Machinery and Appliances.

THE WARREN WATER FILTER.

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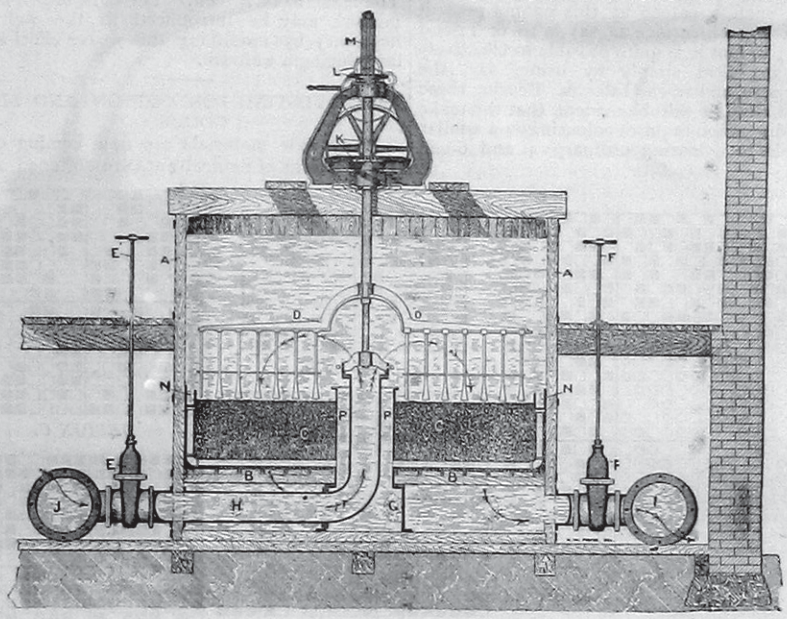
A pure and abundant water supply is one of the most pressing requirements of very many of our industrial communities, especially in the textile manufacturing districts of the country. Our remark has reference more to the need of good water for industrial purposes rather than to the equally if not greater and more urgent necessities of urban populations, the discussion of which does not fall within the scope of the present article. In all the later stages of nearly all the textile industries good clean water is an essential factor if the best results have to be attained. To the bleacher, calico printer, dyer, fuller, finisher, and to many others it is a necessity. To every steam user it is also a very desirable acquisition, as with good, clear water, free from impurities of either a mechanical or chemical nature, the deposition of scale in boilers and the inconveniences that result are to a great extent obviated.

These remarks will constitute ample justification for our drawing the attention of our readers to a newly-devised filter of great capacity and efficiency, and very suitable for industrial establishments of every kind in which purer water than is at present used is a desideratum. The Warren Filter, to which we refer, is an American invention, the inventor being Mr. John E. Warren, agent of Messrs. S. D. Warren and Co., Cumberland Paper Mills, a very large establishment, requiring daily an enormous amount of pure water, and where, in 1884, was constructed the largest mechanical water-filtering plant in existence, this having a filtering capacity of 12,000,000 gallons for 24 hours. The success that attended the working of this plant soon induced a demand from other large water users for similar installations on a smaller scale according to requirement. The result was that numerous ones have been laid down, the working of which, we are informed, has been eminently satisfactory.

Many systems of water filtration have been devised, all of which doubtless have merits of their own, but it is confidently asserted that few, if any, will be found combining the good qualities possessed by the Warren Filter. In this filter the system of filtration is based upon natural principles, gravitation being the force that carries the water through the filtering bed of gravel. The cleansing of the filtering bed by specially designed mechanical appliances is a novel feature of great importance in maintaining the efficiency of the filter.

The presence of some kinds of organic and inorganic impurities in water necessitates a chemical treatment in order to precipitate them before the water is sent through the filter. This often involves a considerable waste of the chemicals employed, as too much is used, which implies waste and increased cost in the result. To obviate this the Warren is provided with a device that supplies the chemical solution of a definite strength and in exact proportion to the quantity of water treated. After receiving it the water is allowed to flow to the filter, where it passes through a gravel bed 20 in. thick, and issuing thence is stored for use in the reservoir, or directly meets the requirements of the user.

