

(No Model.)

3 Sheets—Sheet 1.

C. A. SMITH & M. W. CLARK.
FLOUR BOLT.

No. 469,752.

Patented Mar. 1, 1892.

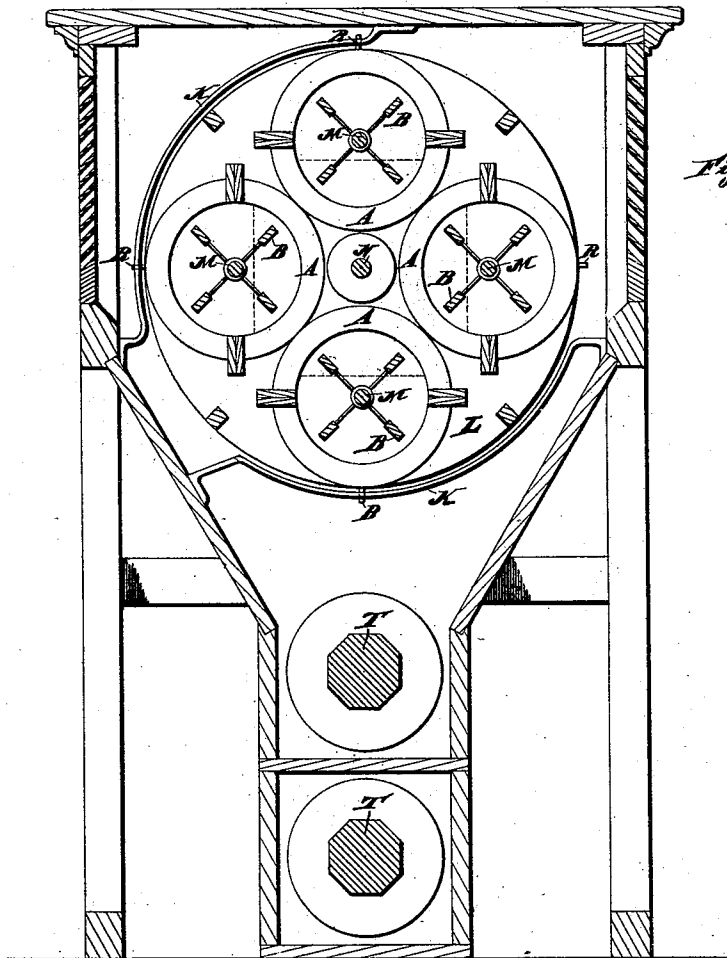


Fig. 1.

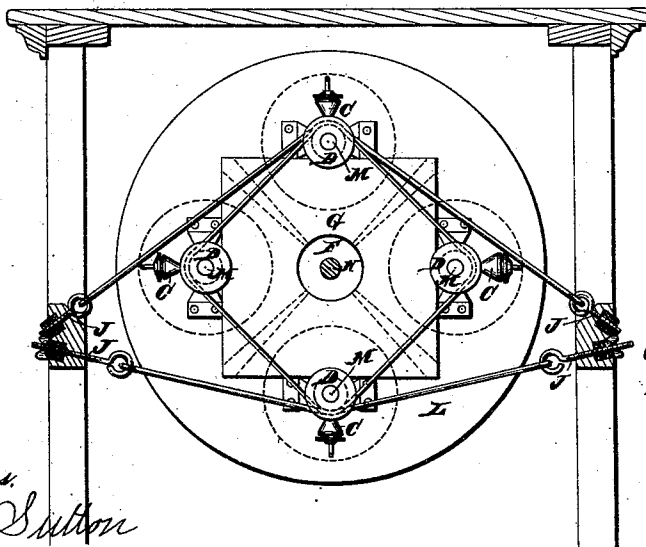


Fig. 3.

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(No Model.)

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Fig. 9.

