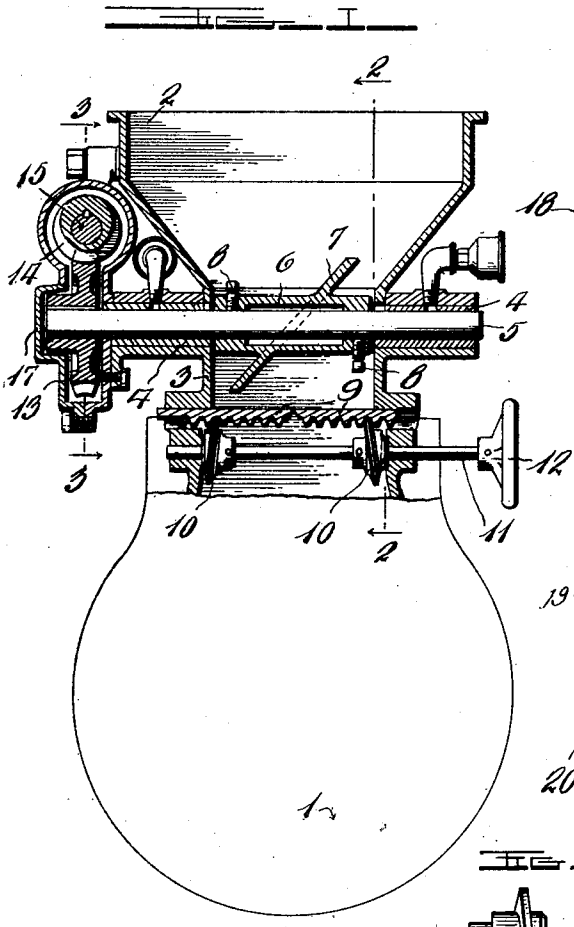
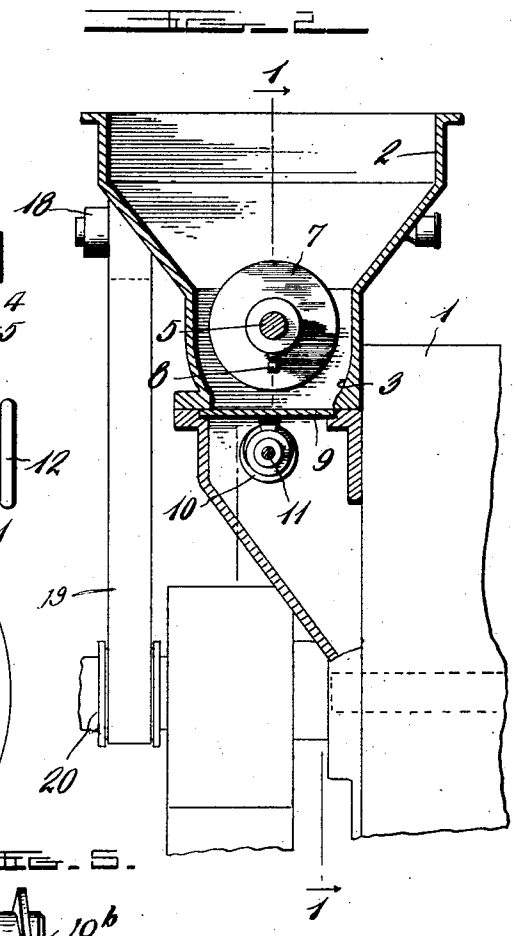
Oct. 6, 1925. 1,555,886

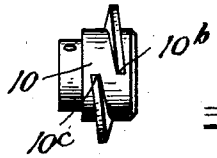
S. SNYDER

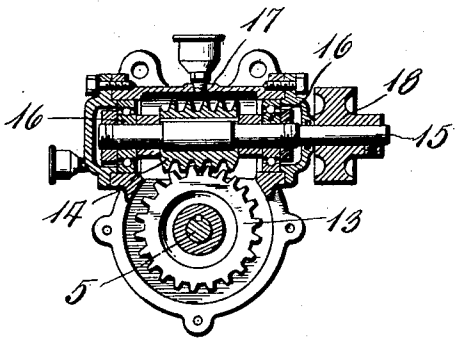
FEED REGULATING DEVICE FOR GRINDING MILLS

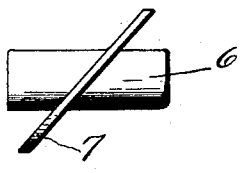
Filed Nov. 21, 1922











Inventor

Simon Snyder

By Julian C. Dowell

his Attorney

Patented Oct. 6, 1925. 1,555,886

UNITED STATES PATENT OFFICE.

SIMON SNYDER, OF MUNCY, PENNSYLVANIA, ASSIGNOR TO SPROUT, WALDRON & CO., OF MUNCY, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

FEED-REGULATING DEVICE FOR GRINDING MILLS.

