

(No Model.)

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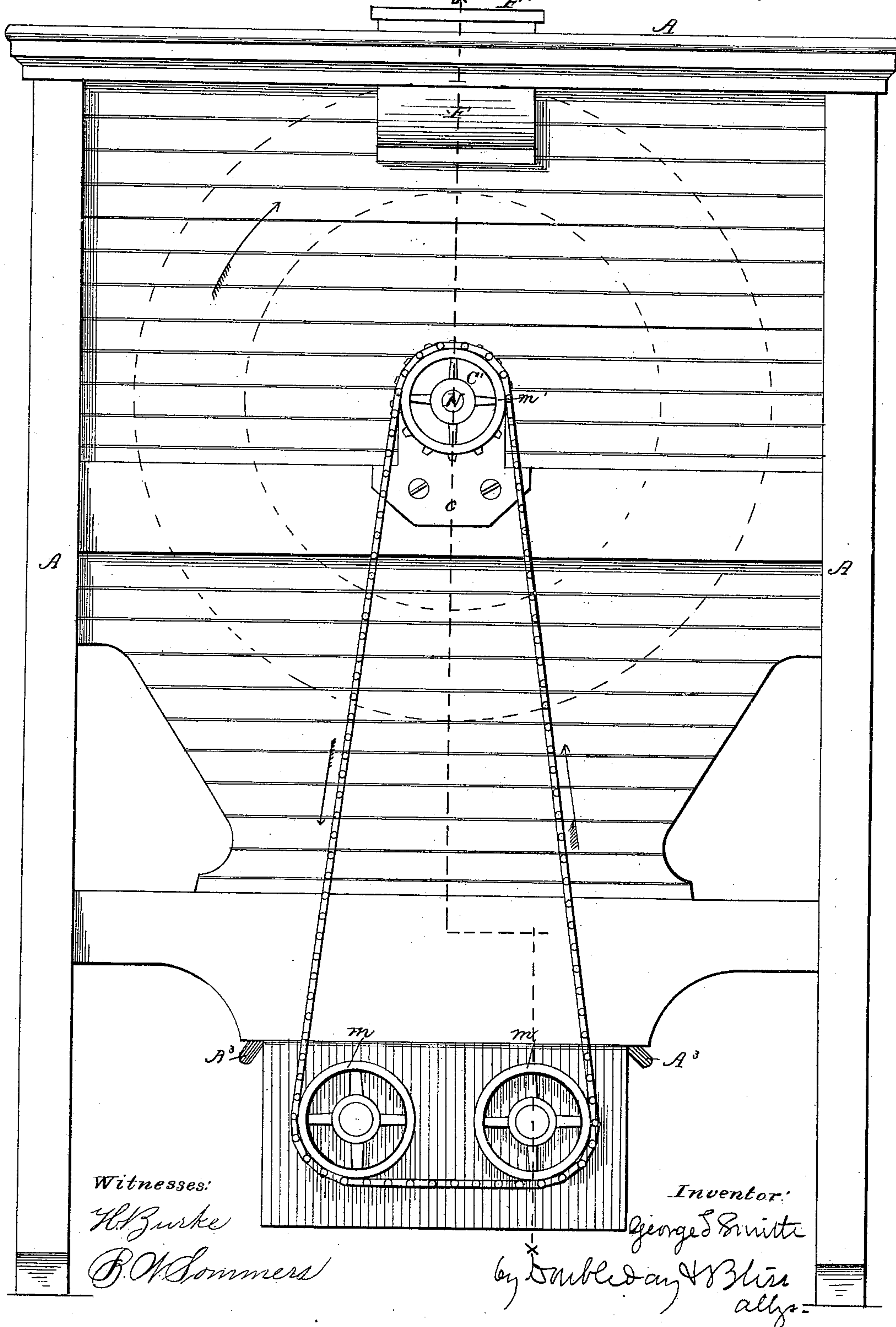
G. T. SMITH.

FLOUR BOLT.

No. 335,543.

Fig. 1.

Patented Feb. 2, 1886.



(No Model.)

