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MACHINES FOR HULLING GRAIN.

No. 178,108. Patented May 30, 1876.

Fig. 1.

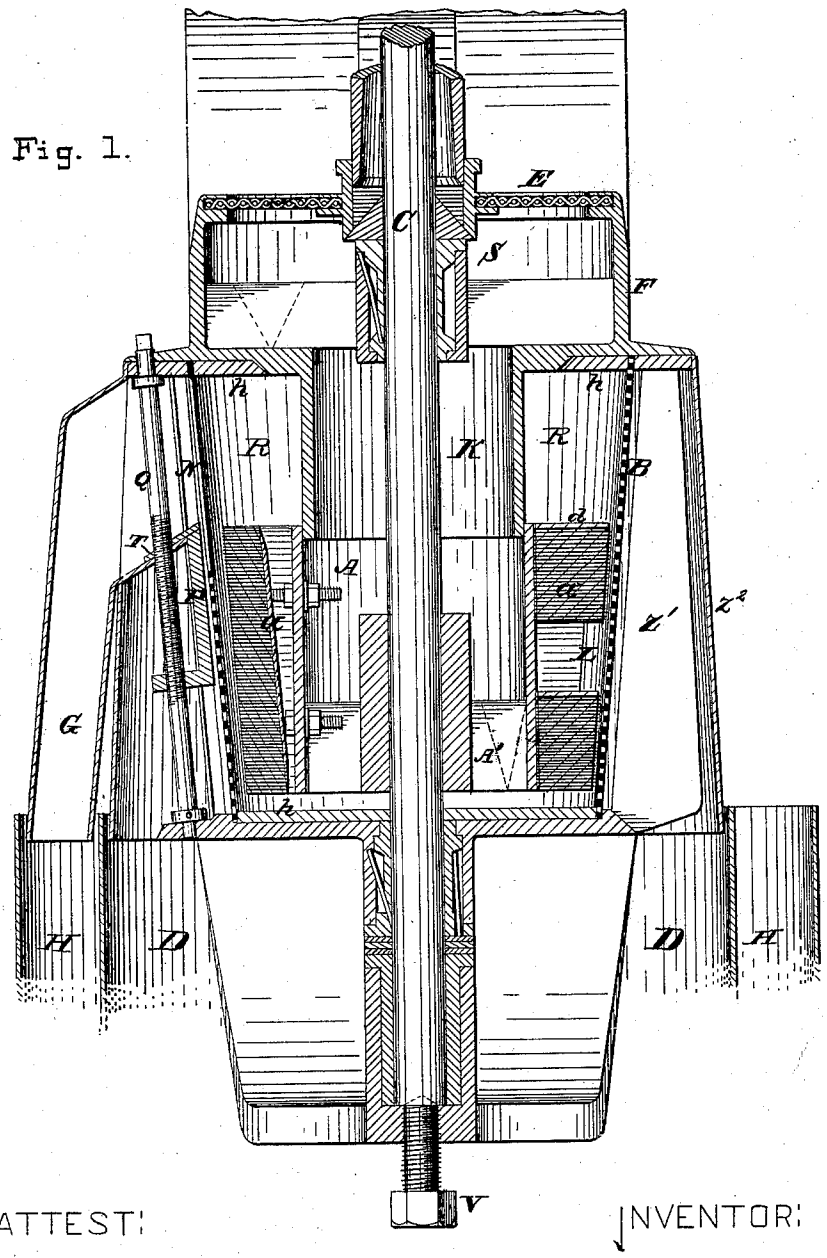

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Fig. 2.

