No. 744,492. PATENTED NOV. 17, 1903.

W. B. COLLINS.

GRINDING MILL.

APPLICATION FILED SEPT. 9, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

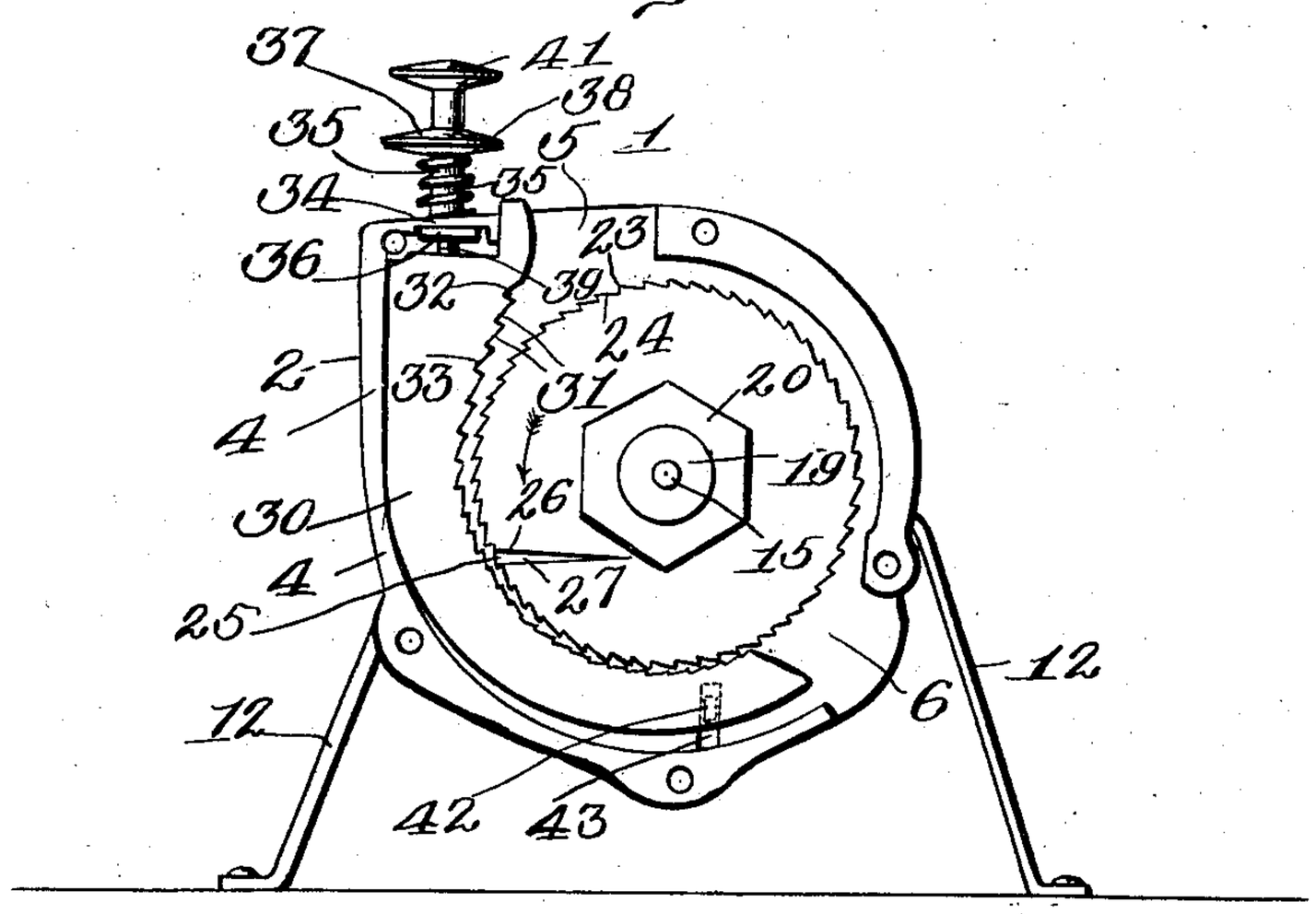
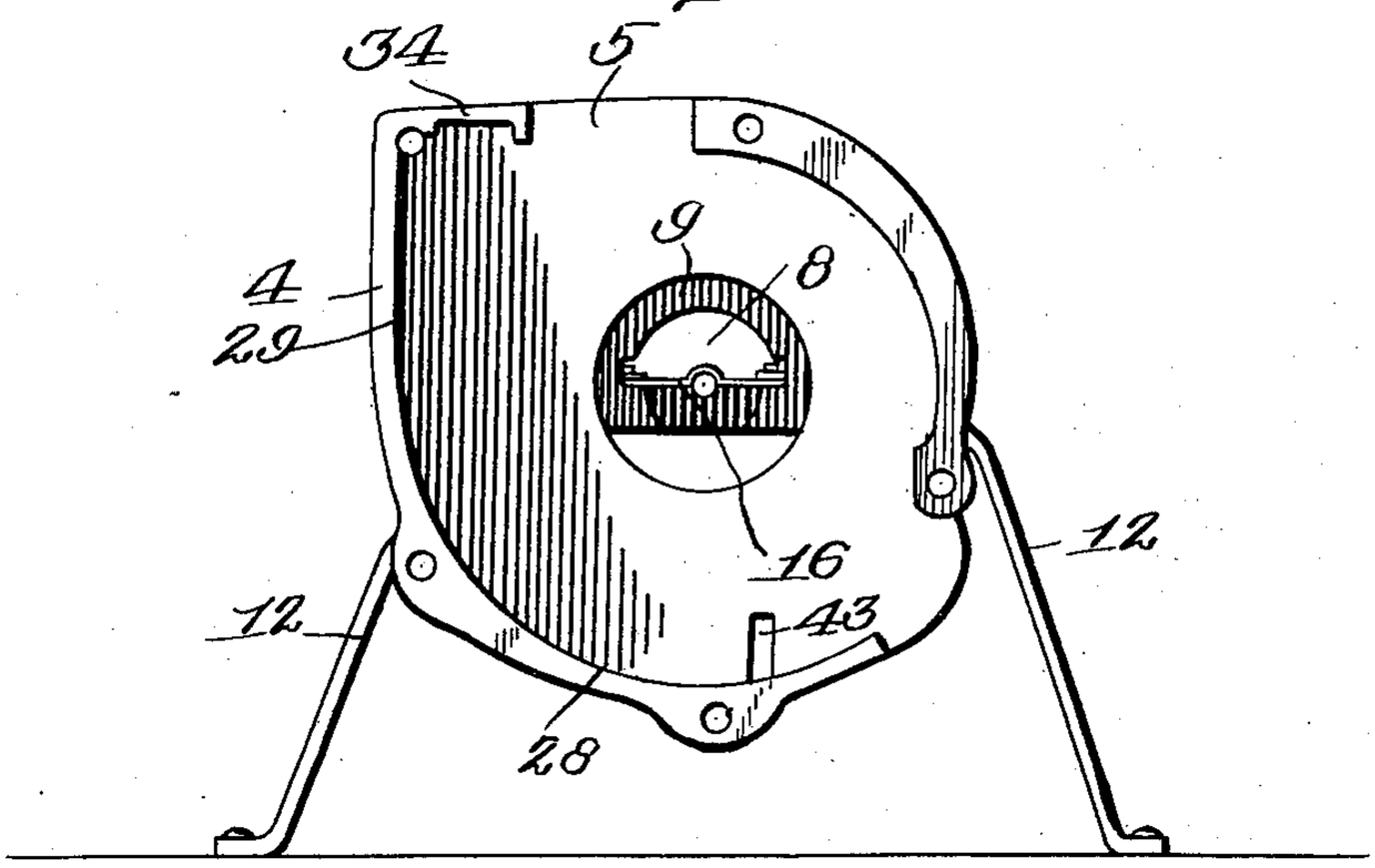


