

(No Model.)

3 Sheets—Sheet 1.

H. A. BARNARD.

ROLLER MILL.

No. 364,984.

Patented June 14, 1887.

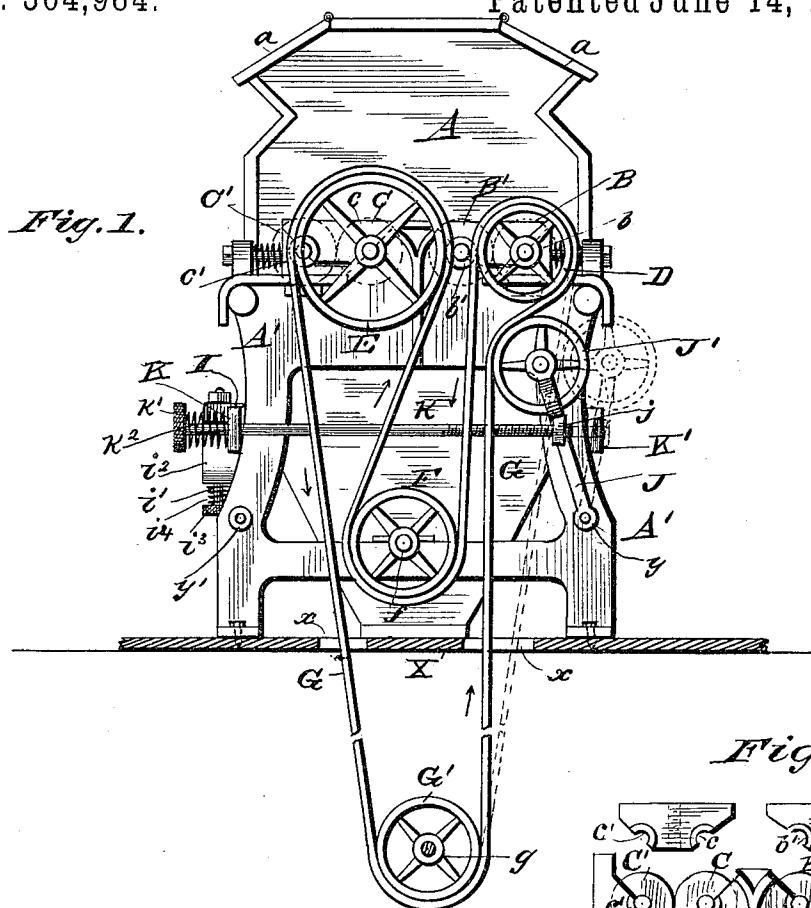


Fig. 8.

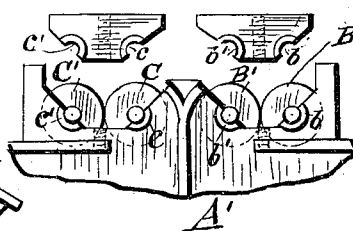
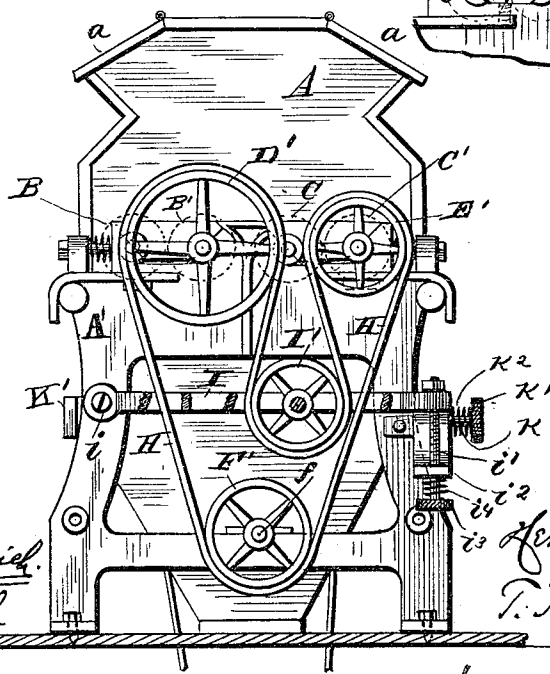


Fig. 2.



