Aug. 8, 1939. G. R. BAKER ET AL 2,168,383

ROLL REFINER AND THE LIKE

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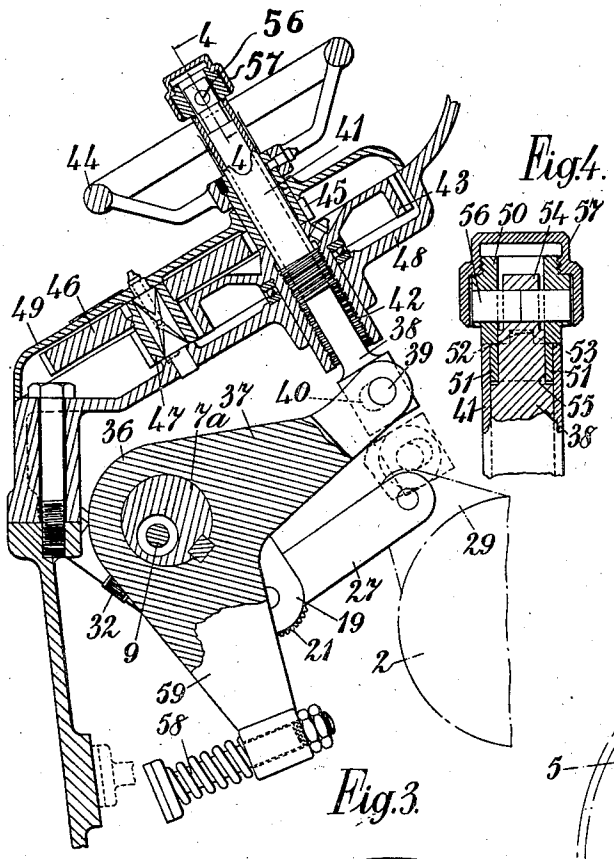


Fig.4.

Fig.3.

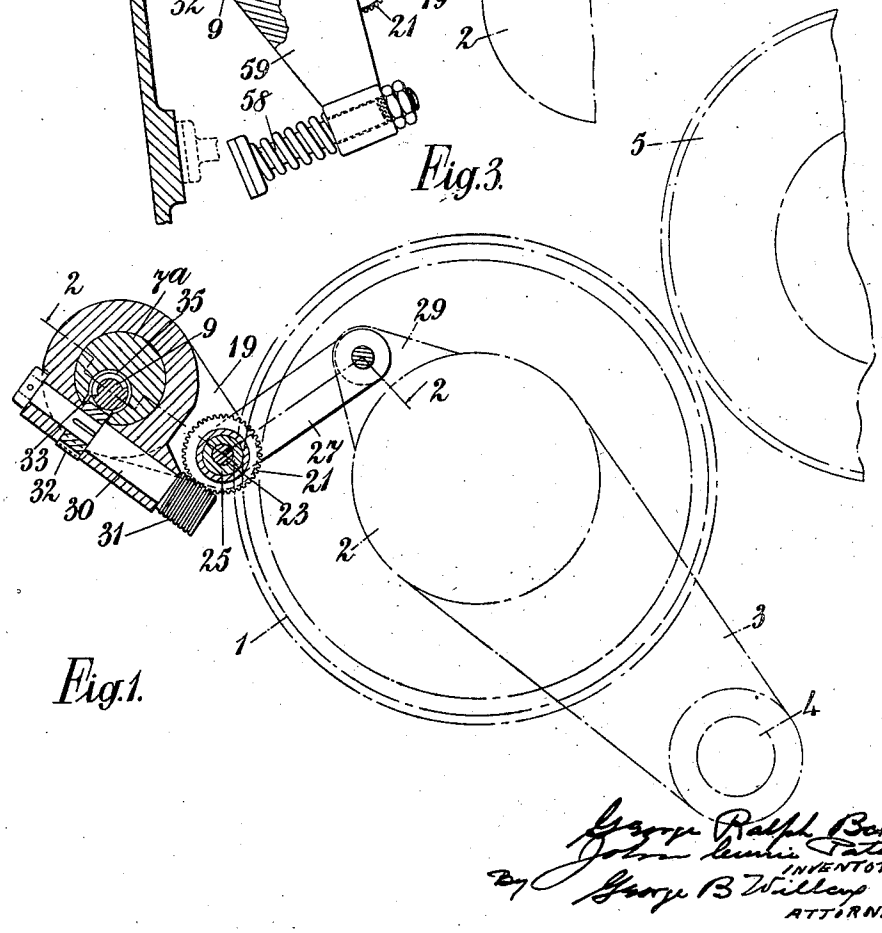


Fig.1.

