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R. KARG

3,269,709

MIXING HEAD

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FIG. 1

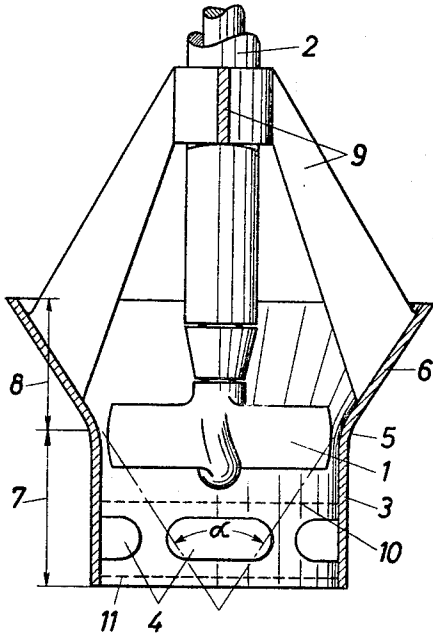


FIG. 2

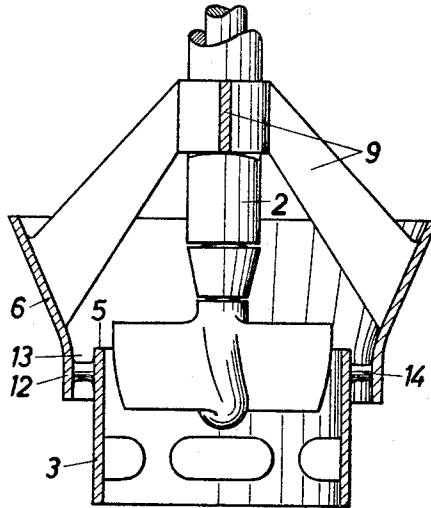


FIG. 4

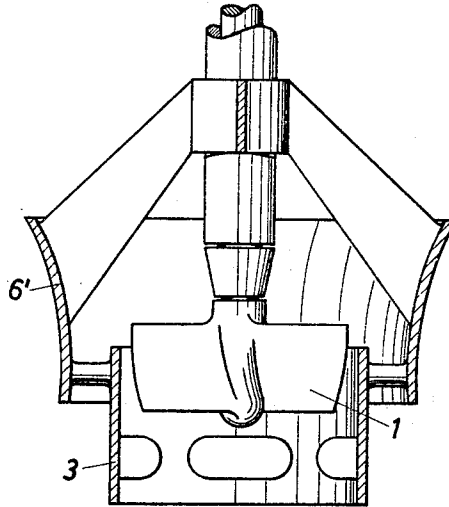
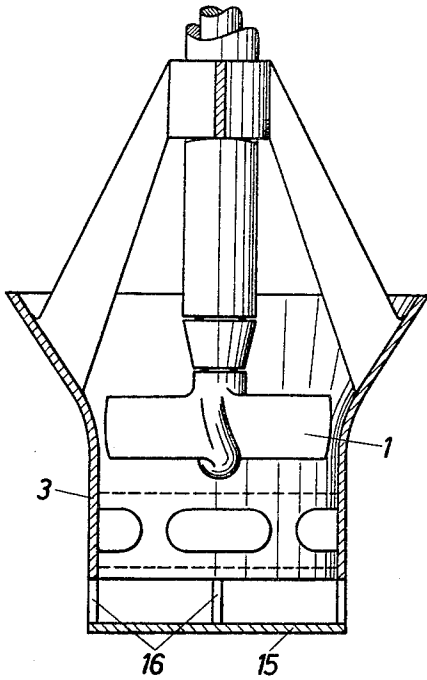


FIG. 3



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3,269,709

MIXING HEAD

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K 51,431

1 Claim. (Cl. 259-97)

This invention relates to a mixing head for the homogenization, emulsification, dispersion, etc., of media having a highly fluid to highly viscous consistency, and for introducing dry solids to liquids.

The known mixing heads comprise a vane wheel or impeller, which is arranged in a cylindrical guide ring, which may be formed with apertures in its lower portion. In these devices, eddies formed near the rim of the guide ring upstream of the latter and had an adverse effect on the action of the mixing head. On the other hand, a mere increase in the length of the guide ring results in an appreciable increase in the resistance to flow so that the efficiency of the mixing device is reduced.

An important object of the invention is to eliminate the above disadvantages of the known devices. This is achieved in that a funnel for the introduction of the material to be mixed is provided on the inflow side of said guide ring and the height of said funnel is substantially as large as the height of the guide ring.

It is another object of the invention to provide a mixing device for an increased throughput of liquid not only as a result of the improved inflow conditions but also of the increase of the total inflow area.

Further features of the invention will be explained with reference to the drawing, which shows various illustrative embodiments of the mixing head according to the invention. FIG. 1 is a longitudinal sectional view showing a first embodiment. FIG. 2 is also a longitudinal sectional view showing another embodiment, in which the funnel has an extension which is spaced around and overlaps the guide ring. FIG. 3 is a longitudinal sectional view showing an embodiment which is basically similar to that of FIG. 1 but has a guide ring additionally provided with a baffle, and FIG. 4 is a longitudinal sectional view showing an embodiment which is basically similar to that of FIG. 2 but has a funnel which has a curved generatrix.