The construction of the filter and the process of filtration are shewn in Fig. 1 of the accompanying illustration. This represents an 8-foot filter, usually constructed of wood, containing a bed of 50 square feet area. The unfiltered water, entering from main J, through valve E, passes up into the filter tank A, thence downward through the gravel bed C, perforated plate B, and through valve F to the filtered water main I, through which the filtered water is carried to the reservoir, where it is stored for use. Fig. 2 shews the manner in which the gravel beds are cleansed of the impurities deposited, the frequency of the cleansing being dependent upon the character of the water treated. When it becomes necessary to cleanse the filter bed, the valve E is closed, shutting off the unfiltered water, and the valve on pipe G is opened, allowing the water in tank A to pass into the sewer. When the level in A falls, the water flows back from main I, up through the bed C, passes down the annular space P and gutter N, thence through waste-pipe G. At the same time the agitator D is revolved by the mechanism K, and mechanically lowered by screw M, operated by gear



THE WARREN FILTER.—FIG. I.

L, until the whole bed is completely stirred up. When the flow of water up through the bed becomes clear, the agitator is raised, the waste gate is closed, and when the tank is partially filled the gate E is opened, and, the water flowing in, filtration is resumed. This means of cleansing the filtering bed, as we have before remarked, is a valuable feature, and requires very little power to operate it.

It should be mentioned in this connection that from the settling basin to the stored supply of pure water in the reservoir the flow of water is maintained by the natural principle of water seeking its level. As the supply of clear water is used the level of the water in the reservoir becomes lowered, and the flow of the water from the settling basin to the reservoir is intercepted by the filter beds and cleansed of its impurities, while at the same time the water receives its proper amount of alum solution when entering the settling basin, where much of its sediment is at first removed.

The first cost of a Warren filter plant is stated to be much less than that of any other system of equal capacity and efficiency, while the current expenses are also less. Any further information that may be desired will be supplied by Mr. F. Nell, who may be addressed as above.

On the 3rd inst. a fire broke out at the important cotton spinning establishment of Spitzat, Cornegliano, near Genoa, which did damage to the amount of 300,000 lire.

Bleaching, Dyeing, Printing, etc.

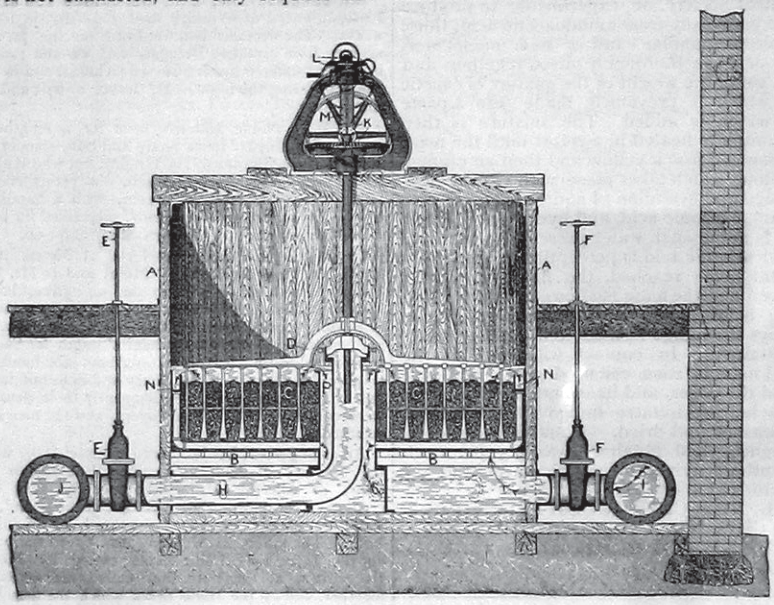
PAPERS ON BLEACHING.—XX.

(*Continued from page 393.*)

