No. 641,329. Patented Jan. 16, 1900.

B. G. ROYAL.

GRAIN CLEANING AND SCALPING MACHINE.

(Application filed Dec. 17, 1897.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1

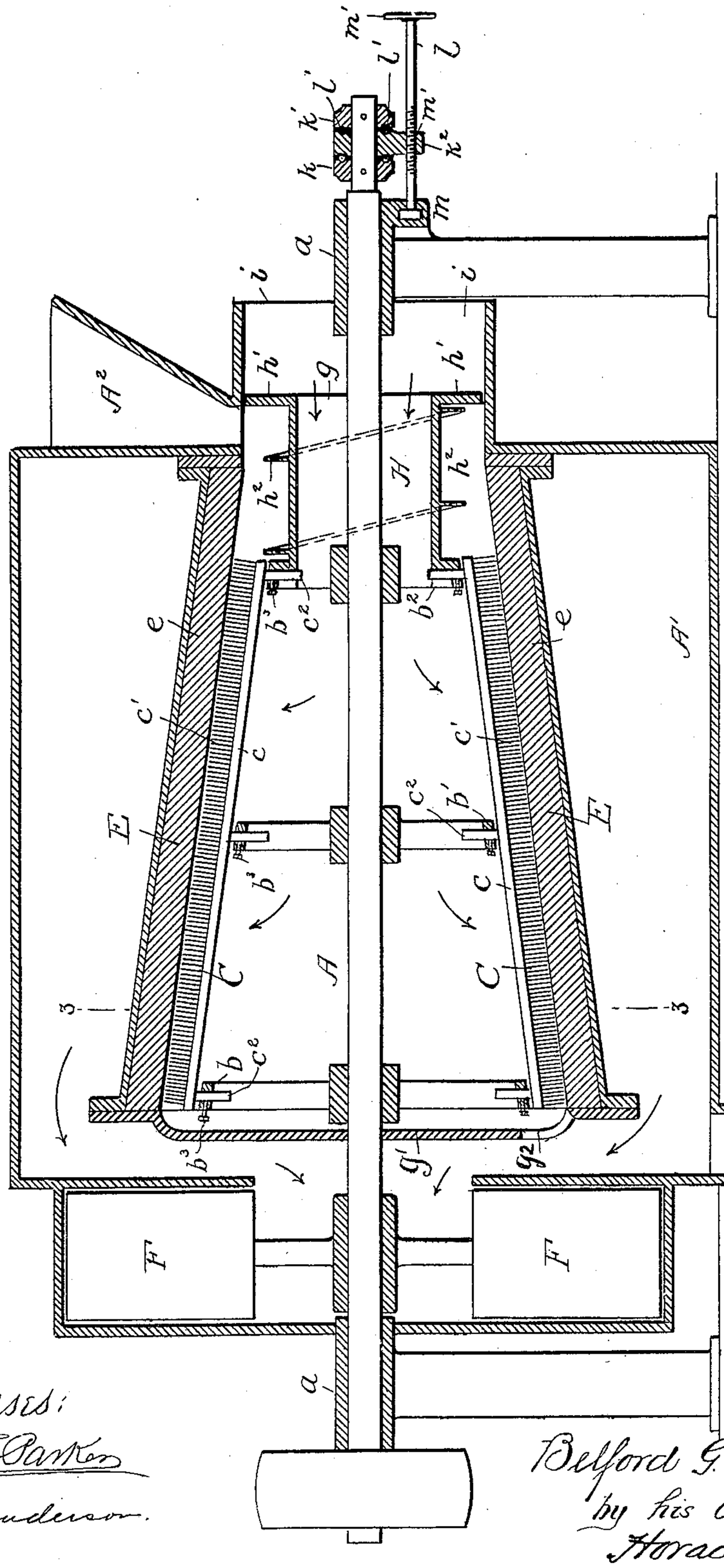

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FIG. 2

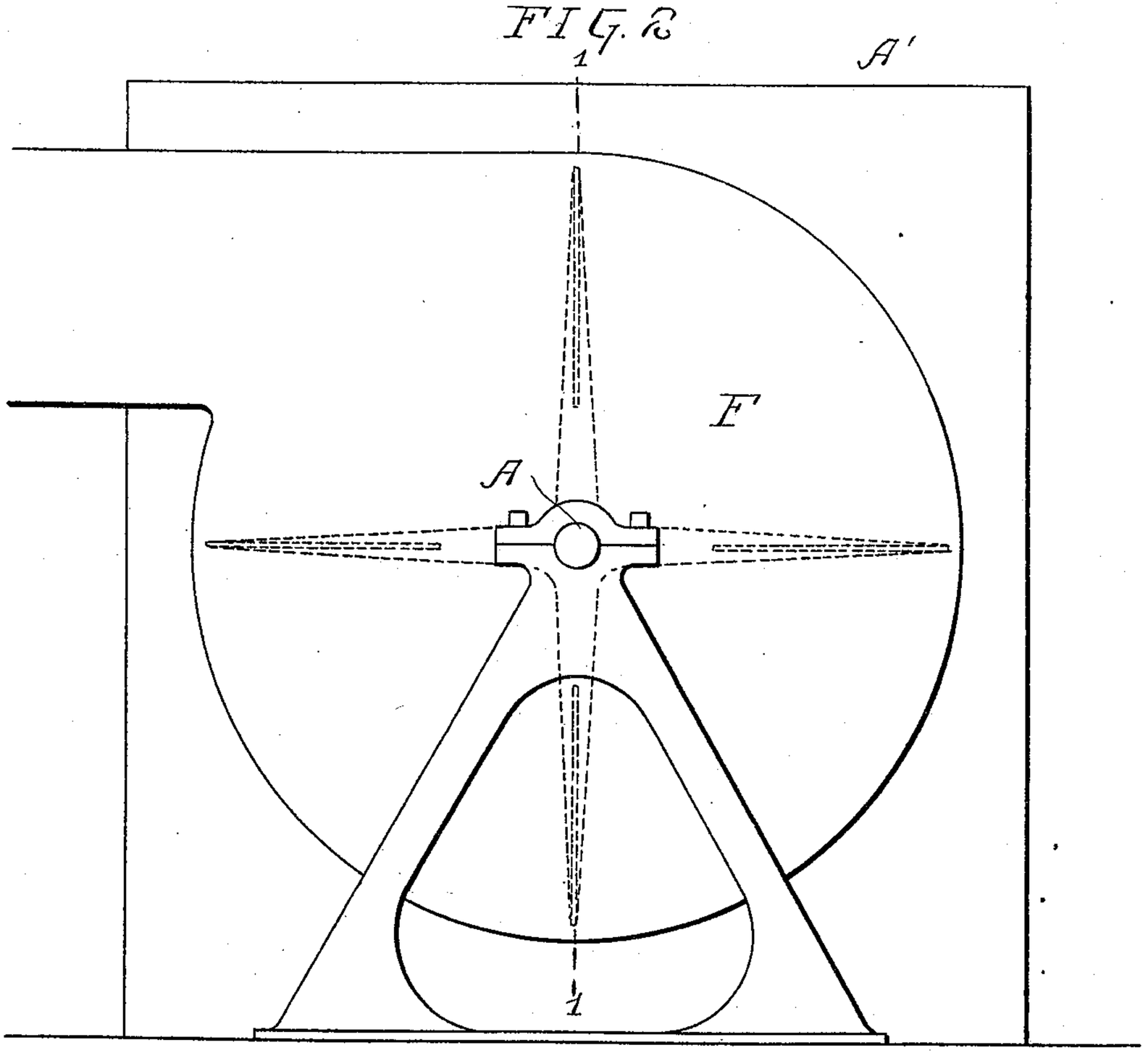

FIG. 3

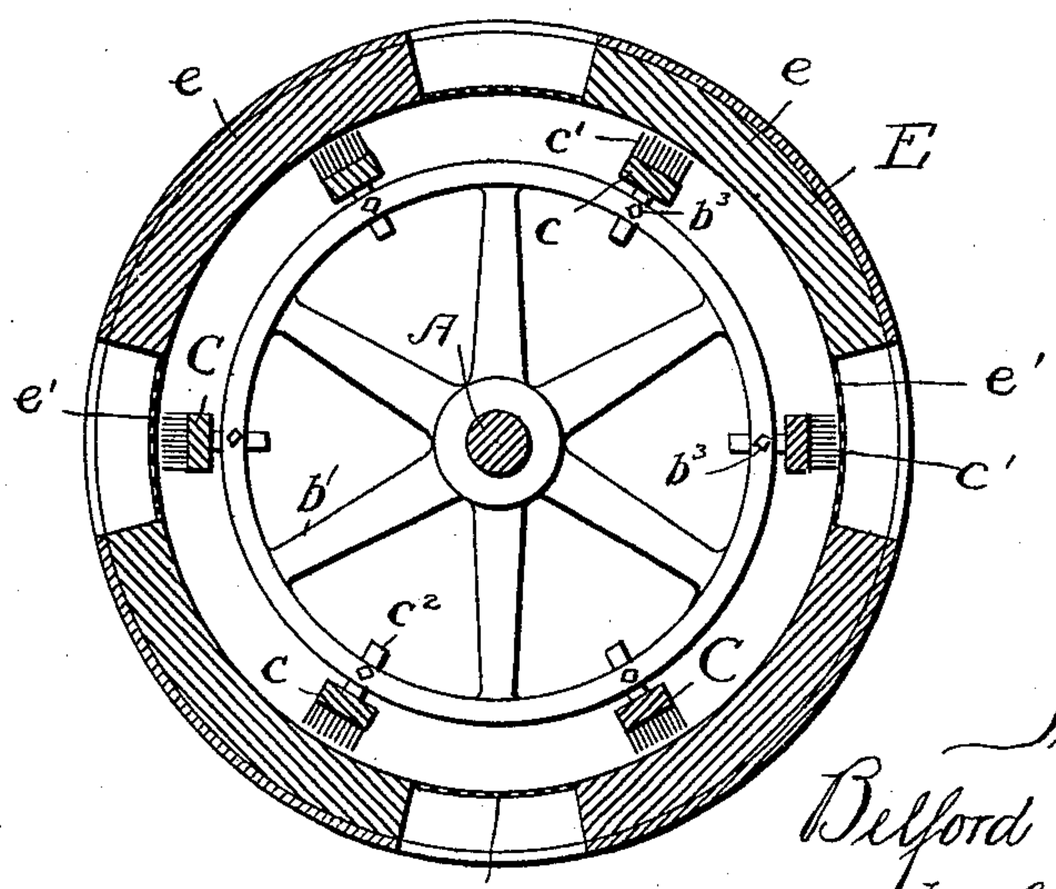

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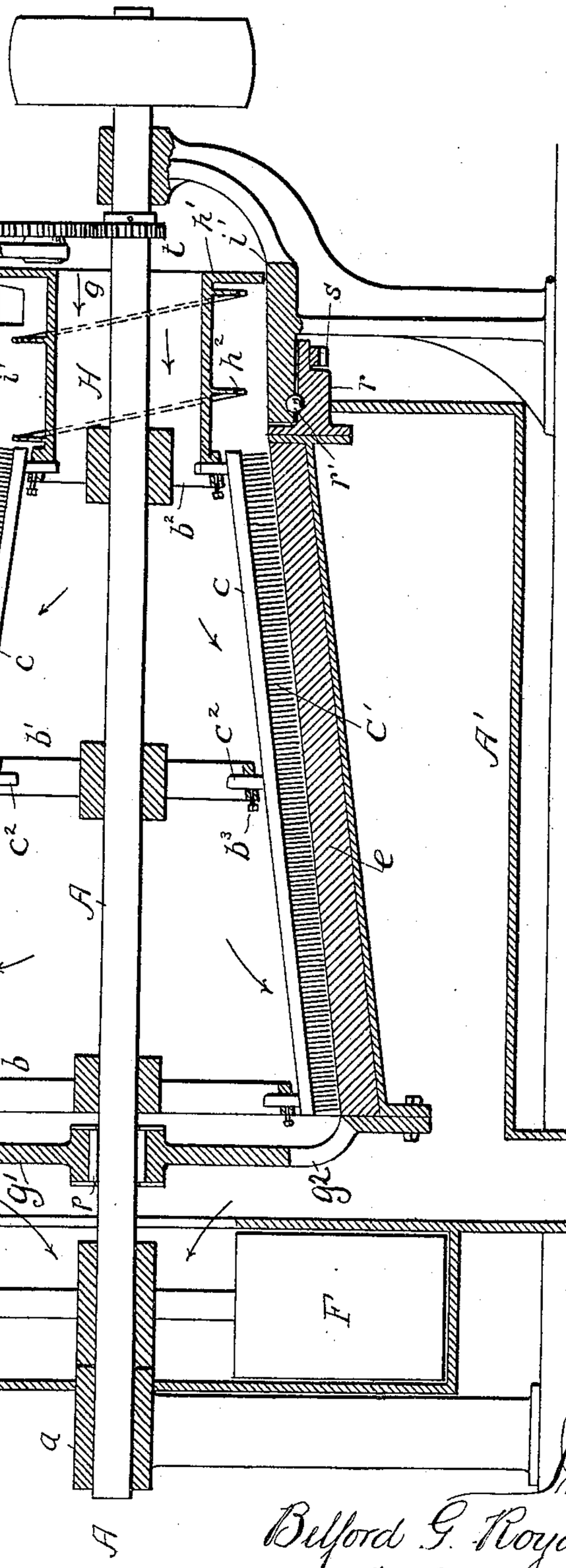
FIG. 4



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UNITED STATES PATENT OFFICE.

BELFORD G. ROYAL, OF CAMDEN, NEW JERSEY.

GRAIN CLEANING AND SCALPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 641,329, dated January 16, 1900.

