SINGLE FLUID BATTERY.

T. O'CONOR SLOANE, PH.D.

The battery here illustrated is a very efficient and simple form for open or closed circuit work. It represents a favorite and recent type for such cells, and can be put together with the minimum number of tools and appliances.

The cover is made of wood. If a circular vessel is used, the cover should be cut in a circle equal in diameter to the outside of the jar, and a shoulder should be formed to hold it in place and prevent lateral motion. Any number of holes, according to the size, are bored through it, one set for the reception of the carbons and the others for the zincs. Care should be taken to bore these holes truly vertical to the plane of the cover, and the bit used should make a hole of exactly the right size to fit the carbons and zincs respectively. The fit must be a very tight one, so that the rods have to be driven into their places with a mallet or hammer.

For the positive elements, zinc rods, such as sold for the Leclanche battery, are used. Such rods can be bought of 6 or 8 feet in length and of uniform diameter. Pieces are cut off of the proper length, a cold chisel, hack saw, or file being used. A very easy way of dividing the rod is with mercury. A fine groove is filed around it. A globule of mercury is placed in a saucer with a little dilute sulphuric acid. A thin slip of zinc or a strip of galvanized iron is dipped in the mercury. Some adheres to it. This is then drawn around the cut, so as to fill it with mercury and amalgam. Then the rod is broken off, either in the hand or in a vise. It becomes almost as brittle as a pipe stem. This process is hardly to be recommended for the upper ends of the zincs. These have to be soldered, and the mercury interferes with the operation to some extent.

For negative elements, electric light carbons are used. The copper is dissolved off by nitric acid, they are washed, dried, cut to the proper length by a saw or cold chisel, and their upper ends are soaked in hot paraffine.

Both elements are now driven into their respective places. With each carbon a slip of copper ¼ inch wide is also introduced, and lies alongside, pressed hard against it and projecting about as much below the cover. As shown in the cut, a wire is carried around the outer circle of the carbons, and is soldered to the copper strips. If a central carbon has been used, as shown, a special connection is soldered to it and to the main wire. The end of the wire is carried up through a hole in the cover. A second wire is soldered to the zincs, this piece lying on the upper surface of the cover. Concentrated hydrochloric acid (muriatic acid) is the best flux for the zincs. If desired, the projecting end of the zinc connection may be secured to the wood by a staple. This is not necessary if the soldering is solid.

To amalgamate the zincs, a strip of galvanized iron is far the best instrument. The end of such a piece, which may be 2 inches by ½ inch, is bent into a hook, so as to fit the zinc rods. This is dipped into the globule of mercury as it lies under a little dilute acid, and is rubbed up and down the rods. If the mercury does not take hold at once, the zincs and carbons may be dipped nearly to the level of the cover in dilute sulphuric acid. After a few minutes' immersion the zinc will be ready to amalgamate, and the rods will shine like silver after a few minutes' rubbing with the galvanized iron and mercury.

The soldering may of course be dispensed with. Instead of strips of copper, the ends of some pieces of wire may be flattened and driven into the holes along with the carbons and zincs. By twisting together the

SINGLE FLUID BATTERY.

ends of these, zinc connections and copper connections separately, the battery will work perfectly if care is taken to avoid short-circuiting. When it is made in a hurry, for temporary use only, the paraffining of the carbons may be dispensed with, and the copper may be left upon their upper ends. The wires may be soldered directly to this, although such connection is rather weak.

For bichromate solution, 2½ oz. of bichromate of potash in fine powder are shaken up in 10 fl. oz. of water. To this 2¼ fl. oz. of sulphuric acid are added slowly with constant stirring. Great care should be taken in pulverizing the bichromate of potash, as it causes ulcers if inhaled. For open circuit work a solution of sal ammoniac may be used. The ends of burned-out carbons, such as are thrown away by the lamp attendants, answer perfectly for the smaller sizes of this battery.

DR. W. CROOKES mentions that if gallium could be obtained in sufficient quantity, it would be a perfect metal for producing vacuum in air pumps, as it is liquid at 86° F., gives off no vapor, and does not oxidize.

