to obtain a much higher rectification in a single operation than is possible in the case of the Scotch pot-still.

A single type of Irish pot-still plant as employed at Messrs J. Jameson’s, Dublin, is shown in fig. 8. It will be noticed that in this ease there is no return pipe from the lyne-arm. The method of collection and of working the Irish pot-stills is a great deal more complicated than that described under the Scotch variety. Three stills are employed and strong low wines and weak low wines, strong feints and weak feints are collected, and mixed in varying proportions according to the discretion of the distiller.

3. *American Pot-still Whisky.—*There are two main varieties of American pot-still whisky, namely, rye whisky, in which rye is the predominant raw material, and Bourbon whisky, in which maize or Indian corn is the chief substance employed. There are different varieties of these whiskies.

“ Sour mash ” whisky is made by scalding the raw material with pot ale *(i.e.* the residue left in the stills from the previous operation), then cooling down to mashing temperature and saccharifying by means of malt. The distillation is sometimes carried out with naked fire, but more generally by means of steam which is passed into the wash (termed ""beer ” in America), either in a free state or by means of a coil, and then collecting the spirit, after condensing and subsequently rectifying by means of a second distillation (termed “ doubling ”). “ Sweet mash ” whisky is made by mashing the raw material in the ordinary way by means of malt. The stills generally employed for making whisky by this process contain three compartments situated above one another and connected by means of a curve pipe. Live steam blown into the lower compartment causes the wash to boil. The vapours go up through the curved pipe into the next compartment and so cause the contents of the latter to boil. The vapour from the second compartment then passes up to the third in the same manner. The vapour from the third compartment passes into a vessel charged with low wines, and the vapours so obtained are finally condensed, forming whisky, or “ high wines.”

4. *Patent-still Whisky.—*Scotch and Irish patent-still or " grain ” whiskies are manufactured usually with a mixed grist of raw and malted grain, and by means of an apparatus usually termed the " patent,” but more properly called Coffey’s still. For the manufacture of patent-still whisky a grist containing generally 25% or more of malted barley is employed. The balance consists of maize together with malted and unmalted rye, oats and wheat, and the mixture of grains employed varies at different distilleries. The mashing takes place as a general rule in an ordinary mash-tun, and calls for no special mention. The fermentation is conducted in much the same way as at pot-still distilleries, except that at some patent-still distilleries where bakers’ yeast is made it is conducted on somewhat different lines, the conditions being adjusted so as to suit the propagation of a healthy type of yeast of a particular type. For fermentation of this description it is well recognized that the use of selected or pure yeast is necessary. The fermenting vessels, wash chargers, &c., are much the same as in the pot-still distillery except that they are of much larger size. The "patent ” still was invented by Aeneas Coffey in the early part of the 19th century with a view of accomplishing in one operation that which necessitates several operations in the pot-still, of economiz­ing time, fuel, and material, and also of obtaining at will a spirit of a higher purity than that which can be got by the pot-still. It is sometimes stated that the patent still does not produce whisky, but merely plain spirit or alcohol, but as a matter of fact this is not the case. It can be so worked by selecting the proper materials and by running the still in a particular way as to produce an article which is most distinctly a potable spirit of the character of whisky. It can also be employed by altering the proportion of the materials and by running the still differently to produce a spirit which may be used for purposes of methy­lation, or which may pass through the hands of the rectifier and emerge as plain spirit or alcohol pure and simple. It is, however, quite impossible to obtain from the Coffey still a really plain or silent spirit such as that produced by some of the stills on the continent of Europe; in order to obtain this type of spirit, the product of the patent still is treated by the rectifier in a special rectifying still with charcoal and potash. In certain details the Coffey still has been modified since it was devised by the inventor, but in principle it has been very little altered. Although it does not in some respects compare with some of the modern continental rectifying stills, it must be remembered that it is not made for the purpose of obtaining pure alcohol, and from this point of view it is a remarkable tribute to the ingenuity of Coffey that he should at so early a date have designed so perfect an apparatus.

