(No Model.) 3 Sheets—Sheet 1.

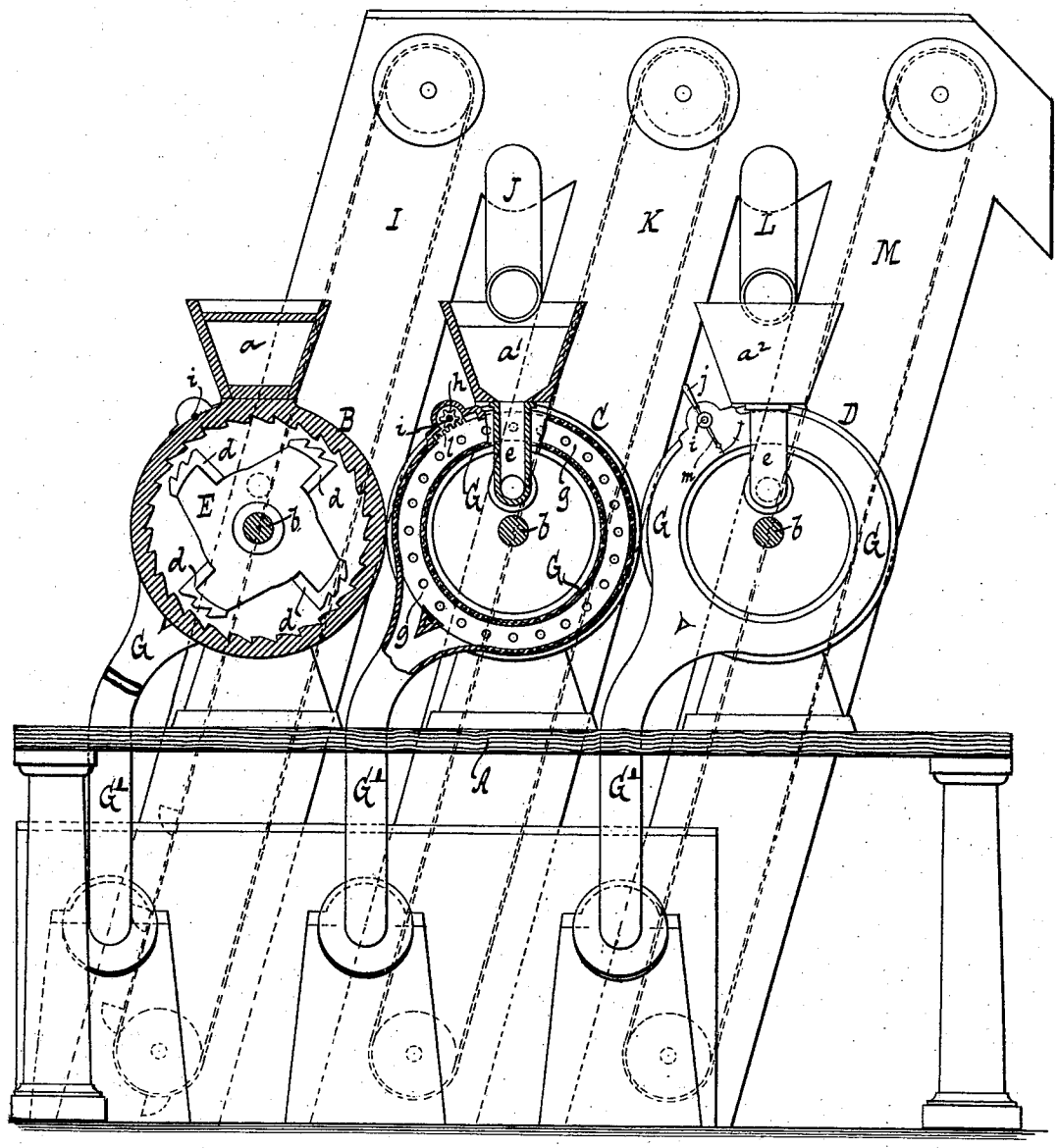
VAN BUREN RYERSON, Dec'd.

N. T. RYERSON, Administratrix.

MACHINE FOR REDUCING CEREALS, &c.

No. 368,900. Patented Aug. 23, 1887.

Fig. 1.



