March 8, 1932. H. J. SWANSON 1,848,676

ROLLER GRINDING MACHINE

Filed June 3, 1929 3 Sheets-Sheet 1

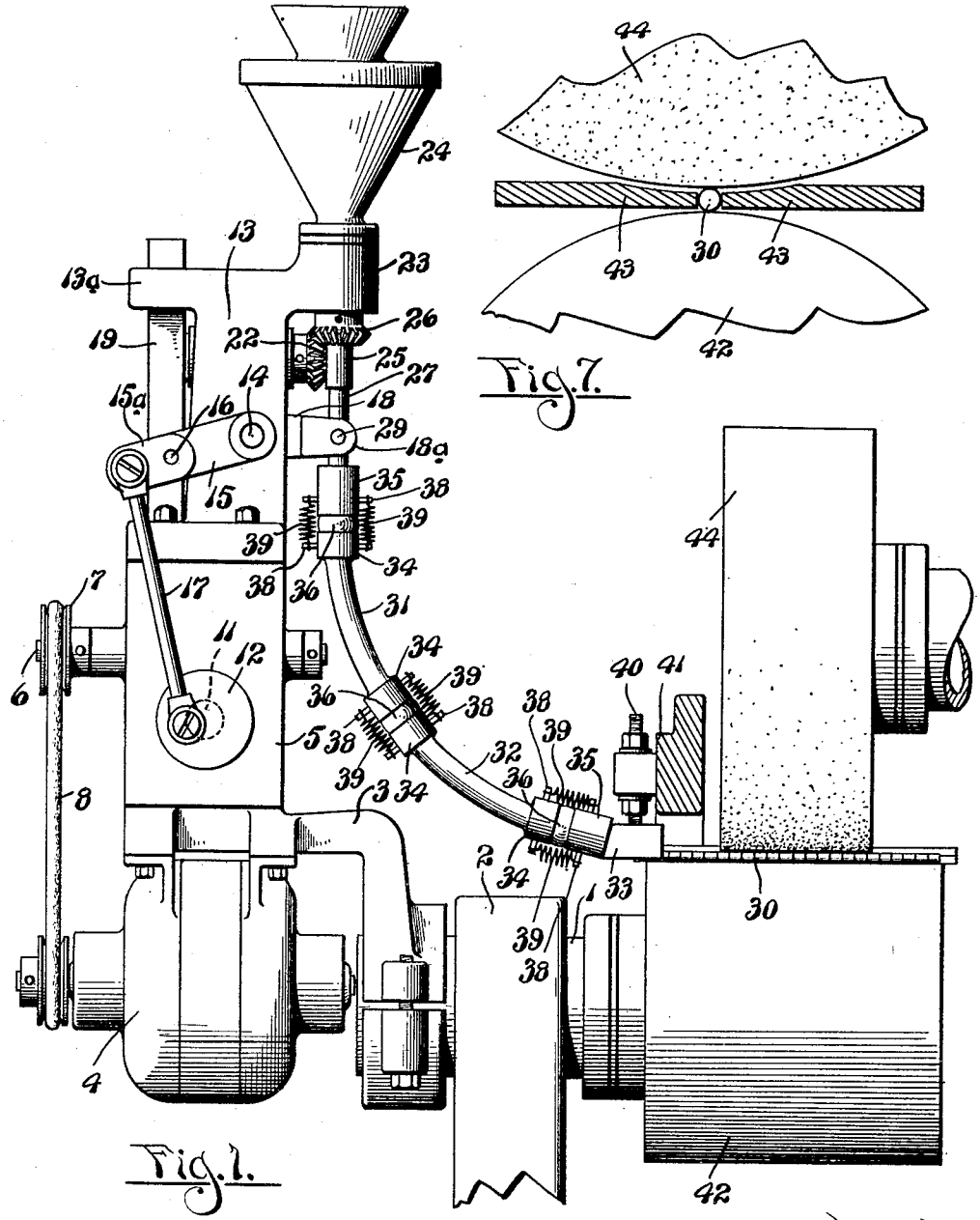


Fig. 1.

Fig. 7.

