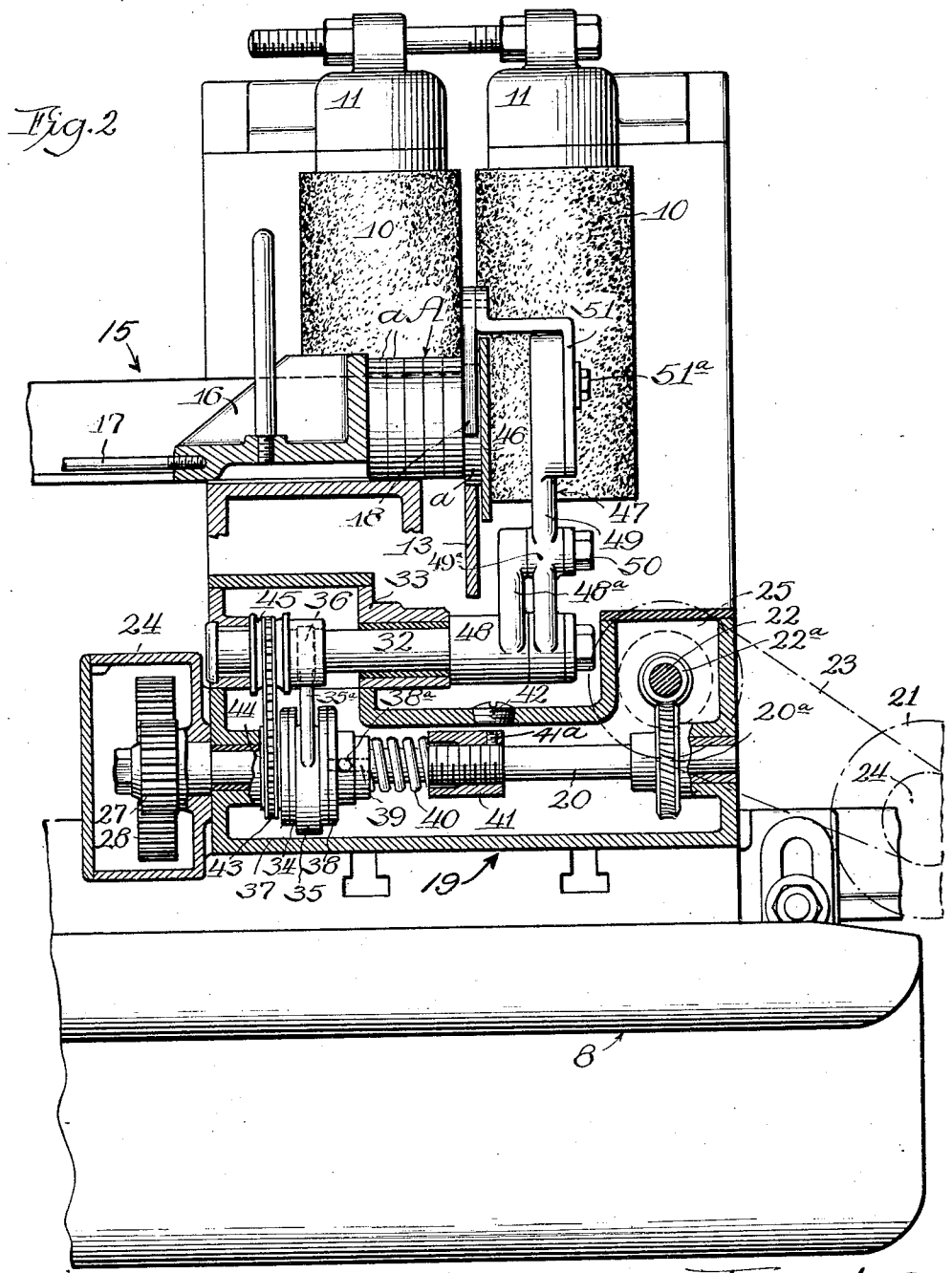
Fig. 2



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UNITED STATES PATENT OFFICE.

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WORK-FEED FIXTURE FOR GRINDING MACHINES.

Application filed January 29, 1927. Serial No. 164,389.

This invention relates to improvements in work feed fixtures for grinding machines and more particularly to grinding machines for operating on relatively small circular pieces of work, such as piston rings, which are continuously fed between the grinding discs of the machine.

