Claims

1. A process for starting up a separating process for purifying removal of acrylic acid crystals from a suspension S of crystals thereof in mother liquor with an apparatus which comprises a hydraulic wash column which has a process space which is rotationally symmetric with respect to its longitudinal axis running from the top downward and is bounded by a cylindrical outer wall and two opposite ends on the axis of symmetry, in which

- one or more filter tubes extend through the process space from the upper end of the process space parallel to the longitudinal axis thereof, which run toward the lower end of the process space opposite the upper end, and have, in the half of the process space toward the lower end of the process space, at least one filter F which constitutes the only direct connection between the particular filter tube interior and the process space, and are conducted out of the wash column outside the process space,

- the quotient Q = L/D of the distance L between the upper and lower ends of the process space and the diameter D of the process space is 0.3 to 4,

- the lower end of the process space is followed in the downward direction by the crystal melt space of the wash column, a rotatable removal device being integrated between the two spaces and a crystal melt circuit which is conducted through the crystal melt space comprising, outside the crystal melt space,

  - a delivery pump P1 which is outside the wash column and has a suction side and a pressure side,

  - a first delivery connection G1 which leads from the crystal melt space of the wash column to the suction side of the delivery pump P1,

  - a second delivery connection G2 which leads from the pressure side of the delivery pump P1 back into the crystal melt space of the wash column and has an outlet A from the crystal melt circuit with regulable flow, and

  - a heat transferer W, through which either the delivery connection G1 from the crystal melt space to the suction side of the delivery pump P1 or the delivery connection G2 from the pressure side of the delivery pump P1 to the crystal melt space is conducted,

- connected upstream of the upper end of the process space in the upward direction is a distributor space which is separated from the process space at least by one end B which has passages U which lead into the process space on the side of the end B facing the process space and into the distributor space on the side of the end B facing away from the process space,

- a delivery pump P2 which has a suction side and a pressure side and a source QS of the suspension S are present outside the wash column,

  - a first delivery connection E1 leading from the source QS to the suction side of the delivery pump P2, and

  - a second delivery connection E2 leading from the pressure side of the delivery pump P2 into the distributor space,

- a delivery pump P3 which has a suction side and a pressure side and a source QT of a control liquor are optionally present outside the wash column,

  - a first delivery connection C1 leading from the suction side of the pump P3 to the source QT, and

  - a second delivery connection C2 leading from the pressure side of the pump P3 into the distributor space and/or into the longitudinal section of the process space between the upper end thereof and the filters F of the filter tubes,

and in which, in the course of performance of the separating process, in steady-state operation thereof,

- the pump P2 is used to continuously conduct a stream ST of the suspension S from the source QS through the delivery connections E1, E2 via the distributor space and through the passages U into the process space of the wash column,

- optionally, the pump P3 is used to conduct a stream SL of the control liquor from the source QT through the delivery connections C1, C2 via the distributor space and the passages U and/or directly into the process space of the wash column,

- overall, a stream SM comprising mother liquor and optionally control liquor is conducted as waste liquor stream into the filter tube interior via the filters F of the filter tubes, and out of the wash column via the filter tubes, and this waste

liquor stream SM conducted out of the wash column is used as the source QT for the control liquor,

- the conduction of mother liquor and optionally control liquor in the process space of the wash column maintains the development of a crystal bed of acrylic acid crystals which has a buildup front facing the upper end of the process space, at which crystals of the stream ST of the suspension S supplied are added continuously onto the crystal bed,

- the crystal bed is conveyed from the top downward past the filters F toward the rotating removal device by the force which results from the hydraulic flow pressure drop of the conduction of mother liquor and optionally control liquor in the process space,

- the rotating removal device removes acrylic acid crystals from the crystal bed which meets it,

- the stream of the acrylic acid crystals removed is conveyed through the rotating removal device and/or past the rotating removal device into the crystal melt space which follows downstream of the process space in conveying direction of the crystal bed, and melted in the crystal melt circuit conducted through the crystal melt space as a result of introduction of heat with the heat transferer W to give a crystal melt stream, and

