

I. COOK,  
Bran Duster.

No. 62,733.

Patented March 12, 1867.

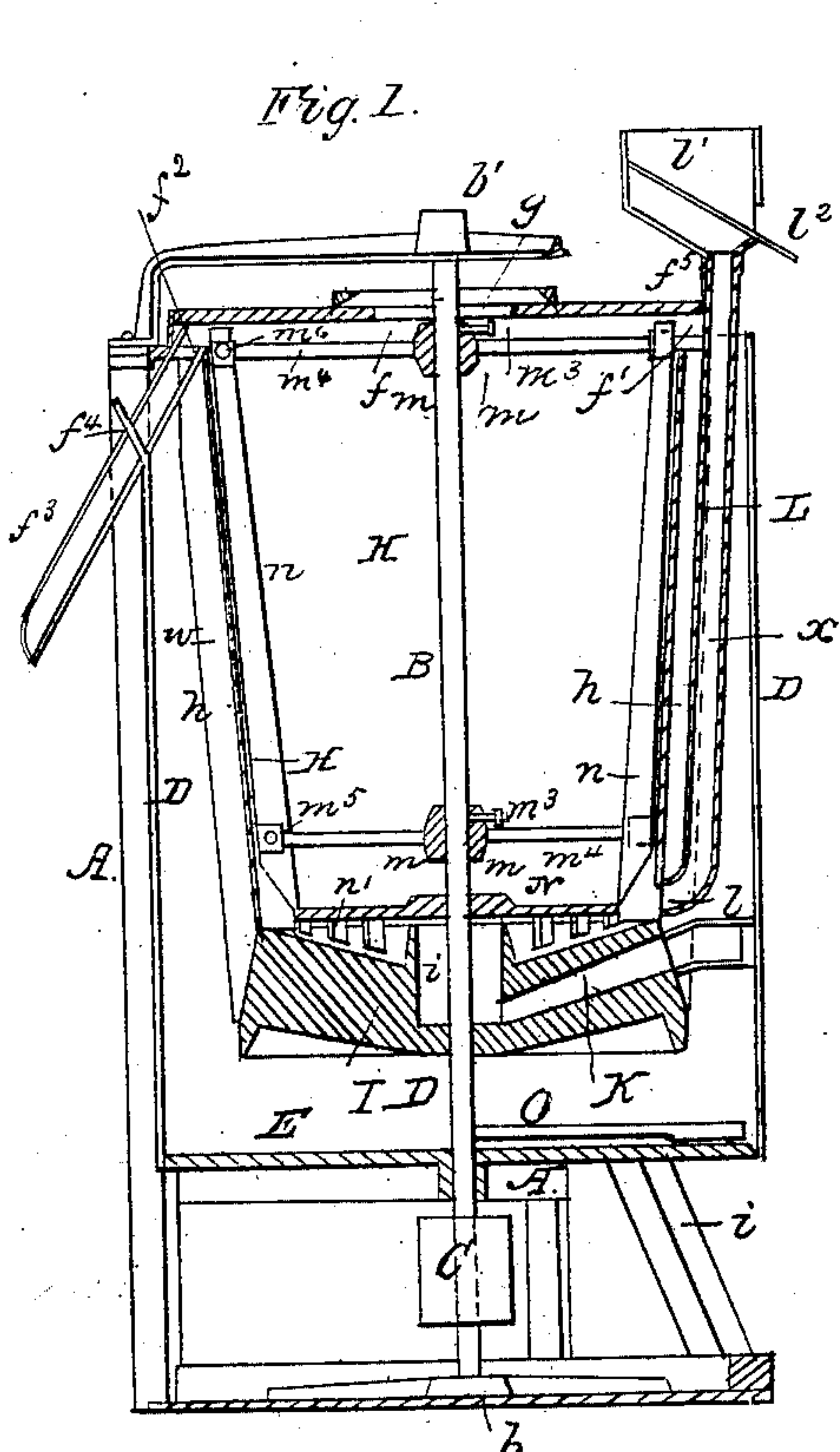


Fig. 2.

