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P. H. MINCK.
 APPARATUS FOR OBTAINING PURE FIBER.
 APPLICATION FILED JUNE 26, 1906.

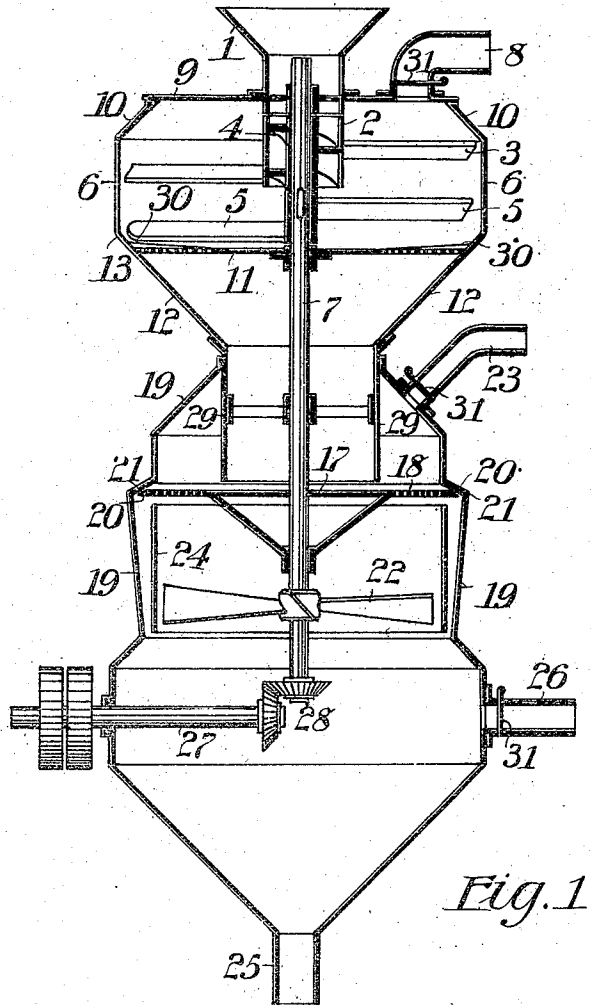


Fig. 1.

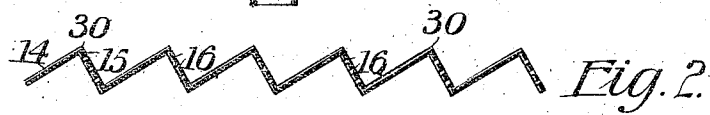


Fig. 2.

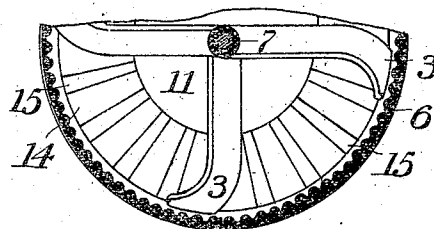


Fig. 3.

Witnesses

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APPARATUS FOR OBTAINING PURE FIBER.

No. 867,286.

Specification of Letters Patent.

Patented Oct. 1, 1907.

Application filed June 25, 1906. Serial No. 323,339.

To all whom it may concern:

Be it known that I, PAUL HERMANN MINCK, a subject of the King of Prussia, and a resident of Hemelingen, near Bremen, in the Empire of Germany, have invented a new and useful improved apparatus for obtaining pure fiber applicable for industrial purposes from cotton-seed hulls and other waste products containing fibers, of which the following is a specification.

The subject-matter of the present application relates to apparatus for separating in a purely mechanical manner and by means of a dry method waste products containing fiber into their fibrous constituents and into amorphous substances, and for obtaining the several products separately and in a marketable form, no matter whether in the material to be treated the heterogeneous substances have grown firmly together, as for example is the case with cotton-seed hulls etc., or whether they are only intimately mixed together, as in the case of cotton, hemp and linen waste (tow) etc., or finally whether the force binding them together in mechanical union was produced by pressure, the operation of felting, etc. The loosening process is for this purpose such that the fibrous constituents are obtained undamaged and not more reduced in length than is proper considering their industrial application, while on the other hand the amorphous substances are reduced to as small pieces as possible, so that the former constituents can be used in the paper and textile industries as well as for the manufacture of artificial silks, acetate and explosives, etc., whereas the latter can be employed as fodder, insulating material, stuffing material, etc.

One embodiment of the apparatus is diagrammatically illustrated by way of example in the accompanying drawings in which:—

Figure 1 is a vertical central cross-section of the apparatus, while Figs. 2 and 3 illustrate on a larger scale details hereinafter described.

