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APPARATUS FOR THE AUTOMATIC INDICATION OF THE VISCOSITY OR CONCENTRATION IN LIQUIDS

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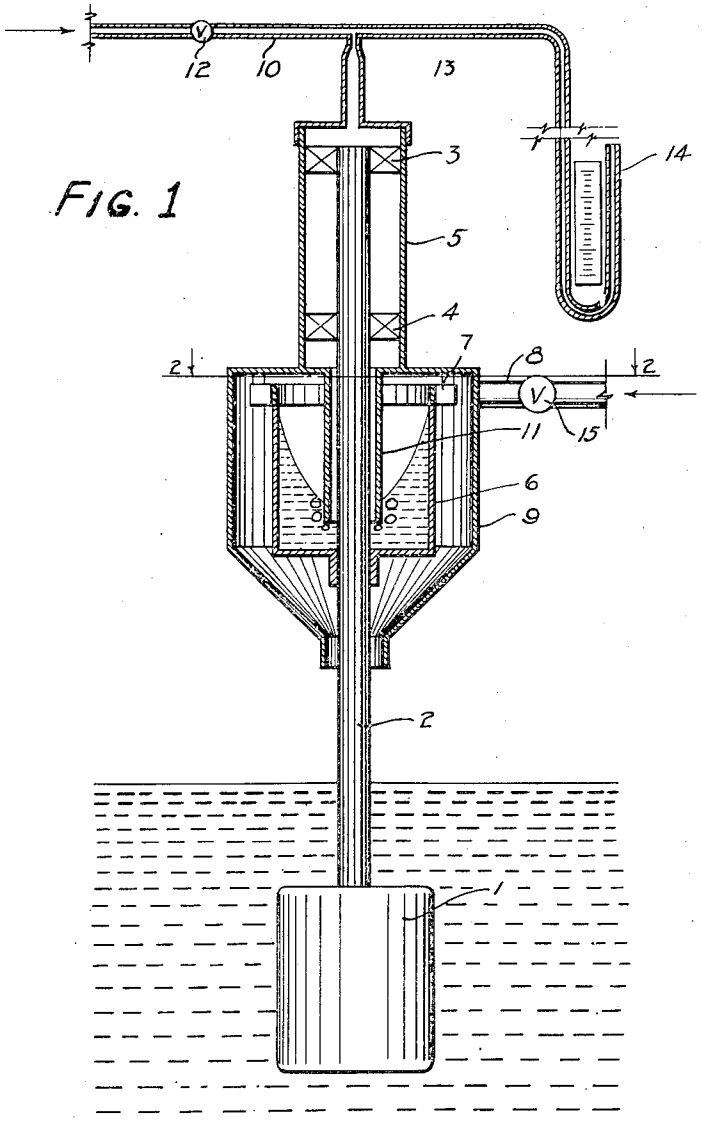


FIG. 1

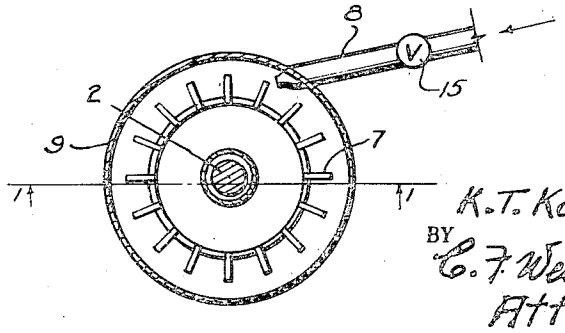


FIG. 2

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APPARATUS FOR THE AUTOMATIC INDICATION OF THE VISCOSITY OR CONCENTRATION IN LIQUIDS

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2 Claims. (Cl. 73—54)

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The present invention relates to an apparatus for the automatic indication of the viscosity or concentration in liquids, more particularly fibre suspensions, in which a rotating member is immersed in the liquid or suspension, the speed of rotation varying in accordance with the viscosity or concentration of the liquid or suspension. Variations in the speed of rotation are thereby recorded by means of an instrument suitable for the purpose which can actuate an indicator. The rotating member in apparatus of the type described above has hitherto been driven by an electric motor the power of which is transmitted to the spindle of the rotating member through a gear or similar device. It has been impossible with this arrangement to avoid a certain lack of sensitiveness in consequence of the friction set up.