- the flow through the outlet A is regulated such that, based on the flow rate of the aforementioned crystal melt stream, proceeding from the crystal melt space, a substream of crystal melt flows as wash melt stream through the rotating removal device and/or past the rotating removal device against the direction of movement of the crystal bed back into the process space, where it ascends within the crystal bed conveyed downward and in doing so washes the mother liquor off the crystals and forces it back, said mother liquor remaining in the crystal bed having been conveyed with the latter under the filters F, which forms, in the longitudinal section of the process space which extends from the filters F to the lower end of the process space, in the crystal bed, a wash front which divides the crystal bed, from the top downward, into a mother liquor zone and into a wash melt zone, and the remaining substream of the aforementioned crystal melt stream leaves the crystal melt circuit through the outlet A,

wherein, in the course of startup of the separating process for first development of the crystal bed in the process space,

- the crystal melt circuit comprising the crystal melt space, and the process space of the previously unfilled wash column, are at first filled with an acrylic acid-comprising startup liquid AT such that the fill height of the startup liquid AT in the process space overtops at least the removal device,

- then the filling of the wash column is continued by using the pump P2 to conduct a stream ST* of the suspension S from the source QS through the delivery connections E1, E2 via the distributor space and through the passages U into the process space of the wash column and optionally using the pump P3 to conduct a substream of the waste liquor stream SM* conducted out of the wash column through the filter tubes as source QT*, as control liquor stream SL* through the delivery connections C1, C2 via the distributor space and the passages U and/or directly into the process space of the wash column, at least until the time t_s is attained at which the pressure difference $P_D = P_K - P_V$, where P_K is the pressure existing at any desired point in the crystal melt space at a particular time in the supply of the stream ST* and P_V is the pressure which exists at the same time at any desired point in the distributor space, no longer rises or remains constant as a function of the duration of the supply of the stream ST*, but decreases suddenly, with the proviso that

  - until the time t_s, the mean superficial velocity on the filters F, calculated as the arithmetic mean of the total waste liquor flow SM* which flows at the particular time through the filters F of the filter tubes during the supply of the stream ST*, divided by the total area of all filters F, is not more than 80 $m^3/(m^2 \cdot h)$,

  - the acrylic acid-comprising startup liquid AT is one from which, in the course of cooling until crystallization sets in, the crystals which form in the course of crystallization are acrylic acid crystals, and

  - between the crystal formation temperature T^{KB}, reported in degrees Celsius, of these acrylic acid crystals in the startup liquid AT and the temperature T^S, reported in degrees Celsius, of the suspension S of the stream ST*, the following relationship is satisfied:

$$T^{KB} \leq T^S + 15°C\,.$$

2. The process according to claim 1, wherein the mean superficial velocity on the filters F until the time t_s is not more than 5 $m^3/(m^2 \cdot h)$.

3. A process according to either of claims 1 and 2, wherein the distance L is ≥ 0.5 m.

4. A process according to any of claims 1 to 3, wherein the distance L is ≤ 5 m.

5. A process according to any of claims 1 to 4, wherein T^{KB} is not more than 20°C below T^{S}.

6. A process according to any of claims 1 to 5, wherein the startup liquid AT is mother liquor removed from the suspension S.

7. A process according to any of claims 1 to 6, wherein the startup liquid AT is that liquid from which the suspension S is obtained by cooling.

8. A process according to any of claims 1 to 7, wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_S is reached, the superficial velocity on the filters F which exists at the particular time is not more than 80 $m^3/(m^2 \cdot h)$.

9. A process according to any of claims 1 to 8, wherein, over the entire period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the superficial velocity on the filters F which exists at the particular time is not more than 80 $m^3/(m^2 \cdot h)$.

10. A process according to any of claims 1 to 9, wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the superficial velocity on the filters F which exists at the particular time is at least $5m^3/(m^2 \cdot h)$ or at least $10m^3/(m^2 \cdot h)$.