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Filed June 3, 1929 3 Sheets-Sheet 2

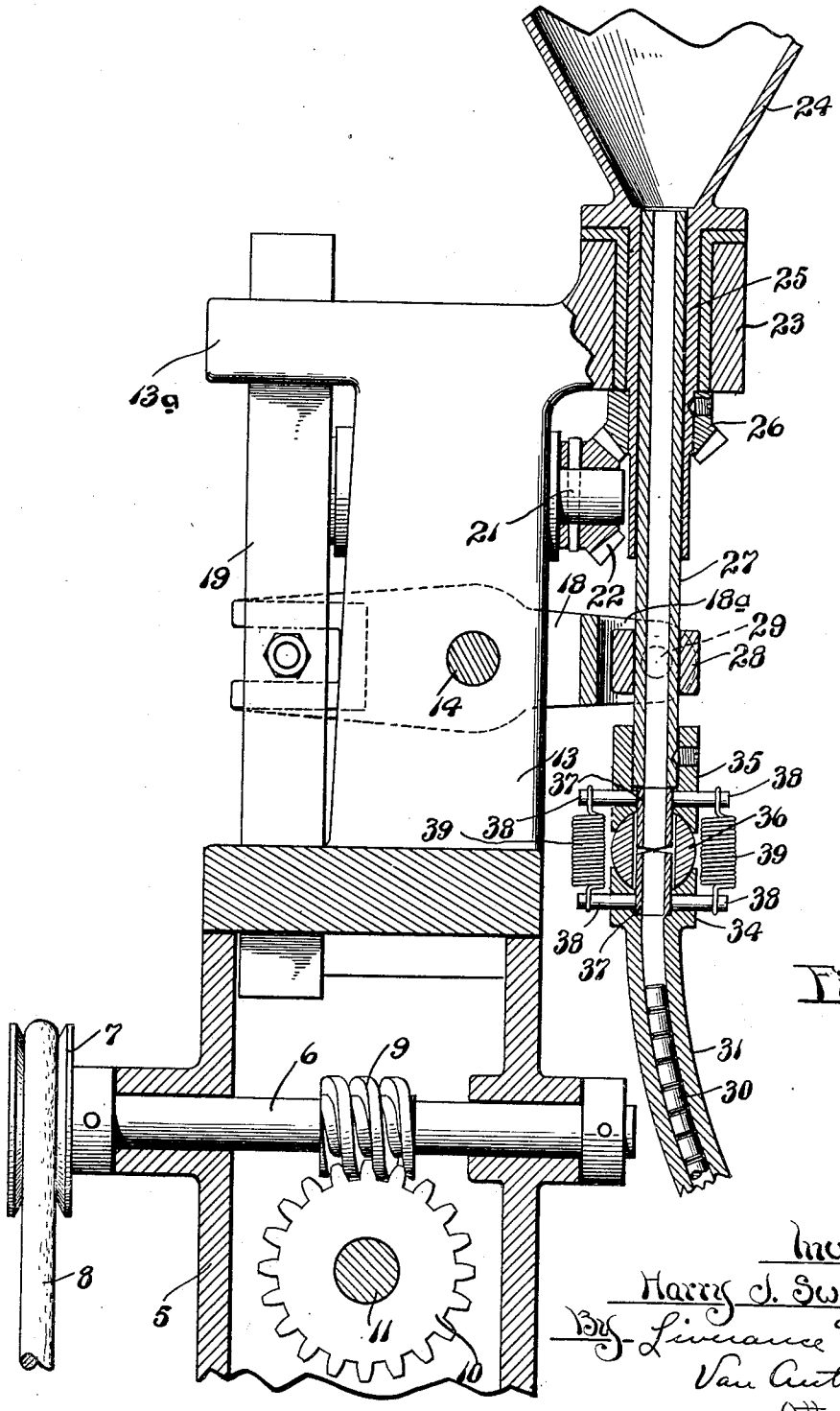


Fig. 2.

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ROLLER GRINDING MACHINE

Filed June 3, 1929 3 Sheets-Sheet 3

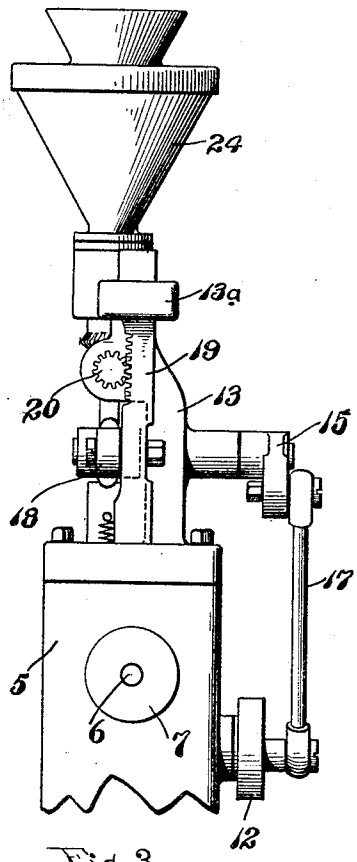


Fig. 3.