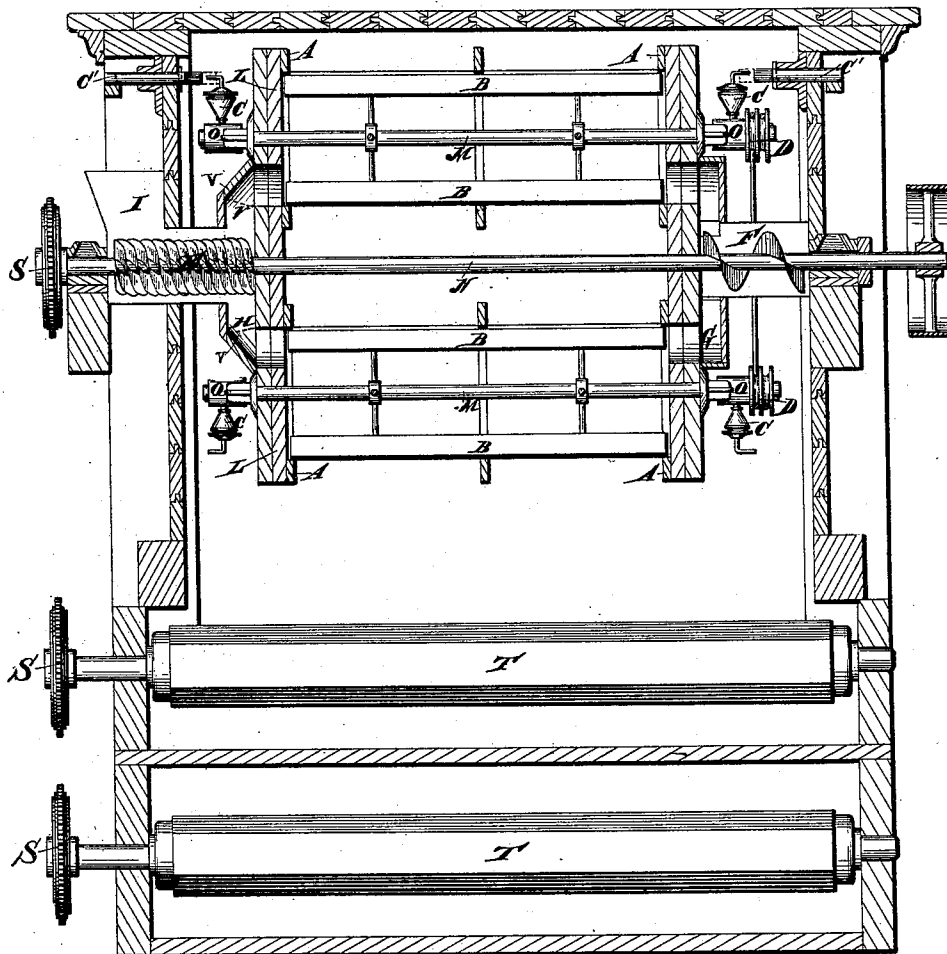
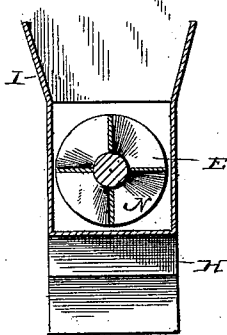


Fig. 10.



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UNITED STATES PATENT OFFICE.

CHARLES A. SMITH, OF JACKSON, AND MYRON W. CLARK, OF PARMA,
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FLOUR-BOLT.

SPECIFICATION forming part of Letters Patent No. 469,752, dated March 1, 1892.

Application filed February 19, 1885. Serial No. 156,484. (No model.)

To all whom it may concern:

Be it known that we, CHARLES A. SMITH, of the city and county of Jackson, and MYRON W. CLARK, of Parma, in the county of Jackson, both of the State of Michigan, are jointly
5 inventors of Improvements in Flour-Bolts, of which the following is a specification.

