



"Frahm" REED TACHOMETERS

Check THESE ADVANTAGES

- **ACCURATE**, because the tuned reed is a natural resonant indicator.
- **DEPENDABLE**, because permanent calibration is a natural characteristic of tuned reeds.
- **STURDY**, because there are no delicate pivots, jewels or moving parts.

and these...

EASY-TO-READ vibrating reed-tips form a clearly defined pattern.

LITTLE MAINTENANCE is a result of simple, sturdy construction.

LOW INPUT POWER is sufficient to actuate the reed comb.

OPERATE IN ANY POSITION without affecting accuracy.

ORDINARY ROOM TEMPERATURE VARIATIONS HAVE LITTLE EFFECT on calibration.

OPERATE WITHOUT DIRECT CONTACT with moving parts under test.

EASY TO OPERATE... may be held against or mounted on machine.

Frahm Resonant-Reed Tachometers in round, rectangular and miniature types are available in ranges between the limits of 900 and 100,000 rpm or vpm. Made for permanent mounting on turbines, generators, motors, blowers, centrifugal pumps, diesel-electric installations, etc. Made also in hand types for a wide variety of uses. Write today for Bulletin 1810-P.

"FRAHM" Resonant-Reed FREQUENCY METERS

... operate on the same unique principle as Frahm Tachometers except that reed vibrations are produced electrically instead of by direct mechanical contact. Available in switchboard, miniature and portable types for ranges between 15 and 500 cycles per second. To meet special requirements, we are equipped to build instruments for measuring frequencies as high as 1400 cps. For complete information write today for Bulletin 1770-P.



JAMES G. BIDDLE CO.

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mounted on the driving head and to receive the pump's shaft-top. Impeller adjustment is made by the shaft's top end extends through driver's hollow shaft. The driver contains bearings to carry the thrust load developed by the pump.

Motors, Fig. 1 and 2, right-angle gears, Fig. 3 and 6, and flat or V assemblies are the commonest drives—all of vertical hollow-shaft design. Flexible-coupling drive is used when vertical solid-shaft prime mover is desirable.

When operation requires more than one driver a combination drive is used. For example, pumps are sometimes mechanically driven by an electric motor in combination with a right-angle drive for emergency operation by line or diesel engine.

Q 20—What types of impellers are used in vertical-turbine pumps?

A—Single-suction enclosed impeller, Fig. 4, in which the waterways are shrouded from suction to discharge and semiopen impellers, Fig. 5, which have only a top shroud. Vertical clearance of the impellers in their bearings is obtained by an adjusting nut on the shaft's top extending through the drive.

Semioopen impellers do not operate with close radial clearances and wear-ring clearance in an enclosed impeller pump. They are generally considered to have some advantage when pumping sandy water, in possibility of sand locking is reduced. Vertical clearance is important in semioopen-impeller pump because maximum performance can be obtained when the impellers are adjusted to operate as closely as possible to the faces. A semioopen impeller develops greater hydraulic thrust than an enclosed impeller because, in addition to a lower shroud, there is a larger area that is hydraulically unbalanced.

Q 21—What accessories are used with vertical-turbine pumps?

A—Suction strainers of the basket type, Fig. 2, for wells or a basket design for sump and pits are commonly used to prevent entrance of trash and large objects. Feet or more suction piping are fitted to well pumps to allow for easy lowering of the pumping head to ground water.

Equipment can be furnished for terminating the water level in a sump. Pumps with open shafts are equipped to lubricate the line bearings before starting. Follow manufacturer's instructions regarding lubrication. Many types of man-

TERRY



Action of steam in Terry wheel turbine. The steam issues from an expanding nozzle at high velocity and enters the side of the wheel bucket in which its direction is reversed 180°. As this single reversal uses but a portion of the available energy, the steam is caught in a stationary reversing chamber and returned again to the wheel. This process is repeated several times until practically all of the useful energy has been utilized.



NO PARTS TO LOOSEN OR WORK OUT

The rotor of the Terry Wheel Turbine is a single forging of special composition steel, in which a series of semi-circular buckets is milled. There are no separate parts to become loose or work out.

The power-producing action of the steam takes place on the solid curved backs of these buckets or pockets. Therefore close

clearance is unnecessary and wear on the blades forming the pockets is of little consequence, as it does not materially effect horsepower or efficiency.

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T-1172

THE TERRY STEAM TURBINE COMPANY
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POWER • January 1948

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