Bleaching Wool by Peroxide of Hydrogen.—During recent years there has come into use for bleaching the animal fibres, peroxide of hydrogen, or, as the French call it, oxygenated water. This body is a near relation to water, being composed of the same two elements, oxygen and hydrogen, in different proportion; in water these elements are combined in the proportion of 1 part of hydrogen to 8 parts of oxygen, while in the peroxide the proportions are 1 of hydrogen to 16 of oxygen. These proportions are by weight, and are expressed by the chemical formulæ: for water H_2O; and for hydrogen peroxide H_2O_2. Water, as is well known, is a very stable body, and although it can be decomposed yet it requires some considerable power to effect it. Now the extra quantity of oxygen which may be considered to have been introduced into water to convert it into peroxide has also introduced an element of instability, the extra quantity of oxygen being ever ready to combine with some other body for which it has a greater affinity than for the water. This property can be utilised in the bleaching industry with great advantage, bleaching being essentially a process of oxidation. The colouring matter of the fibre, which has to be destroyed so that the fibre shall appear white, is best destroyed by oxidation, but the process must not be carried out too strongly, otherwise the oxidation will not be confined to the colouring matter, but will extend to the fibre itself, and disintegrate it, with the result that the fibre will become tendered and be rendered useless. Peroxide of hydrogen is a weak oxidiser, and therefore, although strong enough to destroy the colouring matter of the fibre, is not strong enough to decompose the fibre itself. Hydrogen peroxide is sold as a water-white liquid, without any odour or taste. Its strength is measured by the quantity of oxygen which is evolved when one volume of the liquid is treated with potassium permanganate; the most common strength is 10-volume peroxide, but 20 and 30-volume peroxide is made. On keeping it loses its oxygen, so that it is always advisable to use a supply as quickly as possible.

Articles of all kinds can be bleached by simply placing them into a weak solution of the peroxide, leaving them there for a short time, then taking out and exposing to the air for some time. The best plan of applying

peroxide of hydrogen is the following:—Prepare the bleaching bath by mixing 1 part of peroxide with 4 parts of water. The strength can be varied; for those goods that only require a very slight bleach the proportion may be one to 12, while for dark goods the proportion given above may be used. This bath must be used in either a wooden or earthenware vessel; metals of all kinds must be avoided, as they lead to a decomposition of the peroxide, and therefore a loss of valuable material. To the bath so prepared just enough ammonia should be added to make it alkaline—a condition that may be ascertained by using a red litmus paper, which must just turn blue. Into the bath so prepared the well-scoured goods are entered, and worked well, so that they become thoroughly saturated. They are then gently wrung and exposed to the air for some hours, but must not be allowed to get dry, because only so long as they are moist is the bleaching going on; if they get dry, the goods should be re-entered into the bath and again exposed to the air. If one treatment is not sufficient, the process should be repeated. The peroxide bath is not exhausted, and only requires new material to be added to it in sufficient quantity to enable the goods to be readily and easily worked in the liquor. Any degree of whiteness may be obtained with a sufficient number of workings. No further treatment is necessary. It is found in practice that an alkaline bath gives the best results.



THE WARREN FILTER.—F G. 2.

Another plan of preparing the bleaching bath is to prepare a bath with peroxide and water as before, then to add a sufficient quantity of a solution of silicate of soda—4 parts water to one of silicate of soda at 100° Tw.—to make the bath alkaline. Into this bath the goods are entered, and are then exposed to the air as before, after which they may be passed through a weak bath of sulphurous acid, being next well washed in water, and dried.

The advantage of bleaching with peroxide is that, as it leaves only water in the goods as the result of its action, there is no danger of their becoming tendered by an after development of acid due to defective washing, as is the case with the sulphur bleach. The goods never alter in colour afterwards, because there is nothing left in that will change colour. Some bleachers add a little magnesia to the bath, but this is not at all necessary.

(To be continued.)

[The next two papers of the series will deal with silk scouring and bleaching.]

A NEW substantive blue, which is said to possess a purer colour than any known blue of this group, and to retain its colour by gaslight, has been patented. It is produced by combining a new naphthol sulphonic acid with anisidine.

NOTES ON RECENT PATENTS IN BLEACHING, DYEING, AND PRINTING.

A NEW process of dyeing an aniline black, which will neither rub nor turn green, has been patented by Messrs. Thies and Cleff, two German dyers. The novelties in this new process are two in number: A preliminary drying in of the materials upon the fibre, which is said to be the only means whereby the black can be made unrubbable, and which will also bring about oxidation sufficient to prevent the black turning green afterwards. This part is perhaps not a complete novelty, but the second—the use of hydrofluoric acid in the place of the acids usually employed—is new. The patentee's dye-bath consists of 2 grms. carbonate of copper, and 4 grms. bicarbonate of ammonia, which are dissolved in 25 grms. hydrochloric acid; to this solution is added 55 grms. hydrofluoric acid of 55 per cent. diluted with 200 grms. water, to which mixture are added 140 grms. aniline oil and 60 grms. chlorate of sodium, with sufficient water to make the whole measure 1 litre. The material is worked in this bath, then dried and oxidised in the usual way. The advantages of the use of hydrofluoric acid in place of hydrochloric acid, which is ordinarily used, are said to be many—the process of oxidation goes on much more smoothly, owing to the acid being weaker, due to its greater stability compared with hydrochloric acid; the fibres retain their natural properties, the lustre of silk being scarcely affected, while wool remains soft, and cotton is not changed. It is found necessary to retain some hydrochloric acid in the composition, as hydrofluoric acid is scarcely strong enough by itself; this hydrochloric acid, however, is not used in the free form, but combined with copper or other metallic base.