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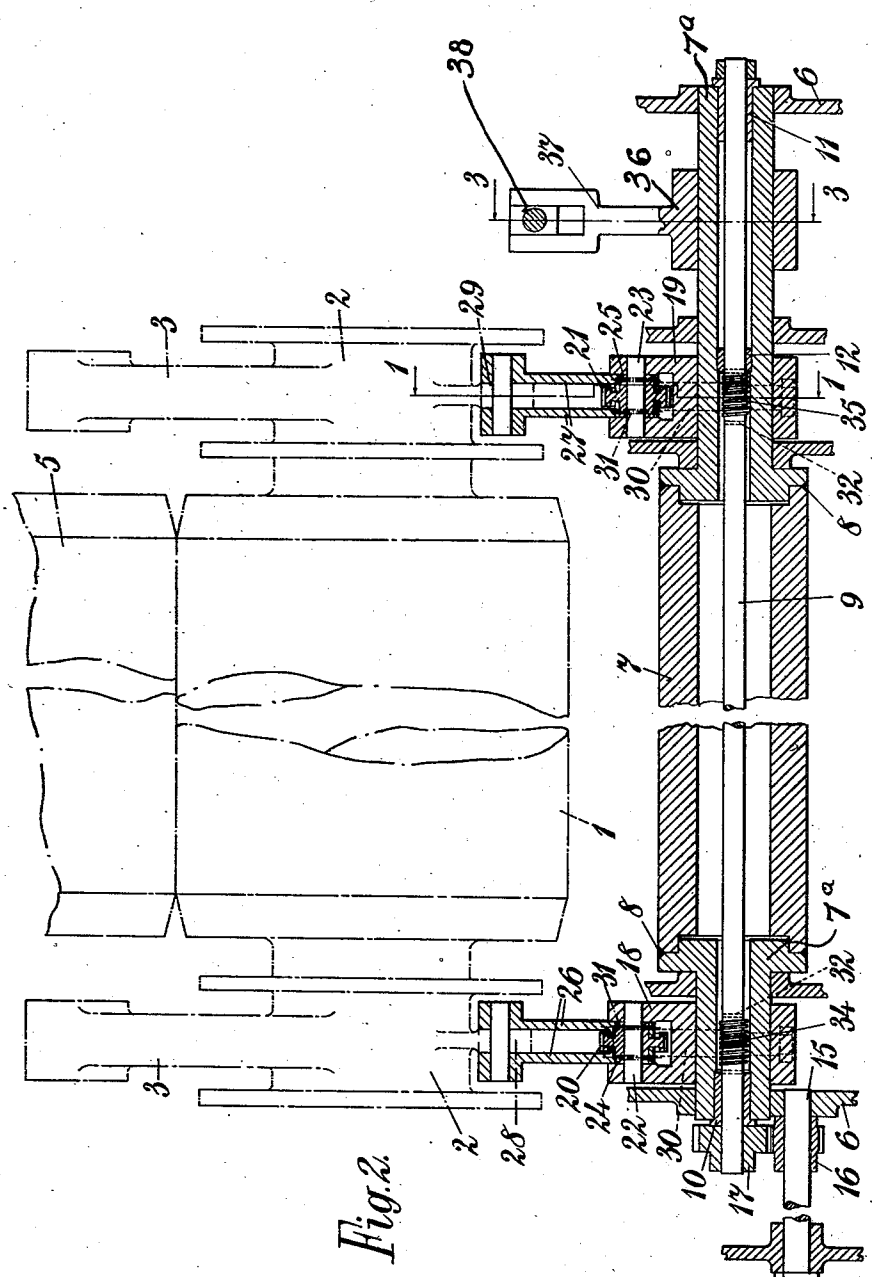


Fig. 2.