WITNESSES

Phil. Dietrich.
A. E. Dowell

INVENTOR

Herman A. Barnard
By: *T. H. Alexander*
Attorney

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Fig. 3.

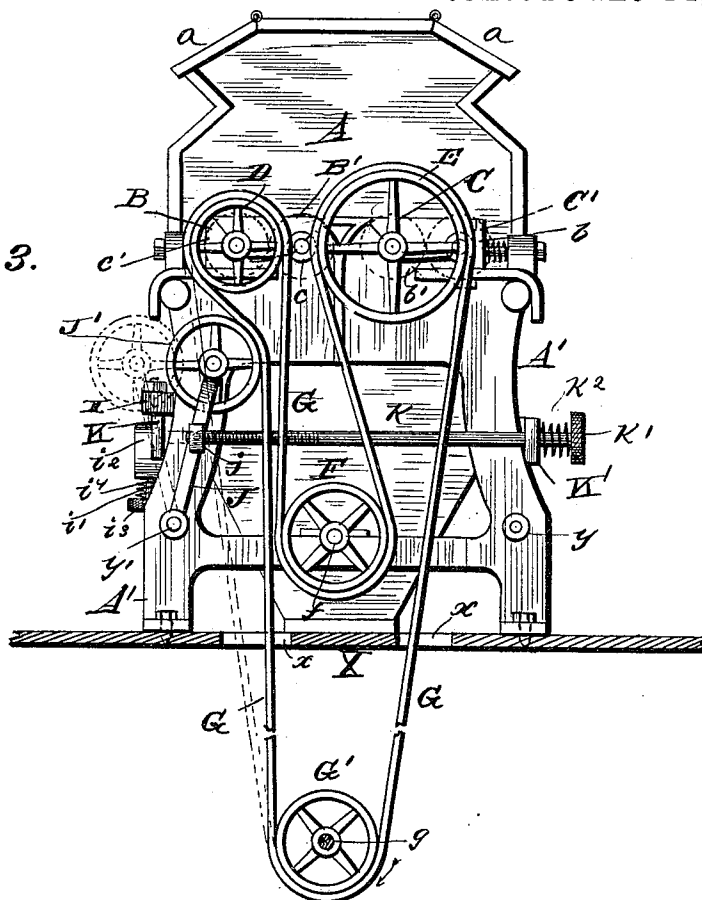
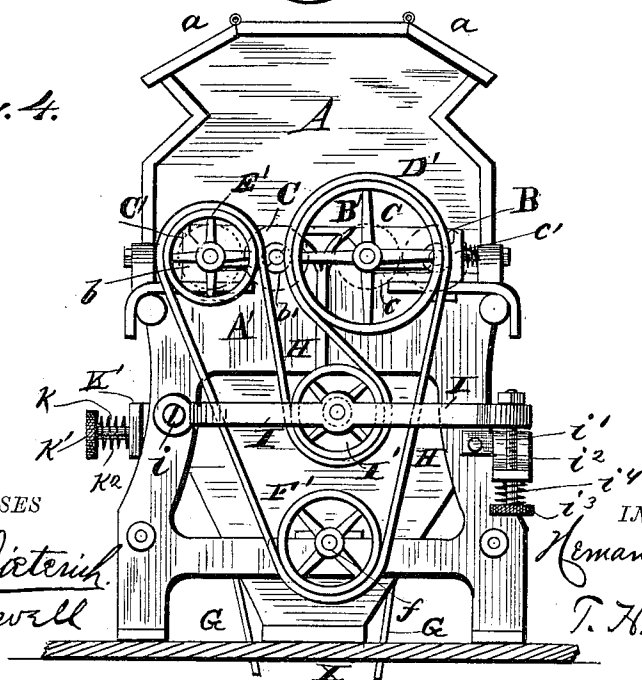


Fig. 4.