A machine for a similar purpose is disclosed in my copending application, Serial No. 164,388, filed January 29, 1927, wherein the work was fed automatically from a magazine, thence along a track passing between feed rolls and positively advanced thereby between the grinding discs.

The grinding machine herein to be described operates in substantially the same manner as above set forth but differing structurally in the feed mechanism intermediate the work magazine and the feed rolls, which in this instance consists of an oscillating plate.

Since the two machines are otherwise similar in purpose and operation, the present disclosure will be confined to the feed mechanism and associated parts, reference being made to the machine as a whole only where such is necessary to a full understanding of its operation.

In the accompanying drawings,

Figure 1 is a general view in side elevation of the feeding mechanism with parts broken away and shown in section; and

Figure 1ª is a view in vertical section taken on line 1ª, 1ª of Figure 1.

Figure 2 is an enlarged detail view in vertical section through the work feeding mechanism as taken on line 2—2 of Figure 1.

Referring in general to the machine embodying the invention, the same comprises a frame 1, supporting two sliding carriages 2 on which are journalled horizontal spindles having grinding discs 3 mounted at their inner ends and located centrally of the machine. Figure 1 shows only one of the grinding discs, its associated disc being oppositely disposed with a relatively narrow space between, the work being advanced edgewise between the two grinding faces. For guiding the work between the discs there are two horizontal parallel guide bars 4, 4 supported at each end by suitable brackets attached to the machine frame and connected together on either side of the grinding discs by transverse guide plates 5, 5 between which the upper bar 4 is free to move, the latter being suspended from brackets 6, 6 with springs 7, 7 acting downwardly on the bar. A detailed description of the work grinding means is not essential to the understanding of the features embodying the present disclosure, since it is readily apparent that any suitable means for guiding the work through the grinding zone will serve the purpose.

Immediately forward of the grinding discs is the work feeding mechanism which may be regarded either as an attachment for the grinding machine proper or as an integral part of an automatic feed grinding machine. The support for the feeding mechanism is a table or bed casting 8 fixed to the front of the machine frame 1 and adjustable for both vertical and horizontal movement, an elevating screw 9 serving both as a floor support and means for elevating the bed casting. At the center of the bed casting 8 is a pair of vertical feed rolls 10, 10 of a resilient material, such as rubber, these rolls being mounted on spindles journalled at top and bottom in bearings 11 and 12 and driven from their lower ends by gearing hereinafter to be described. The feed rolls are spaced relatively close together, the distance being approximately the thickness of the work to be ground.

Extending between the feed rolls and at right angles to the axis of the grinding discs, is a track 13 consisting of a plate supported on edge with its upper edge forming the track surface, extending horizontally in line with the bottom edges of the feed rolls. This track plate 13 is fixed and extends in both directions from the feed rolls, joining the guide bar 4 at its rear end and extending almost to the front edge of the bed casting where it is bolted to a supporting bracket 14.

Immediately to the left (Figure 2) of the track plate 13 and near its forward end is a work magazine 15, consisting of a V-shaped trough in which the work A is stacked on edge, which in the drawings is illustrated as piston rings *a*. The discharge end of the trough terminates just above and in the vertical plane of the left-hand face of the track

plate 13. In the trough is a pusher block 16 mounted at the forward end of a sliding rod 17 which is actuated by a weight and cable (not shown) whereby the pusher block presses against the work and forces the rings successively from the magazine onto the track.

Just opposite the discharge end of the magazine and above the track plate 13, is an oscillating pusher plate 18 moving toward and from the feed rolls, that is to say, during one stroke the pusher plate is carried forwardly beyond the end of the magazine permitting a ring to be discharged onto the track and in front of the edge of the pusher plate, and on the next stroke, the ring is carried toward the feed rolls, each ring so advanced pushing the rings ahead of it along the track.

With this general explanation of the feeding action, the pusher plate and its actuating mechanism as well as that of the feed rolls, will now be described more in detail.