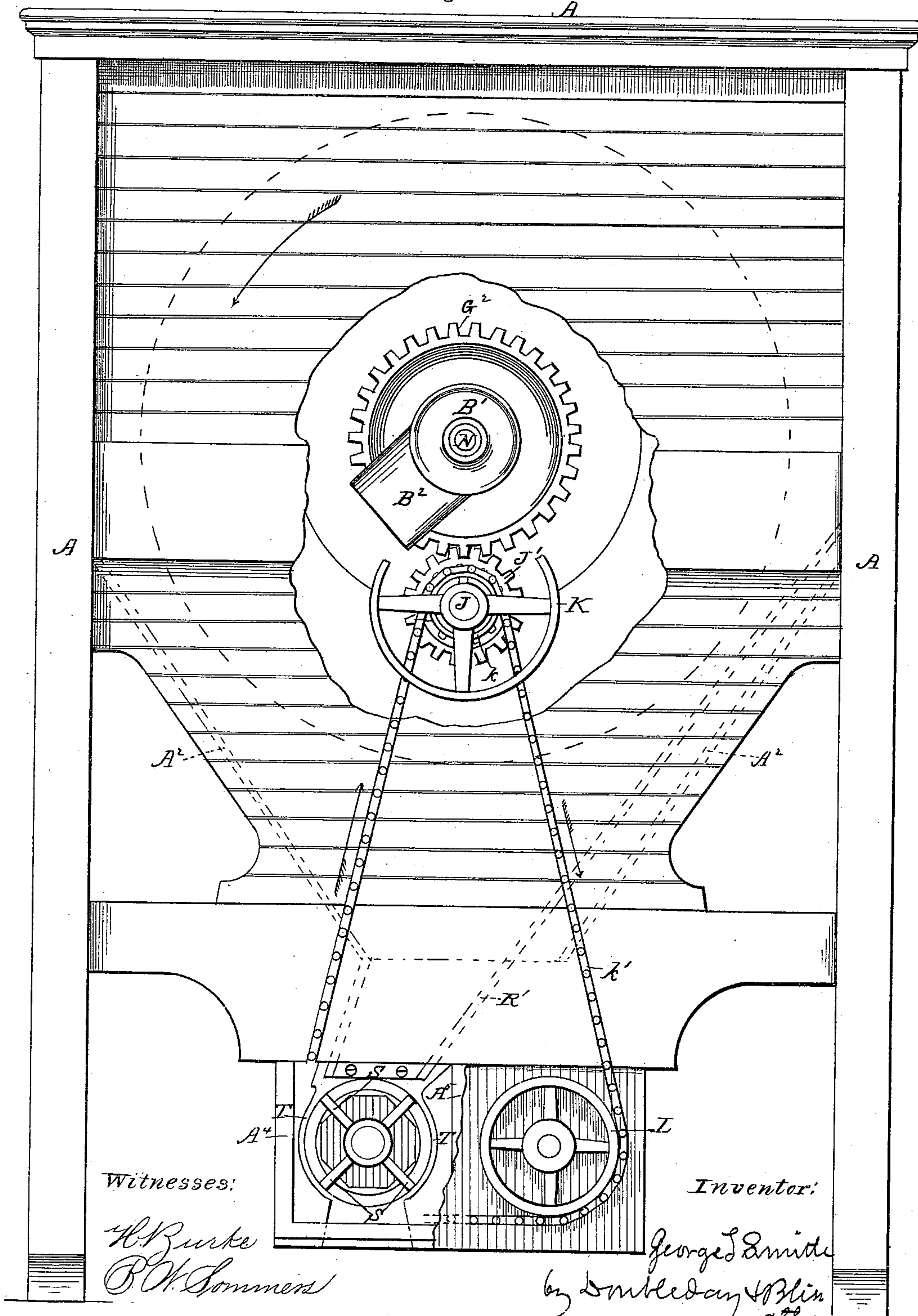
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FLOUR BOLT.

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Patented Feb. 2, 1886.

Fig. 2.



(No Model.)

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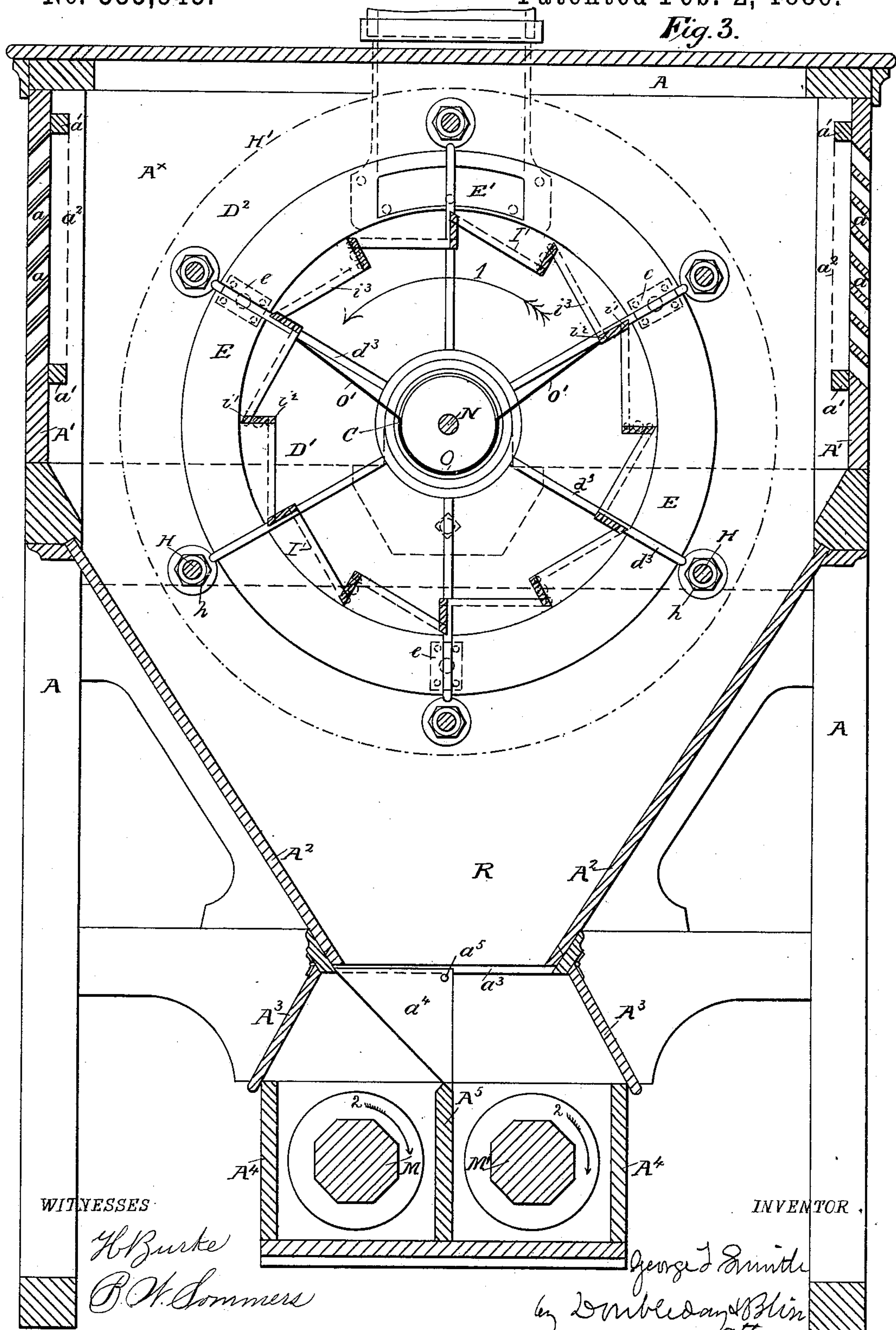
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Fig. 3.