The Bell Telephone Patent Canceled in Austria.

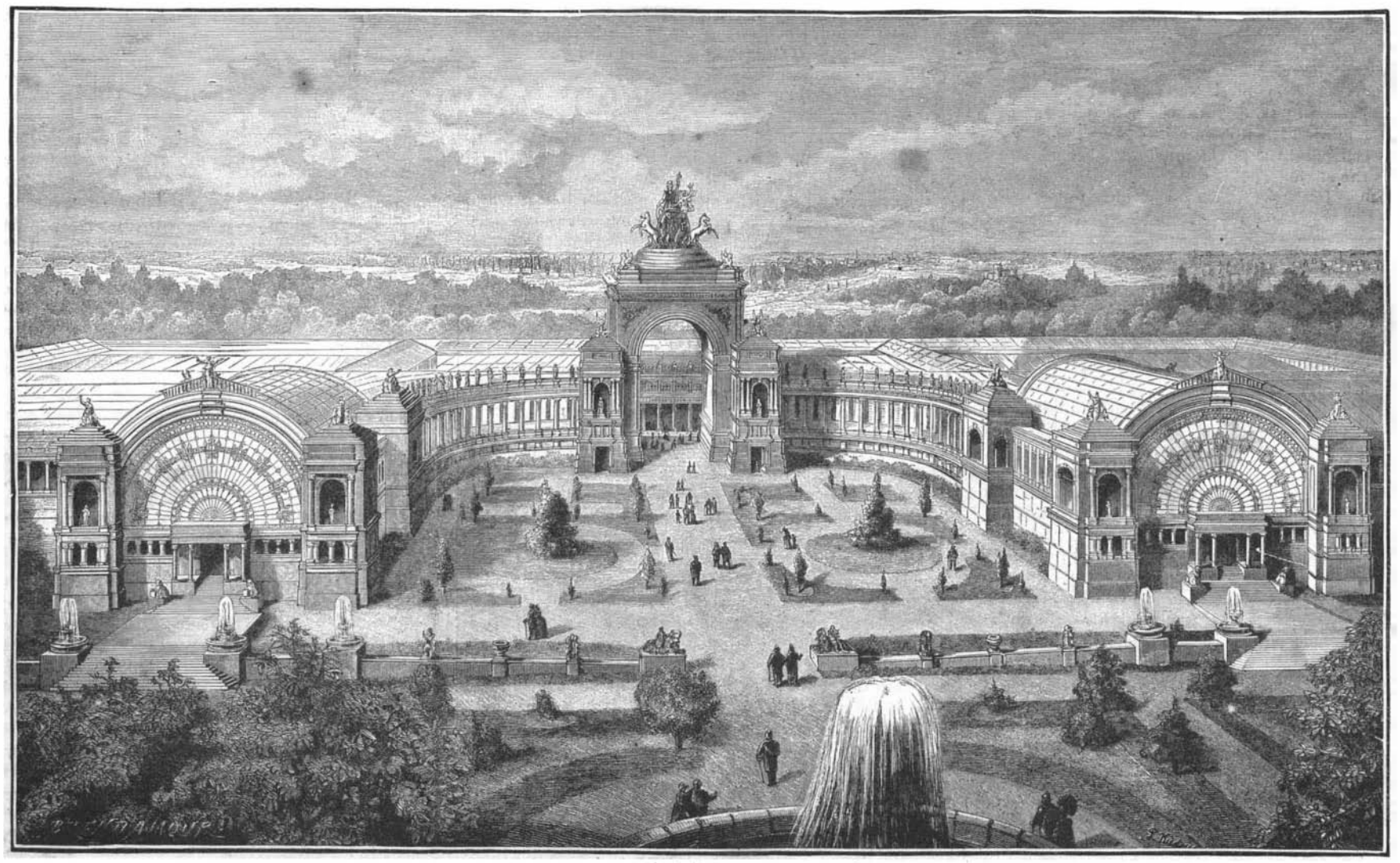
The efforts of the Telephone Company of Austria to get the Bell patent canceled have at last been successful. Their manager, Mr. R. Howard Krause, believed this possible from the commencement, and with the assistance of Mr. Otto Schaffler the company has been the means of securing free trade in telephones in Austria. The result of the decision of the Austrian Ministry of Commerce and the Hungarian Ministry of Agriculture, Industry, and Trade, dated October 28, 1887, seems to be that all those clauses of Bell's patent which refer to the telephone are canceled, only those referring to the multiplex telegraphy being allowed to stand. Certain clauses were canceled because the Telephone Company of Austria was able to prove prior publication, and others were canceled because the company proved that they embodied scientific principles which, according to Austrian law, cannot be the proper subject of a patent.

