E. M. WARRENFELTZ.

GRAIN DRIER.

APPLICATION FILED JUNE 23, 1919.

1,360,336.

Patented Nov. 30, 1920.

3 SHEETS—SHEET 1.

Fig. 1.

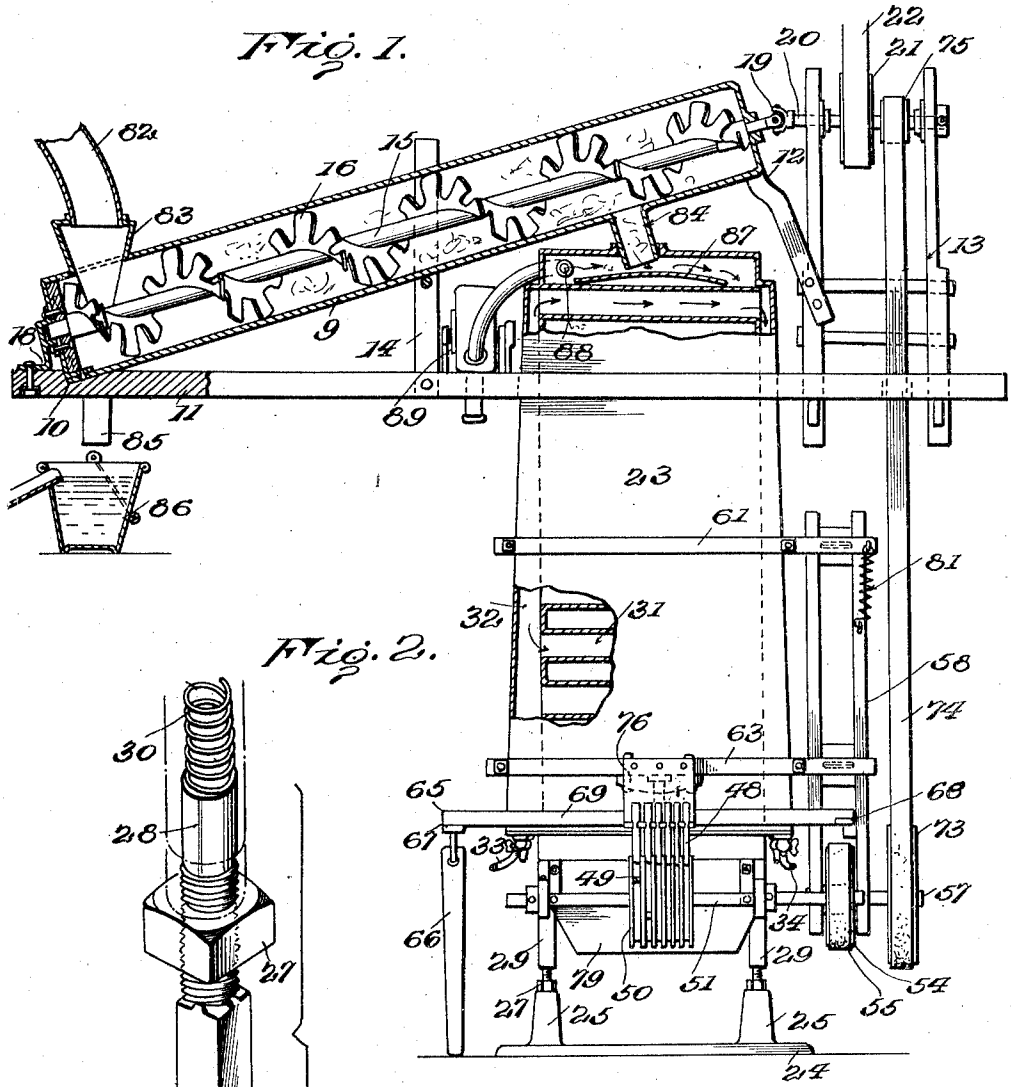


Fig. 2.

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3 SHEETS—SHEET 2.

Fig. 3.