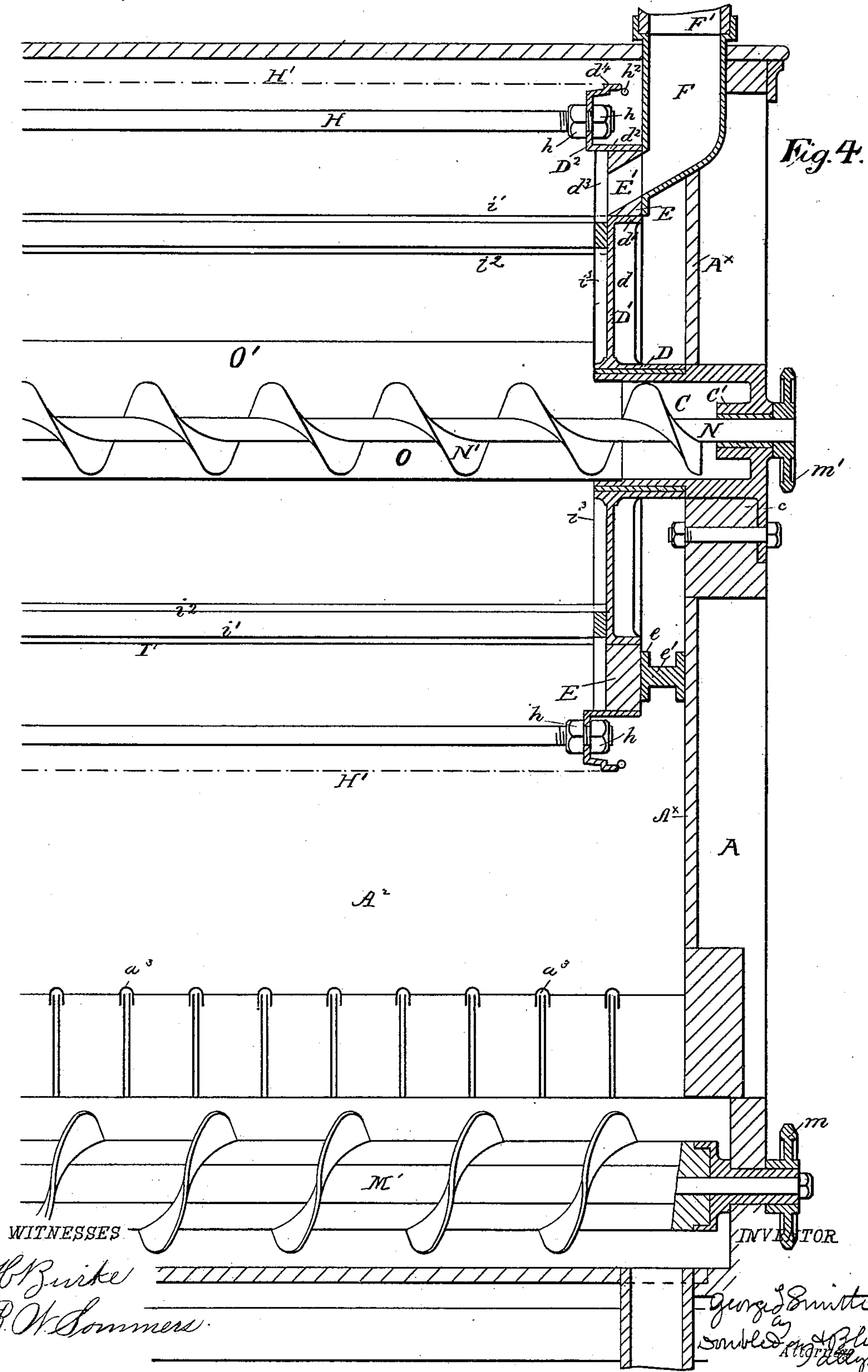
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(No Model.)

