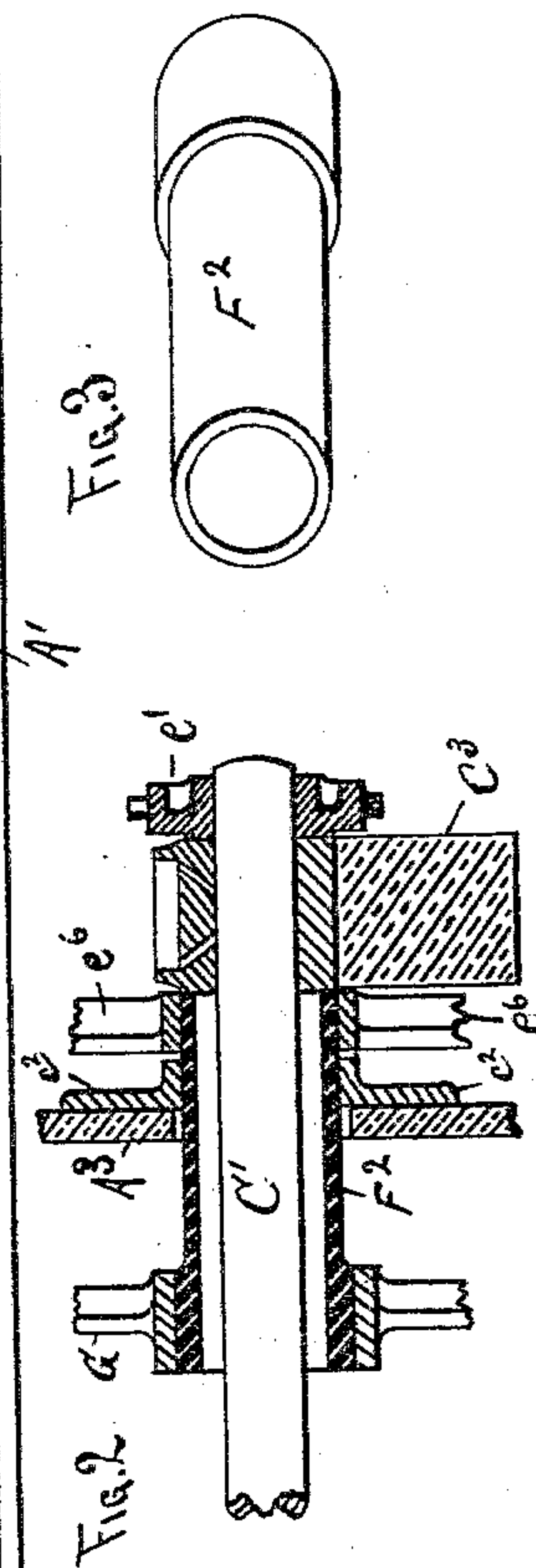
