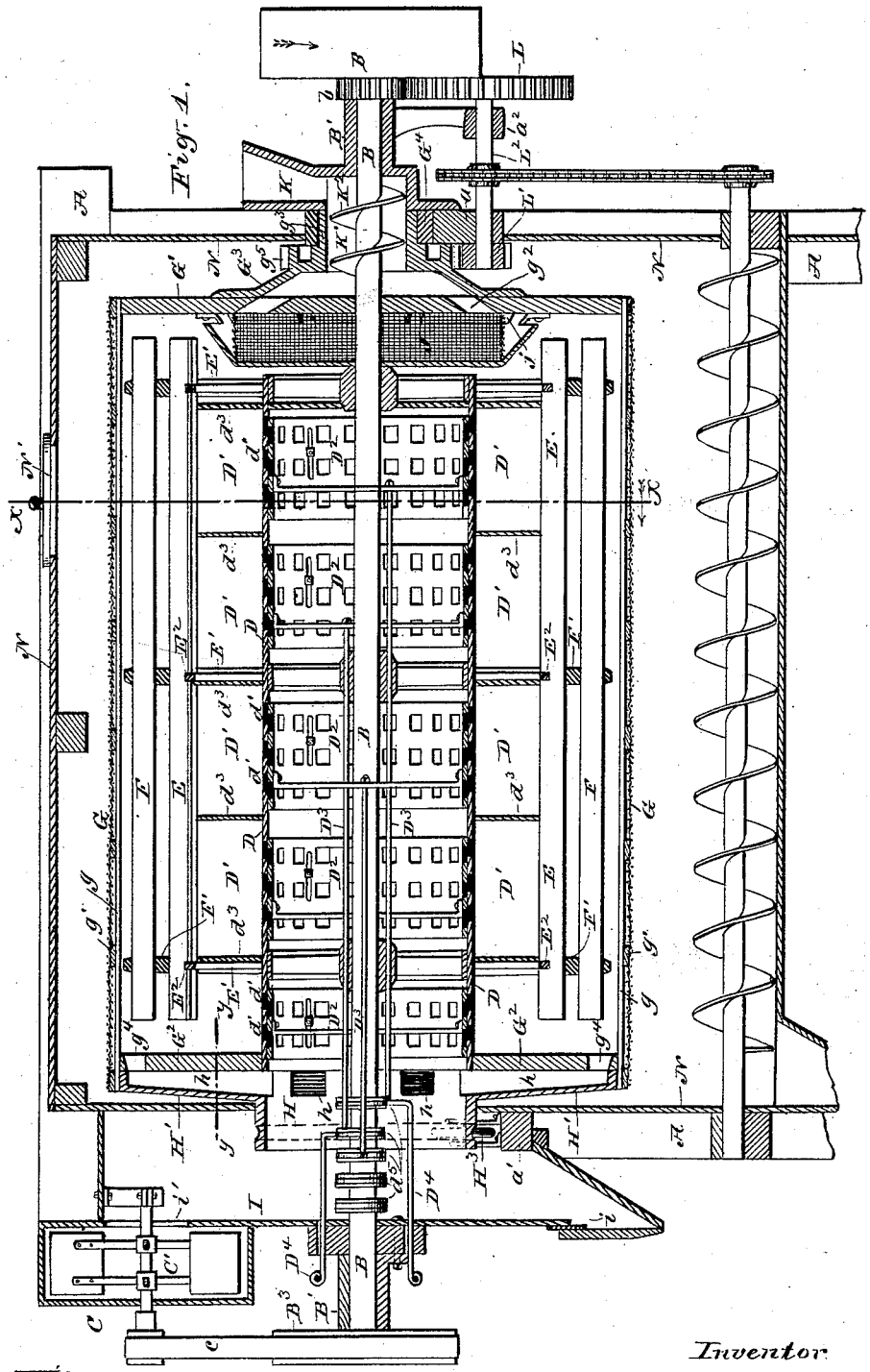
(No Model.) 3 Sheets—Sheet 1.

# W. E. GORTON.

## CENTRIFUGAL BOLTING MACHINE.

No. 302,480. Patented July 22, 1884.

Fig. 1.



Witnesses:
Jno. W. Stockett.
C. C. Poole.

Inventor
William E. Gorton.
by W. E. Gorton
Attorney

(No Model.) 3 Sheets—Sheet 2.

# W. E. GORTON.

## CENTRIFUGAL BOLTING MACHINE.

No. 302,480. Patented July 22, 1884.

Fig. 2.

