Appeal decision

Appeal No. 2017-13123

Tokyo, Japan
Appellant SUMITOMO METAL MINING CO. LTD.

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The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2013-188021, titled "Agitation Device", [the application published on Mar. 23, 2015, Japanese Unexamined Patent Application Publication No. 2015-54272] has resulted in the following appeal decision:

Conclusion

The appeal of the case is groundless.

Reason

No. 1. History of the procedures

The present application is an application filed on Sep. 11, 2013, a decision of refusal was issue on May 31, 2017 in the original examination, an appeal against this examiner's decision was requested on Sep. 5 of the same year, and, at the same time, an amendment was submitted. Reasons for refusal dated Jun. 26, 2018 were notified by the body. Then, a written opinion and an amendment were submitted on Aug. 31 of the same year.

No. 2. The Invention

The invention according to Claim 1 of the present application (hereinafter, referred to as "the Invention") is specified by the following matters described in Claim 1 of the scope of claims amended by the amendment dated Aug. 31, 2018.

[Claim 1]

An agitation device to mix and agitate a raw material and a gas comprising:

a cylindrical agitation tank;

a rotation shaft rotatable along a center axis of the agitation tank;

a plurality of main agitation blades disposed to the rotation shaft;

a lowermost agitation blade disposed at an end of the rotation shaft in a side of a bottom surface of the agitation tank;

a gas supply pipe to supply the gas to the agitation tank; and

an outlet disposed to an uppermost portion of the agitation tank, wherein

the main agitation blade is of an axial flow type, and the lowermost agitation blade is of a disk turbine type, wherein

in the agitation tank, a ratio (H/D) of a height H in a center axis direction to a

diameter D in a cross section orthogonal to the center axis direction is 1.25 or more and 1.5 or less, wherein

a ratio (d/D) of a diameter d of the plurality of main agitation blades to the diameter D of the agitation tank is 0.2 or more and 0.22 or less, wherein

a ratio (h/D) of an installation interval h of the plurality of main agitation blades and the lowermost agitation blade in the center axis direction to the diameter D of the agitation tank is 0.33 or more and 0.38 or less, and wherein

a gas supply port of the gas supply pipe is disposed between the bottom surface of the agitation tank and the lowermost agitation blade in the center axis direction.

No. 3. Reasons for refusal notified by the body

The reasons for refusal notified by the body are as follows.

"In the present application, the statement of the Detailed Description of the Invention does not meet the requirement stipulated in Article 36(4)(i) of the Patent Act."

(hereinafter, referred to as "Violation of Enabling Requirement and Ministerial Ordinance Requirement"), and

"In the present application, the statement of the scope of claims does not meet the requirement stipulated in Article 36(6)(i) or (6)(ii) of the Patent Act."

(hereinafter, referred to as "Violation of Support Requirement and Clarity Requirement").

The above-mentioned inaccuracies in the Detailed Description will be discussed in "No. 4" and "No. 5" below.

No. 4. Regarding Violation of Enabling Requirement and Ministerial Ordinance Requirement

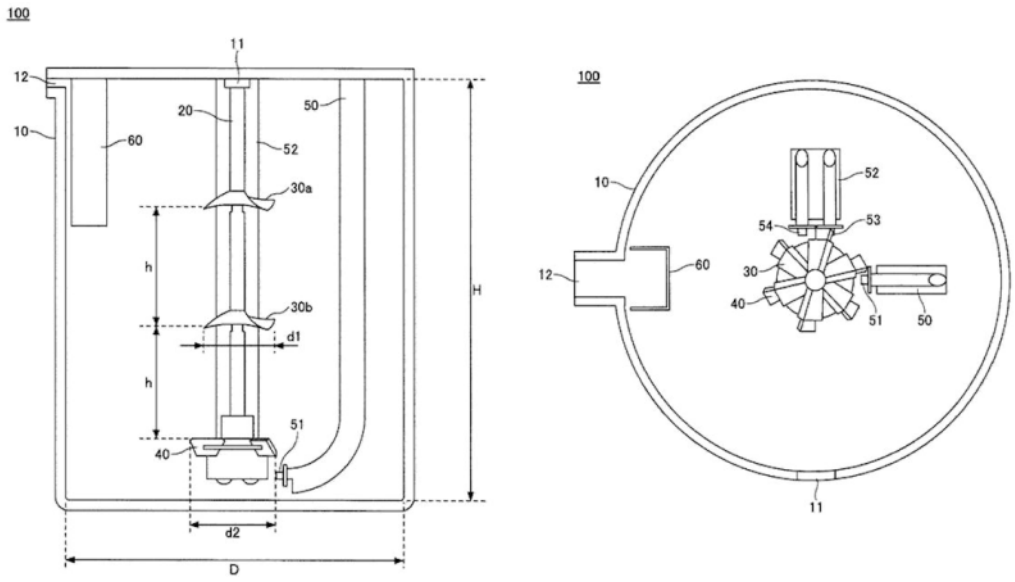
1. Statement of the Detailed Description of the Invention

