No. 879,581. PATENTED FEB. 18, 1908.

F. B. PETTENGILL.

FEEDING MECHANISM FOR CRUSHING MILLS.

APPLICATION FILED OCT. 20, 1906.

Fig. 1.

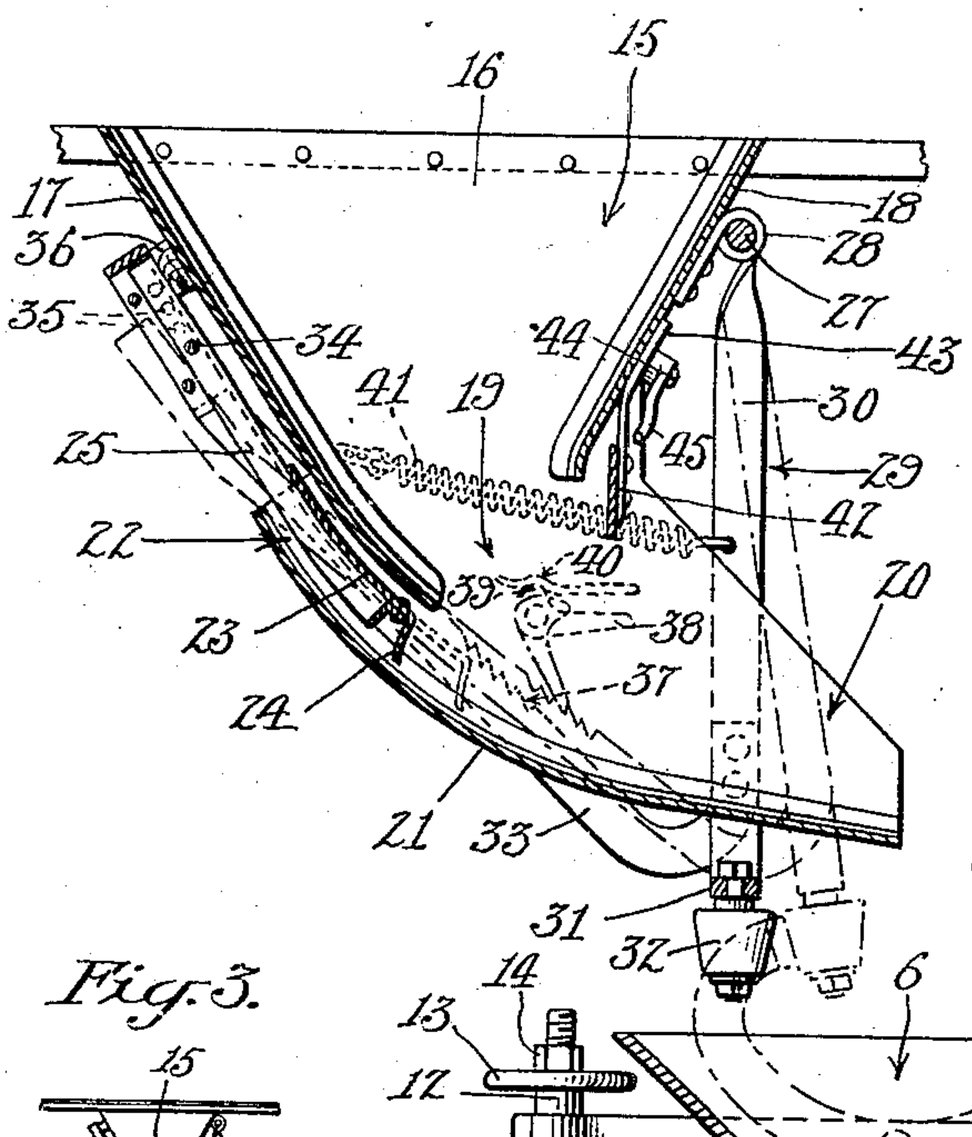


Fig. 2.