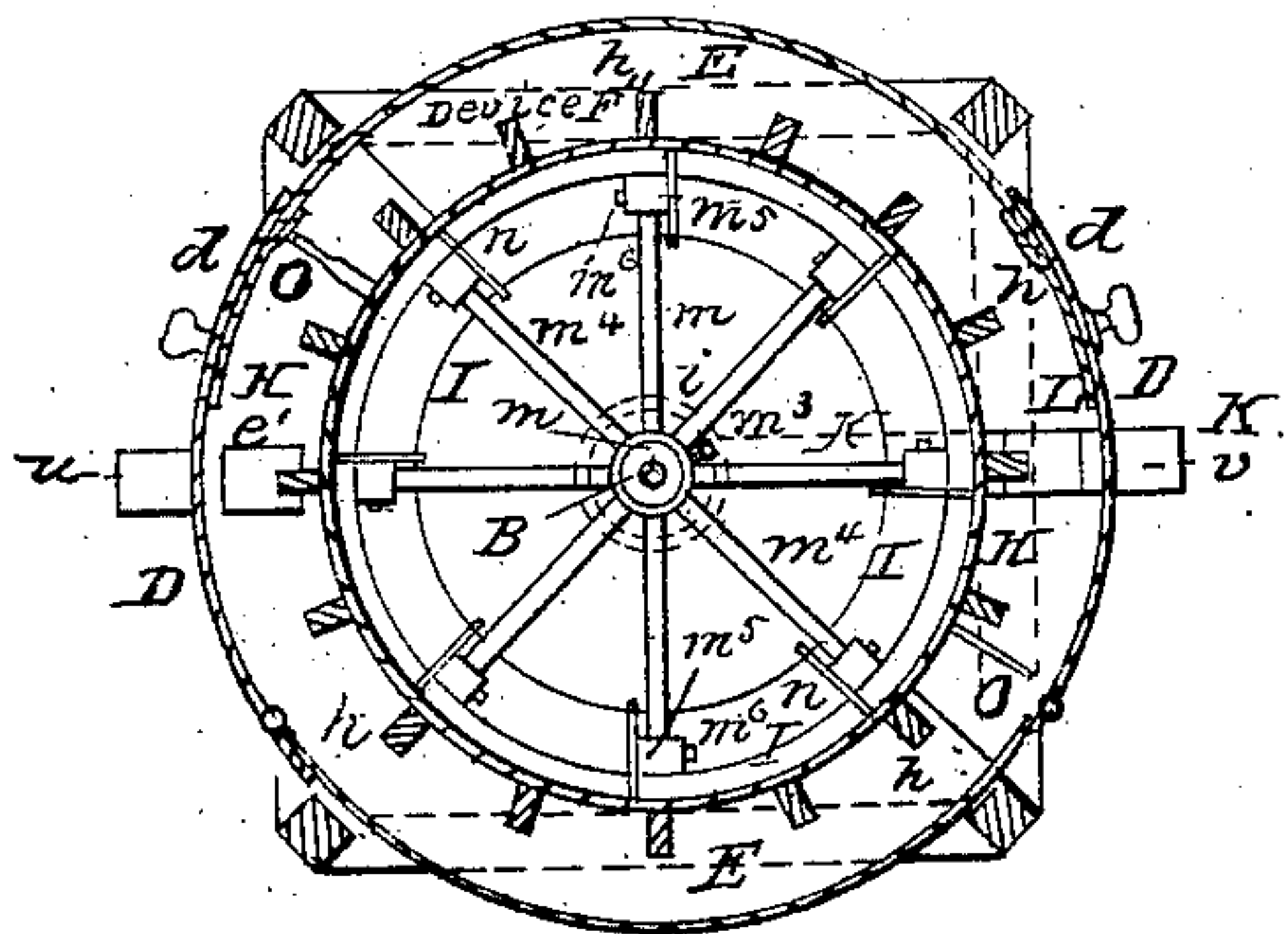


Fig. 3.