THE BRUSSELS INTERNATIONAL EXHIBITION, 1888.

A great international competition of sciences and industry and universal exhibition will be opened at Brussels, the capital of Belgium, on the first Saturday of May, 1888. Applications for space must be made by January 15, and all entries by April 15, the goods to be in their places by April 25. Belgium is in an eminent degree a manufacturing country, and in many lines of production a close competitor with France, Germany, and England; therefore it is proposed to make this exhibition rather an exception to most previous international displays in the fact that a more enlarged programme of direct competition has been offered, which will tend to bring out a good representation of the different industries represented. The products are to be grouped in fifty special competitions, in such manner as to supply material for the complete study of any branch of industry in comparison with the similar products of other nations.

The rewards and cash prizes are to amount to $100,000, and numerous committees have been appointed to the end that the greatest possible amount of information may be obtained and placed at the service of the public. Exhibitors will be free to take part in the competitions or in the exhibition only, or simultaneously in both. An international jury on rewards will be appointed, whose members will be designated by the governments of their respective countries, and the jurymen of nations not officially represented will be proposed by delegates of the exhibitors of such nations. Foreign products designed for the exhibition may be imported with provisional right of free entry, on condition that they will be afterward exported. The exhibition buildings will cover an area of 100 acres, the permanent ones being supplemented by temporary structures of brick, iron, and glass, and the grounds being laid out in beautiful gardens.

Messrs. Armstrong, Knauer & Co., of Nos. 822 and 824 Broadway, New York City, are the authorized agents for the exhibition in this country.



THE BRUSSELS (BELGIUM) INTERNATIONAL EXHIBITION OF 1888.

Tomatoes from Cuttings.

I am very much in favor of propagating tomatoes by cuttings. If a gardener has a good variety, and is not certain that it will come perfectly true from seed, the best plan is to keep up the stock by cuttings. The earliest fruits in spring are readily secured from plants rooted as cuttings in the autumn, and grown during the winter as store plants. At the present time, tomatoes that are about to cease bearing are producing numerous shoots, and if these are taken off and inserted at the rate of from four to six in a 4 inch or 5