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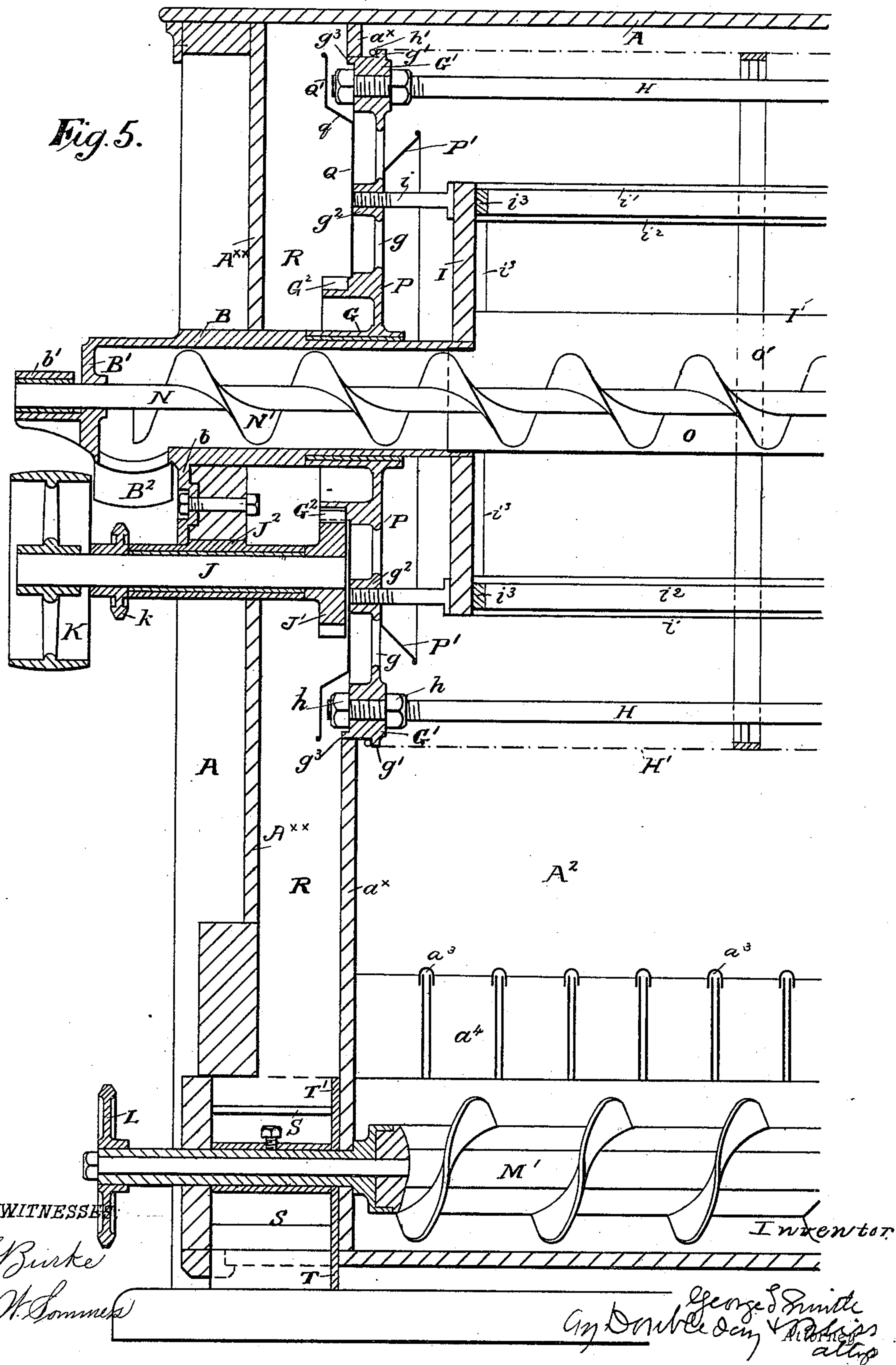
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Fig. 5.



(No Model.)

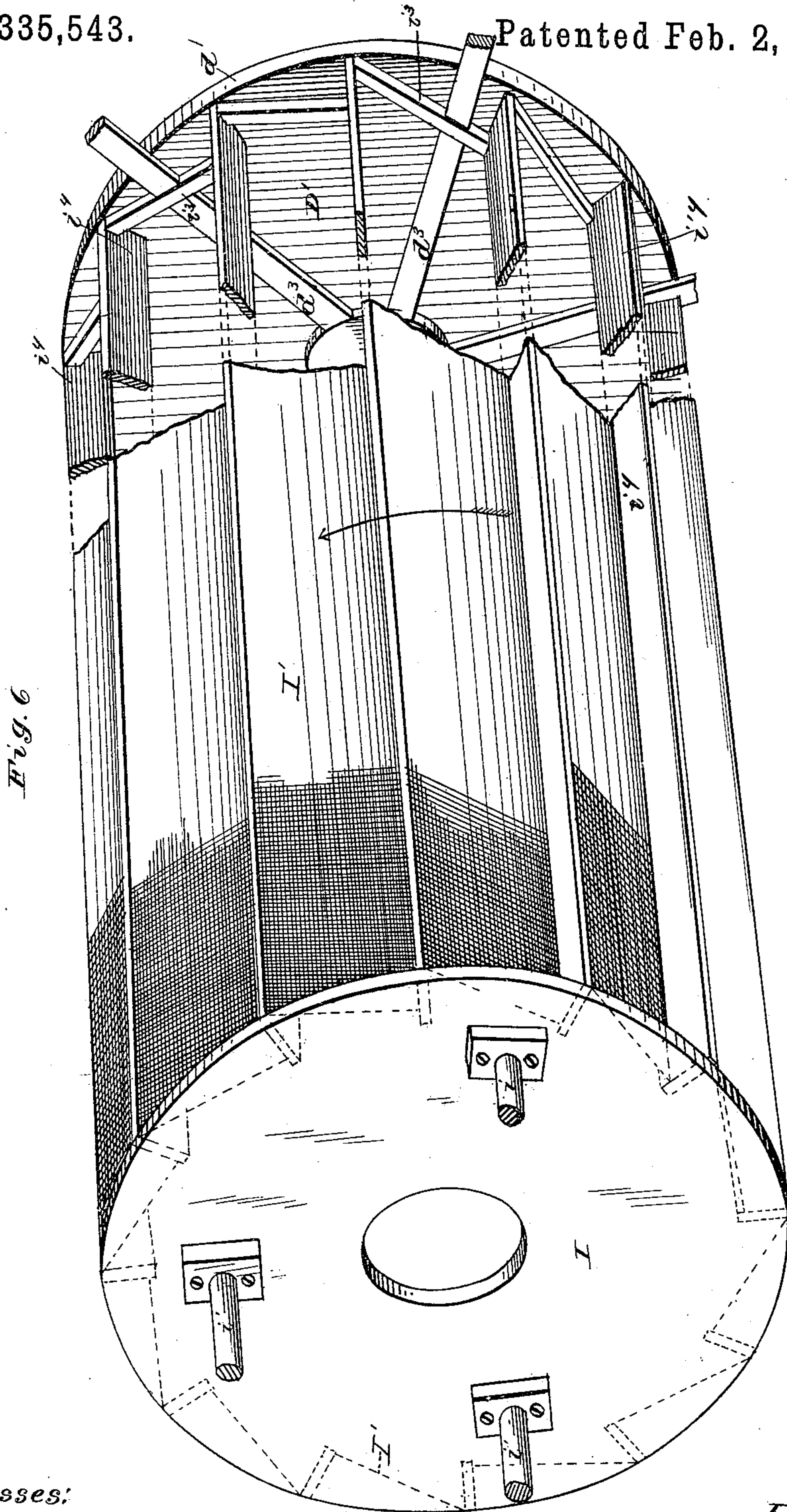
6 Sheets—Sheet 6.