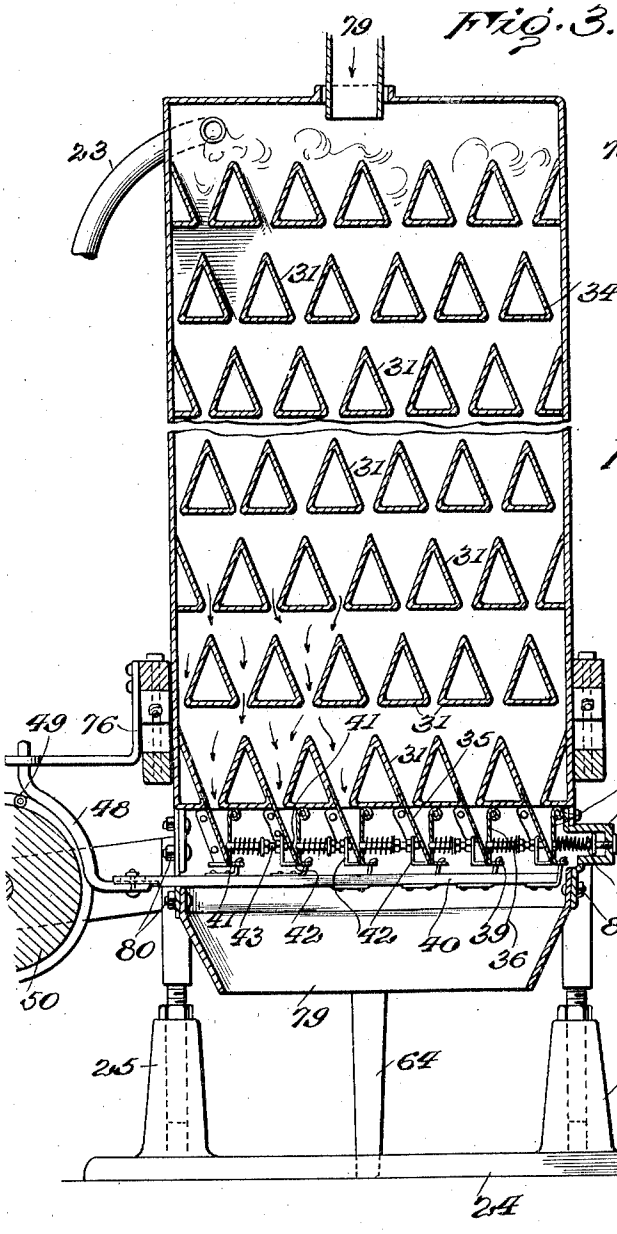


Fig. 6.

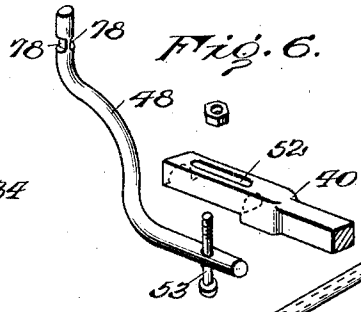


Fig. 5.

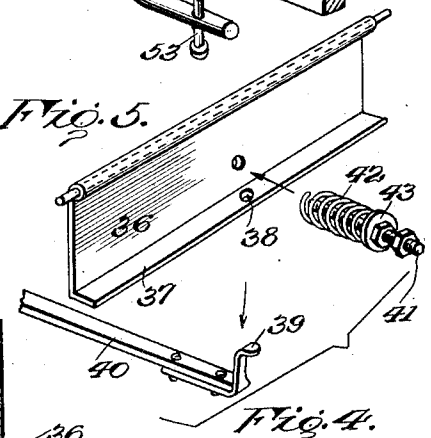
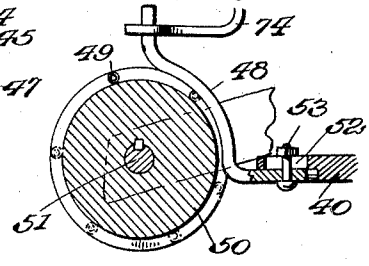


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 7.

