centrifugal spindle in which the drive motor is admittedly arranged in an axial extension of the rotational axis of the centrifugal drum coaxially to this but in which the drive spindle passes through a pipe section, wherein the drive spindle and the pipe section in the case of DE 513 192 are connected in the region of a foot bearing, whereas the pipe section and the drive spindle in a relatively more expensive type of construction have separate neck bearings and only the drive spindle is supported in a radially elastic manner on a machine frame. This type of construction is therefore very costly. The drive housing itself is designed in two parts, wherein an upper part bears on a lower part by means of a flange. There is lubrication with oil but no cooling with a coolant in addition to the lubricant. The stator is fastened directly on the outer circumference of the drive housing.

Overall, the structural design of the known constructions is relatively costly and not adaptable to different application purposes with sufficient flexibility. The cooling of known drive devices, moreover, appears to be worthy of improvement.

In this respect, the modern constructions of DE 10 2006 011 895, DE 10 2006 020 467 A1 constitute a development. Deviating from their construction principle, however, there continues to be a demand for compact separator drives which are easily adaptable to different application purposes and have a perfected and efficient cooling system.

~~Starting from the known prior art,~~ Embodiments of the invention ~~has in this respect the object of taking another path and~~ seek to ~~realize~~provide a separator which is distinguished by a compact type of construction and especially also by a low maintenance requirement and preferably also an efficient cooling system.

~~The invention achieves this object by means of the subject matter of claim 1.~~

According to an aspect of the present invention, there is provided a separator, which features the following: a centrifugal drum with vertical rotational axis, a drive spindle for the centrifugal drum, which by a neck bearing and a foot bearing is rotatably mounted in a drive housing which encloses or forms a drive chamber, an electric motor, which has a stator and a motor rotor, wherein the motor rotor is arranged in the drive chamber of the drive housing directly on the drive spindle in the axial region between the foot bearing and the neck bearing, wherein the stator is also directly supported in the drive housing and wherein an air gap exists between the stator and the motor rotor, wherein the stator and the motor rotor are arranged between the neck bearing and the foot bearing in an open manner in the drive chamber which is otherwise completely or in the main closed toward the outside, wherein provision is made for a lubricating system for the lubrication of especially the neck bearing and the foot bearing, which is wholly or partially integrated directly into the drive chamber, wherein at least one or more of the following features is, or are, also realized: provision is made for a coolant circuit for a free flowable coolant, which is wholly or partially integrated directly into the drive housing, the stator has a flange section for locating, especially resting, on a corresponding collar section of the drive housing.

The simple installation and maintenance of the separator drive and also the advantageous cooling system both for the cooling of the motor and of the liquid lubricant which flows back vertically from the top downwards in the drive chamber are to be referred to as being particularly advantageous. Creating

lubricant mist is not necessary with this but lubricating of the bearings of the drive spindle with flowing, liquid lubricant can be used directly so that no lubricant can enter the electric motor itself, which would be unavoidable when using an oil mist system. The rotor is mounted directly on the drive spindle which is radially movable in this region and on the end of which is mounted the drum.

In this case, the cooling system - being a cooling circuit for a cooling fluid, especially water - is preferably and advantageously integrated wholly or partially directly into the drive housing, whereas the electric motor - especially the stator - itself does not have a separate liquid cooling system built into it. In such a way, the electric motor - especially the stator as a preassembled modular unit without a liquid cooling device - can be designed in a particularly cost-effective manner. In addition to cooling with the coolant, there is preferably lubrication with a lubricant. Different liquids are preferably used as the lubricant and the coolant.

Advantageous embodiments are to be gathered from the dependent claims.

Claims

1. A separator ~~(1)~~, which features the following:
   a. a centrifugal drum ~~(2)~~ with vertical rotational axis ~~(D)~~,
   b. a drive spindle ~~(5)~~ for the centrifugal drum ~~(2)~~, which by a neck bearing ~~(6)~~ and a foot bearing ~~(7)~~ is rotatably mounted in a drive housing ~~(4)~~ which encloses or forms a drive chamber ~~(28)~~,
   c. an electric motor ~~(20)~~, which has a stator ~~(22)~~ and a motor rotor ~~(21)~~,
   d. wherein the motor rotor ~~(21)~~ is arranged in the drive chamber ~~(28)~~ of the drive housing ~~(4)~~ directly on the drive spindle ~~(5)~~ in the axial region between the foot bearing ~~(7)~~ and the neck bearing ~~(6)~~,
   e. wherein the stator ~~(22)~~ is also directly supported in the drive housing ~~(4)~~ and wherein an air gap exists between the stator ~~(22)~~ and the motor rotor ~~(21)~~,
   f. wherein the stator ~~(22)~~ and the motor rotor ~~(21)~~ are arranged between the neck bearing ~~(6)~~ and the foot bearing ~~(7)~~ in an open manner in the drive chamber ~~(28)~~ which is otherwise completely or in the main closed toward the outside,
   g. wherein provision is made for a lubricating system for the lubrication of especially the neck bearing ~~(6)~~ and the foot bearing ~~(7)~~, which is wholly or partially integrated directly into the drive chamber ~~(28)~~,

   ~~characterized in that~~ wherein at least one or more of the following features is, or are, also realized:

   h. provision is made for a coolant circuit for a free flowable coolant, which is wholly or partially integrated directly into the drive housing ~~(4)~~,

i. the stator ~~(22)~~ has a flange section ~~(25)~~ for locating, especially resting, on a corresponding collar section ~~(26)~~ of the drive housing.