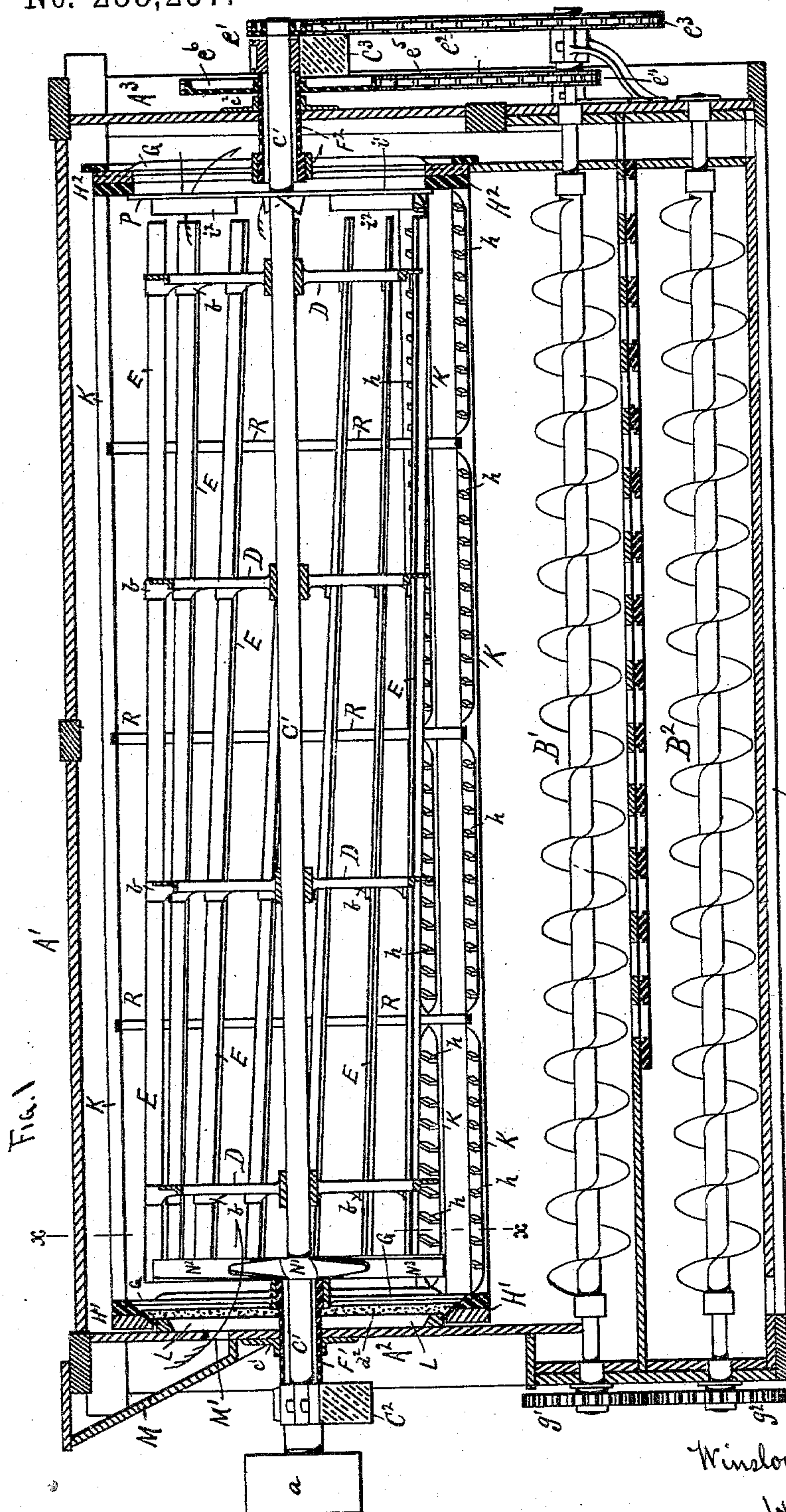


