July 14, 1931. E. McKAIN 1,814,398

GRAIN HULLER

Filed Sept. 24, 1927 2 Sheets-Sheet 1

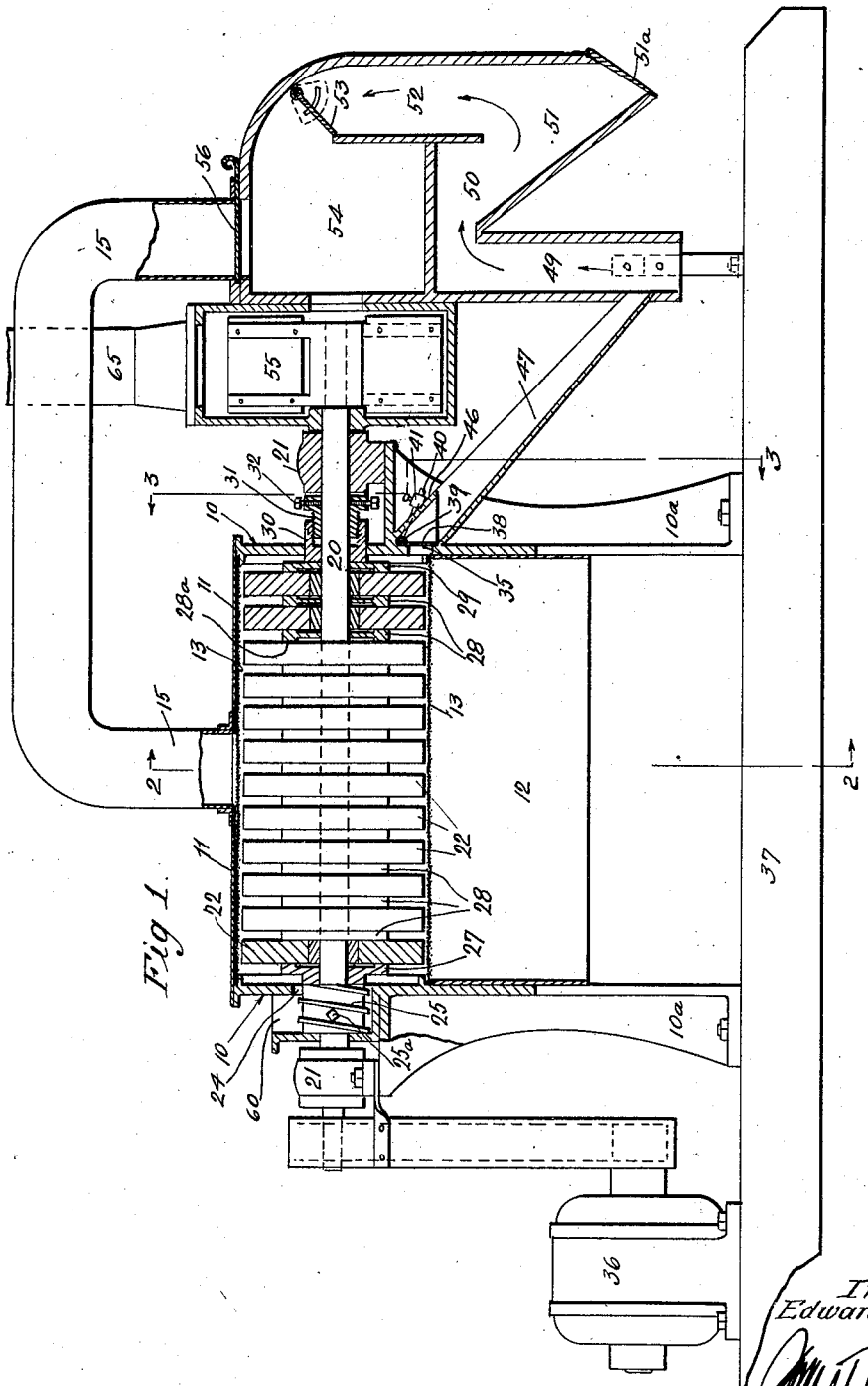


Fig 1.

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Filed Sept. 24, 1927 2 Sheets-Sheet 2

Fig. 2.

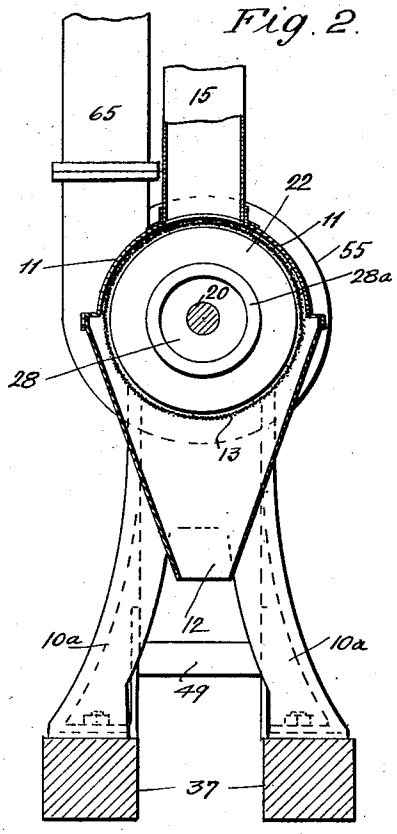


Fig. 3.