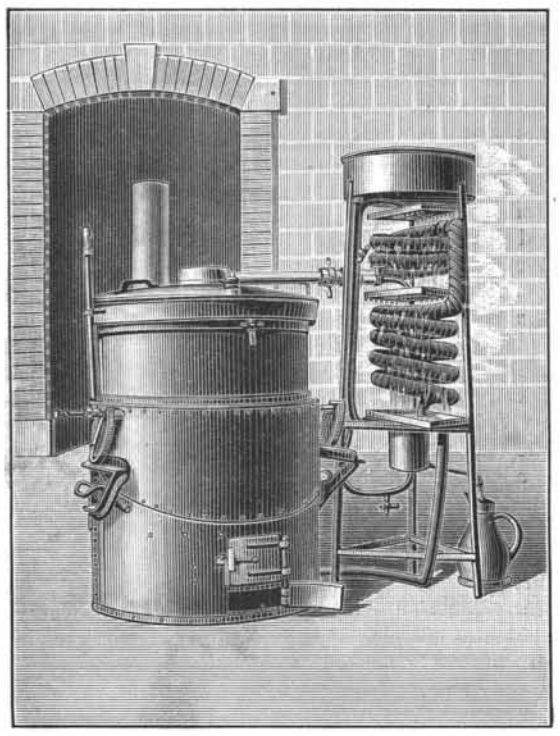
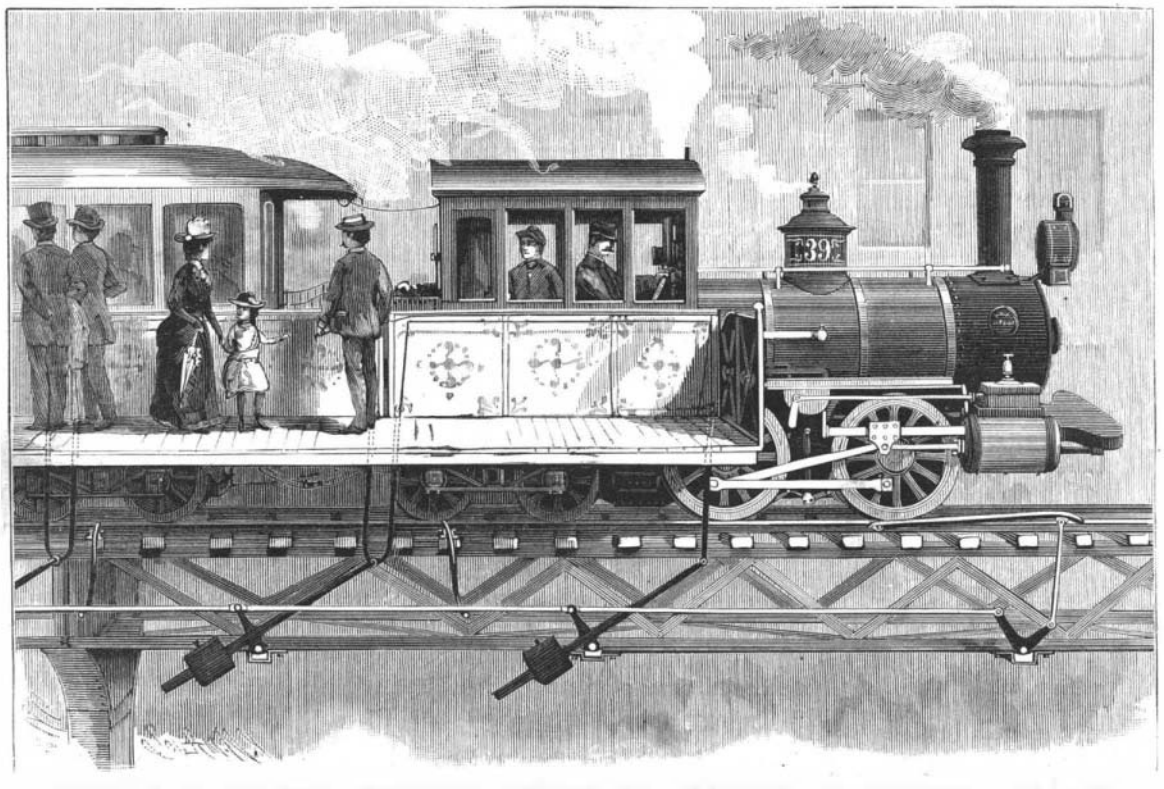


Fig. 1.—EGROT'S DISTILLING APPARATUS.

inch pot, they will turn out well during the early spring months. The pots should be plunged in a little bottom heat until the cuttings are rooted, then harden them off a little, and keep them afterward with pelargoniums or plants of this sort. They winter better in a cool place, away from frost, than in much heat; but they may be potted singly and started into growth very early in spring, and it is then the cuttings have the advantage over seedlings. The latter are always inclined to make very long stems; but cuttings are always dwarf, and I have proved them over and over again to be earlier and produce more fruit than seedlings. All will admit that it is an advantage to have strong tomato plants early in spring, and autumn propagation by cuttings is a certain way of securing them.—*J. Muir, in Field.*

AN AUTOMATICALLY WORKING RAILROAD GATE.

