No. 653,032. Patented July 3, 1900.

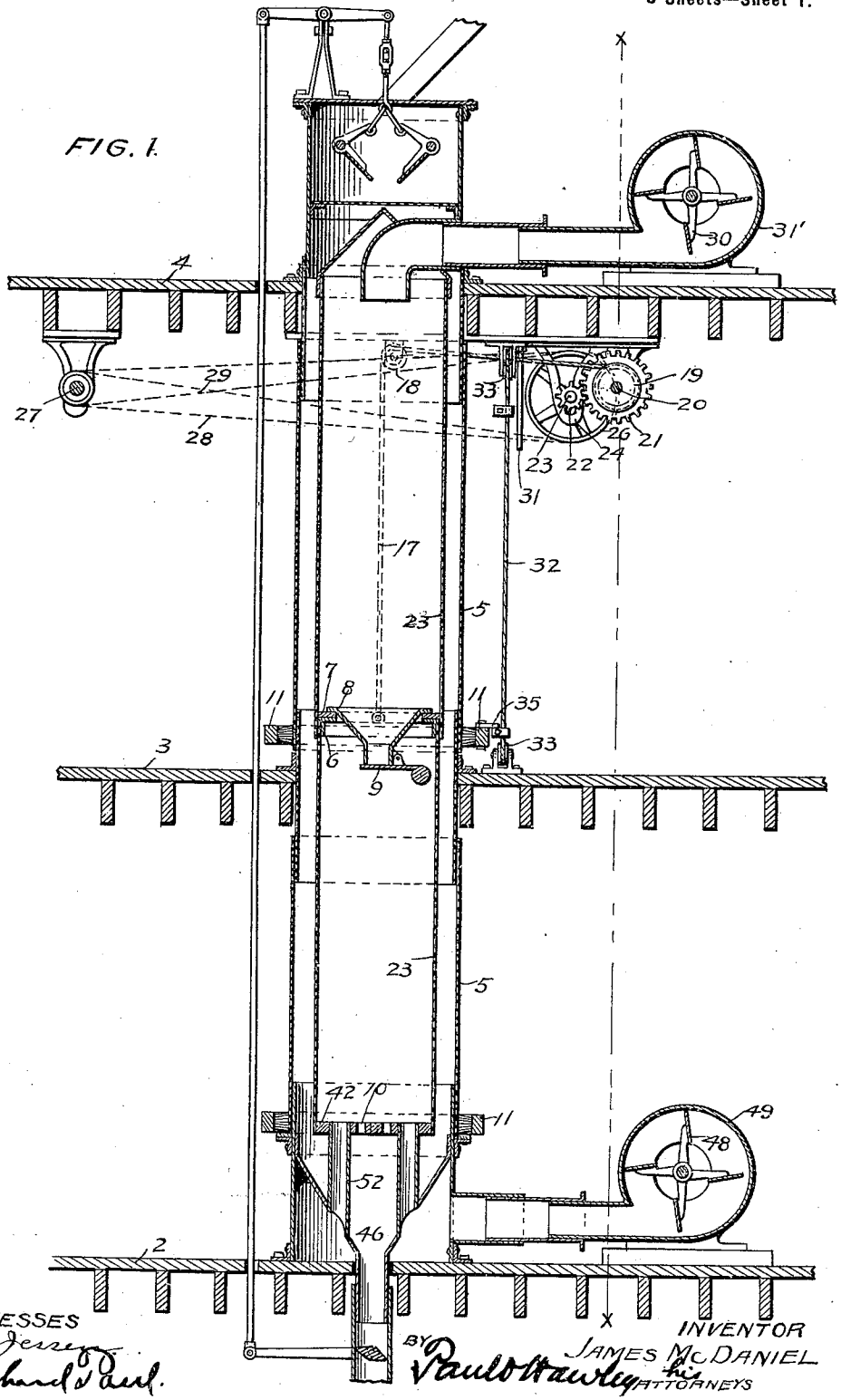
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GRAIN DRIER.

(Application filed Feb. 3, 1900.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1.



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(No Model.) 3 Sheets—Sheet 2.

FIG. 2.