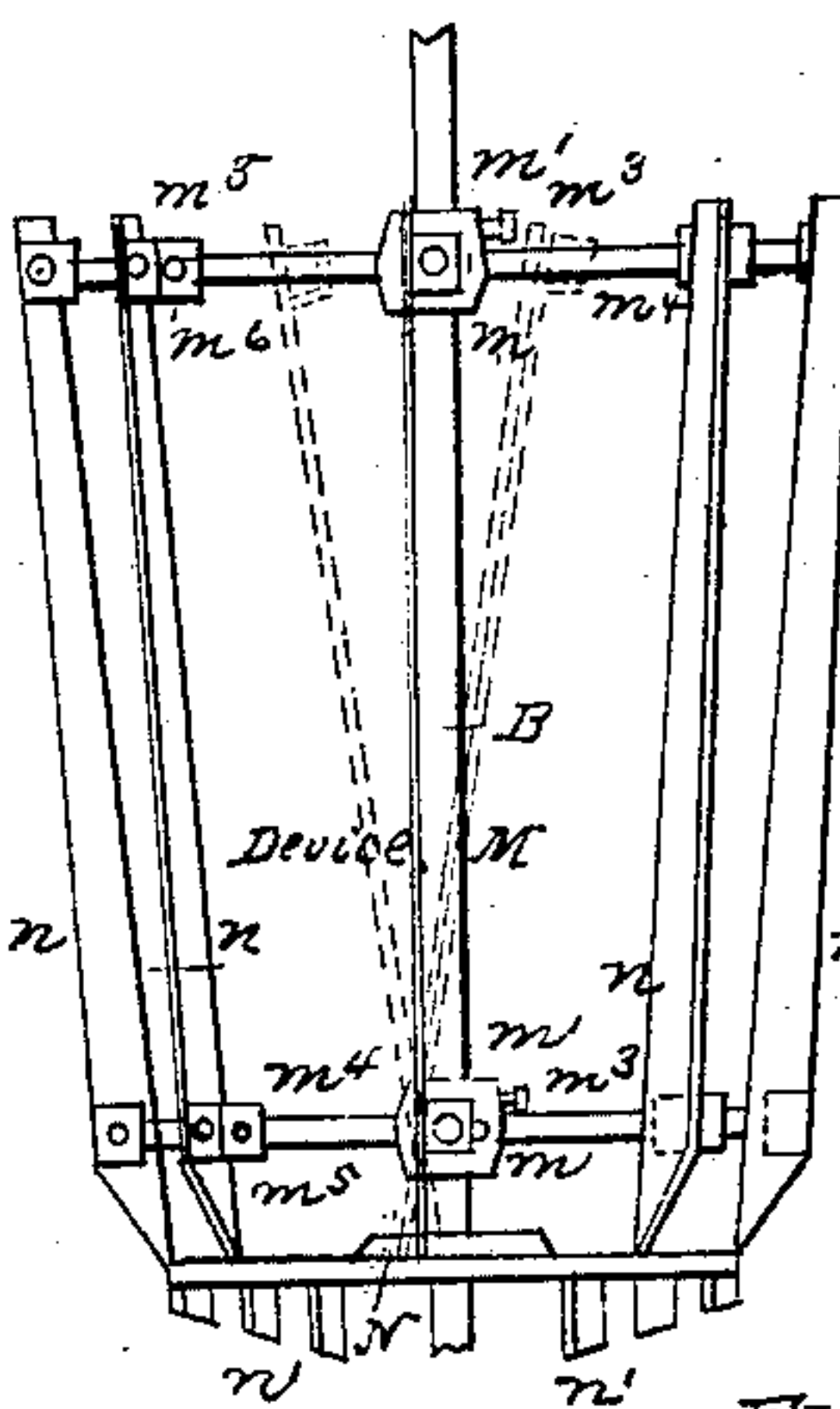


Fig. 4.

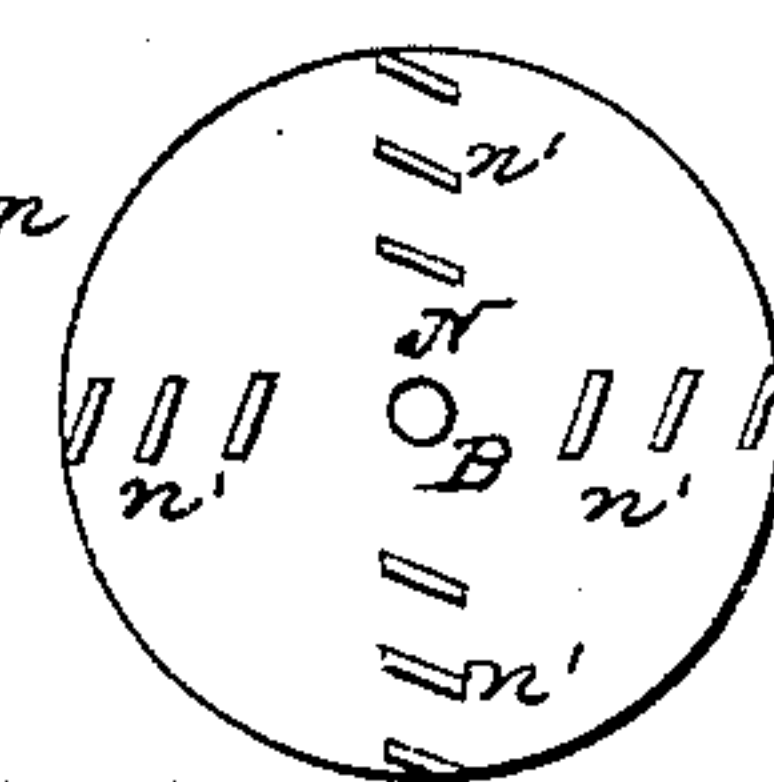


Fig. 5.

