

Oct. 2, 1934.

G. GRAUSS

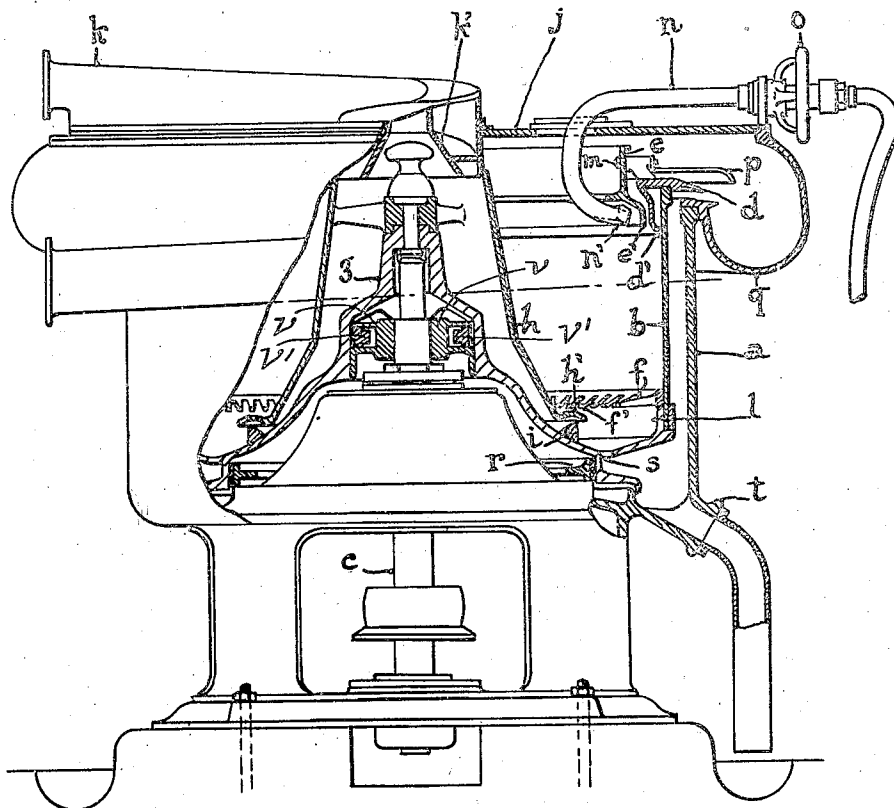
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CENTRIFUGAL MACHINE FOR PURIFICATION OF PAPER PULP AND ANALOGOUS MASSES

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2 Sheets-Sheet. 1

Fig. 1.



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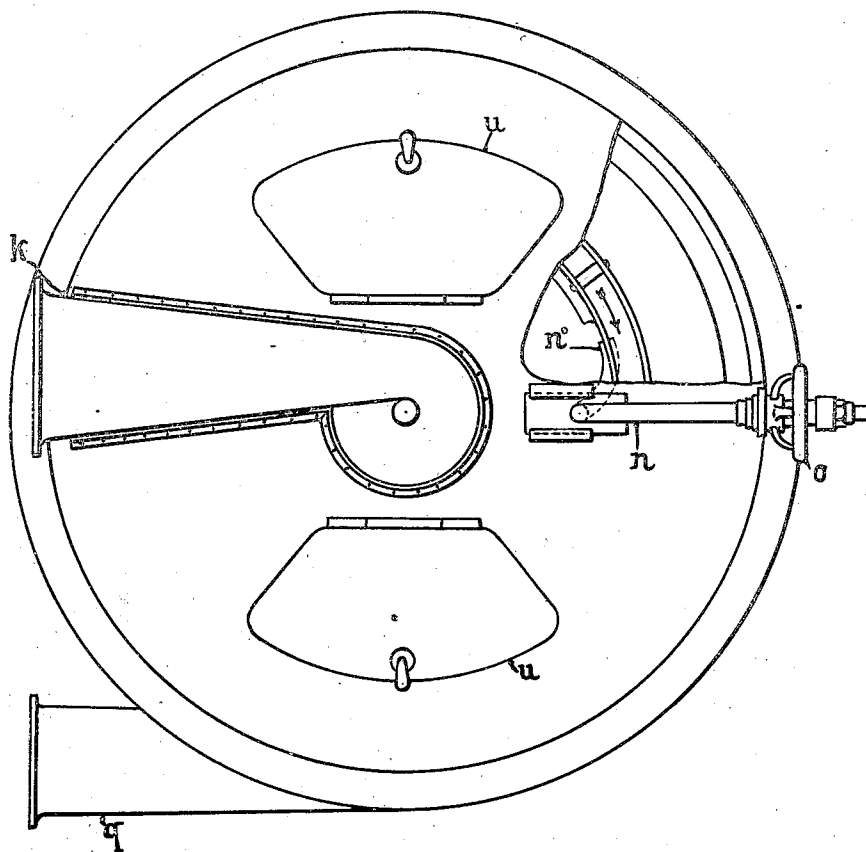
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Fig. 2



