Patent claims

1. Device for ultrasound screening (10, 20, 30, 40)
with a screen frame (11, 21, 31, 41),
with a screen fabric (12, 22, 32, 42) arranged in the screen frame (11, 21, 31, 41),
with at least one ultrasound converter (15, 25, 35, 45) for excitation of ultrasound vibrations and
with at least one means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42), wherein the means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) is in sound-conducting connection with the ultrasound converter (15, 25, 35, 45),
characterized in that
at least one of the means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) is arranged movably relative to the screen fabric (12, 22, 32, 42) so that the place of the screen fabric (12, 22, 32, 42) at which the introducing of the ultrasound vibrations into the screen fabric (12, 22, 32, 42) by the means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) occurs is varied by movement of the means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) relative to the screen fabric (12, 22, 32, 42) during operation.

2. Device for ultrasound screening (10, 20, 30, 40, 50) according to claim 1, characterized in that at least one of the means (13, 23, 33a, 33b, 43a, 43b, 53) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42, 52) is arranged on or

underneath the screen fabric (12, 22, 32, 42, 54) so that it exerts pressure on the screen fabric (12, 22, 32, 42, 52).

3. Device for ultrasound screening (10, 20, 30, 40, 50) according to claim 1 or 2, characterized in that the means (13, 23, 33a, 33b, 43a, 43b, 53) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42, 52) are mounted or attached independently of the screen fabric (12, 22, 32, 42, 52) so that the means and the screen fabric (12, 22, 32, 42, 52) can move relative to each other, preferably also at their contact surfaces with each other.

4. Device for ultrasound screening (10, 20, 30, 40, 50) according to a preceding claim, characterized in that the means (13, 23, 33a, 33b, 43a, 43b, 53) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42, 53) is movable so that every place of the screen fabric (12, 22, 32, 42, 52) can be brought into contact with a segment of the means (13, 23, 33a, 33b, 43a, 43b, 53) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42, 52).

5. Device for ultrasound screening (10, 20, 30, 40, 50) according to a preceding claim, characterized in that the screen fabric (12, 22, 32, 42, 52).consists of a nonmetallic material, in particular a plastic.

6. Device for ultrasound screening (10, 20, 30, 40, 50) according to a preceding claim, characterized in that the screen fabric (12, 22, 32, 42, 52).has a mesh of more than 300 µm.

7. Device for ultrasound screening (10, 20, 30, 40) according to a preceding claim, characterized in that the device for ultrasound screening (10, 20, 30, 40) moreover has a

driving device for the movement of at least one movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) relative to the screen fabric (12, 22, 32, 42).

8. Device for ultrasound screening (10, 20, 30, 40) according to a preceding claim, characterized in that the screen frame (11, 21, 31, 41) has at least one girder (26, 36a, 36b, 46a, 46b) on the side of the screen fabric (12, 22, 32, 42) on which the movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) are arranged, on which the movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) is movably mounted and/or at which a driving device is arranged for movement of the movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42).

9. Device for ultrasound screening (10, 20, 30, 40) according to a preceding claim, characterized in that movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) can rotate relative to the screen fabric (12, 22, 32, 42).

10. Device for ultrasound screening (10, 20, 30, 40) according to a preceding claim, characterized in that the movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) is arranged such relative to the screen fabric (12, 22, 32, 42) that the movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) or an axis about which it can rotate makes an angle of 90° to 0° to the screen fabric.

11. Device for ultrasound screening (10, 20, 30, 40, 50) according to claim 10, characterized in that the angle between the screen fabric (12, 22, 32, 42) and the movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) or the axis about which it can rotate can vary.

12. Device for ultrasound screening (10, 20, 30, 40) according to a preceding claim, characterized in that movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) can move in linear displacement relative to the screen fabric (12, 22, 32, 42).

13. Device for ultrasound screening (10, 20, 30, 40) according to a preceding claim, characterized in that the contact surface of the movable means of introducing ultrasonic vibrations into the screen fabric is a curved surface.

14. Method for ultrasound screening, in which a device (10, 20, 30, 40) with a screen frame (11, 21, 31, 41), with a screen fabric (12, 22, 32, 42) arranged in the screen frame (11, 21, 31, 41), with at least one ultrasound converter (15, 25, 35, 45a, 45b) for generating ultrasound vibrations, and with at least one means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42), wherein the means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) is in sound-conducting connection with the ultrasound converter (15, 25, 35, 45a, 45b), is arranged at least for a portion of the time in a flow of the material being screened in a screening process and the screen fabric (12, 22, 32, 42) is excited with ultrasound vibrations at least for a portion of the time in the course of the method by the means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42),

characterized in that

the position of the means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) is varied relative to the screen fabric (12, 22, 32, 42) during the method, so that different places of the screen fabric (12, 22, 32, 42) are excited into ultrasound vibrations.

15. Method according to claim 14,

characterized in that pressure is exerted on the screen fabric (12, 22, 32, 42, 52) by at least one or more means (13, 23, 33a, 33b, 43a, 43b, 53) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42, 52) from above or from below.

16. Method according to claim 14 or 15,

characterized in that at least one or more means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) from above or from below is brought into contact with the screen fabric (12, 22, 32, 42) and the means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) is brought into contact with one or more ultrasound converters (15, 25, 35, 45a, 45b) directly or indirectly through sound feed conductors (14, 24, 34, 44a, 44b).

17. Method according to one of claims 14 to 16,

characterized in that the frequency of the ultrasound excitation is varied by running through one or more frequency ranges, especially the frequency range or ranges in which resonances of the device are situated, or in which maximum power uptake of the device occurs.

18. Method according to one of claims 14 to 17,

characterized in that the frequency of the ultrasound excitation lies in the Megahertz range.

