No. 789,198. PATENTED MAY 9, 1905.

A. A. AMBLER.

MILL.

APPLICATION FILED APR. 16, 1903.

2 SHEETS—SHEET 1.

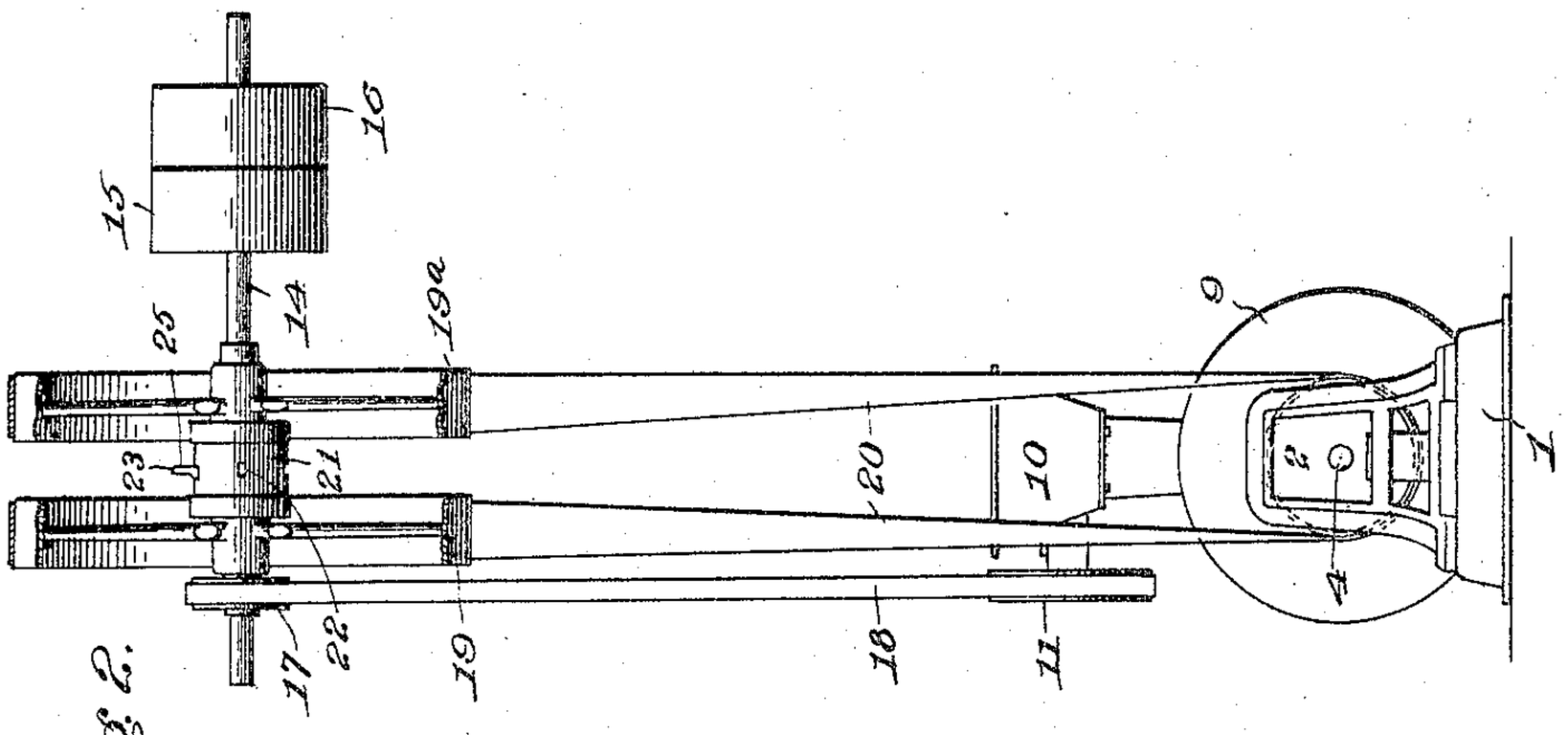

Fig. 2.