In the specification of the present application and drawings, an example of the Invention and the effects are described as follows.

[0023]

Next, results of simulation carried out in the constitution of the agitation device 100 illustrated in FIG. 1 and FIG. 2 using general-purpose thermal fluid analyzing software under the conditions shown in the following example and the comparative examples will be described.

[FIG. 1] [FIG. 2]



[0024]

(Example 1)

Height H of the agitation tank 10: 4000 mm

Diameter D of the agitation tank 10: 3200 mm

Interval h of the main agitation blades 30a and 30b: 1200 mm

Blade diameter d1 of the main agitation blades 30a and 30b: 700 mm

Blade diameter d2 of the lowermost agitation blade 40: 1100 mm

Rotational speed of the rotation shaft: 220 rpm

Raw material density: 1300 kg/m^3

Raw material inflow amount: 513 L/min

Gas density: 1600 kg/m^3

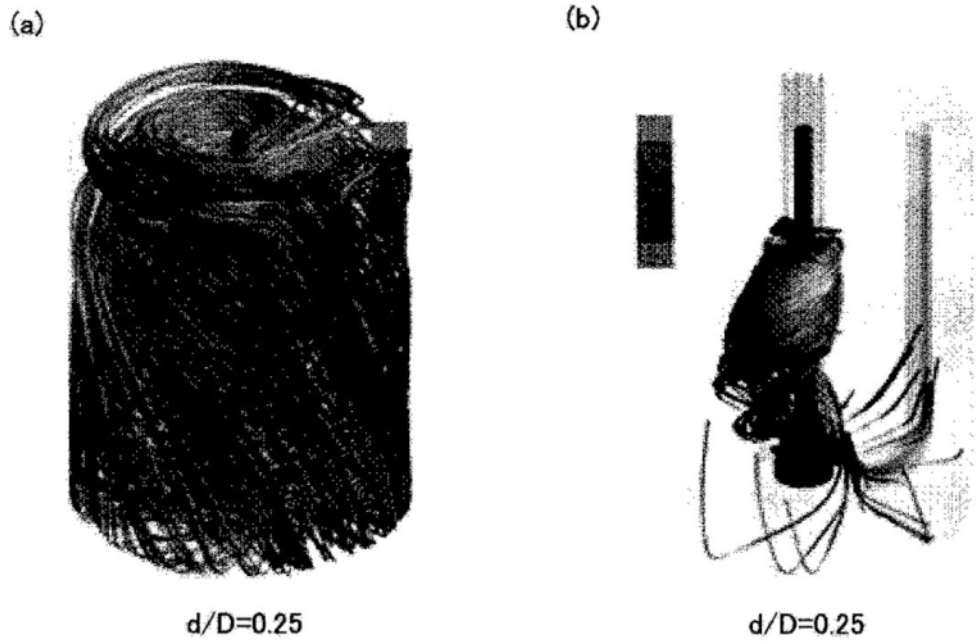
Gas inflow amount: 0.78 t/h

Ratio (H/D) of the height H of the agitation tank 10 to the diameter D is 1.25. The ratio (d/D) of the blade diameter d1 of the main agitation blades 30a and 30b to the diameter D of the agitation tank 10 is 0.21875. In addition, the ratio (h/D) of the interval h between the main agitation blades 30a and 30b to the diameter D of the agitation tank 10 is 0.375.

[0025]

FIG. 3 indicates simulation results in Example 1. FIG. 3 (a) shows a whole flow field of the agitation device 100, and FIG. 3 (b) shows a simulation result of a flow field between the main agitation blades 30a and 30b.