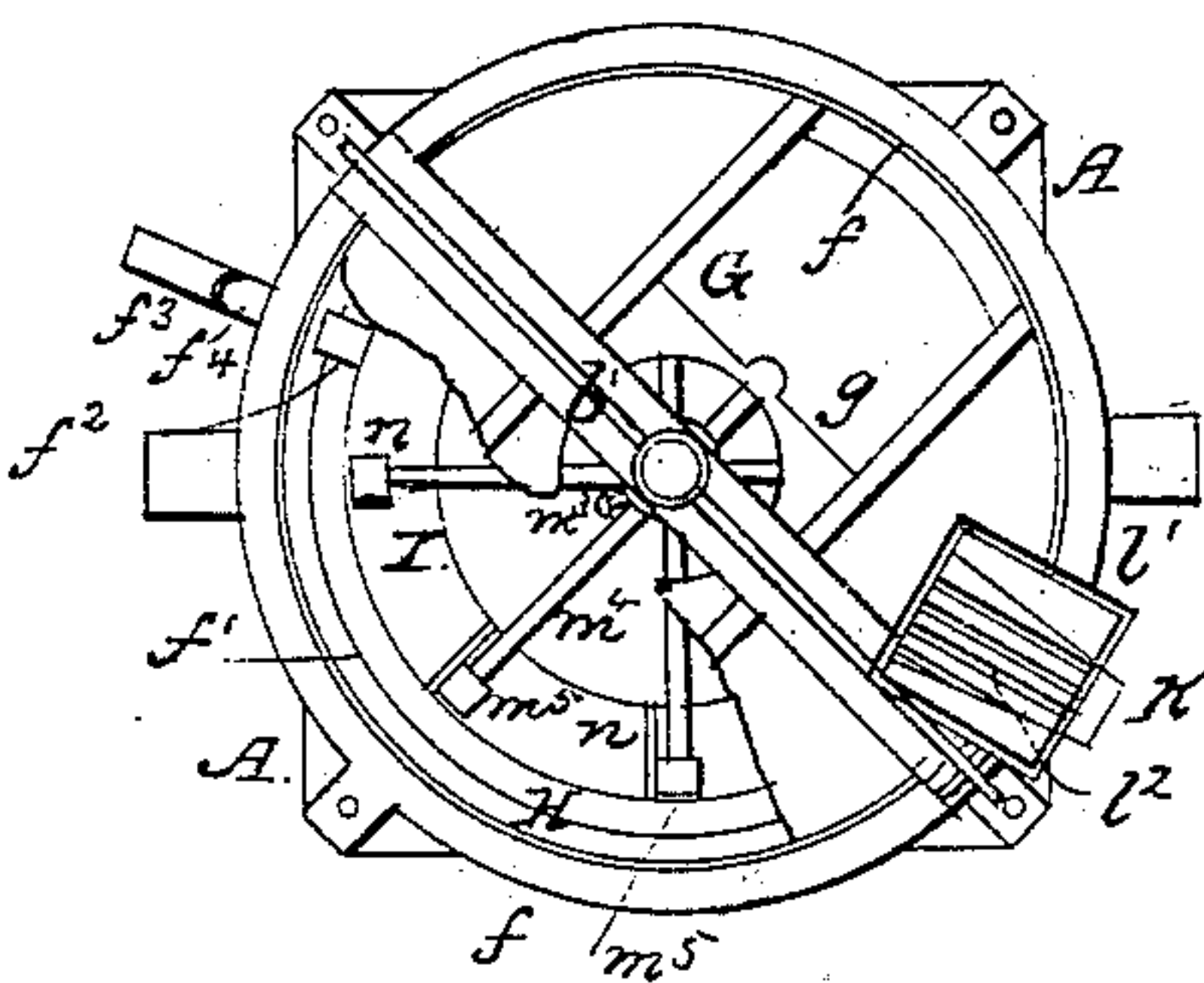
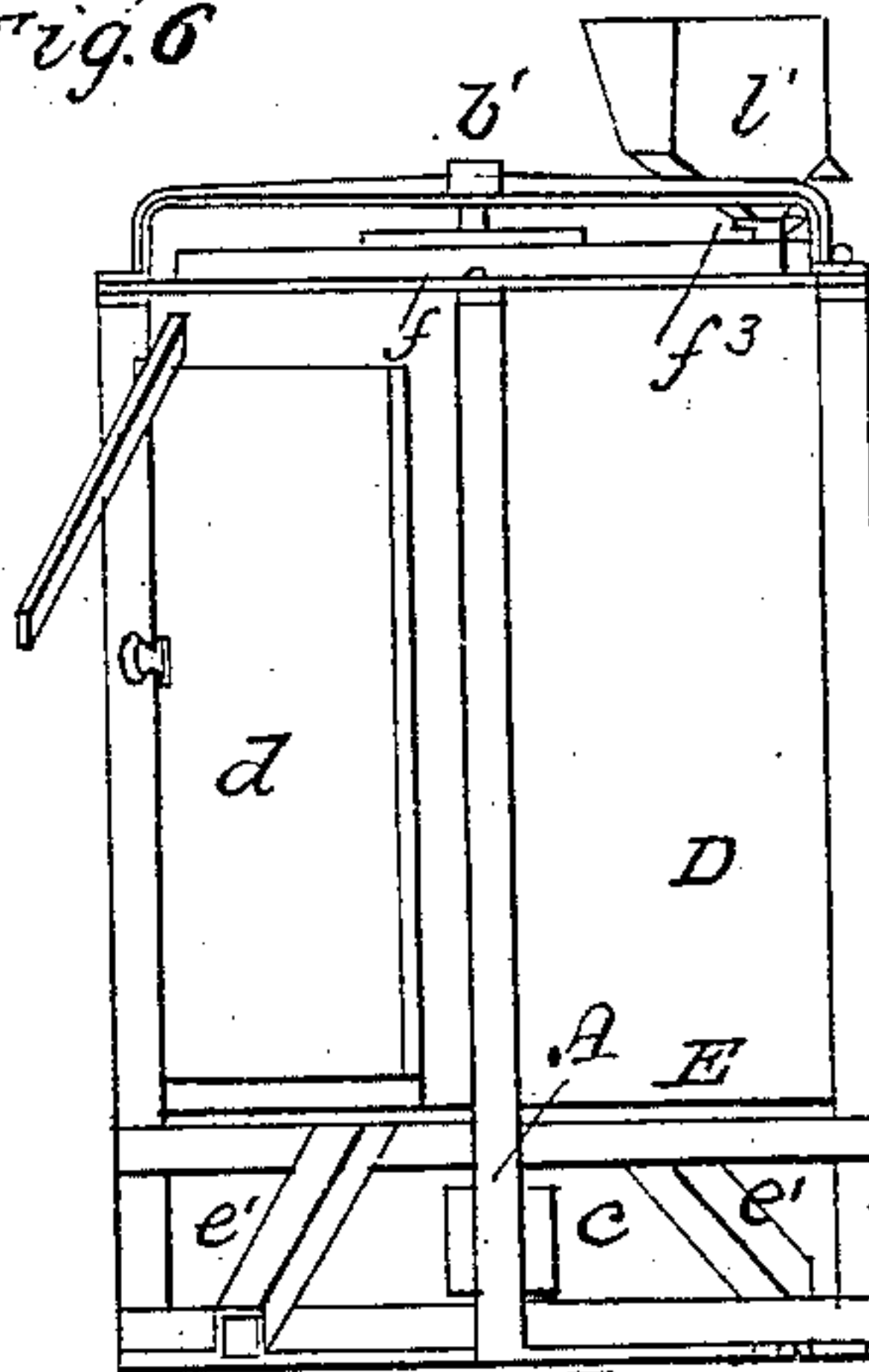