WITNESSES

Phil. Dietrich
A. E. Howell

INVENTOR

Herman A. Barnard
By
T. H. Alexander
Attorney

(No Model.)

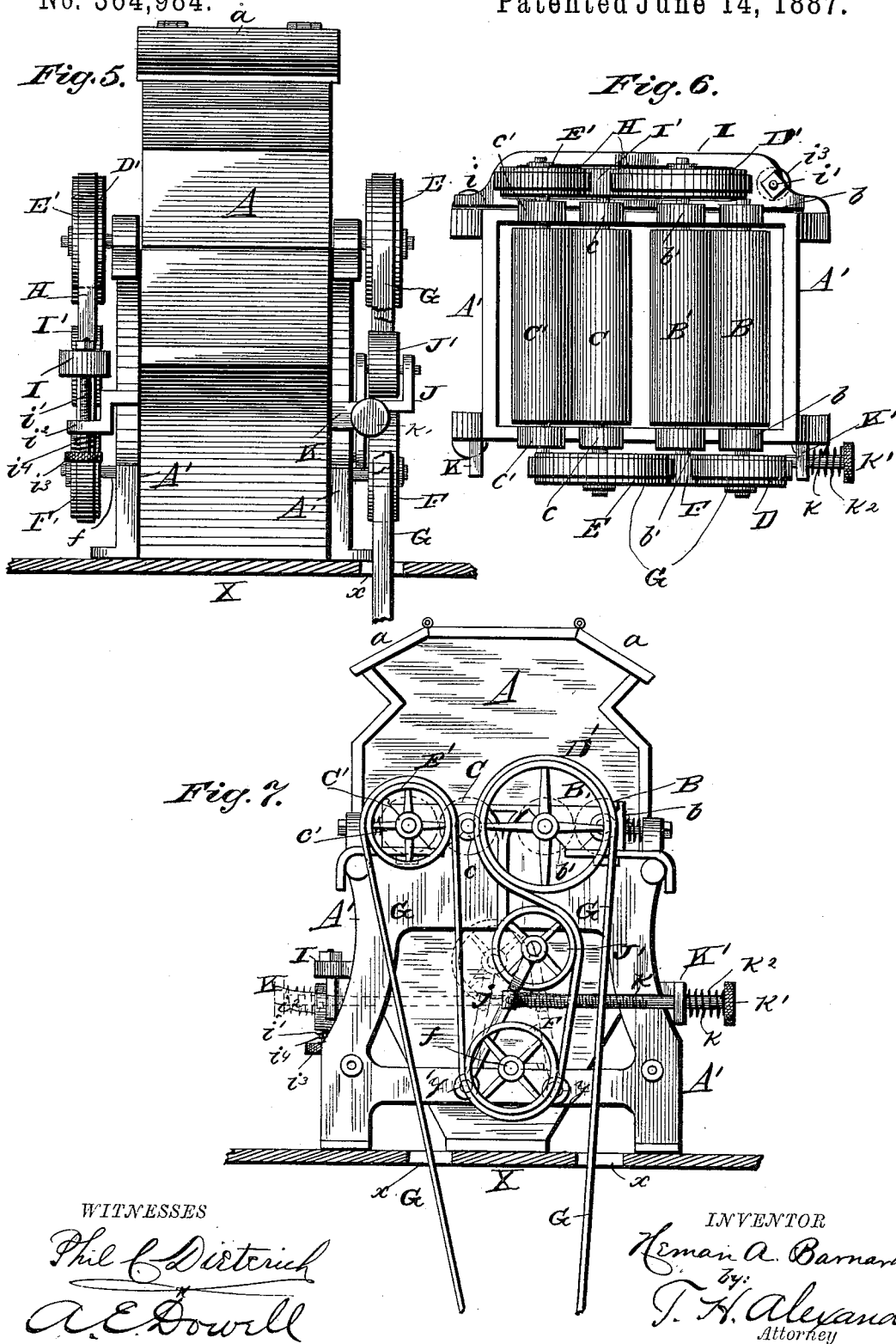
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By
T. H. Alexander
Attorney

UNITED STATES PATENT OFFICE.