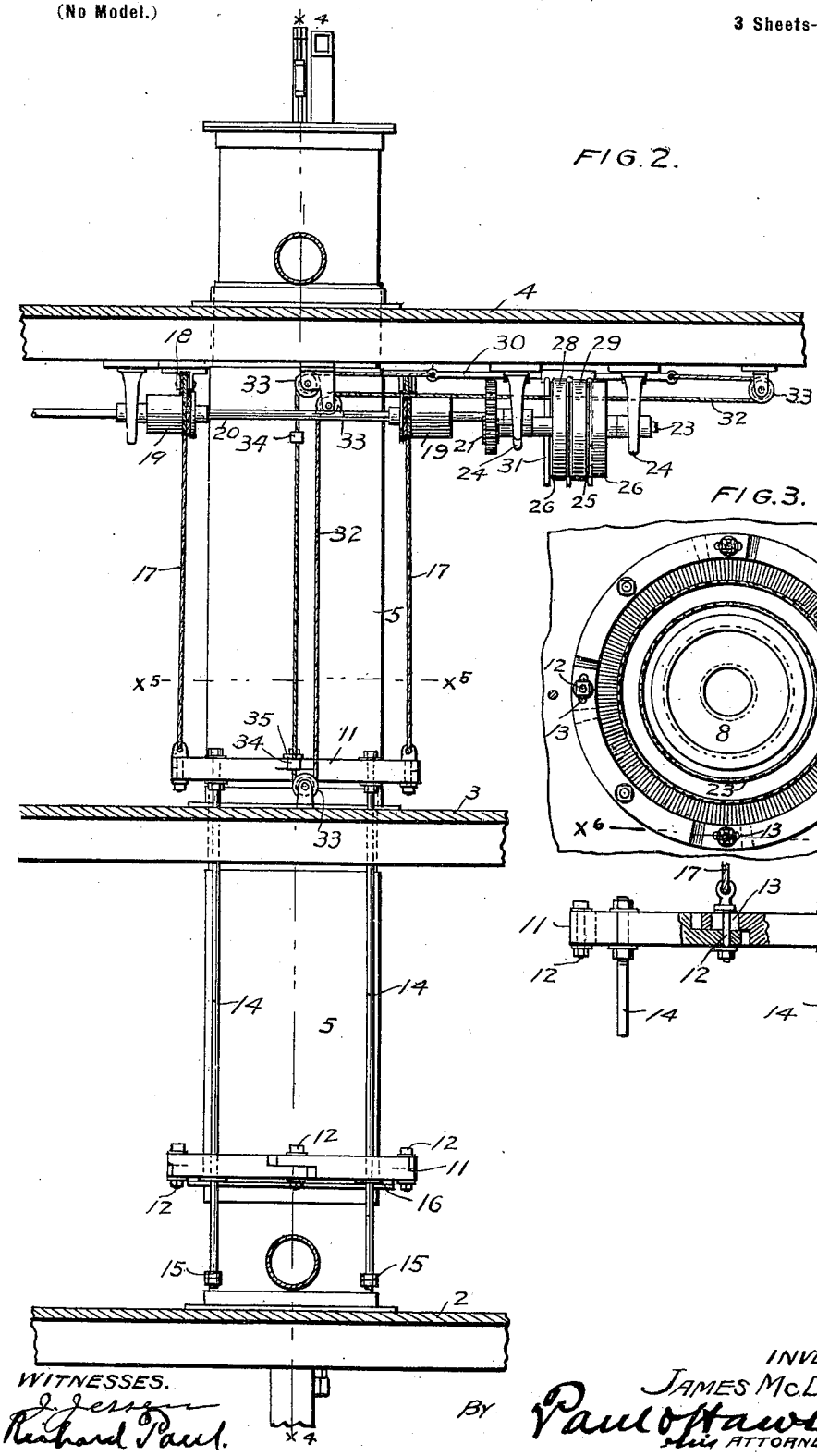


FIG. 3.

FIG. 4.

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(No Model.) 3 Sheets—Sheet 3.

FIG. 5.

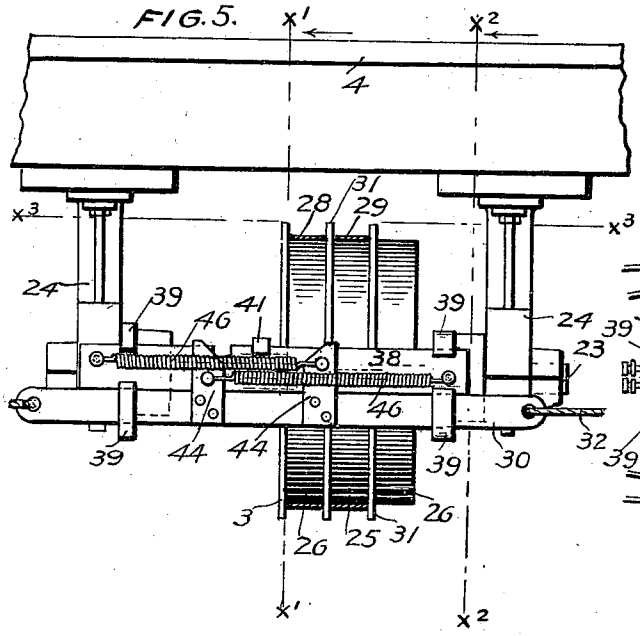


FIG. 6.