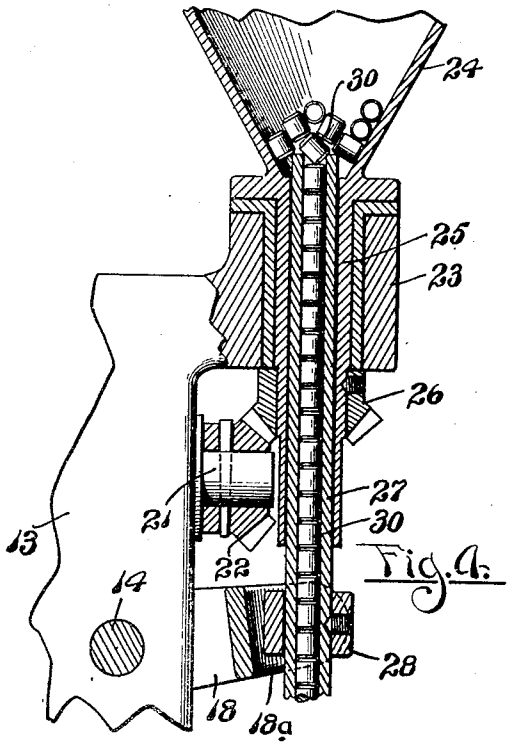


Fig. 4.

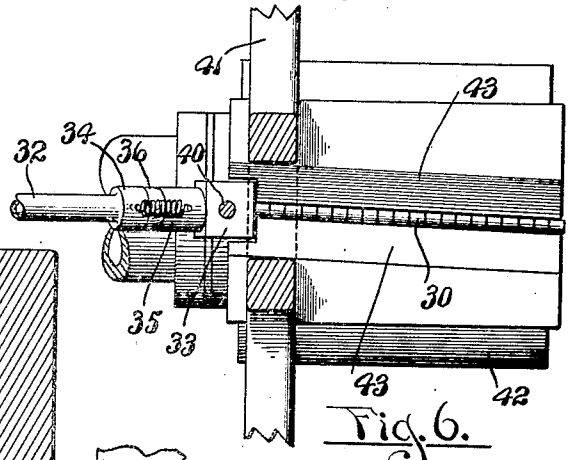


Fig. 6.

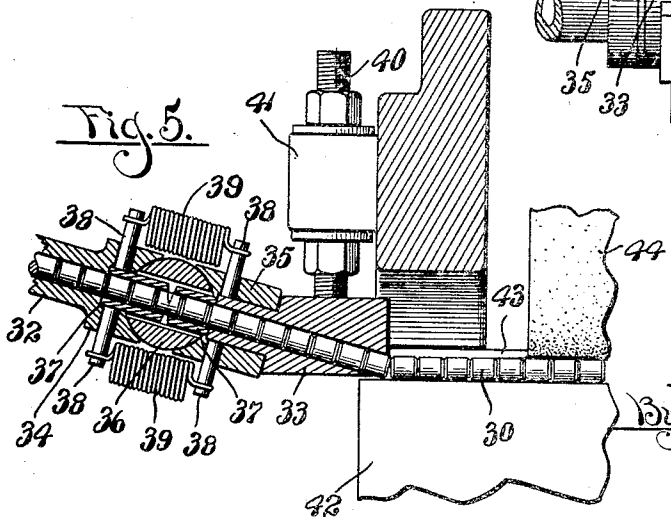


Fig. 5.

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UNITED STATES PATENT OFFICE

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ROLLER GRINDING MACHINE

Application filed June 3, 1929. Serial No. 367,963.

This invention relates to a roller grinding machine being in particular concerned with a feeding mechanism for the machine wherein the rollers having a length substantially the same as their diameter, may be poured indiscriminately into a hopper and through the feeding mechanism of my invention rapidly and properly fed to the grinding machine in longitudinal alignment one after another.