[FIG. 3]



[0026]

As shown in FIG. 3, in the agitation tank 10, streams between the main agitation blades 30a and 30b are connected by downward flows (FIG. 3 (b)), and circulating flows rising along the side walls of the agitation tank 10 are formed (FIG. 3 (a)). Accordingly, under the conditions of Example 1 mentioned above, it is possible for the agitation device 100 to mix and agitate raw materials and a gas uniformly.

[0039]

The following Table 1 shows each parameter used in the simulation in Example 1 and Comparative Examples 1-3 mentioned above, gas uniformity that can be obtained from simulation results, and power necessary for rotating the rotation shaft 20.

[0040]

[Table 1]

	実施例1	比較例1	比較例2	比較例3
攪拌槽の高さH(mm)	4000	4000	4000	4000
攪拌槽の直径D(mm)	3200	3200	3200	3200
攪拌翼の間隔h(mm)	1200	1200	1200	1400
主攪拌翼の翼径d1(mm)	700	600	900	700
H／D	1.25	1.25	1.25	1.25
d／D	0.22	0.19	0.28	0.22
h／D	0.38	0.38	0.38	0.44
ガス均一度(%)	76	68	76	73
動力(kW)	38	36	46	37

攪拌槽の高さ　　Height of agitation tank

攪拌槽の直径	Diameter of agitation tank
攪拌翼の間隔	Interval of agitation blades
主攪拌翼の翼径	Blade diameter of main agitation blade
ガス均一度	Gas uniformity
動力	Power
実施例	Example
比較例	Comparative Example

The gas uniformity in the above-mentioned Table 1 is a value calculated by the following expression (1) based on a density distribution of gas within the agitation tank 10 obtained by simulation.

[0041]

Gas uniformity (%) = (a region having a gas density within a range between the average density of gas ± 0.5%)/the volume of the agitation tank × 100 ... (1)

As shown in the above expression (1), the gas uniformity is the ratio of a region having a gas density within a range between the average density of gas ± 0.5% with respect to the volume of the agitation tank 10, and is a value that indicates a degree to which gas is agitated and distributed uniformly in the agitation tank 10.

[0042]

As shown in Table 1, in Example 1, gas uniformity is high, and large power is not required. That is, it can be seen that agitation can be carried out efficiently and uniformly. In contrast, in Comparative Example 1, it is shown that gas uniformity is low, and agitation and mixing is difficult to carry out uniformly. Furthermore, in Comparative Example 2, although gas uniformity is high, large power is needed, and, therefore, there is a risk that agitation efficiency degrades in such constitution. In Comparative Example 3, as also indicated in FIG. 6, sufficient circulating flows are not formed in the agitation tank 10, and thus gas uniformity is slightly low, and it is difficult to obtain an excellent agitation performance. In this way, in the agitation device 100 according to Example 1, it can be seen that the interval h of the agitation blade, the blade diameter d1 of the main agitation blade 30, and the like are optimized, and an excellent agitation performance can be obtained.

[0043]

As has been described above, by the agitation device 100 according to the present embodiment, even if the agitation tank 10 has a vertically long shape, it becomes possible to improve the agitation performance and obtain a desired mixture state by setting the blade diameter d1 of the main agitation blades 30a and 30b, the interval h of the agitation blades, and the like to optimum conditions relative to the diameter D of the agitation tank 10.

[0044]

Although, as above, agitation devices according to the embodiments have been described, the present invention is not limited to the above embodiments, and various modifications and improvements are possible within the range of the present invention.

2. Regarding violation of Enabling Requirement

(1) In the description of the present application, there is no statement referring to a specific example of the Invention using a concrete agitation device. Only simulation results by a schematic agitation device described in FIGS. 1 and 2 as an example are shown in FIG. 3 and Table 1.

It is examined hereinafter whether or not in accordance with the statement of the example a person skilled in the art can carry out such simulation. A blade diameter and a rotational speed of each agitation blade are shown in [0024] and [Table 1] of the specification of the present application. In addition, according to [FIG. 2], the number of blades of each agitation blade seem 6. However, an agitation performance (for example, a delivery amount of an agitated substance per one turn) of each agitation blade cannot be decided only on the basis of those.

That is because an agitation performance varies due to a shape of agitation blades with an identical blade diameter and the same number of blades. It is also obvious that, if an agitation performance of an agitation blade cannot be set, simulation of an agitation state cannot be carried out.

Therefore, the statement of the Detailed Description of the Invention of the present application discloses no necessary information. Accordingly, it cannot be said that the Detailed Description is described clearly and sufficiently to the extent that a person skilled in the art can perform simulation of the Invention.