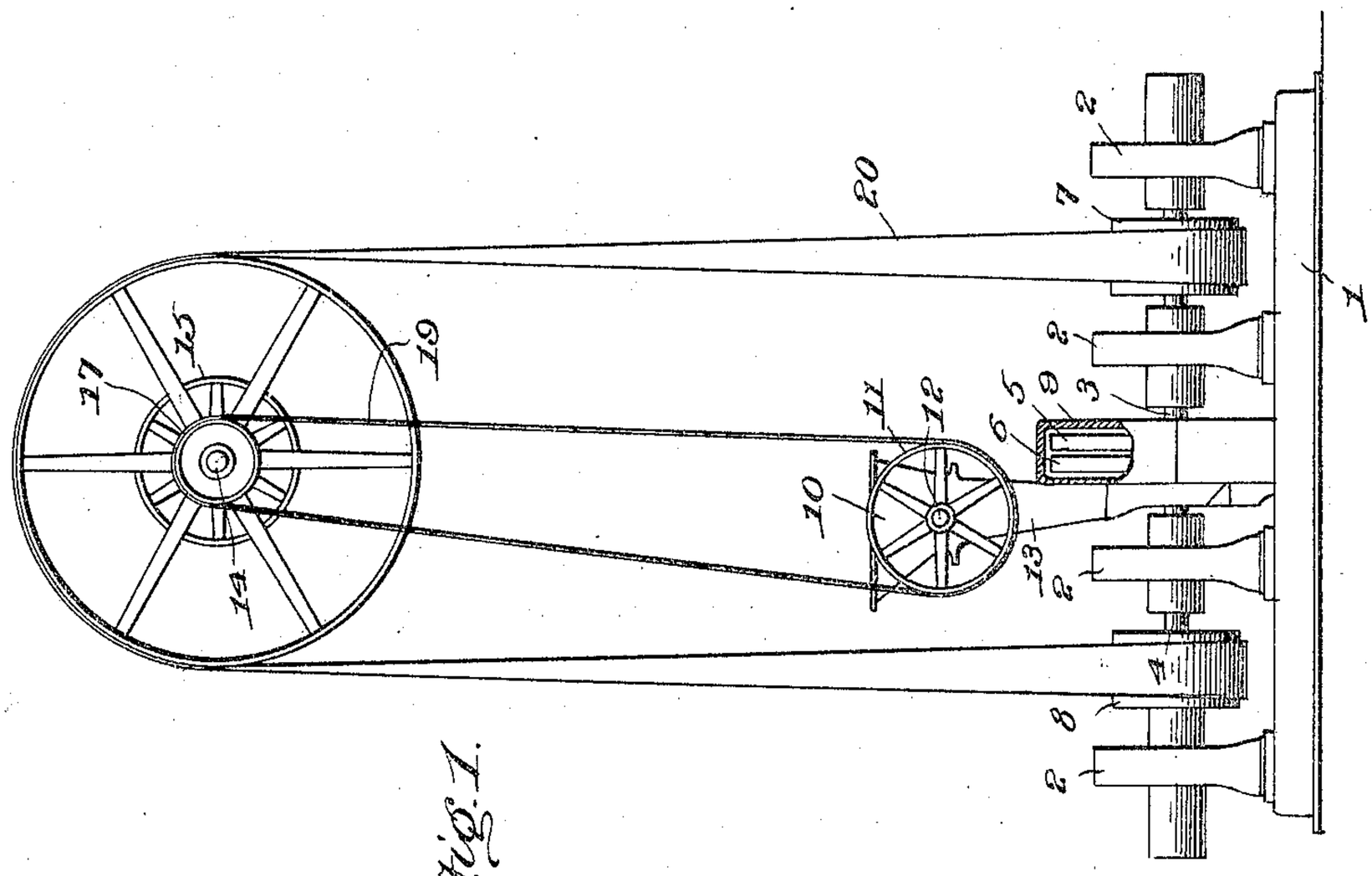

Fig. 1.