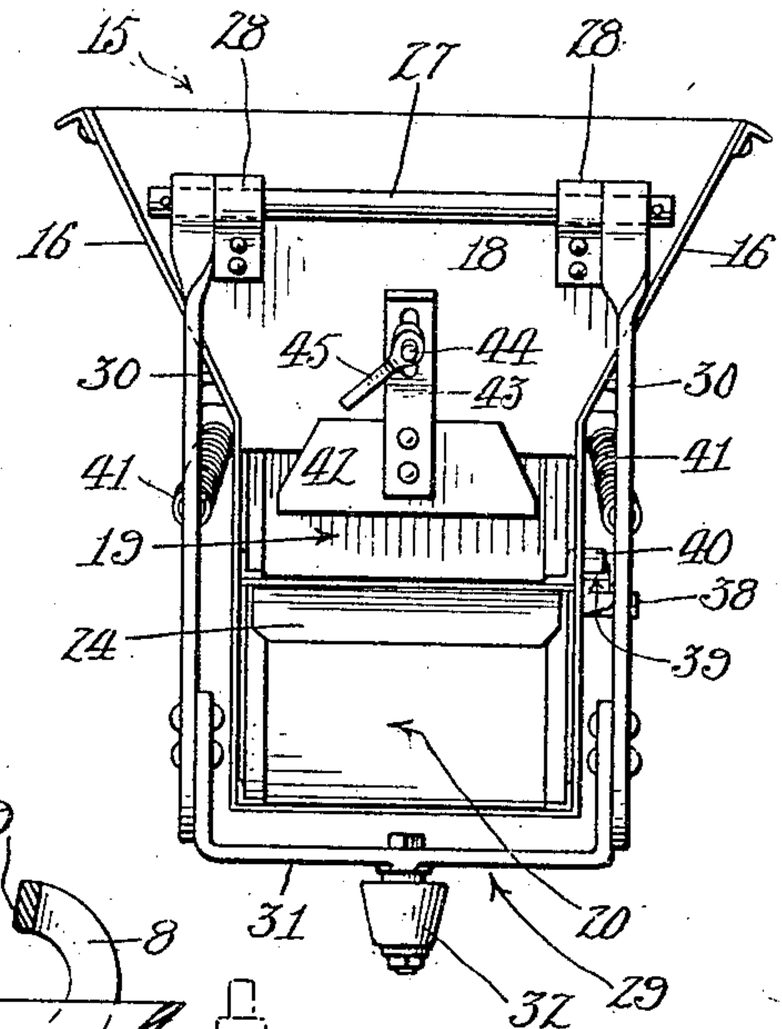
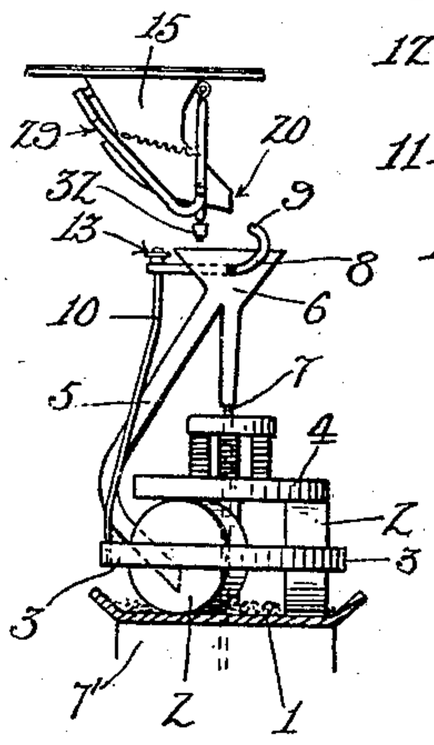


Fig. 3.



