

(No Model.)

2 Sheets—Sheet 1.

T. L. & T. J. STURTEVANT.
GRINDING MILL.

No. 529,761.

Patented Nov. 27, 1894.

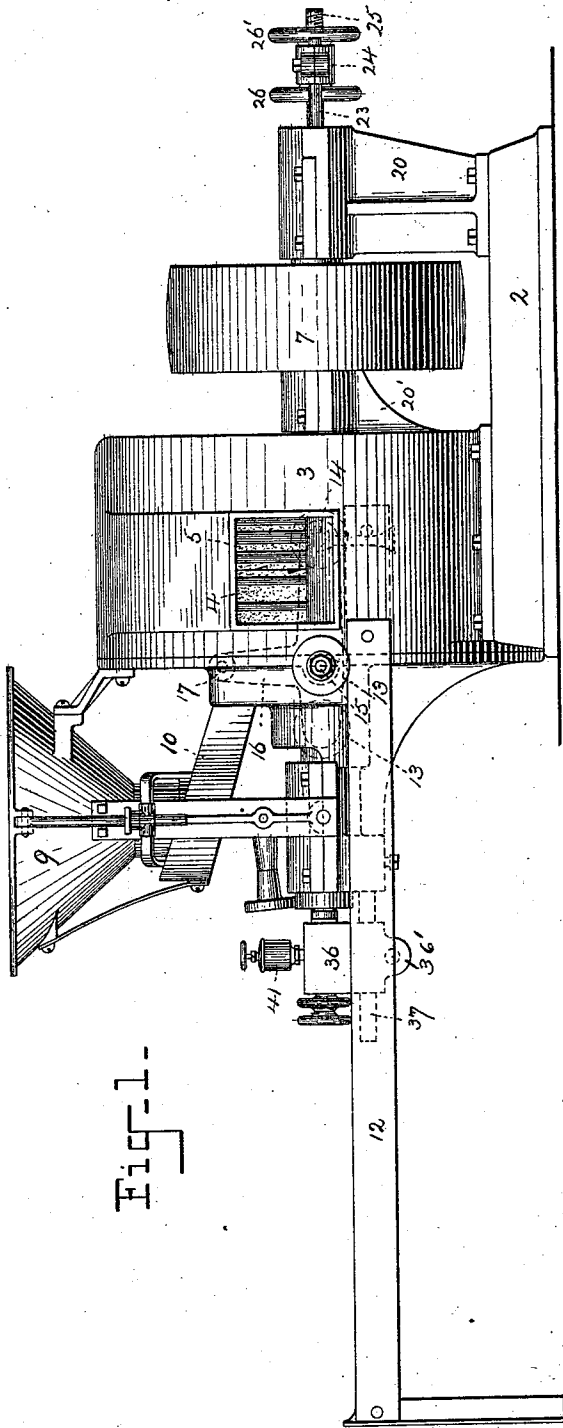


Fig-1-

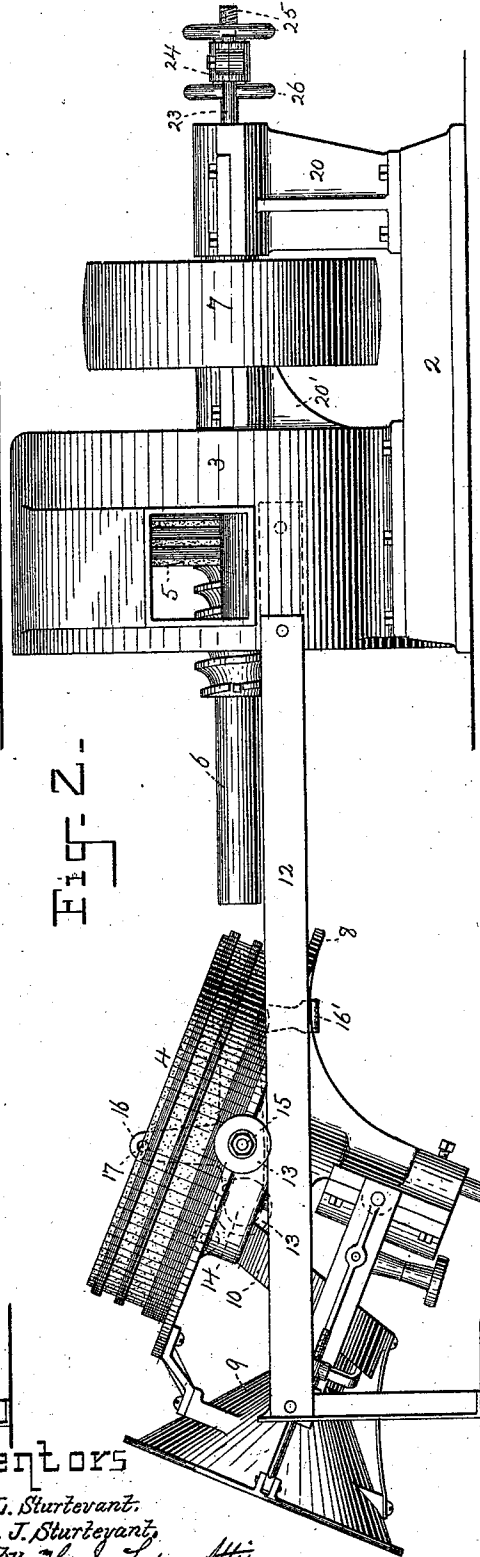


Fig-2-

Witnesses