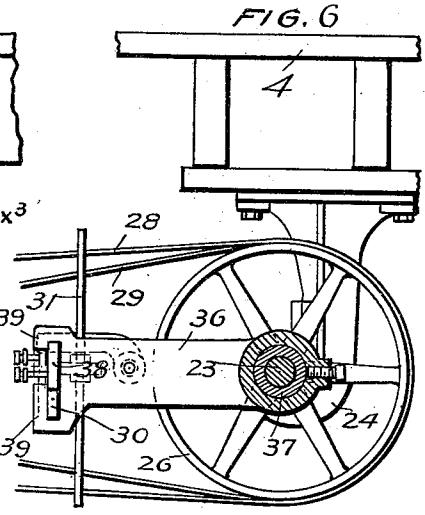


FIG. 8.

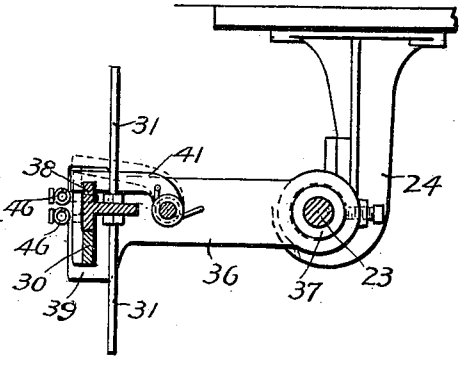


FIG. 7.

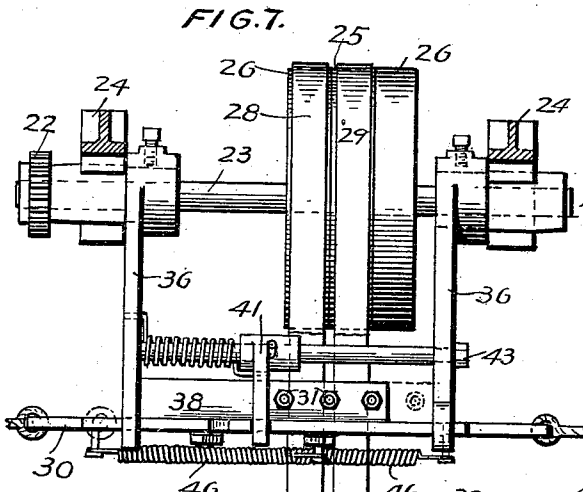
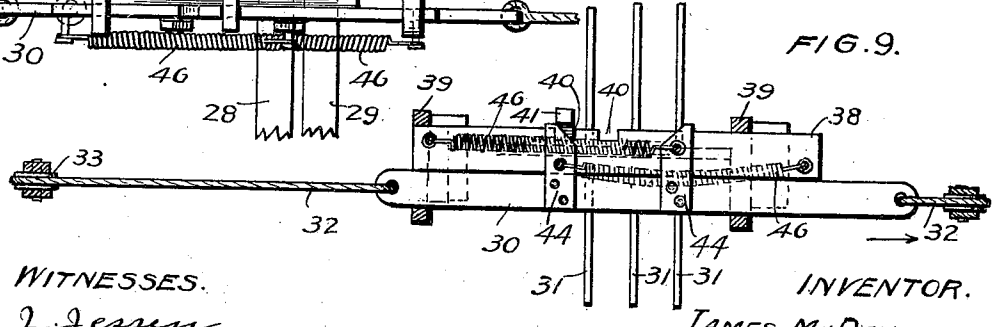


FIG. 9.



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UNITED STATES PATENT OFFICE.

JAMES McDANIEL, OF MINNEAPOLIS, MINNESOTA.

GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 653,032, dated July 3, 1900.

Application filed February 3, 1900. Serial No. 3,774. (No model.)

To all whom it may concern:

Be it known that I, JAMES McDANIEL, of the city of Minneapolis, county of Hennepin, State of Minnesota, have invented certain new and useful Improvements in Grain-Driers, of which the following is a specification.

This invention relates to improvements in devices designed for use in drying grains, and particularly to improvements in the grain-drier shown and described in Letters Patent No. 622,521, granted to me April 4, 1899.

The objects I have in view in my present invention are to provide means for automatically removing the seeds or other material that accumulates in the interior of the drier and means for brushing the outer surface of the outer perforated cylinder.