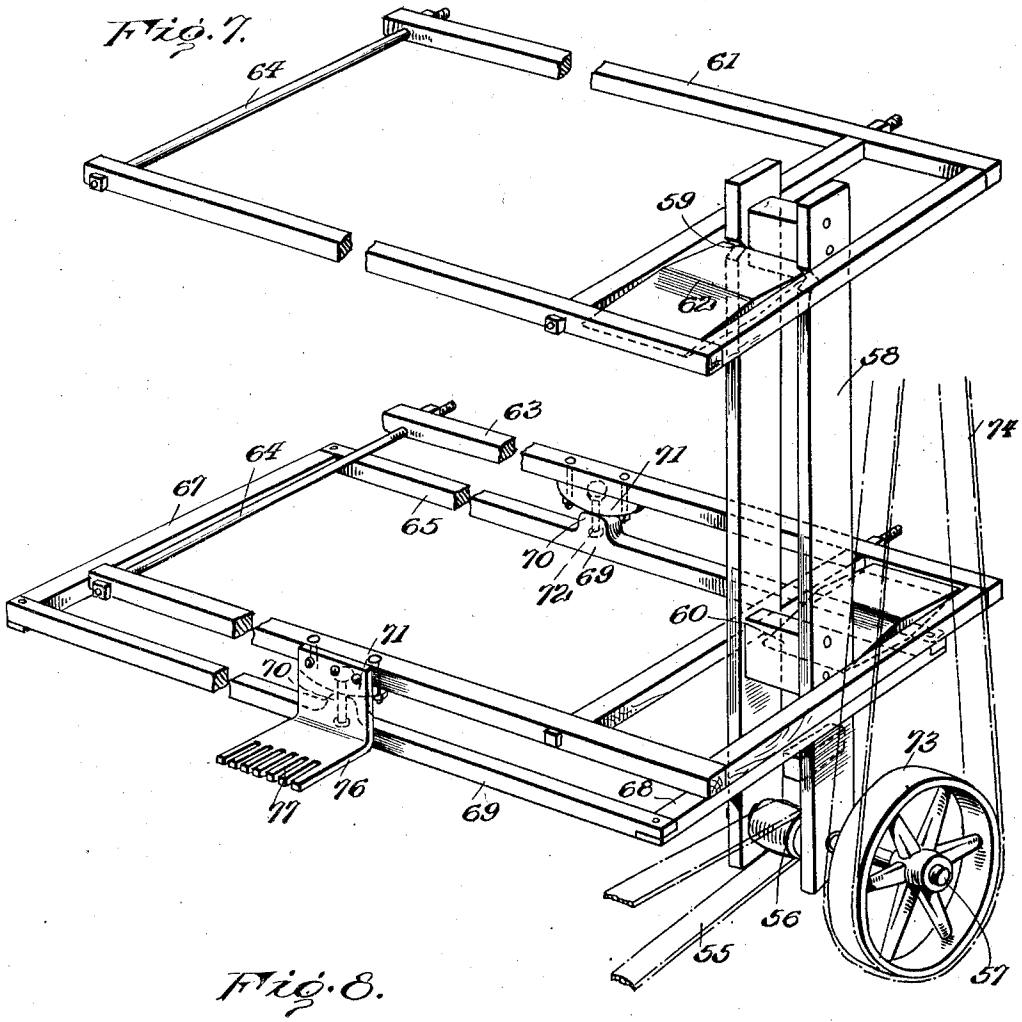
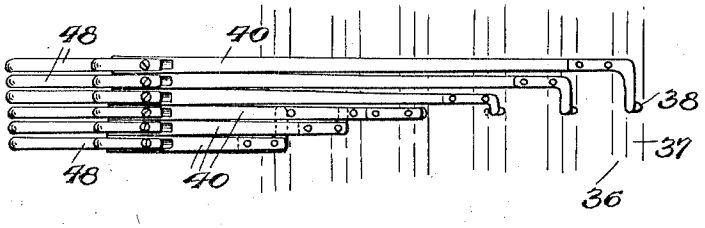


Fig. 8.



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UNITED STATES PATENT OFFICE.

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GRAIN-DRIER.

1,360,336. Specification of Letters Patent. Patented Nov. 30, 1920.

Application filed June 23, 1919. Serial No. 306,020.