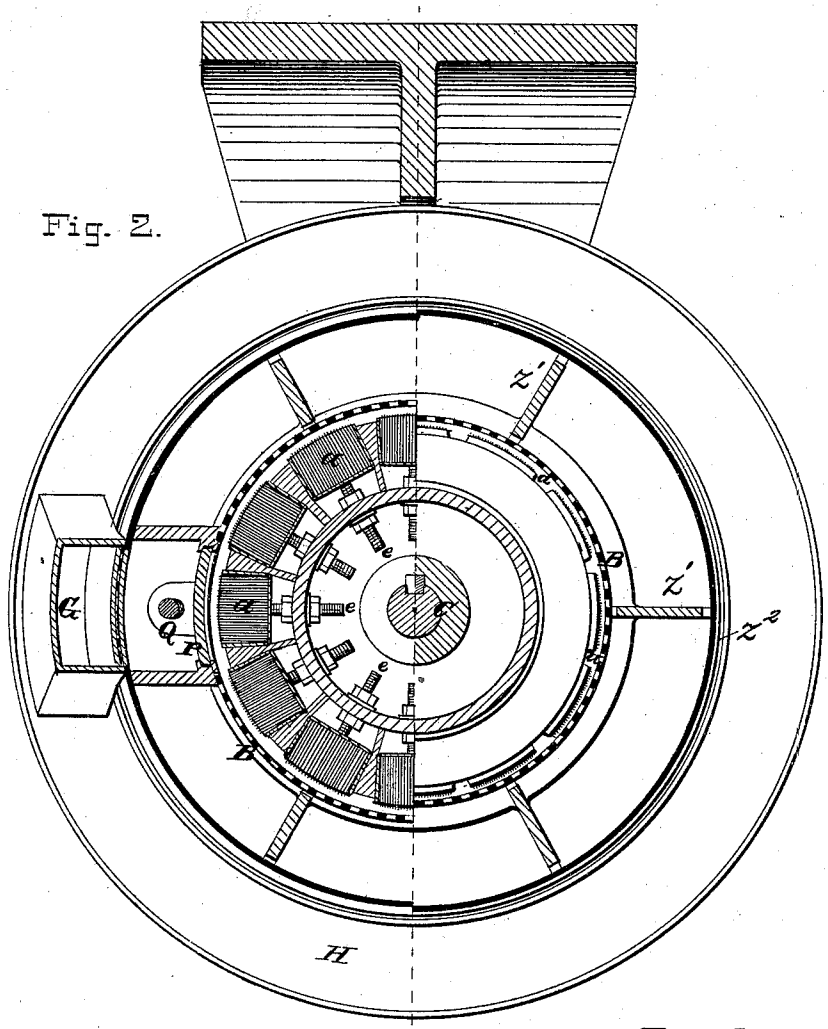

Fig. 3.

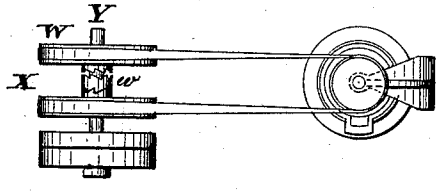

Fig. 4.

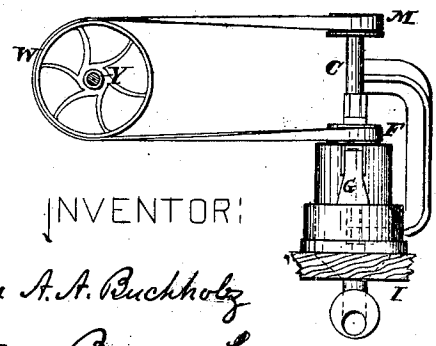

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Fig. 5.