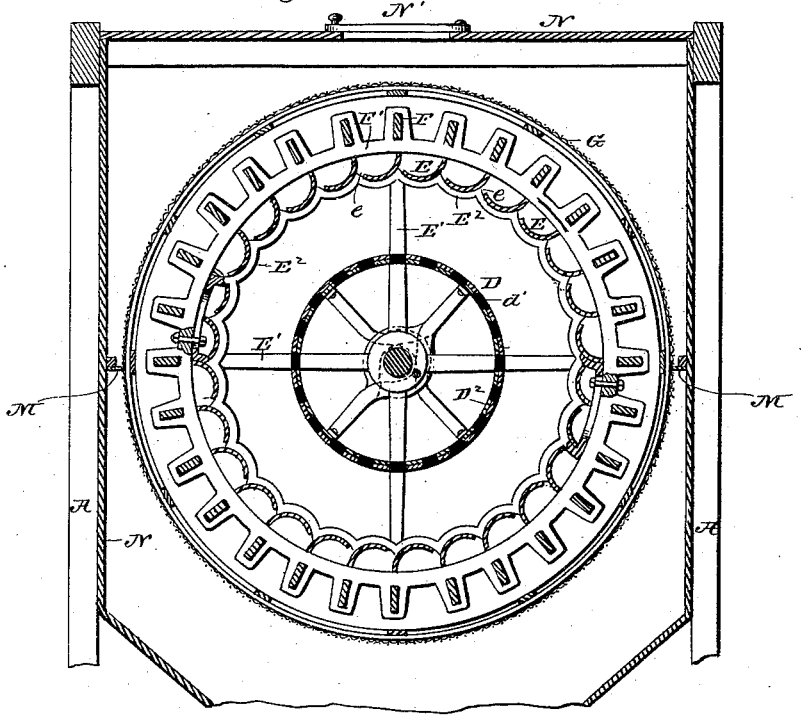
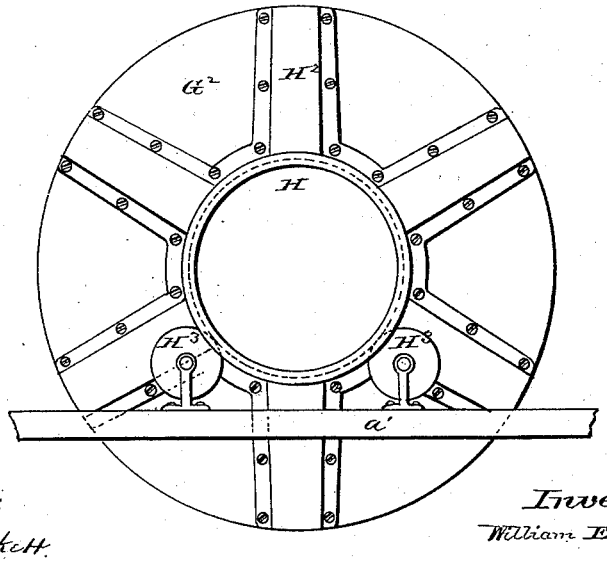



Fig. 3.




Witnesses:
Jno. W. Stockett
C. C. Poole

Inventor.
William E. Gorton
by W. E. Dayton
Attorney.

(No Model.) 3 Sheets—Sheet 3.

# W. E. GORTON.

## CENTRIFUGAL BOLTING MACHINE.

No. 302,480. Patented July 22, 1884.

*Fig. 5.*

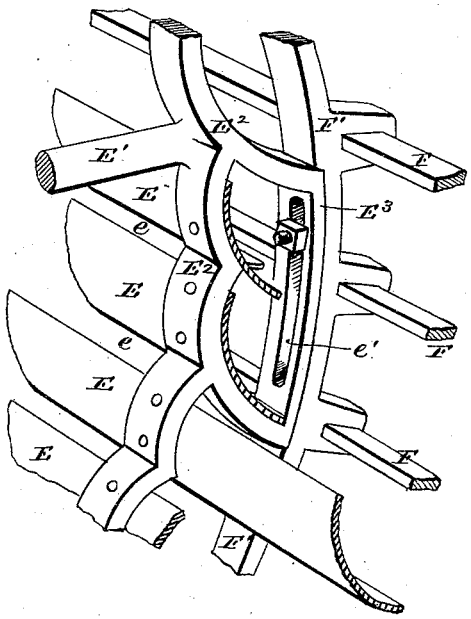
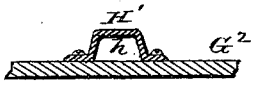



*Fig. 4.*




Witnesses.
Jno. W. Stockett
C. C. Poole

Inventor:
William E. Gorton
by W. E. Dayton
Attorney.