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2,168,383

ROLL REFINER AND THE LIKE

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Application August 15, 1936, Serial No. 96,138
In Germany June 15, 1936

8 Claims. (Cl. 308—61)

This invention relates to roll refiners and like mechanism for use in refining chocolate and other plastic or semi-liquid materials, of the type in which a displaceably mounted feed roll is associated with a series of refiner rolls and is adapted to be adjusted relatively to the first roll in the series whereby the nip or clearance may be varied to vary the amount of material which is fed or transferred to the refiner rolls.

An object of the invention is to provide an improved clearance adjustment means wherein the adjustment is effected from a single control point, preferably at the side of the machine.

A further object is to provide in the clearance adjustment means an improved safety device in the nature of a rupturable element whereby in the vent of a scraper knife or other solid body falling between the feed roll and the associated refiner roll a bodily opening movement of the feed roll will result so that no damage will be done to the adjusting mechanisms and roll bearings and mounting.

According to a feature of the present invention the end trunnions of the feed roll are provided with displaceable mountings and a single adjusting mechanism incorporating a rupturable element is provided for moving the mountings simultaneously.

The adjusting movements of the single adjusting mechanism may be imparted to the mountings through a rock shaft which may be connected to the mountings by links which may be adjustable.

A further feature of the invention is the provision for adjustment of the rock shaft by screw and nut gear, one element of which is connected to an operating means or handle by a shear pin. The nut of the screw and nut gear may be in the form of a sleeve through which an eye-bolt associated with the rock shaft passes, said eye-bolt engaging in a block seated upon the upper end of the sleeve and having an aperture in which a shear pin is located which also engages in an aperture in the eye-bolt.

Further features of the invention will be hereinafter described and defined in the claims.

A convenient embodiment of the invention is illustrated in the accompanying drawings, in which:

Figure 1 is a transverse sectional view through the main elements associated with the feed roll for adjusting the alignment of the latter, the section being taken on the line 1—1 of Figure 2.

Figure 2 is a longitudinal sectional view of the aligning adjustment means taken on the line 2—2 of Figure 1.

Figure 3 is a transverse sectional view illustrating the means for adjusting the nip between the feed roll and the refiner roll with which it cooperates, the section being taken on the line 3—3 of Figure 2.

Figure 4 is a detail sectional view taken on the line 4—4 of Figure 3 showing the shear pin assembly.

In carrying the invention into effect according to one convenient mode, a feed roll 1, shown in dot-and-dash lines in the drawings, is mounted for rotary movement in bearing members 2 carried by arms 3 swingable about a fixed axis 4 (Fig. 1). The feed roll is adapted to feed chocolate or the like to the lower roll 5 of a series of refiners rolls, the remainder of which are not shown.

The mounting of the feed roll 1 is adapted to be adjusted both a vary the alignment of this roll relatively to the roll 5 and to adjust the nip or clearance between said rolls.

The aligning adjustment of the feed roll is effected by the following described mechanism, reference being had to Figures 1 and 2 of the drawings. Mounted for rotary movement in a fixed frame or casing member 6 is a shaft which extends parallel to the axes of the rolls 1 and 5 and is of particularly rigid construction, being built from a heavy steel tube 7 of large diameter the ends of which are welded at 8 to the trunnion portions 7a of the shaft which are of smaller diameter. The ends of the steel tube 7 are counterbored to receive stepped disc portions formed on the trunnion portions 7a. Extending through the shaft 7, 7a parallel to but preferably offset from the axis of the latter is an operating spindle 9 through which the aligning adjustment is effected. The spindle 9 is supported in end bushings 10 and 11 in the trunnion portions 7a of shaft 7 and an interior bearing member or bushing 12. Rotation of the operating spindle 9 is effected by manipulation of a handle 14 secured to a spindle 15 journaled in the frame 6, the spindle carrying a pinion 16 which meshes with a pinion 17 secured to the projecting end of the operating spindle 9.