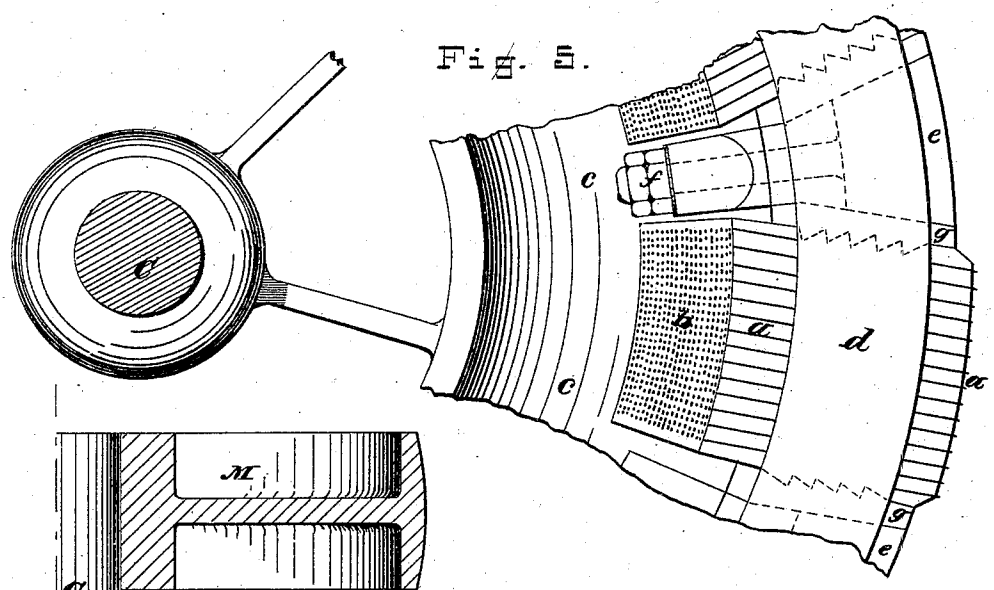

Fig. 8.