G. T. SMITH.

FLOUR BOLT.

No. 335,543.

Patented Feb. 2, 1886.



Witnesses:

H. Burke
B. W. Sommers

Inventor:

George T. Smith
G. Lombard & Bliss attys

UNITED STATES PATENT OFFICE.

GEORGE T. SMITH, OF JACKSON, MICHIGAN.

FLOUR-BOLT.

SPECIFICATION forming part of Letters Patent No. 335,543, dated February 2, 1886.

Application filed May 22, 1884. Serial No. 132,438. (No model.)

To all whom it may concern:

Be it known that I, GEORGE T. SMITH, a citizen of the United States, residing at Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Flour-Bolts, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is an elevation of the front or receiving end. Fig. 2 is an elevation of the tail end or discharging end. Fig. 3 is a central vertical transverse section. Fig. 4 is a vertical central longitudinal section of the head end of the machine, taken on line *x x*, Fig. 1. Fig. 5 is a similar section of the remaining half of the machine, taken on the same line. Fig. 6 is a perspective view of the inner elevating and bolting reel, parts of the cloth covering being broken away.

Similar letters of reference indicate like parts in all the figures.

A A indicate generally the frame-work and deck of the casing.

A' *a* are the side panels, constructed with blind-slats, leaving throats or openings *a a*.

a' a' is a frame, and *a² a²* a bolt-cloth or other filtering-surface stretched upon the frame and secured to the inner wall of each of the panels A' *a* to ventilate the chest or casing.

A² A² are gather-boards forming a hopper-bottom below the reel.

A³ A³ are hinged doors connecting the lower edges or ends of the gather-boards with the side walls, A⁴ A⁴, of a conveyer-box, which is divided by a partition-board, A⁵, into two troughs.

a³ a³ are a series of transverse partition strips or rails, from which are suspended swinging vibrating chutes *a⁴ a⁴*, which are pivoted at *a⁵* in grooves or throats formed in the under sides of the partition-ribs *a³*.

The parts of the machine thus far described may be of the construction shown; or any other usual or approved form of chest or casing may be used, as the invention does not relate to the features so far described. Within this casing there is a rotating reel, which consists, essentially, of a reel-head formed in three concentric sections, the middle one of which is stationary, a spoked reel-head at the opposite end of the machine, stay-bolts or longitudinal bars con-

necting the reel-heads, cloth rings supported upon the stay-bolts or longitudinal bars, and a bolting-surface, preferably of silk. There is also an inner bolting and elevating reel, substantially concentric to the outer bolting-surface, and a conveyer within the inner bolting and elevating reel, as I will now proceed to describe; and wherever in this case the words "bolting surface" are used they refer to a finely-reticulated surface adapted for the sifting of flour or other finely-pulverized material.

B is a tubular sleeve or hollow trunnion, mounted upon a rear girt at the tail end of the bolt. By preference it is provided with a downwardly-projecting flange or web, *b*, which is bolted to the girt. The outer end of this tubular sleeve or trunnion is closed, as at B', except that it has a central opening to receive a conveyer-shaft, to be hereinafter described, and is provided with a downwardly-inclined discharge-spout, B².

C is a tubular sleeve or hollow trunnion, mounted upon a cross-girt at the head end of the bolt, and provided also with a downwardly-projecting flange, *c*, bolted to the girt, and with a closed end, C', which constitutes a bearing for the opposite end of the conveyer-shaft.

D D' D² is a reel-head, the sleeve D of which is mounted upon the inner end of the hollow trunnion C. The central closed or solid part, D', of this reel-head is provided with radial strengthening-ribs *d* and an outwardly-projecting flange, *d'*. The outer ring or flange, D², is connected with the sleeve D and circular solid part D' by means of radial ribs or spokes *d³ d³*, and is provided with sockets to receive the ends of the longitudinal bars, to be explained. This outer ring is also provided with outwardly-projecting flanges *d² d²*, there being an annular space between the flanges *d'* *d²* to receive the stationary ring E. This ring is attached to the end casing, A^x, by means of flanged standards *e e'*, (see Figs. 3 and 4,) and is provided with a throat, E', communicating with a feed spout or hopper, F, which communicates at its upper end with a spout, F', through which material is delivered to the interior. At the opposite end of the reel there is a head consisting, essentially, of a sleeve, G, mounted on the hollow trunnion, and an outer ring, G', connected by radial spokes *g g*.

g' is a rib upon the outer periphery of the

flange or ring G' of the head, and at $g^2 g^2$ there are bosses formed upon the spokes $g g$.

G^2 is an externally-cogged flange projecting rearwardly from the spokes $g g$ and concentric to the sleeve G .

$H H$ are longitudinal bars, having their ends supported in the flanges or rings $D^2 G'$ by means of adjusting-nuts $h h$, substantially as is customary in this class of reels, and, when preferred, cloth-rings may be mounted thereon to support the bolt-cloth H' . The ends of the bolt-cloth are turned over the ribs or flanges $d^4 g'$, and secured by means of tightening-rings $h' h^2$, which may be of any usual or preferred construction. Thus there is formed a reel having a bolting-surface with a spoked head at one end, and at the other end a head formed in three concentric sections.