The invention consists generally in the constructions and combinations hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical section of my improved machine. Fig. 2 is a section on line $x\ x$ of Fig. 1. Fig. 3 is a horizontal section on line $x^5\ x^5$ of Fig. 2. Fig. 4 is a section on line $x^6\ x^6$ of Fig. 3. Fig. 5 is an elevation of the belt-shifting device. Fig. 6 is a section on line $x^2\ x^2$ of Fig. 5. Fig. 7 is a horizontal section on line $x^3\ x^3$ of Fig. 5. Fig. 8 is a section on line $x'\ x'$ of Fig. 5. Fig. 9 is a detail illustrating the operation of the shifting device.

The general construction of the grain-drier is the same as that shown and described in my former patent hereinbefore referred to. The outer perforated cylinder is preferably made in sections, and the inner cylinder is also made in two or more sections. This, as explained in my former patent, is for convenience in setting up or taking down the driers. In the drawings, 2, 3, and 4 represent floors of the mill or other building in which the drier is placed. The cylinders 5 and 23, both of which are perforated, are arranged one within the other, thereby providing an annular space between the cylinders through which the grain passes while it is subjected to currents of air forced into the interior of the inner cylinder by means of the fans 30 and 48, arranged in the fan-casings 31 and 49.

I have found in practice that where unscreened grain is passed through the drier considerable quantities of fine seeds, dust, and dirt find their way into the interior of the cylinder, and with the construction shown in my former patent this material accumulated upon the transverse head or partition, which made it necessary to take the drier apart or get access to the interior for the purpose of removing it. To avoid this difficulty, I construct the inner cylinder with a hopper 8, resting upon a ring 7 and supported by an angle-iron ring 6, said hopper being provided with a central opening and a counterbalanced cover or valve 9 for said opening. The lower head 42 of the cylinder is provided with a series of openings 10, which communicate with the hopper 46, into which the grain falls from the annular space between the cylinders. With this construction the fine material that works into the inner cylinders will be automatically discharged into the hopper 46. The greater part of this material will of course accumulate in the upper part of the cylinder, and it will fall into the hopper 8, and its weight resting upon the valve 9 will cause said valve to open, permitting the material to fall onto the lower head 42 of the inner cylinder, from which it will pass out through the openings 10. The blast of air entering the lower end of the cylinder through the tubes or pipes 52 will prevent said material from passing into said pipes.

For the purpose of keeping the outer cylinder of the drier clear of dust and dirt which are liable to accumulate in the perforations I prefer to provide for each section of said cylinder a ring-brush 11, which is arranged to travel up and down over the surface of the cylinder. These brushes are preferably made in overlapping sections secured together by bolts 12, passing through slots 13 in one of the sections. By this means as the brush fibers become worn the rings may be adjusted so as to keep the brush at all times in close contact with the outer surface of the cylinder. The upper and lower brushes are preferably alike, and the upper brush has a series of depending rods 14, which preferably pass through the floor 3 and through the ring of the lower brush and are provided at their lower ends with the nuts 15. A flange or lug 16 is provided near

the lower end of the lower section of the cylinder. The height of this section of the cylinder may be less than the height of the upper section, and hence by supporting the lower brush in this manner it has less travel than the upper brush. I may use any suitable means for moving the brushes up and down over the sections of the cylinder. It is preferable to have the brushes travel very slowly over the surface of the cylinder in both directions. I have here shown cords or cables 17 connected to the upper brush and passing over pulleys 18 and to suitable drums 19, mounted upon a shaft 20. The shaft 20 is provided with a gear 21, which is engaged by a pinion 22 upon a driving-shaft 23. The shaft 23 is supported in suitable hangers 24, and mounted upon said shaft is a fast pulley 25 and two loose pulleys 26. A counter-shaft 27 is mounted in suitable bearings, and from pulleys on this counter-shaft the straight and crossed belts 28 and 29 pass to the pulleys on the shaft 23. A sliding bar 30 is arranged in proximity to the shaft 23, and it is provided with the depending arms 31, which are adapted to engage the belts 28 and 29. A cable 32 is connected to the opposite ends of the shifting-bar 30 and passes around suitable sheaves 33 and is provided with suitable lugs 34, adapted to be engaged by a projection 35 on the upper brush 11. By this means the belts will be shifted as the brush reaches the end of its travel so as to drive the shaft 20 first in one direction and then the other, and thereby to raise and lower the ring 11 and to move the brushes slowly up and down over the surfaces of the sections of the cylinder. In some instances I find it desirable to provide means for assisting the movement of the shifting-bar in shifting the belts from one set of pulleys to the other, and I have shown a construction suitable for this purpose in Figs. 5 to 9 of the drawings. The shifting-bar 30 in this instance is mounted upon the arms 36, that are adjustably secured upon the boxes 37, in which the shaft 23 is mounted, so that said arms may be adjusted to any position to accommodate the position of the belts. In this instance an auxiliary shifting-bar 38 is arranged adjacent to the bar 30 and is adapted to reciprocate in suitable guides 39. These guides also serve to hold the bar 30 in place, said guides being formed upon or secured to the adjustable arms 36. The auxiliary bar 38 is preferably of T shape in cross-section and carries the rods 31, which engage and move the belts. The auxiliary bar 38 is provided with two notches 40 and a spring-actuated dog 41, mounted upon a rod 43, that is carried by the arms 36, and is adapted to engage either of the notches in the bar 38. The bar 30 is provided with the lugs 44, having beveled upper ends, said bevels being toward each other, and a spring 46 is connected to each end of the bar 38 and has its opposite end connected to the farther lug 44. (See Figs. 5, 7, and 9.)