In the embodiment shown in FIG. 1, the vane wheel is designated 1. This wheel may be replaced by a disc or the like. The vane wheel 1 is mounted at the end of a shaft, which is mounted in a stationary bearing tube 2 and can be driven by an electric motor, not shown. The vane wheel 1 is surrounded by a cylindrical guide or control ring 3, which is formed in its lower half with elongated apertures 4, which are regularly spaced around its periphery and extend longitudinally in the peripheral direction of the guide ring. Means, not shown, are provided to enable an axial adjustment of the guide ring 3 and the vane wheel 1 relative to each other. Above the guide ring, on its inflow side, a funnel 6 is arranged, which in the embodiment shown in FIG. 1 has a substantially straight generatrix and merges directly into upper edge 5 of the guide ring 3 with a rounded portion shaped to reduce any turbulence. The vane wheel is substantially disposed at the junction between the guide ring 3 and the funnel 6. The included angle α of this funnel is relatively large, but less than 90° . The size of this included angle will be selected in view of the viscosity of the medium to be treated. The height 8 of the funnel is substantially as large as the height 7 of the guide ring. A plurality of braces 9 are connected to the funnel and have preferably a so-called "streamlined" cross-section to reduce the resistance to flow. These braces

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extend from a collar, which is mounted on the bearing tube 2.

Screens 10, 11 are mounted in the guide ring 3 below the vane wheel 1. These screens are disposed below and above the apertures in the guide ring, respectively. Each screen may be replaced by a plurality of screens. The screens 10, 11 may have the same mesh size. It is preferable, however, to use an upper screen 10 having a larger mesh size than the lower screen 11. The arrangement of the screens or only one screen particularly below the apertures is desirable particularly when pulverulent substances are to be dispersed in liquid or highly viscous media. When the powder to be dispersed has formed aggregates which are surrounded on the outside by an adhesive layer and which may be obtained particularly at the beginning of the dispersing operation, these aggregates will be disintegrated as they pass through the screen or screens and will be caused to disappear entirely as the mixing operation proceeds. When two screens are disposed above and below the apertures, respectively, the medium cannot be retained between these screens even when it is highly concentrated because all particles disposed between the screens can pass out through the apertures so that they are once more admitted to the vane wheel. Hence, the flow through the guide ring or control ring cannot be impeded.

FIG. 2 shows the mixing head according to the invention in an embodiment which is particularly suitable for liquids of low viscosity. In this embodiment the funnel 6 does not merge directly into the top rim 5 of the guide ring 3 but is provided at its lower end with a cylindrical extension 12, which is spaced around and overlaps the upper rim 5 of the guide ring 3 so that the guide ring 3 and extension 12 define an annular space 13 between them. The guide ring 3 is connected by braces 14 to the funnel 6, more particularly to its extension 12. The funnel 6 is located by braces 9 to the machine frame, particularly to a collar of the bearing tube 2. The funnel has the shape of a truncated straight cone. Alternatively, it may have generatrices which follow a curve which is convex with respect to the axis of the funnel or of the machine housing, preferably according to a logarithmic curve. In any case, the funnel has a rounded portion merging with the extension. The provision of the funnel with an extension which is spaced around the guide ring results in an additional liquid flow on the outside of the guide ring during the operation of the mixing head. Particularly with liquids of low viscosity, this liquid flow affords an additional improvement of the action of the mixing head.

The embodiment shown in longitudinal section in FIG. 3 is basically similar to that of FIG. 1 with the difference that the guide ring 3 carries at its outlet end a baffle plate 15, which is spaced below the lower rim of the guide ring 3 and has a diameter which is substantially as large as the outside diameter of the guide ring 3. Braces 16 for fixing the baffle plate to the guide ring are regularly spaced around the periphery of the baffle plate. The distance between the baffle plate and the lower rim of the guide ring 3 will depend on the nature of the liquid to be mixed. It is an object of the baffle plate to cause a sudden deflection, virtually at right angles, of the flow emerging from the guide ring 3. This results in an improvement of the action of the mixing head. The baffle plate may be provided with holes, if desired.

The embodiment shown in FIG. 4 is basically similar to the embodiment shown in FIG. 2 but comprises a funnel 6', which has a generatrix that follows a curve which is concave with respect to the axis of the funnel. The curve begins preferably in the axial direction and progressively leads away from the axis, particularly according to a logarithmic function. Funnels extending

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according to such a curve may be used in all embodiments which have been described, of course.

To vary the relative position of the vane wheel and the guide ring, the latter may be fixed and the vane wheel may be arranged for adjustment in an axial direction along the drive shaft. 5

What is claimed is:

A mixing head comprising an impeller arranged in a guide ring through which the material to be mixed flows, drive means connected to said impeller, and a funnel disposed on the inflow side of said guide ring and serving to introduce the material to be mixed to the guide ring, the height of said funnel being substantially equal to the height of the guide ring, said funnel being provided at its lower end with a cylindrical extension, which is radi-

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ally spaced around the upper portion of the guide ring, and the said guide ring being secured to said extension.

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