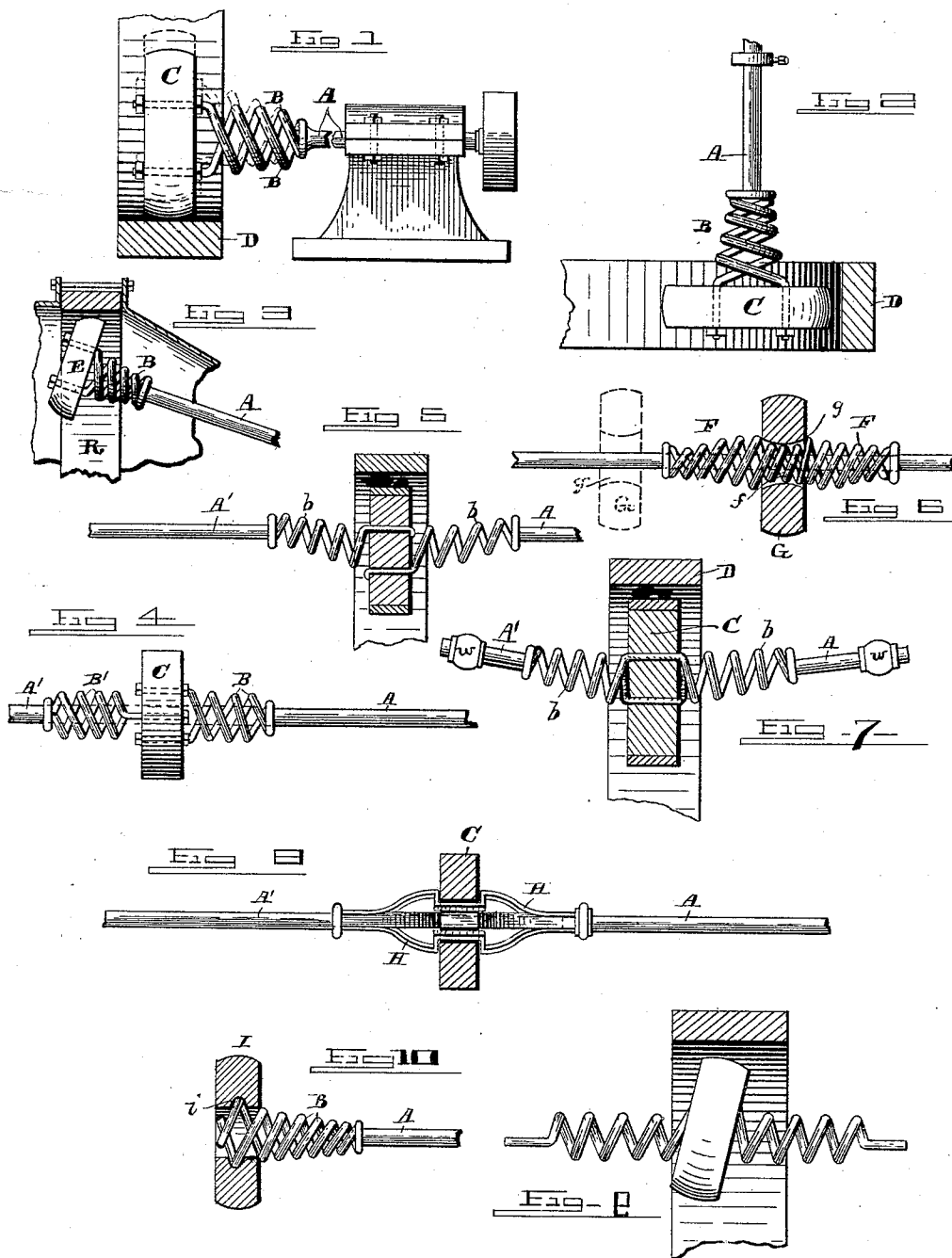


(No Model.)

H. A. DUC, Jr.
GRINDING MILL ROLLER MOUNTING.

No. 451,392.