Within the reel thus described there is a secondary or supplemental reel, constructed as follows:

I is a circular reel-head, mounted at the tail end of the machine upon the hollow trunnion, and connected with the reel-head $G G'$ by means of standards $i i$, which are screwed into the bosses $g^2 g^2$, the head I being secured to the flanged ends of these standards, as plainly shown in Fig. 5.

$i' i^2$ are longitudinal cloth-bars, arranged in two concentric circles, one end of each bar being supported upon the reel-head I , the opposite end of each bar being attached to the section D' of the reel-head at the other end of the machine.

$i^3 i^3$ are strips or cleats attached in zigzag lines to the inner surfaces of both the reel-head I and the part D' of the opposite reel-head by screws, bolts, or otherwise.

I' is a bolt-cloth tacked or otherwise attached to the longitudinal cloth-bars $i' i^2$ and ribs i^3 in zigzag planes, as is plainly shown in Fig. 3, by examining which it will be seen that while the inner reel has external angles it has also internal angles at the intersection or joining of the re-entrant planes of which the sides of the reel are composed; or, when preferred, sheets of wood, metal, or other material may be arranged on radial lines between each pair of adjacent bars $i' i^2$, although in practice I prefer to use a continuous cloth around the entire circumference of this inner bolt.

I am aware of United States Patent No. 299,790, N. W. Holt, and do not claim the construction therein shown; but his elevating-drum differs materially in its structure from mine in that, among other things, the Holt drum in cross-section presents external angles only, whereas my interior reel in cross-section shows not only external angles but internal ones, formed by the intersections of the planes in which the bolting-cloth is arranged. Further, my inner reel performs two separate and distinct functions—to wit, that of elevating material and that of bolting part of the material which is delivered to it. For this reason I propose to claim separately in some instances features of construction by which it is adapted

to perform one of these functions irrespective of its capability of performing the other.

J (see Figs. 2 and 5) is a short driving-shaft, carrying at its inner end a spur-pinion, J' , which meshes with the spur-gear G^2 , and is mounted in a bearing, J^2 , attached, by preference, to the under side of one of the cross-girts. Shaft J is driven by means of a pulley, K , which is belted to any convenient motor. This rotary motion is imparted to both reels in the direction indicated by the arrow 1, Fig. 3.

k is a sprocket-wheel connected by a driving-chain, k' , (see Fig. 2,) with sprocket-wheels $L L$ on the projecting ends of the shafts of conveyers $M M'$, and drive these conveyers in the direction indicated by arrows 2, Fig. 3.

$m m$ are sprocket-wheels at the opposite ends of the shafts of conveyers $M M'$, connected by a chain-belt with a sprocket-wheel, m' , on the front end of the shaft N of conveyer N' . This conveyer-shaft N is mounted in the closed ends $B C$ of the reel-trunnions.

$O O' O'$ is a trough arranged within the supplemental reel. The part O is semicircular in cross-section, except at its extreme ends, where by preference it is provided with a complete circle or ring, which fits closely inside of the hollow trunnions $B C$. The upwardly and outwardly inclined wings $O' O'$ approach closely to the path described by the inner cloth-bars, i^2 , when the reels rotate.

$P P'$ is a deflector attached to the inner face of the reel-head $G G'$ and concentric therewith, the inclined flange P' projecting inwardly, and $Q Q'$ is a corresponding deflector attached to the outer face of the same reel-head with its flange $Q' q$ projecting in a direction opposite to that of the flange P' , thus forming a narrow throat or passage-way between these two deflectors to control the discharge of the tailings. I prefer to call this passage-way a "peripheral throat" or "discharge-opening" to distinguish it from an opening heretofore employed, which was located at the axis of the reel, which latter construction necessitates the arrangement of the tail end of the inner reel or drum at some distance from the tail end of the outer inclosing bolting-surface, in order that the tailings may pass down between the drum-head and reel-head to the central tailings-discharge—as, for instance, in the patent to Holt, above referred to, where the tailings are discharged through the trunnion.

a^x is a vertical partition arranged a short distance from the rear end casing, A^{xx} , and has a circular opening, which receives the flange g^3 of the reel-head, the joint between these parts being so close as to practically prevent anything from passing between them. Thus there is formed a vertical chamber, R , just inside the tail-end casing, and one edge wall of this chamber consists of an inclined board, R' , (shown partly in full lines and partly in dotted lines, Fig. 2,) this chamber opening at its lower end into a discharge-valve, which

consists, essentially, of four or more wings or blades, S S, projecting radially from the gudgeon of the conveyer-shaft M and inclosing-walls T T', the sections T T' of these walls being in arcs of circles, the lengths of the segments being such that the spaces between their upper ends or their lower ends or both, and through which the offal is discharged, are such that the wings S S act as valves to discharge the offal without permitting air-currents to pass, as will be readily understood from an examination of Figs. 2 and 5 without further explanation.