Fig. 6.



witnesses  
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Inventor  
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# United States Patent Office.

ISAAC COOK, OF ST. LOUIS, MISSOURI, ASSIGNOR TO HIMSELF AND M.  
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*Letters Patent No. 62,733, dated March 12, 1867.*

## IMPROVEMENT IN BRAN DUSTERS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, ISAAC COOK, of the city and county of St. Louis, State of Missouri, have invented certain new and useful improvements in the machine commonly used for separating flour from bran, and commonly called Bran Duster; and I do hereby declare that the following is a full and exact description of my said improvements, as well as of the entire machine and of the operation thereof, showing the adaptation of my said improvements to form with devices in common use a more highly useful machine for the purposes aforesaid.

It is well known that in the process of separating flour from bran, the stuff was fed in at or near the top of an upright cylindrical bolt and case, containing an interior vertical rotating cylinder of brushes, &c., as in all the machines called "bran dusters." Moreover, it is clear from this method of feeding stuff in at the top of the duster machine, the force of gravity acted to carry the material simply downward, whilst the centrifugal force generated by the action of rotating brushes or beaters, caused a radial motion of the particles of stuff, precipitating them against the enclosing bolt-cloth, through which the particles of flour could pass, but which prevented the egress of bran, thereby acting to separate said flour and bran. Again, the action of said rotating brushes and sweeps creates air currents tending downwardly and outwardly, which aid the separating action aforesaid, and at the same time may be useful in cooling the flour, relieving it of heat and moisture received in processes to which the grain was previously subjected.

It will be seen that in the processes here described, owing to the action of forces of gravitation and the downward draught of air, unseparated particles of bran and flour may be drawn to the lower receiving bed or plate, properly intended to receive only the bran; moreover, larger clods or bunches of bran and flour will, owing to their superior gravity, pass directly, and without being properly separated or acted upon, to lower parts of the machine; and, moreover, such clods, owing to the arrangement of parts of the machine, may act detrimentally thereto by clogging or choking the same. Again, metallic substances, such as nails, bits of iron or brass, will be passed into said machine, and may injure the same by interposing between the rotating beaters and the bolt-cloth, and then ripping or tearing said cloth. Now, therefore, in order to avoid these defects in the machines now in use, the nature of my invention is principally in the arrangement of a lower feed of stuff to bran dusters; and as resultant from such lower or under feed, it is in the action of revolving parts to cause the stuff to be acted upon to pass against its own gravity or upwardly. The nature of my invention consists, furthermore, in certain detail arrangements of devices: firstly, to secure a proper distribution of stuff, so that the same may be quickly and properly drawn upwardly to be subjected to the further separating action of revolving beaters, &c.; said nature is, secondly, in an adjustable arrangement of revolving beater devices to properly regulate the upward passage of the stuff; said nature is, thirdly, in the adaptation of an upper receiving plate for the bran after its separation; and, fourthly, in the connection with said receiving plate for bran of such conduits and other devices as will act (when so desired) to redeliver the bran if not properly cleared of flour to a second action of the machine for further separation; all of which will more fully and clearly hereinafter be shown.