2. The separator as claimed in claim 1, ~~characterized in that~~ wherein the coolant system, at least in certain sections, is adjacent to a lubricant channel ~~(34)~~ for the passage of liquid and, in the drive chamber, flowing lubricant and in that it is also adjacent, at least in certain sections, to the stator ~~(22)~~.

3. The separator as claimed in claim 2, ~~characterized in that~~ wherein the coolant system has a chamber, especially an annular chamber ~~(37)~~.

4. The separator as claimed in claim 3, ~~characterized in that~~wherein coolant channels ~~(35, 36)~~ are formed in at least one wall of the drive housing ~~(4)~~ and open into the chamber.

5. The separator as claimed in claim 4, ~~characterized in that~~ wherein the chamber, especially the annular chamber, is directly adjacent to the lubricant channel ~~(34)~~ and directly to the stator ~~(22)~~.

6. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the stator ~~(22)~~ has a sleeve body ~~(24)~~ on its outer circumference.

7. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the stator ~~(22)~~ together with the sleeve body ~~(24)~~ form a preassembled, exchangeable modular unit.

8. The separator as claimed in one of the preceding claims or as claimed in the preamble of claim 1, ~~characterized in that~~ wherein the sleeve body ~~(24)~~ in the

installed state in the bearing housing ~~(4)~~ forms a boundary wall of the chamber, especially of the annular chamber ~~(27)~~ of the coolant circuit.

9. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the sleeve body ~~(24)~~ has the flange section ~~(25)~~ which rests on the corresponding collar section ~~(26)~~ on the inner circumference of the bearing housing ~~(4)~~.

10. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the neck bearing ~~(6)~~ is arranged in a bearing housing ~~(9)~~ which has a flange section ~~(10)~~, wherein the bearing housing ~~(9)~~ and the neck bearing form a preassembled and exchangeable modular unit.

11. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the neck bearing ~~(6)~~ is supported in the drive housing ~~(4)~~ via at least one elastic element and in that the foot bearing ~~(7)~~ is designed like a pivot bearing or is arranged in the drive housing ~~(4)~~ in an articulated manner so that the drive spindle ~~(5)~~ can follow precessional movements of the centrifugal drum ~~(2)~~ during operation.

12. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the rotating system together with the centrifugal drum and the drive spindle ~~(5)~~ are supported in the drive housing ~~(4)~~ essentially axially via the foot bearing ~~(7)~~.

13. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the drive spindle ~~(5)~~ is of hollow design and has an axial inner lubricant pipe ~~(30)~~ which extends from a region beneath the foot bearing ~~(7)~~, axially through the

region of the motor rotor ~~(21)~~, into the region of the neck bearing ~~(6)~~ where the lubricant pipe ~~(3)~~ opens into the drive chamber ~~(28)~~.

14. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein a lubricant feed hole ~~(31)~~ opens into the drive chamber above or below the neck bearing ~~(6)~~.

15. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein a lubricant pump is arranged or formed at the lower end of the drive spindle ~~(5)~~.

16. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the lubricant pump is designed as a centrifugal pump or in that the lubricant pump is designed as a suction pipe pump.

17. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein a slinger ring ~~(13)~~ is arranged or formed on the drive spindle ~~(5)~~ in the axial region between the neck bearing ~~(6)~~ and the electric motor ~~(20)~~.

18. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein a lubricant sump ~~(33)~~ is formed in the lower region of the drive chamber ~~(28)~~, into which flows back the lubricant flowing back from the lubricant channel ~~(34)~~.

19. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the lubricating system is integrated altogether into the drive chamber ~~(28)~~ as a circulating system.

20. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein one or more

especially vertically extending holes are formed as the lubricant channel ~~(34)~~ in the drive housing ~~(4)~~ outside the stator ~~(22)~~, through which holes lubricant is directed past the stator ~~(22)~~ and the motor rotor ~~(21)~~ essentially radially on the outside.

21. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the foot bearing ~~(7)~~ during operation is located completely beneath the lubricant level or is arranged completely in the lubricant sump.

22. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein the lubricant level lies beneath the electric motor ~~(20)~~ during operation.

23. The separator as claimed in one of the preceding claims, ~~characterized in that~~ wherein provision is made for one or more sight glasses ~~(43)~~ for the visual checking especially of the lubricating system, especially of one or both parameters which are "lubricant level" and "lubricant in the lubricant channel".