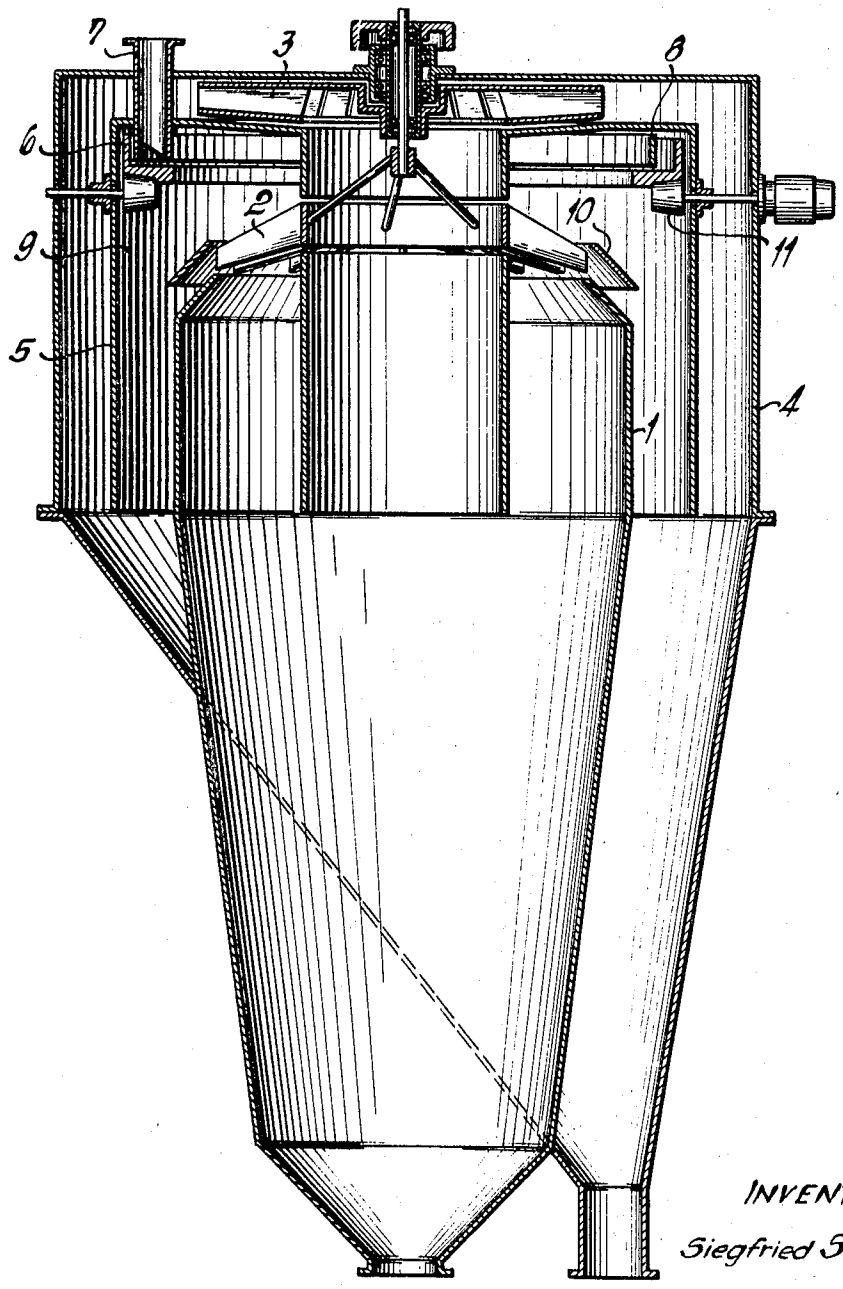
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SIFTER OF THE CIRCULATING AIR TYPE

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FIG. 1



INVENTOR
Siegfried SCHAUER

BY Robert H. Jacobs
AGT.