The apparatus according to the present invention will in the subsequent description be described on the supposition that the raw material employed is cotton-seed hulls.

Referring now to Fig. 1, the numeral 6 denotes a casing of cylindrical shape. 1 denotes a charging hopper mounted on the flat cover 9 of the casing 6 and opening through the center thereof. 8 denotes a pipe communicating with any suitable receiver not shown in the drawing, placed at a distance from the casing 6. Said pipe 8 terminates in the flat cover 9 of the casing 6 peripherally thereof, so as to be adapted to receive the fibers from the interior of the casing. 7 denotes a rotating vertical shaft supported in suitable bearings and passing centrally through the casing 6. Immediately beneath the mouthpiece of the charging hopper 1 is fixed on the shaft 7 a hollow worm or helix 4, which serves at the same time as the head or nave 2 for the attachment of a set of beaters 3. Beneath the nave 2

is fixed directly to the shaft 7 a second set of beaters 5. The cotton-seed hulls pass through the charging hopper 1 and through the passage of the hollow worm or helix 4 and issue on the lower set 5 of the beaters of the mill. On account of the rotation of the shaft 7 the raw material is beaten by the beaters 5, 3 and is driven against the wall of the casing 6, which is ribbed or corrugated in any suitable manner.

In order to enhance the action of the beaters, 3, 5, their outer ends are slightly bent backwards (see Fig. 3), that is in the opposite direction to that of rotation, so that the angle of impact is reduced and the beating is more energetic for a given speed. For the purpose of impeding the falling of the raw material while it is being progressively beaten, the beaters 3, 5, are arranged upon the shaft 7 in a helically ascending line, so that the passage of the material through the mill is prolonged to such an extent that the separation of the fibers can be guaranteed. Simultaneously with the beating of the material the freed fibers are blown upwards by the draft produced by the rotating beaters out of the whole circular surface of the working reach of the beaters into a space above the same and are led from said space through a pipe 8 into a receiver. The space above the uppermost beater is preferably bordered by a conical surface or plate 10 adjoining the flat cover 9, for the purpose of permitting material which may be thrown up by the action of the beaters to fall down again between the beaters after rebounding from the oblique surface or plate 10.

After the conclusion of the process described above for removing the fibers, the specifically heavy hull-remains fall down along the surface of the casing 6 on to the bottom or plate 11 arranged close under the lowermost beater, said plate being fitted in the funnel-shaped outlet or hopper 12 of the casing 6 somewhat below the corner 13. The corner between the casing and the funnel-shaped outlet or hopper 12 is preferably rounded and the outer ends of the lower beaters are made to correspond with this rounding.

The outer annular portion of the plate 11 is provided with radial grooves, flutings or ribs 30 which are bordered by long oblique and short steep sides, 14 and 15 respectively. The steeper sides 15 are provided with holes or perforations 16 which are situated protected from the beaters said sides facing substantially in the same direction as the direction of the motion of the beaters, see Fig. 2. The loosened amorphous substances, which fall upon the plate 11 get into the radial grooves where they are no longer acted upon by the beaters, and they pass through the holes 16 into the outlet-hopper 12 which is below connected with the pipe 29 at a short distance under which a plate 17 rigidly mounted on the shaft 7 rotates. The diameter of the unperforated central portion of this plate corresponds with the diameter of the pipe 29, whereas the

outer annular portion 18 beyond this central portion is perforated or is formed of a sieve having a mesh of suitable size. Around the pipe 29 an annular space is formed by the casing 19 said space being enlarged at 5 21 to correspond with the beveled periphery 20 of the outer annular perforated portion 18 of the plate 17, a narrow annular gap of a breadth of about 5 mm. lying between the edge 20 of the plate 17 and the part 21 of the casing 19 being left free.

10 An air-current is generated by the fan 22 mounted on the shaft 7 under the centrifugal plate 17, and said air-current flows through the annular perforated portion 18 of the plate and sifts the hull-remains passing through the plate from the smallest fiber-remnants still 15 contained in them in a loose form and blows said fiber-remnants out of the casing 19 into the pipe 23, which may communicate with the pipe 8 leading from the beating-mill to the receiver or collecting reservoir. The hull-remains which are now perfectly sifted pass 20 under the action of the centrifugal plate 17 and under that of their centrifugal force which is considerable on account of their weight, into the annular gap under the enlargement 21 of the casing 19 and thence through an annular channel formed by the casing 19 and by a 25 suitably supported pipe 24 surrounding the fan 22 into the lower part of the casing 19 and thence into the outlet-pipe 25. Slides 31 arranged in the air-inlet pipe 26 opening into the casing 19, and in the pipes 23 and 8 permit the air-current to be regulated according to the 30 nature of the raw material to be treated.

