

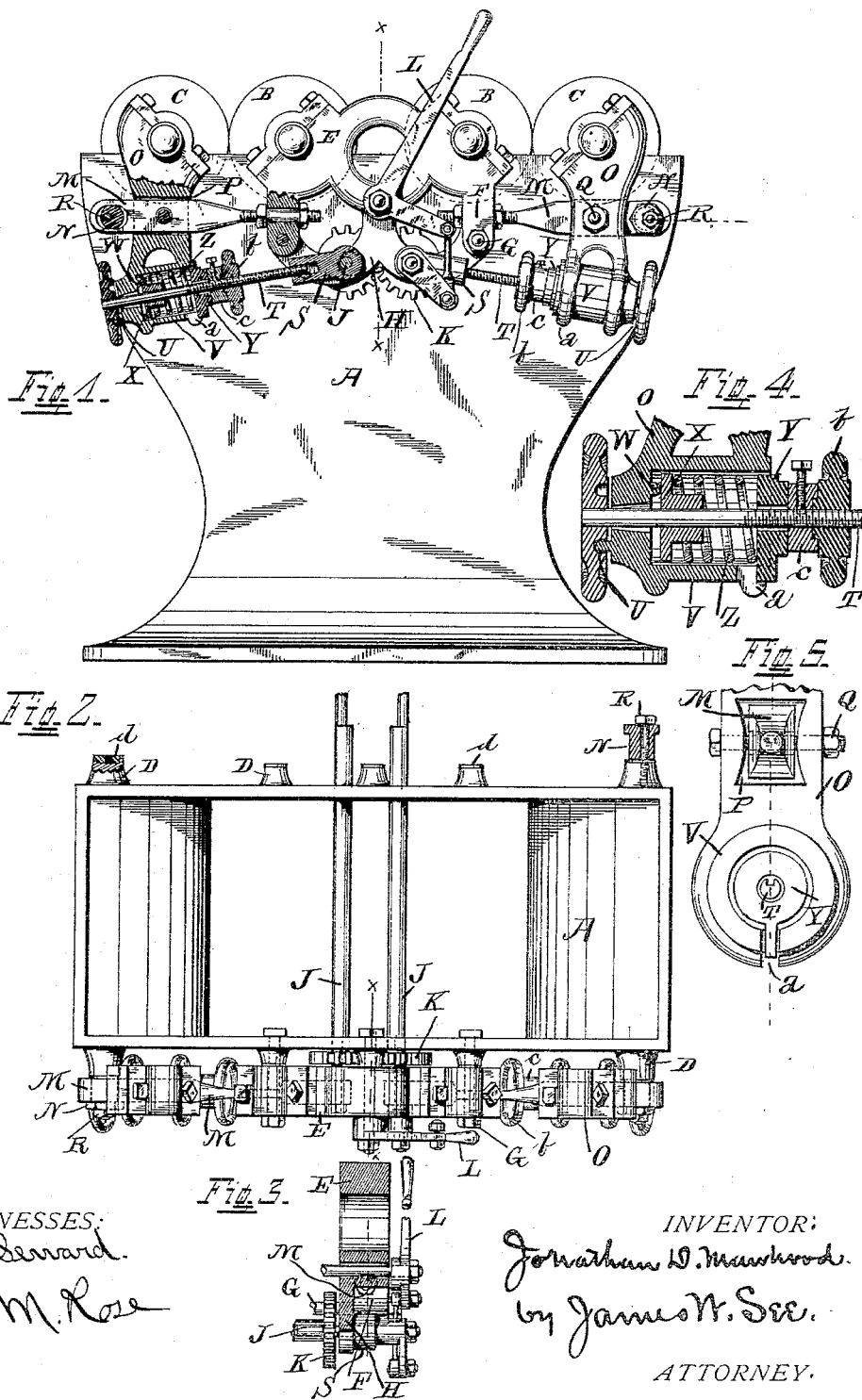
(No Model.)

J. D. MAWHOOD.

ROLLER MILL.

No. 381,710.

Patented Apr. 24, 1888.



WITNESSES:
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RICHMOND CITY MILL WORKS, OF SAME PLACE.

ROLLER-MILL.

SPECIFICATION forming part of Letters Patent No. 381,710, dated April 24, 1888.

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To all whom it may concern:

Be it known that I, JONATHAN D. MAW-
HOOD, of Richmond, Wayne county, Indiana,
have invented certain new and useful Improve-
ments in Roller-Mills, of which the following
is a specification.

This inventions pertains to roller-mills; and
the improvements relate to the roll-supporting
and roll-adjusting mechanism of such mills.

