

SAVELLE'S SYSTEM OF DISTILLATION.

WE illustrate herewith the large apparatus in Springer & Co.'s great spirit and yeast manufactory at Maisons Alfort, near Paris, France, which is said to be capable of utilizing daily 55,000 pounds of barley, rye, and corn, mixed in equal proportions.

In order to obtain regular working with such large quantities of material, two conditions have to be fulfilled. 1. Perfect cleanliness throughout the whole apparatus, and the avoidance of any stoppage in the inner system of tubes. 2. The complete separation of the liquids produced.

The first condition is substantially obtained by the swift passage downwards of the material subjected to distillation. Having to travel, in passing through the apparatus, 410 ft., it accomplishes the descent in six minutes. This gives a speed of 13.65 inches per second, and it is easily seen that with so rapid a movement interior stoppages are nearly impossible.

Each section of the distillation column is provided with five bronze observation tubes which allow of an examination of the interior without interruption of the working. The

alcoholic vapors take place; here the material spreads in thin layers traversed in every direction by the steam brought in by the pipe, *i*, and the introduction of which is regulated by the admission valve, *t*, of the steam regulator, *F*. A constant temperature is maintained by this latter, and the feeding is regulated by the screw admission cock, *2*. The foam breaker, *B*, stops and returns to the column, the substances carried over by the current of alcoholic vapor passing to the alcohol warmer. The tubular cooler, *D*, arranged in compartments, receives cold water from the reservoir, *H*, by the pipe, *u*, and communicates with the graduated gauge and discharge, *E*, which measures the flowing of the phlegm. The condensation which is partially accomplished in the condenser, or alcohol warmer, is finished in the cooler, *D*. The large cylinder, *G*, is used for the reception from the column, and drawing off by means of the conduct, *o*, of the residuary products, *j* is the delivery pipe of the regulator, *F*. *k* and *l* are tubes which carry the alcohol tubes from the distillation column to the foam breaker and alcohol warmer. *r* is the return pipe from the foam breaker to the column, and *s* the air pipe of the alcohol warmer.

The general construction of the entire apparatus is such as to secure regular working at a rigorously constant temperature. The apparatus of Messrs. Savelle, Son & Co., of Paris, is adapted for the distillation of all material yielding alcohol, and is made of various capacities. It is now working in beetroot sugar and molasses manufactories and in distilleries in France, and is soon to be applied to sugar works in the West Indian colonies, and in the great sugar works of the Viceroy of Egypt. In Spain and Italy it is used for the distillation of wine.

NEW BROMINE STILL.

By W. ARVINE, Hartford City, W. Va.

THE object is to economize the materials used in the manufacture of bromine by saving a portion of the vitriol and manganese, or alkaline chlorate, and by dispensing with the caustic alkali heretofore employed for absorbing the vapors and gases that escape uncondensed from the worms.

S is the still proper, wherein the bromine is generated by the usual methods.

This still may be made of any of the materials commonly used for the purpose, such as stone, terra-cotta, pottery ware, or lead; but this still has a funnel-shaped bottom or floor, in the form of an inverted cone, which may be more or less broad in proportion to its depth, according to the nature of materials used.

The apex of this funnel or cone is provided with two perforations—*s* for the admission of steam, and *w* for the withdrawal of the waste or exhausted materials. This still is provided with the condensing worm *W*, which is surrounded with hold water while in use, and the receiver, *R*, is also provided with a worm, *w'*, which serves for additional condensing surface, and an outlet for the uncondensed gases and vapors of chlorine, chloride of bromine, air, etc., which escape in considerable quantity from the worm and receiver. The second worm, *w'*, continues to absorber *A*, which is preferably a stone or earthen jar of such size in relation to the still as experience would show to be necessary. Usually about one-twentieth the capacity or size of the still will suffice for the absorber.

The jar, *A*, is filled with suitable material, such as coke fragments, or pieces of stone, pottery, glass, or any convenient material, which, in a dry or moist state, may present sufficient and proper surface for the condensation and absorption desired. The small pipe shown in the drawing, and terminating in the faucet, *F*, serves to convey bittern or other suitable liquid for absorbing the vapors and gases from the worm, *w'*, and conveying them back to the still, *S*, by the curved pipe, *P*.