HEMAN A. BARNARD, OF MOLINE, ILLINOIS, ASSIGNOR TO THE BARNARD & LEAS MANUFACTURING COMPANY.

ROLLER-MILL.

SPECIFICATION forming part of Letters Patent No. 364,984, dated June 14, 1887.

Application filed April 21, 1886. Serial No. 199,675. (No model.)

To all whom it may concern:

Be it known that I, HEMAN A. BARNARD, of Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Roller-Mills; 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 the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 represents an elevation of one side of the roller-mill. Fig. 2 is an elevation of the opposite side of the machine. Fig. 3 is an elevation of the side of the machine shown in Fig. 1, but with the rollers, pulleys, and belt-tightening mechanism reversed laterally. Fig. 4 is an elevation of the side of the machine opposite that shown in Fig. 3, with the rolls in the same position. Fig. 5 is an end elevation of the machine. Fig. 6 is a plan view of the rolls and attachments. Fig. 7 is an end elevation of a modification of the machine. Fig. 8 is a side elevation in detail of the bearings of the rolls.

The invention relates to improvements in roller-mills, and pertains especially to the belt-drive of the same.

The rolls are all constructed alike, are interchangeable, and the shaft of each is extended at one end to receive a pulley. The rolls are arranged in pairs, and may have any kind of dress, preferably V-shaped, the members of each pair having the extended ends of the shafts and pulleys thereon on opposite sides of the machine. They are so placed upon the main frame of the machine that the extended end of the shaft of the fast-running roll of one pair and the similar end of the shaft of the slow-running roll of the other pair are on the same side of the machine. The rolls of each pair turn toward each other, the material to be ground passing between them. The bearings are all of equal size and similar, so that the journals of each roll will fit in any of the bearings. An idler or tightening pulley is journaled in a detachable frame, that can be secured in corresponding positions to either leg on the same side of the machine.

The objects of making the rolls interchangeable and the tightening-pulley reversible to either side of the main driving-belt is to adapt

the mill to the motion of the driving-shaft when turning in either direction.

Referring to the accompanying drawings, A designates the casing or housing of the mill, having at top the hoppers *a a* to feed the rolls, and supported by the heavy frame A', bolted through openings in lugs on the end of its legs to the floor, as shown in Figs. 1, 2, and 3.

The frame A' is symmetrical, the ends having similar shapes, and in its upper portion, where it connects with the casing A, are the bearings for the roll-journals. The upper portion of the said casing or housing A is detachably secured to the frame A', so that it may be lifted therefrom to interchange the rolls in their bearings.

B B' and C C' are the two pairs of rolls, having the extended ends of their shafts journaled in the bearing-blocks *b b'* and *c c'*, respectively. The long ends of the shafts of the rolls B B' have secured upon them the pulleys D D', of unequal diameters, and the long ends of the shafts of the rolls C C' have secured upon them the pulleys E E', of diameters, respectively, equal to those of the pulleys D' D. The pulleys D' and E are respectively larger than the pulleys D and E'.

F F' are pulleys of equal diameters, on the opposite ends of the transverse counter-shaft *f*, journaled in the lower part of the main frame A'.

G is the main driving-belt, passing around the pulley G' on the actuating-shaft *g*, situated below the floor X, Fig. 1. The said belt passes up through one of the openings *x* in the floor and over the pulley D, thence down under the pulley F, thence over the pulley E, and thence down through the other opening *x* to its starting-point from the pulley G'.

H is a belt on the opposite side of the machine, which belt passes up from the pulley F', over the pulley D', thence downward under the idler-pulley I, hereinafter more fully described, thence upward over the pulley E', and thence downward to the pulley F'. In consequence of this arrangement of the belts and pulleys, the rolls B and C will rotate continuously in the same direction and the rolls B' and C' will rotate continuously in the opposite direction. The rolls B C' rotate faster than the rolls B' C, thus forming, with the latter, two pairs of grinding-rolls. If the driving-

shaft should have its motion reversed, in order to prevent crossing the belts, the casing A is detached and the roll B removed from its bearings and placed in the bearings of the roll C', the latter being placed in the bearings of the roll B. The rolls B' and C are similarly interchanged in their bearings. This adapts the mill to the changed direction of motion of the main shaft and driving-belt, when the former has its rotation reversed.