My improvements will be readily understood
from the following description, taken in con-
nection with the accompanying drawings, in
which—

Figure 1 is a side elevation of the frame,
rolls, and roll supporting and adjusting mech-
anism of a double-roller mill illustrating my
improvements, portions of some of the details
being shown in vertical section; Fig. 2, a plan
of the same, the rolls and the duplicate set of
roll supporting and adjusting devices at the
rear side of the mill being omitted; Fig. 3, a
vertical section through one of the housings
which furnishes bearings for the fixed rolls,
the plane of the section being parallel with the
axis of the rolls, as indicated by central ver-
tical dotted lines in Figs. 1 and 2; Fig. 4, a
vertical section through the lower end of one
of the pivot-housings carrying the bearings
for the movable roll, the plane of the section
being at right angles to the axis of the rolls;
and Fig. 5, a view of the inner faces of the
same. Figs. 4 and 5 are upon a somewhat en-
larged scale. By movable rolls are meant those
rolls which are adjusted to and from the rolls
in connection with which they are operated,
and by fixed rolls is meant the rolls which are
not thus adjusted.

In the drawings, A indicates the frame of
the mill; B, the fixed rolls; C, the movable
rolls; D, bosses projecting outward from the
side faces of the frame and intended to have
bolted against them various parts of the roll-
supporting and roll-adjusting devices; E, the
housing of the fixed rolls, the same consisting
of a casting containing two bearings for one
end of each of the fixed rolls, it being under-
stood, of course, that there is to be one of these
housings at each side of the mill, as is the case,
in fact, with all of the details of the present
device; F, downwardly-projecting lugs at the
ends of this housing, the housing being here-

inafter spoken of as the "fixed-roll housing,"
such lugs having parallel faces themselves par-
allel to the axis of the rolls; G, bolts engaging
these lugs, and also those of the bosses D,
against which the inner side faces of these lugs
bear, these bolts serving to secure the housing
rigidly to the side of the frame; H, a hanger
formed with the fixed-roll housing and de-
pending therefrom, this hanger having its outer
face set back some distance from the outer face
of the lugs F; J, a pair of eccentric-shafts dis-
posed across the frame of the machine below
the fixed rolls and journaled in the hangers H
at the opposite sides of the mill, the ends of
these eccentric-shafts projecting outward at
each side of the mill to receive attachments;
K, spur-gears fast upon the eccentric-shafts
and located between the outside of the frame
and the inside of the fixed-roll housings.
These spur-gears mesh with each other, so that
rotary motion of one eccentric shaft becomes
transmitted simultaneously to the other shaft,
a pair of these gears being placed, preferably,
at each side of the mill; L, a hand-lever piv-
oted to the fixed-roll housing and connected
by link and crank with the projecting end of
one of the eccentric-shafts, the office of the
lever being to partially rotate the eccentric-
shafts, its performance being precisely as if
the lever were secured directly to one of these
eccentric-shafts, the crank-and-link connection
serving merely to permit a more central dis-
position of the lever; M, a pair of horizontal
bars whose inner threaded ends pass through
the lugs F and are provided with nuts at each
side of the lugs, these bars projecting from
these lugs outwardly horizontally under the
journals of the movable rolls, the main por-
tion of the bars being of rectilinear section and
having their outer ends lying against appro-
priate ones of the bosses D, the outer ends of
the bars being provided each with a slot; N,
an eccentric engaging within the end slot of
each of these bars, the inner face of the eccen-
tric setting nearly against its boss D, and its
outer end being provided with a hexagonal
head or flange lying against the outer face of
its bar; O, the movable-roll housings, the
same being in the form of vertical levers piv-
oted upon the bars M and having the movable-
roll bearings formed in their upper ends and

