

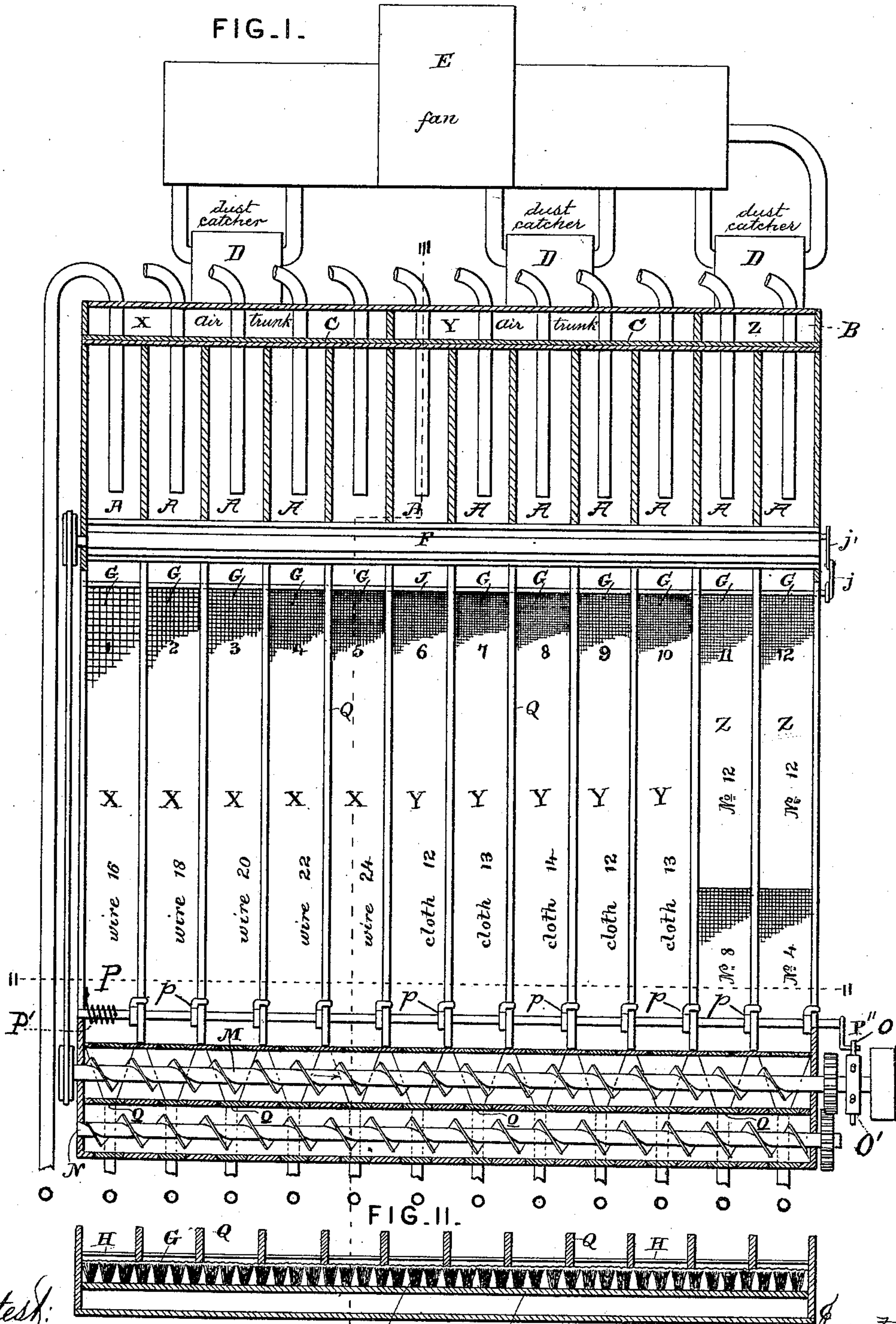
(No Model.)

3 Sheets—Sheet 1.

J. M. CASE.
FLOUR BOLT.

No. 429,998.

