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CENTRIFUGAL PUMP UNIT

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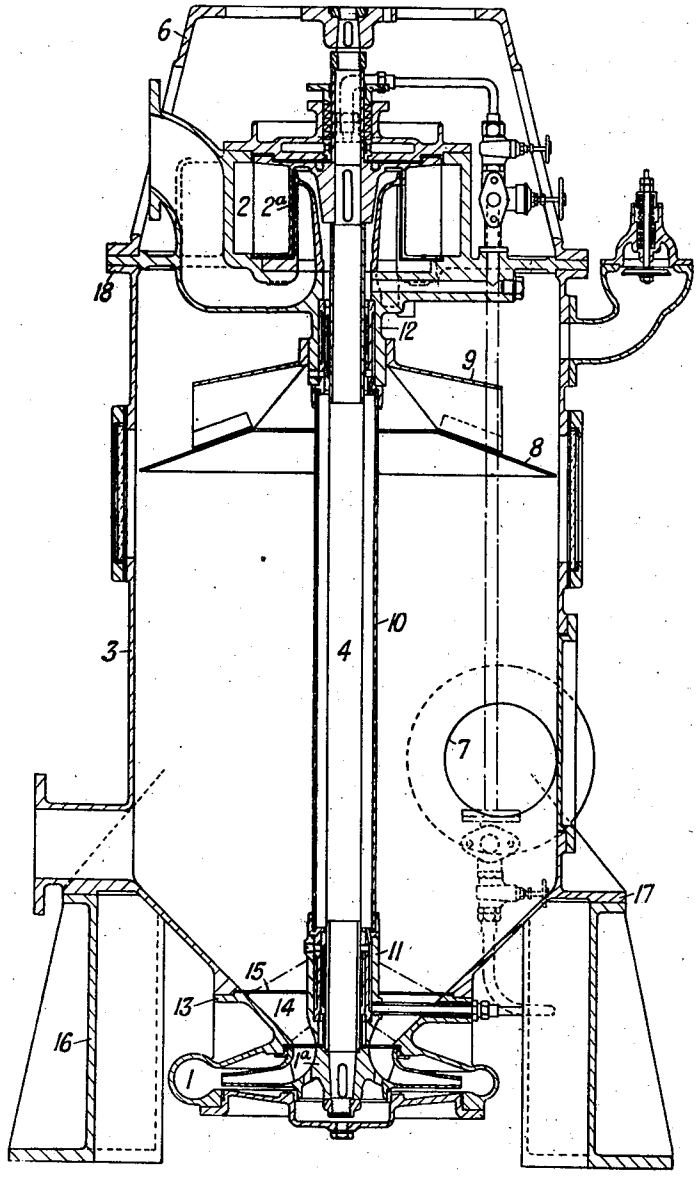

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CENTRIFUGAL PUMP UNIT

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2 Claims. (Cl. 103—113)

This invention relates to improvements in pump units for use, for example, at the wet ends of paper making machines, or in conjunction with wet filtration apparatus working under vacuum.

A pump unit according to the invention includes a centrifugal pump for pumping liquid and a liquid-ring pump for extracting gas entrained with the liquid about to enter the centrifugal pump, arranged in vertically spaced relation with their respective rotors mounted for rotation about a common vertical axis, and a vortex chamber which serves as a liquid and gas separator interposed between the pumps and communicating, at its lower end, with the inlet to the centrifugal pump, and, at its upper end, with the inlet to the liquid-ring pump.

A pump unit according to the invention is illustrated in vertical axial section in the figure of the accompanying drawing.

The pump unit shown includes a centrifugal pump indicated generally at 1 for pumping liquid and a liquid-ring pump indicated generally at 2 for extracting gas entrained with the liquid about to enter the centrifugal pump 1, said pumps being arranged in vertically spaced relation with their respective rotors 1^a, 2^a mounted for rotation about a common vertical axis, the liquid-ring pump 2 being uppermost, and a receiver 3 formed as a vortex chamber to serve as a liquid and gas separator interposed between the pumps 1, 2 and communicating at its coned lower end with the inlet to the centrifugal pump 1 and, at its upper end, with the inlet to the liquid-ring pump 2.

The centrifugal pump impeller 1^a and the liquid-ring pump runner 2^a are secured on the lower end and on the upper end, respectively, of a common vertical driving shaft 4 extending through the interior of the receiver 3 and adapted to be coupled at its upper end to the rotor shaft of an overhead electric driving motor (not shown) the casing of which is seated on a stool 6 mounted on the upper end of the receiver 3. The shaft 4 may, however, be otherwise driven.

The receiver 3, which is constituted as a cylindrical chamber coaxial with the driving shaft 4, is so proportioned that the liquid and gas entering the receiver through a tangential lateral inlet branch 7 are efficiently separated from one another, being constrained to rotate vortically within the receiver 3, whereby the liquid descends smoothly into the eye of the centrifugal pump impeller 1^a and the separated gas ascends within the receiver 3 into the inlet of the liquid-ring pump 2. Annular baffles 8, 9 in the path of the ascending gas are provided within the upper part of the receiver 3, so as to ensure high separating efficiency.

The driving shaft 4 is enclosed, within the receiver 3, in a stationary tube 10 interposed endwise between inwardly projecting gland-forming extensions 11, 12 of the centrifugal pump casing and of the liquid-ring pump casing, respectively.

The centrifugal pump casing is flanged at 13 and bolted to the lower end of the receiver 3, the centrifugal pump inlet 14 registering with an opening 15 in the lower end wall of the receiver 3.

The unit is supported on a stool 16 partially surrounding the centrifugal pump 1 and bolted to a peripheral flange 17 on the lower end of the receiver 3.

The liquid-ring pump housing is bolted to an external peripheral flange 18 on the upper end of the receiver 3.

By virtue of the bolted flange-connections between the pumps and the receiver or vortex chamber 3 the pumps may be adjusted angularly relatively to one another and to the receiver, so that the pumps 1, 2 and the receiver 3 may be relatively angularly disposed as required.

What is claimed is:

1. A pump unit comprising, in combination, a centrifugal pump for pumping liquid and a liquid-ring pump for extracting gas entrained with liquid about to enter said centrifugal pump, said pumps arranged in vertically spaced relation, each of said pumps having a rotor, an upright shaft interconnecting said rotors, and a vortex chamber interposed between said pumps, said chamber having a tangential inlet near its lower end and being in the form of an internally unobstructed upright cylinder surrounding said shaft and having an inwardly converging bottom leading to the inlet to said centrifugal pump, said chamber communicating at its upper end with the inlet to said liquid-ring pump.

2. A pump unit as claimed in claim 1 having superposed annular baffles depending from the casing of the liquid-ring pump in the upper part of the vortex chamber.

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