A gate which is designed to be self-opening and self-closing with the movement of the cars on and off the track at stations, and which is more especially designed for use on elevated railroads, is shown in the accompanying illustration, and forms the subject of two patents recently issued to Mr. John B. Carey, a stenographer, of No. 109 Livingston Street, Brooklyn, N. Y. On the platform supports are secured a number of guides, which extend up to the outer edge of the platform, a vertically sliding gate being held between each two succeeding guides, the gates being connected at each end by a link with a weighted lever fulcrumed on a post or on a bracket secured either to the track posts or to the platform supports. From the fulcrum of each weighted lever extends an arm pivotally connected with a rod arranged horizontally along the platform, the outer end of the rod being pivotally connected with one arm of a bell crank lever pivoted on one of the track posts, and connected at its other arm by a link with the free end of a rail lever held alongside of one of the rails of the track. This rail lever is arranged in position covering the usual locomotive stopping places, and is so formed as to be acted upon only by the larger treads of the locomotive wheels, and not by those of the car wheels. Each gate link may be connected to a separate weighted lever, or the links of two adjoining gate ends may both be connected to one lever. The weights of the levers are so arranged that the levers hold the gates in a closed position and also hold the rail lever slightly extending above the rails of the track. When a train moves up to the station, the treads of the front locomotive wheels press the rail lever downward, swinging the bell crank lever, and drawing the horizontal rod forward, so that the weighted levers are swung to draw down the gates until the top edge of each is flush with the top of the platform, thus permitting passengers to pass from the platform into the cars, or *vice versa*, in the usual manner. As soon as the train starts to leave the station, and the treads of the locomotive wheels move off the rail lever, the gates move upward vertically again by the action of the weights of the levers, and the station platform is closed on its track side. Levers also extend from the horizontal bar to the track rails in such way that the passage of the train, before the locomotive reaches the rail lever, will cause the gates to move alternately up and down for a distance of about six inches, as a warning for those near them to keep out of possible danger. As a still further protection, a rod-like hand rail is held slightly out from and just below the top of the gate, being bent down at its ends and inclined inward. It is hinged on the gate at the platform edge, and is drawn down with it, but is extended in position by a spring as the gate rises, acting as a guard to keep people from crowding too closely up to the gate. Instead of operating the rail lever by the locomotive wheels, a special device located in the locomotive or in one of the cars may be employed, under the control of the engineer or a train hand, but the whole construction is designed to be simple and durable and to operate automatically.



CAREY'S RAILROAD GATE, ESPECIALLY DESIGNED FOR PLATFORMS OF ELEVATED RAILROADS.

THE DISTILLATION OF FRUITS AND MANUFACTURE OF BRANDY.

Among the fruits given us by nature some figure with advantage on our tables and others serve for the manufacture of brandy, preserves, marmalades, etc. Those of inferior quality and less pleasing aspect, and those that cannot be utilized in such a way, because of their abundance, are employed in the manufacture of fruit liquors. Through great carelessness, the larger part of such fruit is lost, thus depriving the land owner of a resource that is of no small consequence.

The distillation of fruits is an operation that is so much the more lucrative in that the law of December 14, 1875, relative to the privileges of distillers of wine and fruits, dispenses with affidavits and frees the farmer who distills the results of his harvest from inspection, and consequently exempts him from tax. The grower, then, has the best of reasons for utilizing the products of his land, since he can cheaply obtain an excellent liquor that he knows to be natural and healthful.

All fruits do not render the same proportional quantity of spirit, the proportion of the latter being greater or less according as they are more or less saccharine.

In Bohemia and Moravia, plums give a liquor called *sliwowitz*. The spirit obtained in France has a great analogy with kirsch, which is more especially produced by a small, black, very sweet cherry.

Kirsch is manufactured principally in Switzerland, in the Black Forest, and in France in Franche-Comte, the Vosges, and Meurthe-et-Moselle.

