MILITARY BALLOONING.

In Europe, the principal governments now have ballooning corps attached to their armies, by means of which observing balloons may be readily transported and quickly inflated on the field. In Germany, much attention has been directed of late to a new process of ballooning invented jointly by Herr Richter, a lieutenant of artillery, and Herr Majert, a scientific chemist, for depriving gas of the moisture it contains, and so lessening its specific gravity, to augment its power of raising and sustaining a balloon, with regard to the size of the balloon and the volume of gas. This process is deemed likely to supersede both the use of the special gas manufactured by the Yon system and that of the condensed gas which is supplied by English and Italian companies. The German military balloon car, also, as shown in our illustration, is suspended from a trapeze, which lessens its oscillation. We are indebted to the *Illustrated London News* for our engraving.

The rope-winding mechanism, by which the height of the balloon is regulated, is arranged upon a strong wagon, and is operated by a steam engine, the whole presenting the general appearance of a steam fire engine. The hydrogen gas for inflating the balloon is carried to the field in highly condensed form in separate steel cylinders. In operation a central steel cylinder, of larger size than the others, is laid upon the ground and the smaller cylinders are then attached to its sides. A flexible pipe at one end of the large cylinder conducts the gas to the balloon. Each cylinder has a stop cock by which the gas is allowed to escape into the balloon.

Soda Foam.

BY THOMAS WARWICK.

With soda water, as with stocks, "der brofit ist in de pubbles," and it is consequently not surprising that special foaming preparations are so often added to the sirups to produce the light and attractive head of foam with which the devotees of the soda water counter are so familiar. Of course it is not only to increase the dispenser's profits that foam is added, but also, as is the case with coloring matters, to please the eye of the customer, for what is more suggestive of cold than the snowy white froth on the brimming tumbler of soda?

Foam is a natural product, being caused by the escape of air or gas from a viscid liquid. In the case of soda water, it is the escape of the carbonic acid gas from the sweetened beverage that causes the attractive sparkling appearance; but the sweetened water alone would give rise to but a small quantity of foam, as the gas would too easily escape. In order to prevent this some mucilaginous substance is usually added to the sirup, which renders the mass more viscous, so preventing the gas from escaping and producing the attractive head of foam so familiar to all.

The question as to why all foam is white is not an easy one to understand, but the fact is that foam is always white, whatever may be the color of the beverage itself. The froth produced on a bottle of the blackest ink is white, and would be perfectly so were it not tinged to a certain extent by particles of the beverage which the bubbles hold in mechanical suspension. As to the cause of this whiteness it is sufficient to say that it is due to the large number of reflecting surfaces formed by the foam, for it is these surfaces which, by reflecting the light, produce upon our eyes the impression of white.

If we remember that all bodies owe their colors to the rays of light which they cannot absorb, and that all bodies which reflect all the light they receive, without absorbing any, appear perfectly white, we shall be prepared to understand how the multitude of reflecting surfaces formed by the foam, and which do not absorb any light, must necessarily give the froth a white appearance. It is for the same reason that any very fine powder appears white, even the blackest marble, when ground to dust, losing every trace of its original color.

Some people deplore the use of foaming preparations in soda water, claiming that such additions are totally uncalled for and unwarranted, but it must, nevertheless, be conceded that soda foam can bring forward several valid arguments in its own favor. In the first place, it aids greatly in keeping the gas from escaping too rapidly from the tumbler. In the second place, as before mentioned, it undoubtedly adds greatly to the dispenser's profits, for it is claimed that, by adding two ounces of foaming preparation to a gallon of sirup, the confectioner can draw fifty more glasses than without the foam. Thirdly, we must remember that the appearance of any article of food or drink plays fully as important a part as its taste in increasing the appetite and stimulating the gastric secretions, and when we bear all these facts in mind, we shall be inclined to look upon the snowy foam with more leniency. And, indeed, however we may look at it, there is no denying the fact that it has come to stay, and to stay probably for a considerable period of time, so we must make the best we can of the matter.

