system worked and dried the coatings perfectly. Before such adjustment, however, the hot air shot to the top in as many currents as there were air inlets.

The use of high temperature air is not always economical or even applicable and some judgment must be used or the mark will be overshot or missed altogether. In one case where by the use of hot air and an increase of drier temperature of 25 per cent, the time of processing was reduced by 75 per cent and the client immediately tried to eliminate the remaining 25 per cent of time by increasing the temperature still more. The results were that the materials were all but ruined and he had to return to the temperatures we had established.

A technical firm wished to evaporate water vapor from a spray containing water and a heavier liquid. They found that at 220 deg. the process worked very much faster than at 160 deg. fahr. Therefore they reasoned that at 1200 deg. the work would be done in practically no time at all. The volume of air at 1200 deg. which would evaporate the water spray, would not have carried off the vapor. To supply sufficient air at the high temperature was too expensive. A careful computation proved that air at 300 deg. in sufficient volume was the most economical way to handle the problem.

Totally disregarding the difference in weight between air and water and the latent heat carried by steam, a number of schemes have been proposed to us for the use of air at 700 or 800 deg., in place of hot water in a radiator having a ¾ in. supply, or a die mold or steam kettle having a very large exposure for the area of opening for heat supply.

It has even been suggested that we boil liquid by blowing or bubbling hot air through it. For the aeration of boiling linseed oil this is very advantageous but the source of heat for the boiling is a direct fire underneath the kettle. In all three of these cases, to accomplish the work, the velocities of the heat carrying air would be terrific.

Another type of proposition which comes to us and which in nine cases out of ten is erroneous, is that a vapor recovery installation which by means of heat interchanges gives up a part of the heat of the effluent gases to the fresh air supply, and then by means of cold water and mechanical refrigeration condensing the vapors, will render large returns. In one case the first cost of the interchangers and condenser plant was estimated at close to $1,000,000, the operating cost per day at $250, and the total available gases for recovery were worth only $160, assuming they could all be recovered. Incidentally, the whole manufacturing plant involved a cost not over $1,000,000.

I have seen very few cases where such vapor recovery installations showed returns which warranted the investment. Waste heat recovery plants are a different proposition, however.

For high temperature work particularly, it is impractical to attempt dehumidification in order to use the same air over and over. The temptation in this seems to be great until the client sees the cost figured out.

Many clients cannot see why air entering the drier at 500 deg. fahr. should not hold the drier temperature at 500 deg., nor understand why the work done in the drier is only proportional to the difference between the entering and the effluent temperatures.

It is not an easy matter to obtain actual correct temperature readings in a drier without an expensive equipment, but fortunately, once the system is properly adjusted and the operators know at what level on their thermometers the heat should be, it does not make any difference whether the thermometer scales says 300 or 3000 deg., or whether there is a scale.

AIR HEATING TO HIGH TEMPERATURES

I will add just a few words regarding the heating of air to high temperatures. Our work in that line has all been done with the Aertube heater.

A large chemical firm wanted hot air at 1200 deg. fahr., to facilitate a certain chemical action. They concluded our heater was too large, heavy and expensive, and that they could get the same results by adapting a steam superheater with wrought iron tubes to their purpose. According to their own report on the result, in a very few hours the tubes had stopped up solid with their own rust on account of the high oxidizing effect of air at that temperature.

For such temperatures only cast iron, duriron, tantiron or similar metals should be used. Our first heater tubes were made of grey cast iron. The alternate heating to cherry red and cooling again, caused them to grow several inches in length in one season.

Professor Diedrichs of Cornell had found that growth in cast iron under such conditions was due to the silicon and graphitic carbon. We reduced the silicon to about 0.2 of 1 per cent and blew out the graphitic carbon in the blast and got a chilled tube which did not grow and which withstood a temperature of 2000 to 2100 deg. fahr.

Then the Duriron Castings Co. made an iron tube for us with 20 to 22 per cent of silicon in it which stands 2550 deg. fahr. and does not grow. In other words, we had passed from plus to minus through zero and they through infinity.

When heating gases carrying sulphur, we had to protect through rods and tried many different patent coatings, cements, etc., but were obliged to fall back on Portland cement mixed with buttermilk. This will stand temperatures up to 1200 deg. and is flexible. The Botfield Specialty Co. of Philadelphia make a fire cement which will stand 3000 deg. fahr. which we are now using with good success.

One thing which our work has proved to my satisfaction, at least, is that for the higher temperatures the steel plate fan, or the volume blower type, are better suited to the work than the multiblade or Sirocco type, particularly if the system requires operation at several temperatures or if at times parts of the system are shut off.

Suppose the fan handles 10,000 cu. ft. of air per min. at 60 deg. fahr. against a maintained pressure through the system of 1 oz., when there is no fire in the heater. Now if the heater is fired up and begins to deliver air at 580 deg. fahr., the maintained pressure in-