The rollers which are to be ground in this machine are of relatively small diameter, for instance approximating a quarter of an inch in diameter, and their length is substantially the same amount. The rollers are carried to the grinding wheel through a feeding tube by gravity, and it is essential that they be entered properly into the upper end of the tube one after the other very rapidly as quantity production is a vital necessity in machines of this character.

I have provided a feeding mechanism for rollers of this type in which this result is accomplished and the rollers are very rapidly fed to the grinding wheel and there is no danger of any projections or fins of metal on the rollers catching in the joints of the tube, which tube must be changed in direction from its inlet end portion, which is vertical, so as to deliver the rollers to horizontal guides between which the same are carried under the grinding wheel; and one feature of my invention is directed to a simple and novel easily assembled and disassembled joint for connecting the sections used to change the direction of the guiding tube, and which also permit a vertical reciprocation of the upper end portion of the tube with the other end of the guide held against movement.

An understanding of the invention for the ends stated, as well as for many others, not at this time specifically enumerated, may be had from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is a side elevation of the feeding mechanism of my invention showing the same in its operative relation to the grinding wheel.

Fig. 2 is a fragmentary enlarged vertical section of the upper part of said mechanism.

Fig. 3 is a fragmentary elevation of the upper part of the machine, the view being taken looking against the left of the machine as shown in Fig. 1.

Fig. 4 is a fragmentary vertical section, similar to that shown in Fig. 2, showing the rollers in the hopper and in the feeding tube and with the upper section of the tube elevated to upper position, it being shown in lower position in Fig. 2.

Fig. 5 is a fragmentary vertical section through the lower portion of the feeding tube, illustrating the delivery of the rollers to the grinding wheel.

Fig. 6 is a partial plan and section illustrating the guide plates in plan at the end of the feeding tube, said plates being located immediately below the grinding wheel, and

Fig. 7 is a fragmentary elevation and section through said guide plates illustrating the cooperating grinding wheel and the supporting drum for the rollers below the guide plates.

Like reference characters refer to like parts in the different figures of the drawings.

In the construction illustrated, a horizontal supporting shaft 1 is carried in a suitable vertical post 2, and at one end of the shape a bracket 3 is clamped thereto, formed with an upper horizontal portion to the lower side of which an electric motor 4 is bolted, as shown in Fig. 1. Above the bracket 3 a vertical housing support 5 is mounted and secured, through which a shaft 6 extends, mounted in suitable bearings in opposite sides thereof. A pulley 7 is secured to one end of the shaft and is driven by means of an endless belt 8 from a similar pulley on the motor shaft.

The shaft 6 within the housing 5 carries a worm 9 which meshes with a worm wheel 10 fixed to a shaft 11 which extends through the housing 5 below the shaft 6 and at right angles thereto. The shaft 11 at one end extends beyond a side of the housing 5 and has a disk 12 fixed thereon.

A vertical support 13 is permanently secured at the upper end of and extends above the housing 5. It has a rock shaft 14 mounted thereon between its sides parallel to the

shaft 11. An arm 15 is fixed to one end of the rock shaft 14 and is formed with a thickened boss 15*a* at its outer end, through which spaced apart openings 16 are made for the selective connection of the upper end of a connecting rod 17 thereto at any selected opening 16. The lower end of the rod 17 is attached to the disk 12 at a distance from the axis of shaft 11 on which it is mounted. It is evident that when the motor 4 is running, shaft 11 is driven continuously at a reduced speed and through the eccentric connection of the rod 17, the rock shaft 14 is oscillated or rocked back and forth about its axis.

A lever 18 is mounted between its ends on the rock shaft 14, and at what may be termed its rear end, has a pivot connection with a vertical rack bar 19 which is slidably mounted on the support 13 passing through the base thereof and through a rear projection 13*a* at the upper end of the support. The teeth of the rack bar 19 mesh with a pinion 20 secured at the rear end of a shaft 21 rotatably mounted near the upper end of the support 13, to which a beveled pinion 22 is secured at the front end of the shaft. Rocking the shaft 14 causes a vertical reciprocation of the rack bar 19 with a consequent oscillatory rotative movement of the shaft 21.

At the front upper end of the support 13, an integral boss 23 is provided which extends in front of the front side of the support of the machine. It has a vertical opening therein suitably bushed. A hopper 24 having downwardly and inwardly inclined sides is located above the boss 23 and has an integral downwardly extending cylindrical neck 25 which extends through the bushing in the boss and is provided with a beveled pinion 26 immediately below the boss which meshes with the pinion 22 previously described. The hopper 24, accordingly, is oscillated back and forth about a vertical axis through the gearing connections made by the pinions 22 and 26 and has a continuous oscillation all the time that the motor 4 is running.