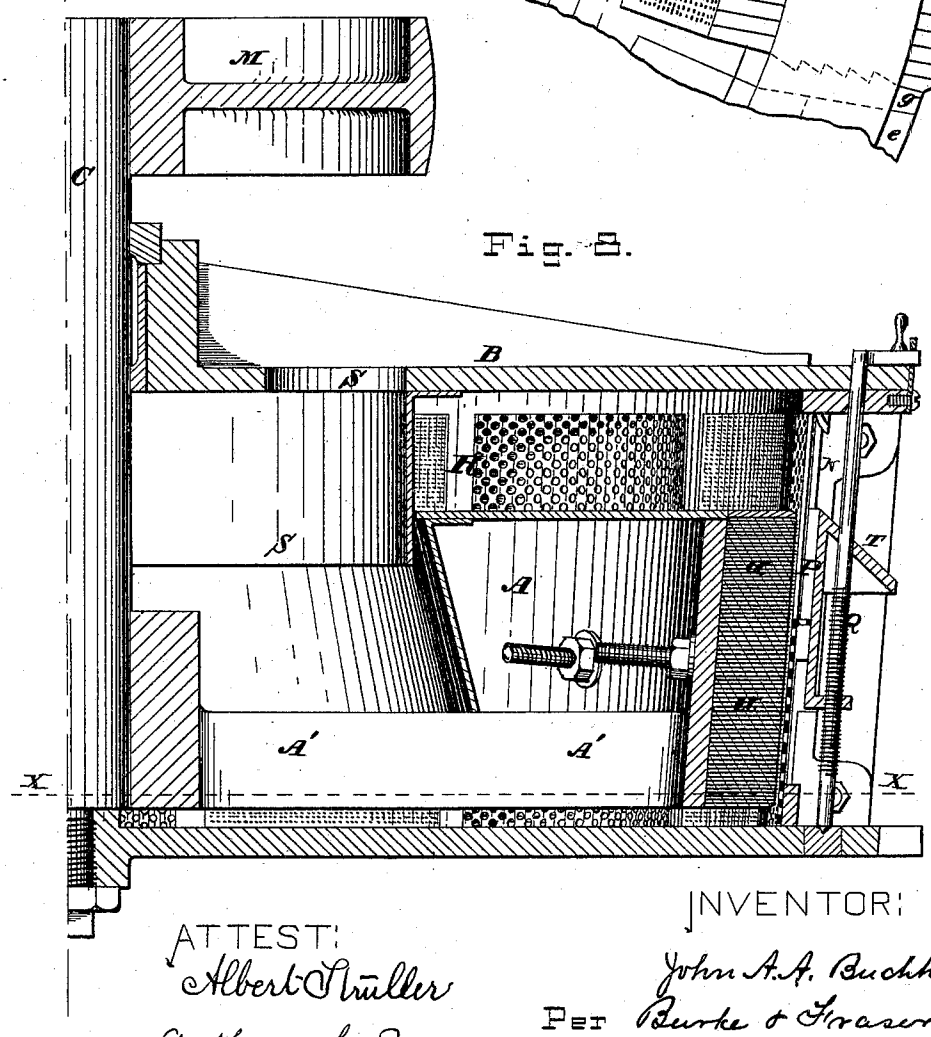

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Fig. 6.

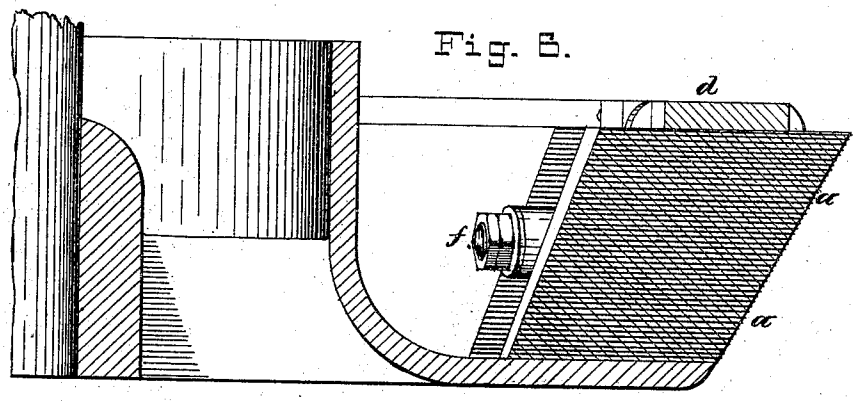

Fig. 7.

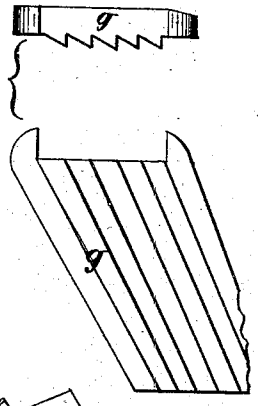

Fig. 8.

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Fig. 10.