To all whom it may concern:

Be it known that I, EDWARD M. WARRENFELTZ, citizen of the United States, residing at Funkstown, in the county of Washington and State of Maryland, have invented certain new and useful Improvements in Grain-Driers, of which the following is a specification.

This invention relates to apparatus for drying grain such as wheat and the like and is especially designed for operation in connection with a washer adapted to wash foreign matter from the grain and to convey the washed grain to the drier, said washer forming the subject-matter of an application filed by me of even date herewith.

An object of this invention is to provide means for discharging the dried wheat from one end of the drier whenever undried wheat is fed into the drier.

A further object is to provide a drier with means for receiving undried wheat and for discharging dried wheat, the discharging means being adapted to be actuated by the weight of the undried wheat.

Another object is to provide an apparatus for drying wheat comprising means for feeding wet wheat into a drier, means for discharging dry wheat therefrom, means for actuating the feeding means, and means adapted to become operatively connected with the feeding means by the excessive weight of the wet wheat to cause the discharge of the dry wheat.

With the above and other objects in view this invention consists in certain novel features hereinafter described, a preferred embodiment whereof is illustrated in the accompanying drawings.

In the said drawings:

Figure 1 is a view partly in section and partly in elevation of my improved apparatus;

Fig. 2 is a detail of one of the legs supporting the drier;

Fig. 3 is a central vertical section of the drier;

Fig. 4 is a detail section of a device for opening the bottom of the drier to discharge some of the contents thereof;

Fig. 5 is a detail perspective view of a gate which forms part of the discharge-controlling means;

Fig. 6 is a detail perspective of some of the parts shown in Fig. 4;

Fig. 7 is a perspective view of the framework which controls the opening and closing of the gate;

Fig. 8 is a detail bottom plan view.

Referring more particularly to the drawings for a detailed description of my invention, 9 is an inclined cylindrical casing supported at one end in a recess 10 of a base 11 and at the opposite end by brackets 12 upon a frame 13 mounted on the base, a pedestal 14 providing an intermediate support. The cylinder is provided with bearings for a shaft 15 and conveyer 16 is mounted on said shaft and surrounds the same in the form of a helix. The shaft 15 is supported at its lower end by a bearing bracket 18 on the base and is connected at its upper end by a universal joint 19 with a shaft 20. The shaft 20 is supported by bearings on the frame 13 and is equipped with a pulley 21 to be driven by a belt 22. Below the casing 9 and, preferably, intermediate the pedestal 14 and frame 13, is mounted a drier 23 which extends downwardly through the base 11 and is supported upon a base 24. The drier does not rest directly upon the base but is mounted for relative vertical movement. Upon the base are a plurality of sockets or hollow posts 25 having angular bores to receive plungers 26 of similar outline whereby the plungers may move vertically but cannot rotate in the sockets. The intermediate portion of each plunger is threaded to receive an adjusting nut 27 which will rest upon the coöperating socket. The upper extremity of the plunger is smooth, as shown at 28, to play freely within a socket 29 rigid with and depending from the casing or frame of the drier, while a spring 30 is housed within said socket between the base of the same and the plunger. It will be readily understood that the weight of the drier and its contents is carried by the springs and by adjusting the nuts upon the plungers the tension of the springs may be regulated to yield to any predetermined weight.

The drier 23 is provided throughout its interior with horizontally mounted flues 31 extending between and communicating with heads 32 coextensive with the ends of the drier and provided at their bottoms with a