Mounted on the bed casting 8 and extending beneath the feed rolls and pusher plate, is a casing 19 in which the driving mechanism is located, said casing being adapted to be partially filled with oil for lubricating the moving parts. Extending transversely of the casing and journalled in bearings on opposite sides thereof, is a shaft 20. This shaft is driven by a motor 21 mounted at the right side of the bed casting through the following intermediate parts: The motor drives directly to a shaft 22 extending transversely of the shaft 20 above its right end, through a belt 23 and pulleys 24 and 25 mounted on the armature shaft of the motor and the end of the shaft 22 respectively, the portion thereof carrying the pulley 25 being exterior of the casing 19. The shaft 22 drives the shaft 20 through a worm 22^a and worm wheel 20^a mounted on the shafts 22 and 20, respectively.

The opposite or left end of the shaft 20 extends through the adjacent side wall of the casing 19 into a change gear box 24. Extending parallel with the shaft 20 and immediately behind it, is a countershaft 26 likewise journalled in the side walls of the casing and having its left end extending into the gear box 24. The shaft 20 carries a pinion 27 meshing with a gear wheel 28 on the countershaft 26, these gear members being interchangeable with other sets of gear members of different gear ratio for the purpose of decreasing or increasing the speed of the countershaft 26 relative to the shaft 20, which may be regarded as the primary drive shaft and driven at a constant speed. Mounted on the countershaft 26 (Figure 1) are spiral pinions 29 which mesh with complementary pinions 30 mounted at the lower ends of the feed roll spindles 31 which extend beyond their lower bearings 12 into the casing 19. The pairs of food roll drive pinions are of opposite lead so that the rolls turn in opposite directions and thus advance the rings toward the grinding discs as they are fed between them.

Going back to the primary drive shaft 20, the drive from this shaft to the pusher plate will now be described:

Immediately above the shaft 20 and parallel therewith is a rock shaft 32 journalled in bearings at opposite sides of a vertical extension 33 of the casing 19 at its left side. The rock shaft extends from the inner side of the casing extension below the track plate and on this end of the shaft and exterior of the casing is mounted the pusher plate assembly.

The drive from the shaft 20 to the rock shaft 32 is through a combined eccentric and friction clutch mechanism. Keyed to the shaft 20 is an eccentric sheave 34 carrying an eccentric strap 35 having an arm 35^a extending vertically and pivotally connected with the end of a rocker arm 36 fixed to the rock shaft 32. On either side of the eccentric sheave 34 are friction discs 37 and 38, the disc 37 on the left being fixed to shaft 20, whereas the disc 38 on the right turns with the shaft but is capable of a limited movement along the shaft, this being accomplished by a pin 38^a engaging a slot or keyway 39 in the shaft. Beyond the shiftable friction disc is a spring 40 surrounding the shaft 20 and bearing at its outer end against an adjustable collar 41 having screw threaded engagement with the shaft. Thus by turning the collar in either direction, the tension of the spring is correspondingly increased or decreased and the pressure exerted by the spring on the shiftable disc is changed in like degree to increase or decrease the friction between the discs 37 and 38 on the eccentric sheave 34. A set screw 41^a in the collar serves to normally lock the collar on the shaft, this set screw being accessible through an opening in the casing wall above, which is closed by a screw plug 42.

Thus it will be seen that the power is delivered from the shaft 20 to the eccentric strap and arm through the friction discs 37 and 38 and the eccentric sheave 34, and as a result any resistance met by the pusher plate in its movement is compensated for by the slippage between the friction surfaces.

For the purpose of lubricating the rocker shaft bearings, an oiler chain 43 driven by a sprocket wheel 44 on the shaft 20 and passing around a grooved collar 45 on the rocker shaft, is provided.

Referring now to the details of the pusher plate 18, the same is a metal plate of substantially the same thickness as the track plate 13 and somewhat irregular in shape, but generally rectangular and elongated in a longitudinal direction. At its

forward edge it has a rounded lip 18ª to better engage the work and carry it forward during the feeding stroke. Cooperating with the pusher plate is a fixed guide plate 46 secured to the track plate 13 on the opposite side from the discharge end of the magazine, and extends lengthwise throughout the path of the pusher plate, which it will be noted from Figure 1, is from a point forwardly of the magazine to the entrance between the feed rolls 10, 10.