BLEACHING liquors have been made by many inventors by passing a current of electricity through solutions of chlorides of the alkali or alkaline earth metals, and although good bleaching liquors can be made in this way, yet, for various reasons, electric processes are not a commercial success. The latest patent on the subject is that of Stepanow, who uses chloride of sodium, to which has been added a little lime water, which is said to effect a great difference in the amount of electricity required to decompose the solution and to cause the formation of stronger bleaching liquor than has hitherto been possible. Even with this increased efficiency, can a bleaching liquor be made cheap enough to compete with bleaching powder?

IN soaping printed fabrics, especially when they have been printed with tannic colours, there is a great tendency for some of the colour to leave the fibre, and floating about in the bath to become fixed upon the fabric in undesirable places. Methylene blue is well known to be a great sinner in this respect, so that it is difficult to use it in printing along with alizarine reds, which in the soaping become changed to a brownish red, due to the methylene blue becoming loose in the bath and fixing itself on the red. Messrs. Favre and Braun have taken out a patent for a process which overcomes this difficulty. They add to the soap bath a small quantity of a paste of tannate of antimony, which is said to attract any of the colouring matter that may be loosened from the fabric in the process of soaping, and to fix it in an insoluble form, and so prevent it from attaching itself to the fabric. The baths are said to last longer than they do without the addition of the tannate of antimony.

A PATENT has been taken out for a process of printing complete designs on textile fabrics for such articles as aprons, neckties, sunshade covers, etc. The design is drawn on a lithographic stone, which is printed from an ordinary lithographic press. The patentees lay some stress on the designs having borders, which they would lead one to infer could not be printed in a roller printing machine. One advantage of printing from a stone is said to be sharper printing, more accurate reproduction of the design, and better colours and shades. It is doubtful whether there is much advantage in the new patent method.

THE Farbenfabriken of Elberfeld have taken out a patent for producing colours direct on the fibre much on the lines of Messrs. Brooke, Simpson, and Spiller's ingrain colours from Primuline, and which bears some resemblance to Holliday's process for producing azo colours direct upon the fibre. The starting point of the present invention is a new dye-stuff formed by combining tetrazo-diphenyl with an amido naphthol sulpho acid. This dyes unmordanted cotton blue-black shades. From this new colours, mostly blacks of various shades, can be developed by first working the dyed cotton in an acidulated bath of sodium nitrite, then passing it into a bath containing a solution of a phenol or amine, whereby the cotton acquires a new colour, which has the merit of being fast to acids, alkalies, or washing. In the patent a very copious list is given of the phenols and amines and their derivatives that may be used, together with a list of the shades that each yields. This method of dyeing promises to become of importance in the future, and it is certainly well worth the attention of dyers. Holliday's method of dyeing has never received the attention from dyers that it ought to have done.

MR. ALLEN NORTH has taken out a patent for dyeing mixed fabrics of wool and cotton black, by first dyeing them a black by any of the usual methods and then topping with methylene blue.

FINISHING OF HALF-SILK GOODS.

In weaving half-silk goods the tendency prevails to give those that are poor in silk the lustrous effect of all-silk fabrics, and for that purpose the binding is as loose as possible. After ungumming and scouring, therefore, the yarns are often displaced, there is no uniformity of appearance, and the tissue appears lustreless and poor. To remedy these faults, to straighten out the threads, and to give the goods lustre and the necessary stiffness, is the object of the plain finish, which is different from the finish by pressing and watering. We observe that the remarks on the finishing of half-silk goods apply both to the back finish (satin) and the full finish (ottoman). As natural factors in the finishing are to be mentioned: the effect of size, gum, glue, etc., the drying following their application, the effect of steaming the goods, and the influence of one or several pressings with more or less heavy pressure.

In order as much as possible to prevent the alteration, dulling, or darkening of the colours