(12) UK Patent Application (19) GB (11) 2 308 313 (13) A

(43) Date of A Publication 25.06.1997

(21) Application No 9620491.2

(22) Date of Filing 02.10.1996

(30) Priority Data
(31) 07354555 (32) 20.12.1995 (33) JP

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(51) INT CL^6
B01F 7/16

(52) UK CL (Edition O)
B1C CAPB C102 C616 C626 C632 C642 C662

(56) Documents Cited
GB 0864605 A US 4095287 A US 4042221 A

(58) Field of Search
UK CL (Edition O) B1C CAPB
INT CL^6 B01F 7/16
Online databases: EDOC,WPI

(54) Apparatus for mixing pellets of synthetic resin with colouring agents prior to extrusion

(57) The apparatus comprises a mixing vessel 2 removably housed in a supporting frame 1 and a rotary agitator 3 movably mounted on the frame for insertion into and withdrawal from the vessel. The agitator 3 includes legs 17 mounting paddles 18 on the lower ends thereof. The bottom of the vessel 2 has a central upright pillar 11 to which a stationary blade 12 is fixed. Mixing blades 14 are provided on the inner peripheral wall of the vessel.

FIG.2.

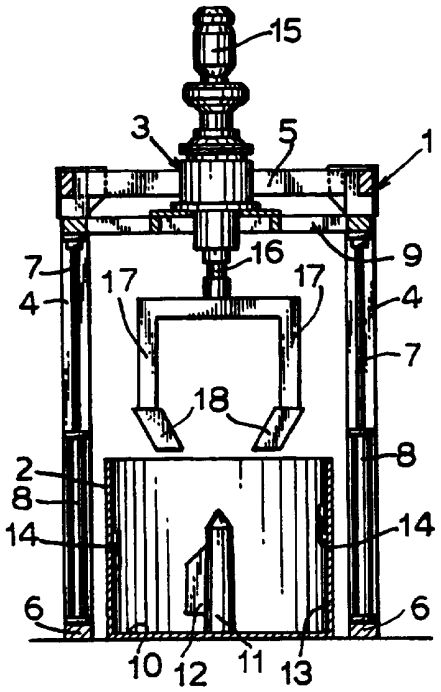

FIG.4.

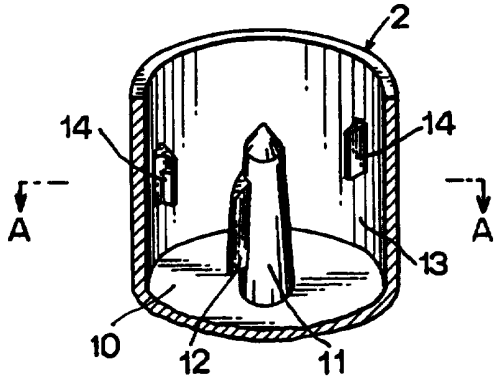

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FIG.2.

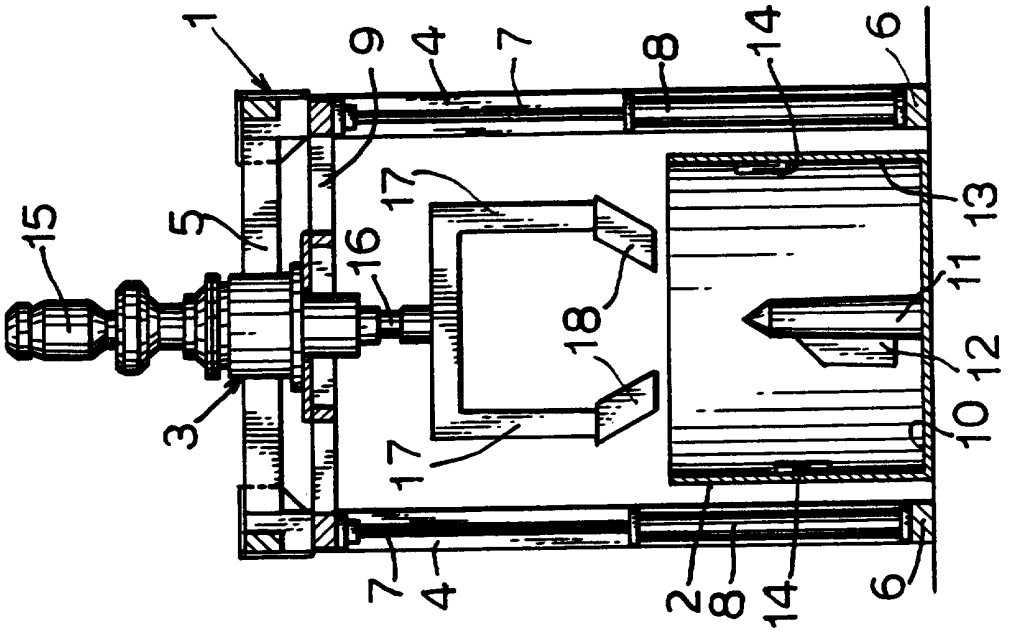
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FIG.1.