Application filed November 21, 1922. Serial No. 602,391.

To all whom it may concern:

Be it known that I, SIMON SNYDER, a citizen of the United States, residing at Muncy, in the county of Lycoming and State of Pennsylvania, have invented certain new and useful Improvements in Feed-Regulating Devices for Grinding Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to feed controlling and regulating devices and more particularly to feed regulators and agitators used in connection with hoppers for delivering grain or other substances to various types and kinds of grinders, burrs, attrition mills, disc mills, hullers and cleaners.

One object of the invention is to provide, in combination with a feed hopper having a restricted passage and adjustable feed regulating devices within and controlling the discharge from said passage, an agitating device consisting of a single disk of elliptical form obliquely arranged on a shaft within said passage and extending substantially the full width thereof, together with means for adjusting said feed regulating device and rotating said disk, all arranged in compact form so as to occupy little space, and adapted to be used in various types of mills for grinding grain.

A further object is to provide a device of the character referred to, which will be simple in construction, comparatively inexpensive to manufacture, and which will effectually and continuously deliver grain or other substances to the mill with regularity in the desired quantity so long as the hopper itself is kept supplied with the feeding material.

My invention will first be hereinafter more particularly described, with reference to the accompanying drawings which are to be taken as a part of this specification and then pointed out in the claims at the end of the description.

In said drawings, Fig. 1 is a sectional side elevation of the hopper and associated elements, the mill being shown in skeleton;

Fig. 2 is a sectional end elevation of the same, taken on the line 2—2 of Fig. 1;

Fig. 3 is a detail sectional view of the agitator drive mechanism taken on the line 3—3 of Fig. 1;

Fig. 4 is a longitudinal elevation of the agitator; and

Fig. 5 is a detail plan view of one of the disk-like elements shown in Figs. 1 and 2.

Referring to the drawings, in which like reference numerals are used to denote corresponding parts throughout the several views, 1 denotes an ordinary mill, the character of which is immaterial to the subject-matter of this application. Over the receiving end or grain inlet of the mill, a hopper 2 is placed and suitably secured by bolts (not shown). The walls of the hopper converge downwardly toward a center to provide a preferably cylindrical, constricted passage 3.

A shaft 5 is journaled in bearings 4, which project from the outer side walls of said passage and upon said shaft is secured an agitating device comprising a hub portion 6 of sleeve-like form having rigidly secured thereto or formed integrally therewith and obliquely arranged thereon a disk 7 of elliptical form extending substantially the full width of said passage from a point above the shaft overlying one end of said hub portion to a point below the shaft underlying the other end of said hub portion; said hub portion being secured to the shaft by means of a set screw or screws 8 or equivalent fastening means so as to revolve therewith; and when the agitator is rotated it will sweep substantially entirely across said passage, thereby agitating and stirring the material therein and discharging it through an opening provided therefor between subjacent oppositely movable closure plates hereinafter described.

Said closure plates are slidably fitted in slots or channels formed in the walls of the passage 3 and they are each formed or provided on the underside thereof with a rack-bar portion which is engaged by one of a pair of disk-like elements 10 fixed on a shaft 11 which extends through the passage 3 and is journaled in bearings provided therefor in the walls of said passage; said shaft having a hand control device or wheel 12 secured to one extended extremity thereof by which it may be rotated to move said closure plates. Said disk-like elements are obliquely arranged on the shaft or inclined in opposite directions at an angle thereto so as to cause the closure plates to separate when the shaft is rotated in one direction

and to cause said plates to approach each other when the shaft is rotated in the opposite direction, and to this end said elements are each constructed in the form of a spiral or screw-thread encircling the shaft and terminating in co-incident end-portions 10^b and 10^c arranged on opposite sides of a line passing vertically through the axis of the disk midway between said end portions, so that when the shaft makes a complete revolution the end portion of the spiral which is in engagement with a groove in the rack-bar will release and at the same time the other end portion will engage the adjacent groove, thus causing the closure plate to move either inwardly or outwardly, according to the direction in which the shaft is turned; the oppositely inclined arrangement of the disk-like elements causing the closure plates to move simultaneously in opposite directions, thereby opening or closing the space between the meeting ends of said plates through which the material is discharged, or increasing or decreasing the distance between said meeting ends for varying the size of the discharge opening therebetween. As will be seen, the meeting ends of the closure plates are arranged in a vertical plane passing centrally through the disk 7, so that the discharge opening provided by separating said plates is centrally disposed with respect to said disk, whether the closure plates are more or less widely separated, and by reason of the elliptical form and oblique arrangement of the disk, it is adapted to act upon and discharge an equal amount of material at each side of the passage in which it rotates during each complete revolution thereof.

