faces are finished very smooth in the shops, ready for grinding. When the pipe with flanges arrives at its destination these flanges are ground in place by the use of a special grinding or face plate, using emery and oil as a grinding mixture.

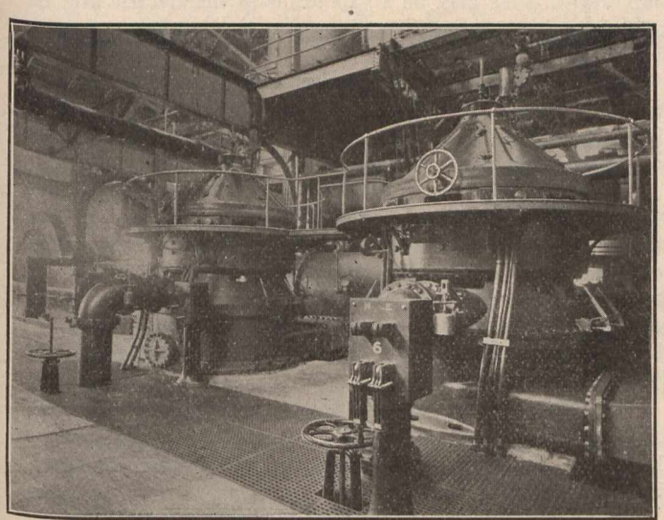
Flanges with spot faced bolt holes are made by facing off around the bolt holes on the back side of flange, where the nut or head of bolt bears. This is done to give the nuts or heads of bolts a more true, firm bearing than could be obtained on the rough casting. It is useless expense, however, to spot face the bolt holes on flanged valves, fittings and flanges, unless the bearing faces of both the heads and nuts are also faced true.

Flanges with calking recesses are made by cutting a recess in hubs on backs of flanges. This recess is ½" in depth, ¼" wide at top and 5-16" wide at the bottom. It can be applied to extra heavy flanges in sizes from 2 to 24". Flanges so fitted are ½" higher than the regular flanges. When the flanges are used on cold water, the recesses are filled with lead, which is caulked in firmly to prevent the flanges from leaking where they are made on pipe. When these flanges are used on steam, the recesses are filled with soft copper, which is caulked in firmly to keep the flanges from leaking where they are made on pipe.

LOW PRESSURE STEAM TURBINES.

The Philadelphia Rapid Transit Company has recently added to its power station at Thirteenth & Mount Vernon Streets an 800 kw. low pressure Curtis steam turbine, direct coupled to a D. C. railway generator. This installation has been manufactured and supplied by the General Electric Co., and is a duplicate of a turbine-generator set finished by the same company and put into service at the end of last year. The installation of the additional unit has been nearly completed and the turbine will be in operation very shortly.

The turbine now in operation is supplied from a steam stack which is connected with the exhausts of five Corliss engines—four of 1,500 nominal h.p each, and one of 2,200 nominal h.p.—which have been operated hitherto without condensers. Each of the 1,500 h.p. engines is direct connected to a 1,500 kw. generator, and it has been conclusively proved, from experience with the first turbine set installed, that the exhaust steam from any one of these engines under full load is more than sufficient to operate the turbine at its rated capacity, without causing any increase of back pressure on the engine.



Type C—5 Pole 800 K.W.—1,200 R.P.M. 575 Volt Curtis Steam Turbines (Low Pressure).
Installed for the Philadelphia Rapid Transit Company.

These results prove that the amount of water used per kilowatt-hour at all loads is greatly improved by the introduction of the turbine, the improvement being greatest at light loads and overloads. This increased economy is due to the fact that the steam engine does not work efficiently at such loads, whereas the turbine has practically the same efficiency at light load as at full load.

The turbine, which is supplied with steam at about one pound above atmosphere, and is of the four-stage type running at 1,200 revolutions per minute, with a condenser vacuum of between 28 and 29 in., easily fulfills the steam consumption guarantees, which state that the steam consumption with dry steam at 15 pounds pressure absolute shall not exceed 36 pounds per kw. hour at full load, and 40 pounds at half load, with 28 in of vacuum. The steam pressure on the turbine has been found quite uniform and constant with three engines operating, though there was just a noticeable pressure pulsation with only one engine running. This pressure variation, however, in no way interfered with the satisfactory operation of the turbine.

The generator of this turbine set has six poles and is compound wound, but is at present run as a shunt machine. The design is new, and the difficulties of designing so large a direct current railway generator running at such a high speed as 1,200 revolutions per minute have been successfully overcome. The generator has a rather high voltage between adjacent commutator segments, but commutation troubles have been avoided by the proper design of the other commutation constants of the machine. The fact that the machine has given 2,200 amp. at 570 volts, or about a 65 per cent. overload, without serious sparking, demonstrates that no trouble will be experienced in this direction.

When the new turbine set is put into operation, it will effect further economies by increasing the output from the power station without increasing the consumption of coal and water. At present, in fact, there is absolutely no difference to be noticed in firing the boilers, whether the low pressure turbine is running at full-load or shut down.

It is obvious, from these actual results as well as from theoretical considerations, that several of these turbine-units can be installed advantageously in connection with Corliss engines, and that a new field has been opened up in central station practice by the introduction of the low pressure turbine.

AN INGENIOUS PIPE-BENDER.

A new pipe-bender which has been placed on the market by an English firm, should, in our opinion, appeal strongly to heating plant engineers, gas and electrical fitters, plumbers, etc. It is operated by hand, and bends without filling or heating, all sizes of pipe up to one inch diameter; and by heating, but without filling, sizes up to 3 in. The bends made by the machine are absolutely free from pucker; of perfect radius, and may be made at such angles as to render screwed fittings unnecessary. As shown in the illustration, the machine consists of a central pulley, bending and clamping blocks, with groove suited to the outside diameters of various sizes of pipes, a base plate, and lever mechanism. Even old and rusty tubes may be bent with accuracy and safety by this bender, and since it is portable, easily attached to any bench, or even nipped in an ordinary vise, it can be used quickly, with manifest saving of labor.