In relation to this, the appellant alleges in the written opinion that disclosure of an agitation performance is unnecessary, citing a prior art document (Japanese Unexamined Patent Application Publication No. 2006-87998).

However, in the prior art document, it is described that a discharge flow volume of an agitation target substance is proportional to the product of: an effective area (A) of an agitation blade in the axis length direction; and the cube of an outermost radius (r) of the agitation blade in the effective area ([0014]), and, in addition, after having disclosed a ratio of the relevant discharge flow volume ($A \times r3$) and Reynold's number (viscosity) of an agitated substance, experimentation results of agitation characteristics are shown ([FIG. 3]-[FIG. 8]). Therefore, it can be said that the above-mentioned prior art document is a document rather indicating that disclosure of an agitation performance (discharge flow volume) is necessary on the occasion of experimentation of agitation.

Accordingly, the above-mentioned allegation cannot be approved.

(2) Next, in paragraph [0024] of the specification of the present application, it is described that, in the simulation of the above-mentioned example, a raw material density was set to 1300 kg/m^3, and a gas density to 1600 kg/m^3. Although this is recognized as gas heavier than water (1000 kg/m^3) being mixed with a raw material lighter than the gas, it cannot be said that such gas and raw material are obvious for a person skilled in the art.

Therefore, it cannot be said that the statement of the Detailed Description of the Invention of the present application is described clearly and sufficiently to the extent that a person skilled in the art can carry out the Invention in an actual agitation device, even if simulation can be carried out.

In relation to this, the appellant alleges in the written opinion that the gas in the above example is pressurized chlorine, the raw material is slurry including a sulfide of nickel, and it is common general technical knowledge for a person skilled in the art to pressurize in order to blow gas into liquid.

However, even if it is obvious to pressurize gas, it is not common general technical knowledge that the density of the gas becomes higher than the density of liquid, and, even if chlorine becomes liquid, its specific gravity is only 1.557 (1557 kg/m^3) in the first place.

Therefore, this reason for refusal is not resolved by the above-mentioned allegation.

3. Regarding Violation of Ministerial Ordinance Requirement

As has been pointed out in "2.(1) and (2)", the example described in the specification of the present application is an example by which a person skilled in the art cannot understand what kind of agitation blade, gas, and raw material are used, and, therefore, it cannot be said that a person skilled in the art can understand the technical significance of the Invention by the working-effect of the example disclosed in FIG. 3 and Table 1 of the specification of the present application.

No. 5. Regarding Violation of Support Requirement and Clarity Requirement

1. Regarding Violation of Clarity Requirement

As has been pointed out in "No. 4. 2. (2)", explanation against the common general technical knowledge is made in the Detailed Description of the Invention regarding "gas" described in Claim 1.

Therefore, it cannot be said that the Invention is clear.

2. Regarding Violation of Support Requirement

According to paragraph [0005] of the specification of the present application, the problems to be solved by the Invention exist in accumulation in an agitation device having a baffle and degradation of an agitation performance therein.

FIG. 3 shows no accumulation and Table 1 shows that an agitation performance is improved (improvement of gas uniformity and power reduction) for an example using an agitation device without a baffle described in FIGS. 1 and 2 in the specification of the present application .

However, as has been pointed out in "No. 4. 3.", the details of the agitation device in the above-mentioned example are not clear, Therefore, a person skilled in the art cannot recognize that the Invention is an invention that can solve the above-mentioned problems to be solved on the basis of the effects caused by the example. Furthermore, as has been pointed out in "1.", "gas" in the above example cannot be usual gas in light of the common general technical knowledge. Therefore, it is understood that the example in question is not an example that supports the Invention.

Therefore, it cannot be said that the Invention is the invention described in the Detailed Description of the Invention.

No. 6. Closing

As above, in the present application, the statement of the Detailed Description of the Invention does not meet the requirement stipulated in Article 36(4)(i) of the Patent Act, and, in addition, the statement of the scope of claims does not meet the requirement stipulated in Article 36(6)(i) or (ii) of the Patent Act.

Accordingly, the present application should be rejected due to the reasons for refusal by the body.

Therefore, the appeal decision shall be made as described in the conclusion.

Nov. 27, 2018

Chief administrative judge: TOYONAGA, Shigehiro
Administrative judge: OHASHI, Kenichi
Administrative judge: HASHIMOTO, Kenichiro