One end of the shaft 5 is extended through a journal 4 and has a worm wheel or gear 13 keyed thereto, said gear being engaged by a worm gear 14, the latter being keyed to a driven shaft 15 journaled within spaced radial and end ball thrust bearings 16 within a suitable protective housing 17 provided therefor.

Rotation is imparted to the shaft 15 by means of a pulley 18 keyed thereto at one end protruding through the housing 17, and an endless belt 19 traveling thereover, the latter being driven by the main shaft 20 of the mill 1. Suitable grease or oil cups are provided for the thrust bearings, gears and shafts to permit proper lubrication of the various parts at their bearing and friction points.

An even running and noiseless driving mechanism which may be driven clockwise or counter-clockwise with equal efficiency is thus provided for imparting motion to the agitator which revolves within the passage 3, continuously disturbing the grain or stock supplied to the hopper and preventing any choking or congestion in the hopper feed passage, thus causing the grain to flow regularly therethrough, the closure plates 9 therebelow being properly adjusted with relation one to the other, to effect the desired opening at the base of the passage through which the grain will flow to the mill in a continuous feeding stream, the quantity of flow dependent upon the fineness and composition of the stock and the capacity of the mill, being controllable as the speed of the mill is accelerated or retarded, merely by turning the hand wheel 12 one way or the other to enlarge or decrease the central opening.

The speed ratio of the agitator shaft 5 to the main shaft 20 of the mill, is preferably about 20 to 1, as such ratio has been found by experience to afford the maximum efficiency of the feeding device to the mill, but differing ratios may be adapted therebetween without departing from the spirit and scope of this invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. The combination, in a feed regulating device for grinding mills, of a hopper having a depending restricted passage, a shaft extending through said passage, and an agitating device on said shaft extending across said passage approximately the full width thereof from a point above the shaft at one side of said passage to a point on the other side thereof blow the shaft; said device being of elliptical form and obliquely arranged on said shaft and revoluble therewith, and means for rotating said shaft.

2. In combination with a feed hopper having a depending restricted discharge passage and a driven shaft extending through said passage, an agitating device consisting of a single disk of elliptical form obliquely arranged on said shaft within said passage and extending substantially the full width thereof, and adjustable feed regulating means within said passage for varying the amount of material that may pass therethrough.

3. In a feed regulating device for grinding mills and the like, a hopper having a depending restricted discharge passage, a shaft extending through said passage, an agitating device comprising a hub portion of sleeve-like form fixed on said shaft; said sleeve carrying a disk of elliptical form obliquely arranged thereon rigid therewith and extending across said passage from side to side thereof substantially its full width, and means for rotating said shaft.

4. In combination with a grinding mill, a feed hopper having a depending restricted passage and shaft bearings thereon, a shaft journaled in said bearings and an agitating device comprising a hub portion of sleeve-like form secured on said shaft and having

rigid therewith obliquely arranged thereon a disk-like body of elliptical form extending obliquely across said passage from side to side thereof from a point at one side overlying one end of said hub portion to a point at the other side underlying the other end of said hub portion, together with means for rotating said shaft.

5. In a feed regulator, a hopper having a depending restricted passage, a removable feed agitator comprising a hollow sleeve having a single disk obliquely arranged thereon extending approximately the full width of said restricted passage, and a shaft upon which said sleeve is mounted and adapted to rotate therewith, together with means for rotating said shaft in either a clockwise or counter-clockwise direction to continuously agitate the feed within the hopper as it is supplied thereto.

6. In combination with a feed hopper having a depending restricted passage, an agitating device within said passage consisting of a single disk obliquely arranged on a shaft extending through said passage; said shaft being journaled in bearings projecting from the outer side walls of said passage and having a worm-wheel thereon engaging a worm on a driving shaft extending substantially at right angles thereto and a housing for said worm and worm-wheel and for the bearings for said driving shaft; said housing being fixed to one of the bearings for said first named shaft.

7. In combination with a feed hopper having a discharge passage, a shaft extending through said passage and having an agitating device thereon, means for rotating said shaft, and means within said passage controlling the discharge of material therefrom; the latter means comprising oppositely movable closure plates slidably fitted in the side walls of said passage each having a series of grooves and intervening projections or teeth on the underside thereof, and a manually operated shaft extending through said passage and having obliquely arranged disks thereon each engaging a groove between adjacent teeth on one of said closure plates and adapted by conjoint cam-like action to move said plates simultaneously in opposite directions.

8. In combination with a feed hopper having a depending restricted discharge passage, a shaft journaled in bearings projecting from the outer side walls of said passage, said shaft carrying an agitating device within said passage and having a worm-wheel thereon at one end engaging a worm on a driving shaft arranged beside said hopper substantially at right angles to the first named shaft; and a housing secured to the projecting end of one of the bearings for said first named shaft and enclosing said driving shaft and its bearings and said worm-wheel and worm.

In testimony whereof I affix my signature.

SIMON SNYDER.