11. A process according to any of claims 1 to 10, wherein, over the entire period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the arithmetic mean M of the total flow of liquid supplied to the process space of the wash column, divided by the free cross-sectional area of the process space, is 1 to 30 $m^3/(m^2 \cdot h)$.

12. A process according to any of claims 1 to 11, wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the total flow of liquid supplied to the process space of the wash column at the particular time, divided by the free cross-sectional area of the process space, is 1 to 30 $m^3/(m^2 \cdot h)$ or 5 to 25 $m^3/(m^2 \cdot h)$.

13. A process according to any of claims 1 to 12, wherein content of acrylic acid in the suspension S is ≥70% by weight.

14. A process according to any of claims 1 to 13, wherein the degree of crystallization of the suspension S is ≥ 0.10.

15. A process according to any of claims 1 to 14, wherein the longest dimension of the majority of acrylic acid crystals present in the suspension S is 50 to 1600 µm.

16. A process according to any of claims 1 to 15, wherein the orifice ratio OV of the removal device is ≥ 0.01.

17. A process according to any of claims 1 to 16, wherein the orifice ratio OV of the removal device is ≤ 0.9.

18. A process according to any of claims 1 to 17, wherein the removal device is a bladed disk having passage orifices.

19. A process according to any of claims 1 to 18, wherein the crystal melt circuit and the process space of the previously unfilled wash column are at first filled with an acrylic acid-comprising startup liquid AT such that the fill height of the startup liquid AT in the process space overtops at least the filters F.

20. A process according to any of claims 1 to 19, wherein the temperature of the suspension S is -25 to +14°C.

21. A process according to any of claims 1 to 20, wherein the mother liquor present in the suspension S comprises ≥ 70% by weight of acrylic acid.

22. A process according to any of claims 1 to 21, wherein a substream of the waste liquor stream SM* conducted out of the wash column through the filter tubes as source QT* is conducted with the pump P3 as control liquor stream SL* through the delivery connections C1, C2 via the distributor space and through the passages U into the process space of the wash column.

23. A process according to any of claims 1 to 22, wherein both the pressure P_K and the pressure P_V are measured during the startup.

24. A process according to any of claims 1 to 23, wherein the pressure difference P_D is determined with a pressure difference manometer.

25. A process according to any of claims 1 to 24, wherein, after the time t_s, the melt circuit and the removal device are put into operation and the flow through the outlet A is opened, and a molecular oxygen-comprising gas is metered into the

melt circuit, by introducing the molecular oxygen-comprising gas into a substream of the melt circuit, and then supplying the substream comprising the molecular oxygen back to the melt circuit.

26. A process according to any of claims 1 to 25, wherein the number of filter tubes in the hydraulic wash column is 3 to 200.

27. A process according to any of claims 1 to 26, wherein the suspension S has the following contents:

≥ 70% by weight of acrylic acid,
up to 15% by weight of acetic acid,
up to 5% by weight of propionic acid,
up to 5% by weight of low molecular weight aldehydes,
up to 3% by weight of diacrylic acid, and
up to 25% by weight of water.

28. A separating process for purifying removal of acrylic acid crystals from a suspension S of crystals thereof in mother liquor with an apparatus which comprises a hydraulic wash column, wherein the separating process has been put into operation by a process of claims 1 to 27.

29. A process according to claim 28, which is followed by a further process in which removed and molten acrylic acid crystals are subjected to a polymerization with acrylic acid itself or other, at least monoethylenically unsaturated compounds.

