(No Model.) 2 Sheets—Sheet 1.

J. F. WINCHELL.

FEED REGULATING MECHANISM.

No. 397,045. Patented Jan. 29, 1889.

Fig. 1.

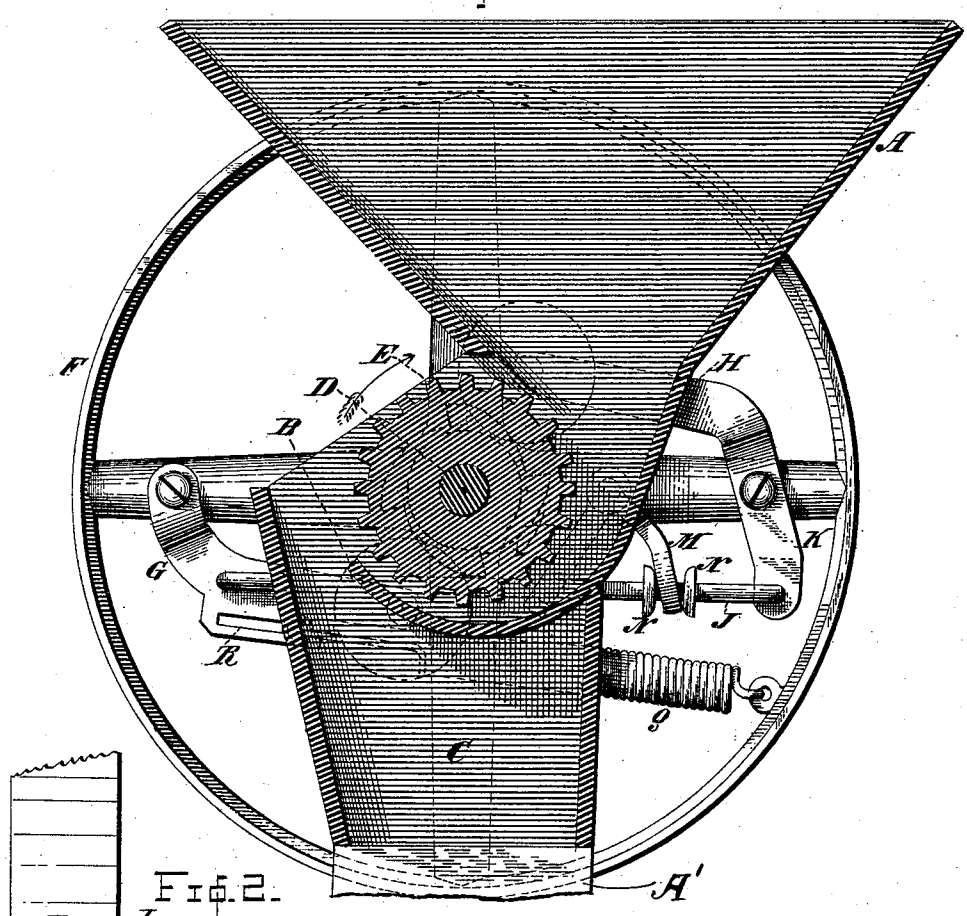
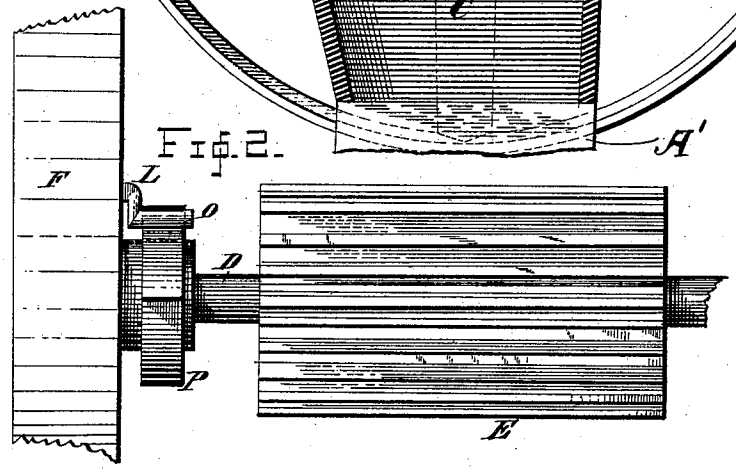


Fig. 2.



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Fig. 3.