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

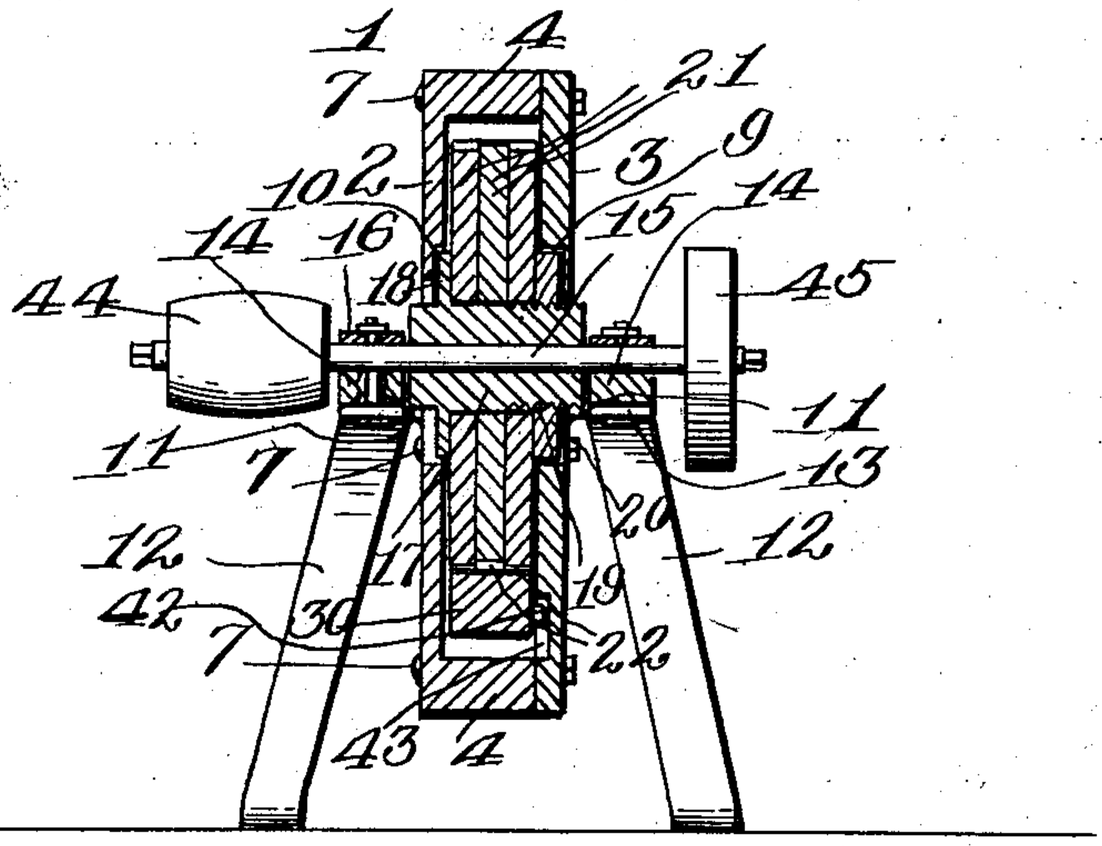


Fig. 6.

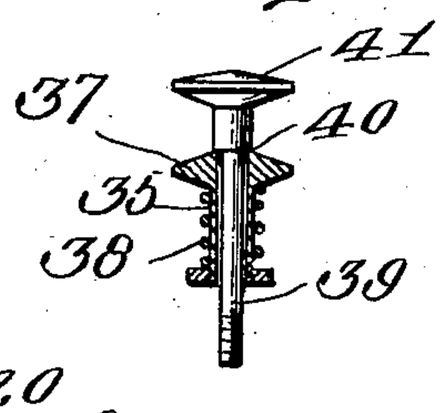


Fig. 4.