Patented June 10, 1890.



Attest:

Geo. T. Smallwood.
J. M. Hopkins.

Inventor:

John M. Case.
By Ingham & Co. attys

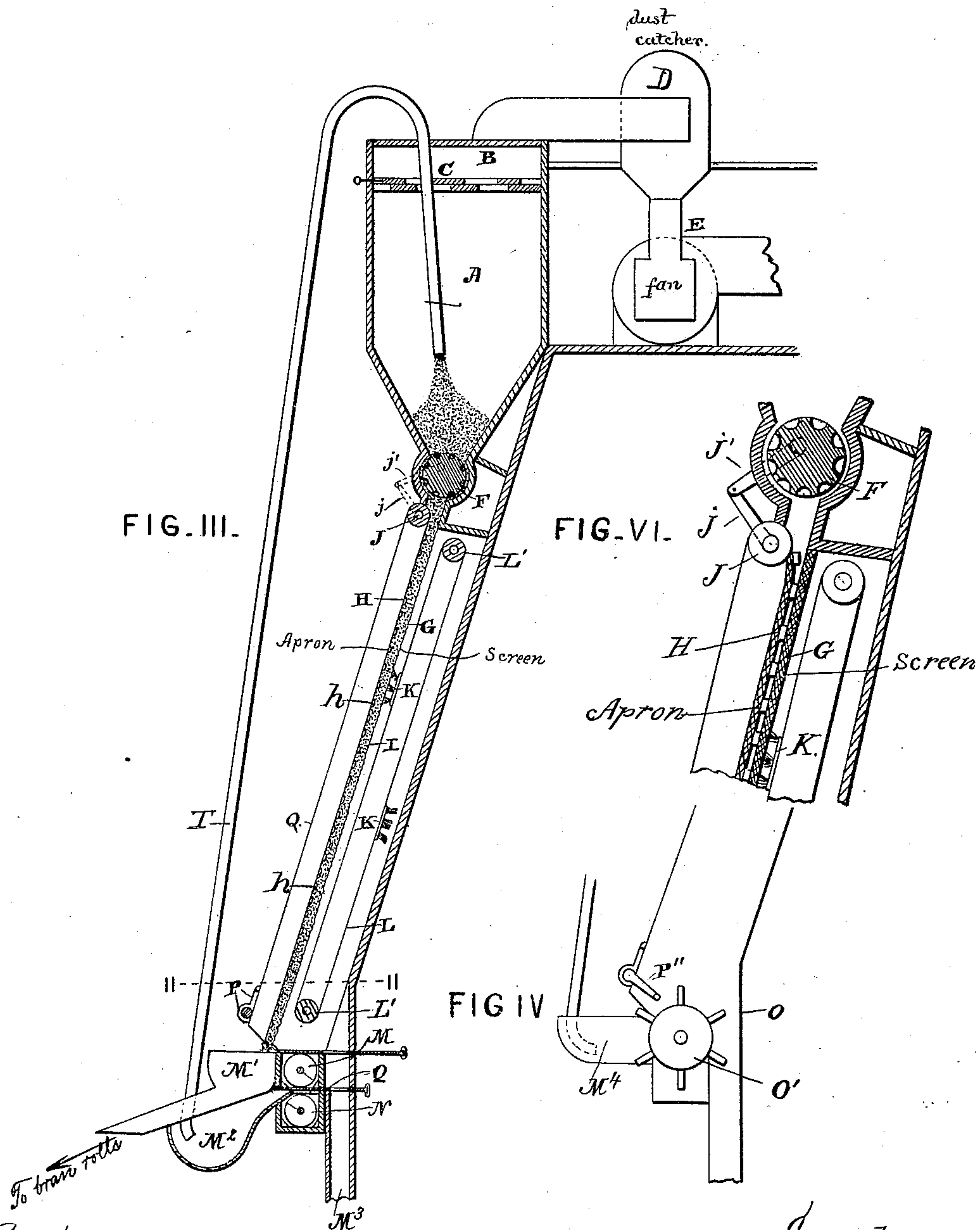
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FLOUR BOLT.