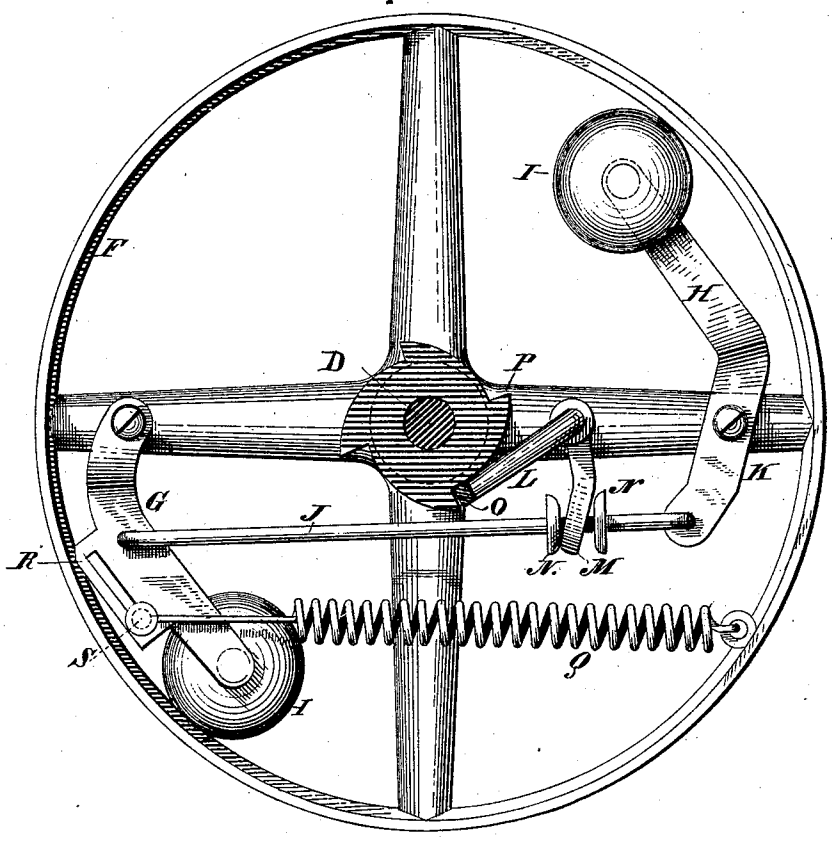
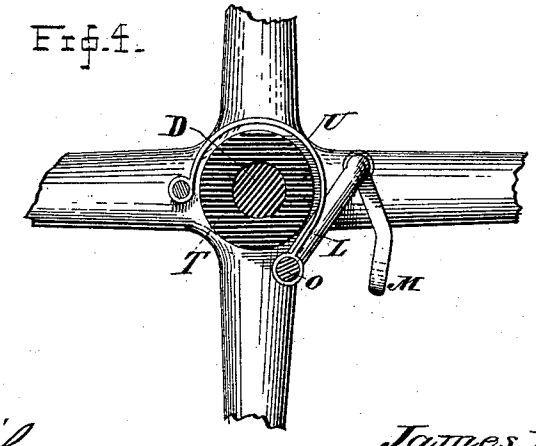


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES F. WINCHELL, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE FOOS MANUFACTURING COMPANY, OF SAME PLACE.

FEED-REGULATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 397,045, dated January 29, 1889.

Application filed January 25, 1886. Serial No. 189,680. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. WINCHELL, 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 Feed-Regulating Mechanism, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in feed-regulating mechanisms for grinding-mills, and is specially designed for use in connection with mills which are operated from a source of power exposed to a wide variation of speed, as wind-engines. Grinding-mills generally perform the operation of reducing the material fed into them with greater dispatch and thoroughness when run at not less than a given speed, determined by the size and character of the mill, while if run much below that speed they fail to grind and become choked unless the feed is stopped altogether. In the mills with which it is specially contemplated to use the present invention a speed of about eight hundred revolutions per minute (or upward) of the grinding-plates is found to be the minimum velocity of rotation for securing the maximum grinding capacity of the mill, while at a speed of less than from six hundred and fifty to six hundred revolutions per minute of the grinding-plates the mill becomes choked, the parts bind together, and, if the further feed of the material is not entirely cut off, the machine is exposed to serious strains, and should the machine suddenly resume its movement disarrangement and breakage follow. The latter remarks have special application to wind-engines, for when the wind is brisk and of good velocity the mill operated by the wind-engine will run at the requisite speed; but when the wind moderates or ceases entirely the engine's speed lessens or fails altogether, and the rotation of the grinding-plates of the mill falls below the proper velocity for keeping up the requisite rapidity of grinding or for grinding at all, or the mill will actually stop. Should the quantity of the inflow of the material into the mill be continued under the first of these conditions, the product will be imperfect, and if that condition of speed and the inflow be continued too long the mill will overflow and stop; or if any inflow at all be allowed when the two latter conditions of speed exist the mill will choke in the one instance sooner or later and in the other instance will choke at once. To overcome these difficulties and to permit of the use for operating grinding-mills of a driving-power subject to wide variations of speed and subject to absolute stoppage and sudden restarting, and this without the necessity of a constant attendant upon the machine, is what I have in view; and therefore my invention consists in means for both regulating the inflow or feed of the material to the mill according to the speed thereof and for entirely cutting off or stopping the feed when the speed of the mill falls below a given velocity, or when the mill actually stops, the latter being the principal object, all as hereinafter described, and then pointed out in the claims.