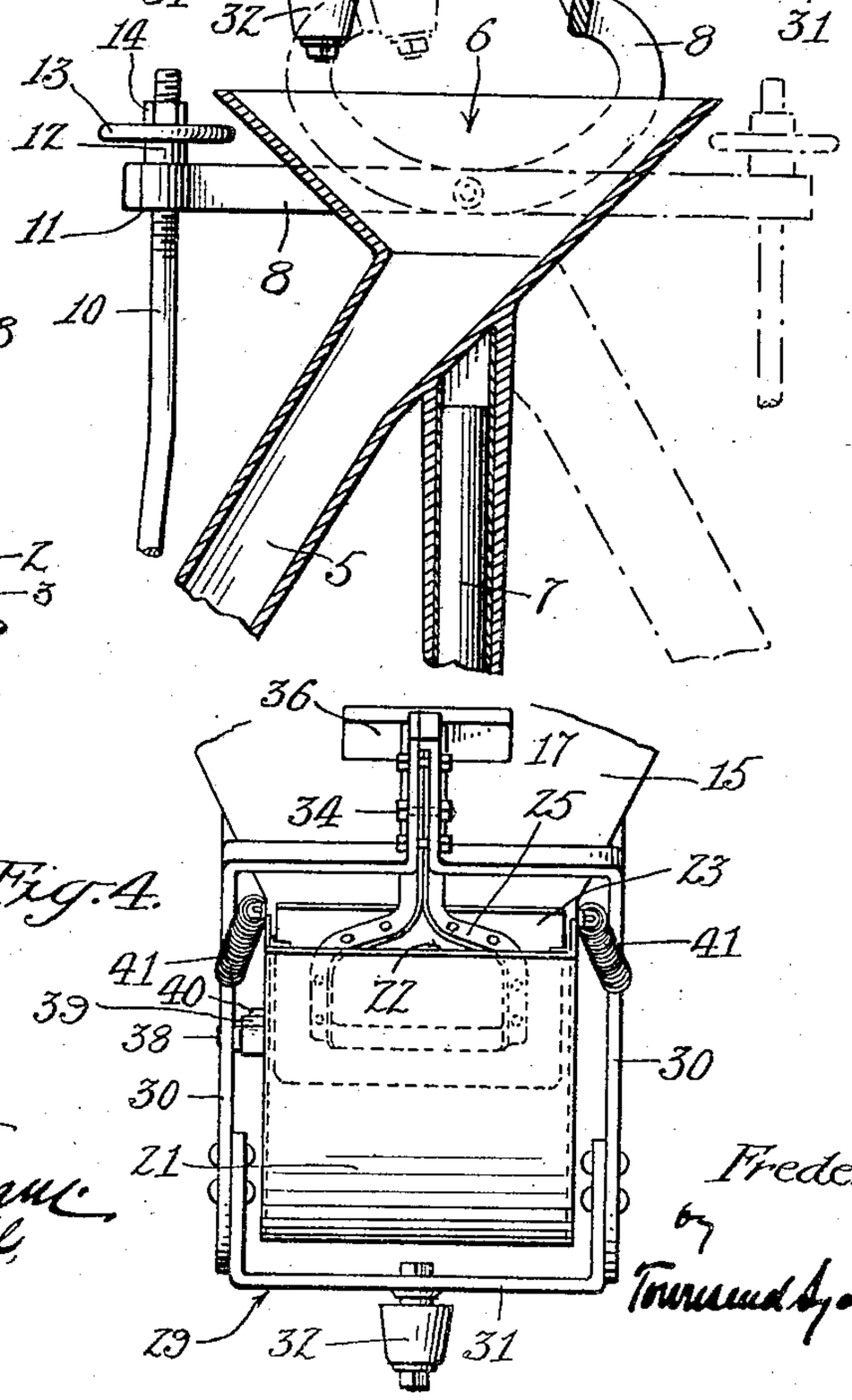
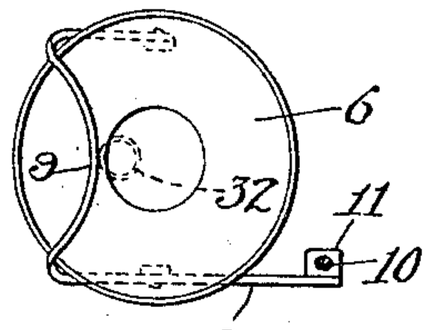


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

FREDERICK B. PETTENGILL, OF BURBANK, CALIFORNIA, ASSIGNOR OF ONE-HALF TO SAMUEL L. KISTLER, OF LOS ANGELES, CALIFORNIA.

FEEDING MECHANISM FOR CRUSHING-MILLS.

No. 879,581. Specification of Letters Patent. Patented Feb. 18, 1908.

Application filed October 20, 1906. Serial No. 339,880.

To all whom it may concern:

Be it known that I, FREDERICK B. PETTENGILL, a citizen of the United States, residing at Burbank, in the county of Los Angeles and State of California, have invented new and useful Feeding Mechanism for Crushing-Mills, of which the following is a specification.

This invention relates to means for feeding rock or ore to a crushing mill and the main object of the invention is to provide a feeding mechanism which will deliver the rock or ore at a rate proportionate to the capacity of the mill, to automatically feed the ore fast or slow, according to the speed of the crushing process.

Further objects of the invention are to provide a mechanism which is extremely simple in construction, positive in operation, durable in use and which is susceptible to fine and accurate regulation according to the demands of the mill.

Another important object is to provide a feeding device which will not become clogged.

In the accompanying drawings I have shown the invention as applied to a crushing mill of the roller type, but it should be understood that the feeding device is not necessarily restricted to use in combination with a mill of the roller type as but slight modification by one skilled in the art would enable it to be applied to a stamp mill.