WITNESSES:

Otto Hupfeld

William Miller

INVENTOR

Nathlié T. Ryerson - Administratrix of the Estate of the late VanBuren Ryerson

by Van Santvoord & Hauff

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N. PETERS, Photo-Lithographer, Washington, D. C.

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Fig. 4.

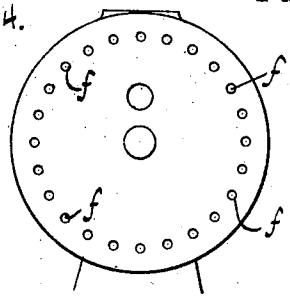


Fig. 5

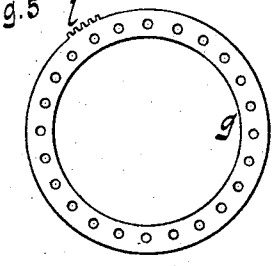


Fig. 2.

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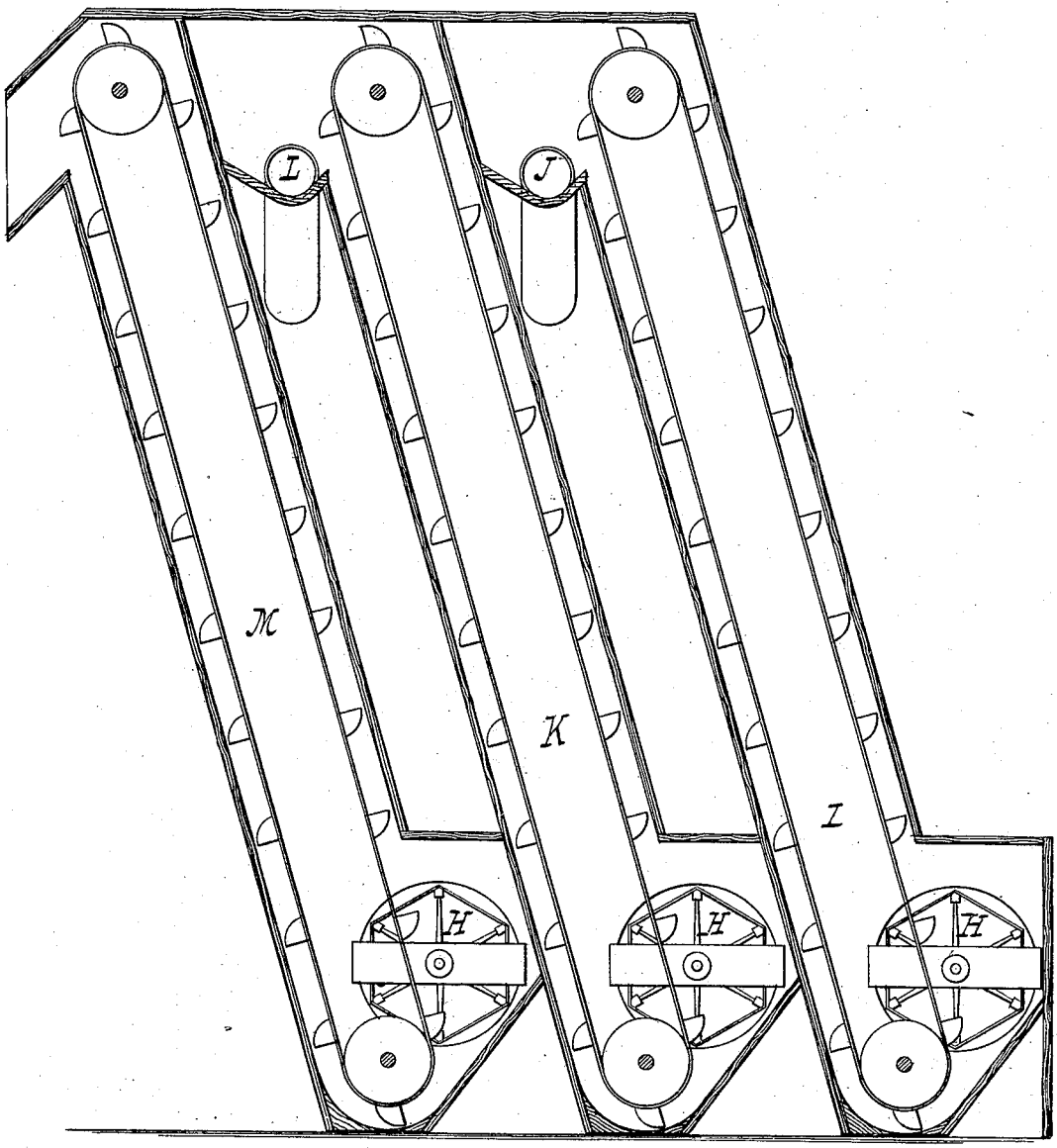
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Fig. 3.



