AN APPARATUS FOR HEATING SEALED TUBES.

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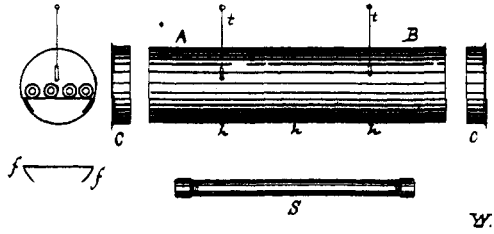
In a recent number of the *Journal of the Franklin Institute* Mr. Henry Pemberton describes an apparatus made of wrought iron pipe for heating sealed tubes.

Having occasion to make some analysis in 1889 which involved the sealed tube method, I constructed a somewhat similar apparatus which has, however, several advantages.

The oven is made as follows:



A length of 5-inch stove pipe, A B, is provided with a sheet iron cap at each end, C C, the caps not fitting so closely as to prevent being easily removed, as one of them must serve as the oven door.

A piece of sheet iron, *f f*, of the same length as the oven bent down at the edges may be fastened in place by four rivets to serve as a floor. Two holes are bored at suitable places in the top for thermometers *t t*, and three half-inch holes *h h*, in the bottom at equal distances from each other, under which Bunsen burners are placed.

The thermometers should not be placed directly over the burners as incorrectly shown in the figure.

A piece of rather heavy asbestus paper is wrapped around the oven and fastened with copper wire. Two discs of asbestus board are fitted into the end caps.

If desired, a suitable stand may be constructed of heavy galvanized wire but I have found it quite convenient to support the oven on the rings of two retort stands, fastening while in use with copper wire.

When not in use the oven requires very little storage space—if unencumbered with a special stand.

Three or four pieces of wrought iron pipe of 1-inch internal diameter, S, with screw caps at each end, complete the arrangement.

The properly sealed glass tubes are wrapped around several times in paper to prevent scratching by any roughness in the iron tube, pushed into place and the iron cap screwed on *with the fingers*.

It is not only unnecessary to screw up the cap so as to be steam tight, but it is as disadvantageous as it is inconvenient.

If the glass tube explodes, the gases escape with a hissing noise from the leaky iron cap, and while there is no other sound to startle neighbors (sometimes a matter of importance in city laboratories), the operator is apprised of the fact that the analysis is lost and does not waste time continuing to heat an exploded tube as would occur if he failed to hear the slight rustle accompaning the breakage of the glass tube enclosed steam tight in the iron pipe.

Heating the glass tube in an iron one has two important advantages :

(*a*). Uniform distribution of the heat is ensured.

(*b*). Flying glass and the noise of explosion are prevented.

It is thus possible to carry on such work in the midst of ordinary laboratory operations without inconvenience or danger.

The burners should not project into the oven but should stand under the half-inch holes made for the purpose, the flame tips just passing inside.

It will be found that they need not be turned very high to give a temperature of 300° C., and the uniform distribution of the heat is satisfactorily effected by the combined action of the sheet iron floor and the iron tubes which do not come in contact with the floor except at the end caps.

The advantages of the arrangement may be summed up as follows:

The oven costs but little.

The consumption of gas to heat it is very small.

It is not heavy and requires little storage space.

Several sealed tubes may be heated at once without the breakage of one affecting the others.

In case of breakage there is no noise and no flying glass.

The escape of the gases through the not too closely screwed up cap apprises the operator of the loss of a tube thus preventing further waste of time.

The safety of this method of procedure is absolute in all the ordinary cases of using the sealed tube method for analysis.

In experimental work on substances liable to yield products of high explosive power, extra precautions would be necessary.