My invention may be operated as follows:
 15 The material to be bolted, being fed in through the hopper or spouts F F' and opening E' to the annular space between the reels, is caught by the inner reel and delivered to the inner surface of the outer bolting-cloth, H'. Such flour as passes through the upper surface of the inner bolt falls into the trough O O' O', and is carried by the conveyer N to the rear end of the machine and discharged through the trunnion B and spout B'. The flour which
 25 passes through the bolt-cloth H' of the outer reel falls through the throat between the lower edges of the gather-boards A', and is delivered to one or the other of the conveyers M M', the proportions delivered to each of these conveyers being regulated by means of the swinging chutes a'. The offal which passes over the tail end of the inner bolt falls upon the inner surface of the outer bolt and is discharged through the throat between the inner deflector, P P', and the outer deflector, Q Q', and thence through the offal-chamber R and the valve at the tail end of the conveyer M. By an examination of Fig. 5 it will be understood that the flange Q' of the outer deflector projects so far rearward as to effectually prevent the offal from falling between or into the gears G' J'. It will be seen that the outer surface of the inner reel is formed in intersecting planes, which are arranged alternately upon radial lines and lines which
 45 are tangential to the axis of the reel, thus constituting an outline in cross-section which is substantially that of a ratchet-wheel, the direction of rotation being such that the sections of surface which are arranged in radial planes can operate substantially as buckets or elevators to carry material in an upward direction, and thence over the top of the inner reel, and deliver it upon the inner downwardly-moving surface of the outer reel; but I do not wish to be limited to this exact construction, because the surface of this inner reel, instead of being made in planes, might be grooved or fluted, or of any other suitable form by which
 60 its outer surface is adapted to receive material and deliver it to the downwardly-moving inner surface of the outer reel. It will be understood that the bolt is run at such speed that the material upon the inner surface of the outer bolt or reel will be elevated to such
 65 height that as it falls it will be caught by, the

upward-moving outward surface of the elevating-reel, the radial portions of which, as has been explained, act as buckets or elevators. A portion of the flour thus caught by the elevating-reel sifts through the upper portion of its bolting-surface and falls into the conveyer-trough, whence it is delivered out of the reel by the conveyer N'. That portion of the material which does not sift through into the inner bolt is delivered upon the downward-moving part of the outer bolt, whereby the effective bolting capacity of the reel is greatly increased. The outward-extending inclined wings, O'—which, with the circular part O, form the conveyer-trough—approach closely the bolting-surface of the inner reel at points above the axis thereof. This construction is desirable, for should the outward-extending portions of the conveyer-trough be situated below the reel-axis a portion of the flour might fall upon the lower part of the bolting-surface and sift back into the outer reel.

I do not in this application claim the subject-matter of the claims forming part of my application No. 141,670, filed August 24, 1884.

What I claim is—

1. In a flour-bolt, the combination of the outer reel, the inner reel rotating in the same direction, a feeding mechanism adapted to deliver flour to the space between the reels, and a conveyer for withdrawing from the inner reel the material which has passed through its bolting-surface, substantially as set forth.

2. In a flour-bolt, the combination of the outer reel provided with a head having a central circular rotating section, an outer circular rotating section, and an intermediate stationary section, an elevating-reel mounted within the rotating reel and rotating in the same direction, and a feeding mechanism which delivers the material through the stationary section to the space between the outer bolting-surface and the elevating-reel, substantially as set forth.

3. In a flour-bolt, the combination of the outer reel provided with a head having a central circular rotating section, an outer circular rotating section, and an intermediate stationary section, an inner elevating-reel supported at one end upon the central circular rotating section of the reel-head, and a feeder which is connected with the stationary section of the reel-head and delivers material into the space between the outer bolting-surface and the elevating-reel, substantially as set forth.

4. In a flour-bolt, the combination of the outer reel provided with a head having a central circular rotating section, an outer circular rotating section, and an intermediate stationary section, an inner elevating and bolting reel supported at one end upon the central circular rotating section of the reel-head, a conveyer mounted within the inner elevating and bolting reel and adapted to deliver material therefrom, and a feeding mechanism

which delivers material into the space between the outer bolting-surface and the elevating and bolting reel, substantially as set forth.

5. In a flour-bolt, the combination of an outer reel, a central sleeve, a circular section attached to and rotating with the sleeve, an outer circular rotating section on which is mounted the outer bolting-surface, an intermediate stationary section, and an inner elevating-reel supported at one end upon the circular central rotating section, substantially as set forth.

6. In a flour-bolt, the combination of the outer reel, an inner reel, a feeding mechanism adapted to deliver material into the space between the two reels, and a conveyer which withdraws the material which has sifted into the interior of the inner reel, the head at the tail end of the inner reel being arranged at some distance from the head of the outer reel and connected thereto by interposed supports, substantially as set forth.

7. In a flour-bolt, the combination of the outer reel, an inner reel, a feeding mechanism adapted to deliver material to the space between the two said reels, and a conveyer mounted within the inner reel and extending beyond the end of the outer reel and adapted to deliver the material which has sifted into the interior of the inner reel, substantially as set forth.

8. In a flour-bolt, the combination of the outer reel, an inner reel, a feeding mechanism adapted to deliver material into the space between the two reels, a conveyer which delivers out of the inner reel the material which has sifted into it, and a conveyer-trough having its opposite edges situated in close proximity to the bolting-cloth on opposite sides of the inner reel, substantially as set forth.

9. In a flour-bolt, the combination of the outer reel, an inner reel, a feeding mechanism adapted to deliver material into the space between the two reels, a conveyer which delivers out of the inner reel the material which is sifted thereinto, and a conveyer-trough having its opposite edges situated in close proximity to the bolting-surface on the opposite sides of the inner reel above the axis thereof, substantially as and for the purposes set forth.

10. In a flour-bolt, the combination of a central supporting hollow trunnion, an outer reel supported upon said trunnion, an inner reel also supported upon said trunnion, and a conveyer which withdraws the material from said inner reel, said conveyer being mounted in said trunnion, substantially as set forth.

11. In a flour-bolt, the combination of an outer reel, an inner reel, a centrally-arranged hollow trunnion upon which both are mounted at the discharging end of the bolt, a delivery-spout at the end of said trunnion, and a conveyer mounted within the inner bolt which withdraws material therefrom and delivers it through said trunnion to the delivery-spout, substantially as set forth.