By this arrangement of still, the offensive gases and vapors which usually escape into the air are entirely absorbed and saved, and the air is allowed to escape freely from the top of the absorber. As the chlorine and chloride of bromine serve to liberate bromine from its natural combinations, their complete return to the still increases the amount of bromine obtained, and lessens the amount of manganese, or alkaline chlorate, and vitriol usually required, while the conical bottom of the still is easily rinsed clean with water, or is cleansed from sediment by the rapid withdrawal of the exhausted liquors.

The steam used in heating and agitating the contents of the still is most advantageously admitted at *s*, since it will only stir up the manganese and oil of vitriol sufficiently when admitted under the charge.

It has been customary in bromine making to introduce the pipe, *w'*, into a dish containing a strong solution of caustic soda, which, when nearly saturated with chlorine, bromine,

etc., was then transferred to the still, and sufficient vitriol and manganese added to liberate its bromine. In this method only a portion of the gases was absorbed, and the remainder escaped into the air, to the annoyance of the workmen and neighborhood, and to the loss of the manufacturer. In my arrangement I dispense with the use of caustic alkali, and fully overcome all the objections and disadvantages connected with its use, such as odor, chemicals used to decompose it, and loss of chlorine, while the pressure exerted upon the still by the dipping of this waste-pipe, *w'*, into the caustic solution is entirely removed by the arrangement herein described.

THE PHOENIX STEAM BREWERY, NEW YORK.

THE brewery of H. Clausen & Son may be considered, in many respects, a model brewery. A description of it may, therefore, be useful to those of our readers who may not be familiar with these leviathan establishments in the larger cities of the East and West.

The founder of this brewery was the late Mr. Henry Clausen, who to some extent may be considered one of the pioneer brewers of the country. In 1858 he opened the brewery that has now grown to such magnificent proportions, and he died about six years ago. The business is now conducted by his sons, Henry, George, and Herman.

The Phoenix steam brewery is situated in East 47th st. and 48th st.; it has a frontage of one hundred and fifty feet, and it stands upon eighteen city lots, including yards and ice-houses, and has a capacity of six hundred barrels. Their trade last year was 71,175 barrels. The firm is engaged in the brewing of both ale and lager beer, but the two breweries are quite distinct; Mr. George Clausen is the ale brewer, and Mr. Herman the lager beer brewer.

Commencing at the fifth floor, the topmost story of the building, is the surface cooler; the dimensions of which are 60x75.

On the floor below are the capillary coolers, two of the largest coolers generally used, one of which is placed horizontally above the other; by this arrangement about one-third in ice is saved. On this floor also is the malt mill, and scourer, two machines of very large size. The malt mill grinds about two hundred and fifty bushels per hour.

There are also two mash-tubs with a capacity of four hundred and fifty bushels each.

By an admirable arrangement the two kettles are placed underneath the mash-tubs on the floor below; these kettles have a capacity of about two hundred and fifty barrels each. By an ingenious disposition of copper pipes, which can be connected with each of the mash-tubs, any difficulty can be overcome instantly in the event of any accident to either of the kettles.

On this floor is the laboratory, a very interesting room, in which chemical tests of the most important and delicate character are made under the direction of Professor Bruns. The Messrs. Clausen are very particular in being assured of the integrity of the quality of everything they use. One of the instruments we noticed in the laboratory was a polymeter for the testing of saccharine, and another instrument for the microscopic examination of all the malt and yeast that is used.

In this laboratory is a very ingenious mechanical arrangement, denominated a Watchman's Register; this elaborate contrivance has wire communications with certain brass knobs in various parts of the building, which the watchman pulls as he passes them, and these register on a roll of marked paper, passing over a kind of drum, the hour and minute the watchman was in that part of the building, and it also registers the time of the watchman's arrival and departure from the brewery. Any failure in the register would be presumable evidence that the watchman had been absent from that designated floor or cellar.