2 Sheets—Sheet 1.

No. 288,257.

Patented Nov. 13, 1883.



WITNESSES.
Lorne Feeder Jr.
Daniel Murphy.

Winslow Page Northway,
INVENTOR, BY
Louis Fraser & Co.
Attys.

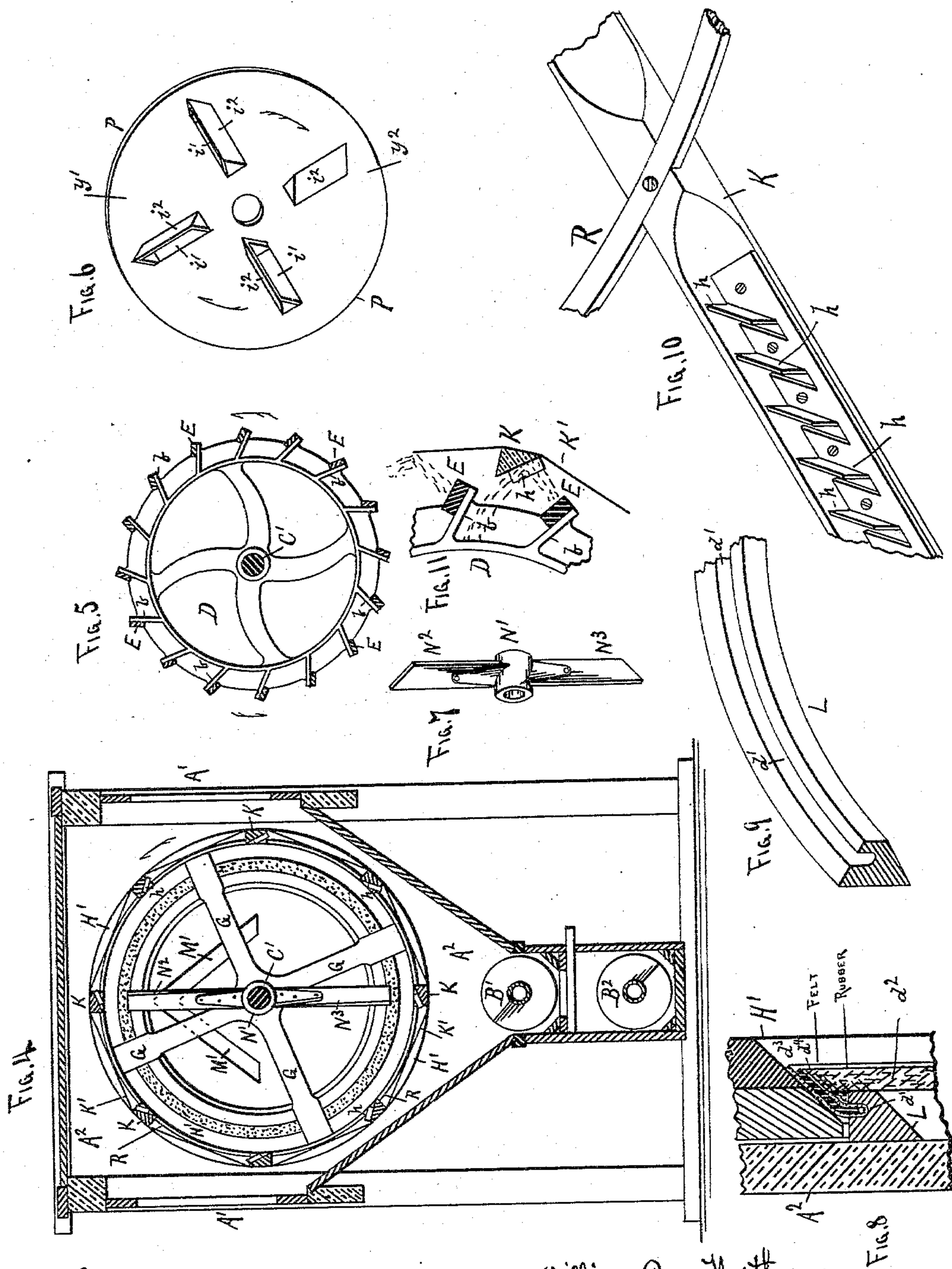
(No Model.)

2 Sheets—Sheet 2.

W. P. NORTHWAY.
CENTRIFUGAL SEPARATOR.

No. 288,257.

Patented Nov. 13, 1883.



WITNESSES.
Louis Fraser Jr.
Daniel Murphy

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UNITED STATES PATENT OFFICE.

WINSLOW P. NORTHWAY, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF TO JOSEPH L. WILFORD, OF SAME PLACE.

CENTRIFUGAL SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 288,257, dated November 13, 1883.

Application filed April 2, 1883. (No model.)

To all whom it may concern:

Be it known that I, WINSLOW PAGE NORTHWAY, a citizen of the United States, and a resident of Minneapolis, in the county of Hennepin, in the State of Minnesota, have invented certain new and useful Improvements in Centrifugal Separators, of which the following specification gives a full, clear, and exact description, reference being also had to the accompanying drawings.

This invention relates to that class of machines used for separating the reduced or partially-reduced particles of grain during the process of milling; and it consists in the construction and arrangement of parts herein shown, and then specifically defined by the claims.

