Oct. 3, 1939. E. ROTH 2,174,843

ROLLER MILL HAVING FEED CONTROLLED GRINDING ROLLERS

Filed Dec. 14, 1937 2 Sheets-Sheet 1

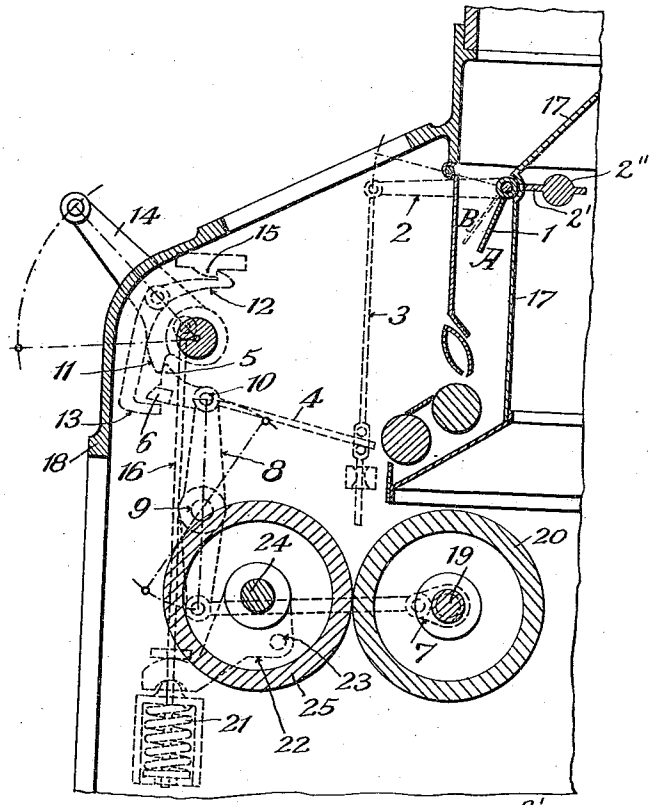


Fig. 1

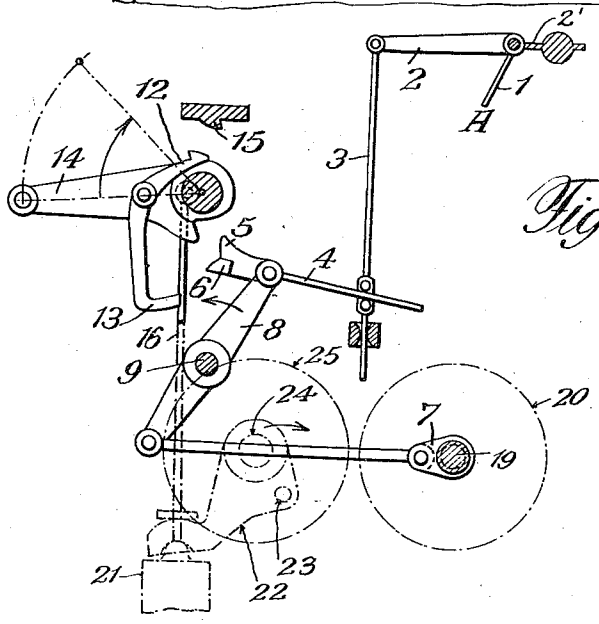


Fig. 2

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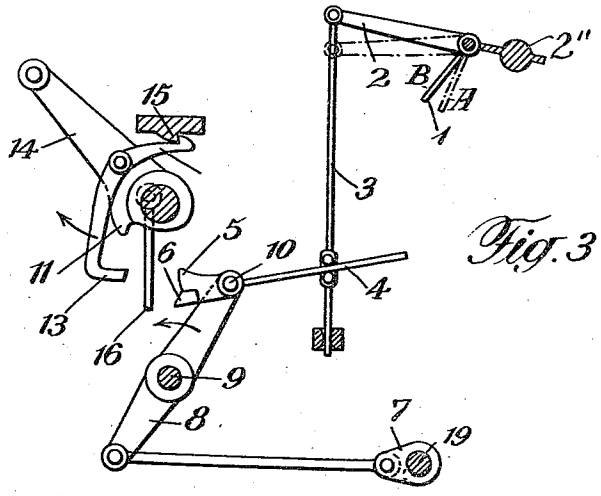