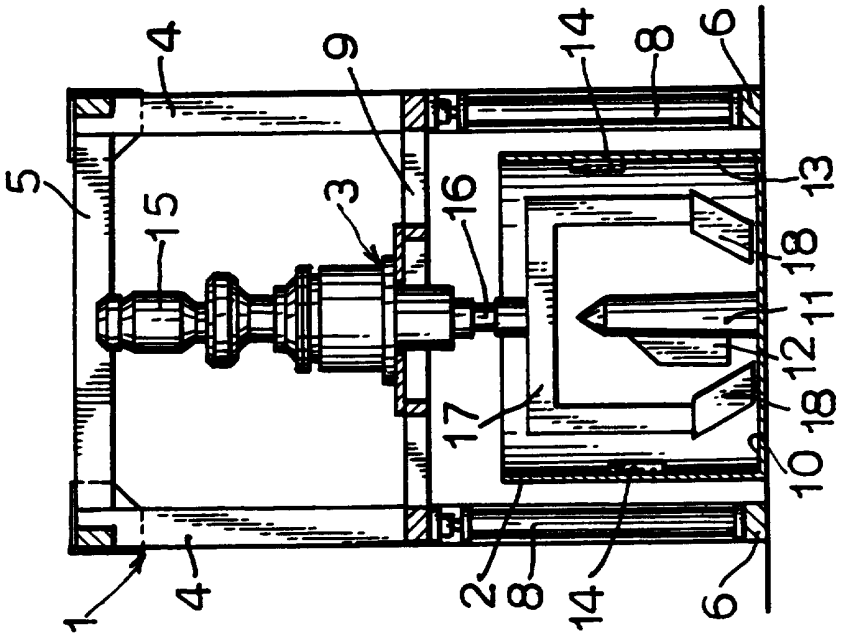
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FIG. 3.

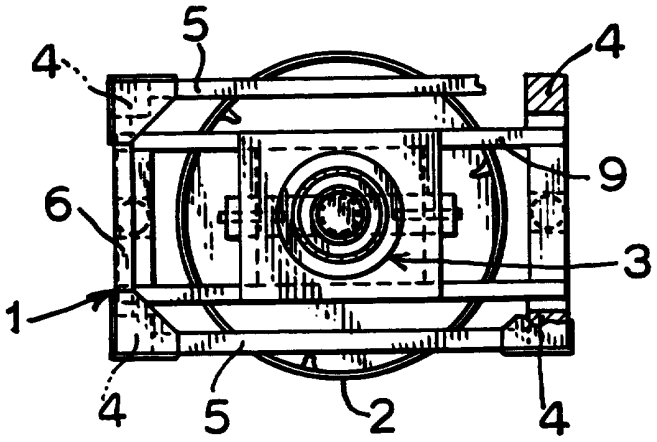


FIG. 4.

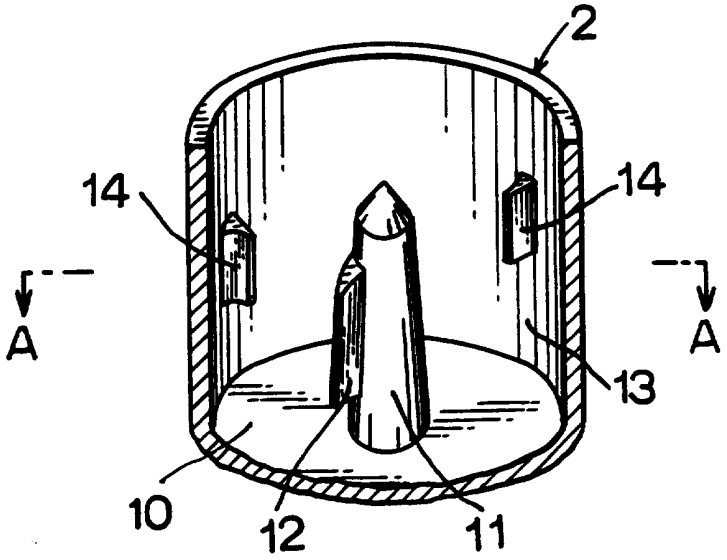
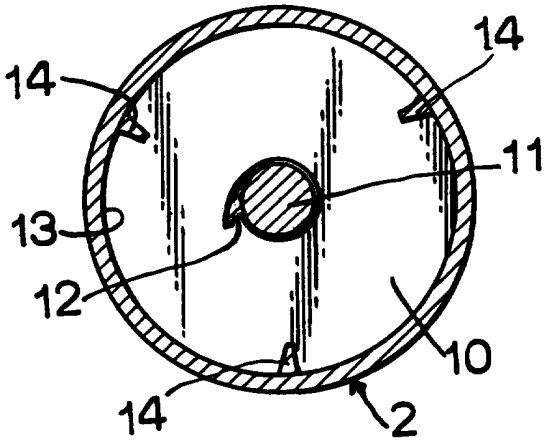


FIG. 5.



