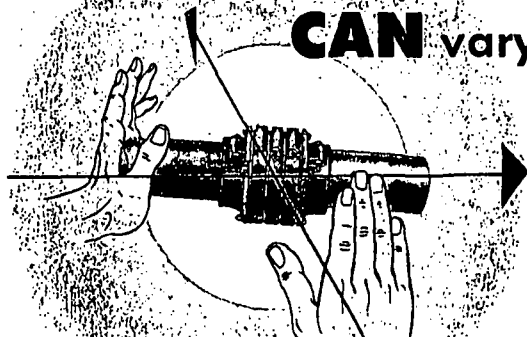


Pipe line movements CAN vary



Here are a few conditions and the
Expansion Joints for them

BADGER DIRECTED-FLEXING SELF-EQUALIZING JOINTS

standard for straight-line axial movements



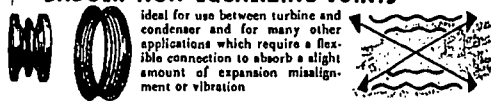
BADGER TANDEM JOINTS

for lateral or combined lateral-axial movements; designed individually for each problem



BADGER NON-EQUALIZING JOINTS

ideal for use between turbine and condenser and for many other applications which require a flexible connection to absorb a slight amount of expansion misalignment or vibration



BADGER HINGED TYPE JOINTS

Hinged type expansion joints are designed to absorb expansion in one plane by angular rotation. They must be used in pairs and are specially designed to meet individual applications. Available in both non-equalizing and self-equalizing types, either flanged or welded ends.



The above designs suggest the versatility of the Badger corrugated type of expansion joint... the joint that requires no maintenance. There are others equally useful. If you have any kind of problem like those outlined above or any other pipe line movement you must control and absorb, write us in detail. We shall be glad to submit recommendations.

BADGER MANUFACTURING COMPANY

Original and Sole Manufacturer of Badger Expansion Joints

230 BENT STREET • CAMBRIDGE • MASS.

More TECHNICAL BRIEFS

Register on page 152

tie. However, in 1949, permanent connections were made to two old boilers and the machine was rerated to its design capacity of 165,000. During this time it has produced over 16 billion kw hrs and has operated at an average capacity factor of approximately 72 per cent. As a matter of interest, this unit in 1944—a war year—operated at a capacity factor of 90.74 per cent.

The maintenance record of this machine is one of outstanding accomplishment. Not until 1949, fourteen years after initial operation, was the high pressure end opened for inspection. Both the rotating and stationary blades were found to be in good condition. Considerable work was necessary on the horizontal joint and other parts of the casing. This major overhaul was completed with an outage time of sixteen weeks. During this time, the low pressure section has been inspected practically every year in order to properly maintain the blading in the later stages when water cutting occurs. These outages averaged not more than ten days apiece. It is also interesting to note that the machine operated on its original bogie throughout this entire period.

A running record from 1939 of the maintenance cost on all our generating units indicates that the cost per kw for the 165,000 kw unit at Richmond Station is approximately 40 per cent less than the average of all the machines on the system. The average maintenance cost of the 182,000 kw Southwark machines installed in 1947 and 1948 to date has been 75 per cent less than for the system average. It is evident, therefore, that the unit cost in mills/kwh of maintaining large units is less than for small units.

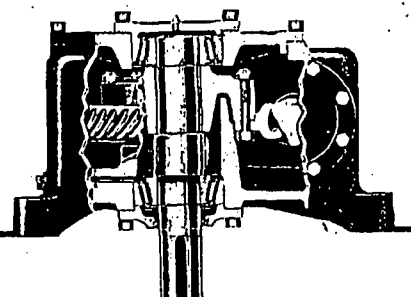
The problem of scheduling maintenance on these large machines is one which requires careful study and planning. There are many factors to be considered in arranging these schedules such as a seasonal load drop, hydro availability, manpower availability, outage time required, etc. We find no penalty attached to the large machine in this respect.

One of the most important considerations in maintenance scheduling is the detailed planning to coordinate men and materials so as to reduce the outage time to an absolute minimum. When a machine is out of service, the replaced kw must be generated on machines with lower efficiencies. The result is an out-of-pocket cost.

These costs, which are proportional to

Directions for ordering papers on p 154

RIGHT DRIVE



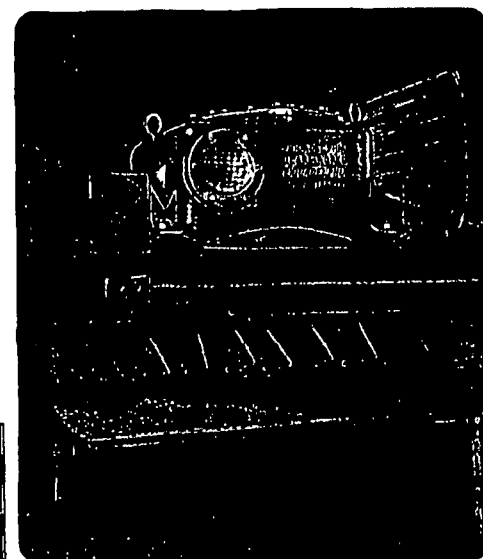
...where Dependable Performance Counts

Philadelphia WORM GEAR SPEED REDUCERS

are of extremely sturdy construction throughout. Bearings have a generous spread, which in the vertical units as shown here, provide for heavy radial loads. Note, too, the famous dry-well construction which eliminates oil leaks down the vertical shaft, and these are but a few of the outstanding features found in Philadelphia units.

Vertical type reducers can be furnished with output shafts extended either up or down. Conventional horizontal types can also be supplied. A complete range of ratios from 3½:1 up to 6300:1, in units up to 250 horsepower, provide complete selectivity.

For full information on Philadelphia Worm Gear Speed Reducers, write for catalog WG-51.



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