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FIG. 2

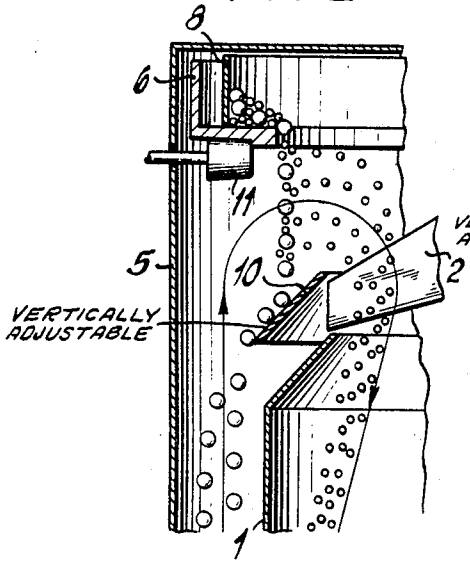


FIG. 4

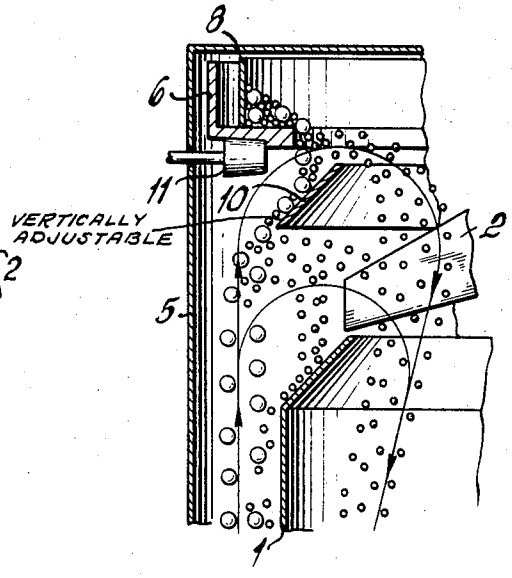


FIG. 5

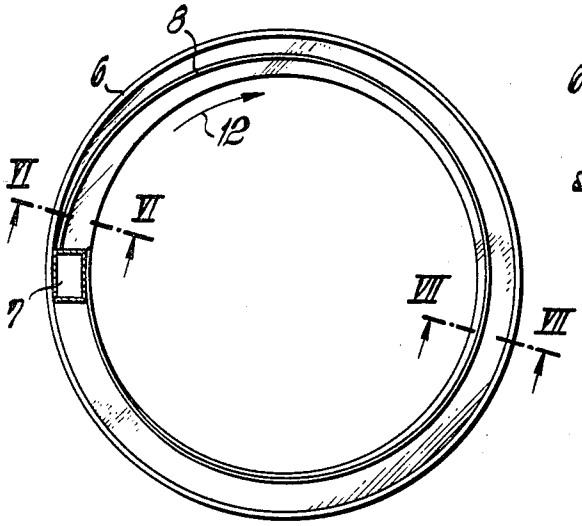


FIG. 6

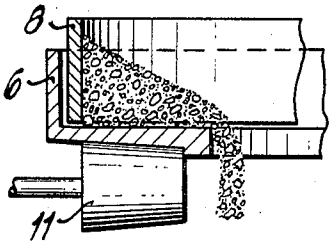
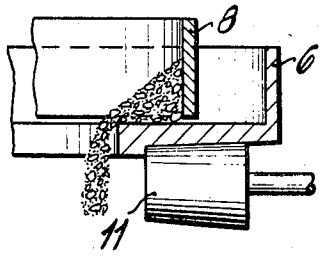