The invention claimed is:

1. A process for starting up a separating process for purifying removal of acrylic acid crystals from a suspension S of crystals thereof in mother liquor with an apparatus which comprises a hydraulic wash column which has a process space which is rotationally symmetric with respect to its longitudinal axis running from the top downward and is bounded by a cylindrical outer wall and two opposite ends on the axis of symmetry, in which

one or more filter tubes extend through the process space from the upper end of the process space parallel to the longitudinal axis thereof, which run toward the lower end of the process space opposite the upper end, and have, in the half of the process space toward the lower end of the process space, at least one filter F which constitutes the only direct connection between the particular filter tube interior and the process space, and are conducted out of the wash column outside the process space,

the quotient Q=L/D of the distance L between the upper and lower ends of the process space and the diameter D of the process space is 0.3 to 4,

the lower end of the process space is followed in the downward direction by the crystal melt space of the wash column, a rotatable removal device being integrated between the two spaces and a crystal melt circuit which is conducted through the crystal melt space comprising, outside the crystal melt space,

a delivery pump P**1** which is outside the wash column and has a suction side and a pressure side,

a first delivery connection G**1** which leads from the crystal melt space of the wash column to the suction side of the delivery pump P**1**,

a second delivery connection G2 which leads from the pressure side of the delivery pump P1 back into the crystal melt space of the wash column and has an outlet A from the crystal melt circuit with regulable flow, and

a heat transferer W, through which either the delivery connection (G1 from the crystal melt space to the suction side of the delivery pump P1 or the delivery connection G2 from the pressure side of the delivery pump P1 to the crystal melt space is conducted,

connected upstream of the upper end of the process space in the upward direction is a distributor space which is separated from the process space at least by one end B which has passages U which lead into the process space on the side of the end B facing the process space and into the distributor space on the side of the end B facing away from the process space,

a delivery pump P2 which has a suction side and a pressure side and a source QS of the suspension S are present outside the wash column,

a first delivery connection E1 leading from the source QS to the suction side of the delivery pump P2, and

a second delivery connection E2 leading from the pressure side of the delivery pump P2 into the distributor space,

a delivery pump P3 which has a suction side and a pressure side and a source QT of a control liquor are optionally present outside the wash column,

a first delivery connection C1 leading from the suction side of the pump P3 to the source QT, and

a second delivery connection C2 leading from the pressure side of the pump P3 into the distributor space and/or into the longitudinal section of the process space between the upper end thereof and the filters F of the filter tubes, and in which, in the course of performance of the separating process, in steady-state operation thereof,

the pump P2 is used to continuously conduct a stream ST of the suspension S from the source QS through the delivery connections E1, E2 via the distributor space and through the passages U into the process space of the wash column,

optionally, the pump P3 is used to conduct a stream SL of the control liquor from the source QT through the delivery connections C1, C2 via the distributor space and the passages U and/or directly into the process space of the wash column,

overall, a stream SM comprising mother liquor and optionally control liquor is conducted as waste liquor stream into the filter tube interior via the filters F of the filter tubes, and out of the wash column via the filter tubes, and this waste liquor stream SM conducted out of the wash column is used as the source QT for the control liquor,

the conduction of mother liquor and optionally control liquor in the process space of the wash column maintains the development of a crystal bed of acrylic acid crystals which has a buildup front facing the upper end of the process space, at which crystals of the stream ST of the suspension S supplied are added continuously onto the crystal bed,

the crystal bed is conveyed from the top downward past the filters F toward the rotating removal device by the force which results from the hydraulic flow pressure drop of the conduction of mother liquor and optionally control liquor in the process space,

the rotating removal device removes acrylic acid crystals from the crystal bed which meets it,

the stream of the acrylic acid crystals removed is conveyed through the rotating removal device and/or past the rotating removal device into the crystal melt space which follows downstream of the process space in conveying direction of the crystal bed, and melted in the crystal melt circuit conducted through the crystal melt space as a result of introduction of heat with the heat transferer W to give a crystal melt stream, and

the flow through the outlet A is regulated such that, based on the flow rate of the aforementioned crystal melt stream, proceeding from the crystal melt space, a substream of crystal melt flows as wash melt stream through the rotating removal device and/or past the rotating removal device against the direction of movement of the crystal bed back into the process space, where it ascends within the crystal bed conveyed downward and in doing so washes the mother liquor off the crystals and forces it back, said mother liquor remaining in the crystal bed having been conveyed with the latter under the filters F, which forms, in the longitudinal section of the process space which extends from the filters F to the lower end of the process space, in the crystal bed, a wash front which divides the crystal bed, from the top downward, into a mother liquor zone and into a wash melt zone, and the