To enable those skilled in the arts to make and use my improved machine, I will now describe it in detail, and also its operation, referring herein to the accompanying drawings, and to the letters of reference thereon. Of said drawings—

Figure 1 is a vertical central sectional elevation along the line *uv* of the plan.

Figure 2 is a horizontal sectional plan along the line *wz* of the elevation.

Figure 3 is an elevation of the beater devices to show their adjustable arrangement.

Figure 4 is a plan of the bran and stuff-distributing head viewed from below.

Figure 5 is a general top plan, showing the parts visible when the cover is partly removed.

Figure 6 is a general elevation of the entire machine.

In all said figures I have used similar letters to indicate similar parts.

I construct, to sustain the working parts of my machine, the frame A, usually made of wooden posts. The proper sizes of all parts will appear from the said drawings, the same being to a scale of about one-twelfth full size, or one inch equal one foot. The frame A supports the lower and upper bearings respectively, *b* and *b'*, of



the central vertical shaft B. To said shaft motion and power are imparted through the pulley or gear-wheel C, connected with the power source in any of the usual modes. Within the frame A I secure the casing (usually of sheet iron) D. This is arranged with doors,  $d$ , in order to permit an inspection of the interior parts. To said frame A I further secure the bottom or base-plate E, which makes a tight fit with the casing D at the joints therewith. Said bottom E is usually made of wood. On said frame A I further support the bolt device, F. This device is usually formed of an upper ring,  $f$ , which is arranged with proper radial projections supporting it (and the entire device F) upon posts of the frame A. Said ring  $f$  is usually cast iron, and is shown in radial section in fig. 1, its inner upper surface, marked  $f^1$ , being the receptacle for the bran, as hereinafter explained. Said inner surface,  $f^1$ , has the bran-discharge opening  $f^2$  leading to the funnel or conduit  $f^3$ , said discharge being regulated by the slide  $f^4$ . The feed spout, through which stuff is passed to the machine, is usually arranged tangent to said ring  $f$ ; then connecting or disconnecting the surface  $f^1$  with the feed spout, I arrange an opening with an adjustable slide,  $f^5$ . The ring  $f$  is arranged with an annular shoulder upon its vertical rib to receive the top or cover G. This has slides,  $g$ , to suitably control the air-draught through a central opening encircling the shaft B. Said cover and its slides are usually of wood. To said ring,  $f$ , I connect, to form the second part of the device F, the vertical or nearly vertical slats of wood or iron  $h$ . These are intended to form the support of the bolt-cloth H, which is properly secured (usually by tacks or screws) to the inner edges of  $h$ ; and said slats furthermore support the receiving plate or bed I, which may be of cast iron or wood, and is formed in the shape as shown by the several figures. Said receiving plate I has a central cylindrical opening,  $i$ , connecting with the air-conduit K, which passes to the outside of the casing, D. Said conduit may be of wood or sheet iron, but should be compactly, if not air-tightly, made. I also arrange a feed-funnel, L, which will usually be of wood or sheet iron; and will usually pass tangent to the ring  $f$ , between the casing D and the bolt-cloth H, and connect by an opening,  $l$ , immediately above the upper surface of I with the interior of the machine. Then the stuff fed down, L, through said opening  $l$  upon I, will pass down the inclined (conical) upper surface of I toward the cylindrical ridge surrounding the central opening  $i$ . I expressly include the arrangement of the feed through the conduit L to the centre of the plate I direct, as in the nature of my invention, and a direct feed through L to the centre of the receiving plate I may at times be more highly advantageous than the feed arrangement first described. In this case of a direct feed to the centre of I, the feed conduit L may either pass within the air-feed K; or pass entirely below the plate I. In either arrangement, the feed conduit L will end in an annular bowl encircling the shaft B, it being again surrounded by the annular air-feed passage  $i$ . As was first above stated, the adjustable slide  $f^5$  regulates the connection between the ring surface,  $f^1$ , and the feed passage L. At the upper end of the feed passage L I usually arrange a hopper,  $l^1$ , to receive the stuff to be subjected to bran-duster action. Said hopper has an inclined sieve,  $l^2$ ; this is intended to prevent the passage of large clods of stuff or of pieces of metal, these being too bulky to pass the interstices of said sieve, and will roll down the same and be discharged through a proper opening in the side of the hopper  $l^1$ . Upon the shaft B I secure the devices M. This, by its rapid revolution about said shaft, is to cause a centrifugal motion of the stuff to be acted upon, as well as the air, toward the bolt-cloth H. The devices M consist of the metallic spiders  $m$ , composed of the hubs (encircling B)  $m^1$  and arms  $m^4$ . Said hubs are secured to B by set-screws,  $m^3$ . Usually the arms  $m^4$  will be cast with the hub  $m$ . At the ends of said arms I place the blocks  $m^5$ . These are arranged to slide (radially) upon  $m^4$ . Moreover, the said arms may be turned of a circular section, and  $m^5$  will then turn upon  $m^4$ .  $m^5$  may be secured in place until adjustment is needed by the usual set-screw arrangements,  $m^6$ . To said blocks,  $m^5$ , I secure the beaters or brushes " $n$ ", it being here particularly intended to use any device for beating, brushing, and otherwise separating that has already been used. It will be seen that by simply turning the upper or lower spider  $m$  on the shaft B, (relatively to B,) the beaters  $n$  may be inclined from the perpendicular position. Now, if the arms  $m^4$  are rounded, the blocks  $m^5$  may then turn to accommodate the inclined position of " $n$ ," without hoisting  $n$ . If, however, the arms  $m^4$  are squared, and do not permit  $m^5$  to turn, then the contact surface of  $m^5$  and  $n$  will be suitably rounded to prevent twisting the beaters; all of which is plainly indicated in fig. 3. I also secure upon the shaft B the distributing head N on its lower surface. This is armed with spuds,  $n'$ ; said spuds are of proper length to fit the conical space formed between the plate I and N; they are, moreover, placed in the inclined direction, as plainly shown in fig. 4. Said head N will usually be of cast iron, but may be of wood. Lastly, upon the shaft B, and between the bottom E and the receiving plate I, I place the sweeps O. These are intended to sweep the flour dropping on E to the delivery spout  $e$ . O are usually iron bars, simply screwed into B.