WITNESSES:

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Arthur A. Ambler,
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FIG. 3.

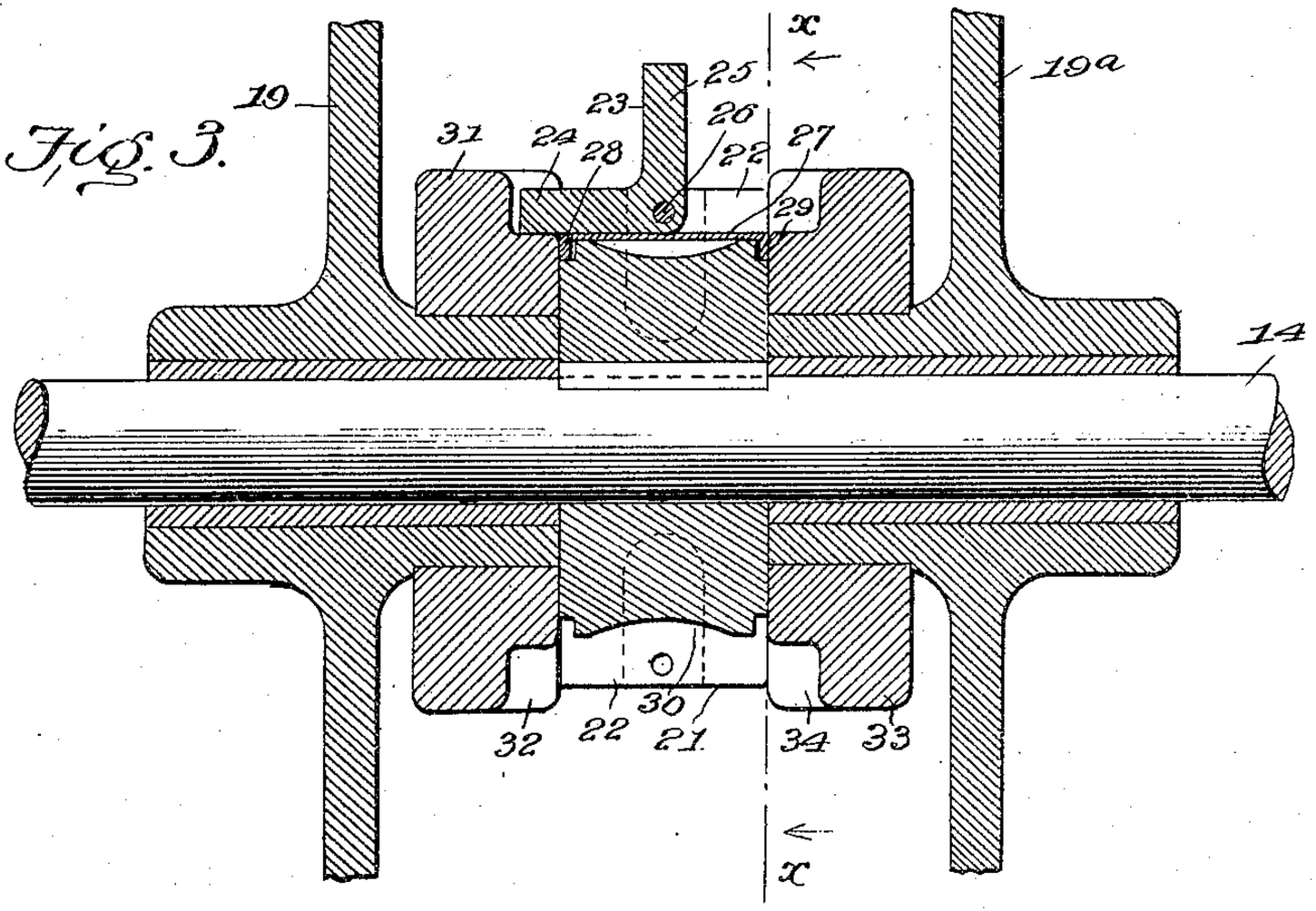
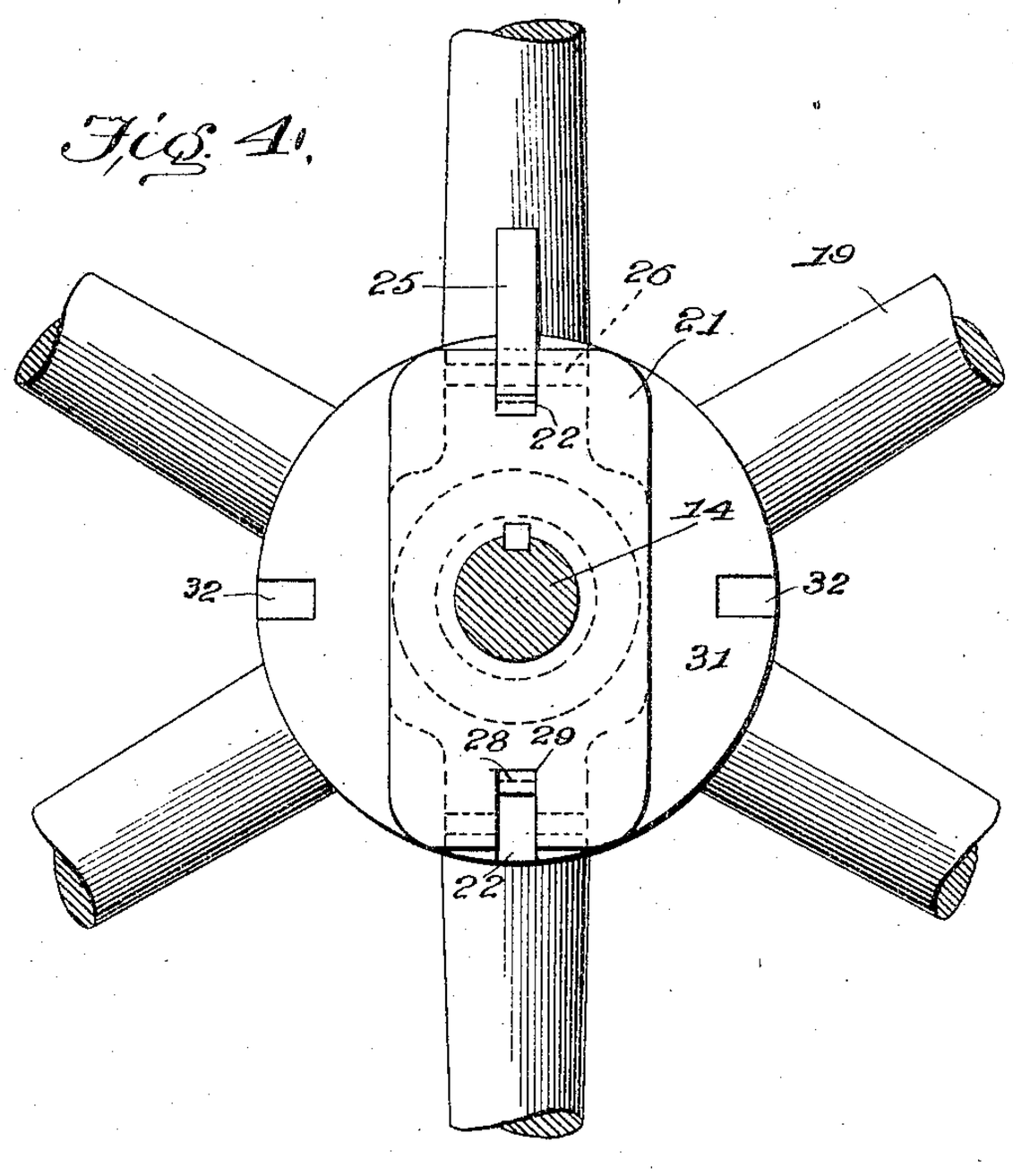


FIG. 4.