The front end of the lever 18 is divided making a fork between the sides 18*a* of which the upper vertical section 27 of a guide tube passes, said section passing freely through the neck 25. A collar 28 around this section 27 is located between the sides 18*a* of the fork and has oppositely projecting trunnions 29 which are mounted in the sides 18*a* of the fork. When the machine is in operation the lever 18 is rocked back and forth and its front end raised and lowered with a consequent vertical reciprocation of the upper section 27 of the tube.

The guide tube for the rollers, which are indicated at 30, is continued at the lower end of the section 27 by additional curved sections 31 and 32, the lowermost of which is connected to a feed block or nozzle 33 in turn permanently connected to the grinding machine proper. The connection of the sections 31 and 32 to each other and to the lower end of the section 27 and the outer end of the feed block 33 is one which permits a change in angular relation of the parts by reason of the following construction:

The opposite ends of the intermediate sections 31 and 32 are enlarged as at 34 and formed with concaved recesses, while to the lower end of the tubular section 27 and outer end of the feed block 33 sleeves 35 are secured which are formed with complementary concaved recesses thereby permitting the mounting of a ball 36 between the adjacent ends 34 or 34 and 35. The ball 36 has a continuous opening therethrough and short sleeves 37 are located in the ball, the inner diameter of which is the same as the inner diameter of the tubular sections 27, 31, and 32. The adjacent ends of the sleeves 37 are formed at an angle to each other, best shown in Fig. 2, permitting a limited angular movement of the same with respect to each other.

Pins 38 extend from the enlarged ends 34 of the intermediate sections and from the sleeves 35, and are connected by coiled tension springs 39, thereby holding the parts securely together, providing a continuous tubular passage for the rollers 30, making joints which are readily separated should any need for such separation occur, and permitting limited vertical movements of the upper tubular section 27 while the block 33 is held against any movement; and there is no danger of the rollers being caught and held by reason of their ends engaging against the ends of the sleeve members 37.

The feed block or nozzle 33 is carried by a rod 40 which is mounted on the frame 41 of the grinding machine proper. It may be adjusted a limited distance so as to properly locate the outlet of the block with relation to a supporting wheel or drum 42 which in practice is mounted for rotation at the opposite end of the tubular support 1 first described. The rollers in alinement and in consecutive order are carried to the upper side of the drum 42 and delivered between two spaced apart guide plates 43 located directly over the drum 42. The grinding wheel 44 is mounted for rotation above the drum 42 and in a position such that its under side engages against the rollers 43. The guide plates 43 are located with their adjacent edges at an angle to the axis of the drum whereby there is an automatic movement of the rollers 30 under the grinding wheel and over the drum. The rollers are ground by the grinding wheel and delivered after passing therefrom. It is to be understood that while the adjacent edges of the guide plates 43 are shown at an angle to the axis of the drum 42, as an equivalent said adjacent edges of the guide plates may be parallel to the axis of the grinding wheel and the axis of the drum 42

may be located at an angle to the axis of the grinding wheel.

In the use of the machine the drum 42 will be dressed from time to time in order to true the same, with a consequent reduction in its diameter. This is compensated for by shifting the bracket 3 on the shaft 1 toward the bracket 2, the feed block or nozzle 33, of course, being lowered as the diameter of the drum 42 is decreased. Such adjustment of the bracket 3 moves the whole feeding mechanism inward toward the grinding wheel and properly maintains the relation of the parts for effective operation.