FIG. 7



INVENTOR
Siegfried SCHAUER

BY Robert K. Jacob

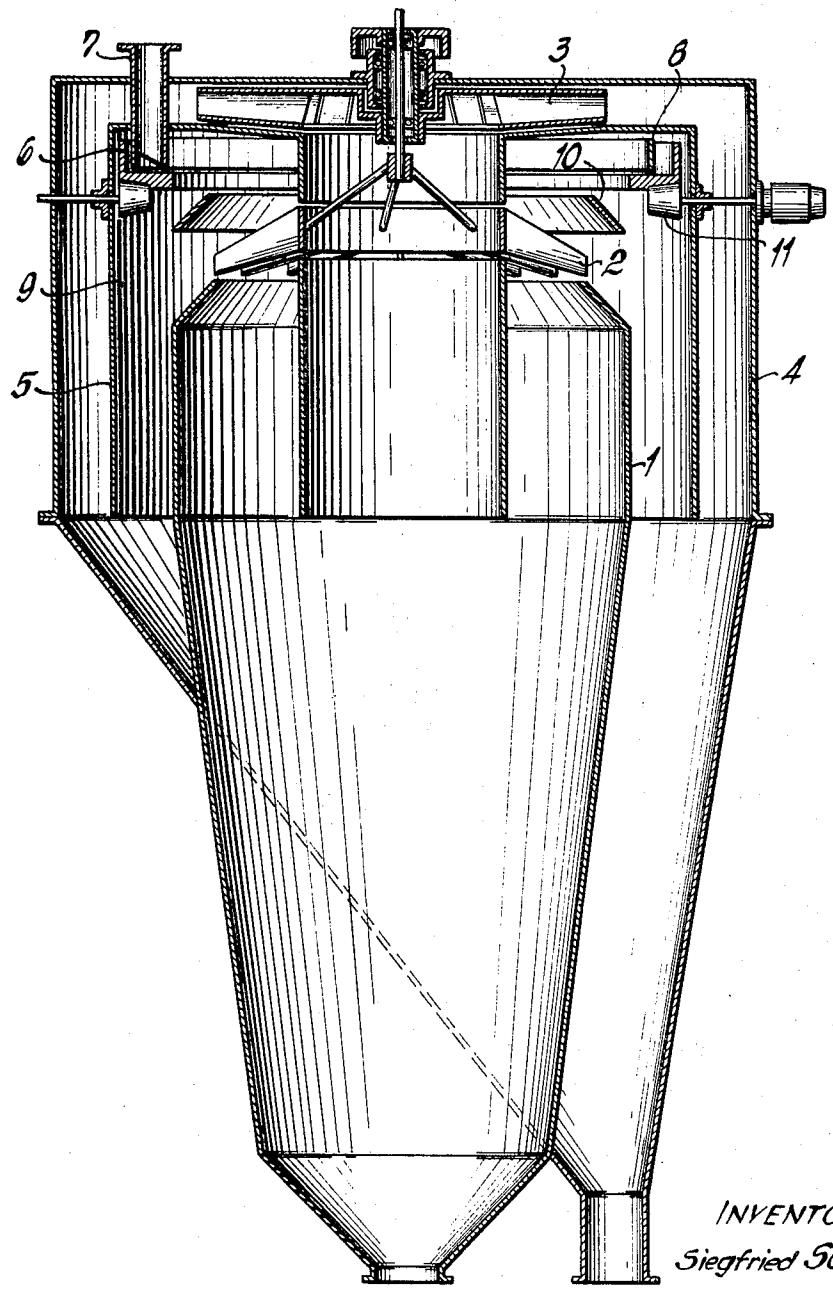
AGT.

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SIFTER OF THE CIRCULATING AIR TYPE

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FIG.3



INVENTOR
Siegfried SCHAUER

BY Robert H. Jacob

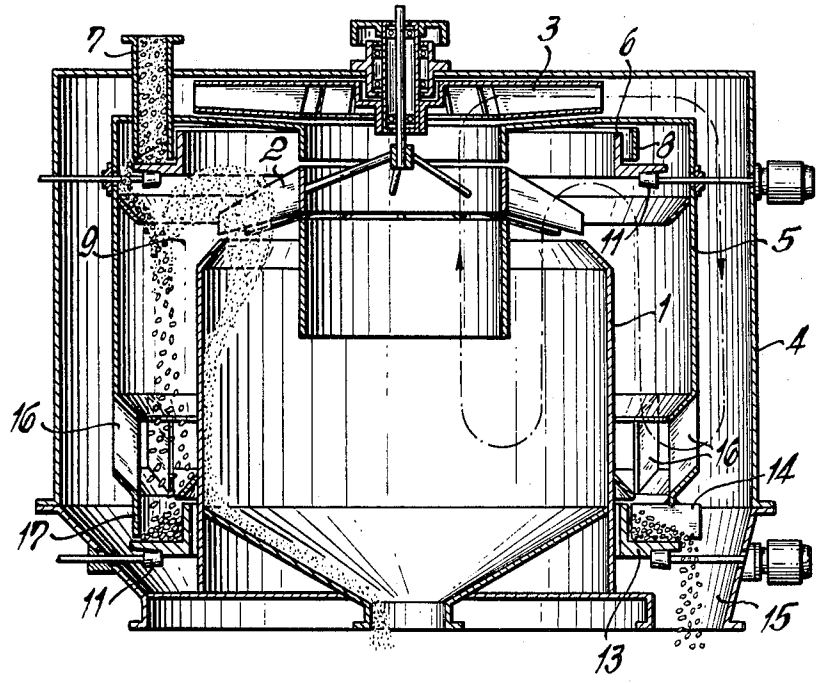
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FIG. 8



INVENTOR
Siegfried SCHAUER

BY Robert K. Jacob

AG.T.