The accompanying drawings illustrate the invention, and referring thereto:—

Figure 1 is a vertical elevation taken diagrammatically through the feeding device and the upper portion of a roller crushing mill, for example such a type of mill as is described and claimed in a former application of mine filed Feb. 8, 1906, Serial No. 300,144. Fig. 2 is a front elevation of the hopper of the feeding device and adjacent mechanism, removed from the mill. Fig. 3 is a side elevation of the device applied to a mill of the roller type to illustrate the coöperation of the mill and feeding device, the mill being shown in simple lines and stripped of details. Fig. 4 is a rear elevation of the feeding device with the upper part broken away. Fig. 5 is a plan view on a reduced scale of the hopper of the mill, the operating shoe, and its yoke.

1 designates the mortar within which the ore is crushed by rolls 2 which are connected by a suitable frame 3, a pressure plate 4 being mounted upon the rolls to cause the necessary pressure of the rolls against the ore or rock. The ore is fed to the mortar 1 through an ore chute 5, the upper end of which communicates with a hopper 6, the hopper 6 being supported by a vertical shaft 7 which extends down through the plate 4 and through the mortar 1 into the bed 7′. The hopper 6 and ore chute 5 operate in a fixed horizontal plane although the rolls 2 frame 3 and plate 4 rise and fall according to the amount of ore which lies underneath the rolls 2.

Pivoted to the hopper 6 is a yoke 8 having a shoe 9, and fastened to the frame 3 is an operating rod 10 the upper end of which, as shown in Fig. 1, passes through an eye 11 formed in the end of the yoke 8, the upper end of the operating rod 10 being threaded and having a nut 12 thereon which is operated by a hand wheel 13 for adjusting the operating rod with respect to the yoke 8, there being a lock nut 14 for holding the nut 12 in the position set.

Further details of the mill, which are unnecessary to an understanding of the present invention are omitted and may be found in the former application above referred to.

Located above the mill is a feeding device comprising a hopper 15 supported on bars 16 which may be formed of angle-iron, the hopper having side walls 16, a back wall 17, and a front wall 18. The walls may be formed of sheet metal and the front wall 18 is shorter than the back wall 17, thus forming a throat 19. A spout 20, which may also be formed of sheet metal is arranged below the throat 19 and a portion of its bottom wall 21 is curved and extends back for a distance behind the lower part of the back wall 17 of the hopper, thus forming a way 22. The mouth of the spout 20 is arranged above the hopper 6 to discharge the rock as it is fed from the spout into the hopper 6.

Slidably mounted within the way 22 is a feeding plunger comprising a flat plate 23 having a down turned front ledge or plunger face 24, the plate 23 being attached to a pair of spreading arms 25, as shown in Fig. 4. The arms 25, together with the plate 23 are somewhat smaller than the way 22 allowing a certain amount of vertical play of the plunger for a purpose hereinafter described. A pintle 27 is supported by lugs 28 on the front wall 18 of the hopper, and hung to the pintle 27 is a pendent yoke 29, comprising a pair of V-shaped side arms 30 which are united by a cross bar 31 which carries a

graduated member comprising a tapered roll 32. The rear parts 33 of the arms 30 extend back outside of the side walls of the spout 20, and as shown in Fig. 4 are bent inwardly and fastened by a bolt 34 to the arms 25, the arms 25 having a series of holes 35 to enable the plunger to be adjusted relatively to the arms 33. A block 36 which may be formed of wood is fastened to the back wall 17 of the hopper and serves as a buffer against which the arms 33 strike in their back stroke in operation. One of the arms 33 is provided with a series of teeth 37 adapted to be engaged by a pawl 38 mounted on a side wall 16 as shown in Figs. 1 and 4 which pawl has a nose 39 adapted to coact with a locking spring 40 to hold the pawl 38 out of engagement with the teeth 37 when the pawl is swung up to bring its nose into engagement with the seat in the spring 40, the pawl 38 being entirely free and independent of the spring 40 when the pawl is in engagement with the teeth 37. Attached to the respective arms 30 are coil springs 41 the rear ends of which are connected with the side wall 16 of the hopper, and which act to retract the pendent yoke 29. A gate 42 is suspended in front of the throat 19 by means of a slotted tongue 43 which may be clamped in the position desired by means of bolt 44 and lever nut 45.