In the drawings, Figure 1 is a longitudinal vertical section of the machine complete. Fig. 2 is an enlarged sectional detail view, illustrating the manner of constructing the journals and bearings of the revolving reel and beater shaft. Fig. 3 is an enlarged detached perspective view of the hollow reel-supporting sleeve. Fig. 4 is a cross-sectional view on the line $x x$ of Fig. 1, with the beater-reel removed. Fig. 5 is a cross-sectional view of the beater-shaft and one of the beater-supporting "spiders." Fig. 6 is a detached perspective view of the "tail-discharge" mechanism. Fig. 7 is a detached perspective view of the feed-distributer. Fig. 8 is an enlarged detail sectional view, illustrating the manner of constructing the packing-rings at the head end of the machine. Fig. 9 is an enlarged perspective view of a portion of the stationary packing-supporting ring. Fig. 10 is an enlarged perspective view of a portion of one of the ribs of the revolving reel, illustrating the manner of attaching the supporting-hoops and feed-flights. Fig. 11 is an enlarged detail view of a portion of the reel and two of the beaters, illustrating more fully their combined action on the material.

A' is the main frame or casing, having the usual screw-conveyers, $B' B^2$, in the lower part, to carry the material away from the machine, and provided with ends $A^2 A^3$.

C' is a horizontal shaft supported by bearing-trees $C^2 C^3$ on the ends $A^2 A^3$, and adapted to be revolved by a belt or other power applied to a pulley, a . Upon this shaft, inside

the casing A' , at suitable intervals, is a series of spiders or frames, D , having angular lugs b upon their rims, to which wooden beater-strips E are secured, the faces of the beater-strips being thus arranged at an inclination to the radii from the shaft C' , as shown in Fig. 5. Each end of the shaft C' , where it passes through the ends $A^2 A^3$, is surrounded by a circular hollow sleeve, $F' F^2$, (see Fig. 3,) the outer ends of these sleeves abutting against the inner surfaces of the bearing-trees $C^2 C^3$, and supported where they pass through the ends $A^2 A^3$ by collars $c' c^2$, attached to the same ends. Secured to the inner enlarged ends of these sleeves $F' F^2$ are radiating arms G , either cast in one piece with the sleeves or formed separately, and adapted to support rings $H' H^2$ upon the outer ends of the arms, as shown.

The outer peripheries of these rings $H' H^2$ are connected to each other by ribs K , for supporting the bolting-cloth K' , the arms G , rings $H' H^2$, and ribs K thus forming a reel supported by and adapted to be revolved with the sleeves $F' F^2$ outside of and independent of the beater-frame.

Upon the opposite end of the shaft C' from the pulley a , outside the bridge-tree C^3 , is a chain-pinion, e' , over which a chain, e^2 , leads to a chain-wheel, e^3 , on the shaft of the upper screw-conveyer, B' , by which means the latter is revolved, while gears $g' g^2$ upon the opposite ends of the conveyer-shafts serve to impart the necessary motion to the under conveyer, B^2 . e^4 is another chain-pinion fast upon the shaft of the conveyer B' , and connected by a chain, e^5 , to a chain-wheel, e^6 , fast upon the sleeve F^2 above. By this arrangement the revolution of the shaft C' is communicated to the conveyer B' , and from thence back to the sleeve F^2 , and by the difference in sizes of the chain-pinions and chain-pulleys the outer bolting-cloth-covered reel is caused to revolve outside the beater-reel in the same direction, but at a greatly-reduced speed, the speeds being ordinarily about fourteen per minute for the reel and two hundred per minute for the beaters. The inner surface of the ring H' is formed in an angular shape, and is adapted to fit over a smaller ring, L , fast upon the end A^2 of the frame A' , as shown in Fig. 8. The outer surface of this ring L is provided with a groove, d' , completely encircling the ring, in which groove a strip of

felt or other suitable material, d^2 , is held by a cord, wire, or other means. The edges d^3 d^4 of this felt strip project out beyond the ring L, and are adapted to lie against the inner beveled surface of the ring H', as shown in Fig. 8, to form a flour-tight packing between the ring H' and end A². A strip of rubber or other material stiffer than the felt will be inserted between the folds of the felt, to cause the latter to bear with greater force against the ring H', and thus increase the efficiency of the packing.