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UNITED STATES PATENT OFFICE.

ARTHUR A. AMBLER, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE FOOS MANUFACTURING COMPANY, OF SPRINGFIELD, OHIO, A CORPORATION OF OHIO.

MILL.

SPECIFICATION forming part of Letters Patent No. 789,198, dated May 9, 1905.

Application filed April 16, 1903. Serial No. 152,828.

To all whom it may concern:

Be it known that I, ARTHUR A. AMBLER, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to mills, and more particularly to that class known as "attrition-mills," in which two alined shafts revolve in opposite directions, their adjacent ends being provided with heads carrying grinding-plates.

My invention has for its object to provide a simple and efficient driving mechanism for mills of this class by means of which the shafts and disks may be driven in opposite directions from a single driving-shaft without the employment of a cross-belt or the use of small guiding-pulleys, which will bend the belting repeatedly in different directions, such driving mechanism being readily reversible, so as to simultaneously change the direction of motion of the shafts and heads and being so constructed that the feeder is always driven in one and the same direction from the driving-shaft, permitting reversal of the direction of movement of the mill-shafts without reversing the direction of movement of the feeder-shaft.

To these and other ends my invention consists in certain novel features, which I will now proceed to describe and will then particularly point out in the claim.

In the accompanying drawings, Figure 1 is a front elevation of a mill having my improved drive applied thereto. Fig. 2 is an end view of the same. Fig. 3 is an enlarged detail sectional view of the reversing-clutch, and Fig. 4 is a sectional view taken on the line $x\ x$ of Fig. 3 looking in the direction of the arrows.

In the said drawings the mill is shown as mounted upon a base 1, having bearings 2 for the alined shafts 3 and 4, provided, respectively, with the heads 5 and 6 and pulleys 7 and 8. The heads are inclosed within the usual casing 9, and the material is fed to the heads by means of a feeder 10, driven by a pulley 11 on the feeder-shaft 12, so as to force the material through the feed-chute 13 to the heads. Mills of this type have their shafts and heads driven in opposite directions, and in order to accomplish this and drive from a single line-shaft or counter-shaft it has heretofore been customary to either use a cross-belt to connect one of the mill-shafts with the driving-shaft or to employ small idle pulleys adjacent to one of the mill-shafts to guide the belt around the mill-shaft pulley in a reverse direction. Either of these constructions is objectionable on account of the excessive wear on the belt and for other reasons. Again, it is desirable to at times reverse the direction of movement of the grinding-heads in order to equalize the wear on the grinding-plates, and this has heretofore usually been accomplished either by changing the belts or by turning the entire mill around end for end, each of these operations requiring considerable time and labor of a more or less skilled type. To provide a remedy for these objections, I have devised the construction shown, in which a driving-shaft 14 is located above the mill in a position at right angles to the mill-shafts. This driving-shaft may be driven from any suitable source of power by any suitable means—as, for instance, fast and loose pulleys 15 and 16 (shown in Fig. 2) and a suitable belt—so that the driving-shaft 14 rotates always in the same direction. Said driving-shaft 14 is provided with a fast pulley 17, which, by means of a belt 18, drives the pulley 11, which actuates the feeder-shaft. In this way the feeder is always driving in the same direction, as it requires to be. Mounted loosely on the shaft 14 are two pulleys 19 and 19^a, each preferably of a diameter equal to the distance between the centers of the pulleys 7 and 8, the said pulleys 19 and 19^a being preferably separated by a distance between their centers equal to the diameter of the pulleys 7 and 8. A single belt 20 passes over the pulleys 19 and 19^a and under the pulleys 7 and 8, as shown. Either one of the pulleys 19 and 19^a may be connected with the shaft 14, so as to rotate therewith, by means