In operation the pawl 38 is thrown up out of engagement with the teeth 37 and is retained by the spring 40 thus permitting free rocking movement of the pendent yoke 29. As the mill is operated and the rolls 2 travel over the ore and crush the same, the ore chute 5 and hopper 6, with attached parts, rotate in unison therewith, and as the shoe 9 swings around in its circular orbit it strikes the tapered roller 32 at first with an easy motion which is gradually accelerated, and acting against the roller 32 swings forward the pendent yoke 29 into the position shown by dot and dash lines Fig. 1; continued movement of the shoe 9 in its circular orbit allows the yoke 29 to be gradually retracted by the coil springs 41 as the shoe 9 recedes until the shoe 9 has passed out of contact with roller 32, at which time the backward swing of the pendent yoke 29 is stopped by the buffer 36. As the yoke 29 is thus swung forward and back on the pintle 27 the plunger 24 is thrust out from under the back wall 17 of the hopper, and forces the ore from the spout 20 into the hopper 6, the spout 20 being continually replenished by ore from the hopper 16 falling through the throat 19. The gate 42, while not necessarily essential, is of advantage and prevents ore from piling up in the neck of the spout 20 just outside the hopper 15. As the plunger 24 swings back it rides up over any ore which may have slightly accumulated in the way underneath the plunger and during the forward stroke is pushed out of the way by the plunger. The enlarged way 22 permits of the slight vertical movement of the plunger caused by the location of the pintle 27. Thus in operation the ore is discharged step by step from the spout 20 by the strokes of the plunger. If too much ore is fed to the mill the rolls 2 will obviously rise and carry up the super-structure a corresponding distance, excepting of course the hopper 6 and ore chute 5 which latter remains at a constant elevation, and this upward rise of the frame 3 pushes up the operating rod 10 which tilts the yoke 8 a relative degree and retracts the shoe 9 so that the latter will operate in a larger circular orbit, which will correspondingly lessen the amount of swing imparted to the yoke 29 or miss the yoke altogether if its orbit is enlarged sufficiently. Conversely as the rolls 2 work down lower in the mortar 1 the shoe 9 is lifted and its orbit decreased and it thus strikes earlier against the roller 32 and at a larger diameter and is in contact with the roller during a longer period, thus increasing the swing of the yoke 29 and increasing the amount of ore pushed out of the spout 20 by the plunger 24. In this manner the amount of ore or rock discharged from the spout 20 is directly dependent upon the size of the circular orbit through which the shoe travels which in turn is dependent upon the elevation of the plane at which the crushing rolls 2 operate, and obviously the elevation at which the rolls 2 operate depends directly upon the amount of ore underneath them. If it is desired to suspend delivery of the ore from the spout 20 the pawl 38 is released from the spring 40 and allowed to drop down against the teeth 37 so that at the next outward swing of the pendent yoke 29 the pawl 38 will catch behind a tooth and hold the pendent yoke in its extreme forward position so that as the shoe continues to revolve in its circular orbit the yoke 29 will not be operated thereby and no ore will be pushed out of the spout 20. By adjusting the nut 12 the elevation of the shoe 9 and the size of its circular orbit may be regulated to coact with the roller 32 at a point suited to the crushing capacity of the mill or character of ore being crushed, thus enabling a coarse or a fine feed to be secured.

What I claim is:—

1. In combination, a roller crushing mill comprising a mortar, crushing rolls, means for feeding ore to the mortar, means for producing a rolling movement of the rolls relatively to the mortar to crush the ore permitting a relative rectilinear movement between the mortar and rolls to accommodate variation in the amount of ore between the rolls and mortar, and means rotating with said second named means for controlling said feeding means.

2. In combination, a hopper with a spout, a plunger for pushing ore from the spout,

a mortar, crushing rolls, means for rolling said crushing rolls on the mortar and permitting the rolls to rise or fall according to the amount of ore between them and the mortar, means for conveying ore from said spout to the mortar, and means rotating with the crushing rolls for operating said plunger.

3. In combination, a hopper with a spout, a plunger for pushing ore from the spout, a mortar, crushing rolls, means for rolling said crushing rolls on the mortar and permitting the rolls to rise or fall according to the amount of ore between them and the mortar, means for conveying ore from said spout to the mortar, means rotating with the crushing rolls for operating said plunger, and means for automatically varying the length of stroke of said plunger when the crushing rolls change from one plane of rotation to another.

4. In combination, a roller crushing mill, a pivoted shoe connected and rotated therewith and adapted to be operated thereby in an orbit of various sizes according to the amount of rock in the mill, a hopper, and ore feeding means adapted to contact with and be operated by the shoe through a length of stroke dependent on the diameter of the orbit of the shoe.