In the accompanying drawings, forming a part of this specification, and on which like reference-letters indicate corresponding parts, Figure 1 represents a vertical sectional view of the hopper and feeder or feeding-roller, showing the governor or governor mechanism in side elevation; Fig. 2, a face view of the feeder or feeding-roller, a portion of the governor-wheel, and the ratchet and pawl; Fig. 3, a side elevation of the governor or governor mechanism and wheel; and Fig. 4, a like view of a portion of the wheel, showing a modified form of means for connecting the pawl with the feed-roller shaft.

The letter A designates the hopper which receives the supply of material to be fed to the mill, which is constructed, preferably, of one piece of cast-iron, and is designed to fit upon a mill, as at A′, (when used with the mill described in my applications filed, respectively, on or about November 9, 1885, Serial No. 182,241, and January 25, 1886, Serial No. 189,679. The connection is made as described in said applications in respect to the hopper.) The present hopper has a curved bottom, B, terminating some distance from one of the walls of the throat C of the hopper, from which termination the material descends, and

which termination is above the body of the bottom, so that the material travels uphill in discharging, which prevents it from jarring through when the feed-wheel is not revolving.

The letter D designates a shaft, which is mounted in bearings formed in the walls of the hopper and eccentrically to the bottom B, and is provided with a feeder or feeding-roller, E, of any approved type, but preferably of that shown, in which the periphery is provided with a series of longitudinal ribs or teeth which take into the material and feed it positively over the bottom and into the throat when rotated in the direction of the arrow, and as positively prevents the passage of the material when not rotated. The tapering passage between the feeder or feeding-roller and the opposite wall and the bottom of the hopper admits of a proper feeding action.

I will now proceed to describe the governor or governor mechanism which serves to control the feeding-roller in respect to giving motion to it or not, as will hereinafter more fully appear.

The shaft D also carries a belt-wheel, F, mounted loosely thereon, over which passes a belt which receives motion from any convenient pulley operated by the power which operates the mill, as by the sleeve-pulley on the main shaft of the mills described in my said applications. Attached to one of the spokes, or otherwise pivotally mounted on said wheel F, are the arms G and H, carrying each a weight or ball, I, at its outer end which swing when the wheel is in rotation outwardly under the influence of centrifugal force. To the arms is also attached by a pivotal connection a pitman, J, the arm H having an extension, K, beyond its fulcrum-point for this purpose, and so as to permit the centrifugal action to operate the pitman transversely to the axis of the wheel. To the same spoke is also pivotally mounted a two-armed pawl, L M, the arm M of which is bifurcated and embraces the pitman J between two collars, N, mounted thereon, whereby, as the pitman is moved in either direction, as will be presently explained, the arm M will be carried with it, and the other arm, L, of the pawl adjusted with respect to the axis of the wheel. This latter arm has a projecting foot, O, as seen more clearly in Fig. 2, and rigidly mounted upon the shaft D is a ratchet, P, having any convenient number of teeth, with which the foot O of said pawl is made to engage or to disengage, according to the speed of the wheel F. A spiral or other form of spring, Q, is attached at one end to the wheel and at the other to the arm G in the present instance, and preferably by an adjustable connection consisting of the slot R in the arm G and the binding-screw S, whereby the tension of the spring may be increased or decreased, and thus make the degree of speed necessary to overcome the tension of the spring and throw the arms outwardly more or less rapid. From these remarks it will be understood that the spring tends to keep the arms and balls toward the center of the wheel, and the foot O, consequently, out of engagement with the ratchet P. Thus it will be observed that when the wheel F is stationary the feeding-roller will also be stationary and the engagement of the foot O with the ratchet P broken; also, that when the wheel is put in motion by the starting of the mill the tendency will be for the balls to fly from the position shown in dotted lines in Fig. 1 toward that shown in Fig. 3, the degree of this outward travel being controlled by the speed at which the wheel F is traveling and the tension to which the spring Q has been adjusted. When, however, the mill has attained the minimum grinding speed, the wheel F will have attained a speed sufficient to cause the balls to move the arms sufficiently to operate the pitman and throw the foot O of the pawl L M within the periphery of the ratchet P and rotate the same, and consequently the shaft D and the feeding-roller. So long as this speed is maintained so long will the feeding be maintained in the proper ratio, and as the speed is increased the quantity of material fed into the machine is correspondingly increased; but the moment the speed is reduced below the minimum at which the engagement of the pawl and ratchet takes place, that moment the spring and the absence of the required centrifugal force break that engagement and the feeding-roller comes to rest, though the mill and wheel F continue in motion. The same is true if the mill and wheel come to an entire stop. With this governor or governor mechanism a mill can be supplied with a hopper of large capacity—say of the capacity for a day's or a night's work—and connected with a wind-engine. If the machine is set for work at the close of the day, it will grind during the night accordingly as the wind may blow, and if it is squally the wind will operate accordingly and the feed be correspondingly controlled, but not allowed to run at all into the mill if the speed thereof is below the minimum speed at which the mill successfully grinds. On the other hand, without the governor or governor mechanism the feed is allowed to continue, notwithstanding the speed falls below that of grinding capacity. The result is that if the wind be light for awhile material is allowed to accumulate in the mill and choke and stop it. Then when the wind increases the mill will not operate, or if the increase happens to be in a sudden gust the belt will either slip or the mill or the wind-engine be broken, and this may occur early in the night, while from that time on until morning, when the mill is revisited, the wind may blow most favorably for the purpose of grinding. Thus the material will be found unground, the time lost, and probably the mill or the engine, or both, damaged. With the governor or governor mechanism, however,