The operation and action of the parts so described is as follows: The stuff to be separated, after a preliminary cleansing from clods or nails in passing the sieve  $l^2$  in the hopper  $l^1$ , passes down the feed conduit L, and reaches (either at the circumference or through the central opening  $i$ ) the upper inclined surface of the receiving plate I. Now, the upper surface of I being inclined downwardly to the ring ridge encircling  $i$ , the stuff will tend to roll toward the lower centre of I, and nails or clods which have passed the sieve  $l^2$ , above mentioned, will, owing to their superior gravity, roll to the central ridge of I, and there remain until removed by the operator, doing no manner of injury. The stuff to be acted upon will, however, be stirred and spread upon the surface of I by the spuds  $n'$  on the head N, which is turned by the revolving shaft B. Moreover, by the revolving shaft B the beater devices, M, being turned, the air in the space described by the turning of M will receive a centrifugal impulse, and pass out at the circumference through meshes of the bolt-cloth H, as well as above the ring surface  $f^1$ . To fill the partial vacuum so created, external air will rush in through the air-feed K, passing up through the central opening  $i$ , and between the spuds  $n'$ , it will carry upward the stuff to be acted upon. Moreover, such improper material as metallic chips, nails, or clods, will, owing to diminutive bulk and great weight, not be carried upwardly, but remain on the plate I without damage to parts above. Thus, then, the revolving spuds on N and the upward air currents will cause only the proper material to pass up to the beaters. Again,



the distributing head N acts by its body to direct said air and grain current to the circumference of the cylindrical space above in such wise that it may come properly under the action of the beaters "n," and not simply pass up vertically around the shaft B, and remain unacted upon as it otherwise might. Not only does the head N act to keep the material near the circumference of internal cylinder, but the centrifugal force imparted to said material by the beaters n acts powerfully to propel the material against the bolt-cloth H, thus, then, permitting the finer particles, which are flour, to pass through the meshes of H in the usual manner. It will be observed that the stuff, being first distributed upon the head or plate I, is subjected here to a first operation of separation to wit, from its improper mixture with clods; that even here, however, owing to a beater action of the spuds n', a separation of flour and bran may be effected, which separated particles will then be carried upwardly to be separately discharged as required. Owing to its rapid rotary motion, the head N, by its spuds, not only by their inclined setting, (see fig. 4,) but also by centrifugal force imparted through the spuds n' h, the material will act to separate, as before mentioned, and to direct the currents of material and air to the inner surface of the bolt-cloth H.