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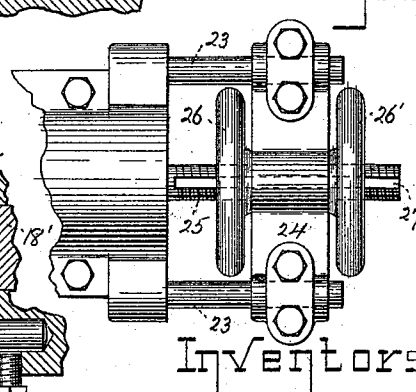
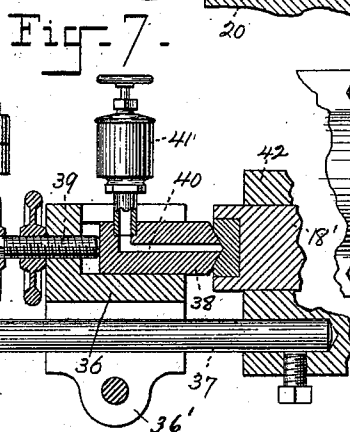
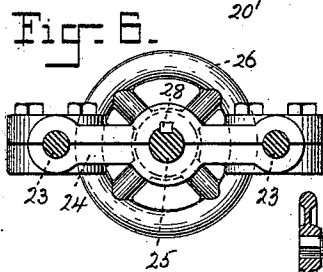
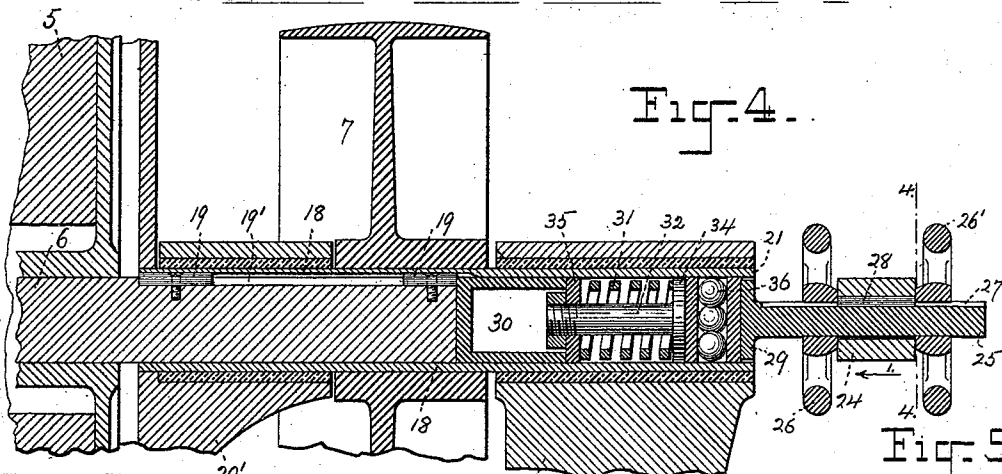
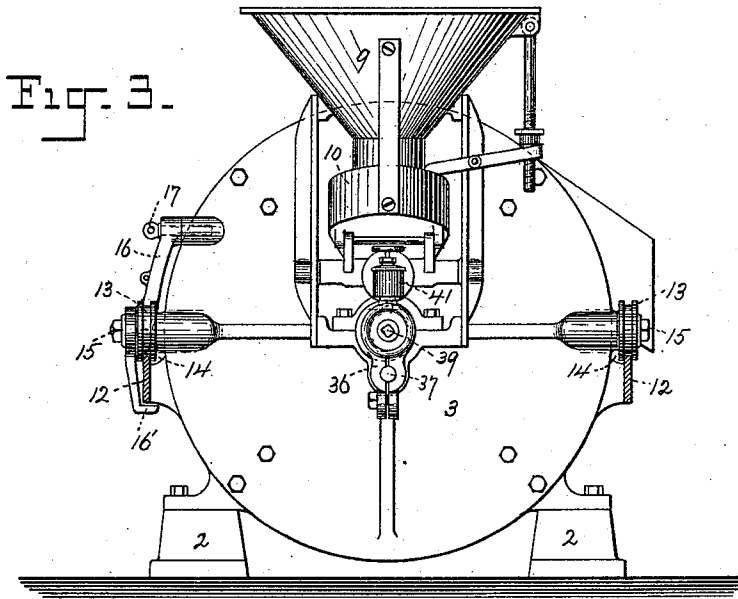
Thos. J. Sturtevant.