For producing a foam on beverages, three substances are in general use. These are soap bark, gum arabic, and the whites of eggs. Of the three, soap bark is the one usually preferred, as it is more stable than either of the others, and it is at the same time cheaper.

Soap bark is the inner bark of the *Quillaia saponaria*, a South American tree, and is shipped to this country in large quantities. It has a bitter taste, and its dust is most irritating to the eyes and nostrils. The bark is first crushed or ground, and its mucilaginous portions are extracted by percolating a mixture of alcohol, glycerine, and water through the bark, thus producing a foaming preparation which possesses many good qualities.

Gum arabic is seldom used for producing foam, owing chiefly to its high cost, but also to the fact that it is liable to fermentation and inversion, and is hence not suitable for bottled beverages or those which have to be kept for any length of time. Nevertheless many of the foaming preparations on the market go under such names as gum foam, foaming gum, Blank's gum, etc., although in most of them no gum whatever is used.

As regards the whites of eggs, I have mentioned them merely to condemn their use, for these are so unstable that, unless the sirup be used immediately, the eggs will decompose and give the beverage the disgusting odor of sulphureted hydrogen. Hence white of eggs should never be employed in making the sirup, not even for the dispensing counter. The only way in which eggs may be used at the soda fountain is in the shell, for the preparation of such drinks as eggnog, egg phosphate, etc., in which cases the egg is broken directly into the tumbler in the presence of the customer.

Hence, everything considered, soap bark must be accorded the palm for foaming purposes, although other substances are occasionally used, such as soap root, senega root, isinglass, glue, and a host of other mucilaginous bodies, but none of these possesses all the advantages of soap bark.

This point being decided, we come to the question as to whether it is better for the confectioner to make his own foaming preparations or buy them ready-made. While home-made extracts are bad enough as a rule, home-made foaming preparations "take the cake" for causing trouble in the shop. Simple as the process of manufacture appears, there are yet numerous points to be looked after in the preparation of the soda foam which none but an experienced chemist can hope to contend with successfully. For drinks that are dispensed the disadvantages are not so great, the sirups not being kept long enough to give much trouble, but those confectioners who bottle soda water should beware of using home-made foam, as to this may be traced a large number of standard soda water diseases, such as ropiness, cloudiness, precipitation, bitterness, etc.

In using foaming preparations it is well to deal them out with a parsimonious hand. Not only is it most vexatious for the thirsty customer to obtain a glass of "sweetened wind" instead of the refreshing beverage he desires, but the drink acquires a bitter taste, which does not in any way add to its attractiveness. Soap bark is naturally bitter, and, while it is imperceptible to the taste when present in small quantities, it yet becomes unpleasant when used in excess. In addition to this there is also the danger that if too much be used, it may not all be held in solution, and cloudiness and precipitation will then inevitably result.

Moreover, in all dark colored beverages there is another point which must be taken into consideration. It is that the sugar coloring used to produce the dark color will by itself produce a certain amount of froth, even without the addition of any special foaming preparation. In fact, in some beverages, such as root beer and sarsaparilla, this frothing is so great as to be a considerable impediment to the proper drawing of the beverage, so that in these cases some kind of an antifoam would be a great desideratum. Numerous attempts have been made to reduce this foam by mechanical devices attached to the draught arm, such, for instance, as filters or relief chambers for the escape of the gas from the beverage. None of these devices seems, however, perfectly satisfactory, and the man who would invent a harmless preparation to add to the sirup that would reduce the amount of foam without in any way impairing the quality of the beverage would confer a lasting benefit upon humanity, and perhaps upon himself as well. In an article published some twelve years ago in an English bottling paper, the author claimed to have discovered this very secret. He held that all oily matters tend to destroy foam, and he consequently claimed that all that was necessary to reduce the frothing of such drinks as root beer and sarsaparilla was merely to add to the beverage a small quantity of oil of lemon dissolved in spirits of wine in the proportion of one part of oil to five parts of spirit. One fluid drachm of this mixture, or even less, was to be added to every gallon of sirup.