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FIG. 9

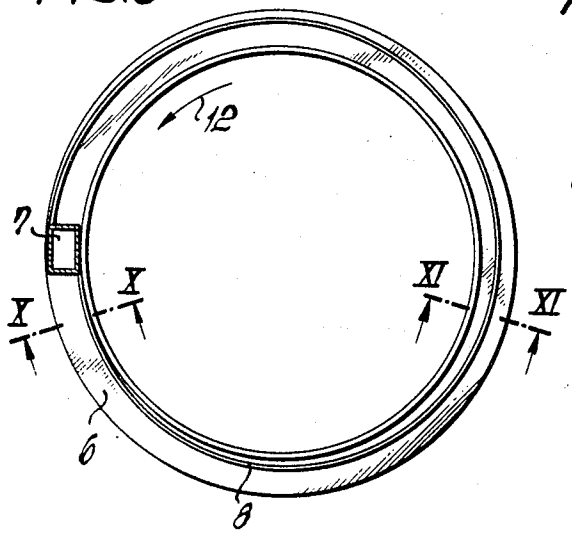


FIG. 10

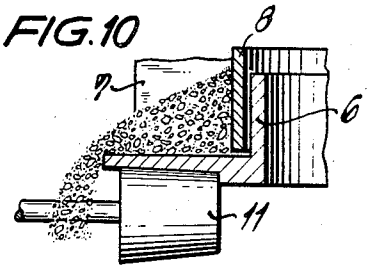


FIG. 11

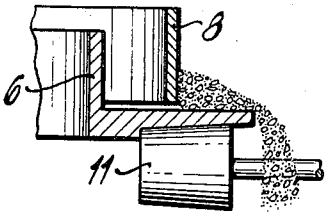


FIG. 12

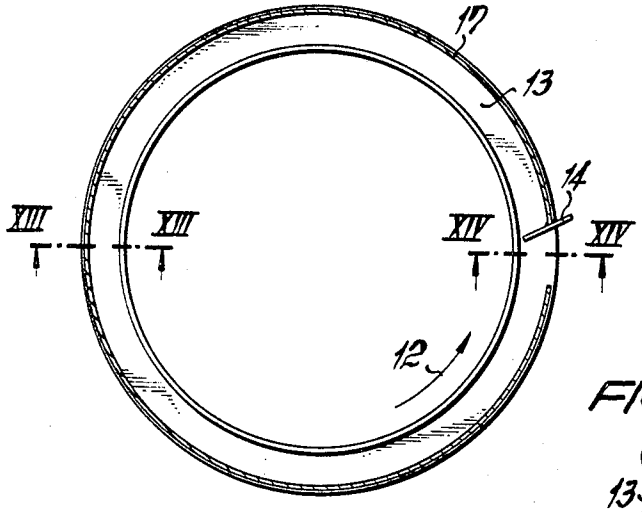


FIG. 13

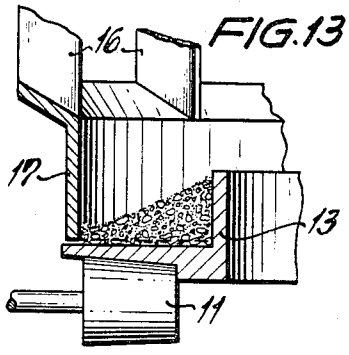
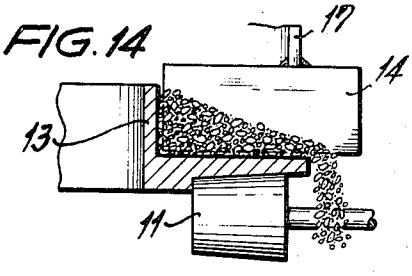


FIG. 14



INVENTOR
Siegfried SCHAUER

BY Robert H. Jacob

AGT.