# UNITED STATES PATENT OFFICE.

WILLIAM E. GORTON, OF CHICAGO, ILLINOIS.

## CENTRIFUGAL BOLTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 302,480, dated July 22, 1884.

Application filed January 3, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM E. GORTON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Centrifugal Bolting-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of reels for bolting flour and middlings which are known as centrifugals or centrifugal reels. It has for one of its principal objects to provide a construction whereby, in the operation of bolting, the lighter and feathery or fluffy materials may be withdrawn from the mass being operated upon without also carrying off material that should be retained. Another object is to prevent obstruction of the meshes of the bolting-cloth, and still another to improve the action of the bolting-cloth in its lower portion.

To these and other ends that will further appear the invention consists in the matters hereinafter set forth, and pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of a centrifugal reel containing my improvements. Fig. 2 is a transverse section through *x x* of Fig. 1, looking in the direction indicated by the arrow *x'*. Fig. 3 is a view of the rear end or head of the reel having a portion of the outer hub-casting thereon broken away. Fig. 4 is a transverse section of the walls of one of the radial passages in the rear head of the reel, taken at *y y* of Fig. 1. Fig. 5 is a detail.

My invention is adapted to either horizontal or vertical reels, but is herein illustrated as applied to one of the former class.

To first describe the particular construction, which is shown in the drawings as one practical embodiment of my invention, A is a frame of any form suitable for the purpose of properly supporting the working mechanism.

B is the axial shaft of the reel or flyer, mounted in bearings B' B'.

$B^2$ is a driving-pulley fixed to said shaft.

C is a suction-fan driven from the shaft B by a belt, *c*, trained over the pulley $B^3$ on shaft B.

D is an apertured cylinder or drum, supported from the shaft B by means of open supports *d*, and having its interior in communication with the fan C.

E E are a series of longitudinal shelves or troughs, supported from the shaft B by arms E', terminating in scalloped rims $E^2$, which conform to the sectional shape of the troughs. The purposes of these troughs will appear hereafter. They rise at their rear edges (reference being had to their direction of motion) to a common circle, and at their front edges approach the adjacent troughs at a less distance from the axis of the reel, as more plainly indicated in Figs. 2 and 5, leaving long and narrow spaces or slits *e e* between each two adjacent ones.

F F are beater-blades secured upon two or more movable rings, F', which are bolted to slotted extensions $E^3$ of the scalloped rim $E^2$, as best shown in the detail, Fig. 5. By sliding the rings F' in the direction of the slots *e'*, any desired inclination or obliquity may be given to the blades F.

G is the bolting-cloth, sustained by longitudinal ribs *g* and circumferential ribs *g'*, attached to the heads G' $G^2$. The head G' at the receiving end of the machine is provided with a series of inlet-passages, $g^2$, (or it may be opened at the center,) and is supported by a conical casting, $G^3$, secured to the head outside the passage $g^2$. On said casting $G^3$ is formed a hollow trunnion, $g^3$, which surrounds the shaft B and runs in a bearing, $G^4$, mounted on a frame-piece, *a*.

Upon the inside of the head G' is secured a screen, J, of wire-cloth or other suitable material, which embraces the inlet-openings $g^2$, and forms a chamber through which the material fed to the machine must pass to the bolt, its object being to arrest dough-balls and other matters that should be excluded from the bolt.

Exterior to the hollow trunnion $g^3$ is placed the hopper K, which is shown as being of the same casting with the adjacent shaft-bearing B', but which may be made otherwise, if preferred. Said hopper communicates with the interior of the trunnion $g^3$, as shown, and within the central chamber, K', thus formed, the

shaft B is provided with the feed-worm $K^2$ of the usual construction, and for the usual purpose of carrying material horizontally from the hopper to the bolt. The opposite head, $G^2$, is annular in form, and at its inner periphery closely approximates the drum D. It is supported by a casting, H, having radial hollow arms H′, and a central large hollow hub or trunnion, $H^2$, resting on rollers $H^3$, which are mounted upon a transverse frame-piece, $a'$. The arms H′ afford passages $h$, which are placed in communication with the openings $g^4$ through the head $G^2$ at its outer margin, and form, in connection therewith, bent passages connecting the interior of the reel with the interior of the hub H.