Patented Apr. 28, 1891.



WITNESSES

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HENRY A. DUC, JR., OF CHARLESTON, SOUTH CAROLINA.

GRINDING-MILL ROLLER-MOUNTING.

SPECIFICATION forming part of Letters Patent No. 451,392, dated April 28, 1891.

Application filed September 12, 1890. Serial No. 364,711. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. DUC, Jr., of Charleston, in the county of Charleston and State of South Carolina, have invented certain
5 new and useful Improvements in Grinding-Mill Roller-Mountings; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to
10 the letters of reference marked thereon, which form part of this specification.

My present invention is especially designed for use with crushing or grinding mills wherein rollers, balls, or cylinders are employed co-
15 acting against a stationary or revolving annulus. It is also applicable to mills wherein the crushing or reducing of the material is effected by passing it between two or more cylinders or rollers.

20 The object of the invention is to yieldingly support the rolls independently of the journal bearings or supports of the roll-shafts, so that the shafts may be, and preferably are, journaled in fixed or non-yielding bearings,
25 and yet the rolls be so mounted on or attached to the shaft that while securely connected thereto and revolved thereby they can vibrate and alter their position in relation to the shaft, and if necessary assume eccentric and angu-
30 lar positions in relation thereto when subjected to strain without displacement of the shaft or its bearings, and will, when the displacing cause is removed, at once resume a proper concentric or normal position with re-
35 spect to the shaft.

In the accompanying drawings are illustrated various modes of mounting the rolls on the shafts.

40 Figures 1, 2, 3, and 4 are side elevations of partly-broken shafts and rolls attached thereto by various arrangements of springs. Figs. 5, 6, 7, and 8 are similar views, with the rolls sectioned, of other forms of spring attach-
45 ments. Fig. 9 is a side view of a single spiral-spring mounting. Fig. 10 is a sectional view showing the springs sprung into an axial bore of the roll.

50 The shafts bearing the rolls are mounted in journal-bearings which do not permit the shafts to vibrate or oscillate, but will keep them in the same plane, and the shafts should be of such stiffness as to sustain the weight

of the rolls and the grinding or crushing pressure without yielding or vibration.

In Fig. 1 the stub-shaft A has two spiral
55 springs B B, rigidly connected to its free end and projecting in the longitudinal plane of the shaft. The ends of these springs B project through openings in the roll C and are secured thereto, so that normally the roll is
60 held in a position concentric to the shaft A.

Fig. 2 shows the shaft arranged vertically with the roll suspended by the springs from the lower end thereof and adapted to operate
65 against a horizontal annulus D.

Fig. 3 shows a section of a vertical die-ring or annulus R, with portions of casing of a
70 grinding-mill with shaft A inclined and a conical roller E attached to its end by springs B B.

Fig. 4 illustrates two stub-shafts A A' and two sets of spiral springs B B', the crushing-
75 roll being supported by the said springs centrally between the ends of shafts A A', which latter revolve in the same axial plane.

Fig. 5 shows the roller mounted between two stub-shafts A A' by single coil-springs
80 b b, and showing it in yielding position in passing over an obstruction or unyielding piece of ore.

Fig. 6 shows the stub-shafts A A' united by double continuous conically-coiled spiral
85 springs F, which have their central coils f smaller than their main coils. The roller G has a bore g and is secured to the coils by twisting one of the shafts until the spring F at that side is so reduced in diameter that the roll can be slipped thereover onto small coils
90 f. Then by releasing the shaft the spring F resumes its natural size and binds the roller tightly in place. In this case when the roll and shafts are used in the mill they should be revolved in a direction that would tend to unwind the springs, thereby causing the roll to be more tightly gripped.

Fig. 7 illustrates the stub-shafts mounted in ball-and-socket bearings w and deflected
95 while the roller is mounting over a piece of hard substance. The roller in this case may or may not turn angularly to the annulus.