Application filed December 17, 1897. Serial No. 662,361. (No model.)

To all whom it may concern:

Be it known that I, BELFORD G. ROYAL, a citizen of the United States, and a resident of Camden, State of New Jersey, have invented certain new and useful Improvements in Grain Cleaning and Scalping Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to certain improvements in machines employed for the removal of the hulls from wheat and other cereals, and has for its object to provide an improved machine of this character for effectively hulling and cleaning the grain.

In the accompanying drawings, Figure 1 is a sectional elevation on the line 1 1, Fig. 2, of a grain cleaning and scalping machine constructed in accordance with my invention. Fig. 2 is an end elevation of the same. Fig. 3 is a transverse sectional view on the line 3 3, Fig. 1; and Fig. 4 is a view similar to Fig. 1, illustrating a modification of the apparatus.

Referring to the drawings, A represents a suitable shaft extending through a casing A′ and supported at its opposite ends in bearings *a*. On this shaft are secured three rings *b b′ b²*, situated at equal distances from each other along the length of the shaft, the central ring *b′* being of a diameter less than the diameter of the ring *b*, but greater than the diameter of the ring *b²*. The rings serve to support a series of brushes C, each comprising a backing-piece *c*, from which extend wires *c′*, spaced at such distance from each other as to permit of the admission between them of the smaller diameter of the grain and acting in the nature of carriers rather than brushes. Each carrier or brush is provided with three inwardly-extending pins *c²*, which pass through suitable openings in the rings *b b′ b²* and are adjustably secured therein by set-screws *b³*, the object of this construction being to permit of the adjustment of the various carriers to a greater or less distance from the center of the shaft A. This structure forms what may be termed an "open cylinder," tapering in its length from the greater diameter *b* to the lesser diameter *b²*.