Our invention relates to that class of flour-bolts commonly denominated "centrifugal
10 reels," in which the operation of bolting the flour is assisted by the action of revolving beaters, which throw the meal against the surface of the cloth with which the reels are clothed, and so drive the flour through the
15 meshes more rapidly than is the case where the meal merely falls upon the cloth and slides upon the surface as the reel revolves.

To save continued repetition of phrases in this specification, we shall restrict the use of
20 the words "rotating" and "rotation" to that motion of a body which it has in turning upon its own axis, as in the diurnal motion of the earth, while the words "revolution" and "revolving" will be restricted to the description
25 of that motion which a body has around a center outside of itself, as that of the earth around the sun.

In the annexed drawings, making a part of this specification, Figure 1 is a vertical transverse section. Fig. 2 is a longitudinal sectional elevation. Fig. 3 is an elevation showing the means of rotating the beaters while they revolve. Fig. 4 is a plan and cross-section of the brushing mechanism. Fig. 5 presents
35 two sections of the reel, showing one mode of applying the wire basket or screen. Fig. 6 presents two sections of the same with a different arrangement of the basket. Fig. 7 presents two sections of the end of the reel, showing the cloth-stretching device. Fig. 8 presents, in views 1 and 2, different modes of constructing the lubricator for the beater-shafts. Fig. 9 shows the mode of adjusting the beater-blades. Fig. 10 is a transverse section of a screw conveyor having four blades.
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The same letters are employed in the indication of identical parts in all the figures.

The bolting-chest is framed and ceiled in the usual manner and furnished with conveyers TT for distributing the material sifted

through the meshes of the bolting-cloth. The shaft N carries two heads, which may be of wood or metal, as preferred. It has its bearings in the frame, and is rotated in the usual manner by belt or gear. The heads L are
55 keyed to the shaft and rotate with it. Between the heads is arranged a series of bolts A, which are preferably cylindrical and formed of annular heads, which are fastened to the heads L, so as to have only a motion in revolution with the latter. In the case illustrated we
60 have shown four of these revolving bolts; but more or less of them may be used. It will also be understood that while they may be fixed to the rotating heads they may also be hung on
65 hollow shafts carrying belts or gearing by which they may be rotated; but the arrangement shown is the cheaper and, we think, under ordinary circumstances better mode of attaching them. Between the reel-heads the bolting-cloth is stretched. In the case shown this
70 cloth is a cylinder of silk supported against the usual external annular ribs and attached at the ends to a ring A', (shown in Fig. 7,) which slides over another ring a, smaller in
75 diameter and bolted to the rotating heads L. The ring A is adjustably attached to the heads L by threaded bolts and nuts A², so that by turning the latter the tension of the bolting-cloth may be adjusted. The head L is constructed with openings, as shown, leading into
80 the interior of the bolting-reels, and on the outer faces of the heads are formed chambers K' and G, the former at the head to receive the meal and the other at the tail to receive
85 the tailings. The meal is fed from the hopper I through a tubular extension by means of the conveyor E, which is formed of four spiral flanges or flights, respectively terminating at equal distances from one another, so that each shall deliver an equal charge of
90 meal into the chambers K' as the reels come successively into the lower part of their orbit, when the meal will flow through the opening at the head into the reel. When the reels
95 come into the upper part of their orbit, the tailings will flow out through the openings at the tail end of the reel into the trough of the discharging-conveyor F. By this means the reels successively receive equal charges of
100

meal at one part of their revolution and discharge their tailings at the opposite part of their revolution. Within each reel is placed a revolving beater carried upon a central shaft M and having radial arms D D, which carry the blades B, adjustably attached thereto, as shown in Fig. 9. The faces of the flattened ends of the arms are corrugated and the inner faces of the bolt-heads B B correspondingly formed, the arms being slotted to permit the bolts to be set in or out. These bolts pass through the beater-blades B, and when the latter are properly adjusted they are fastened by a nut, which bears against a flexible metallic plate A A, interposed between the nut and the face of the beater. When the nuts have been properly tightened, they are locked by turning up one edge or corner of the flexible plate. By this lock the parts are effectually secured, so that the nuts cannot come off and cause the destruction of the bolting-cloth or beaters. Other known forms of nut-lock may be used instead of the one here shown to secure the nuts in place.