remaining substream of the aforementioned crystal melt stream leaves the crystal melt circuit through the outlet A,

wherein, in the course of startup of the separating process for first development of the crystal bed in the process space,

the crystal melt circuit comprising the crystal melt space, and the process space of the previously unfilled wash column, are at first filled with an acrylic acid-comprising startup liquid AT such that the fill height of the startup liquid AT in the process space overtops at least the removal device,

then the filling of the wash column is continued by using the pump P**2** to conduct a stream ST* of the suspension S from the source QS through the delivery connections E**1**, E**2** via the distributor space and through the passages U into the process space of the wash column and optionally using the pump P**3** to conduct a substream of the waste liquor stream SM* conducted out of the wash column through the filter tubes as source QT*, as control liquor stream SL* through the delivery connections C**1**, C**2** via the distributor space and the passages U and/or directly into the process space of the wash column, at least until the time t_s is attained at which the pressure difference $P_D=P_K-P_V$, where P_K is the pressure existing at any desired point in the crystal melt space at a particular time in the supply of the stream ST* and P_V is the pressure which exists at the same time at any desired point in the distributor space, no longer rises or remains constant as a function of the duration of the supply of the stream ST*, but decreases suddenly, with the proviso that

until a time t_s, the mean superficial velocity on the filters F, calculated as the arithmetic mean of the total waste liquor flow SM* which flows at the particular time through the filters F of the filter tubes during the

supply of the stream ST*, divided by the total area of all filters F, is not more than 80 $m^3/(m^2 \cdot h)$,

the acrylic acid-comprising startup liquid AT is one from which, in the course of cooling until crystallization sets in, the crystals which form in the course of crystallization are acrylic acid crystals, and

between the crystal formation temperature T^{KB}, reported in degrees Celsius, of these acrylic acid crystals in the startup liquid AT and the temperature T^S, reported in degrees Celsius, of the suspension S of the stream ST*, the following relationship is satisfied:

$$T^{KB} \leqq T^S + 15^\circ \text{ C.}$$

2. The process according to claim **1**, wherein the mean superficial velocity on the filters F until the time t_S is at least 5 $m^3/(m^2 \cdot h)$.

3. A process according to either of claims **1** and **2**, wherein the distance L is $\geqq$0.5 m.

4. A process according to claim **1**, wherein the distance L is $\leqq$5 m.

5. A process according to claim **1**, wherein T^{KB} is not more than 20° C. below T^S.

6. A process according to claim **1**, wherein the startup liquid AT is mother liquor removed from the suspension S.

7. A process according to claim **1**, wherein the startup liquid AT is that liquid from which the suspension S is obtained by cooling.

8. A process according to claim **1**, wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_S is reached, the superficial velocity on the filters F which exists at the particular time is not more than 80 $m^3/(m^2 \cdot h)$.

9. A process according to claim **1**, wherein, over the entire period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the superficial velocity on the filters F which exists at the particular time is not more than 80 $m^3/(m^2 \cdot h)$.

10. A process according to claim **1**, wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the superficial velocity on the filters F which exists at the particular time is at least 5 $m^3/(m^2 \cdot h)$ or at least 10 $m^3/(m^2 \cdot h)$.

11. A process according to claim **1**, wherein, over the entire period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the arithmetic mean M of the total flow of liquid supplied to the process space of the wash column, divided by the free cross-sectional area of the process space, is 1 to 30 $m^3/(m^2 \cdot h)$.

12. A process according to claim **1**, wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the total flow of liquid supplied to the process space of the wash column at the particular time, divided by the free cross-sectional area of the process space, is 1 to 30 $m^3/(m^2 \cdot h)$ or 5 to 25 $m^3/(m^2 \cdot h)$.