AGITATION APPARATUS FOR PELLETS OF SYNTHETIC RESINS

This invention relates to an agitation apparatus for pellets of synthetic resins to be used for uniformly mixing and colouring the pellets of raw materials of synthetic resins to be supplied to an extrusion machine.

Known agitation apparatus of this kind comprises a rotary agitator having a rotating shaft with a fixed axis. Such a rotary agitator is provided with a closing lid at its upper end for receiving poured pellets and with a discharging port at its lower end. Both ends of the rotating shaft are supported rotatably by a column. A pulley is fixed to one end extended to the outside of the column and another pulley is also fixed on the shaft of an electric motor disposed at the lower end of the column, the two pulleys being connected by a belt. Therefore, the pulleys are driven by the motor, and the rotary agitator is rotated by the center rotating shaft to which the pulley is fixed, for mixing and colouring the pellets.

In the known agitation apparatus, the agitating condition of pellets can not be observed from the outside of the agitation apparatus itself, as the rotary agitator, into which the pellets were poured from the closing lid is rotated for mixing and colouring the pellets. Also, it takes a long time for the pellets to be thoroughly uniformly coloured in the mixing and colouring operation because the pellets in the rotary agitator only slide upward and downward circumferentially along the inside of

said rotary agitator. Moreover, upon completion of the mixing and colouring operation, it is necessary to clean up the inside of the rotary agitator, especially to remove colouring agents therefrom, which takes much time and labour.

Accordingly, an object of this invention is to provide an agitation apparatus for pellets of synthetic resins which enables the pellets to be coloured uniformly in a short time by agitation of the pellets and colouring agents together in the agitation vessel, whilst enabling observation of the mixing/colouring conditions of pellets from the outside of the agitation apparatus, and simple and easy cleaning of the agitation vessel.

An agitation apparatus for pellets of synthetic resins in accordance with this invention comprises a cylindrical agitation vessel into which the raw material pellets of synthetic resins can be poured and which is movably housed in a supporting frame,

an agitator mounted elevatably on the supporting frame for insertion into and withdrawal from the agitation vessel, agitating means secured to the agitator for agitating the pellets of synthetic resins and

mixing means included in the agitator vessel for temporarily obstructing the pellets and causing turbulent movement thereof.

Further preferred features and advantages of the invention will become apparent from the following description taken in conjunction with the dependant claims

and the accompanying drawings, in which:

Fig. 1 is a front view of an agitation apparatus in accordance with one embodiment of this invention showing the agitator in a descended position.

Fig. 2 is a front view of the agitation apparatus of Fig. 1 showing the agitator in an elevated position.

Fig. 3 is a plan view of the agitation apparatus of Fig. 1.

Fig. 4 is a perspective view showing the inside of the agitation vessel of the apparatus, and

Fig. 5 is a sectional plan view along the line A-A of Fig. 4.

Referring to Figs. 1-3 of the drawings, the agitation apparatus has a supporting frame 1 assembled approximately in a rectangular shape with longitudinal frames 4 at four corners, side frames 5 at front and rear sides, and lateral frames 6 at right and left sides. Between the upper and lower lateral frames 6, 6 disposed on both sides of the supporting frame, there is fixed an elevator 8, in which a guiding bar 7 is arranged to move upwardly and downwardly therein. The elevator 8 is provided at the upper end of the guiding bar 7 with an elevating carrier 9 to which an agitator 3 is mounted. The elevator 8 comprises pneumatic or hydraulic pressure cylinders that enable the guiding bar 7 and the elevating carrier 9 to be moved together upwardly and downwardly under pneumatic or hydraulic power.

An agitation vessel 2 is removably housed in the inside of the supporting frame 1, and comprises a

cylindrical vessel into which pellets of synthetic resin and colouring agents can be poured. The agitation vessel 2 is provided at the center of the bottom 10 with an upright guiding pillar 11 to which a stationary blade 12 is secured, the stationary blade 12 protruding perpendicularly relatively to a tangent to the circumference of the upright guiding pillar 11 so as temporarily to stop the movement of pellets of raw materials. Furthermore, in the agitation vessel 2, there are a plurality of mixing blades 14 which project respectively to the inside from the cylindrical inner circumferential wall surface 13 at a predetermined distance alternately to each other in the upper and lower direction.