The beaters are required to rotate rapidly while they revolve with the reels. One mode of accomplishing this is shown in Fig. 3. On the projecting end of the shaft M at the tail end of the reel is fastened a pulley. Two ropes are adjustably attached to the posts of the chest by eyebolts, as shown at J. Each of these ropes (or belts) bears against three of the pulleys, and by their friction they will cause the beater-shafts to rotate as they revolve with the heads L, through which they project. The rapidity of their rotation will depend upon the size of the pulleys and the length of their orbit. Other means may be adopted for rotating the beaters. Thus a stationary central pulley may be made to engage the faces of small friction-pulleys on the beater-shafts, and as the reels bearing the beater-shafts revolve around the central pulley the beaters will receive a rotary motion, dependent upon the relative sizes of the driver and driven pulleys.

Instead of pulleys operated by friction, a spur-wheel fixed centrally may be made to drive spur-pinions on the beater-shafts.

In operating these machines it is necessary that the beater-shafts shall be provided with means for lubricating their bearings, and as it would be impossible to oil them by hand while the machine is in operation and very inconvenient to stop the machine for the purpose, and as it is also very desirable to prevent the escape of oil into the chest and also to avoid its exposure to the flying dust with which the interior of the chest is filled, we have provided the following device. The bearings of the shaft M are in tubular boxes O, secured to the exterior faces of the heads L. On these boxes are fixed oil-cups C. In Fig. 8 we have shown two forms of cups. They are provided with a valve attached to a valve-stem acting against a seat in the bottom of the oil-chamber and held in place by a spiral

spring coiled around the valve-stem. In one of these the valve sits upon the seat. In the other it is held up against the seat by the spiral spring. In both the valve is lifted by the stem. In one case the valve is opened by lifting the stem. In the other it is opened by depressing the stem. In both as soon as the valve-stem is released the spring brings the valve back to its seat and holds it there. A sliding bar C' passes through the chest, and when drawn out is not touched by the valve-stem; but when the bar is pressed in the head of the valve-stem engages it in the one case by its hooked end and in the other by its rounded head, so that the valve is opened every time it passes under the bar and a small amount of oil is permitted to flow out into the bearing. By these means the operator may regulate the supply of oil so as to allow no excess to overflow and adjust it or cut it off without stopping the machine. In such machine it is necessary to provide a wire basket to arrest foreign substances which entering the reel would tear the cloth or break the beaters. This is done by a basket inserted in the feed-opening, as indicated by the dotted lines V in Fig. 2, or by a cylindrical basket of wire, as shown at W in Fig. 5. Instead of these, however, we prefer to employ an interior cylinder of wire bolting-cloth, as shown in Fig. 6, attached to the shaft M, and rotating rapidly with the beaters and extending the whole length of the reel, opening at the tail to discharge the tailings with those of the silk cloth. This interior screen will thus serve not only as a basket does in other reels, but also as a scalping-reel to take out the bran and coarser particles of the meal, admitting to the silk cloth only the finer particles and distributing these over the entire surface. To keep open the meshes of the cloth we use annular traveling brushes, sweeping each such portion of the bolting-cloth as lies between the annular ribs.

In Fig. 4 we show three rings of brushes Q, connected by parallel bars forming a brush-frame, the bristles bearing against the surface of the bolting-cloth and revolving with the reel. A reciprocating longitudinal motion is communicated to the connected brush-frame by means of iron guide-rods K, fastened to the bolt-chest, and so formed and placed that as the bolts revolve a stud R on the middle ring shall engage the stationary rod and slide the brush-frame to the end of its path in one direction when the stud escapes, and as the bolt revolves it then strikes against the other rod, which causes the brush-frame to travel in the other direction to the end of its course, when the stud is again released and the brush stands until the stud engages the rod, as at first, and so it is made to travel from end to end.