Surrounding the carrier-cylinder is a cylinder E, formed of alternately-arranged abrading-stones *e* and concaved strips of wire-gauze or foraminous sheet metal *e′*, the openings or perforations of which are sufficiently large to permit the passage of any particles of hull or dirt which may be removed from the surface of the grain, but not being large enough to permit the passage of any of the grain being treated.

The whole structure is inclosed within the casing A′, from which is an outlet to the eye of a fan F, mounted on the shaft A, and the air-currents induced by such fan after entering through the open end *g* of the carrier-cylinder traverse the space between the carrier and the openings in the perforated material *e′*, and from thence to the fan, any direct flow of air being prevented by a disk *g′*, inclosing the end of the cylinder E. The disk *g′* has located at or near its lower end a discharge-opening *g²* for the exit of the cleaned grain.

Secured to the ring *b²* is an air-tube H, open at both ends and provided at its outer end with a circular flange *h′*, which fits within a cylindrical portion *i* of the casing A′ and serving to prevent the entrance of any considerable quantity of air to the interior of the casing except through the tube H. The periphery of the tube is provided with a helix *h²*, which catches the grain delivered into the machine through the hopper or spout A² and feeds the same forward until it is caught by the carriers or brushes C and is thrown by said carriers or brushes into contact with the abrading-stones.

To effect the adjustment of the carriers with respect to the cylinder E, the set-screws *b³* and pins *c²* may be brought into play and each of the carriers be separately adjusted to the required position. This separate adjustment, however, is usually necessary only when the parts of the machine are first assembled or when it becomes necessary to supply new carriers.

To provide for the simultaneous adjustment of all of the brushes, the end of the shaft A is provided with two fixed collars *k k′*, between which is placed a third collar carried by a threaded spindle *l*, and ball-bearings *l′* are provided between the adjacent faces of the collars in order to prevent excessive friction during

the operation of the machine. One end of the spindle *l* is swiveled in a box *m*, arranged on one of the shaft-bearings or on a casing, and its opposite end is provided with a handle *m'*, so that it may be readily turned. A depending portion of the collar l^2 has a threaded orifice m^2 for the reception of the threaded spindle *l*, so that when said spindle is turned the shaft, with its rings and carriers, may be moved longitudinally in either direction, and owing to the tapering of the cylinders the outer faces of the carriers will be moved nearer to or farther from the abrading-surfaces, thus securing great delicacy of adjustment.

In operation the wheat entering through the hopper or spout A^2 is immediately acted upon by the helix h^2 and forced toward the end of the carrier-cylinder, where it is caught by the rapidly-revolving carriers and by them thrown against the abrading-stones. The grain is propelled from the smaller feeding end of the cylinder to the larger discharge end of the same by two forces. Owing to the tapering of the cylinder the upper surface of the lower abrading-stone lies in the inclined plane down which the grain tends to roll or slide by the action of gravity. As the diameter of the carrier-cylinder at the discharge end is greater than at the feed end, the surface speed at the larger end will be greatly in excess of that at the smaller end, and consequently the centrifugal force will be augmented at the larger end and will in a measure tend to draw the grain from the smaller to the larger end. The feeding of the grain and its transit from end to end of the machine are even and regular, and sufficient time is permitted during the travel of the grain to effect its thorough cleaning. Any particles of hull or dirt which may be removed from the grain are caught by the currents of air entering through the air-pipe H and are carried out through the perforations in the sections *e'* of the cylinder E and from thence around to the discharge-fan.