5. In combination, a mortar, crushing rolls traveling therein, a hopper and ore chute rotating with the rolls but at a fixed elevation, a feeder, a shoe carried by the hopper for operating the feeder, and means carried by the frame in which said crushing rolls are journaled for automatically changing the diameter of the orbit of rotation of the shoe when the crushing rolls rise or fall in their plane of rotation thereby changing the shoe to correspondingly vary the operation of the feeder.

6. In a combination, a mortar, crushing rolls traveling therein, a hopper and ore chute rotating with the rolls but at a fixed elevation, a feeder having a graduated operating member, a shoe rotating with said hopper and coacting with said graduated member to operate the feeder, and means for automatically shifting said shoe when the rolls rise or lower to cause the shoe to engage the graduated member at various points and impart relative amount of movement thereto.

7. A feeding device comprising a hopper with a throat, a swinging yoke, and a plunger having a thrust stroke under the hopper pivoted to and operated by the yoke, the front of the plunger having a down turned ledge, whereby the plunger, if caused to ride up during its back stroke over ore accumulated under it, can drop during the front stroke and cause the ledge to push out the accumulation of ore.

8. A feeding device comprising a hopper with a throat, a swinging yoke, a plunger having a thrust stroke under the hopper pivoted to and operated by the yoke, the front end of the plunger comprising a down turned ledge, and means for adjusting the pivotal point of connection between the plunger and yoke.

9. A feeding device comprising a hopper with a throat, a pendent yoke pivoted to the hopper, a plunger having a thrust stroke under the hopper operated by the yoke, a graduated member on the yoke, and means operated by a crushing mill for coacting with the graduated member to swing the yoke.

10. A hopper, a plunger for pushing rock away from under the hopper, means for operating the plunger comprising a rotating shoe, a mortar, crushing rolls operating in the mortar, means for operating the crushing rolls and rotating said shoe in orbits of various diameters to vary the stroke of the plunger according to the elevation of the plane of rotation of the crushing rolls.

11. A hopper, a plunger, means for thrusting the plunger across an opening in the hopper to remove ore therefrom, said means comprising a pivoted yoke, a tapered roller thereon, a roller crushing mill, and means operated in an orbit by the mill for striking the roller and swinging the yoke.

12. A hopper, a plunger for pushing ore away from the hopper, a yoke pivoted to the hopper and connected to the plunger, means for operating the yoke, and means for holding the yoke and plunger in extended position free from the yoke operating means.

13. A hopper, a plunger for pushing ore away from the hopper, a yoke pivoted to the hopper and carrying the plunger, a crushing mill, means operated by the mill for positively thrusting the plunger forward, means independent of the mill for retracting the plunger and means for holding the yoke and plunger in extended position.

14. A hopper, a spout therefor, an adjustable plunger operating in the spout for pushing ore away from the hopper, a crushing mill, means operated by the mill for positively thrusting the plunger forward, springs for returning the plunger, and means for holding the plunger stationary in its forward position free from said plunger operating means without disturbing the adjustment of the plunger.

15. A hopper, a plunger for pushing ore away from the hopper, a pendent yoke for operating the plunger forward, a rack formed on one of the arms of the yoke, a pawl for engaging the rack, means for detachably holding the pawl out of engagement with the rack, means for moving the yoke forward, and means for returning the yoke.

16. A hopper, a plunger for pushing ore away from the hopper, a yoke pivoted to the hopper and connected to the plunger, a mill, a shoe pivotally connected with the frame

of said mill and operated in a circular orbit by the mill, a graduated member on said yoke adapted to be operated by said shoe, and means for automatically varying the position of said shoe according to the amount of ore in the mill.

17. A hopper, a plunger for pushing ore away from the hopper, a pendent yoke pivoted to the hopper and connected to the plunger, a mill comprising a hopper with a fixed elevation, a mortar, crushing rolls operating in the mortar, a yoke pivoted to the latter hopper, an operating rod connected to said latter yoke and having operative connection with the crushing rolls to tilt the latter yoke when the crushing rolls rise or lower in the mortar, and graduated means carried by one of said yokes for coacting with the other yoke to cause the pendent yoke to be swung through a stroke corresponding to the amount of ore under the crushing rolls.

In testimony whereof, I have hereunto set my hand at Los Angeles California this 11th day of October 1906.

FREDERICK B. PETTENGILL.

Witnesses:
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