Fig. 3

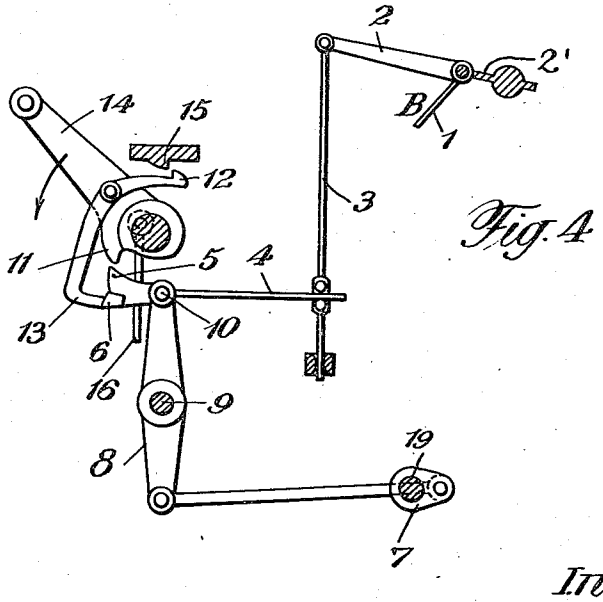


Fig. 4

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ROLLER MILL HAVING FEED CONTROLLED GRINDING ROLLERS

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2 Claims. (Cl. 83—12)

This invention relates to roller mills having automatic control means for adjusting the grinding rollers, said means comprising a linkage which is controlled by the material fed to the mill and which controls a mechanical driving gearing so that a control lever for adjusting the grinding rollers is adjusted into operative or inoperative position depending on whether the gearing is connected or disconnected.

In a known roller mill of this kind, a linkage operates to either connect or disconnect a clutch of a gear wheel ratio gearing by influence of which the control lever is adjusted into operative or inoperative position. This driving gearing is very complicated and therefore expensive to manufacture. Furthermore, for effecting the adjusting movements of the control lever, the linkage must counteract relatively large amounts of frictional and spring resistance, so that the reliability of operation of the means for alternately adjusting the lever into operative and inoperative position is considerably reduced, due to the fact that only a small driving effort is exerted on the lever adjusting means by the material fed, particularly, when light material is being ground. For this reason, only a minimum of frictional or other resistances should be opposed to the lever adjusting operation.

In another known roller mill, the grinding rollers are automatically adjusted, by a compression spring which acts on the movable roller bearing being compressed, when the supply of material to the mill is interrupted. This result can be obtained by relatively simple means. However, for compressing the spring, relatively large efforts are required, depending upon the power thereof, as compared with the functioning of the control lever operated arrangements which requires only little effort, since there is no necessity for compressing a spring. On the other hand, the adjustment of rollers by compressing a compression spring is obviously not practicable in roller mills which are devoid of such a spring.

In contradistinction to these known roller mill arrangements, the roller mill according to the present invention comprises a lever which is reciprocated by the mechanical driving gearing and extends substantially in the direction of movement of a pivot joint provided therein and the rear end of which is adjusted as to height by the linkage, said lever carrying two control members one of which adjusts the control lever into operative position when hitting a stop provided on the control lever, in a raised position of this control member, whereas the other control member releases a pawl securing the control lever in the operative position thereof by engaging with a nose provided on the control lever, in a lowered position of this second control member.

With this arrangement no frictional losses to speak of set up in the linkage while rockingly adjusting the reciprocating lever about its pivot joint and, as there are no further resistances to be overcome, only a very small effort need be exerted by the material fed for adjusting the reciprocating lever. Furthermore, this driving arrangement is distinguished by great simplicity, apart from its great reliability of operation, on account of the effort for adjusting the reciprocating lever being only small.

In the accompanying drawings an embodiment of the invention is illustrated by way of example only, in which

Fig. 1 is a cross section of the roller mill according to the invention showing the control device with the control lever in operative position;

Fig 2 shows an elevation of the control device with the parts thereof in their relative positions immediately before moving the control lever out of inoperative position;

Fig. 3 shows an elevation of the control device similar to that of Fig. 2, but with the parts thereof in their relative positions prior to moving the control lever out of operative position, and

Fig. 4 shows an elevation of the control device with the parts in relative positions as assumed during moving the control lever out of operative position.

In the drawings, the numeral 1 designates a flap valve for regulating the flow of material fed to the grinding rollers 20, 25 through a feed chute 17 which is included in the housing 18 of the roller mill.

The flap valve 1 is mounted on a pivot in the chute 17 and carries a control arm 2 firmly connected to this valve and is kept under the influence of an adjustable weight 2'' on a lever arm 2' extending in prolongation of the arm 2 rearwardly thereof, as shown in the drawings in the upper right hand corner of each figure thereof. The arm 2' thus tends to press the valve against the end position B, as indicated in chain-dotted lines in Fig. 1. When the feed is in progress, the flap valve is kept in the open position A by the weight of the material exerted upon the valve, whereas if the feed ceases, the flap valve is closed by the weighted lever 2'. The control arm 2 is pivotally connected to one end of a rod 3. The lower part of the rod 3 supports one end portion of a two-armed lever 4 pivotally connected to a pin 10. The other arm of this lever ends in two control members 5 and 6. The pivot pin 10 of the lever 4 is connected to one end of a two-armed lever 8 oscillating on a

pivot pin 9. The other or lower end of this lever 8 is linked by means of a connecting rod to a crank arm 7 fixed on an axle 19 of the grinding roller 20. Irrespective of whether the grinding rollers are in operative or inoperative position, the lever 4 keeps on moving to and fro by action of the crank arm 7. The relative arrangement of the levers 4 and 8 is such that the reciprocating lever 4 extends substantially in the direction of movement of the pivot pin 10 thereof during the travel of the latter together with the oscillating lever 8.