of a suitable clutch mechanism, and when thus connected said pulley will rotate in the same direction as the shaft 14, while the other pulley of said pair will rotate in the opposite direction, being loose on the shaft 14. The mill-shafts and grinding-heads will then manifestly rotate in opposite directions, and this will be effected without the use of cross-belts or guide-pulleys to hold the belt around the mill-shaft pulley, so that the driving-belt is not subjected to undue wear and its life and efficiency are correspondingly increased.

By making provision for connecting either one of the pulleys 19 and 19[a], which I term "driving-pulleys," with the driving-shaft 14 it will be seen that the direction of movement of the mill-shafts and grinding-heads may be at once reversed. I prefer for this purpose the particular form of clutch mechanism shown in detail in Figs. 3 and 4. In this construction there is keyed or otherwise secured upon the shaft 14 between the hubs of the driving-pulleys a collar 21, having its periphery transversely slotted, as indicated at 22, to receive a clutch-arm 23, having two clutch-fingers 24 and 25 arranged at right angles to each other. Said clutch-arm is pivoted within the slot 22 by means of a pivot 26, located at the angle of the clutch-arm. In the lower part of the slot 22 there is mounted a spring 27, secured in place in any suitable manner—as, for instance, by having its ends bent down, as shown at 28, to fit in seats 29 in the lateral faces of the collar 21. The bottom of the slot 22 is hollowed out or recessed below the body of the spring 27, as indicated at 30. The construction is such that the clutch-arm 23 may be turned so as to project from either side of the collar 21, according as the arm 24 or 25 is turned down into the slot, the other arm projecting upward, so as to form a means for operating the same, the spring 27 holding the clutch-arm in either position in an obvious manner. Each of the driving-pulleys is provided adjacent to the collar 21 with a clutch member coöperating with that secured to the shaft. The pulley 19 has its hub provided with a collar 31, having notches 32 therein to receive the projecting end of the finger 24 of the clutch-arm, while the hub of the pulley 19[a] has a collar 33, having notches 34 to receive the projecting end of the finger 25. In this way either pulley may be readily connected with or disconnected from the shaft, one pulley always being free or loose when the other is thus connected.

It will be seen that my improved construction not only does away with the disadvantages of excessive belt wear and complication of parts attendant upon the construction in ordinary use, but also provides a practically instantaneous means for reversing the running of the mill. Furthermore, it permits the driving of the feeder from the same driving-shaft as the mill-shafts, permitting the reversal of the direction of movement of the mill-shafts without reversing the direction of the movement of the feeder-shaft.

I do not wish to be understood as limiting myself to the precise details of construction hereinbefore described, and shown in the accompanying drawings, as it is obvious that these details may be modified without departing from the principle of my invention. For instance, although I prefer to make both driving-pulleys of the same diameter and both shaft-pulleys of the same diameter, the diameter of one or more of these pulleys may be varied when it is desired to differentiate the speed of the grinding-heads.

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

In a mill of the character described, the combination, with two alined shafts having opposite grinding-heads, a pulley on each shaft, and a feeder provided with a driving-pulley at right angles to the mill-shaft pulleys, of a driving-shaft at right angles to the mill-shafts, two driving-pulleys loosely mounted on said driving-shafts, clutch mechanism for connecting either driving-pulley at will with said driving-shaft, a fixed pulley on said driving-shaft, a belt passing around said fixed pulley and the feeder-pulley, and a second belt passing around both driving-pulleys and both mill-shaft pulleys, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR A. AMBLER.

Witnesses:
IRVINE MILLER,
WILL O'LAUGHLIN.