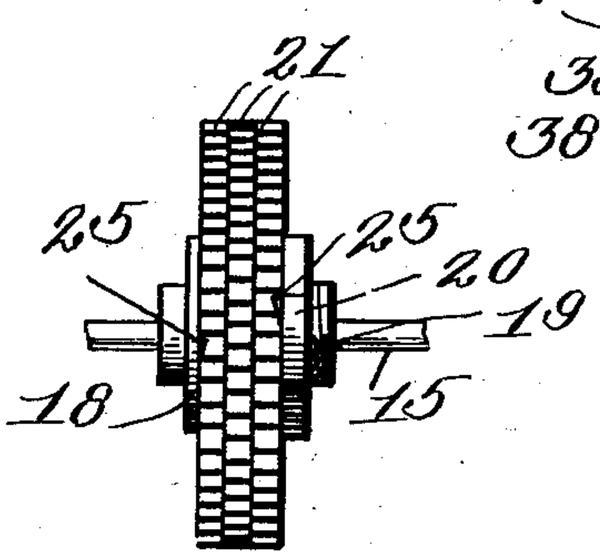
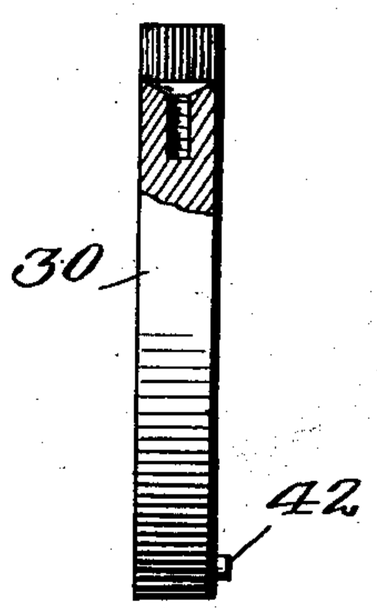


Fig. 5.



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No. 744,492. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM B. COLLINS, OF SANTA ROSA, MISSOURI.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 744,492, dated November 17, 1903.

Application filed September 9, 1902. Serial No. 122,711. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. COLLINS, a citizen of the United States, residing at Santa Rosa, Dekalb county, Missouri, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

This invention relates to grinding-mills, and especially that class of mills for grinding corn and feed for stock; and it has for its object to provide a mill of the type referred to which will be simple and inexpensive in construction and efficient in operation, which will grind the material rapidly with an economical expenditure of power, and which will be durable and not liable to get out of order.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming part of this specification.

Figure 1 is a view in side elevation of my improved mill, one of the sides of the casing being removed. Fig. 2 is a similar view, the operative parts of the mill being removed. Fig. 3 is a transverse vertical central sectional view of the mill. Fig. 4 is an edge view of the grinding-wheel. Fig. 5 is a similar view of the breast viewed from its rear or outer edge. Fig. 6 is a detail view illustrating the means for adjusting the breast.

Referring to the drawings, the numeral 1 indicates the casing inclosing the operative parts of the mill and comprising two approximately circular members 2 and 3, each consisting of a flat metallic casting, the member 2 having cast on its inner face a marginal inwardly-projecting flange 4, provided on its upper side with an opening 5 and on its lower side with an opening 6, said openings respectively forming a feed-inlet and discharge-outlet. The member 3 of the casing fits flush against the face of the flange 4 and is tightly and rigidly secured in place thereagainst by bolts 7, which pass through the two members 2 and 3 and through the flange 4. Each of the sides 2 and 3 of the casing is centrally apertured, as at 8, and the inner faces of said sides about said apertures are countersunk, as at 9 and 10, for the purpose hereinafter made apparent. Mounted on the outer faces of the sides 2 and 3 are horizontal, transverse, and laterally-projecting riles or flanges 11, which bridge the apertures 8 and form supports for the shaft of the grinding-wheel, as well as means for the attachment of the legs 12, which support the grinding-mill. The legs are four in number and are provided at their upper ends with laterally-bent portions 13, which are bolted to the under sides of the ends of the riles or flanges 11. Formed centrally in the upper sides of the riles or flanges are half-bearings 14, in which is journaled a shaft 15, that is held to its seat in the bearings 14 by half-boxes 16, that are mounted onto the upper sides of the riles or flanges 11. Fixed centrally on the shaft 15 is a sleeve or hub 17, provided at one end with an integral flange or collar 18, which is rotatably seated in the countersink or annular recess 10, the other end of the sleeve or hub 17 being screw-threaded, as at 19, and having screwed thereon a nut 20, which is adapted to rotate in the countersink 9. Arranged on the shaft 15 between the nut and the collar is the grinding-wheel, consisting of a plurality of metallic disks 21, of uniform diameter and thickness, the periphery of each disk being provided with a series of teeth 22, each tooth having one of its faces, as 23, formed radially relatively to the disk, and its other side 24 formed at an angle to the radial side 23, the radial sides of the teeth being disposed toward the direction in which the grinding-wheel rotates. The disks are so arranged on the shaft that the teeth alternate or break joints—that is to say, the teeth of one disk will be slightly in advance or rear of the teeth of an adjacent disk. In other words, the teeth of the several disks are staggered. By tightening up the nut 20 the disks are tightly clamped on the shaft between the nut and collar 18 and are rigidly held in place on the shaft. In practice when meal is being ground very fine there is a tendency of some of the meal working its way between the outer faces of the outermost disks and the inner faces of the sides 2 and 3 of the casing, and in order to permit of the escape of such meal I provide the outer face of each outermost disk with a groove or channel 25, which