M is the feed-hopper, through which the material is fed to the interior of the machine, and is set upon the end A², above the collar c' , and is connected to the interior of the machine by ports M'.

Attached to the shaft C', just inside the inner end of the sleeve F', is a hub, N', upon which are secured one or more wings, N² N³, set at an angle to the shaft C', and adapted, when revolved with the shaft C', to catch the material as it falls from the ports M' and feed it toward the tail end of the machine, and thus prevent the banking or lodgment of the material at the head end. These wings N² N³ are also aided in their work by the action of the beaters E and the ribs of the reel, as hereinafter shown.

The ribs K, as will be seen, are cut away on their sides opposite to the direction in which they revolve, so that inclined surfaces are formed upon the back of the ribs, to prevent the material being banked up behind them by the action of the beaters.

Attached to the ribs K, on their inclined edges, are a series of small angular flights, h , (see Fig. 10,) which serve to feed the material slowly along from the feed end to the tail end of the machine by the action of the beaters E throwing the material against them. The beaters E catch up the material and throw it against the cloth, and also against the inclined surfaces of the ribs K, this latter action causing the material to be shot in toward the center of the machine, where it is again caught by the beaters and thrown back again against the cloth. This keeps the material flying back and forth all through the machine, and greatly increases the friction, and consequently produces a more thorough separation of the particles. As the reel slowly revolves, the ribs K pass beneath the material, which settles upon the lower section of the reel, and carries a portion around and upward until the inclination of the ribs has reached such a point as to cause the material to fall off and be caught by the rapidly-revolving beaters and thrown by their outward inclination against the cloth K' again, thereby still further increasing the friction. At the same time that the beaters are throwing the material outward they throw it against the inclined flights h , and thereby cause it to move slowly along from the feed to the tail end of the machine. This combined action of the ribs K and beaters E is more clearly shown in Fig.

11, where it will be seen that the beaters E, revolving so much more rapidly than the ribs K, will throw the material against the inclined surfaces of the ribs and cause it to shoot inward toward the center, and then be thrown out again by the revolving beaters. This throwing of the material back and forth by the combined action of the inclined ribs and beaters could be accomplished, to a certain extent, if the beaters E were set in a line radiating from the shaft C', but not to so great an extent as when inclined as shown. The wings N² N³, as before stated, throw the material forward toward the tail end of the machine, where it is caught by the beaters and thrown out against the cloth, the wings, beaters, and beveled surfaces of the ribs K thus acting in conjunction to still further increase the friction upon the material.

In the drawings, the beater-strips E are shown arranged in the usual spiral form; but by using these flights h the ribs E may be arranged parallel with the shaft C', as the flights alone are sufficient to convey the material through the machine. These flights may be arranged upon the ribs K their entire length, as shown in Fig. 1, or only on a portion of their length; or they may be arranged upon the beater-strips E, or partially upon the beater-strips and partially upon the ribs K, or upon the whole length of both, as circumstances or different grades of material may require. These flights, when placed, as shown, on the ribs K, have the effect of detaching or disintegrating flaked or crushed material, which is an additional feature of their usefulness. In Fig. 10 the manner of forming these flights is shown, consisting in cutting L-shaped slits in strips of sheet metal and turning the cut-out portion up to form the flights, and then screwing or otherwise fastening the body of the strip to the ribs K.

The ring H² is covered on the inside with a sheet-metal disk, P, having a number of slots, i' , over which slots angular hoods i^2 , open on one side only, are arranged, so that access can be had to the slots from the open sides of the hoods only. The construction is more clearly shown in Fig. 6, which represents a perspective view of this sheet-metal disk and its slots and hooks detached.