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UNITED STATES PATENT OFFICE

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CENTRIFUGAL MACHINE FOR PURIFICATION OF PAPER PULP AND ANALOGOUS MASSES

Georges Grauss, Paris, France

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2 Claims. (Cl. 233—45)

The invention in question relates to a centrifugal machine for the purification of fibrous masses such as paper pulp or analogous masses.

The invention particularly consists in that the centrifugal basket is divided by a loading body turning with the basket and having a tubular form, into two centrifuging chambers which are in communication, in the neighbourhood of the bottom of the drum. The material to be centrifuged is then introduced in the internal centrifuging chamber surrounded by the loading tube and moves from the bottom to the top in this chamber where it is dispersed and subjected to a disintegrating action of its structure. The material which has been subjected to the centrifuging and disintegrating action then passes through the lower opening of the tube which serves for the loading or charging, into the external centrifuging chamber which is located between the loading or charging tube and the casing of the basket. In the external centrifuging chamber, the material which has been centrifuged rises upwardly while the light and heavy impurities and the like contained in the centrifuged material are separated.

The technical progress gained by the invention consists essentially in that in the internal centrifuging chamber, an intensive disintegration and separation of the fibres and the impure elements in the mass to be purified, is produced which then allows of a complete separation of the impurities, in the external centrifuging chamber under the action of centrifugal force.

In a modification of the invention, provision may in addition be made of means for the intensifying of the disintegrating action, such as the repercussion surfaces as well as means for the discharge of the impurities and of the purified mass.

Within the tubular loading body, which preferably is tapered in the form of a truncated cone towards the base, it is advantageous that the bottom of the drum should have a conical form tapering towards the top. A centrifugal basket thus constructed is therefore especially suitable for the employment of a hollow hub with centrifugal coupling up inside.

Such a construction of the hub and the coupling up permits, amongst other things, to freely withdraw the centrifugal basket for emptying the same or for replacement thereof.

In the accompanying drawings which show a form of construction by way of example,

Figure 1 is a side view, partially in vertical section, of a centrifugal machine constructed in

accordance with the invention while Fig. 2 shows the centrifugal machine in plan view, the cover being partly removed.

In the drawings, *a* represents a bowl which forms the outer envelope or casing of the centrifugal machine. The centrifugal basket which is driven by a vertical shaft *c* has an external casing *b*, while the bottom of the centrifugal basket is formed by a hub *g* which is disposed in the middle of the basket and takes the shape of a hopper funnel or a cone.

The drive for the basket can advantageously be that described in the American specification of Letters Patent No. 1,573,240 and which consists in that between the shaft *c* and the hub *g* is intercalated a centrifugal drive or coupling. For this purpose, for instance, there is secured on the shaft *c* a box *v* divided into compartments having the form of segments. In the several compartments of the said box *v* are housed, in such a manner as to be capable of moving blocks *v'*. Under the influence of centrifugal force the blocks are projected against the inner wall of the hub *g* and drive the same progressively by friction in such a manner that a coupling up between the basket and the shaft *c* is created. When the machine is stopped, the centrifuging basket can be withdrawn or removed without further difficulty so that it can be emptied or changed in the shortest possible time.