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UNITED STATES PATENT OFFICE.

NATHLIÉ T. RYERSON, OF NEW YORK, N. Y., ADMINISTRATRIX OF VAN BUREN RYERSON, DECEASED; SAID ADMINISTRATRIX ASSIGNOR TO JOSEPH S. HALL, OF SAME PLACE.

MACHINE FOR REDUCING CEREALS, &c.

SPECIFICATION forming part of Letters Patent No. 368,900, dated August 23, 1887.

Application filed July 22, 1886. Serial No. 208,760½. (No model.)

To all whom it may concern:

Be it known that VAN BUREN RYERSON, late a citizen of the United States, residing at New York, in the county and State of New York, now deceased, did, during his lifetime, invent new and useful Improvements in Machines for Reducing Cereals and other Substances, of which the following is a specification.

This invention relates to an improvement in machines for reducing or pulverizing cereals, ores, &c., by which the grain or particles of ore or other material are reduced by attrition upon each other, as described in Letters Patent No. 189,959 granted to Van Buren Ryerson, now deceased, April 24, 1877; and it consists of certain novel features of construction and combination of parts, fully pointed out in the following specification and claims, and illustrated in the accompanying drawings, in which—

Figure 1 represents a part-sectional side view of the machine. Fig. 2 is a part-sectional end view. Fig. 3 is a section on the line *x x*, Fig. 2. Figs. 4 and 5 are details which will be described hereinafter.

Similar letters of reference indicate corresponding parts.

In the drawings, the letter A designates a table, upon which are mounted three independent metallic cases, B C D, provided with hoppers *a a' a²*. In each of these cases is journaled a shaft, *b*, which carries a disk, E, and to which a rotating motion is imparted by means of the pulleys *c*, Fig. 2. I have shown but one of these disks E, having beaters *d*, in Fig. 1, since the section is taken for convenience of illustration and for the purpose of more fully showing the construction in different vertical planes.

The disks E carry four beaters, *d*, the outer face of each of which is ratchet-dressed, while the radial face is smooth. The inner peripheries of the cases are dressed in the same manner as the outer peripheries of the beaters, except that the angle of the dressing on the beaters is the reverse of that on the inner peripheries of the casings.

When each disk E, with the beaters *d*, is revolved at a high rate of speed, it causes a rotation of the air in the central body of the case, and also produces a reactionary effect upon the belt of air lying between the path of revolution of the upper faces of the beaters and the dressed surface of the inner periphery of the case.

The ratchet-dressing on both the beaters and the inner surface of the case is not intended for grinding, but for the purpose of presenting a succession of abrupt surfaces radial to the circle in which the belt of air revolves, which serve, by the impingement of this belt of air upon them, to break it into whirlpools or eddies. These eddies of air, while each revolves on its own axis, have also a path of revolution about a fixed center.

The material to be reduced is poured into the hopper *a*, from which it passes into the center of the case B on both sides of the disk E by means of the pipes *e*. At the instant it enters the case it flies out in radial lines toward the periphery of the case, and is there caught up by the revolving belt of air-eddies above described, and each particle is then rapidly reduced to powder by the violent attrition of the particles upon each other. The operation of the machine imparts to the particles a tendency to discharge at right angles to the plane of revolution through the port-holes *f* in the sides of the case. The size of the particles will depend upon the length of time that they are subjected to these air-eddies and attrition in the case.

The port-holes *f* in the ends of the cases, which open into chambers G, are covered by annular slides *g*, having holes of a like size and number with those in the ends of the case, and by moving each slide so as to partly close the port-holes the size of the particles driven out of the port-holes into the chambers G by the operation of the machine can be easily controlled. The slides *g* are supported between the walls of the casings and the annular chambers G, as shown in Fig. 2.

