using a well-devised still, both in the first instance and also for rectifying, a product very free from fusel oil, and especially from fatty aldehydes and volatile ethers, may be obtained. The removal of acids—objectionable chiefly on account of the unpleasant decomposition products which they form in still—is carried out by neutralizing the still contents with an alkaline medium. The alkali so used also decomposes undesirable esters, and retains some of the aldehydes. For the elimination of fusel oil, treatment with charcoal is the most common method. Luck has suggested for this purpose the passing of the alcoholic vapours through petroleum, which is said to absorb the higher alcohols much more easily than it does ordinary spirit; and some distillers have successfully tried the method of V. Traube, which consists in treating the spirit with a saturated aqueous solution of various inorganic salts. This causes the formation of a super­natant layer, which is said to contain practically all the fusel oil as well as the greater part of the foreshot by-products, *i.e.* fatty aldehydes, &c.@@1

Finally, there remain for consideration the *artificial maturing processes.* These are exceedingly numerous, but it may be said at once that the great majority of them are hardly to be taken seriously. Thus one inventor, acting on the alleged fact that spirits are improved by lengthy journeys, suggests that a miniature railway, with numerous obstacles to augment the roll­ing and shaking action, be laid down in the distiller’s ware­house. Of the methods worthy of consideration may be men­tioned, first, those depending solely on the action of currents of air, oxygen and ozone. They exist in numerous modifications, but the principle involved, broadly speaking, is to pass a current of hot or cold air or oxygen, or alternate currents of hot and cold air, or a current of ozonized air, through the liquid, with or with­out pressure, as the case may be. According to the patents of E. Mills and J. Barr, new whisky rapidly acquires the character of the mature sherry-cask stored spirit if the action of alternate hot and cold air currents be assisted by the addition of a little sherry and a minute trace of sulphuric acid, the latter being subsequently neutralized by lime. Secondly, there are the pro­cesses which make direct or indirect use of the electric current. Of the indirect methods in this class may be mentioned that of Hermite, which consists essentially in adding an electrolysed solution of common salt to the spirit, and subsequently redistill­ing. Thirdly, the processes which rely on accelerating natural cask action by artificially reproducing the conditions attendant on the latter in a purposely exaggerated or heightened form. One method strives to obtain this object by heating the spirit under pressure in an atmosphere of oxygen in a vessel containing a quantity of oak shavings. This process certainly seems calcu­lated to remove a portion of the by-products, for the “ grog ” obtained in A. H. Alien’s experiments by steaming the staves of an old whisky cask contained appreciably more fusel oil and esters than commercial whisky. Fourthly, we have the methods chiefly dependent on the action of cold. R. P. Pictet, by cooling a new brandy to -80° C., is said to have obtained a liquid which had apparently acquired the properties of a twelve-year-old spirit. R. C. Scott’s process consists in energetically treating spirit which has been cooled down to 0° C. with dry filtered air, and the operations are so conducted, it is said, that there is no loss of alcohol or of the important aromatic esters. According to the published data, the quantity of the fusel oil is materially reduced by this method, and the quality of the spirit much improved. None of the above processes has apparently (although in practice they may give satisfactory results) been devised with a view to effecting the direct removal of those specific substances (furfurol, other aldehydes and volatile bases) which later research has shown to be present to a greater extent in new or inferior spirits than in the matured or superior article, and to some of which, at any rate, owing to their acknowledged toxicity in very small quantities, it is more than reasonable (as Lauder

Brunton and Tunnicliffe have pointed out) to suppose that at least a part of the evil effects by drinking new or inferior spirit may be ascribed. In this connexion a patent taken out by J. T. Hewitt is of interest, inasmuch as it deals with the problem of spirit purification on seemingly rational scientific lines. This patent takes advantage of the fact that furfurol and similar aldehydes can be removed from spirits by distillation with phenyl- hydrazine-sulphonate of soda, which salt forms non-volatile products with the substance in question. (P. S.)

**SPIRITUALISM,** a term used by philosophical writers to denote the opposite of materialism, and also used in a narrower sense to describe the belief that the spiritual world manifests itself by producing in the physical world effects inexplicable by the known laws of nature. It is in the latter sense that it is here discussed. The belief in such occasional manifestations has probably existed as long as the belief in the existence of spirits apart from human bodies (see Animism; Magic, &c.), and a complete examination into it would involve a discussion of the religions of all ages and nations. In 1848, however, a peculiar form of it, believed to be based on abundant experi­mental evidence, arose in America and spread there with great rapidity, and thence over the civilized world. To this movement, which has been called “ modern spiritualism,” the present article îs confined.

The movement began in a single family. In 1848 a Mr and Mrs J. D. Fox and their two daughters, at Hydesville (Wayne county), New York, were much disturbed by unexplained knockings. At length Kate Fox (b. 1839) discovered that the cause of the sounds was intelligent and would make raps as requested, and, communi­cation being established, the rapper professed to be the spirit of a murdered pedlar. An investigation into the matter was thought to show that none of the Fox family was concerned in producing the rappings; but the evidence that they were not concerned is insufficient, although similar noises had been noticed occasionally in the house before they lived there. It was, how­ever, at Rochester, where Kate and her sister Margaret (1836- 1893) went to live with a married sister (Mrs Fish) that modern spiritualism assumed its present form, and that communication was, as it was believed, established with lost relatives and deceased eminent men. The presence of certain " mediums ” was required to form the link between the worlds of the living and of the dead, and Kate Fox and her sister were the first mediums. Spiritualists do not as yet claim to know what special qualities in mediums enable spirits thus to make use of them. The earliest communications were carried on by means of “ raps,” or, as Sir William Crookes calls them, “ percussive sounds.” It was agreed that one rap should mean “ no ” and three “ yes,” while more complicated messages were—and are— obtained in other ways, such as calling over or pointing to letters of the alphabet, when raps occur at the required letters.

The idea of communicating with the departed was naturally attractive even to the merely curious, still more to those who were mourning for lost friends, and most of all to those who believed that this was the commencement of a new revelation. The first two causes have attracted many inquirers; but it is the last that has chiefly given to modern spiritualism its religious aspect. Many came to witness the new wonder, and the excite­ment and interest spread rapidly. It should be noted that expec­tations favourable to the new idea had already been created by the interest in mesmerism and the phenomena of hypnotic trance (see Hypnotism), widely diffused at this time both in America and Europe. It was believed that information about other worlds and from higher intelligences could be obtained from persons in the sleep-waking state. Andrew Jackson Davis *(q.v.)* was in America the most prominent example of such persons; his work, *The Principles of Nature, Her Divine Revelations* (New York, 1847), was alleged to have been dictated in “ clairvoyant ” trance, and before 1848 his followers were expecting a new religious revelation. Many reputed “clairvoyants” developed into mediums *(q.v.).* The “spiritualistic” movement spread like an epidemic. “ Spirit circles ” were soon formed in many families. There is very little evidence to show that mediumship

@@@l The above chiefly applies to industrial spirit, in the manufacture of which a product which is practically pure alcohol is desired. These methods can only be used to a limited extent by whisky and brandy distillers, for a complete removal of by-products also entails destruction of the spirit’s character.