I is a chamber in communication with the suction-fan and with the interior of the bolt and the drum D through the trunnion $H^2$. It is provided with a hinged valve, $i$, at its lower end for the discharge of the tailings. The drum D is provided throughout its length with numerous openings, $d'$ $d'$, distributed over its surface, which openings are large enough to allow a free passage for a large volume of air and those light and feathery particles commonly present in the unbolted mass of flour or middlings. The space immediately surrounding the drum is divided into chambers D′ D′ by means of annular diaphragms $d^3$, said chambers corresponding, preferably, with the divisions of the exterior bolting-cloth G into sections of unequal mesh or fineness when the bolting-cloth is so constructed. Within the drum D are placed a number of cylindric registers, $D^2$, fitted to the interior of said drum, but adapted to slide freely therein. These registers are apertured at $d^2$ to coincide with the holes $d'$ in the drum, so that by a movement of the registers the said holes $d'$ may be opened or closed to any desired extent. The registers are shown as having a movement longitudinally of the drum, and they are operated from the exterior of the machine by rods $D^4$. For this purpose interior rods, $D^5$, are provided, each of which connects at one end with diametric arms $d^4$, secured to one of the registers, and at the other with one of a series of sliding collars, $d^5$, surrounding the shaft B near the rear end of the machine. The rods $D^4$ are forked or otherwise constructed to engage peripheral grooves in the collars $d^5$, and are supported in passages made for them through the cross-piece $a'$ of the frame or otherwise.

The desired difference in speed between the bolt-frame and flier (the latter comprising the drum D, troughs E, and beater-blades F) is obtained by the following means: On the protruding end of the shaft B, at the head of the machine, is provided a pinion, $b$, and on the casting $G^3$ is formed or secured a circular rack, $g^5$. Motion is communicated from the pinion $b$ to the rack $g^5$ by means of a spur and pinion, L′, fixed to a shaft, $L^2$, suitably supported by the frame-piece $a$ and bracket $a^2$.

In a horizontal machine, as will be seen by reference to Fig. 2, longitudinal ledges M M are secured to the sides of the housing N, dividing the space within the housing and exterior to the bolt into two chambers, one above the other. The upper chamber is provided with a register, N′, and the lower one with a conveyer or other device or form of construction adapted to discharge the bolted material.

In the operation of a machine constructed as above described, it is evident that the suction-fan C will induce an air-current radially inwardly through the bolting-cloth, through the spaces between the beater-blades, through the slots or openings $e$ between the troughs E, through the apertures $d'$ of the drum D, and outwardly through the trunnion $H^2$ and discharge-chamber I to the fan-chamber. The object of this air-current is to separate and carry off the light and feathery substances hereinbefore referred to, to prevent their obstruction of the bolting-cloth G, and in some degree to counterbalance the force of gravity operating in the lower portion of the bolt to load the cloth and obstruct its meshes at this point. This last effect is obtained by the division of the space exterior to the bolt by partitions M and the provision of the register N′, as above pointed out, by which the air-draft through the several upper and lower parts of the bolt may manifestly be relatively controlled.

The construction shown is designed to withdraw the said light and fluffy particles without also carrying away the fine flour or middlings. To this end the shelves or troughs E are constructed and arranged to arrest and receive the denser material that fails to pass the meshes of the bolting-cloth at any one of the centrifugal impulses imparted thereto, when the same rebounds or falls from the cloth. In such inward radial movement of the flour or middlings, and because of the form of the troughs and their direction of motion, said flour or middlings will naturally strike the rear portions of the troughs, and owing to the outwardly and rearwardly inclined direction of said troughs, as viewed in Fig. 2, said material so arrested at once slides backward upon and is hurled outward by said rear and outer parts of the troughs. The slots $e$ for the passage of the fluffy material placed at the front edges of the troughs will, therefore, not afford escape or passage for the relatively dense flour or middlings, while if an air-current of sufficient strength be employed the said lighter particles may be drawn from the dissipated or flying mass and carried inwardly through said openings $e$. The division of the space surrounding the drum into chambers and the employment of several separately-operable registers $D^2$ within the drum enables the force of said air-current to be varied at different parts of the bolt, such regulation being commonly performed with reference to the relative closeness of mesh in the several

sections of cloth of which the bolt-clothing in this, as in bolts generally, is usually composed. In the lower portions of the horizontal form of the bolt such inward air-current will also operate to loosen the substance being bolted and lessen the accumulation of material and to prevent obstruction thereby at this part of the bolt.