No. 429,998.

Patented June 10, 1890.



Attest

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(No Model.)

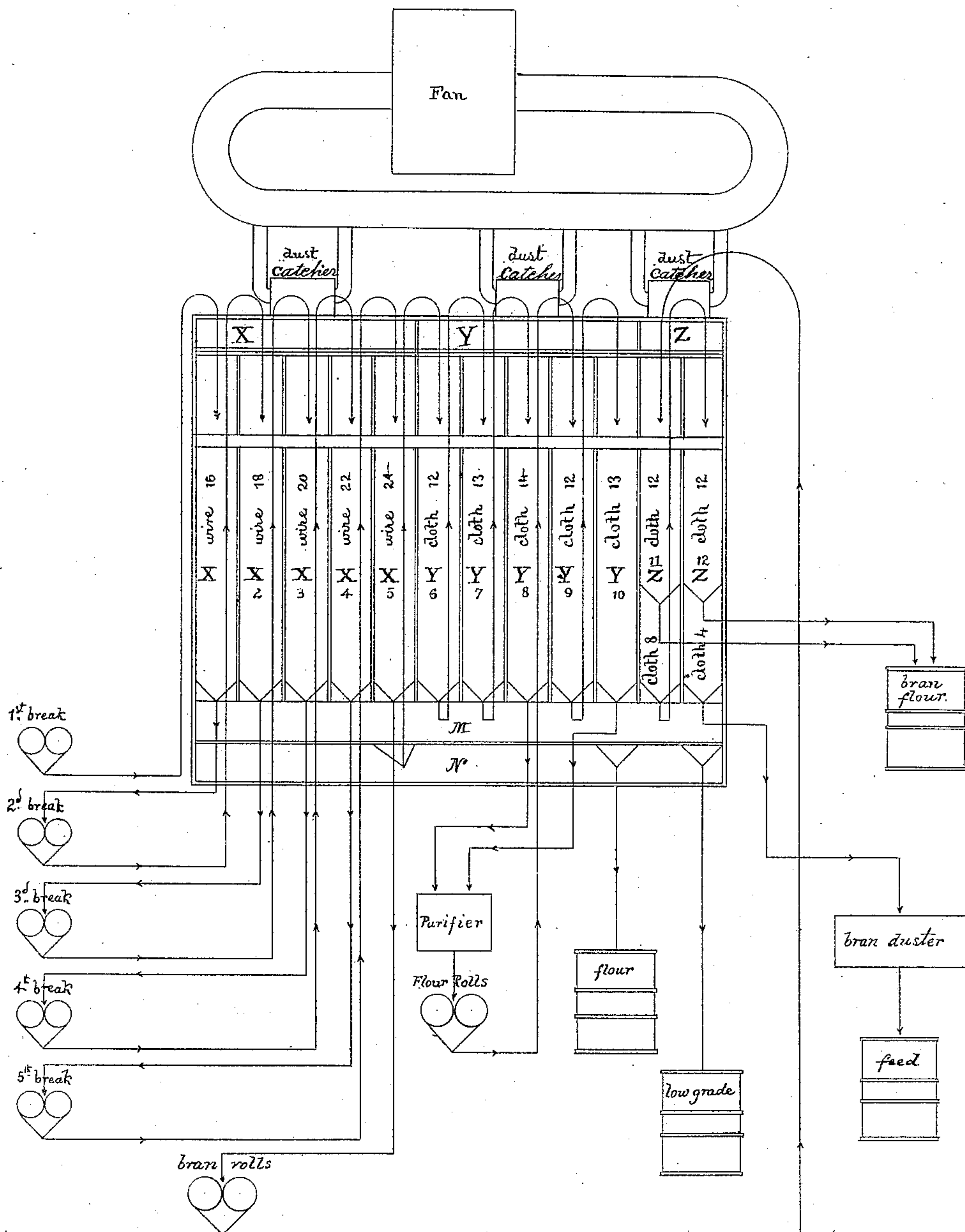
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FIG. V.