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The still shown in fig. 9 is one of the type designed by Messrs Robert Willison of Alloa for Scotch grain whisky distilleries. The Coffey still is a double still consisting of two adjacent columns, termed respectively the rectifier and analyser. Both columns are subdivided into a number of chambers by perforated copper plates. The main structure is of wood firmly braced with iron. Each com­partment communicates with the next by means of a drop pipe standing slightly above the level of the plate and passing downwards into a cup, which forms a water seal or joint. Each compartment is also fitted with a safety valve in ease of the plates choking or of the pressure rising unduly. At the beginning of the operation both columns are filled with steam at a pressure of about 5 lb. The steam at the base of the analyser passes upwards through it, and then to the bottom of the rectifier by means of the pipe B (termed the low-wines vapour pipe), and then up through the rectifier. When both columns are filled with steam the wash is pumped up from the wash charger through the copper pipe A to near the top of the rectifier, which it enters at the point A'. the pipe A runs from the top to the bottom of the rectifier forming a double bend in each compartment, and the wash (contained in the pipe) travels down in a zigzag course until it reaches the base of the rectifier at the point C. From here (still remaining in pipe A) it is pumped to the top of the analyser, where it emerges from the pipe and covers the plate of the top compartment. As there is an upward pressure of steam the wash is not able to pass through the perforations of the copper plate forming the base of the compartment, but collects until its level reaches the top of the first drop pipe. Through this it passes into the cup on the plate below and so out on to the next plate. The drop pipes being trapped by the cups the steam cannot pass upwards through the former. In this way the wash passes through compartment to compartment of the analyser until it reaches the bottom, and then passes out by means of the spent wash siphon. The steam on its passage up through the analyser carried with it the alcoholic vapours and other volatile matters contained in the wash. The alcoholic vapours pass from the top of the analyser to the bottom of the rectifier, and then upwards through the latter from compartment to compartment. In so doing they are gradually cooled by the wash flowing down through the pipe A. This gradual cooling causes the less volatile constituents to condense and so to flow downwards through the column until they reach the base of the rectifier. At a certain point in the upper part of the rectifier (marked S in the illustration) the bottom of the compartment in question is formed not of a perforated plate, but of a stout copper sheet, pierced by a fairly wide pipe, which stands up about two inches above the level of the former. This is termed the spirit plate. It is so placed that the alcoholic vapours condense either on or imme­diately above it. The alcohol passes out from the spirit plate cham­ber from one of the two pipes shown in the illustration (either to the spirits or to the feints receiver as the case may be), and is then further eooled, in order to complete the condensation, by means of coils immersed in flowing water, as shown in the illustration. In order to render the condensation still more perfect the upper cham­bers of the rectifier are fitted with coils through which cold water is passed. The vapours condensed by this fall upon the spirit plate. The vapours which have an appreciably lower boiling-point than ethylic alcohol, such as the aldehydes, together with a large volume of carbonic acid gas derived from the wash, pass out of the top of the rectifier by means of the " incondensible gas ” pipe E, and thence to a separate condensing coil. The spirit obtained is of high strength, generally about 64 o.p. The less volatile constituents of the wash, generally termed " fusel oil,” which pass out of the base of the recti­fier, are cooled and then passed to the oil vessel. After the apparatus has been worked for some time the fusel oil which floats in a layer on the top of the contents of the oil vessel is skimmed off. The watery layer from the oil vessel, which still contains a little alcohol, is again passed through the apparatus to remove the last trace of the latter. By employing the Cold wash to cool the alcoholic vapours much condensing water is saved as compared with the ordinary pot-still apparatus. Conversely, as the hot alcohol vapours heat the cold wash to boiling-point, there is a great economy of coal as compared with the older process.

The distillation is controlled by an operator standing on the platform P. The operator is able by means of the sampling appa­ratus X to determine the quality and strength of the spirit and of the wash. He is able, by regulating the quantity of steam admittcd to the apparatus, by modifying the rate of pumping, and by running