13. A process according to claim **1**, wherein content of acrylic acid in the suspension S is $\geqq$70% by weight.

14. A process according to claim **1**, wherein the degree of crystallization of the suspension S is $\geqq$0.10.

15. A process according to claim **1**, wherein the longest dimension of the majority of acrylic acid crystals present in the suspension S is 50 to 1600 μm.

16. A process according to claim **1**, wherein the orifice ratio OV of the removal device is $\geqq$0.01.

17. A process according to claim **1**, wherein the orifice ratio OV of the removal device is $\leqq$0.9.

18. A process according to claim **1**, wherein the removal device is a bladed disk having passage orifices.

19. A process according to claim **1**, wherein the crystal melt circuit and the process space of the previously unfilled wash column are at first filled with an acrylic acid-comprising startup liquid AT such that the fill height of the startup liquid AT in the process space overtops at least the filters F.

20. A process according to claim **1**, wherein the temperature of the suspension S is −25 to +14° C.

21. A process according to claim **1**, wherein the mother liquor present in the suspension S comprises ≧70% by weight of acrylic acid.

22. A process according to claim **1**, wherein a substream of the waste liquor stream SM* conducted out of the wash column through the filter tubes as source QT* is conducted with the pump P**3** as control liquor stream SL* through the delivery connections C**1**, C**2** via the distributor space and through the passages U into the process space of the wash column.

23. A process according to claim **1**, wherein both the pressure P_K and the pressure P_V are measured during the startup.

24. A process according to claim **1**, wherein the pressure difference P_D is determined with a pressure difference manometer.

25. A process according to claim **1**, wherein, after the time t_s, the melt circuit and the removal device are put into operation and the flow through the outlet A is opened, and a molecular oxygen-comprising gas is metered into the melt circuit, by introducing the molecular oxygen-comprising gas into a substream of the melt circuit, and then supplying the substream comprising the molecular oxygen back to the melt circuit.

26. A process according to claim **1**, wherein the number of filter tubes in the hydraulic wash column is 3 to 200.

27. A process according to claim **1**, wherein the suspension S has the following contents:

≧70% by weight of acrylic acid,

up to 15% by weight of acetic acid,

up to 5% by weight of propionic acid,

up to 5% by weight of low molecular weight aldehydes,

up to 3% by weight of diacrylic acid, and

tip to 25% by weight of water.

28. A separating process for purifying removal of acrylic acid crystals from a suspension S of crystals thereof in mother liquor with an apparatus which comprises a hydraulic wash column, wherein the separating process has been put into operation by a process of claim **1**.

29. A process according to claim **28**, which is followed by a further process in which removed and molten acrylic acid crystals are subjected to a polymerization with acrylic acid itself or other, at least monoethylenically unsaturated compounds.

30. A process for starting up a separating process for purifying removal of acrylic acid crystals from a suspension S of crystals thereof in mother liquor with an apparatus which comprises a hydraulic wash column which has a process space which is rotationally symmetric with respect to its longitudinal axis running from the top downward and is bounded by a cylindrical outer wall and two opposite ends on the axis of symmetry, in which

one or more filter tubes extend through the process space from the upper end of the process space parallel to the longitudinal axis thereof, which run toward the lower end of the process space opposite the upper end, and have, in the half of the process space toward the lower end of the process space, at least one filter F which

constitutes the only direct connection between the particular filter tube interior and the process space, and are conducted out of the wash column outside the process space,

the quotient Q=L/D of the distance L between the upper and lower ends of the process space and the diameter D of the process space is 0.3 to 4,

the lower end of the process space is followed in the downward direction by the crystal melt space of the wash column, a rotatable removal device being integrated between the two spaces and a crystal melt circuit which is conducted through the crystal melt space comprising, outside the crystal melt space,

a delivery pump P1 which is outside the wash column and has a suction side and a pressure side,

a first delivery connection G1 which leads from the crystal melt space of the wash column to the suction side of the delivery pump P1,

a second delivery connection G2 which leads from the pressure side of the delivery pump P1 back into the crystal melt space of the wash column and has an outlet A from the crystal melt circuit with regulable flow, and