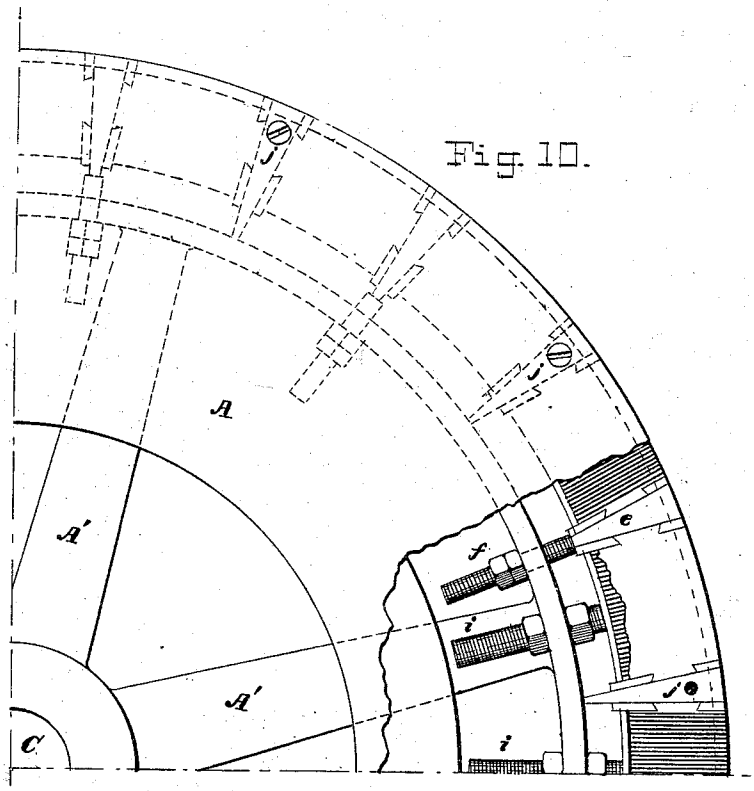
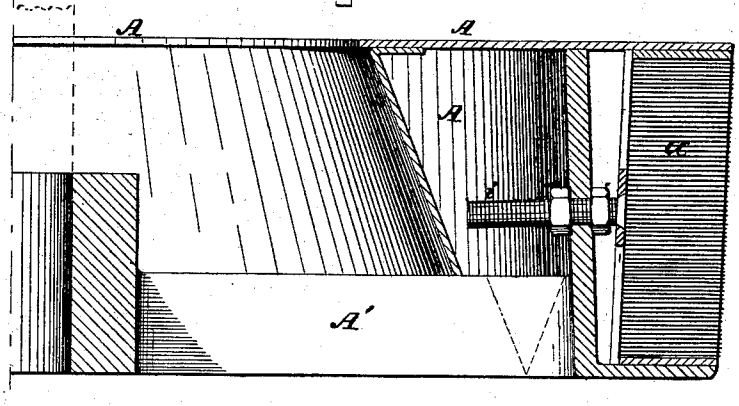


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHN A. A. BUCHHOLZ, OF HAMMERSMITH, ENGLAND.

IMPROVEMENT IN MACHINES FOR HULLING GRAIN.

Specification forming part of Letters Patent No. **178,108**, dated May 30, 1876; application filed January 20, 1876.

To all whom it may concern:

Be it known that I, JOHN AUGUST ARNOLD BUCHHOLZ, of Hammersmith, in the county of Middlesex, England, have invented certain Improvements in Machines for Hulling, Polishing, Cleaning, and Dressing Grain, &c., of which the following is a specification:

My invention relates to that class of machines in which one drum, conical or partly conical, is arranged to revolve within another of similar shape, or both may revolve, or either be a fixture.

The invention consists partly in the arrangement and construction of the machinery for rotating the drums, whereby both may be revolved in opposite directions simultaneously, thus increasing relatively the peripheral velocities and enabling me to adapt the principle to small mills, as will be more fully set forth.

Another feature consists in the arrangement, in connection with drums constructed as herein shown, of a sliding gate or gates, whereby a "head" or pile of grain may be retained within the mill, for purposes to be more fully set forth hereafter.

Another feature of the invention consists in constructing the rubbing or decorticating surfaces of the drum of wires and some yielding material, formed into segmental blocks, as will be described.

In the drawings, Figures 1 and 2 are, respectively, vertical and horizontal sections, illustrating my improved machine; and Figs. 3 and 4 are, respectively, a plan and elevation on a small scale, showing the gearing for driving the same. Figs. 5 and 6 are, respectively, a plan and vertical section on a larger scale, showing the construction of the decorticating-blocks and their connection with the inner drum; and Fig. 7 illustrates in detail the serrated plates for embracing the decorticating blocks or segments. Fig. 8 is a vertical section, and Fig. 9 is a horizontal section, taken in the plane of the line *x x*, Fig. 8, illustrating, on a larger scale, a modification of Figs. 1 and 2. Figs. 10 and 11 are, respectively, a plan and vertical section, designed to illustrate a modified form of the device shown in Fig. 5.