According to the invention it has now been found that the apparatus in question becomes appreciably more sensitive if the rotating member is driven by turbine power actuated by a constant force. Since the turbine wheel can be rigidly combined with the spindle of the rotating member no special arrangements are required for the transmission of the driving power, such as gears, etc., and the sensitiveness of the system can hereby be increased to a maximum.

In a preferred form of construction the turbine wheel is arranged in connection with the rotating spindle below the bearings supporting the latter whereby it is possible to surround the said bearings by a tight protecting casing which prevents gases and vapours from penetrating into and corroding the parts of the bearings.

The apparatus according to the invention will now be more particularly described with reference to the accompanying drawing which illustrates a suitable form of construction without limiting the invention to this form. Thus Fig. 1 shows a diagrammatic section through the apparatus viewed from the side and Fig. 2 shows the turbine wheel in section at right-angles to Fig. 1. 1 indicates the rotating member immersed in the liquid or suspension, the spindle 2 of which is supported and fixed both in an axial and radial direction by the bearings 3, 4. Below the bearing housing 5 and rigidly mounted on the rotating spindle is a vessel 6 closed at the bottom and open at the top, containing liquid, this vessel being of the same type and having the same effect as the arrangement described in Swedish Patent No. 99,674 for example. At the upper edge of the vessel 6 a turbine wheel 7 is fixed which is driven by means of liquid conveyed through the turbine nozzle 8 at constant pressure. The vessel 6 and turbine wheel 7 are built into a casing 9. The liquid driving the turbine runs down partly into the vessel 6 to the extent the latter requires refilling, and is partly thrown out against the casing 9 from which it can run down into the liquid in which the rotating member is working. The quantity of liquid supplied in this manner is, however, much too small to effect the concentration of the liquid which is to be examined.

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The ball bearing housing 5 which is connected at the top to an air supply pipe 10, is provided at the bottom with a tubular extension 11 surrounding the rotating spindle 2, which opens into the vessel 6 below the level of the liquid. Air is led through the pipe 10 via the bearing housing 5 and the tube 11, whereupon the liquid contained in the vessel 6, which forms a parabola of greater or lesser depth according to the speed of rotation, in consequence of its lower or higher level will offer less or more resistance respectively to the outflow of the air, this fact being utilised in a known manner for indicating the viscosity or concentration of a liquid or suspension.

The location of the turbine wheel and the vessel 6 below the bearing housing 5 in the manner shown in the drawing is accompanied by the special advantage that the housing is maintained completely closed so that the bearings are protected against the penetration of corroding gases or vapours from media which have been heated up. Any vapours which may rise are condensed when coming into contact with the liquid issuing from the turbine and furthermore the liquid in the vessel 6 forms an effective liquid seal.

For the indication only of the viscosity or concentration of the liquid or suspension in question a substantially constant quantity of air is supplied through the pipe 10 which is supplied for this purpose with a check valve 12. As the air flows out through the opening of the tube 11 a varying static pressure is set up in the tube 11 which is dependent upon the speed of rotation. The pressure variations thus caused in the pipe 10 are registered in a known manner by a pressure gauge 14 or other pressure-indicating device which is connected to the air supply pipe 10 by a branch pipe 13.

The nozzle 8 supplying the driving fluid to the turbine wheel is provided with an adjustable reducing valve 15 by means of which the speed of rotation, can be adjusted for various desired viscosities or suspensions.

The above described forms of construction may of course be varied within wide limits without departing from the scope of the invention. For example, the turbine wheel may be arranged in another manner than that described, and/or be driven by means of a gaseous pressure medium. Similarly the vessel 6 may be replaced by some other organ which registers the speed of rotation, such as a tachometer.

I claim:

1. An apparatus for automatically indicating the viscosity or concentration of liquids more particularly fibre suspensions, comprising a rotating member having a spindle immersed in the liquid, a turbine wheel mounted around the spindle of said rotating member, a pipe supplying to said turbine wheel a liquid jet having a constant force, a vessel containing liquid and fixed around the spindle below said turbine wheel, and means responsive to fluctuations in the liquid level in the vessel, caused by variations in the rotation speed, said variations being dependent on the viscosity or concentration of the liquid.

2. An apparatus according to claim 1, in which bearings are provided for supporting the upper part of the spindle of the rotating member, a bearing housing surrounding said bearings, a supply pipe for air at the top of said housing and a tubular extension at the bottom thereof, said extension surrounding the spindle and ending below the liquid level in the vessel fixed under the bearing housing, said liquid also forming a liquid seal for the bearing housing.

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REFERENCES CITED

The following references are of record in the file of this patent:

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