19. Method according to one of claims 14 to 18,

characterized in that the angle between the screen fabric (12, 22, 32, 42) and the movable means (13, 23, 33a, 33b, 43a, 43b) of introducing ultrasonic vibrations into the screen fabric (12, 22, 32, 42) can vary.

CLAIMS

1. A device for ultrasound screening, comprising:
a screen frame with a screen fabric arranged in the screen frame;
at least one ultrasound converter [[for]] providing excitation of ultrasound vibrations;
at least one means of operably introducing ultrasonic vibrations into the screen fabric, [[wherein]] the means of introducing ultrasonic vibrations into the screen fabric is in a sound-conducting connection with the ultrasound converter,
[[wherein:]]at least one of the means of introducing ultrasonic vibrations into the screen fabric [[is]]being arranged operably movably in continuous direct contact relative to the screen fabric so that the place of the screen fabric at which the introducing of the ultrasound vibrations into the screen fabric by the means of introducing ultrasonic vibrations into the screen fabric occurs is operatively varied by continuous contacting movement of the means of introducing ultrasonic vibrations into the screen fabric relative to the screen fabric during operation,
the means of introducing ultrasonic vibrations further comprising at least one movable means, the device for ultrasound screening further comprising:
a driving device for the movement of the at least one movable means of introducing ultrasonic vibrations into the screen fabric relative to the screen fabric, the
movement including rotational movement relative to and in said continuous direct contact with the screen fabric and being movable to bring the means of introducing ultrasonic vibrations in contact with at least a portion of the screen fabric.

2. The device for ultrasound screening, according to claim 1, wherein: at least one of the means of introducing ultrasonic vibrations into the screen fabric is arranged at least one of on and underneath the screen fabric so that it exerts pressure on the screen fabric.

3. The device for ultrasound screening, according to claim 1, wherein:
the means of introducing ultrasonic vibrations into the screen fabric are at least one of mounted and attached independently of the screen fabric so that the means and the screen fabric can move relative to each other.

4. The device for ultrasound screening, according to claim 1, wherein: the means of introducing ultrasonic vibrations into the screen fabric is movable so that every place of the screen fabric can be brought into contact with a segment of the means of introducing ultrasonic vibrations into the screen fabric.

5. The device for ultrasound screening, according to claim 1, wherein: the screen fabric consists of a nonmetallic material selected from a group of nonmetallic materials including a plastic.

6. The device for ultrasound screening according to claim 1, wherein: the screen fabric has a mesh of more than 300 pm.

7. The device for ultrasound screening, according to claim 1, wherein: the screen frame further comprises: at least one girder on the side of the screen fabric on which the means of introducing ultrasonic vibrations into the screen fabric are arranged, on which the means of introducing ultrasonic vibrations into the screen fabric is movably mounted and at which a driving device is arranged for movement of the means of introducing ultrasonic vibrations into the screen fabric.

8. The device for ultrasound screening, according to claim 1, wherein: the means of introducing ultrasonic vibrations into the screen fabric is operative to rotate relative to the screen fabric.

9. The device for ultrasound screening, according to claim 1 wherein: the means of introducing ultrasonic vibrations into the screen fabric is arranged such relative to the screen fabric that the means of introducing ultrasonic vibrations into the screen fabric or an axis about which it can rotate makes an angle of 90° to 0° to the screen fabric.

10. The device for ultrasound screening, according to claim 9, wherein: the angle between the screen fabric and the means of introducing ultrasonic vibrations into the screen fabric or the axis about which it can rotate can operatively vary during a use.

11. The device for ultrasound screening, according to claim 1, wherein: the means of introducing ultrasonic vibrations into the screen fabric can operatively move in linear displacement relative to the screen fabric.

12. The device for ultrasound screening, according to claim 1, wherein: the contact surface of the means of introducing ultrasonic vibrations into the screen fabric is a curved surface.

13. A method for ultrasound screening, comprising the steps of:
providing a screen frame with a screen fabric arranged in the screen frame with at least one ultrasound converter for generating ultrasound vibrations, and with at least one means of introducing ultrasonic vibrations into the screen fabric, [[wherein]]the means of introducing

ultrasonic vibrations into the screen fabric [[is]]being in a direct sound-conducting connection with the ultrasound converter, and [[is]]being arranged at least for a portion of the time in a flow path of the material being screened in a screening process and the screen fabric and during a use is excited with ultrasound vibrations at least for a portion of the time in the course of the method by the means of introducing ultrasonic vibrations into the screen fabric; and
varying a position of the means of introducing ultrasonic vibrations into the screen fabric relative to the screen fabric, including rotating the means of introducing ultrasonic vibrations in direct contact to the screen fabric during a use thereof so that different places of the screen fabric are excited into ultrasound vibrations and are brought into contact with at least a portion of the means of introducing ultrasonic vibrations.

14. A method, according to claim 13, further comprising the step of: exerting a pressure on the screen fabric by at least one or more means of introducing ultrasonic vibrations into the screen fabric from at least one of from above and from below.

15. The method, according to claim 13, further comprising the steps of:
bringing into contact at least one or more means of introducing ultrasonic vibrations into the screen fabric from at least one of from above and from below with the screen fabric: and
bringing into contact the means of introducing ultrasonic vibrations into the screen fabric with at least one of the ultrasound converters at least one of directly and indirectly through sound feed conductors.

16. The method, according to claim 13, further comprising the step of: varying the frequency of the ultrasound excitation by running through one or more frequency ranges in which resonances of the device are situated and in which maximum power uptake of the device occurs.

17. The method, according to claim 16, wherein: the frequency of the ultrasound excitation lies in the Megahertz range.

18. The method, according to claim 13, further comprising the steps of: varying an angle between the screen fabric and the means of introducing ultrasonic vibrations into the screen fabric.