I is a rectangular frame, pivoted at one end to a pin or arm, *i*, standing out from the upper end of one leg of the frame A' on the same side of the belt H. The frame I surrounds the belt H, and has journaled transversely upon it the idler-pulley I', hereinbefore referred to, and under which the said belt passes. The end of the frame I, opposite the pivoted end, has passing through a threaded opening in it the upper end of a vertical adjusting-screw, *i'*, a proper nut being on said screw above the frame. The said screw *i'* passes through an opening in a lug, *i''*, standing out from an extension of the frame A', and has between the lower surface of said lug and its head *i''* the coiled spring *i'''*, which tends to keep the screw *i'* and the frame I depressed, so that the idler I' will always keep the belt H taut.

J is an arm pivoted at its lower end at a proper point on a boss, *y*, on one leg of the main frame, on the same side as the belt G, and carrying an idler-pulley, J', with its shaft journaled in the bifurcated upper end thereof. *j* is a nut pivoted in an opening in the arm J below said bifurcation.

k is a longitudinal rod passing through a lug, K, on the leg of the main frame A', on the same side but opposite end to that on which the arm J is attached. The inner end of the rod *k* is threaded, to engage the pivoted nut in the opening of the arm J. The said rod passes loosely through the lug K, and has surrounding it, between said lug and its head *k'*, the coiled spring *k''*, which tends to force it outward and to draw the idler J' against the belt G, on which it rests, so as to keep the said belt sufficiently taut. The arm J is detachable from its boss *y*, and can be attached to a similar boss, *y'*, on the opposite leg, but the same side of the frame A', the same pin, *y''*, serving to attach it to each boss. The said pin passes through an opening in the enlarged end of the arm J, and enters the opening of either boss where it is secured. The rod *k* is also reversible by passing it through an opening in a lug, K', corresponding to the lug K,

and at a similar point on the opposite leg. The arm and rod are thus reversed when the rolls are interchanged in their bearings, as described.

Fig. 7 shows a modification of the belt-tightening devices, the arms J in this case being pivoted upon the lower part of the main frame at the points *y* or *y'*; while the rod *k* is shorter and reversible, as before. This construction is used on machines in which it is not possible nor desirable to use the former modification.

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

1. In a four-roller mill, the combination, with the interchangeable rolls provided with pulleys, of a main driving-shaft having a pulley thereon, a counter-shaft having a pulley on each end, a main driving-belt communicating power from said shaft to the pulleys on one roll of each pair on the same side of the machine and to said counter-shaft, a belt on the opposite side of the machine transmitting motion from the counter-shaft to the remaining rolls of the machine, a belt-tightening device, and an adjustable and detachable frame therefor, all constructed and arranged to operate substantially as and for the purpose set forth.

2. A roller-mill comprising the following instrumentalities: main frame A', provided with devices for supporting a belt-tightening frame on each side of the main driving-belt, bearing-blocks *b b' c c'*, interchangeable rolls B B' C C', pulleys D D' E E' F F', counter-shaft *f*, main driving-belt G, and belt-tightening pulley J for said belt, a detachable and adjustable frame for said pulley, and short belt H, all arranged to operate conjointly, and substantially as and for the purposes set forth.

3. A roller-mill comprising a main frame having bosses *y y'* and lugs K K', bearing-blocks *b b' c c'*, interchangeable rolls B B' C C', counter-shaft *f*, pulleys D D', E E', and F F', belts G H, idler-pulley I', frame I, adjusting-rods *i' k*, tightening-pulley J', and detachably-pivoted arm J, all constructed and arranged to operate substantially as and for the purpose set forth.

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

HEMAN A. BARNARD.

Witnesses:

J. S. LEAS,
GEO. M. FARNUM.