At a stage lower of the hub of the drum is installed a braking arrangement *r* which acts by means of a large surface acting directly on the basket. Such a construction of the driving and braking means is very economical and very certain or sure in action. The capacity of the machine is increased from the fact that the coupling and braking members act directly on the centrifuging basket.

The interior of the centrifuging basket is divided into two centrifuging chambers which are concentric, by a tubular loading body *h* connected with the hub of the basket. The tubular loading body *h* which can likewise be termed a distributor, is preferably formed tapering towards the bottom in the shape of a truncated cone and terminates at a certain distance from the bottom of the basket which, in the form of example shown, consists of the hub *g*. Thus there is provided or formed an annular opening which brings the internal centrifuging chamber situated between the hub *g* and the loading body *h*, in communication with the external centrifuging chamber which is disposed between the loading body *h* and the casing *b* of the basket. At the extremity

of the loading body or distributor *h* are disposed one or several repercussion surfaces. By way of illustration, there is in front of the annular opening a repercussion ring *i* secured to the hub.

5 Opposite the repercussion ring *i*, the loading body *h* is provided with a base having the shape of a flange which serves as a second repercussion surface.

The cover *J* of the machine carries a feed pipe 10 *k* which, at the place where it enters the loading body *h* is wound round the cone *k'* in the form of a helix or serpentine. The material to be impelled entering through the tube *k* receives in this helical pipe the start of a circular movement. 15 Impelled with this circular movement the material enters the internal centrifugal chamber and falls thereinto being pressed against the internal wall of the loading body *h*. The loading body *h* communicates its speed of rotation to the said material and throws it against the annular 20 repercussive surface *i*. The material is, by this fact, deviated towards the top and strikes the base *h'* of the loading body *h*. Through the action of the shocks received by the material to be impelled, against the repercussive surfaces, 25 the mass composing the material to be centrifuged is disintegrated and its fibrous elements and the impurities contained in the mass are freed.

Thereafter, the centrifuged material penetrates 30 into the lower part *l* of the external centrifuging chamber under the influence of the centrifugal force. In the external centrifuging chamber, the material which enters impetuously, tries to reach the top and it has to pass between the fingers or 35 bars *f'* of a sieve *f*. There is advantage in retaining as long as possible the impelled material in the lower part *l*, in order that the impurities which are heaviest be separated and left behind. For that purpose the fingers *f'* of the sieve *f* are 40 inclined obliquely towards the bottom in relation to the axis of the basket and are provided on their lower face with chamfered stops.

When the centrifugal material passes through 45 the sieve, the fingers of the sieve uniformly receive the entire mass so that all the particles of the mass, after the passage through the sieve, possess the same angular speed. This action of the sieve *f* is of great importance. On the internal zones or layers of the impelled material, 50 which are annular, there is exerted the same impelling action by means of the sieve the same impelling action as on the external layers so that relative slip between the layers is eliminated. On the contrary the speed of rotation of the basket 55 can be considerably reduced which prevents the clarification or the decantation of the filling materials incorporated in the centrifuged mass such as kaolin.

During its ascending movement in the external 60 centrifuging chamber, the impelled material is distributed vertically forming a ring the thickness of which is determined by the internal diameter of a collecting dome *d* disposed on the casing *b* of the basket. The heavy impurities contained in 65 the impelled material, paper pulp for instance, such as sand, metal particles and so on, are separated from the pulp and mash, under the action of centrifugal force, and pressed against the wall of the casing *b* of the basket. The light impuri- 70 ties such as rubber, resin and so on having a lesser density than the pulp, collect in the inner zone of the ring formed by the pulp. To retain these light impurities there is provided on the basket a separating ring *e* in the form of a flange 75 which plunges with its slanting edge *e'*, the di-

ameter of which is greater than the internal diameter of the collecting dome *d*, into the mass of pulp.