100 Fig. 8 shows the roll mounted on a series of bow-shaped springs H H, the ends of which are connected to the adjoining ends of stub-shafts A A', and Fig. 9 shows the roll mounted

on a continuous single spiral spring passing through the roll.

In Fig. 10 the roll I has an annular recess *i* in its bore, and is secured in position on the spring B by springing the enlarged ends thereof in the bore *i*, the shaft being revolved in a direction to expand the springs, thus binding the roll more tightly. I preferably make the peripheries of the rolls rounding, as shown, so that if they are turned diagonally to the axle there will still be the same amount of grinding-surface contact between the roll and annulus.

In some instances the springs might be formed integral with the shafts. The rolls are fastened to the springs, so that they cannot slip thereon in revolving. Obviously various modifications might be made in the mounting of the rolls on the shafts without departing from the spirit of the invention, which is to yieldingly mount the roll on springs independently of the shafts and their journal-bearing mountings, so that the roll can vibrate or shift its position in relation to the shaft, while the latter maintains an undisturbed position. When thus mounted, should any hard substance fall between two rolls so mounted or between a roll so mounted and a non-yielding body, the roll would ride up over the substance without displacement of its driving-shaft, and would at once be thrown back into proper grinding or crushing position when the foreign or unyielding substance was passed, thus avoiding injury to the roll and to the shaft, and if such substance be to one side of the roll instead of its center the roll could turn diagonally to the shaft without injury thereto. The supporting-springs must be stiff enough to hold the roll up to grinding position, and the shaft-journals might be made adjustable, so as to throw the roll toward the annulus, thus enabling the grinding-pressure of the roll to be regulated as the springs permit the rolls to revolve eccentrically to the shaft without injury.

In some cases the shaft might be continuous—that is, instead of employing two stub-shafts connected by springs, a continuous shaft might be used and the springs be slipped thereover. Such construction is indicated in Figs. 4 and 6 by dotted lines. In this case the roller would necessarily have a bore sufficiently large in diameter to permit its free play and movement by the springs independently of the shaft.

I am aware that dynamos and other rapidly-revolving mechanisms have been mounted on sectional shafts and cushioned by springs,

so that if out of proper alignment the yielding of the shaft would automatically compensate for the non-alignment thereof and cause the body to revolve without jar or trembling; but in my invention I sustain the rolls entirely upon the springs, which are in turn mounted on the shaft; but the latter is non-sectional and is not distorted from a true unbroken axial position, or does not have to be so distorted or deflected in order to enable the roll to pass over irregularities. My invention is not designed to enable the rolls to revolve without jar or to automatically obtain an alignment or compensate for an irregular alignment of the shaft-bearings, but simply to enable the rolls to pass over unyielding pieces of material while grinding, and in so doing, if necessary, to shift to positions eccentric or angular to the shaft without disturbing the lineal truth of the shaft or deflecting the portion thereof outside the bearings in relation thereto.

Having described my invention, what I claim as new, and desire to secure by Letters Patent thereon, is—

1. The combination of a stub-shaft, a spring secured by one end to one extremity of the shaft and projecting forwardly in the plane of the shaft, constituting a linear continuation thereof and rotated thereby, with a crushing-roll secured to the free end of the spring, supported thereby, and rotated therewith, being thus indirectly connected to, supported on, and driven by the shaft, and yet free to vibrate independently of the latter, substantially as specified.

2. The combination of a stub-shaft, a coiled spring connected to the end thereof and projecting therefrom, and a roll having a central bore into which the spring is sprung in order to connect the roll thereto, whereby the roll is caused to rotate with the shaft, but can vibrate independently thereof, substantially as specified.

3. The combination of opposite stub-shafts, spiral springs secured to the adjoining ends of said shafts and projecting axially therefrom, and a roll interposed between the said springs, connected thereto, and suspended thereby, all constructed substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HENRY A. DUC, JR.

Witnesses:

T. H. ALEXANDER,
S. BRASHEARS.