Let A represent an inner and B an outer drum, both conical or tapering, and corresponding in contour. These are mounted on a vertical shaft, C, having bearings in a suitable frame. The inner drum A is keyed to the shaft C, and revolves therewith, but the outer drum B turns loosely upon the said shaft, and is provided with a pulley, *f*. The drums are arranged to revolve in opposite directions, and the method of driving them is fully illustrated in Figs. 3 and 4. Mounted upon the top of the central shaft C is a pulley, M, and on a horizontal driving-shaft, Y, are two loose pulleys, W and X, having between them an ordinary double clutch, *w*, of any suitable kind, arranged to slide on a spline on the shaft Y. A single endless belt passes around the two driving-pulleys W X, and around the pulleys M and F on the spindle C and drum B, respectively. By this device the pulleys W X may either one become the driver for the time being, and the drums A B, which always revolve in opposite directions, be driven in either direction at will by simply shifting the clutch. The pulleys M and F may be of the same size or of different sizes; and by loosening either of them from its drum, that drum may be kept fixed.

The object of rotating the drums in opposite directions is to enable me to use drums of small diameter for small mills. The angular velocity with which the drums may be rotated is often limited, practically, and with small drums the peripheral velocity would not be sufficient if one drum was fixed. But where both revolve in opposite directions, the hulling effect is doubled. Where the drums are large it may only be necessary to revolve one, usually the inner. The outer drum B is here shown as formed of perforated metal, clamped at top and bottom between disks or plates *h h*, so that it can be readily removed for the substitution of screens or drums having larger or smaller perforations to suit the grain or seed being operated upon. Z^1 Z^1 are a series of fan-blades, which may be affixed to an outer jacket, Z^2, or to the outer drum, and serve to draw the floating dust through the drum and deposit it in a receptacle, D, below.

Referring to Figs. 5 and 6, the rubbing or decorticating surface of the inner drum A is built up of segmental blocks, constructed as follows: Wires *a a*, preferably of steel, are

cut to the proper length and laid side by side upon a sheet of rubber, or similar yielding material, *b*, which I denominate "packing." Another sheet of packing is then laid upon this, the wires and packing alternating, until a block of sufficient size is formed. In building the blocks care must be had to let the ends of the wires *a a* project slightly beyond the packing, and to arrange them so that their ends will form the proper slope for the contour of the coned drum, as shown in Fig. 6. The bottom of the drum consists of a circular plate, *c*, and the blocks are arranged around the outer edge of the same to form the walls, as shown. The blocks or segments are embraced between plates *g g*, serrated on one side and smooth on the other, the serrated faces being placed next the outer packing-layers of the blocks. The general form of these plates is clearly shown in Fig. 7. Between the adjacent blocks or segments, all around, are placed wedge-shaped blocks *e e*, provided with screws and nuts *f f*, which latter abut against suitable provisions on the plate *c*, and enable the wedges to be drawn in radially. This operation causes the serrations in the plates *g g* to bite into the packing *b*, and compress all into a compact mass. A cap-ring, *d*, is then put on and secured firmly to the base plate or ring *c*.

The above description relates more particularly to the application of wire blocks to the inner drum; but the outer drum might also be constructed partially of blocks built up in the same manner, as illustrated in the modification shown in Figs. 8 and 9. In this construction of the outer drum spaces must be left between the wire blocks, as at U, to be formed of perforated metal or wire-gauze.

In carrying out my invention it is not absolutely necessary to fix the blocks in place by means of wedges *e e*, as the spaces they occupy may be filled with a cement composed of emery and alum. The wedges, however, are preferable, and in Fig. 10 I have shown a modified form of the same, in which only alternate wedges are movable, the others, *j j*, being fixtures. The nuts and bolts *i i* assist in securing the blocks.

