

12

EUROPEAN PATENT APPLICATION

21 Application number: **83306427.2**

51 Int. Cl.³: **B 01 F 13/04**

22 Date of filing: **24.10.83**

30 Priority: **23.11.82 GB 8233368**

71 Applicant: **MASTERMIX LIMITED, Vigo Place Aldridge, Walsall West Midlands WS9 8UG (GB)**

43 Date of publication of application: **04.07.84**
Bulletin 84/27

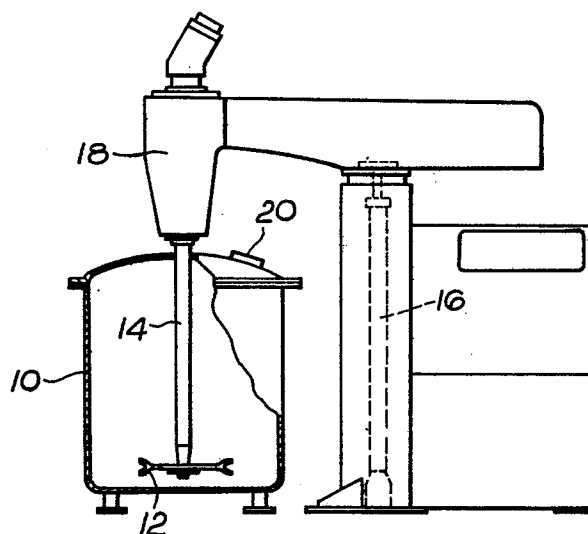
72 Inventor: **English, Robert William, "highfields" 8 Cloister walk Whittington, Nr.Lichfield Staffordshire (GB)**

84 Designated Contracting States: **AT BE CH DE FR GB IT LI LU NL SE**

74 Representative: **Hands, Horace Geoffrey et al, LEWIS W. GOOLD & CO. Whitehall Chambers 23, Colmore Row, Birmingham B3 2BL (GB)**

54 **Apparatus for the production of mixture, dispersions and the like.**

57 Paint making apparatus comprises a rotor for dispersing powder into solvent, a microphone for sensing noise generated by the dispersing operation, and various different (alternative or in combination) means for making the rotor more and less effective according to the noise level and based on turbulence as a result of unmixed powder being present, as compared with the conditions when the powder is fully dispersed.



1.

APPARATUS FOR THE PRODUCTION OF MIXTURES,
DISPERSIONS AND THE LIKE.

Known apparatus e.g. for making paint, comprises a vessel for receiving liquid and other material to be mixed and a rotary agitator for immersion into the contents of the vessel. The other materials
5 may comprise opacifiers, pigments and the like, and are often added in successive increments. The size of an increment is determined by the state of the liquid to which the increment is added, and the desire to avoid clots and lumps in the mixture.
10 In general, it is better to add successive small increments than fewer larger increments.

European Patent No. 0000827 describes apparatus of the mentioned kind in which the agitator is vertically moved in the vessel under the control of means responsive
15 to the noise level emitted by the contents of the vessel during agitation. Effectively, the addition of a powder increment, although having a blanketing effect, causes increased turbulence and hence more noise and this noise is sensed and a resulting signal
20 causes the agitator to be raised so as to be nearer the surface of the liquid. In this position the agitator has a greater effect on mixing and dispersing of the powder (assumed to be located towards the surface of the liquid) and consequently the speed
25 and efficiency of the dispersion is improved.

The apparatus is made in various sizes, for example a nominal 500 litre, 2500 litre and so on vessel capacity. If a large vessel is used for a small batch for example a 400 litre batch in a 2500
30 litre vessel as is sometimes necessary because of the unavailability of smaller apparatus, pool

of liquid is shallow and the scope for raising
and lowering of the agitator is quite limited because
the agitator must be immersed in the solvent.
The apparatus of said European Patent is then of
5 only limited value or even is not useful.

The object of the invention is to provide
improvements.

In accordance with the invention, mixing apparatus
comprising a vessel for receiving liquid and other
10 materials to be mixed, a rotary agitator for immersion
into the contents of the vessel, and means responsive
to the noise level emitted by the contents of the
vessel during agitation, is characterised in that
the said means responsive to the noise level are
15 used to vary the effectiveness of the agitator
other than by height adjustment.