Below this is the ton room, where the beer passes down into skimming vats, where it remains for about thirty hours for fermentation and separation. Four of these tons average two hundred and thirty barrels each.

Passing into the Forty-eighth street section of the brewery, we entered a large room, where there is a storage of about five hundred bales of hops.

On this floor, which runs clear through from block to block, are the lager beer and ale barrel washing rooms. The two are, however, quite distinct from each other.

Near by is the fermenting room for ale, in which are twelve tons, each ton averaging a capacity of ninety barrels.

Below this floor, on the ground floor of the building, in Forty-eighth street, is the racking room. Adjoining this is the storeroom for fresh ales. These are delivered from Forty-eighth street, and the storerooms for lager are on Forty-seventh street, and delivered from that street; thus

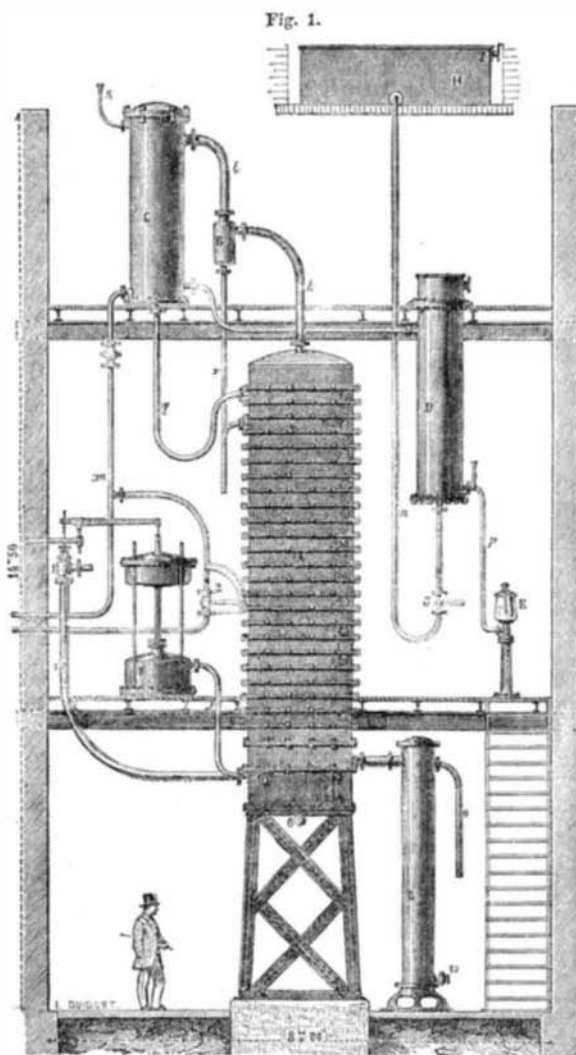


Fig. 1.