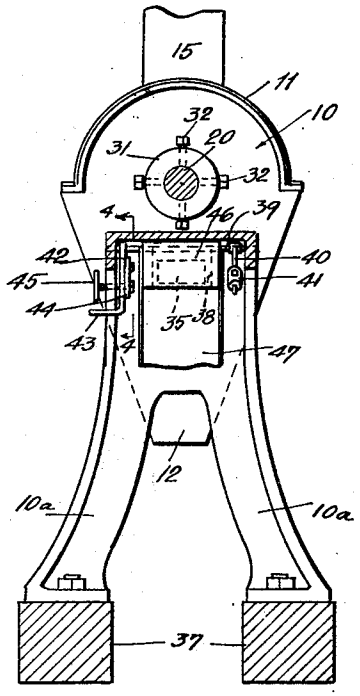
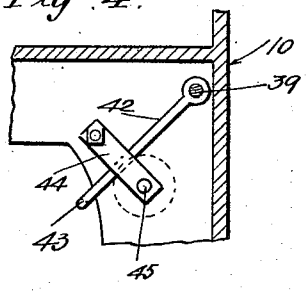


Fig. 4.



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UNITED STATES PATENT OFFICE

EDWARD McKAIN, OF LOS ANGELES, CALIFORNIA

GRAIN HULLER

Application filed September 24, 1927. Serial No. 221,642.

This invention relates to grain hullers and the like; it being a primary object to provide a simple, inexpensive and efficient machine for hulling grain and similar material. It will be understood that the invention is applicable to the removal of the hull, or outer shell or coat, of material other than grain; but the present specific embodiment of the invention having been designed particularly for operating upon such grain as barley, the machine will be described in that connection, but without necessary limitation thereto.

The invention itself will be readily understood, without the necessity of any preliminary description, from the following detailed description of the present preferred and specific form; reference for this purpose being had to the accompanying drawings in which:—

Fig. 1 is a vertical, longitudinal section of a complete machine in accordance with the invention;

Fig. 2 is a cross-section on line 2—2 of Fig. 1;

Fig. 3 is a cross-section on line 3—3 of Fig. 1; and

Fig. 4 is an enlarged detail section on line 4—4 of Fig. 3.

In these drawings I show a frame and casing made up of end members 10 which are prolonged below to form supporting legs 10*a*. These end members 10 form the end walls of a casing. What I refer to as the outer casing of the machine is made up of these end walls and a semi-cylindric cover 11, and a bottom casing 12 which is open to atmosphere at its lower end. What I term the inner casing of the machine is made of the end members and a perforate cylindric wall 13, extending between the end walls 10 and within which the abrasive wheels of the device are mounted. The cylindric perforate wall 13 may be composed of any suitable material, as for instance, of screen with a mesh of proper size. The screen is of such mesh that it will pass the finer hull particles but will not pass the hulled grain. This perforate wall may be fairly close to the upper cover 11, and the suction applying pipe 15 is applied to cover 11. The action of suction, thus applied to the outer casing of the device, is to draw the finer particles of the separated hull through the screen and thus to effect a partial separation of the released hull from the hulled grain, leaving the coarser pieces and particles of hull to be separated as hereinafter described.

Within the machine is a longitudinal shaft mounted in suitable bearings 21 supported by the end members. This shaft extends through the casing concentrically with the cylindric perforate wall 13; and it carries a plurality of spaced abrasive wheels 22 whose peripheries lie close to screen 13. At the feed end of the machine one end member 10 is provided with a feed opening 24 through which the grain is fed by the action of a screw 25 set upon the shaft 20. This screw 25 is set solidly upon the shaft, as for instance, by a set screw 25*a*, so that it not only revolves with the shaft, but also forms a fixed abutment to take the end pressure of the assembled wheels and spacers. The preferred method of assembly is to place an end thrust plate 27 on the shaft against the screw 25, the first wheel 22 being placed against this plate 27. Then the successive wheels in the assembly are alternated with spacer plates 28. At the right-hand side of the last wheel (the one furthest to the right in Fig. 1), there is placed another end thrust plate 29. This plate is forced toward the left in Fig. 1 by setting up an internally threaded nut 30 which has screw-threaded engagement with a sleeve or collar 31 which is set tightly on shaft 20, as for instance, by the set screws 32. By setting up the nut 30, the wheels and their spacer plates are tightly compressed endwise between the end thrust plates 27 and 29, and the wheels are thus all rigidly mounted upon the shaft. To insure the wheels being set up truly the end thrust plates and the spacer plates are accurately machined and ground on their wheel engaging faces; each of the plates having its wheel-engaging faces limited to a narrow peripheral surface as indicated at 28*a* in Fig. 1.