The theory that oil would prevent foam seems plausible, for it is precisely for this purpose that oil is used on shipboard, to break up the small waves into one large, uniform sheet, and it would, therefore, seem at first sight as though the same effect should be produced in the soda water tumbler; but not having made any experiments myself in this direction, I give the statement for what it is worth.

When buying foaming preparations, the principal points to consider are: First, cheapness; second, lack of taste; third, keeping properties; fourth, convenience for use. A simple method of testing soda foam is to put a few drops of the sample to be tested in a tumbler and draw plain soda water upon it. You can thus ascertain how perceptible the taste of the foam will be, and can readily compare which of two preparations produces the densest and most lasting foam. Of course it must be remembered that in siruped beverages the taste will be less pronounced, and the foam will be denser and more lasting than in the plain soda; but this, nevertheless, forms a very convenient rough-and-ready test.

Another test which is sometimes recommended for comparing two samples of gum foam is to put a small amount of each in a bottle full of ordinary drinking water (without carbonic acid gas). The bottles should then be well shaken, and afterward allowed to stand. The foam produced will last several hours, and will serve as a fair test of the comparative value of the two preparations.—*Confectioners' Journal.*

The Young Men's Institute.

An institution that is doing good service for young men is the institute on the Bowery, New York, founded a few years ago by several philanthropic New Yorkers.

It follows more extensively the plan of work introduced by the Young Men's Christian Associations, and has courses of instruction in several branches of science. Among those that have been very successful has been the course on the "Theory and Practice of Steam Engineering," under the management of a practical engineer, Mr. William H. Weightman, M.E. At a small fee per month, instruction is given to those desiring to become engineers, in the practical operation of engines, boilers and machinery, and in the theory, rules and practice of the steam engine, boiler and transmission of power. Special information, not attainable in shop practice, is given pertaining to such matters as are required by examining boards, and particularly essential to the engineer, fireman, machinist, boiler maker and others, in the proper performance of their duties.

A new course on "Practical Electricity," under the charge of Mr. H. A. Benedict, of Cornell University, is to be inaugurated this winter.

It will include the imparting of a practical knowledge of the rules essential to the proper understanding of the principles of operation of the apparatus employed in the modern application of electricity.

The study of a text book on electrical arithmetic, illustrated lectures, the consideration of units of measurements, apparatus and methods of measurement, primary and storage batteries, incandescent lighting by direct and alternating currents, arc lighting, electric plating, direct current motors, electric traction, telephones and telegraphs.

There are departments in free hand and mechanical drawing and stenography. Located in one of New York's densely populated sections, the Young Men's Institute is doing a work which is greatly needed, and supplies instruction not readily obtained at the common schools. The institute also owns a good library, with a capacious reading room.

A Novel Fabric.

This invention consists of a novel frieze-like fabric and of the process or method of making it. For this purpose the well known knitted fabric or web is used, such as is produced on the circular, flat, or on any of the frames working with open, tongue, or ledge needles, and which has a backing of threads of wool, cotton, silk, or other fibrous material. This fabric, which is known as stockinet, shows on the one side the ordinary regular knitted meshes and on the other or rough side the threads of wool, cotton, silk, etc., bound by the finer threads of the knitted web. The fabric is first subjected to a nap-raising process, in any suitable napping machine, so as to convert the rough side into a fleecy state, and, for the purpose, a knitted fabric is used in which wool is the material that forms the threads of the rough side. The fleece produced by the napping machine, on the backing of the knitted web, is next submitted to the action of a friezing machine of suitable construction, in order to convert the fleece into a frieze-like surface, resembling lambskin, ratteen, or petersham. The fabric thus obtained is well suited for wearing apparel, or for decorative or other purposes. It may be dyed before the nap-raising process, in order to obtain the finished frieze-like fabric in any desired color. Or the wool threads, before being bound into the knitted web threads, may be colored or dyed so as to obtain any desired color in the frieze side of the finished fabric.

MANY of the explosions in flour mills have been traced to electricity generated by belts.