which, as above noted, positively stops the inflow of the material below a given speed, such does not occur; but on revisiting the mill, after having left it set for work, it will be found to have accomplished all the work the state of the wind admitted of, and the parts will not be damaged nor choked.

In Fig. 4 I have illustrated a modified form of constructing the means for connecting the pawl with the shaft D, consisting of the sleeve T, mounted on the shaft D, instead of the ratchet P, and of the strap U, connected with the wheel at one end and with the foot O of the pawl L M at the other, and which binds against the periphery of the sleeve T when the pawl is thrown toward the shaft D, passing back of the sleeve, as viewed in Fig. 4.

I do not confine myself to the details of construction or arrangement illustrated, nor to the use of the governor or governor mechanism in connection with a hopper or feeding mechanism of any particular construction.

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

1. The combination, with a hopper, of a feeding-roller, a ratchet, a wheel, and a governor and a pawl mounted on said wheel, and a spring connecting the governor with the wheel, substantially as described, whereby the feeding-roller is engaged with the wheel and disengaged therefrom according to the speed at which the wheel is revolved.

2. The combination, with a hopper, of a feeding-roller, a wheel, pivoted weighted arms carried thereby, a pitman, a spring, and a pawl and ratchet to engage said wheel with the feeding-roller, whereby when the wheel attains a given speed the material is fed and when the wheel falls below that speed the material is cut off.

3. The combination, with a hopper having a bottom partially across it, a shaft mounted in said hopper, a ratchet, and a feeding-roller mounted on said shaft within the hopper and eccentrically to the bottom thereof, of a wheel mounted on the roller-shaft, arms pivotally attached to said wheel, a connecting-pitman, a pawl actuated by said arms and pitman to engage the wheel with the shaft, and a spring to break said engagement.

4. The combination, with a mill and its hopper, of a feeder co-operating with said hopper, a rotating governor mounted in proximity to said feeder, and clutch devices actuated by the governor to connect the governor and feeder-shaft together when the governor reaches a given speed and disconnect them when the governor falls below said speed, whereby in the one instance the feeder is actuated and the cereals fed and in the other instance the feeder is not actuated and the cereals not fed.

5. The combination, with the hopper consisting of a receiving portion, the throat portion, and a curved bottom located at the juncture of the receiving portion and said throat and extending partly across the latter, of a grooved feeding-roller mounted within the hopper and eccentrically to the bottom thereof and forming a tapering space between the said bottom and its periphery, and adapted to feed the material when rotated and to cut off the feed when stopped, a ratchet, the roller-shaft on which it is mounted, a wheel on said shaft, governor mechanism carried thereby and consisting of pivoted arms having weights and a pitman connecting them, and a pawl controlled by said pitman and thereby made to engage and disengage said ratchet.

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

JAMES F. WINCHELL.

Witnesses:

A. A. YEATMAN,

CHASE STEWART.