12. In a flour-bolt, the combination, of an

outer reel, an inner reel, feeding mechanism which delivers material into the space between them, hollow trunnions which support them at each end, and a conveyer mounted within the inner reel and which delivers material therefrom, it being supported at its opposite ends in said trunnions, substantially as set forth.

13. In a flour-bolt, the combination of an outer reel, an inner reel, feeding mechanism which delivers material into the space between them, a conveyer mounted within said inner reel and adapted to deliver material therefrom, a conveyer-trough consisting of the wing portions O' O' and the central circular portion, O , in which works the conveyer, and a central trunnion, said trunnion forming a continuation of the conveyer-trough, substantially as set forth.

14. In a flour-bolt, a bolting-reel having at its receiving end a reel-head consisting of a central circular rotating section, an outer rotating section, and an intermediate stationary section, in combination with strips i^3 i^3 , attached to the circular rotating section, and a concentric series of cloth-bars, each attached at one end to the central rotating section to support the cloth, substantially as set forth.

15. In a flour-bolt, the combination, with the outer bolting-surface and the inner reel, of a reel-head at the receiving end of the bolt which closes the annular space between the outer bolting-surface and the inner reel, and a feeder which delivers the material to be bolted through the reel-head into said annular space, substantially as set forth.

16. In a flour-bolt, the combination, with the outer bolting-surface and the inner reel, of a trunnion at the receiving end, and a reel-head formed in three concentric sections, the outer and inner of which rotate, and the intermediate one is stationary, said reel-head being connected directly to the outer bolting-surface and to the inner reel at the receiving end of the bolt, substantially as set forth.

17. In a flour-bolt, the combination, with the inner reel, of an outer reel having at its receiving end a head formed in three sections, of which the outer and inner sections rotate, the intermediate section being stationary and provided with a feed-opening through which material may be delivered to the upper surface of the inner reel, substantially as set forth.

18. In a flour-bolt, the combination, with the outer reel, of the inner reel having its outer surface formed on planes which intersect each other to form re-entering angles, whereby there are formed elevating-buckets, substantially as set forth.

19. In a flour-bolt, the combination, with the outer bolting-surface and the reel-head at the receiving end of the reel, of the inner reel attached at one end to the said reel-head, and the flange to which is attached the outer bolting-surface at the tail end of the reel, the spokes projecting inward from the flange, the head I of the inner reel, and the standards

which connect the said reel-head with the spokes, substantially as set forth.

20. In a flour-bolt, the combination, with the outer bolting-surface, and the reel-head at the receiving end of the reel having a stationary ring provided with a feed-opening in its upper part, of the inner reel attached at one end to the reel-head between the stationary ring and the axis of the reel, and the support e' , connecting the stationary ring with the casing A^x , substantially as set forth.

21. In a flour-bolt, the combination of the outer reel and the inner elevating and bolting reel rotating in the same direction, and provided with buckets which catch the material elevated by the upward-moving part of the outer reel and deliver it to the opposite side thereof, substantially as set forth.

22. In a flour-bolt, the combination of the outer reel, the inner elevating and bolting reel having its outer surface formed on planes which intersect each other to form re-entering angles, whereby are formed elevating-buckets, and a feeding mechanism which delivers material into the space between the bolting-cloths, substantially as set forth.

23. In a flour-bolt, the combination of the outer reel, the inner elevating and bolting reel having its surface formed on intersecting planes which are arranged alternately on planes substantially radial to the axis of the bolt and on planes substantially tangential to the axis of the bolt, and a feeding mechanism which delivers material into the space between the bolting-cloths, substantially as set forth.

24. In a flour-bolt, a reel-head having a central sleeve, radial arms projecting therefrom, a ring or circular flange at the ends of the arms, a deflector having a flaring flange mounted at the inner side of the radial arms, and a deflector having a flaring flange and mounted upon the reel-head outside of the radial arms, substantially as set forth.

25. In a flour-bolt, the combination, with the reel-head at the tail end of the reel, of the gears $G^2 J'$, and the deflector $Q Q'$, projecting beyond the reel-head and adapted to prevent offal from falling upon the gears, substantially as set forth.

26. In a flour-bolt, the combination, with the inner elevating reel, of the outer bolting-reel provided at its tail end with a reel-head having an outer flange and inward-projecting spokes, whereby there is formed a peripheral tailings-discharge having a diameter greater than the diameter of the inner reel, substantially as set forth.

27. In a flour-bolt, the combination, with the inner elevating-reel, of the outer bolting-reel provided at its tail end with a reel-head having an outer flange and inward-projecting spokes, and having both the bolting-cloth and the inner reel attached thereto, and having also a peripheral tailings-discharge of greater diameter than the inner reel, substantially as set forth.

28. In a flour-bolt, the combination, with the outer bolting-reel having a spoked reel-head at its tail end, of an inner elevating-reel which is shorter than the outer bolting-reel, and brackets connecting the inner reel with the spokes of the reel-head, substantially as set forth.

29. In a flour-bolt, the combination, with the outer bolting-reel having a spoked reel-head at its tail end, of an inner elevating-reel which is shorter than the outer-reel and is attached to the spoked reel-head, and a flange projecting inward from the spoked reel-head and adapted to receive the tailings and direct them between the spokes, substantially as set forth.

30. In a flour-bolt, the combination of the outer bolting-reel having at its tail end a reel-head provided with spokes and a hollow trunnion, the inner elevating-reel, a stationary sleeve supporting the hollow trunnion at the tail end of the bolt, a toothed rim on the tail-end reel-head inside the casing, the shaft J and pinion J' inside the casing, and the belt-pulley K outside the casing, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE T. SMITH.

Witnesses:

WM. H. DICKEY,
GEO. S. BENNETT.