having inwardly-opening spring-cases formed in their lower ends; P, a mortise through the intermediate portion of each of these movable-roll-housings, the same receiving the bars M, the side walls of these mortises being convex, as seen in Fig. 5; Q, pivot-bolts passing through the movable-roll housings across the mortise and through the bars M, these bolts fitting tightly, preferably, in the housings, and fitting so loosely in the bars M as to permit the housings to have a free rocking motion to a limited extent in every direction upon the bars; R, bolts passing through the eccentrics N and engaging in the boss D at the eccentrics, these bolts serving as the pivots upon which the eccentrics may turn, and also as the means by which the eccentrics may be clamped firmly against the bars; S, swinging nuts, presenting threaded openings outwardly toward the lower ends of the movable-roll housings and freely journaled upon the eccentric ends of the shafts J; T, adjusting-screws engaging the swinging nuts and reaching outward through the lower ends of the movable-roll housings, and provided at their outer ends with hand-wheels, and near their outer ends with spline-grooves; U, a teat projecting outward from the lower end of each movable-roll housing, just below its adjusting-screw T, and into engagement with the hub of the hand-wheel upon the adjusting-screw; V, an inwardly-opening spring-case formed in the lower end of each of the movable-roll housings, the adjusting-screw passing axially through these spring-cases; W, a teat projecting inwardly from the end wall of each spring-case directly over the adjusting-screw; X, a collar upon each adjusting-screw within its spring-case, the outer face of the collar bearing against the teat W, the collar having a comparatively long hub fitting upon the adjusting-screw and free for endwise movement thereon; Y, a collar upon each adjusting-screw, and free to slide thereon, this collar closing the inner end of the spring-case; Z, a spiral spring encircling the adjusting-screw within the spring-case, and compressed endwise between the collars X and Y; *a*, a notch in the wall of the spring-case engaged by a tongue projecting radially from the collar Y, such notch and tongue serving to prevent rotation of the collar Y without interfering with its proper endwise motion; *b*, a hand-nut upon the adjusting-screw, near the collar Y, this hand-nut serving in adjusting the position of the collar Y, and consequently the degree of compression of the spring; *c*, a collar interposed between the collar Y and the nut *b*, this collar being free to slide upon the adjusting-screw, but being prevented from rotation thereon by being splined to the adjusting-screw, the drawings Figs. 5 and 4 showing the screw as having a splineway engaged by a set-screw in the collar *c*, the set-screw, however, performing no pinching office, its duty being simply to enter the splineway and thereby prevent rotation of the collar upon the screw; and

d, facings of soft metal, as Babbitt metal, upon the outer surfaces of the bosses D.

In the construction and mounting of the machine I complete all the separable parts to jigs, templets, or gages, so as to secure interchangeability. I then apply a suitable supporting-fixture to the rough frame, and upon such fixture I hang and screw these parts which are to come in direct contact with the frame, such parts being, for instance, the fixed roll housings. The bosses D upon the frame are made so short as not to reach into engagement with these housings when the housings occupy their proper positions, thus leaving a space between the outer ends of the boss and the inner faces of the housings. I then lute properly around the box and pour soft metal into these spaces. This course is followed in connection with all of the bosses, and the result is that I conveniently and cheaply secure accurate and perfect endwise distances for the bosses. In the drawings the facings *d* represent the soft metal thus applied.

The soft metal employed is of low fusibility and flows closely around the bolts and into the facial inequalities of the bosses and contiguous parts.

The adjustment of the movable rolls with reference to the fixed rolls is effected by oscillating the movable-roll housings through the medium of the adjusting-screw, such adjustment serving in regulating the working-distances between the rolls. As the movable-roll housings are loose upon the bolts Q, the housings are at liberty to rock sidewise upon the bars, whereby the movable-roll housings are endowed with the qualities of universal self-adjusting bearings—that is, the bearings will adjust themselves into parallelism with the journals of the rolls which they support.

The bars M serve as supports for the movable-roll housings, and the nuts upon the ends of the bars serve as means by which the pivot-bolts Q at each end of a movable roll may be adjusted to equal distances from the axis of the corresponding fixed roll. Furthermore, the bars M form tension elements to meet the working-strains, and any shifting of the fixed-roll housing upon the frame of the mill will not disturb the relation of the two rolls of a pair, as such shifting will shift also the bars M, and with them the movable-roll housing, the bars M shifting endwise upon the eccentric which supports their ends. The eccentrics N serve as end supports for the outer ends of the bars M, and also in vertically adjusting the outer ends of the bars, whereby the axes of the movable rolls may be brought truly into the planes of the appropriate fixed rolls. The eccentrics N are turned by a wrench applied to their hexagonal flanges, and are fixed in adjusted position by the clamping action of the bolts R. The inner ends of the bars M will readily flex sufficiently to permit of the small adjusting movement of their outer ends.

The lever L serves in giving partial rotation to one of the eccentric-shafts J, and through

the medium of the spur-gearing to the other eccentric-shaft, and the rotation of the eccentric-shaft serves in an obvious manner in opening the rolls. The employment of the two eccentric-shafts J, moving simultaneously, but each operating its own movable roll, guards against peculiar working-strains and shocks due to the action of one set of rolls being transmitted to the other pair of rolls. One eccentric-shaft might be arranged in the ordinary manner to operate the housings of both movable rolls; but the result of such construction would be that any extraordinary outward movement of one movable roll would transmit the shock and some slight movement to the single eccentric-shaft, and the single eccentric-shaft would in turn transmit shock and movement to the other movable roll—a fault entirely avoided in the present arrangement.

As the fixed rolls and the inner ends of the bars M and the eccentric-shafts all find support in the rigidly-constructed fixed-roll housings, it follows that an integrality of strain-resisting structure is secured in a system of construction independent of the body or frame of the machine for its strength in meeting the working-strains.