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Inventor:
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By Knight & Sons Attys

UNITED STATES PATENT OFFICE.

JOHN M. CASE, OF COLUMBUS, OHIO, ASSIGNOR TO THE CASE MANUFACTURING COMPANY, OF SAME PLACE.

FLOUR-BOLT.

SPECIFICATION forming part of Letters Patent No. 429,998, dated June 10, 1890.

Application filed March 3, 1886. Serial No. 193,881. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. CASE, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Flour-Bolts, of which the following is a specification.

My present invention relates to bolts for gradual-reduction milling which are adapted to treat all the products of the grain in the several stages, and has for its object to provide means for treating all the different kinds of material and with the aid of suitable rolls reducing them by successive steps into flour and bran-flour of different grades.

To these ends the invention consists in a large bolt divided into a number of sections (preferably three) provided with independent air-trunks and dust-catchers and a single fan, each section being subdivided into a number of compartments having independent settling-chambers, said compartments being clothed with material of different-sized mesh and having reciprocating endless floating aprons throughout their length and communication with graded break-rolls, the upper and lower side of the tail of the last middlings-compartment having communication, respectively, with bran-rolls and the head of the flour-section. Pneumatic elevators are used in connection with the air-trunks and settling-chambers for passing the material from point to point. The bolt is designed and well adapted to do the bolting of the whole mill, and may be of any height and any number of compartments, for which purpose it may extend up through one or more floors of the building.

In the accompanying drawings, Figure I is a sectional elevation of the improved bolt. Fig. II is a horizontal section thereof on the line II II, Figs. I and III. Fig. III is a vertical section on the line III III, Figs. I and II. Fig. IV is an elevation of the knocking device. Fig. V is a diagram illustrating the entire system for gradual-reduction milling. Fig. VI is an enlarged detail view illustrating the means for hanging the endless apron.

X Y Z represent different sections of the

bolt, each of which is divided by suitable partitions Q into a number of sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12, clothed with material of different-sized mesh, as represented in the drawings.

A represents settling-chambers, B air-trunks communicating therewith, and C valves for controlling the communication.

D represents dust-collectors connected to the air-trunks by means of pipes and to an exhaust-fan E in a similar manner. This single fan acts upon all the settling-chambers and dust-collectors.

F is a feed-roller fitted snugly in the bottoms of all the settling-chambers A and provided with suitable cavities forming pockets into which the material settles to be passed around and deposited in a chute or spout below without permitting the passage of air through said chute.

G represents the bolting-cloth, which varies in material and size of mesh according to the work it is to perform.

P represents a transverse shaft journaled in the partitions and extending through all the compartments. This shaft is provided with a crank-arm P'' on one end and suitable knockers p throughout its length in proper position to be intercepted by the partitions. A spring P', secured at one end to the bolt and coiled and secured at the other upon the shaft P, serves to hold the knockers normally against the partitions and to return them with a jar when they are removed by rotation of the shaft. To cause rotation and release of the shaft at regularly-recurring intervals, a spur-wheel O, adapted to engage the crank-arm P'' and driven by the machine, is provided.

It will be observed that the bolt herein illustrated is placed in nearly a vertical plane, so that the material placed upon it gravitates toward the lower end without the aid of shaking action. To retard the material in a measure and to keep it into more intimate contact with the bolting-surface, I provide endless floating flexible aprons H, of canvas or similar material, suspended at top only and resting throughout the length of each bolt

upon the cloth, so as to keep up a uniform pressure upon the material during its entire passage over the bolts. Though plain canvas produces good results, to increase the retarding action of these aprons transverse strips *h* are attached to each, and to increase their effect upon the bolts a reciprocating motion is imparted to the aprons by means which will now be described with reference more particularly to Fig. VI.