The operation of the shifting device is as follows: Suppose that the parts are in the position shown in Fig. 5 of the drawings, with the belts upon the center and left-hand pulleys, and that the brush has reached the limit of its travel in one direction. The last part of the movement of the brush will cause it to engage the lug 34 on the cable 32. The shifting-bar 30 will be moved to the right from the position shown in Fig. 5, and thereby the left-hand spring 46 will be put under tension. When the inclined end of the left-hand lug 44 comes in engagement with the dog 41, it will raise said dog out of the notch in the auxiliary bar 38 and the tension of the spring will give said auxiliary bar a quick movement to the right, and this movement of the auxiliary bar will move the belts from one set of pulleys to the other. This movement of the shifting device is reversed when the brush reaches the other limit of its travel. With this spring attachment to the shifting device the movement of the brush may be utilized for reversing its travel. As the brush is made to travel very slowly over the surface of the cylinder, if the spring attachment to the shifting device is not used it will sometimes occur that the belts will be partially shifted and reaching a neutral point will stop and fail to complete the shifting operation. By means of the spring attachment to the shifting device, combined with the brush traveling at a slow rate of speed, I am enabled to brush the outer surface of the cylinder at regular intervals and to promptly reverse the brush at the limit of its travel in each direction.

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

1. In a grain-drier, the combination, with an upright perforated cylinder and means for forcing air into the opposite ends of said cylinder, of a transverse partition within said cylinder dividing the same into an upper and lower compartment, a hopper arranged in said partition, and a valve in said hopper arranged to open automatically upon the accumulation of material in the hopper, for the purpose set forth.

2. In a grain-drier, a perforated cylinder divided into two compartments by a hopper provided with a suitable valve adapted to open automatically upon the accumulation of a certain predetermined weight of material, for the purpose set forth.

3. In a grain-drier, the combination, with the outer perforated cylinder 5, of the inner perforated cylinder divided into two compartments by a transverse partition, provided with a suitable hopper having a balanced valve, for the purpose set forth.

4. In a grain-drier, the combination, with the upright perforated cylinder having a bottom or lower head provided with a series of openings, of a hopper arranged in said

cylinder and forming a transverse partition therein, and a suitable valve closing the bottom of said hopper and adapted to open automatically upon the accumulation of a certain predetermined weight of material in the hopper, for the purpose set forth.

5. In a grain-drier, the combination, with a perforated cylinder, of a ring-brush surrounding said cylinder, and means for reciprocating said brush longitudinally of said cylinder, for the purpose set forth.

6. In a grain-drier, the combination, with a perforated cylinder, of an adjustable ring-brush surrounding said cylinder and means for reciprocating said brush longitudinally of said cylinder, for the purpose set forth.

7. In a grain-drier, the combination, with a perforated cylinder, of a brush surrounding said cylinder and consisting of a series of overlapping sections, and means for adjustably securing said sections together, for the purpose set forth.

8. In a grain-drier, the combination, with the perforated cylinder extending above and below the floor 3, of the ring-brushes surrounding both sections of said cylinder, means connecting said brushes, and means for reciprocating said brushes, for the purpose set forth.

9. The combination, with the perforated cylinder and the reciprocating brush surrounding said cylinder, of the belt-shifter provided with the spring-actuated auxiliary shifting-rod, for the purpose set forth.

In testimony whereof I have hereunto set my hand this 27th day of January, 1900.

JAMES McDANIEL.

In presence of—
A. C. PAUL,
M. E. GOOLEY.