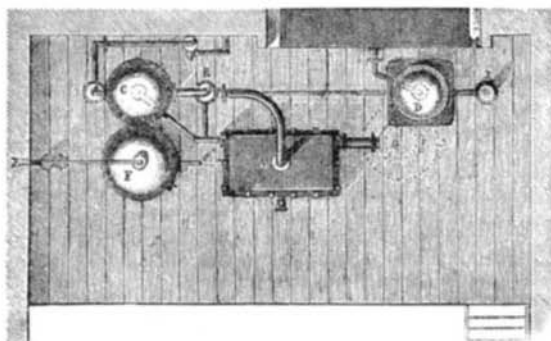
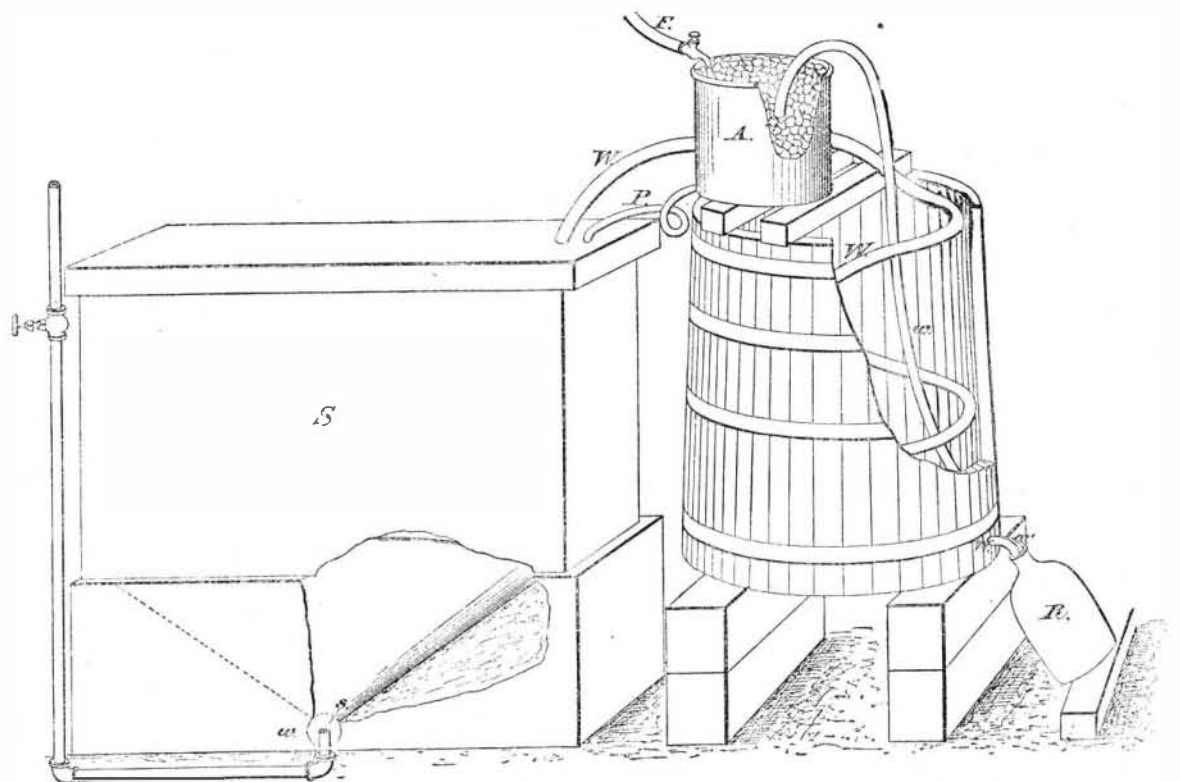


Fig. 2.

THE SAVELLE SYSTEM OF DISTILLATION.

second condition which relates to the separation of the liquid is well fulfilled. The liquid subjected to distillation, which, as above stated, forms a continuous stream 410 ft. long, is traversed in every direction by the steam which carries with it the alcohol formed. The intimate commingling of steam and liquid to be distilled causing a complete absorption by the former of the alcohol contained in the latter. Besides this, the operation of distillation is hastened by the preparatory warming apparatus, provided with large heating surfaces, which utilizes the lost heat of the mass of alcoholic steam issuing from the distillation column, and therefore saves a good deal of fuel. As there is no stoppage in the working, it is necessary that a complete separation of the alcohol should take place regularly, and that none should be lost in the residuary liquors which run out from the base of the column. This result is assured by the steam regulator which maintains constant working conditions. Everything has been arranged so that the matter to be distilled should be kept as long as possible in contact with the steam. The disposition described induces an energetic separation of the contents of the material to be distilled, facilitates the departure of the subsidiary products, gives a working season of eight consecutive months, and allows of a passage through the apparatus of 15,400,000 pounds of material, without any cleaning being needed.

The material to be distilled is first carried by the feeding pipe, *m*, into the alcohol warmer, *C*, which, as above stated, transmits to it the lost heat of the column below, thereby partially condensing the alcoholic vapor. After this preparation it passes by the pipe, *g*, on to the upper surface of the rectangular copper distillation column, *A*, which is composed of 25 rectangular sections, bound together by cast iron clamps, and supported on a framework of iron. In this column the distillation and gradual and methodic enrichment of the



ARVINE'S NEW BROMINE STILL.