To give an idea of a practical design for hulling such grain as barley, but without any implied limitation, I may state that a pres-

ent machine uses wheels fourteen inches in diameter and two inches face width, spaced one-half inch apart and with their peripheries about one-half or three-quarters of an inch from the screen wall.

The nut 30 fits snugly in a hole through the right-hand end member 10 so that no material can find its way out around the nut, that member 10 having an outlet opening 35 for the material that is delivered from the casing, the outlet opening being substantially at the level of the lowermost part of screen 13.

The machine may be driven from any suitable source of power, as from motor 36 mounted on a common base 37 with the machine.

Outlet 35 is controlled by a gate 38 pivoted on a shaft 39. This shaft 39 carries a small arm 40 on which a gate closing weight 41 is adjustably mounted, the action of the weight being to yieldingly close the gate. Also on shaft 39 there may be another arm 42 having a handle 43 at its end, so that the gate may be manually operated. And, if it is desired to set the gate at any selected degree of opening, the arm 42 may be clamped in any adjusted position by a clamp bar 44 which is operated by the hand screw 45.

Over the opening 35 and the gate 38 there is a hood 46 to prevent light material from being scattered; and leading down from opening 35 is a chute 47 which carries the material to the lower end of air shaft 49 of a separator. The separator here shown is of ordinary construction and needs no detailed explanation except as to its association with the other parts of the machine. The air shaft 49 at its upper end communicates with the passage 50 which leads to a chamber 51 and from which a vertical passage 52, controlled by a gate 53, leads into suction chamber 54. The suction intake of fan 55 communicates directly with suction chamber 54; and suction pipe 15 also communicates with that chamber, controlled by a gate 56. Suction fan 55 may be preferably set directly on shaft 20.

In operation the grain to be hulled is fed into the machine at 60 directly onto the feed screw 25. Feed screw 25 feeds the grain at a regular rate into the feed end of the casing. The wheels are being revolved at a comparatively high rate; and immediately the grain strikes the first wheel, it is thrown out against the perforated casing wall and falls back again into contact with the wheel. As soon as enough material has been introduced into the feed end of the machine, it begins to move toward the discharge end; and when a sufficient quantity of material has accumulated in the casing and at the discharge opening, the gate is pushed open and the material begins to flow out. Or the gate may be set at any desired opening to allow the material to flow out at such a rate as to always keep a certain amount of material in the machine where it is being constantly moved about and acted on by the wheels.

Within the machine, when it is in full operation, the material is being constantly thrown out centrifugally by the wheels, thrown around the casing, and is in more or less constant, or constantly repeated, engagement with the abrasive wheels. The agitation, and the general movement toward the discharge end, causes each grain to come into many repeated contacts with the several wheels at all points of its surface. By the abrasive action of the wheels the hull is entirely removed from the kernels; and a mixed body of hulled grain and broken hulls passes out through outlet 35. During the hulling action a certain amount of fine particles is produced and the resultant dust is being constantly drawn off through the screen and pipe 15 to the blower 55, where it is blown out through the blower outlet 65. The removal of this fine material at its point of generation obviates the necessity of dealing with that fine material in the final separator, enabling that separator to be adjusted for efficient operation to cleanly separate the hulled grain from the remainder of the hull. The hulled grain and the remainder of the hull, comprising mostly the larger particles, go to the bottom of the air shaft 49 where the grain drops down, and is thus removed in clean condition from the machine, and the hull is drawn up by the air currents. The pivoted gate at 51*a* allows discharge of some, if not most, of the hull from chamber 51, as is well understood; and the amount of suction applied to air shaft 49 is regulated by the gate 53. By proper regulation of gates 53 and 56, to apply proper suctions to the hulling machine and to the separator, the hulled grain is delivered in perfectly clean condition from the machine.

I claim:

A grain huller or the like, comprising a horizontal shaft, a plurality of abrasive wheels on the shaft, a horizontal cylindric screen completely surrounding the shaft, a suction chamber wall surrounding the upper half of the screen, means to apply suction to that chamber and thus to that part of the screen surrounded by the suction chamber wall, an air inlet surrounding the other half of the cylindric screen and communicating with the suction chamber only through the cylindric screen, a material outlet at the bottom of an end of the screen enclosed chamber, and a material inlet at the opposite end of the screen enclosed chamber.

In witness that I claim the foregoing I have hereunto subscribed my name this 20 day of August, 1927.

EDWARD McKAIN.