United States Patent Office 3,476,244
Patented Nov. 4, 1969

3,476,244

SIFTER OF THE CIRCULATING AIR TYPE

Siegfried Schauer, Hohenecken, Germany, assignor to Gebr. Pfeiffer Barbarossawerke AG, Kaiserslautern, Pfalz, Germany

Filed Dec. 27, 1967, Ser. No. 693,907
Claims priority, application Germany, Dec. 29, 1966, P 41,116
Int. Cl. B04c 5/107
U.S. Cl. 209—133 7 Claims

ABSTRACT OF THE DISCLOSURE

Sifter having a rotatable dispersing ring below a feed sleeve with a stationary scraper spiral above the ring, which may extend from the outer side of the sleeve inwardly to the free inner edge of the dispersing ring or from proximate the inner side of the sleeve outwardly to the free outer edge of the ring to proximate the opposite side of the sleeve. In the latter embodiment the housing may be of low construction and a discharge ring provided in the lower housing area which is of identical construction as the dispersing ring.

Background of the invention

The invention relates to sifters for grit or the like. More in particular the invention is concerned with vertical sifters of the circulating air type where a cyclone is coaxially arranged with respect to the upper covered sifting housing for separating the fine components of the material being sifted, a sifting wheel disposed above the entrance of the cyclone and an annular space defined between the walls of the cyclone and the sifting housing for the coarse particles of the siftings.

The conventional feeding of the sift material takes place approximately centrally from the top of the sifter onto a dispersing disk which rotates rather rapidly and thus casts the sift material outwardly whereby it arrives in the current of circulating air.

It has been found that the outward casting of the sift material causes a relatively rapid wear of these parts of the walls of the sifter which are exposed to the impingement of the material. This results in relatively frequent repairs or replacement work for which the sifter has to be dismantled, particularly at its upper part.

Accordingly, it is an object of the invention to provide a possibility for feeding the material into the sifter which eliminates these shortcomings, while the feeding of the sift material into the air current remains at least as good as before or is even improved.

In accordance with the invention this problem is solved in a circulating air sifter of the type described in that in the upper part of the sifting housing or chamber proximate the wall thereof and above the sifting wheel a circulating dispersing ring having a rectangular cross section is arranged which has a horizontal annular leg, and above this leg a stationary scraper of spiral shape is disposed, which scraper spiral begins where the inlet or feed sleeve for the sift material leads in above the horizontal annular leg laterally of the vertical leg of the dispersing ring and extends over the entire annular surface of the horizontal leg to its free border at the fed sleeve.

Summary of the invention

As a result of the rotation of the dispersing ring the spiral progressively pushes the continuously supplied sift material along the entire circular path to the free edge of this ring. The material forms a curtain of sprinkled material from the inner border of the dispersing ring

downwardly, evenly distributed over the entire circumference of the dispersing ring and therefore of the sifter, and thus arrives in the current of circulating air.

The dispersing ring may be journalled on several rollers spaced from one another, at least one of which serves as the driver, preferably by taking advantage of the available friction.

The spiral of the scraper may begin outwardly of the feed sleeve for the material and may meet at the free inner border of the annular surface of the horizontal leg of the dispersing ring at the feed sleeve.

With this form of construction, it is advantageous to provide in the area below the dispersing ring, where the curtain of the spray move downwardly, a conical outwardly inclined ring, the level of which is adjustable, whose outer diameter is slightly larger than the inner diameter of the dispersing ring that produces the spray curtain and which is also larger than the greatest diameter of the cyclone.

By suitable adjustment of the level or height of the conical ring, between the dispersing ring and the upper edge of the cyclone, the border between the fine and coarse particles of the sifting material can be displaced so that, for example, not all of the fine material is sifted out but a part thereof remains in the coarse material as is frequently desired in practice.

However, the spiral of the scraper may also begin on the inside proximate the material feed sleeve and gradually widen toward the free outer border of the annular surface of the horizontal leg of the dispersing ring. This requires, of course, that the vertical leg of the rectangular cross-section of the dispersing ring is provided on the inside.

Starting preferably with this form of construction it is possible to provide in the lower region of the annular space between the center cyclone and the outer housing of the sifter a discharge ring having a scraper for the coarse material in a manner known per se. This leads to a decrease in the structural height of the sifter because the discharge of the coarse particles of the sift material results not along due to the effect of gravity, but also by the use of the aforementioned technical means. With the embodiment in accordance with the invention having an upper dispersing ring, the advantage is obtained here, that the discharge ring may in its mechanical form be constructed identically with that of the dispersing ring which serves as a discharge ring.