The different classes of grain, such as hard and soft, require different treatment—as, for instance, the hard grain would stand considerable rubbing without deterioration, while the softer grain wound not stand so much. Consequently some care must be exercised in providing for the proper feeding of the material through the machine, and the centrifugal force used for forcing the wheat into contact with the abrading-stones must be regulated by reducing or increasing the speed of rotation. To accomplish this and yet provide for the proper cleaning of the wheat, I modify the apparatus, as shown in Fig. 4. Referring to Fig. 4, the abrading-cylinder E' is provided at one end with roller-bearings *p*, encircling the shaft A, and at the opposite end has a flange *r*, extending around the cylindrical portion *i'* of the casing, there being between the two a ring of antifriction-rollers *r'* to enable the easy rotation of the cylinder E'. On the flange *r* is a gear-wheel *s*, connected by a train of gearing S to a pinion *t* on a shaft A, the arrangement being such that the rapidly-revolving shaft A will rotate the cylinder E' in a direction opposite to that of the rotation of the shaft A and at a much less speed. This arrangement gives, in effect, a series of carriers revolving at a speed sufficient to impart to the grain enough centrifugal force to carry it into contact with the abrading-stones, while the abrading-stones revolving in the opposite direction act more effectively on the wheat than they would if stationary. Such a machine may be effectively employed in cleaning hard wheat, and by changing the gears the speed of rotation of the abrading-cylinder may be increased or diminished, while the speed of rotation of the shaft A remains constant.

For the cleaning of the softer varieties of wheat or of other grain the centrifugal force should remain about the same, but the abrading contact should be considerably lessened. To accomplish this, the gearing is changed by the substitution of three wheels for the four wheels in the train of gears shown in Fig. 4, and the cylinder E' is rotated in the same direction as the carrier, but at a much less speed, the result being that the extent of abrading contact is reduced to suit the character of the grain, while the centrifugal force necessary to throw the grain against the stones is maintained. This effect will be gained by driving the cylinder either directly from the shaft A or from another source of power, by which the shaft may be readily turned in either direction and at any desired rate of speed. The cleaning effect will in all cases remain the same, and owing to the vast amount of air-space given for the passage of currents of air between the carriers the broken hulls and dirt will be effectively carried off. In some cases the carriers or brushes have been arranged in cylindrical form and a space between adjacent brushes filled up with wire-gauze or perforated metal; but I find in practice that in such a construction the volume of air is divided into such minute streams or currents as to considerably reduce its effectiveness, and for this reason I have in the present apparatus used the carriers without intervening material of any kind to retard or diminish the flow of air.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a grain-cleaning machine, the combination of an outer casing open at one end, an exhaust-fan, F, located at the opposite end, a tapering cylinder, E, composed of alternately-arranged abrading-stones and foraminous material open at one end, a disk, *g'* adapted to partially close the opposite end of the cylinder, a discharge-opening, g^2, provided in said disk, a longitudinally-disposed driving-shaft running centrally through the abrading-cylinder, a series of rings, *b*, *b'*, b^2, supported on

spider-arms carried by the driving-shafts, a series of longitudinally-disposed brush-carriers supported on said rings, dowel-pins, c^2, formed on said carriers adapted to openings in the rings, set-screws, b^3, for securing the same in an adjusted position, a feed-hopper located in the outer casing, and a hollow cylinder, H, having a feed-screw, h^2, on its outer periphery located in the open end of the abrading-cylinder for feeding the grain to the carriers, substantially as described.

2. The combination of the outer casing having an opening at one end, an exhaust-fan located in the other end, a centrally-disposed driving-shaft, a series of rings, b, b', b^2, supported on spider-arms carried by the driving-shaft, a series of inclined brush-carriers adjustably mounted on said rings, an abrading-cylinder surrounding said carriers open at the feeding end, a discharge-opening in the closed end, and a hollow feed-screw located in the open end of the cylinder thereby leaving a central draft-opening through the machine, substantially as described.

In witness whereof I have hereunto set my hand this 2d day of December, A. D. 1897.

BELFORD G. ROYAL.

Witnesses:

EDMUND S. MILLS,

HORACE PETTIT.