With the machine as described, the rollers which have been hardened previously are dumped indiscriminately into the hopper 24. The hopper oscillates back and forth about a vertical axis simultaneous with the vertical reciprocation of the upper tubular guide section 27. In Fig. 4 the tube 27 is at the uppermost point of its movement and in Fig. 2 at its lower point. A roller, such as indicated at the upper end of the tube 27 in Fig. 4, which is cocked at an angle to the axis of the tube is shifted around and changed in position so that it drops vertically into the tube due to the vertical movement of the tube and the pressure of the other rollers around it; while the oscillatory movement of the hopper 24 is of value in shifting the rollers to different positions whereby no roller can remain fixed at the upper end of the tube section 27 and block the flow of the rollers 30 thereinto. The oscillatory movement of the hopper is not an absolutely essential feature of the invention as the vertical reciprocation of the upper section 27 of the tube into and out of the lower end of the hopper will dislodge the rollers should any of the rollers be in a position to block entrance into the tube, and it has been proven by actual practice and continuous use that the rollers are properly headed into the tube and fed continuously thereto as fast as the grinding tube 44 takes care of them without blocking of movement through the tube, catching at any cracks or corners therein or the like. The invention has proved to be of particular value with respect to quantity production in the matter of grinding the rollers to their correct size. A single machine will pass one hundred and fifty thousand of the rollers daily without attention further than supplying the hopper with the rollers which are to be ground. The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within the scope thereof.

I claim:

1. In a machine of the class described, a vertically positioned hopper having downwardly and inwardly inclined sides, a neck extending from the lower end of the hopper, a vertical tube extending through said neck, means connected with said tube and operable for reciprocating the tube in the neck, additional tubes located end to end with each other and with the lower end of the first tube, yieldable connections between adjacent ends of the tubes permitting angular change of position of the same relative to each other, and a stationary feed block with which the lowermost tube has a like connection.

2. In a machine of the class described, a vertical support having a projecting boss, a hopper having downwardly and inwardly inclined sides mounted on said boss, a neck connected with and extending from the lower end of the hopper through the boss, a shaft mounted on the support, gearing connections between said shaft and neck of the hopper, a tube slidably mounted in and extending through said neck, a lever pivotally mounted on the support connected with the tube below said neck, and means for simultaneously rocking said lever and oscillating said shaft, whereby the hopper is turned back and forth about the axis of said tube and said tube is simultaneously reciprocated in the neck of the hopper.

3. In a machine of the class described, a vertical tube, a second tube below the lower end of said vertical tube and curving at its lower portion to one side, enlarged heads on the adjacent ends of said tubes having concaved recesses at their adjacent ends, a ball located between and seated in said recess, sleeves having inner diameters the same as the inner diameters of said tubes extending from said heads on the tubes into the ball and meeting substantially at the center thereof, said sleeves at their adjacent ends being angularly cut to permit rocking movement of one with respect to the other, and yielding spring means connecting said heads at the adjacent ends of the tubes and holding the same in secure engagement against said ball.

4. In a machine of the class described, a vertical support, a boss thereon, a hopper having downwardly and inwardly inclined sides mounted on and above the boss, a neck extending from the lower end of the hopper and through said boss, a horizontal shaft mounted on the support, gearing connections between the shaft and neck, a rock shaft mounted on said support, a lever mounted between its ends on said rock shaft and extending at one end underneath said neck of the hopper, a tube slidably mounted in the neck with which said end of the lever is connected, means for rocking the rock shaft, and means disposed between the opposite end of the lever and the first mentioned shaft for oscillating said first shaft on the rocking movement of the lever, whereby the hopper is oscillated and the tube is vertically reciprocated simultaneously.

5. In a machine of the class described, a grinding wheel mounted to turn about a

horizontal axis, a hopper for containing rollers to be ground mounted to one side of and above the grinding wheel, said hopper having downwardly and inwardly inclined sides, a tubular roll feeder structure between said hopper and grinding wheel, including an upper tube mounted for vertical movements and extending into the lower end of the hopper, a feed block permanently secured at one side of the grinding wheel and curved tubular sections between the lower end of said first tube and feed block, joint connections between the feed block, tubular sections and the first tube permitting an angular movement between the same at their ends and means for vertically reciprocating said first mentioned tube.

6. A construction containing the elements in combination defined in claim 5, combined with means for oscillating the hopper back and forth about the axis of said first tube simultaneously with the reciprocations of the tube.

7. In a machine of the class described, a hopper having downwardly and inwardly inclined sides, and a neck extending from the lower end thereof, a tube slidably mounted in the neck, additional tubes located one with its upper end adjacent the lower end of the first tube and another with its upper end adjacent the lower end of the second tube, flexible connections between the tubes at their ends for holding the same together but permitting limited angular and longitudinal movement of the tubes with respect to each other, said additional tubes being curved to one side away from the axis of the first tube, and a feed block having a passage therethrough of the same diameter as the passages through said tubes, similarly connecting with the lower end of the lowest tube.

In testimony whereof I affix my signature.

HARRY J. SWANSON.