An agitator 3 is mounted to the center portion of the elevating carrier 9 fixed to the guiding bar 7 of the elevator 8. The agitator 3 has an electric motor 5 disposed on the upper part of the elevating carrier 9 and a rotating shaft 16 protruded to the lower part of the carrier 9. Further the agitator 3 is provided with a plurality of agitating legs 17 mounted to the lower end of the rotating shaft 16 and with agitating pawls 18 secured to the lower ends of the agitating legs 17. Each agitating leg 17 comprises a horizontal portion extending from the lower end of the rotating shaft 16 parallel to the side frame 5 and the lateral frame 6 of the supporting frame 1 and a vertical portion extending parallel to the longitudinal frame 4 and bending vertically to the side frame 5 and lateral frame 6, and the agitating pawls 18 are

inclined inwardly toward an axis of the rotating shaft 16 to make a favourable mixing of pellets. The agitator 3 can be moved by the downward and upward movement of the elevating carrier 9 between an upper position and a lower position which is shown in Fig. 1 and which is the agitating and mixing operation position in which the agitating legs 17 and agitating pawls 18 are inserted into the agitation vessel 2 housed within the supporting frame 1. The upper elevated position is shown in Fig. 2 where the agitating pawls 18 are located above the agitation vessel 2.

For agitating, mixing and colouring of pellets in the agitation apparatus according to this invention, the raw material pellets of synthetic resin are supplied from a storing tank to the agitation vessel 2 together with the given colouring agents. The agitation vessel 2 is set in the supporting frame 1 in the position shown in Fig. 2 where the agitator 3 is elevated to the upmost position within the supporting frame 1. Then by releasing the air or hydraulic pressure from the cylinders of the elevator 8, the elevating carrier 9 is caused to descend and the agitating legs 17 and pawls 18 of the agitator 3 are inserted into the agitation vessel 2 which is housed in the supporting frame 1. Thus the agitator 3 is moved into the lower position shown in Fig. 1, wherein the agitating legs 17 and pawls 18 are rotated by means of the electric motor 15 and the pellets are agitated, mixed, and coloured. In the agitation of the pellets with the agitating pawls 18,

the pellets and colouring agents move in the same direction within the vessel 2. However, the movement of the pellets will be disturbed temporarily by the mixing blade 14 mounted on the inner peripheral wall surface 13 of the vessel 2 and the stationary blade 12 mounted on the upright guiding member 11, thereby said movement in the same direction will be changed to produce a turbulence for colouring pellets uniformly overall and it is possible to enhance a much better colouring efficiency of pellets. Upon completion of mixing and colouring of the pellets, the electric motor is stopped and then by applying air or hydraulic pressure to the cylinders of the elevator 8, the agitator 3 having the agitating pawls 8 is moved to the elevated position shown in Fig. 2 and the agitator vessel 2 can be taken out from the supporting frame 1 for supplying the pellets to a transferring apparatus.

CLAIMS:

1. An agitation apparatus for pellets of raw materials of synthetic resins, comprising

a cylindrical agitation vessel into which the raw material pellets of synthetic resins can be poured and which is removably housed in a supporting frame,

an agitator mounted elevatably on the supporting frame for insertion into and withdrawal from the agitation vessel, agitating means secured to the agitator for agitating the pellets of synthetic resins and

mixing means included in the agitator vessel for temporarily obstructing the pellets and causing turbulent movement thereof.

2. An agitation apparatus according to Claim 1, wherein the supporting frame is provided with an elevator having a guiding bar mounted movably in the upward and downward direction, and said guiding bar is provided with an elevating carrier, to which the agitator is secured.

3. An agitation apparatus according to Claim 2, wherein the agitator comprises an electric motor disposed on the upper portion of the elevating carrier, a rotating shaft of the electric motor extended to the lower portion of the elevating carrier, a plurality of agitating legs mounted to the lower end of the rotating shaft, and agitation pawls secured to lower ends of the agitating legs.

4. An agitation apparatus according to any one of Claims 1-3, wherein the agitation vessel is provided at the

center of its bottom with an upright guiding pillar to which a stationary blade is secured, and is provided at the inner peripheral surface with a plurality of mixing blades which protrude alternately to each other in the upper and lower direction at a predetermined distance.

5. An agitation apparatus substantially as described herein with reference to the accompanying drawings.

The Patent Office

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Application No: GB 9620491.2
Claims searched: 1-5

Examiner: Graham Russell
Date of search: 22 October 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B1C (CAPB)

Int Cl (Ed.6): B01F 7/16

Other: Online: EDOC, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 864605	(CLEVELAND) see page 2 lines 70-99 & page 4 line 123 - page 5 line 6	1
A	US 4095287	(BONAVAL) see column 2 lines 32-58	1
A	US 4042221	(MYERS) see Fig 1	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.