In Algeria, dates, sweet figs, and Indian figs yield an excellent liquor. Huckleberries and raspberries also are sometimes distilled, although rarely.

The method employed in the manufacture of spirits is just about the same, whether it concerns fruit with or without stones, and, moreover, it is very simple. As soon as the fruit has been collected in sufficient quantity, it is put upon an osier frame placed over a tub, and is crushed so as to make it give up all its juice, which, along with the pulp, passes into the tub. With plums, cherries, and other fruits whose stones are held back by the frame, care must be taken to throw these stones into the tub, as this is what gives the liquor that peculiar bouquet to which it owes its value.

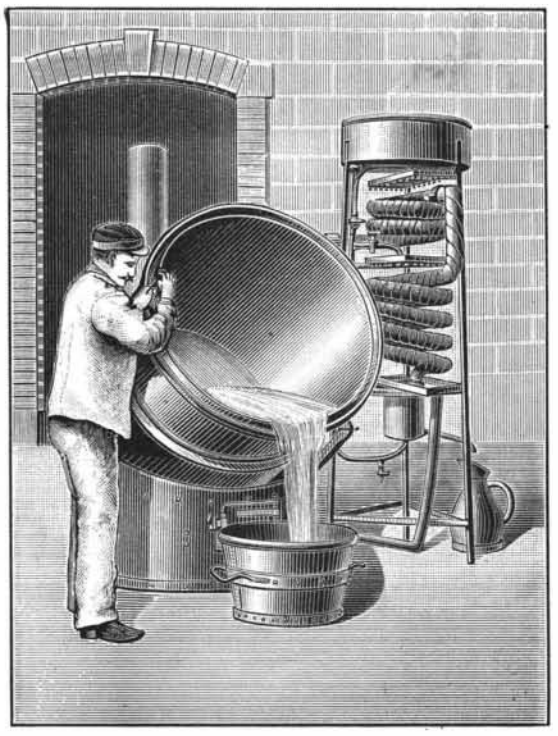


Fig. 2.—MODE OF EMPTYING THE STILL.

The whole is then thrown into a fermenting tub, which is generally a cask with one head removed. Care is taken to pour in a small quantity of tepid water, in order to start fermentation, and then the cask is covered. A room must be selected that has a nearly equable temperature of between 18 and 25 degrees. The temperature of 25 degrees should never be exceeded, for, were it to be, fermentation would be arrested and the yield in alcohol would be diminished very largely. On the contrary, if the temperature were too low, the fermentation would proceed more slowly.

When the fruits to be fermented are dry ones, such as figs and raisins, they must be placed in tepid water and allowed to macerate. It is preferable to chop figs up, so that they may be reduced to a pulp. The water in which the fruit is macerated enters into fermentation in the same manner that the juice does.

The duration of the fermentation depends on the fruit. It may be eight days, and sometimes a month. Plums and cherries require from twelve to fifteen days. The cessation of fermentation is shown by the settling of the cap, which consists of grains and pellicles carried to the surface of the liquid by the disengagement of carbonic acid gas. It is likewise shown by the vinous odor that is emitted. When the fermentation is over, the liquid is drawn off and the marc is pressed in order to extract from it all the juice, and the latter is added to the liquid. In this state the juice is ready to be distilled. It contains not only the alcohol of the fruit, but also the latter's characteristic bouquet. Many routine distillers do not take the trouble to separate the solid and liquid material, but distill the whole in a pasty mass. But the spirit obtained has a peculiar, more or less pronounced empyreumatic taste, due to the boiling of the solid substances, which, despite all care, adhere to the side of the still and are burned.

The marc of the grape alone does not have to be fermented, since it is due to the fermentation of the fruit, contains alcohol all formed, and can be distilled at once, or be allowed to macerate in water, in order that it may give up its alcohol thereto. This latter method gives a better product, and one that has not the characteristic taste of marc spirits.

In the distillation of fine fruit alcohols, the liquid to