a heat transferer W, through which either the delivery connection G1 from the crystal melt space to the suction side of the delivery pump P or the delivery connection G2 from the pressure side of the delivery pump P1 to the crystal melt space is conducted,

connected upstream of the upper end of the process space in the upward direction is a distributor space which is separated from the process space at least by one end B which has passages U which lead into the process space

on the side of the end B facing the process space and into the distributor space on the side of the end B facing away from the process space,

a delivery pump P2 which has a suction side and a pressure side and a source QS of the suspension S are present outside the wash column,

a first delivery connection E1 leading from the source QS to the suction side of the delivery pump P2, and

a second delivery connection E2 leading from the pressure side of the delivery pump P2 into the distributor space,

a delivery pump P3 which has a suction side and a pressure side and a source QT of a control liquor are optionally present outside the wash column,

a first delivery connection C1 leading from the suction side of the pump P3 to the source QT, and

a second delivery connection C2 leading from the pressure side of the pump P3 into the distributor space and/or into the longitudinal section of the process space between the upper end thereof and the filters F of the filter tubes,

and in which, in the course of performance of the separating process, in steady-state operation thereof,

the pump P2 is used to continuously conduct a stream ST of the suspension S from the source QS through the delivery connections E1, E2 via the distributor space and through the passages U into the process space of the wash column,

optionally, the pump P3 is used to conduct a stream SL of the control liquor from the source QT through the delivery connections C1, C2 via the distributor space and the passages U and/or directly into the process space of the wash column,

overall, a stream SM comprising mother liquor and optionally control liquor is conducted as waste liquor stream

into the filter tube interior via the filters F of the filter tubes, and out of the wash column via the filter tubes, and this waste liquor stream SM conducted out of the wash column is used as the source QT for the control liquor,

the conduction of mother liquor and optionally control liquor in the process space of the wash column maintains the development of a crystal bed of acrylic acid crystals which has a buildup front facing the upper end of the process space, at which crystals of the stream ST of the suspension S supplied are added continuously onto the crystal bed,

the crystal bed is conveyed from the top downward past the filters F toward the rotating removal device by the force which results from the hydraulic flow pressure drop of the conduction of mother liquor and optionally control liquor in the process space,

the rotating removal device removes acrylic acid crystals from the crystal bed which meets it,

the stream of the acrylic acid crystals removed is conveyed through the rotating removal device and/or past the rotating removal device into the crystal melt space which follows downstream of the process space in conveying direction of the crystal bed, and melted in the crystal melt circuit conducted through the crystal melt space as a result of introduction of heat with the heat transferer W to give a crystal melt stream, and

the flow through the outlet A is regulated such that, based on the flow rate of the aforementioned crystal melt stream, proceeding from the crystal melt space, a substream of crystal melt flows as wash melt stream through the rotating removal device and/or past the rotating removal device against the direction of movement of the

crystal bed back into the process space, where it ascends within the crystal bed conveyed downward and in doing so washes the mother liquor off the crystals and forces it back, said mother liquor remaining in the crystal bed having been conveyed with the latter under the filters F, which forms, in the longitudinal section of the process space which extends from the filters F to the lower end of the process space, in the crystal bed, a wash front which divides the crystal bed, from the top downward, into a mother liquor zone and into a wash melt zone, and the remaining substream of the aforementioned crystal melt stream leaves the crystal melt circuit through the outlet A,

wherein, in the course of startup of the separating process for first development of the crystal bed in the process space,

the crystal melt circuit comprising the crystal melt space, and the process space of the previously unfilled wash column, are at first filled with an acrylic acid-comprising startup liquid AT such that the fill height of the startup liquid AT in the process space overtops at least the removal device,

then the filling of the wash column is continued by using the pump P**2** to conduct a stream ST* of the suspension S from the source QS through the delivery connections E**1**, E**2** via the distributor space and through the passages U into the process space of the wash column and optionally using the pump P**3** to conduct a substream of the waste liquor stream SM* conducted out of the wash column through the filter tubes as source QT*, as control liquor stream SL* through the delivery connections C**1**, C**2** via the distributor space and the passages U and/or directly into the process space of the wash column, at least until the time t_s is attained at which the pressure difference $P_D=P_K-P_V$, where P_K is the pressure existing