by H. C. Lodge Atty.

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UNITED STATES PATENT OFFICE.

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GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 529,761, dated November 27, 1894.

Application filed July 5, 1894. Serial No. 516,565. (No model.)

To all whom it may concern:

Be it known that we, THOMAS L. STURTEVANT and THOMAS J. STURTEVANT, citizens of the United States, residing at Quincy, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Grinding-Mills; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to grinding mills particularly that class which comprise a stationary grinding or bed stone disk and a rotary disk termed the "runner stone."

Our improvements relate to mechanism by which the position of the runner stone is adjusted with respect to the stationary stone. This mechanism is intended to control the longitudinal movements of the driving shaft upon which the runner is mounted and comprises an end-thrust at one end and a stop-thrust at the opposite end, the end-thrust being adapted not only to enable the runner to approach or recede from the bed stone to provide for different grades of product, but to afford a spring or yielding action to the runner in the event of hard foreign substances passing between the stones and so permit of their passage without injury to the mill. On the other hand the stop-thrust is intended to limit the approach of the runner to the bed-stone. Thus when the desired space between the stones has been obtained, the stop-thrust is adjusted and the runner is thereby prevented from approaching; a positive stop to the end movement of the shaft being created.

Another important feature in our invention is embodied in the manner of mounting and operating the runner stone, in order to enable the latter to be dismounted and dressed or repaired without disturbing the main driving shaft and pulley. Briefly described this plan comprises a shaft carrying the runner stone together with a main sleeve-shaft upon which is mounted the driving pulley; the

shaft which carries the mill stone to have telescopic or sliding movement in or out of the main sleeve shaft.

Other characteristic features will be hereinafter fully described and explained.

The drawings represent in Figure 1 a side elevation of a grinding mill embodying our invention. Fig. 2 is a similar view showing the runner stone with the various operating parts attached thereto drawn out and open for dressing. Fig. 3 is an end elevation of the mill proper. Fig. 4 is a vertical longitudinal section showing the main sleeve shaft and the runner stone shaft, likewise the end-thrust mechanism. Fig. 5 is a plan in part of Fig. 4 showing the end-thrust adjustment. Fig. 6 is a transverse vertical section on line 4, 4, in Fig. 4. Fig. 7 is a longitudinal central sectional elevation of the various elements comprising the stop-thrust.

This invention relates to that class of mills which, as before premised, contain a bed stone and a runner and may be considered as an improvement upon the invention included under application Serial No. 484,115, filed jointly in our names, August 26, 1893; patented July 10, 1894, No. 522,698. Briefly described, this grinding mill comprises a base or standard 2, a casing 3 adapted to contain the two stones, respectively bed stone 4, and runner 5. The latter is mounted upon a shaft 6 adapted to be rotated by means of a pulley 7 to some prime motor. The casing is firmly bolted to the base 2 and is provided with a removable end head 8 to which is secured the bed stone. In addition to the bed stone several other parts are attached, viz: the hopper 9, a rocking feed trough 10, and mechanism by which said trough is vibrated in order to secure constant feed to the grinding stones. In Fig. 2 the bed stone is shown as removed from the casing in order to dress, so termed. To enable the said stone to assume the position there shown, parallel guides or ways 12 are provided to support rollers or wheels 13. These latter are mounted in plates 14 which receive the trunnions 15 forming part of the head. In the present instance two wheels are shown on one side, and one upon the other, for simplicity of construction.