The operation of the machine is evident. The meal fed into the hopper is discharged in successive and equal charges into the head

of the revolving and rotating scalping-reels as they come to the lower part of their orbit. The rapidly-revolving internal wire screen throws the fine particles of meal through its meshes and against the silk cloth of the revolving reels. It is evident, however, that if the beaters which carry the wire screen rotate too rapidly the bolting action of the screen will be impaired or even stopped by the centrifugal action. When such rapid rotation of the beaters is desired, therefore, the ordinary form of a basket must be substituted or a very coarse screen employed, too coarse to perform also the function of a scalper; or some other mode of driving the beaters must be adopted, so as not to have their motion and that of the internal screen dependent upon one another. The flour sifted through the cloths will be taken away by the conveyer in the usual manner.

Larger particles which cannot pass through the meshes will work toward the tail and be discharged in the upper part of the orbit of the reel when the hole at the tail comes to be at the lower side of the reel.

While we prefer a cylindrical reel, it is evident that the reel can be made in prismatic form, and the machine will operate on the same principles; but the action of the beaters is more effective when they are equidistant from the cloth at all parts of their rotation.

In using the word "reels" we are aware that the usual meaning of the term applies to bolting-reels rotating on their axes; but we employ the term as the synonym of chambers, because of its familiarity and because they have the form and appearance of reels, although ordinarily they do not rotate; but, if preferred, they may be given both a movement of revolution and rotation.

We have described a feeding-conveyer of four flights. It must be understood that the number of flights should conform to the number of reels. We do not, however, wish to be understood as limiting our claims to the particular device used, as other forms of feeders operating mechanically to feed a reel may be used—as, for instance, a reciprocating plunger arranged to deliver the meal positively into the reels in succession—such as has been used for feeding that class of bolts in which atmospheric air is forced into the interior of the reel, commonly known as "atmospheric" bolts.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In combination with a series of revolving reels, beaters within said reels and gearing for rotating the beaters, a receiving-chamber K', and feed mechanism, substantially

such as set forth, for delivering the feed to said chamber as the reels come successively into position to receive their charge, substantially as set forth.

2. In combination with a series of revolving reels, a receiving-chamber K', a conveyer E, having a series of flights corresponding in number with the number of reels and serving to supply material to the receiving-chamber, a tailings-chamber G, and a conveyer F, serving to deliver the tailings out of the tailings-chamber, substantially as set forth.

3. A series of revolving reels carried around a common shaft, having openings in their heads at the side nearest such shaft, in combination with a feeding-chamber K', arranged to deliver material to the reels above their centers when in the lower part of their orbit, and a tailings-chamber G, arranged to receive the tailings delivered out of the reels below their centers when at the upper part of their orbit, substantially as set forth.

4. In combination with a series of reels revolving about a common axis, beaters within said reels, and gearing, substantially such as described and shown, whereby the beaters are caused to rotate about their own axes while the reels revolve about their common axis.

5. In combination with a series of revolving reels, beaters within said reels and gearing for rotating the beaters, a feeding-chamber K', and a conveyer E, having a corresponding number of flights supplying meal to said chamber, substantially as set forth.

6. The combination of the revolving and rotating beater-shaft, oil-cup attached to the bearing of the beater-shaft, valves, and adjustable bar c for admitting oil to the bearing at the discretion of the operators, substantially as set forth.

7. In combination with a series of reels revolving about a common center, beaters rotating within said reels, pulleys upon the beater-shafts, and the belts arranged to give continuous rotation to the beaters while revolving with the reels, substantially as set forth.

8. In combination with the revolving reels, annular brushes and means whereby they are made to travel longitudinally to sweep the exterior surface of the bolting-cloth, substantially as set forth.

In testimony whereof we hereto sign our names in presence of two attesting witnesses.

CHARLES A. SMITH.
MYRON W. CLARK.

In presence of—

GEO. S. BENNETT,
E. C. BENNETT.