at any desired point in the crystal melt space at a particular time in the supply of the stream ST* and P_V is the pressure which exists at the same time at any desired point in the distributor space, no longer rises or remains constant as a function of the duration of the supply of the stream ST*, but decreases suddenly, with the proviso that

until a time t_S, the mean superficial velocity on the filters F, calculated as the arithmetic mean of the total waste liquor flow SM* which flows at the particular time through the filters F of the filter tubes during the supply of the stream ST*, divided by the total area of all filters F, is not more than 80 $m^3/(m^2 \cdot h)$,

the acrylic acid-comprising startup liquid AT is one from which, in the course of cooling until crystallization sets in, the crystals which form in the course of crystallization are acrylic acid crystals, and

between the crystal formation temperature T^{KB}, reported in degrees Celsius, of these acrylic acid crystals in the startup liquid AT and the temperature T^S, reported in degrees Celsius, of the suspension S of the stream ST*, the following relationship is satisfied:

$$T^{KB} \leqq T^S + 15^\circ \text{ C.}$$

wherein the mean superficial velocity on the filters F until the time t_S is at least 5 $m^3/(m^2 \cdot h)$,

wherein the distance L is $\geqq 0.5$ m,

wherein the distance L is $\leqq 5$ m, and

wherein T^{KB} is not more than 20° C. below T^S.

31. A process according to claim **30**, wherein the startup liquid AT is mother liquor removed from the suspension S.

32. A process according to claim **30**, wherein the startup liquid AT is that liquid from which the suspension S is obtained by cooling.

33. A process according to claim **30**, wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_S is reached, the superficial velocity on the filters F which exists at the particular time is not more than 80 $m^3/(m^2 \cdot h)$.

34. A process according to claim **30**, wherein, over the entire period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the superficial velocity on the filters F which exists at the particular time is not more than 80 $m^3/(m^2 \cdot h)$.

35. A process according to claim **30**, wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the superficial velocity on the filters F which exists at the particular time is at least 5 $m^3/(m^2 \cdot h)$ or at least 10 $m^3/(m^2 \cdot h)$.

36. A process according to claim **30**, wherein, over the entire period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the arithmetic mean M of the total flow of liquid supplied to the process space of the wash column, divided by the free cross-sectional area of the process space, is 1 to 30 $m^3/(m^2 \cdot h)$.

37. A process according to claim **30**, wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the total flow of liquid supplied to the process space of the wash column at the particular time, divided by the free cross-sectional area of the process space, is 1 to 30 $m^3/(m^2 \cdot h)$ or 5 to 25 $m^3/(m^2 \cdot h)$.

38. A process according to claim **30**, wherein content of acrylic acid in the suspension S is ≧70% by weight.

39. A process according to claim **30**, wherein the degree of crystallization of the suspension S is ≧0.10.

40. A process according to claim **30**, wherein the longest dimension of the majority of acrylic acid crystals present in the suspension S is 50 to 1600 μm.

41. A process according to claim **30**,

wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_S is reached, the superficial velocity on the filters F which exists at the particular time is not more than 80 $m^3/(m^2 \cdot h)$,

wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the superficial velocity on the filters F which exists at the particular time is at least 5 $m^3/(m^2 \cdot h)$ or at least 10 $m^3/(m^2 \cdot h)$,

wherein, at least over 50% of the period calculated from the commencement of supply of the stream ST* of the suspension S until the time t_s is reached, the total flow of liquid supplied to the process space of the wash column at the particular time, divided by the free cross-sectional area of the process space, is 1 to 30 $m^3/(m^2 \cdot h)$ or 5 to 25 $m^3/(m^2 \cdot h)$,

wherein content of acrylic acid in the suspension S is ≧70% by weight, and

wherein the degree of crystallization of the suspension S is ≧0.10.