The pulp freed from the light and heavy impuri- 80 ties must, in order to leave the basket, penetrate between the separator ring *e* and the collecting dome *d*. These two parts form together, at the entry point for the pulp, a kind of slit the width of which is variable. This slit exerts on the pulp 85 which passes through it a kind of stretching or laminating action which causes the agglutinuous parts of the pulp such as clods, knots and so on, which have the same density as the pulp to be retained.

It is well that the slit should be between the 90 inclined part of the edge *e'* of the separator ring *e* and the part *d'* which is likewise inclined and which is opposite the collecting dome *d*. The adjustment of the space between the parts *e'* and *d'* can be effected by a circular displacement of 95 the ring *e*. For this purpose, the separator ring *e* carries, for example, six inclined recesses in which engage shoes or bolts *m* which are secured to the collecting dome *d*. During the rotation of the separator ring *e*, the inclined recesses are dis- 100 placed on the shoes *m*, which causes the elevation and lowering of the separator ring. In consequence hereof the interval or space between the inclined part of the edge *e'* and the inclined part *d'* is reduced or increased. 105

In order to discharge, during the operation of the machine, the light impurities retained by the separating ring *e*, there is advantage in providing an adjustable aspirator tube *n* wherein the suction effect can be adjusted. The mouth *n'* of this 110 tube is shaped in a particular manner and its opening is opposite to the sense of direction of the basket (Fig. 2). By means of a steering wheel *o*, the mouth *n'* can be introduced into the zone containing the impurities. Under the influence 115 of their speed of rotation, the impurities penetrating into the interior of the suction tube *n* are sucked up by the latter.

The purified pulp, in passing over the dome *d*, 120 is projected against a shield *p* constructed in the form of a crown. This shield *p* is shaped in such manner that the pulp is ejected or discharged onto the bottom of a discharge gutter *q*, which has a circumferential form. The pulp falls there- 125 after onto the pulp which is already on the bottom of said gutter. In this way no emulsion is formed.

After having passed through the centrifugal machine constructed according to the invention, the pulp or any other impelled material is com- 130 pletely purified that is to say freed from its heavy, light and other impurities, its agglutinuous parts and so on without nevertheless the filling materials contained in the impelled material being separated. 135

The impurities retained within the basket fall at the stopping of the machine and are discharged with the washing water through orifices provided in the bottom of the basket, into the external bowl *a* whence they are conducted away outside 140 through discharge necks or chutes *t* arranged beneath the openings *s*. The cleaning of the machine is moreover facilitated by the fact that the median part of the basket is accessible through openings *u* provided for the purpose in 145 the cover *j*.

The invention is in no way limited to the form of construction described and shown but in- 150 cludes all other modifications which are possible

according to particular requirements within the scope of the appended claims.

I claim:

1. A centrifugal machine for purifying paper pulp and analogous material comprising a non-rotatable outer casing, means for supporting said casing, a rotatable bowl within said outer casing, a cover to said outer casing, a feed conduit carried by said cover, a tubular loading member carried by the bowl, a spiral tube connected to said loading member with said feed conduit for imparting a preparatory movement to the entering material, means for rotating the bowl, means at the base of said loading member for disintegrating the material, means for separating heavy impurities, means for discharge thereof, means for separating light impurities, means for withdrawing said light impurities, means for discharge of cleaned material and means for preventing emulsification.

2. A centrifugal machine for purifying paper pulp and analogous material comprising, in combination, a rotatable basket, a vertical shaft, a

hub on said shaft for carrying said basket, a casing surrounding said basket, means for supporting said casing, a cover to said casing, a feed conduit carried by said cover, a conical tubular loading member rotating with the basket and disposed centrally thereof, a spiral tube connecting said feed conduit with said loading member imparting a preparatory circular movement to the entering material, a flange on the lower end of said conical loading member, an abutment ring disposed beneath said flange for disintegrating the material, the material in the basket rising, a sieve for retarding the rising material, the heavy impurities separating centrifugally, means for discharge of heavy impurities, an adjustable ring for separating the light impurities, said light impurities being retained beneath said separating ring, a suction pipe for withdrawing the light impurities from beneath said ring, an outlet for cleaned material, means for adjusting said outlet and means for preventing emulsification.

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