Referring to Figs. 1 and 8, an aperture, N, is formed in the wall of the drum B, and a gate, P, provided with a sloping lip, T, is arranged to slide up and down over said opening, so as to increase or diminish its area. The gate is operated by providing a fixed nut on the same, and a screw, Q, journaled at both ends, engaging said nut, so that, by turning said screw, the gate, (which always forms the lower side of the opening N,) may be raised and lowered, thus practically regulating the height of the opening above the bottom of the drum B.

The object of this device will be best illustrated by describing the operation of the mill.

The drums are set in rapid motion, and the grain is admitted at the opening S, which may be covered by a sheet of coarse wire-gauze, E, whence it falls to the bottom of the drum B, passing through the drum A. The centrifugal force of the rotating drum, assisted by the radial arms A′ A′ of the same, which are angular in section, and act as fans, causes the grain to be thrown to the periphery. It then rises between the two drums, and is decorticated in its upward passage to the opening N, where it escapes over the gate P, and down the sloping lip T. Thence it is guided down an outlet-spout, G, affixed to the outer drum, and traversing a fixed annular chamber, H, which latter leads the grain into a suitable hopper or vessel below, as at I, in Fig. 4.

As before stated, the gate P may be adjusted to any height, and above the top of the drum A, so as to retain a portion of the grain in the annular chamber R, between the inner cylinder K and the outer wall of the drum B, so as to form a yielding "head" or pressure upon the grain being decorticated. Thus the gate P serves to regulate the pressure upon the uprising column of grain being hulled, and to retard its upward travel, thus governing the time it remains under the action of the decorticating-surfaces.

It is this principle of retaining a yielding pile of grain above the level of the decorticating-surfaces to retard the upward passage of the grain being acted upon, and prevent its too early escape by arranging the exit or exits N above the said level, that forms one of the most important features of my invention, and it is this construction I desire to claim.

By this arrangement the trituration the grains or seeds receive by reason of their frictional action on each other conveys to them a high degree of polish, which is very desirable.

For hulling and cleaning rice I prefer to rotate both drums; but for some grains it may be preferable to rotate but one.

The decorticating-blocks may extend the whole height of the drum A, as shown on the left of Fig. 1, or the central part may be omitted to form a grain-pocket, as at L, on the right of the same figure.

The width of the angular space between the drums A and B will depend upon the sizes of the grains to be operated on, and may be regulated and adjusted by means of a set-screw, V, acting against the lower extremity of the spindle C, to raise or lower it.

When blocks to form decorticating-surfaces are placed at intervals in the walls of the outer drum, as in Fig. 9, they may be formed of steel blades, preferably set at a little distance apart; but they may be embedded in cement.

I am aware that steel blades for this purpose are not new, and I do not claim them; but they may sometimes be used to advantage in connection with my improved wire blocks.

I claim—

1. In a hulling-machine, the combination of an inner drum, A, having a decorticating-surface formed of wire blocks, an outer drum, B,

provided partially or wholly with a perforated wall to permit the escape of dust, and a sliding gate, P, arranged to slide in grooves secured to the outer drum, and regulate the apertures N, when all are arranged to operate in connection, substantially as set forth.

2. The adjustable gate P, provided with a lip, T, the screw Q, and outer drum B, having an aperture, N, when combined and arranged to operate as and for the purposes set forth.

3. The segmental blocks, forming decorticating-surfaces, composed of alternate layers or strata of steel wires and packing of some yielding material, substantially as set forth.

4. The combination, in a hulling-machine, of two drums, A and B, wholly or partly conical, the inner provided with a decorticating-surface, and both mounted upon one vertical shaft, C, and arranged to revolve in opposite directions, as set forth.

5. The driving mechanism, consisting of the loose clutch-pulleys W X, clutch *w*, pulleys M and F, and an endless belt, as shown, in combination with the shaft C and drums A B, all arranged substantially as shown.

6. The combination of the inner drum A, outer perforated drum B, fan wings or blades Z^1, fixed jacket Z^2, chamber D, and annular chamber H, all arranged to operate substantially as set forth.

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