It will be observed that the primary and essential elements of a machine for the principal purposes of my invention are a bolting-cloth, beaters or equivalent devices for producing centrifugal action, a suction-fan or similarly-operating means constructed to produce an inward air-current, and means for arresting the middlings and flour while allowing the lighter substances to pass, by reason of their greater subjection, to the action of the inward air-current. As these and subordinate effects sought by my invention may be produced by other devices than those illustrated and above specifically described as forming one practicable means for carrying out my said invention, I wish it to be understood that I am not limited to said special devices.

It is particularly evident that my general invention may be applied in a centrifugal bolting-machine having a vertical axis, and that in this case the inward air-current will prove an important auxiliary centripetal force operating to aid the inward rebound of the middlings and flour from the cloth equally at all points thereof. It is also evident that in either form of bolt the general effect of withdrawing the lighter substances may be effected without inducing the air-current through the bolting-cloth or bolt proper by admitting it at one or both ends of the bolt for this purpose. I prefer, however, to pass the said current exclusively through the bolting-cloth, both for the purpose of thereby clearing the meshes of the cloth and also of giving a substantially-radial inward direction to the air or one nearly the same as that taken by the material repelled from the bolt. It is further manifest that the rear walls of the troughs E may serve as beaters, to the exclusion of the outer series of beaters, F, and to this end the said rear walls of the troughs may be prolonged, if need be. The said outer series of beaters is not, therefore, essential to the operation of the invention, and I do not limit myself to a construction in which such separate beaters are used, except in the claims in which they are specifically mentioned. I prefer, however, to employ the outer and separate series of beaters, because they may be more readily adjusted to different inclinations for the purpose of varying the speed of passage from end to end through the bolt of the material being operated upon. The troughs E may be placed in contact with each other and apertured at their front edges, as the equivalent of the slits *e;* and, if necessary or desired, a second series of troughs or more than one series of such troughs, with suitable passages, may be arranged between the series shown and the drum D, for the purpose of more effectively arresting the middlings and flour, or more perfectly separating the fluffy substances therefrom. The shelves or troughs are not necessarily of the sectionally-curved form here shown, but may consist of flat boards or plates set at a rearward and outward inclination corresponding with the rear portions of the structures herein denominated troughs, the inclination being such as to produce the desired centrifugal action when revolved at a suitable speed. The openings through the drum may also be otherwise formed and registered than as illustrated without departing from my invention.

I claim as my invention—

1. The combination, with the bolting-cloth and means operating to produce an inward radial air-current, of a series of revolving shelves or troughs, constructed to arrest and throw outwardly the denser substances carried inward by such air-current and to allow the feathery substances to pass with the air, substantially as and for the purpose set forth.

2. The combination, with the bolting-cloth, revolving beaters, and means operating to produce an inward radial air-current, of a series of shelves or troughs constructed to arrest the middlings and flour and to afford passages for the air and lighter substances, substantially as described.

3. The combination, with the bolting-cloth, a series of revolving beaters, F, and means operating to produce an inward radial air-current, of a series of troughs, E, arranged inside the beaters F, said troughs being constructed with their rear walls relatively prolonged outwardly, and with spaces between them, substantially as described.

4. The combination, with the bolting-cloth, beaters, and means for arresting the inward radial movement of flour or middlings, constructed to afford passage for air, of an apertured inner drum, and a suction-fan communicating with the interior of the drum, substantially as described.

5. The combination, with the bolting-cloth, beaters, means for arresting the inward radial movement of middlings or flour, an inner apertured drum, and a suction-fan communicating with the interior of the drum, of means constructed to vary the size of the apertures in the drum, substantially as described.

6. The combination, with the bolting-cloth, beaters, means for arresting the inward radial movement of the middlings or flour, an apertured drum, and a suction-fan communicating with the interior of the drum, of two or more registers constructed to vary the size of the bearings in the drum, and annular partitions dividing the space exterior to the drum.

7. The combination, with the apertured drum D and registers $D^2$, within the drum, and shaft B, of rotating grooved collars $d^3$ on the shaft, rods $D^3$, connecting the registers

and collars, and rods $D^4$, engaged with the grooves of the collars, substantially as described.

8. The combination, with a horizontal bolt, reel, or flyer, the housing, and means constructed to produce an inward radial air-current through the bolting-cloth, of side partitions, M, and a registered opening in the upper part of the housing, substantially as described.

9. The combination of a centrally-apertured reel-head, $G^2$, constructed of wood and provided with marginal openings $g^4$ and an open metallic hub, H, formed with hollow radial arms H′, adapted to support the head $G^2$ and to form, in connection with the said head, bent passages *h*, connecting the interior of the reel with the interior of the hub, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WILLIAM E. GORTON.

Witnesses:

M. E. DAYTON,

OLIVER E. PAGIN.