Secured to the trunnion member 7a of shaft 7 are two levers 18, 19, one opposite each bearing 2 of the roll 1, these levers having bifurcated ends between which worm wheels 20, 21 are journaled respectively on pins 22, 23. The worm wheels 20, 21 are provided respectively with eccentric bosses 24 and 25 which support one end of

two pairs of links 26, 27, the other ends of which are pivotally connected to lugs 28 and 29 projecting from the bearings 2 of the feed roll 1, (see Figs. 3 and 4). The worm wheels 20, 21 are so disposed relatively to one another that the eccentricity of the bosses 24 is on the side of the mounting pin 22 opposite to that of the bosses 25 whereby upon rotation of worm wheels 20, 21 in the same direction the links 26 and 27 will be moved in opposite directions.

Rotatively mounted in each of the levers 18 and 19 is a spindle 30 having a worm 31 and a worm wheel 32 secured thereto. The worms 31 are in mesh respectively with the worm wheels 20, 21 while the worm wheels 32 project through slots 33 in the shaft 7a and mesh respectively with worms 34, 35 on the operating spindle 9.

With the above described arrangement it will be seen that upon manual operation of the handle 14 the operating spindle 9 will be rotated and rotary movement will be imparted to the spindles 30 through the worms 34, 35 and worm wheels 32. The worm wheels 20, 21 are thus rotated in the same direction by the worms 31, and due to the arrangement of the eccentric bosses 24 and 25 as described above, the links 26 and 27 are moved in opposite directions a corresponding amount whereby one of the bearings 2 is moved outwardly while the other bearing is moved inwardly. It will therefore be appreciated that by a suitable manipulation of handle 14 the feed roll 1 can be accurately aligned with the refiner roll 5. It will be obvious that the spindle 9 may be arranged concentric to the shaft 7, 7a, the gears being suitably modified.

The mechanism for adjusting the nip or clearance between the rolls 1 and 5 for varying the feed of the chocolate is as follows, reference being had particularly to Figures 3 and 4 of the drawings.

A bell crank lever 36 is secured to the right hand trunnion portion 7a of shaft 7 adjacent one end thereof, one arm 37 of this lever being bifurcated at its outer end to receive an eye bolt 38, these parts being connected by a pin 39 which engages in a slot 40 of the eye bolt to permit lateral play between the parts. The eye bolt 38 extends upwardly through a sleeve 41 and is secured to the latter at its upper end by a shear pin arrangement hereinafter described. The sleeve 41 is externally threaded at its lower end, the threads engaging the internal threads of a sleeve extension 42 of a gear 43, thus forming an adjusting screw gear which is regulated by means of a handwheel 44 through a reduction gear comprising gear 45, secured to the handwheel, and gears 46, 47 and 43. The elements of this gear are located in a recessed portion 48 of the casing having a cover plate 49 bolted or otherwise secured thereto. The screw-threaded sleeve member 41 passes axially through the handwheel 44 and gears 45 and 43 engaging the gear 45 and handwheel 44 with a sliding fit.

It will be seen that by manipulation of the handwheel 44 an axial movement of the eye bolt 38 is obtained through the reduction gear and adjusting screw gear, and this axial movement of the eye bolt effects, through the bell crank 36, a bodily movement of the shaft 7 and the members carried thereby about the axis of shaft 7 whereby the levers 26 and 27 move the feed roll 1 bodily toward or away from the roll 5, the feed roll swinging about the axis 4 of the arms 3 to effect adjustment of the nip or clearance.

The shaft 7, 7a is of particularly rigid construction so as to preclude twisting thereof which might otherwise occur as a result of the adjusting force being applied thereto at one end only. Thus simultaneous and accurate adjustment of levers 18 and 19 at both ends of the roll 1 is insured.

Means is provided to prevent damage to the mechanism and bearings of the roll 1 and its associated mounting should a solid body, for example a scraper knife, fall between the rolls 1 and 5. This means consists of a shear pin arrangement between the eye bolt 38 and the screwed sleeve 41.