If desired, only a section of the case ends may be provided with port-holes covered by slides of corresponding length, or the slides may be made in sections and operated sepa-

rately. The slides may also be dispensed with altogether, and port-holes of different sizes may be formed in the different cases. When this is done, the largest port-holes would be put into the first case, smaller ones in the second, and the smallest in the last case of the series.

The annular slides *g* may be operated in any convenient manner; but it is preferred to use gear-wheels *h*, Fig. 1, carried by shafts *i*, and meshing with a toothed section, 1, on the annular slides *g*. (See Fig. 5.) Upon each shaft *i* is mounted a lever or finger, *m*, Fig. 1, which also serves as an index, and travels over a graduated arc indicated on the outer walls of the annular chambers G, whereby the position of the rings relatively to the walls having ports *f* is easily determined. It will be seen that by the adjustment of these slides the ports *f* may be diminished in size according to the circumstances of each case. The gear-wheels *h* may be mounted in semicircular extensions of the casings B C D, as shown in Fig. 1.

The particles after leaving the case B are carried by the annular chambers G and tubes G′, leading from said chambers, to a bolting-reel, H, where the finer particles are separated from the coarser, the latter dropping from the bolting-reel into the path of an elevator, I, which carries them up and discharges them into a pipe, J, leading into a hopper, *a′*, on the case C. This case is in all respects like case B, except that the disk carrying the beaters revolves at a somewhat greater speed. From this case it passes in a like manner to the elevator K, by which it is carried through the pipe L into the case D, in which the disk revolves at a still greater speed. Another elevator, M, is provided when it is desired to carry the particles into some other machine.

When cereals—wheat, for instance—are reduced by this machine, the passage of the same through the various cases, with disks running at increasing speeds, will result about as follows: The wheat-berries upon being introduced into case B are broken into two pieces and thoroughly scoured, the dirt being taken out of the crevices in the kernels and the fine "fuzz" on their ends removed. The port-holes in this case are opened wide to accomplish this. About two per cent. of flour is made, which bolts out with the dirt and fuzz. The broken and cleaned kernels are then elevated by the elevator I and discharged into the case C, the port-holes therein being set closer than in case B. About fifty per cent. of middlings and about five per cent. of flour are made in case C, and the flour will be very fine, white, and good. This flour is bolted out, and what runs over the end of the bolting-reel—middlings and bran—is carried by elevator K into case D. The port-holes in this case are set closer still, and all that remains is reduced to flour and fine middlings. Five per cent. of flour is made, which is bolted out. The bran and middlings which are then left are bolted, the bran being separated from the middlings, and the latter are purified and carried by the elevator M into another machine, which completely reduces them to flour.

By the construction herein described the amount of work required of each case is accurately controlled, and the material which has passed through the first case has the particles which are of the required fineness taken out or separated before passing it into the next case, which it will enter clean and free from dust. The operation of each case is independent of the others, and the particles sufficiently reduced by it are deposited in the bolting-case and not passed through the next case.

What is claimed as new, and desired to be secured by Letters Patent, is—

1. The combination, with a series of casings, B C D, each having ports *f* and provided with semicircular extensions, of annular slides *g*, having toothed sections *l* and provided with openings which may be caused to register with the ports *f*, the gear-wheels *h*, mounted in the extensions of the casings and meshing with said toothed sections *l* of the slides *g*, and chambers G, communicating with the ports *f*, substantially as described.

2. The combination, with the case B, having ports *f* in its end walls, and provided with an extension upon one side, of the disk E, having beaters *d*, the annular slides *g*, having openings which may be made to register with the ports *f*, and provided with toothed sections *l*, the gears *h*, mounted on a shaft lying in the extension of the casing B and meshing with said toothed sections *l*, and the index-finger *j*, mounted in the projecting end of the said shaft, a graduated arc being provided on the end of the annular chamber G, over which the end of the finger travels, substantially as described.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

NATHLIÉ T. RYERSON, [L. S.]
Administratrix of the estate of the late Van Buren Ryerson.

Witnesses:
W. HAUFF,
E. F. KASTENHUBER.