J is a roller or shaft from which the apron is suspended, journaled in the partitions of the bolt and extending across all the compartments. To this shaft is imparted an oscillatory motion by means of a long crank-arm *j*, connected eccentrically to the before-mentioned feed-roller *F* by means of a pitman *j'*, the length of the pitman and crank-arm being such that the shaft will not be completely rotated. It will therefore be observed that the aprons will greatly increase the capacity of the bolts by retarding the material and rubbing it through.

To remove the material from the under side of the bolts, I provide endless belts *L*, traveling over stretching and drive rollers *L'*, and provided with cleaning-brushes *K*, which move downward over the under faces of the bolts.

As will appear from Figs. III, IV, and V, the material after being delivered into the first break-rolls passes up by pneumatic elevator to the first compartment of the middlings-section. The material then passes successively over each compartment of the middlings-section, being treated each time by a different pair of rolls until the last compartment is reached, when the tailings pass off through receptacle *M* to bran-rolls. In the meantime all the middlings passing through the respective compartments pass into the upper conveyer *M* and are collected in a receptacle *M*² at the last middlings-compartment, whence it is elevated by a pneumatic tube *T* and deposited into the first compartment of the flour-section, to be elevated as described. In passing through the flour-section the middlings are sifted in several compartments successively before being passed to the flour-rolls, after which the tailings pass to the flour-rolls, and thence after being ground to the succeeding compartments of the flour-section, and any material passing off as tailing from the last flour-compartment is returned to the rolls, and after being ground again passed over the flour-screens until all the middlings are reduced to flour. Before passing to the flour-rolls all material passes through a middlings-purifier. In the bran-section the tailings from the last middlings-compartment are treated after passing through the bran-rolls. The product of the bran-rolls passes over the screens in the bran-section, and, being in the meantime thoroughly dusted, is finally separated into bran flour and feed.

The arrangement of the compartments may

be altered at will and the material operated upon in a variety of ways.

It will be seen that the herein-described apparatus is very effective and economical, requiring but one fan, one feed-roller, and one conveyer.

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

1. The combination of a bolt inclined nearly to vertical position and an endless flexible floating apron attached at top, free at bottom, and resting uniformly against the entire length of the bolt, whereby the material is retarded and held into close contact with the bolt uniformly throughout the length of the bolt, as explained.

2. The combination of an inclined bolt, a floating apron suspended over and resting upon the bolt, and means whereby a reciprocatory movement is produced between the apron and bolt, as and for the purpose explained.

3. The combination of a bolt, an apron resting upon the bolt, and an oscillating shaft to which the apron is connected and whereby the apron is moved relatively to the bolt.

4. The combination of a bolt, a reciprocating apron resting upon said bolt, and transverse strips secured to said apron, as and for the purposes explained.

5. In a gradual-reduction machine, the combination of a bolt divided into a number of sections for the respective products of the grain to be reduced, each of which sections comprises a graded series of independent bolting-compartments, a graded series of rolls for each section designed to treat successively the products of the respective sections, communication between the respective compartments and the corresponding rolls, and communication between the tailing of each section and the head of the next, all substantially as set forth.

6. In a gradual-reduction machine, the combination of a bolt consisting of a middlings-section, a flour-section, and a bran-flour section, each of which sections comprises a graded series of compartments, a graded series of rolls for each section, having suitable head and tail connection with the corresponding compartments therein, communication between the opposite sides of middlings tailing and the heads of the flour and bran sections, respectively, and suitable outlets at the flour and bran-flour tailings, all substantially as set forth.

7. In a gradual-reduction system, the combination of the following elements, to wit: a flat bolt divided into three sections adapted for middlings, flour, and bran, each comprising a graded series of compartments, a graded series of break-rolls connected with the respective compartments of the middlings-section, bran-rolls connected with the bran-outlet of the middlings-section and tail-

ing into the bran-flour section, communication between the middlings-outlet and the flour-section, flour-rolls fed from the flour-section and tailing back into the same, suitable outlets for the flour and bran-flour, end-
5 less aprons located on the screen, and a feed-roller common to all the compartments and

connected to the aprons for moving them, substantially as set forth.

JOHN M. CASE.

Witnesses:

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C. N. SHOUGH.