struction. To prevent the head with the various elements attached thereto from tipping when traveling upon the guides, a strap 16' engages the under side of the guides, see Fig. 3, while a locking arm 16 with a bolt 17, see Fig. 3, is also provided. After the head has been drawn back or run out from the casing, the bolt 17 may be disengaged from the head, when the latter can be swung upon the trunnions and positioned as shown in Fig. 2. This group of elements provides for ready removal of the bed stone from the casing for purposes of repair or otherwise. To provide for similar movement of the runner stone with its shaft, and to avoid any disturbance of the driving mechanism we have adopted the following construction: The several cooperating elements comprise a main sleeve shaft 18 adapted to receive one end of the runner-stone shaft 6, the two being interconnected for simultaneous rotation by a spline and groove connection, respectively 19, 19', the splines preferably being fastened to the runner shaft in order that they may move with it. This sleeve shaft is suitably mounted in journal supports 20, 20', the latter being attached to the mill casing in the present instance for compactness of form. This arrangement allows the runner stone and shaft to be disengaged readily from the main sleeve shaft. No disturbance of the latter, or its pulley, or the main driving belt need occur, and in this way repairs on the runner stone may be effected in the most expeditious manner, since all that is required is to slide one end into the shaft, adjust the bed stone, close the mill casing and commence operations. Since the runner stone is adapted to revolve, as likewise to have adjustment toward or from the bed stone, we have provided an end-thrust bearing which is one of the chief features of our invention. Reference to Figs. 4, 5, 6, shows the various instrumentalities comprising said end-thrust. Here it will be seen that the outer end 21 of the shaft extends within the journal support 20, while secured in said support are twin posts 23 upon which is adjustably mounted a split fulcrum plate 24 centrally pierced to loosely admit a screw-threaded rod 25 fitted with adjusting hand nuts 26, 26'. To prevent rotation of this screw rod when the nuts are rotated, a longitudinal key-way 27 is formed to engage a key or rib 28. The inner end of said rod is furnished with a piston 29 adapted to enter the extremity of the main sleeve shaft. Between the said piston and the end of the runner-stone shaft are positioned the following elements: A cylindrical cup 30 is entered within the sleeve shaft and the shaft of the runner stone abuts against its closed end. Furthermore a coiled spring 31 is positioned within the sleeve shaft, while the tension of said spring is controlled by the aid of a bolt 32 with a head 34 and a washer 35 loosely upon the bolt. The latter is free to play through the washer which bears against the open end of the cup. Thus by the

confinement of the spring the tension of the latter is exerted only when the pressure between the two stones exceeds the normal thrust produced by the several elements provided for such object. Hence, as stated, should some hard foreign substance enter between the stones the runner is free to yield and prevent injury to the mill.

Between the head of the bolt and the piston 29 are assembled a number of anti-friction balls 36 to create a ball-bearing and enable the shaft to turn with the least possible friction upon the end thrust support. Thus it will be seen that the clamping plate 24 is a fixed point or fulcrum, while the shaft may slide to and fro before the piston 29, as mentioned. The spring under the proper tension and coiled about the bolt is first inserted in the sleeve shaft; when the balls are placed in position and the piston entered within the bore of the sleeve shaft. The nuts 26, 26', are now moved to compress the spring and thus cause the runner stone to approach the bed stone. The adjustability of the plate 24 upon the posts and the advantages which accrue are evident. As the stones wear away and the runner is advanced toward the bed stone, the clamping plate is released and slipped along the posts toward the shaft end to compensate for the continued end adjustment forward. Thus the rod 25 may be made very short and the entire mechanism very compact. It is evident that the cup 30 may be omitted in which event the end of the runner shaft is to be recessed to allow proper movement of the bolt whenever the spring is compressed.

From the above description and the arrangement of parts comprising the end-thrust it is evident that there is nothing to prevent the runner from being thrust or forced against the bed stone by the action of the end-thrust mechanism. Hence we provide an end-stop, illustrated in Fig. 7. This is constituted as follows: At the opposite end of the shaft 18', which is here journaled in a hub 42 forming part of the removable end head, is positioned a thrust-block 36. This latter is provided with a spring clamp 36', by means of which said thrust block 36 is adjustably secured upon a horizontal post 37 also adjustable in the hub 42 bored to receive it. Thus a double adjustment is provided and the block may be either slipped upon the rod or it may retain its position upon the rod and the latter may be adjusted in or out of the hub 42. To provide a still nicer adjustment the thrust block 36 is bored for part of its length to receive a bearing pin 38 which may be advanced or retracted by means of a screw 39 with a lock nut. This pin is pierced with an oil duct 40, while an oil cup 41 is mounted on the thrust block, here slotted, to permit movement of the cup in order to align the latter over the duct and thus to furnish oil to the point of contact between the bearing pin 38 and the shaft end 18'. Thus it will be seen that the

contact of the shaft end 18' against the bearing pin 38 creates a positive stop in this direction and prevents the runner stone from advancing too far toward the bed-stone.