extends rearwardly from the periphery of the disk to a point eccentric to the center of the disk. The rear wall 26 of each of said grooves is straight or parallel with the axis of the grinding-wheel, while the rear wall 27 is beveled or formed at an inclination to the straight side 26. Any meal that may work its way between the outermost disks and the sides of the casing will be caught in said grooves and will be prevented from escaping laterally from said grooves by the straight or vertical wall 26 thereof. As said grooves, however, incline rearwardly from the direction of the rotation of the disks, the meal therein will be moved out of said grooves to the periphery of the grinding-wheel by attrition and by centrifugal action.

One portion of the flange 4, as 28, between the inlet and outlet openings is concentric with the grinding-wheel, while the other portion 29 at its upper part gradually recedes from the periphery of the grinding-wheel and is approximately vertical. Arranged in the casing between the periphery of the grinding-wheel and the part 29 of the flange 4 is a concave breast 30, the inner face of which for the greater part of its length is concentric with the toothed periphery of the grinding-wheel and at its upper end gradually diverges or recedes therefrom. The said inner face of the breast is provided with a series of transverse teeth 31, which are relatively coarse at the upper end of the breast and gradually become finer and finer toward the lower end of said breast. The breast extends from the top of the casing to the discharge-opening 6 and embraces approximately one-half of the toothed circumference of the grinding-wheel. The upper edges 32 of the teeth 31 of the breast are formed approximately radially to the grinding-wheel, while the other sides of said teeth are inclined or beveled, as at 33, whereby when the machine is in operation the straight or radial sides of the teeth of the grinding-wheel and breast are opposed to each other. Loosely fitted in a perforation in the upper overhanging portion 34 of the flange 4 is a sleeve 35, which is externally threaded and screwed into a nut 36, fitted in a socket formed on the under side of the overhanging end 34 of the flange 4. An annular head or collar 37 is formed on the upper end of the sleeve 35, and fitted on the latter between the collar 37 and the overhanging end 34 of the flange 4 is a coiled spring 38. Fitted loosely in the sleeve 35 is an adjusting-screw 39, the lower end of which screws into a threaded socket formed in the upper end of the breast 30, the upper portion of said screw being provided with a shoulder 40, which rests on the upper side of the collar 37. A hand-wheel 41 is fixed on the upper end of the adjusting-screw, by means of which the latter may be turned to adjust the breast. By turning the screw toward the right the breast will be raised, and hence adjusted closer to the periphery of the grinding-wheel to cause the latter to grind finer, while a reverse movement of said screw will of course move the breast away from the grinding-wheel and cause the mill to grind coarser. Should any foreign or hard substance pass into the mill, the coiled spring 38 will permit the breast to yield and allow such substance to pass between the grinding-wheel and the breast without injury to the teeth of either. The tension of the spring 38 may be adjusted by turning the sleeve in the nut 36 by means of the head or collar 37. By means of the adjusting-screw 39, also, as the grinding-face of the grinding-wheel becomes worn away through use and resharpening the breast may be adjusted up to the grinding-wheel to preserve the relative arrangement between the two. When the breast is adjusted toward the grinding-wheel, the tendency of the latter when the mill is in operation is to force or thrust the lower end of the breast away from and to one side of the grinding-wheel, and in order to permit this the lower end of the breast is provided on one side with a laterally-projecting pin 42, which engages a vertical slot 43, formed in the inner face of the side 2 of the casing. When the breast is adjusted upward by the adjusting-screw, the pin 42 travels in the slot 43 and guides the breast, causing the latter to preserve its relationship to the grinding-wheel and preventing the latter from forcing or thrusting the breast to one side. On one end of the shaft 15 is fixed a pulley 44, which may be driven from any suitable prime motor or source of power, and on the other end of said shaft is fixed a balance-wheel 45.

