to fill the tubes with water to prevent them from burning out while raising steam in the boiler. When these tubes are flooded they add to the heating surface of the boiler, but when steam is being taken from the boiler, the water must be drawn from the tubes and then the steam started to circulate through them. All types should be accessible for inspection and cleaning. In return tubular boilers, the superheater is placed under the shell back of the bridge wall or in the rear combustion chamber.

VARIOUS USES FOR SUPERHEATED STEAM.

In steam engines, whether simple or compound, condensing or non-condensing, the steam consumption may be reduced from 10 to 40 per cent.

For ordinary conditions it is not recommended to use above 125 to 150 degrees of superheat which would make the temperature of the steam in the pipe before reaching the engines, where working pressure is 125 lbs. per square inch about 480 to 500 degrees.

The more wasteful the engine, the more economy by using superheated steam—more can be saved on a simple engine than on a compound, but with superheated steam a compound can be run as economically as a triple expansion, because superheated steam at a lower pressure can carry the same energy per pound as saturated steam at a higher pressure.

There is less friction when using superheated steam and in consequence the steam pipes, etc., can be greatly reduced in size. It is safe to figure on a velocity of from 30 to 40 per cent. greater than when saturated steam is used, or say an increase in speed from 60 feet per second to 100 feet.

Superheated steam has shown a marked economy when used in turbine engines. One authority says that with superheat of from 60 to 70 degrees the economy was increased 30 per cent. I have not succeeded in getting any reliable data upon the use of superheat for locomotives, but I learn that many of our railroads are doing away with the compound engines and using superheated steam instead. The cost of construction is less and there is a marked improvement in economy and draw bar power.

In Germany the use of superheated steam has made rapid strides and it is used upon all the best engines with a result that is far in advance of any practice in this country. The Stumpf engine which is built without exhaust valves, the cylinder being twice the length of the stroke and the depth of the piston. It uncovers openings at the centre when the piston reaches the end of the stroke, with this arrangement the cylinder, taking steam at each end for one stroke is never cooled at the initial end of the stroke, and the cylinder condensation is