

is well adapted for the dyeing of sewing cotton.

Dyeing Directions.—It is dyed with the addition of one-half per cent. soda and ten twentieths per cent. Glauber's salt.

The after-treatment consists in boiling for half an hour in a fresh bath containing three-fourths per cent. potassium bichromate.

As the dyeing bath is not completely exhausted, it should be retained for future dyeing, a reduction being made in the quantities of dyestuff and chemicals.

For samples address—Wm. J. Matheson & Co., Ltd., 178 Front St., New York.

VALUE OF EXHAUST STEAM.

In the recently issued catalogue of the McKachren Heating and Ventilating Company, Galt, Ont., is the following interesting article on the value of exhaust steam:

"Among the many who own steam engines, and the engineers who run them, there few who have a just appreciation of the thermal value of the clouds of exhaust steam constantly blown to the winds from the apparently numberless exhaust pipes which can be seen from the tops of high buildings in any of our large cities.

"When we say that three-quarters of the practical thermal value of every pound of

coal burned in the boiler furnace is lost past recovery to the consumer, we are putting it at less than actual loss. As yet there has been no means discovered whereby this valuable heat can be utilized, except in the heating of air, water, or other tangible substance.

"The first purpose for which exhaust steam is generally used is to warm the feed water, the object being to raise its temperature as high as possible before it enters the boiler, thereby to save fuel.

"The first question which nearly always suggests itself to the engineer is, how hot can feed-water be made? The second, which he sometimes considers, but seldom arrives at a satisfactory conclusion about, is, what percentage of the coal does the heating of feed-water represent? And the following, which rarely comes under his notice, is, how much of the exhaust steam from an engine can be used in heating all the feed-water necessary to supply the loss sustained in the boiler by supplying steam to the same engine? and how much of it is left for use elsewhere to heat the factory in winter, heating water for other purposes than boiler feeding, drying, etc.?

"The answer to the first question is: Water under the pressure of atmosphere cannot be heated above 212 degrees Fahr., and when the feed-water passes the check valve at a temperature of 200 degrees it

should be considered satisfactory, although it is possible to do better. Where water is forced through a heater, the temperature can be raised higher than when drawn by a pump from the heater, as the lessening of pressure also lessens the capacity of the water for sensible heat. Some makers of feed-water heaters claim they can heat the water above 212 degrees, because it is under pressure; but this is evidently a mistake, as both the water to be heated and the steam necessary to heat it should have a pressure above atmosphere, and any attempt to keep a back pressure in the exhaust pipe for the simple purpose only of warming the feed-water above 212 degrees is attended with a loss instead of a gain. The attempt to heat the feed-water five degrees above 212 degrees or 217 degrees, by a back pressure of two pounds, the mean pressure in the cylinder being fifty pounds, is attended with a loss in the engine, greater by more than five times the gain to the feed-water.

"The answer to the second question is: That when the feed-water is raised from mean temperature of 40 degrees to 212 degrees by the use of exhaust steam at atmospheric pressure, it is equivalent to very nearly two-thirteenths of the weight of the fuel necessary to convert water at mean temperature to steam at any pressure, and fifteen to eighteen per cent. of the coal is the greatest possible saving that

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