At the lower end of the intermediate wall forming the border wall of the sifting chamber between the outer annular space for the downward conduction of the circulating air current and the annular space proximate the inner cyclone for the coarse material and for the upward conduction of the air current, it is possible with the embodiment of the sifter described, to provide louvres directly above the discharge ring for the passage of the circulating air current.

Brief description of the drawings

Further features and advantages of the invention will become apparent from the following description of the embodiments illustrated in the drawings in which:

FIG. 1 is a vertical section of a sifter where the conical ring is illustrated in a lowered position;

FIG. 2 illustrates the area between the dispersing ring and the inner cyclone with the conical ring drawn to a larger scale;

FIG. 3 shows a vertical cross-section of a sifter where the conical ring is illustrated in raised position;

FIG. 4 shows the region between the dispersing ring and the inner cyclone with the conical ring to an enlarged scale;

FIG. 5 is a plan view of the dispersing ring in accordance with FIGS. 1 and 3;

FIG. 6 is a section through the dispersing ring in accordance with FIG. 5 along the line A;

FIG. 7 is a section along line B in FIG. 5;

FIG. 8 is a sifter having a receiving and discharge ring;

FIG. 9 is a plan view of the receiving ring from the outer border of which the sift material drops down;

FIG. 10 is a section through the receiving ring in accordance with FIG. 9 taken along line A thereof;

FIG. 11 is a section along line B of FIG. 9;

FIG. 12 is a plan view of the discharge ring;

FIG. 13 is a section through the discharge ring taken along line A in FIG. 12 and

FIG. 14 is a section taken along line B in FIG. 12.

Description of preferred embodiment

The sifter has a central cyclone separator housing **1** for separating the sift material. A sifting wheel **2** rotates above the upper edge of the cyclone separator housing **1**. Furthermore, in addition to the sifting wheel **2**, an air circulator such as a blower wheel **3** is provided in the uppermost region of the sifter above the cyclone separator housing for producing the circulating air current which flows downwardly into the annular space between the outer housing wall **4** and the inner housing wall **5** of the sifter, is turned inwardly at the lower end of the housing **5** and again flows upwardly in the annular space between this inner housing and the cyclone separator housing.

The receiving of the sift material now no longer takes place centrally by way of a spraying disk but by way of a spraying ring **6** which is supplied with the material by an intake or feed sleeve **7**. In the space defined by the L-shaped profile of the spraying ring **6**, a stationary spiral **8** is disposed which, beginning proximate the intake **7**, narrows from the outside toward the inner edge of the dispersing ring **6** while returning to the location of the intake **7**.

The dispersing ring **6** rotates slowly so that the sift material discharged on it from the intake **7** is slowly pushed inwardly by spiral **8**, whereby an evenly distributed spray curtain of the sift material is formed ove rthe entire inner circumference of the spray ring **6**, and thus also over the circumference of the cyclone. This spray curtain then reaches the space **9** in the upwardly flowing air current whereby a pre-sifting of the material takes place already before it arrives in the area of the sifting wheel **2**.

This spraying ring on the one hand affords the advantage that wall parts of the sifter are no longer exposed to rapidly impinging particles of the sift material, thus eliminating, of course, the rapid wear of these wall parts. Furthermore, all parts of the sift material no longer reach the region of the sifting wheel, the largest particles drop down immediately into the annular space between the inner wall **5** and the cyclone **1**. Only the remaining particles of the sift material are carried along by the air current and are conducted to the sifting wheel which rotates more or less rapidly, and which is in the form of a radial wheel and thus supports the air current. Here the main sifting takes place and in such manner that the particles of the material to be separated follow the air current and pass axially through the sifting wheel **2** while the coarser particles, due to the centrifugal forces to which they are subjected by the sifting wheel, are not able to follow the air current and are cast into the shaft for the coarse material. Thus, for a pre-determined grain-size corresponding to a pre-set sifting wheel velocity the sifting wheel provides a balance between the centrifugal force effected by it and the suction of the air circulated by the blower wheel.