When by gravitational action of the feed of material the flap valve 1 is rocked into position A shown in Fig. 2, the member 5 of the lever 4 comes into contact with a cam 11 on the control lever 14, thereby raising the latter into operative position shown in Fig. 1. When the feed of materal ceases, the flap valve 1 is rocked into position B in Fig. 1 by action of the counterweight 2'' whereby the member 6 of lever 4 comes into contact with a nose 13 on a detent 12, so that this detent is disengaged from a stationary tooth 15 holding the lever 14 in operative position when engaged by said detent. The control lever 14 is thus pulled into the inoperative position shown in Fig. 2 by action of the weight of the movable grinding roller 25 through the intermediary of a tensioning device 21 including a tension rod 16.

The tension rod 16 acts upon a mounting arm 22 which is rockable about a fulcrum 23 and carries the bearing of the axle pin 24 of the grinding roller 25, so that the spacing of the grinding rollers can be varied within limits corresponding to the positions A and B of the regulator flap valve, by adjusting the lever 14 into operative and inoperative position respectively.

In adjusting the grinding rollers for operation, the lever 14 is rocked from the inoperative position of the same, as shown in Fig. 2, into the operative position shown in Fig. 1 by cooperation of the control member 5 with the cam member 11, when this control member assumes a raised position in response to the regulator flap valve being forced open by material falling through the hopper 17, in conseqence of which the grinding rollers are closed on each other. While the levers 8 and 4 are then conjointly moved to and fro by action of the crank arm 7, the lever 14 remains secured in operative position by interengagement of the detent 12 with the tooth 15.

These movements of the automatic control means for adjusting the grinding rollers will be still better understood from Figs. 3 and 4 of the drawings. After the flap valve 1 has been rocked from the full line position A into the chain-dotted position B and thus the rear arm of the lever 4 has been raised accordingly, the control member 6 assumes a lowered position, as shown in Figs. 3 and 4, for cooperation with the nose 13 which is provided on the lever 14 through the intermediary of the detent 12. By this means, the detent 12 is rocked from the position which it occupies in Figs. 1 and 3 into the position shown in Fig. 4 and is thus released from engagement with the tooth 15. Consequently, the control lever 14 is released from locking engagement whereupon this lever moves from operative position into inoperative position, by action of the tensioning device 21 and the tension rod 16, as previously described.

Various changes and modifications may be made in the practice of my invention without departing from the principle or spirit thereof, by adding customary practice and established knowledge of the art to the present disclosure and the scope of the appended claims is not to be regarded as limited except as specified therein.

I claim:

1. In a roller mill having automatic control means for adjusting the grinding rollers selectively to operative or non-operative position in dependence on the feed or interruption of the feed of material to the grinding rollers, a pair of cooperative grinding rollers, means for adjusting the gap between said cooperative rollers from operative to non-operative position and vice versa, a lever for controlling said adjusting means, said control lever having an abutment and also having a latch for holding it in one position, a mechanical driving means driven by the mill for engaging said abutment to move said lever in one direction, said latch having a releasing arm spaced from said abutment, said driving means including a continuously reciprocating lever for selective cooperation with said control lever abutment and latch releasing arm in dependence on the feed of material to the rollers, and a linkage controlled by the feed of material to said rollers articulated to said reciprocating lever to prevent the transmission of reactive impulses from said reciprocating lever to said linkage while said linkage positively adjusts said reciprocating lever in accordance with the movements of said linkage for cooperation with said control lever for moving said control lever into operative and inoperative position selectively in response to progress or interruption of said feed.

2. In a roller mill, a pair of cooperating grinding rollers, automatic control means for adjusting the relative position of the grinding rollers to and from operative position in dependence on the feed of material to be ground, said control means including a lever for controlling said adjusting means, said lever having an operating abutment and having a latch for holding it in one position, mechanical means for driving said control lever engaging said abutment to move said lever in one direction, said latch having a releasing arm spaced from said abutment, said control lever driving means including a pivotal reciprocable lever, means driven by a grinding roller for continuously reciprocating said lever, mounting means for said reciprocating lever arranged in said driving means for conjoint movement with said reciprocating lever, said pivotal lever extending substantially in the direction of said conjoint movement, and a linkage controlled by the feed of material to said mill articulated to the pivotal reciprocating lever towards its outer end to prevent the transmission of reactive impulses from said reciprocating lever to said linkage while said linkage positively adjusts said pivotal reciprocating lever in accordance with the movements of said linkage for cooperation with said abutment of said control lever or said latch releasing arm for adjusting said control lever into operative and inoperative position respectively in response to progress or interruption of said feed.

ERNST ROTH.