Hence the adjustment based on noise level
is used effectively in situations where the apparatus
of said EP is useless, although the present invention
20 is in fact useful in other situations also, that
is to say, as a substitute for the apparatus of
said EP.

Various possibilities for carrying out the
invention will now be discussed with reference
25 to the accompanying drawing wherein the sole figure
is a schematic view of apparatus for making paint.
In the drawing a pot 10 is charged with powder
and solvents which are mixed and dispersed by rotor
12 driven by shaft 14. The shaft can be raised
30 and lowered by ram 16 and the shaft is rotated
by a motor in the head 18. Microphone 20 senses
noise which is used by appropriate circuitry to
vary the mixing conditions from time to time.

According to a feature of the invention, the agitator is to be rotated by a variable speed drive (known per se) and the noise responsive means varies the speed of rotation of the agitator. An increase
5 in turbulence as a result of a powder increment will lead to an increase in rotation speed, and vice versa, but with upper and lower threshold limits between which no variation takes place, in order to avoid unnecessary "hunting".

10 One example of a known variable speed drive is in BP1051692 where a variable volume pump is used in a hydraulic transmission. In applying the present invention to a drive of the kind described in said BP, the noise signal from microphone 20
15 will be used to control the swash plate angle of the variable volume pump which drives the motor in head 18.

According to another feature of the invention, the rotary agitator is provided with blades of
20 variable pitch, and the pitch is adjusted by the noise responsive means. The effect will be similar to that attained by agitator speed variation, in that an increase in pitch will increase the agitation of the liquid for better mixing, and a reduction
25 in pitch, that is movement towards a fully "feathered" position will have the opposite effect, and threshold limits avoid hunting.

For example, the blades of the agitator 12
may be pivoted on a hub at the bottom of the agitator
30 shaft 14 for movement between the feathered and effective positions, and be spring urged to one or other. A loose collar or tubular shaft surrounding the drive shaft 14 may be axially displaced by

an actuator in head 18 operated by the noise control system so as to cam the blades against the spring to the opposite position.

5 According to another feature of the invention,
the agitator is provided with blades which are
adjustable between positions more and less closely
akin to radial positions. Effectively the overall
diameter of the agitator is varied by such adjustment,
and hence a decrease in noise due to powder addition
10 will result in an increase in agitator diameter
and vice versa, with thresholds for the same reasons
as would be the case if either of the alternative
features were utilised.

15 This possibility may be utilised by again
having inner and outer shafts 14 with one driving
(rotating) the agitator blades 12 and the second
moved relatively to the first, such as by an epicyclic
gear set via a noise sensing system to cam the
blades to different angles, between the radial
20 and the tangential to the shafts, so that the blades
sweep through different diameter circles according
to the angular position of the blades to the shafts.
At maximum diameter the mixing effect is greatest,
akin to maximum pitch displacement from the feathered
25 position, likewise akin to maximum speed of the
drive shaft 14, or to maximum effective height
of the agitator in the pot in the various respective
other possibilities mentioned.

30 However, it is possible to utilise all of
these features in combination, or ones of these
features in combination.

5.

0112619

It is also possible to utilise any of these features or combination of these features, in combination with the vertical adjustment feature.

CLAIMS

1. Mixing apparatus comprising a vessel for receiving liquid and other materials to be mixed, a rotary agitator for immersion into the contents of the vessel, and means responsive to the noise level
5 emitted by the contents of the vessel during agitation, is characterised in that the said means responsive to the noise level are used to vary the effectiveness of the agitator other than by height adjustment.
2. Mixing apparatus as claimed in Claim 1 characterised
10 in that the agitator is rotated by a variable speed drive (known per se) and the noise responsive means varies the speed of rotation of the agitator.
3. Mixing apparatus as claimed in Claim 1 characterised
15 in that the rotary agitator is provided with blades of variable pitch arranged to be adjusted by the noise responsive means.
4. Mixing apparatus as claimed in Claim 1 characterised
20 in that the agitator is provided with blades which are adjustable between positions more and less closely akin to radial positions under the control of the noise sensor.