steam inlet pipe 33 and an exhaust 34, respectively. The flues are triangular in cross section, as shown in Fig. 3 and are arranged in staggered relation so that the grain will be deflected from side to side and forced to follow a tortuous path in its descent through the drier. Immediately below the lowest row of flues and adjacent the spaces between the flues of said row, partitions 35 extend between the end walls of the drier, all the partitions being inclined in the same direction, as shown in Fig. 3. A gate 36 is pivotally supported below each of said flues and depends from its pivot to meet the respectively adjacent partition and each gate is provided at its free lower edge with a flange 37 in which is an opening 38 to be engaged by an upstanding hook 39 on a bar 40 mounted below the partitions and gates for reciprocation and having one end projecting laterally beyond the drier. A rod 41 is projected transversely through the gates and partitions and is supported by brackets 42. On the rod 41 between each gate and an opposite partition is mounted a coil spring 42 the tension of which may be adjusted by a nut 43 in an obvious manner. The wall of the drier, opposite the wall through which the bars 40 project, is provided with an opening and supports a socket 44 around said opening. A plunger 45 plays through the end of the socket and is connected by the spring 46 therein with the rod 41, being provided upon its outer end with an adjusting nut 47. Each of the bars 40 is connected with an arm 48 which is adapted to be operated by pins 49 on the face of the wheel 50 keyed on a shaft 51, the end of the bar 40 being provided with a longitudinal slot 52 to receive the connecting bolt 53 carried by the arm 48 so that the throw of the bar may be adjusted. It will be noted that the arm 48 is curved to substantially conform to and rest upon the periphery of the wheel 50 which is grooved to prevent disengagement of the arm from the wheel. On the shaft 51 is mounted a pulley 54 which is connected by a belt 55 with a pulley 56 on the shaft 57 supported by bearings of a frame 58, said frame being provided with knife edge fulcrums 59 and 60. The frame 58 is projected vertically through a frame 61 which frame is pivotally supported by a bar 62 having knife edges fulcrumed in the knife edge fulcrum 59 of the frame 58. The frame 58 is also projected through a frame 63 supported by a bar having knife edges fulcrumed in the knife edge fulcrum 60. The sides of the frames 61 and 63 are extended along the opposite walls of the drier and the free ends are joined by rods 64 which are in sliding contact with the drier. A frame 65 is mounted on the drier below the frame 63 and is supported by a leg 66, which leg is flexibly connected with the side 67 while the opposite side 68 is passed through the frame 58. The sides 69 are provided with lugs 70 for brackets 71 of the frame 63 which are the counterpart of the lugs 69 and are pivotally connected with the latter by pins 72 slidingly projected through perforations of the lugs 69 and brackets 71. The shaft 57 is provided with a pulley 73 connected by a belt 74 with a pulley 75 mounted on the shaft 20. A bracket 76 is mounted on the frame 63 and bears against the side 69 of the frame 65 whence it projects outwardly, the outwardly projecting portion being constructed with slots 77 to receive the arms 48 which are provided in their sides, at their upper ends, with notches or grooves 78 to be engaged by the walls of said slots.

A trough 79 is suspended from the drier by bolts 80. The frames 58 and 61 are connected by a spring 81. The grain is fed through a chute 82 into a tank 83 in which the foreign matter is washed from the grain, the grain being conveyed through the casing 9 to a chute 84 through which it is discharged into the drier, the grain being drained during its transfer and the drainage flowing back into the tank which is provided with a drain pipe 85 to drain into a receptacle 86, this portion of the apparatus forming the subject-matter of an application filed by me of even date herewith. The grain descends through the spaces between the flues, sliding from one row of flues to the next row along the inclined faces of the flues filling the drier and the spaces between the bottom partitions and gates. The steam heats the flues through which it circulates and the heat is given off to act on the grain so that it will be thoroughly dried during its descent in the drier. As more and more grain is fed into the drier, the increased weight overcomes the tension of the springs 30 and causes the drier to correspondingly drop, the frame 69 moving with the drier and forcing the frame 58 to descend which motion is transmitted and guided by the frames 61 and 63. As the frame 58 descends, the belt 74 is tightened on the pulley 73 resulting in the transmission of power to the shaft carrying said pulley and the belt 55 connecting the pulley 56 with the pulley 54 so that the shaft 51 and the wheels 50 will rotate. The pins 49 of the wheels 50 ride under the arms 48 during the movement of said wheels and force said arms inwardly so that the bars 40 will be pushed against the tension of the springs 42 to open the gates, permitting some of the grain to discharge into the trough 79. The discharge of some of the grain reduces the weight on the casing which will be thereupon moved upwardly by the recovery of the supporting springs, so that the belt 72 is loosened and the transmission of power to the shaft

51 ceases. The gates will be closed and will remain closed until the weight of the contained grain again overcomes the force of the supporting springs.