The pusher plate moves in a vertical plane immediately above the track 13 and is carried at the upper end of a rocker arm 47 offset therefrom on the opposite or right side of the guide plate 46. The rocker arm assembly consists of several parts as follows: Keyed to the rock shaft 32 is a collar 48 having a radial arm 48ª extending upwardly. At the extreme end of the rock shaft is a lever arm 49 loosely journalled on the shaft and extending upwardly beyond the arm 48ª to the top edge of the guide plate 46. Intermediate the ends of the lever arm 49 is a slotted sector 49ª through which passes an adjusting screw 50, anchored in the end of the radial arm 48ª of the fixed member 48 on the rock shaft. The lever arm 49 carries an endwise adjustable arm 51 bearing against the upper portion of the lever arm 49 and slotted lengthwise to take an adjusting screw 51ª. The upper end of the arm 51 is bent at right angles toward the pusher plate and clearing the top edge of the guide plate 46, is fixed to the pusher plate at its upper edge and between its ends.

By the foregoing arrangement, the length of the rocker arm can be adjusted to raise or lower the pusher plate. Similarly, the rocker arm 47 can be shifted relative to the axis of the rock shaft 32, so as to vary the stroke, these two adjustments making it possible not only for different sizes of work to be handled in the machine but the rate of feed to be regulated so that the work will be advanced to the feed rolls at the proper intervals.

The operation of the feeding device will be readily understood from the following: As the pusher plate is moving forwardly and clears the end of the magazine, a ring *a* is forced into its path against the guide plate 46 and rests on the track plate 13, and on the succeeding feeding stroke delivers the ring to the feed rolls where it is immediately picked up and carried onward at the peripheral speed of the rolls forcing or pushing the preceding rings ahead of it into and through the grinding zone.

In feeding the work to the feed rolls, it is desirable that the rings shall move forward in contact with each other, and hence the purpose of the several adjustments as well as the friction drive of the pusher plate, since in this way the action can be nicely regulated so that each ring as it is delivered to the feed rolls, is held momentarily in retarded position against the preceding ring and thus follows it through the feed rolls in close contact. Thus the entire feeding operation is made automatic and continuous without breaks or interruptions from one end of the grinding operation to the other.

Having set forth the novel features of the mechanism embodying my invention, I claim:

1. In a work feeding device for grinding machines, the combination of a pair of grinding discs, means for advancing the work to be ground between said discs including an oscillating feed plate moving toward and from said grinding discs, a rock shaft supporting said feed plate and provided with a rocker arm, a drive shaft extending parallel with said rock shaft, an eccentric sheave turning loosely in said drive shaft, an eccentric strap and rod connecting said sheave with said rocker arm, and friction clutch members mounted on said drive shaft and engaging said eccentric sheave.

2. In a work feeding device for grinding machines, the combination of a pair of grinding discs, means for feeding successive pieces of work between said discs including an oscillating feed plate, a rock shaft supporting said feed plate and provided with a rocker arm, a drive shaft extending parallel with said rock shaft, an eccentric sheave turing loosely in said drive shaft, an eccentric strap operatively connected with said rocker arm, friction discs mounted on said drive shaft and embracing said eccentric sheave and tension means acting on said discs.

3. In a work feeding device for grinding machines, the combination of a pair of grinding discs, means for advancing the work to be ground between said discs including an oscillating feed plate moving toward and from said grinding discs, a rock shaft supporting said feed plate and provided with a rocker arm, a drive shaft extending parallel with said rock shaft, an eccentric sheave turning loosely in said drive shaft, an accentric strap and rod connecting said sheave with said rocker arm, friction discs mounted on said drive shaft on either side of said sheave, a spring acting on one of said discs to press the same together to frictionally engage said sheave, and means for adjusting the tension of said spring.

4. In a work feeding device for grinding machines, the combination of a pair of grinding discs, means for advancing the work to be ground between said discs including an oscillating feed plate moving toward and from said grinding discs, a rock

shaft, an endwise adjustable lever arm mounted on said rock shaft and carrying said feed plate, a drive shaft extending parallel with said rock shaft, an eccentric sheave turning loosely in said drive shaft, an eccentric strap operatively connected with said rock shaft, friction discs mounted on said drive shaft on either side of said sheave, one of said discs being shiftable on said shaft, and a spring acting on said shiftable disc.

Signed at Beloit, Wis., this 24th day of January, 1927.

JOHN MILLER, JR.