The sifting action can be further improved, especially the composition of the different separated grain sizes, i.e. the borderline between fine and coarse material can be

changed if as proposed in accordance with the invention a conical ring **10** is provided in the space **9** which is adjustable in height. This conical ring **10** has an outer diameter which is somewhat greater than the inner diameter of the dispersing ring **6**. If the conical ring is in the upper position as shown, for example in FIG. 3, then a part of the fine components of the sift material remains in the coarse material. If the conical ring **10** is moved downwardly as shown in FIG. 1, then all of the fine material is separated and collected in the central cyclone. Depending on the level or height of the conical ring, any desired displacement of the limit between the two separated parts is possible as shown particularly in FIGS. 2 and 4.

The journalling and drive of the dispersing ring takes place preferably by way of rollers **11**. Generally, it is sufficient when one roller is driven and the driving force is transmitted by friction onto the dispersing ring **6**.

FIGS. 5–7 illustrate particularly the relationship of the rotating dispersing ring and the stationary spiral **8**. The direction of rotation of the dispersing ring is indicated by the arrow **12** in FIG. 3.

In order to make possible the shortening of the height of the sifter, it is also possible in accordance with the invention to provide a discharge ring **13** in the lower area which structurally is formed identically as the receiving-dispersing ring **6**. It is immaterial whether the receiving-dispersing ring **6** discharges the sift material inwardly or outwardly. If it discharges it outwardly as illustrated in FIG. 8, the ring **13** rotating in the direction **12** can be used which is journalled on rollers **11**, at least one of which serves as the drive ring. Then, merely a scraper **14** is required in the area of the outlet **15** in order to scrape the coarse material from the ring **13**. For conducting the circulating air current, louvres are provided in the lower region of the inner wall **5** proximate the discharge ring **13**.

Having now described my invention with reference to the embodiments illustrated in the drawings I do not wish to be limited thereto but what I desire to protect by Letters Patent of the United States is set forth in the accompanying claims.

I claim:

1. Sifter of the circulating air type disposed about a vertical axis, comprising a covered sifting housing, a cyclone separator housing for separating the fine components of the sift material, a sifting wheel arranged above said cyclone separator housing, said cyclone separator housing being coaxial with said sifting housing and having an upper entrance opening, an air circulator in the upper part of said sifting housing, said sifting housing having an outer wall and an inner wall disposed between said outer wall and said cyclone separator housing, said inner wall and the wall of said cyclone separator housing defining an annular space for the coarse particles of the sift material, a dispersing ring rotatably disposed above said sifting wheel in the upper part of said sifting housing proximate said inner wall, said dispersing ring having an L-shaped cross section with a horizontally disposed leg portion presenting a free edge, and a stationary scraper defining a spiral disposed above said leg portion, a material feed sleeve extending into said housing toward said leg portion, said scraper spiral having one end fixedly secured proximate one side of said sleeve and extending along and above the annular surface of the leg portion of said dispersing ring to said free edge of said leg portion proximate the other side of said sleeve.

2. Sifter in accordance with claim **1**, comprising a plurality of supporting rollers rotatably mounted below said dispersing ring to support said ring for rotation thereon, and at least one of said rollers being a driving roller.

3. Sifter in accordance with claim **2**, where said scraper spiral begins inwardly of said sleeve and increases in radius outwardly to said free edge of said horizontal leg portion to a position proximate and outwardly of said sleeve.

4. Sifter in accordance with claim 3 comprising a discharge ring disposed in the annular space between said cyclone separator housing and the outer housing of said sifter, a scraper for coarse particles disposed above said discharge ring, said discharge ring being of L-shaped cross section with a horizontally disposed leg portion presenting a free edge.

5. Sifter in accordance with claim 4 including a plurality of louvres disposed at the lower end of said inner wall between the outer annular space of said sifter and the annular space proximate said cyclone separator housing and above said discharge ring.

6. Sifter in accordance with claim 1, where said scraper spiral begins outwardly of said sleeve and decreases in radius inwardly to said free edge of said horizontal leg portion to a position proximate and inwardly of said sleeve.

7. Sifter in accordance with claim 6, comprising a conical ring having an outwardly and downwardly inclined surface disposed below said dispersing ring and being adjustable in height, said ring having an outer diameter that is greater than the inner diameter of said dispersing ring and also greater than the largest diameter of said cyclone separator housing.

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FRANK W. LUTTER, Primary Examiner

U.S. Cl. X.R.

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