As has been stated, the separating and dusting action upon the stuff takes place principally during the upward passage thereof from the plate I to the top G. In order that this upward passage may be accelerated or retarded, and thus the stuff be subjected to the action of the beaters n during a less or greater period of time, I have arranged the spider m so that the upper ends of said beaters n may be moved to the left or right side of the vertical position, as shown in red lines in fig. 3. The beater devices on the shaft B usually rotate from left to right. If, then, the upper ends of "n" are inclined to the right, the stuff in its upward passage will strike the inclined flat surfaces of n, and be impeded; whereas, if the ends of n be inclined to the left, the stuff will be carried upward by the impulse imparted by the right-hand flat surfaces of n more rapidly than before such impulse. Thus may the beater action be regulated to secure a proper separation to suit a greater or less cohesion of particles of bran and flour, a greater or less speed of the beater devices, an increased or decreased feed, et cetera. Thus, not only is the action of separation aforesaid fully performed, but the flour is cooled and freed from moisture, being "aired" in a thorough manner. The upward passage of the material may also be varied by inclining the bolt-cloth, (and the slats h,) thus causing the bolt to form the frustum of a cone, whose apex is either above or below the machine. If the apex is below the machine, the cloth widening toward the top of the machine, the passage of the material upwardly will be facilitated, and hence lighter material may be carried up uncleaned; but where the material is weighty, and the cohesion of flour and bran is small, this inclined shape of bolt is judicious. If the apex of the frustum be above, the bolt will be narrower at the top, and the material must be forced upward against the inclined bolt-cloth, thereby scouring it in a most perfect manner.

It will thus be seen that my invention admits of the application of devices in a variety of shapes and constructions, dependent upon the character of the material; but that the arrangement of the devices N M and H may here always be such as to secure by the beating and scouring action a separation of the flour from the bran, and to act also to cool or air the grain, but more especially by the centrifugal action of beaters aforesaid to act upon the flour in a thorough manner, thereby depositing it outside the bolt-cloth, and upon the bottom E in a proper state to insure its preservation when packed and in storage. From the bottom E the flour is swept by the sweeps O into the openings "e," and is discharged by means of proper conduits, e', into proper receptacles therefor. The bran (and such other material as will not pass the meshes of H) is carried upward and deposited on the ring surface f<sup>1</sup>, and as the beaters n extend up sufficiently, the bran is here carried around to its discharge opening, f<sup>2</sup>; this, also, acts as an air discharge, and for the regulation hereof I have arranged the slide f<sup>4</sup> in the discharge conduit f<sup>3</sup>. Should it be necessary, sweeps similar to O may here also be used to pass the bran to its discharge. As it may occur that some of the bran deposited on f<sup>1</sup> is not properly dusted of flour, I have arranged that such material may be returned to the feed-spout L, and passed through the machine a second time. To accomplish this return feed of partially dusted material, I close the bran-discharge spout f<sup>3</sup> by means of the slide f<sup>4</sup>, then raise the slide f<sup>5</sup>, thus connecting the surface, f<sup>1</sup>, with the feed-spout L. I would here especially mention that it may be advantageous to cause the bolt device F to rotate in a reverse direction (or in the same direction) from the shaft B. Then the scraper device O may be attached to F. It will thus be seen that my invention consists in forming new combinations from essential features or elementary devices, which are thus to be more especially described, to wit: first, a vertical or nearly vertical position of the bolt for separating flour from bran, rendering the whole bolting surface efficient; second, a case, enclosing the bolt, intended to confine the flour immediately upon its passage of the bolt-cloth; third, a rapidly rotating shaft or cylinder, forming a beater device; fourth, a rapidly rotating distributing head, located immediately below the beater device, acting, firstly, to distribute the material to the circumference of the bolt, secondly to separate the material itself, similar to a beater device; fifth, a lower receiving head, conically inclined, and arranged to receive, near its centre, dangerous materials like clods and nails, and to receive the material generally; sixth, an upper receiving ring surface, to receive bran thereon, connected with the feed funnel in such wise as to secure a second operation upon material that has not been properly "dusted" in a first passage; seventh, a closed-up position of the top and bottom of the machine, excepting such openings as are necessary for flour, bran, and air discharge.

Having thus fully described my said invention, what I claim, and desire to secure by Letters Patent, of the United States, is as follows:

1. Feeding the material through a pipe, L, and upon the receiving head I underneath the beaters, substantially as set forth.
2. Passing the material upwardly from the head I by an upward air draught, drawn from the lower air-feed K, substantially as set forth.



3. The receiving head I, constructed and operating substantially as and for the purposes set forth.
4. Adjusting the beaters "n" to any desirable angle, by the means substantially as described.
5. The combination of the beaters "n" and the distributing head N, operating substantially as set forth.
6. Returning the bran from the receiving surface  $f^1$  through the feed pipe L, substantially as and for the purposes described.
7. The combination of the feed pipe L, head I, distributing head N, and adjustable beaters M, substantially as and for the purposes described.

ISAAC COOK.

Witnesses:

GEO. P. HERTHEL, Jr.,  
M. RANDOLPH.