The operation of my improved grinding-wheel will be readily understood from the foregoing description. The material to be ground is fed into the mill through the feed-opening 5 and is discharged through the outlet 6. The grinding-wheel is rotated in the direction indicated by the arrow, and the grain is first subjected to the action of the teeth of the grinding-wheel and the coarse teeth of the breast. This operates to crack the grain, and as the material continues to be carried around between the breast and the grinding-wheel it gradually encounters finer and finer teeth on the breast, which also approaches nearer to the teeth of the grinding-wheel, whereby the material is ground finer and finer until it is discharged through the outlet 6. By staggering the teeth of the grinding-wheel in the manner described the material being ground is subjected to a great multiplicity of grinding-surfaces and the grinding action of the wheel is greatly augmented. Moreover, any particles that escape laterally from the teeth of one disk will be caught with certainty by the succeeding teeth of the adjacent disk. By forming the grinding-wheel of a plurality of independent or separate disks the operation of sharpening the teeth is greatly facilitated, as the disk may be re-

moved and separated and be separately sharpened. By properly adjusting the breast the mill is adapted for grinding coarse feed, by adjusting the breast nearer to the grinding-wheel it is adapted to grind fine feed or medium meal, and by adjusting the breast still closer the mill will produce fine meal.

I do not confine myself to any number of disks, and it will be evident to those skilled in the art that the details of construction of my mill may be modified without departing from the spirit of my invention, and I do not wish to be understood, therefore, as limiting myself to any such details excepting as set forth in the claims hereunto appended.

Having described my invention, what I claim is—

1. In a grinding-mill, the combination with an inclosing casing, of a grinding-wheel having a toothed periphery, and a toothed concave breast arranged in close proximity to the periphery of the grinding-wheel, the outer or opposite sides of said wheel each having a groove formed therein extending from the periphery of the wheel to a point eccentric to the axis thereof, said grooves being inclined rearwardly from the direction in which said wheel rotates, substantially as described.

2. In a grinding-mill, the combination with an inclosing casing, of a grinding-wheel having a toothed periphery, and a toothed concave breast arranged in close proximity to the periphery of the grinding-wheel, the outer or opposite sides of said wheel each having a groove formed therein extending from the periphery of the wheel to a point eccentric to the axis thereof, each of said grooves having one side formed substantially at right angle to the plane of the grinding-wheel and the other at an inclination thereto, substantially as described.

3. In a grinding-mill, the combination with an inclosing casing, of a vertically-disposed grinding-wheel arranged therein, a concave breast arranged in proximity to the periphery of one side of the grinding-wheel, an adjusting-screw fitted in the top of the casing and screwed into the upper end of the breast for vertically adjusting the breast, a spring for yieldingly supporting said adjusting-screw, and means for adjusting the tension of said spring, substantially as described.

4. In a grinding-mill, the combination with an inclosing casing, of a vertically-disposed grinding-wheel arranged therein, a concave breast arranged in proximity to the periphery of one side of the grinding-wheel, a headed sleeve loosely fitted in the top of the casing and engaging a nut held against rotation on the casing, a spring arranged beneath the head of the sleeve and operating to yieldingly support the latter, and an adjusting-screw loosely fitted in said sleeve and screwed into the upper end of the breast, said screw having a shoulder resting on the upper end of the sleeve, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM B. COLLINS.

Witnesses:
F. R. HENDERSON,
E. M. STREET.