The shaft 7 is suitably driven from the shaft 27 by means of the bevel-wheels 28. The material to be treated may be fed in continuously as, on account of the central feeding worm or helix 4 can disturb neither 35 the removal of the fibers nor that of the amorphous substances.

The results of practical experiments have shown that cotton-seed hulls and other waste products containing fiber which up to the present have withstood all at- 40 tempts to loosen and thoroughly sift them into their heterogeneous constituents by mechanical means and by using a dry method are perfectly loosened and simultaneously sifted by means of the apparatus above described.

45 As far as the construction of the apparatus is concerned alterations may be made within wide limits according to the given circumstances without the scope of the invention being exceeded.

What I claim as my invention and desire to secure by 50 Letters Patent, is:—

1. Apparatus for obtaining fiber from waste products containing fiber, comprising in combination a casing provided above with a charging hopper, a vertically rotating shaft substantially concentric with said hopper, a nave 55 fixed on said shaft and arranged under the hopper and provided with a passage passing helically downwards round the shaft, beaters attached to said nave, a second set of beaters fixed to the shaft and arranged under the former beaters, the beaters being arranged in a helix run-

ning upwards round the shaft during rotation so as to adapt same to retard the material in falling through the casing, and to blow the fibers set free away from the residue of said material.

2. Apparatus for obtaining fiber from waste products containing fiber, comprising in combination a casing provided above with a charging hopper and having an outlet 65 hole in its upper part, a vertical rotating shaft substantially concentric with said hopper, a plurality of beaters fixed on said shaft, a horizontal bottom plate for the aforesaid casing provided with an opening for the passage therethrough of the shaft and arranged close under the 70 lowermost of said beaters, said plate being provided with radial flutings at its peripheral portion of which flutings the surfaces facing substantially the direction of rotation are provided with perforations 16 to allow fine material to pass through said plate, under the action of the afore- 75 said beaters, which simultaneously blow the fibers set free out of said casing through the outlet hole provided in the same.

3. Apparatus for obtaining fiber from waste products containing fiber, comprising in combination a casing provided with a charging hopper and having an outlet opening, a rotating vertical shaft passing through said casing, a nave fixed on said shaft and arranged under the afore- 85 said charging hopper and provided with a passage leading helically downwards round the shaft, beaters attached to said nave, a second set of beaters fixed to the shaft beneath the former beaters, the beaters being arranged in a helix running upwards round the shaft during rotation, a fixed perforated plate close under the lowermost beater, 90 a funnel-shaped casing under said plate terminating in a pipe 29, an outer casing 19 provided above with an outlet opening and surrounding said pipe 29 and fixed above to the same so as to form between itself and said pipe an annular chamber, a rotating horizontal plate immediately 95 under said pipe 29 and extending almost up to the casing 19, that portion of the plate immediately under the pipe 29 being unperforated and that portion under the annular chamber being perforated, a fan mounted on the shaft under said plate for forcing air through said plate and 100 blowing the fiber-remnants carried therewith through the latter outlet opening in the outer casing.

4. Apparatus for obtaining fiber from waste products containing fiber, comprising in combination a casing provided with a charging hopper and having an outlet opening, a rotating vertical shaft passing through said casing, a plurality of beaters on said shaft, a fixed perforated 105 plate close under the lowermost beater, a funnel-shaped casing under said plate terminating in a pipe 29, an outer casing 19 provided above with an outlet opening and surrounding said pipe 29 and fixed above to the same so as 110 to form between itself and said pipe an annular chamber, a rotating horizontal plate immediately under said pipe 29 and extending almost up to the casing 19, that portion of the plate immediately under the pipe 29 being unperforated and that portion under the annular chamber 115 being perforated, a fan mounted on the shaft under said plate, and a fixed pipe surrounding said fan, said pipe having a diameter less than that of the plate whereby the air current passes through the plate and blows the fiber- 120 remnants through the latter outlet opening in the outer casing while the material projected from the plate passes between said plate and the casing and falls outside the pipe surrounding the fan.

In witness whereof I have hereunto signed my name 125 in the presence of two subscribing witnesses.

PAUL HERMANN MINCK.

Witnesses:

VICTOR HENRICH REINERMANN,
JOHANN KLAUP.