In all forms of discharge in this class of machines with which I am acquainted the exit or discharge is left unprotected; hence a very large percentage of the material which should pass through the cloth K' is thrown by the beaters through the discharge-openings; but by this arrangement the material can only pass through the slots i' while the slots are passing through about one-third of a revolution of the reel, or from y' to y^2 , as shown in Fig. 6, the hoods i^2 covering the slots and preventing the material from passing through them during the remaining two-thirds of the revolution. By this means only a very small quantity of the finer material escapes being forced through

the cloth by the beaters E, while the means of discharge is ample for the coarse material.

The slots i' and hoods i'' may be formed to extend out to the inner surface of the ring H^2 , or to a line even with the cloth K' , and inward close to the shaft C' , and as many slots may be used as desired; but four, as shown, will be a sufficient number ordinarily.

The material, as before described, by the combined action of the beaters E and ribs K, is kept in constant motion all through the machine, and unless it were retarded somewhat by the hoods i'' a large percentage of the material which it is desirable to have pass through the cloth would escape by the tail of the machine; but by my arrangement the material is held back a sufficient length of time for a more perfect and complete separation.

R represents metal hoops embedded into the ribs K, at suitable intervals, to strengthen and stiffen the reel, and prevent twisting when the reel is driven from one end only, as shown.

Having described my invention and set forth its merits, what I claim is—

1. In a centrifugal separator, the combination of a revolving bolting-reel, longitudinal ribs on the interior surface of the reel, having beveled rear surfaces, a series of beaters revolving inside of the reel, in the same direction as and at a greater speed than the said reel, and means for rotating the reel and beaters at different speeds, substantially as and for the purpose herein specified.

2. In a centrifugal separator, a horizontal revolving bolting-reel provided with ribs having beveled rear surfaces, in combination with a series of beaters arranged horizontally in a circle within said reel, and connected to a central shaft, and adapted to be revolved in the same direction and at a greater speed than said reel, and a series of angular flights, h , substantially as described.

3. In a centrifugal separator, a horizontal revolving bolting-reel provided with ribs having beveled rear surfaces, and angular flights h , attached to said beveled surfaces, in combination with a series of beaters arranged horizontally in a circle within said reel, a central shaft, and means whereby said beaters are revolved in the same direction and at a greater speed than said reel, substantially as and for the purpose set forth.

4. In a centrifugal separator, the combination of the beaters, the bolting-reel, the end

ring, H^2 , and the end plate, P, covering the entire end of the bolting-reel between the beater-shaft and the ring H^2 , and provided with radial discharge-slots i' and hoods i'' , covering the several slots on all sides, except at their rear edges, substantially as and for the purpose herein specified.

5. The combination of a revolving bolting-reel provided with ribs having beveled rear surfaces, angular flights h , attached to said beveled surfaces, a series of circularly-arranged revolving beaters within said reel, means for feeding material to said reel, and one or more angular revolving wings, $N^2 N^3$, substantially as set forth.

6. The combination of a bolting-reel, sleeves $F' F^2$, sprocket-wheel e^6 , attached to one of said sleeves, a series of circularly-arranged beaters, E, a central revolving shaft, C' , within said reel, sprocket-pinion e' , attached to said shaft outside of said reel, screw-conveyer B' , sprocket-pinion e^4 , and sprocket-wheel e^3 , attached to the common shaft, and chains $e^2 e^5$, adapted to connect said sprocket wheels and pinions, whereby the parts operate substantially as and for the purpose specified.

7. The combination of a stationary ring, L, having a groove, d' , a flexible packing secured therein, and a revolving bolting-reel, substantially as described.

8. The combination of a stationary ring, L, having a groove, d' , a flexible packing-strip secured in said groove, and a bolting-reel having ring H' , provided with beveled inner surface adapted to revolve in contact with said packing, substantially as set forth.

9. The combination of the reel-ribs K K, sheet-metal strips attached thereto, and flights $h h$, formed from the said strips, substantially in the manner and for the purpose herein specified.

10. The combination of the journal-sleeves $F' F^2$, reel mounted thereon, circularly-arranged ribs K K on the reel, and metallic hoops R R, embedded in the ribs, substantially as and for the purpose herein specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WINSLOW PAGE NORTHWAY.

Witnesses:

C. N. WOODWARD,
LOUIS FEESER, Sr.