Referring to Figures 3 and 4 a shear pin block 50 is mounted on the upper end of the sleeve 41, the block being retained in position by two depending portions 51 which project within and engage the sleeve. Relative rotation between the sleeve and the block is prevented by a dog clutch arrangement consisting of projections 52 on the sleeve engaging recesses 53 in the block. The block 50 is slotted axially, the slot having arcuate ends and flat sides, to receive the flattened end 54 of the eye bolt 38 which is also flattened at 55 to lie within the depending portions 51 of the block. The block 50 and the flattened end 54 of the eye bolt are drilled transversely to receive a shear pin (or pins) 56 which are retained in position by a cap member 57 screwed to the block.

The shear pin 56 supports the normal load or pressure on the roll 1 but should the load become excessive due for example to the falling of a solid body, such as a scraper knife, into the nip of the rolls, the shear pin will break and the eye bolt will drop into the position shown in dotted lines in Figure 3 whereby the roll 1 will be moved away from the roll 5. In order to prevent shock to the feed roll and associated parts upon shearing of the pin 56 a spring buffer 58 is mounted on the second arm 59 of the bell crank 36 which buffer is adapted to engage the casing or frame of the machine.

It will be appreciated that the aligning adjusting means and the nip or clearance adjusting means are operative independently of one another, the improved arrangements being such that an adjustment of the alignment of the feed roll may be made without affecting area of clearance or nip and thus the quantity of material per unit of time passing therethrough.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a roll refiner for chocolate or the like having a feed roll, in combination, means for adjusting the feed roll relatively to a refiner roll to vary the clearance comprising displaceable mountings for the end trunnions of the feed roll and a single adjusting mechanism operatively connecting both mountings and connected to a single actuating means for moving the mountings simultaneously, said mechanism being reversible from said trunnion mountings to said single actuating means, and a rupturable element associated with said single actuating means.

2. In a roll refiner for chocolate or the like having a feed roll, in combination, means for adjusting the feed roll relatively to a co-operating refiner roll to vary the clearance, comprising displaceable mountings for the end trunnions of said feed roll, a rock shaft, links between the rock shaft and the mountings, and a single adjusting mechanism, incorporating a shearable

element, operatively connected to and oscillating the rock shaft.

3. In a roll refiner for chocolate or the like having a feed roll, in combination, means for adjusting the feed roll relatively to a co-operating refiner roll to vary the clearance comprising pivotal mountings for the end trunnions of said feed roll, a rock shaft, links between the rock shaft and said mountings, a crank arm on said rock shaft, and an adjusting mechanism operatively connected to said crank arm to impart oscillatory movements to said rock shaft, said mechanism incorporating a shearable element.

4. Means for adjusting the feed roll relatively to the co-operating roll of a chocolate or like roll refiner to vary the clearance comprising displaceable mountings for the end trunnions of the feed roll, a rock shaft, adjustable operative connections between the rock shaft and said mountings, an arm on said rock shaft, and adjusting mechanism operatively connected to said arm through a rupturable element.

5. Means as claimed in claim 4 wherein the adjusting mechanism connected to said arm comprises an eye bolt connected at one end to the arm and coupled at its other end by the rupturable element to a sleeve, said sleeve having screw threads engaging a nut element, and means for rotating the nut element.

6. Means as claimed in claim 4 wherein a screw and nut mechanism is provided and is connected to said arm through an eye bolt, said eye bolt being operatively connected to one element of the screw and nut mechanism through a shearing pin which extends through an aperture in the eye bolt and into an aperture in a block mounted upon said element and clutched thereto.

7. Means for adjusting the feed roll of a chocolate or like roll refiner comprising pivotal mountings for the end trunnions of the feed roll, a rock shaft, adjustable operative connections between the rock shaft and said mountings, said rock shaft comprising a central hollow-section, and end trunnion sections extending into the central section and welded thereto, said end trunnion sections being hollow to accommodate an actuating element of an alignment adjusting mechanism, and means mounted on one of the trunnion sections for oscillating said shaft.

8. Means as claimed in claim 7 wherein the ends of the hollow central shaft sections are counterbored to receive stepped discs on the end trunnion sections.

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