5 However the runner although prevented from approaching the bed stone is free to recede therefrom in case of a foreign object as a nail or bolt entering between the two stones since the cylindrical cup 30 allows the nut to advance within the cup, whenever the spring is compressed, which occurs when the foreign object enters. After passage of the latter between the stones, the spring forces the runner back into place, the bearing pin 40 being a fixed point. Thus the runner is compelled to assume its original position. As the stones wear away the runner shaft 6 is to be advanced in the direction of arrow 1, Fig. 4. The adjusting screw 39 is however first retracted. 20 When the screw has been fully withdrawn the block 36 may be slipped back upon the post 37, when the screw 39 is again advanced in to its full extent, pushing the bearing pin 38 forward. The latter is now in readiness for further retreat movement, as it becomes necessary to allow the shaft to advance to compensate for the wear of the stones.

What we claim is—

1. In combination with a main tubular driving shaft, an interior shaft equipped with a mill stone, and adapted to slide in and out of the driving shaft, and mechanism to cause the two shafts to rotate in unison, substantially as explained.

35 2. In combination with a mill stone, an inner rotary shaft which carries the same, a tubular outer shaft which incloses said inner shaft in part and in which said inner shaft slides, one or more bearings common to both shafts, a thrust bearing adapted to compel the interior shaft to move longitudinally within the said tubular outer shaft, and means for rotating said shafts in unison, substantially as described.

45 3. The combination with a hollow shaft, a secondary shaft telescoping therein, and mechanism to provide for telescoping and to compel rotation of the shafts together, of suitable bearings to support the hollow shaft, and an end thrust bearing comprising a fixed fulcrum plate, a spring adapted to bear against the secondary shaft, and a screw threaded rod which moves in the hollow shaft, substantially as specified.

55 4. The combination with a stationary stone, a runner stone, its shaft, and a tubular main shaft adapted to revolve the runner stone shaft, of a cylindrical cup in the bore of the main shaft, a spring also therewithin, its confining bolt, a piston for positive adjustment likewise within the main shaft, and balls in-

terposed between the confining bolt and the piston, all operating substantially as stated.

5. In a grinding mill, the combination with a tubular driving shaft, of an inner shaft 65 splined therein and having a sliding movement in and out of the same, a runner stone carried by said inner shaft, a stationary bearing, two parallel rods mounted therein and provided with an adjustable fulcrum-plate, a screw-threaded rod carried by said plate and provided at its inner end with a piston, and means, interposed between said piston and shaft, whereby said piston exerts a yielding end thrust against said shaft, substantially as 75 described.

6. In grinding mills, a main driving shaft, a secondary shaft carrying a mill stone and telescoping within the main driving shaft, and means for supporting and rotating said 80 shafts, combined with a thrust bearing adapted to permit endwise movement of the secondary shaft, and a stop bearing to limit the endwise travel of said shaft in one direction, as described and stated.

7. In a grinding mill, the combination with a tubular driving shaft, of a rotary shaft partially inclosed thereby and sliding therein, a runner stone carried by said rotary shaft, means for rotating said shafts in unison, and 90 an end-thrust bearing contained in one end of the said tubular driving shaft and comprising a spring adapted to bear against the shaft end, an adjusting rod provided with a piston, anti-friction balls between said spring 95 and piston, means for moving said rod endwise, and means for preventing the rotation of said rod, substantially as described.

8. In a grinding mill the combination with a runner stone, a revoluble shaft, and an inclosing casing, a bed-stone secured to one end of the casing, wheel-equipped trunnion plates to support said end casing, guides on which said end travels, and means for interlocking the trunnion plates to the end casing, substantially as set forth. 105

9. In a grinding mill, the combination with a bearing, of a rotary shaft mounted therein, a rod adjustably mounted in said bearing, a thrust block adjustable on said rod, and a 110 bearing pin sliding in said block and impinging against the end of the said rotary shaft and means for controlling the travel of said pin, substantially as described.

In testimony whereof we affix our signatures 115 in presence of two witnesses.

THOS. L. STURTEVANT.
THOMAS J. STURTEVANT.

Witnesses:

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H. E. LODGE.