By setting the fixed-roll housings outward some distance from the sides of the frame, as governed by the length of the bosses D, room is secured behind these housings for the spur-gears, and by transposing the front face of the hanger H backward some distance from the general front face of the fixed-roll housing it becomes possible to locate the adjusting-screws T directly below the center of length of the roll-bearings.

The springs Z serve to press the movable rolls toward the fixed rolls as far as the adjusted length of the adjusting-screws T will permit, and the elasticity of the springs permits the automatic outward movement of the movable rolls when any foreign substance passes between the rolls, the springs yielding in such case and permitting the lower ends of the movable-roll housing to move inward upon the adjusting screw. Turning the adjusting-screws by means of the hand-wheels upon their outer ends serves in adjusting the grinding-distances between the fixed and movable rolls; but such turning of the adjusting-screws for the purpose of adjusting the grinding-spaces does not in any manner or to any degree affect the tension of the springs, for the reason that during such adjustment of the adjusting-screws the abutments at each end of the springs are carried along with the lower end of the movable-roll housings.

The tension of the springs is adjusted by means of the hand-nuts b, which serve in lengthening or shortening the distances between the abutments at opposite ends of the springs, and this adjustment does not in any manner affect the measure of the grinding-space of the rolls. When the hand nut b is turned to adjust the tension of a spring, the collar c slides along upon the adjusting screw, and the collar Y of

course moves with it. When the adjusting-screw is turned to regulate the grinding-distances between the rolls, the collar Y does not revolve, being prevented therefrom by the tongue-and-slot arrangement; but the collar c will revolve with the screw by reason of the spline arrangement, and of course the hand-nut b also revolves with the screw. The interposition of the spline-collar c therefore prevents the disturbance of the hand-nut b as the adjusting-screw is turned.

The adjusting-screws, where they pass through the outer end walls of the spring-cases, do not find bearings of the usual character therein, but, on the contrary, are free of any peripheral contact, the screws having thrust-bearings only at this point. These thrust bearings are formed by the teats W and U, the outer one, U, below the screw, the inner one, W, above the screw, one of these teats being against the hub of the hand-wheel on the adjusting-screw, the other one bearing against the face of the collar at the outer end of the spring. It follows that the outward pressure of the spring will tend to push the upper end of the movable-roll housing outwardly, the lower teat, U, acting as a fulcrum. The result of this arrangement is that the movable-roll housings are always, whether the rolls be running empty or not, strained against the inner peripheral surfaces of the pivot-bolts Q, upon which they rock—a condition which nullifies all of the usual evil effects of lost motion at the rocking point of movable-roll housings.

I claim as my invention—

1. In a roller-mill, a frame, a pair of rolls, a roll-housing for one roll of the pair, a supporting-bar for the housing of the movable roll, and a roll-housing for said movable roll, said housing having a mortise loosely engaging said bar, so as to be free to rock in all directions thereon, and a pivot-bolt uniting said movable-roll housing to said bar, combined substantially as and for the purpose set forth.

2. In a roller-mill, a frame, a fixed-roll housing provided with a downwardly-projecting lug, a bar at the side of the frame provided with a threaded end, and nuts engaging said lugs, an outer end support for said bar, and a movable-roll housing pivoted to said bar, combined substantially as and for the purpose set forth.

3. In a roller-mill, a frame, a fixed-roll housing, a bar, M, projecting therefrom and having an end slot, a lever-form movable-roll housing having an intermediate mortise engaging said bar, and an eccentric, N, supported by the frame and engaging said end slot, combined substantially as and for the purpose set forth.

4. In a roller-mill, a frame, a fixed-roll housing, a movable-roll housing, a nut, an adjusting-screw, T, engaging said nut and having a hand-wheel engaging outside the movable-roll housing, spring Z upon said screw, a nut, b, upon said screw for adjusting the tension of

the spring, and a collar, *c*, splined to the screw and disposed between said spring and said nut *b*, combined substantially as and for the purpose set forth.

- 5 5. In a roller-mill, a frame, a fixed-roll housing, a pivoted-roll housing provided with teats *W* and *U*, a screw, *T*, having threaded connection with the frame, a hand-wheel fast on said screw and engaging said teat *U*, a collar,
10 *X*, on said screw and engaging said teat *W*, spring *Z* on said screw engaging said collar *X*, and nut and collar on the screws to serve in adjusting the tension of the spring, combined substantially as and for the purpose set forth.

6. In a roller-mill, a frame provided with 15 outwardly-projecting bosses, a roll-housing disposed contiguous to said bosses, bolts engaging said housing and bosses, and facings of metal of low fusibility disposed between the housing and bosses and seating closely around 20 said bolts and into the facial inequalities of the bosses and contiguous housing parts, combined substantially as and for the purpose set forth.

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Witnesses:

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