

## THESIS.

Subject, Distillation

Name, J. R. Thistlethwaite

## Distillation

Distillation is an important process in the arts. It consists essentially in converting a liquid into vapor in a close vessel, by means of heat, and then conveying the vapor into another cool vessel where it is condensed again into a liquid.

The object of distillation is to separate one substance from others with which it may be mixed. In what is called, distillation proper, no chemical decomposition takes place. When any of the substances are decomposed, it is called destructive distillation. What is meant here by substances

being decomposed, is to resolve them into their original elements. The possibility of separating substances by vaporizing them, depends upon the fact that very few substances are volatile, or apt to change into another state at the same temperature. For instance water boils or becomes rapidly converted into vapor at  $212^{\circ}$ ; alcohol at  $173^{\circ}$ ; sulphuric ether at  $94.8^{\circ}$ ; while oil of turpentine must be raised to  $318^{\circ}$ , and mercury to  $662^{\circ}$ . Thus we see that there is a wide difference in the kind of liquids used. So by applying the proper amount of heat, and no more, the more volatile of any two substances

may be expelled from the other.

It is often, however, not so easy to obtain a perfectly pure product by distillation, as might at first appear, owing to a fact in chemistry - namely - that many bodies which, when pure, require a high temperature to vaporize them, become more easily vaporized when mixed with substances more volatile than themselves.

Owing to this, it is impossible to obtain by distillation alone, perfectly pure alcohol from water.

The applications of distillation are many both in chemistry and in practical arts. Pure water is obtained by dis-

tillation; the most of the substances dissolved in natural waters being fixed. Sea water may in this way be rendered drinkable, and there are apparatus for this special purpose. Wherever there are cooking utensils a distilling apparatus might be improvised. The extraction of zinc from the ore is also a kind of distillation. The metal, when reduced, passes over in vapor, and is condensed in a separate vessel.

The most extensive use of distillation, however, is in the manufacture of spirits. Strictly speaking, the spirits are not produced by the act of distillation; that is done by a previous step

called fermentation. Distillation merely separates the spirits from the mixture in which they already exist.

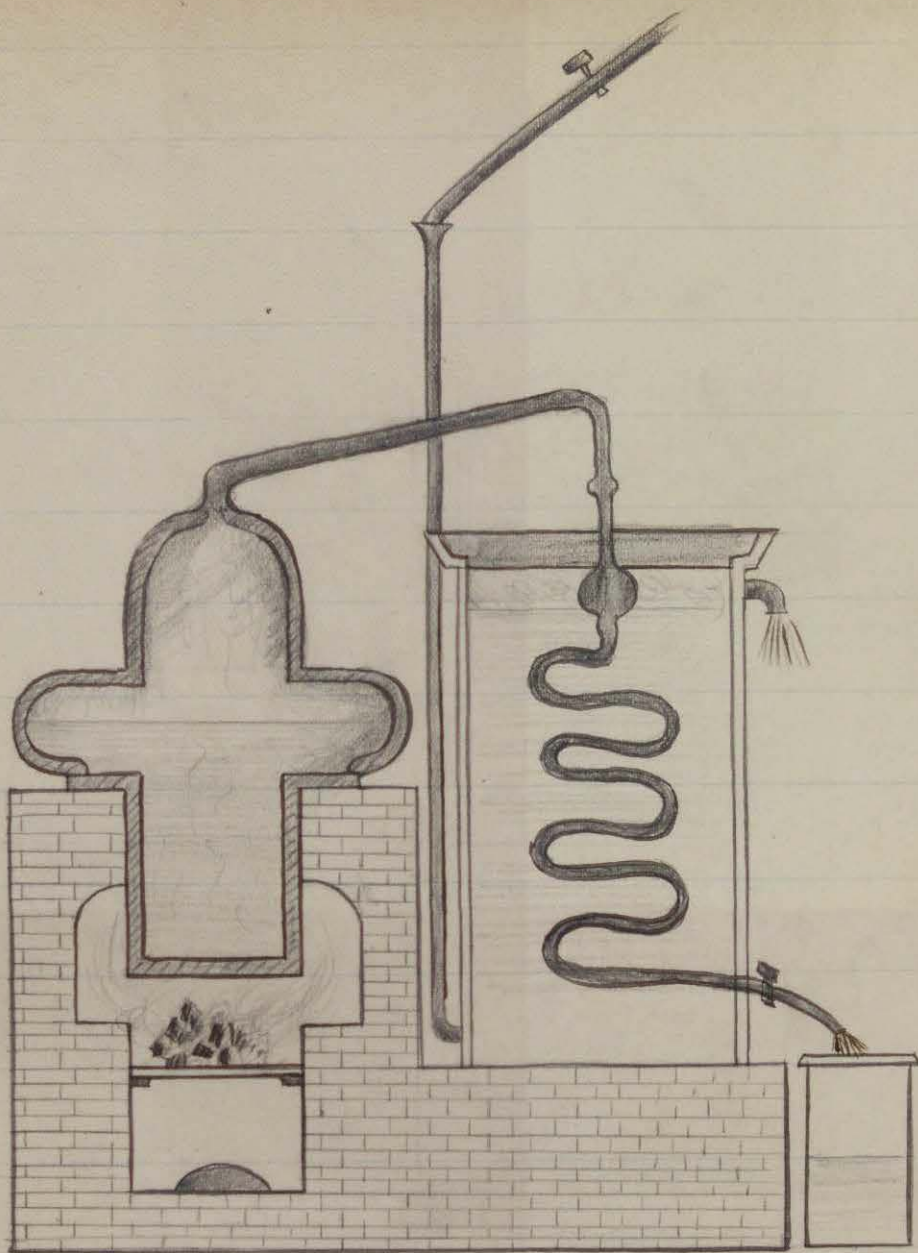
The manufacture of spirits is a most interesting process. As for instance in the manufacture of whisky, the rye and malt, after being thoroughly cleaned by machinery, is ground into a coarse flour separately, then mixed in proper proportion, and is then scalded in a large steel tank called a mash tub, with pure spring water. After being mashed it is conveyed into a large tub called a fermenter, and allowed to remain there from forty-eight to seventy-two hours. To this mash yeast is intro-

duced when first placed in the tub, causing the mash to ferment, and the fermentation creates alcohol. The alcohol is then separated from the mash by distillation and conveyed into large cisterns or tanks where it is barreled. The yeast is nothing more than a kind of liquor drawn off from hops and rye malt. Therefore liquor is really nothing but condensed steam coming from fermented grain. As it comes from the still, the liquor is clear as crystal, and the beautiful color that the liquor possesses is due to the fact that the interior of the barrels are charred into which

it is stored. It is said that the storing of liquor is as important and as essential as the method of manufacture. Many large distilleries are to be found all along the banks of the Monongahela, for the purpose of the manufacture of liquor, and some of it is shipped to all parts of the United States. Thus we see that distillation may be made very useful for many different things. In conclusion I will make a drawing showing a distillery in its simplest form.

J. R. Thistlethwaite





Distillation  
Process