It will be observed that the leg 66 provides a fulcrum for the fixedly mounted frame 69 and causes it to force the vertical frame 58 downwardly to prevent the belt 72 from forcing the shaft 57 upwardly. The arms 48 are guided by the slots of the bracket 76 and when the wheels 50 are rotating and the pins 49 strike the arms they are prevented by said guides from bending sidewise and slipping off the pins.

If so desired, a deflector 87 may be provided at the top of the drier to spread the incoming grain so that it will be distributed over the drying flues equally and this deflector may be stationary or oscillate as preferred. An outlet 88 for the moisture and vapor from the grain is provided at the top of the drier. I have shown this outlet as connected with a suction fan 89 but, obviously, it may be connected with the suction pipe of the mill in which the drier is located.

Having thus described the invention, what is claimed as new is:

1. The combination with a drier, of a hopper for discharging grain therefrom, said hopper comprising stationary sides and yieldably mounted gates normally adapted to prevent the discharge of grain, the gates being operable to open under an accumulation of grain.

2. The combination with a casing yieldably mounted for vertical movement, of spaced transverse drying flues mounted therein, a hopper under said casing, means for feeding grain through the casing and between the drying flues into the hopper, swinging gates controlling the flow from the casing to the hopper, yieldable means for holding the gates closed, means operatively connected with the feeding means to cause the gates to open, and means actuated by the movement of the casing to control said gate-opening means.

3. The combination with a drier, of means for feeding grain thereto, said drier provided with a bottom and gates to open said bottom, bars operatively connected with said gates and provided with arms, means adapted to intermittently actuate said arms to cause the bars to open the gates, and means operatively connecting said actuating means with the feeding means.

4. A casing, means for feeding grain thereto, a hopper for discharging grain therefrom, said hopper provided with a parallel series of slanting walls, a gate to each slanting wall, said gates normally adapted to close for holding grain filling the spaces between the slanting walls and gates, and means to open the gates adapted for connection with the feeding means.

5. The combination of a drier, means for feeding grain thereto, a hopper for discharging grain therefrom, said hopper comprising stationary sides and yieldably mounted gates normally adapted to prevent the discharge of grain, and means for opening the gates operatively connected with the feeding means.

6. A drier, means for feeding grain thereto, means for discharging grain therefrom, a base, means yieldably supporting the drier above said base, a frame pivotally mounted on the drier, a leg pivotally connected with the frame at one side of the base, a frame provided with means to be actuated by the pivoted frame to operatively connect the feeding means with the discharging means.

7. A drier, means for feeding grain thereto, means for discharging grain therefrom, a base, means yieldably supporting the drier above the base, means pivotally supporting the drier at one side of the base, a vertical frame provided with means to operatively connect the feeding means with the discharging means, a frame movably mounted on the drier for guiding the vertical frame, and means yieldably connecting said frames.

8. A drier, means for feeding grain thereto, means for discharging grain therefrom, a base, means yieldably supporting the drier above the base, means pivotally supporting the drier at one side of the base, a vertical frame adjacent the drier above the side of the base opposite the pivotal support, a frame mounted on the drier adapted to guide the vertical frame and supported by bearings thereof, and means pivotally supporting said last-mentioned frame intermediate the pivotal support and vertical frame.

9. A drier, means for feeding grain to be dried thereto, said drier provided with openings for discharging grain therefrom, yieldable means to close said openings, means to open the closing means, operating means adapted to actuate the opening means, and movable supporting means adapted to guide the opening means in position to be actuated by the operating means.

10. The combination of a vertically movable drier having a discharge opening at its lower end, a swinging gate mounted adjacent and controlling the flow through said opening, yieldable means for holding the gate normally closed, an opening bar disposed below and connected to the gate, an arm extending from said opening bar, a guide for said arm carried by the drier, a driving roller arranged to actuate said arm, and operating means for said roller controlled by the vertical movement of the drier.

In testimony whereof I affix my signature.

EDWARD M. WARRENFELTZ. [L. S.]