Machinery and Appliances.

THE GLOBE COMPOUND AUTOMATIC ENGINE.


In many of our spinning, manufacturing, and finishing processes it often becomes necessary, or at least desirable, to work certain portions of the machinery apart from the others, or at times when the remainder is not working at all. In the latter case it is expensive to run the gearing and shifting of the whole place, it may be that only one machine is really required to be at work. Where this is a frequent liability, it becomes highly desirable, on the ground of economy, that the driving power should be divided and a certain portion have allotted to it.

The cylinders and valve chest are, in the larger sizes, cast in one piece, and bolted to the top of the crank case. In the smaller sizes, the crank case and cylinders are cast together. The cylinder heads cover the upper ends of the cylinder only, the lower ends opening directly into the crank case. The cylinder heads are provided with spring relief valves to allow of the escape of water, carried into the cylinders in starting, or from priming in the boilers after the engine is running, and so prevent damage to the engine from this cause. The pistons are of the trunk form, and carry hardened steel wrist pins for the attachment of connecting rod. The connecting rods are of hampered steel of a rectangular section, and of ample strength to resist all strains that may come upon them. Both upper and lower bearings are lined with a special babbitt which has given the best of results in regular working. The cranks and shafts are all of steel, and run in babbitted bearings, two of which are in the heads of crank case, and the third is situated between the cranks.

In order to meet all contingencies, facilities are provided for enabling the end bearings of the shaft to be readily removed for inspection without disturbing the shaft or the crank case heads. The side covers of crank case can be quickly removed, giving easy access to the whole interior of crank case, including cranks, connecting rods, eccentric and governor, and, if necessary, the whole of the working parts, including pistons, connecting rods, cranks, governor, eccentric and valve can be removed from a 100 h.p. engine in less than one hour. This will be appreciated by any proprietor of a establishment who has had experience of the delay and loss of time arising from the necessity of dismantling the older types of engines, in order to arrive at the seat of, perhaps, some trifling derangement.

This engine has been furnished with a piston valve of special design, which is not only balanced as regards steam pressure, but from method of construction is made absolutely tight, and the tendency is for it to remain tight instead of wearing loose and leaking after running a short time. An automatic governor is also supplied, which is situated in the crank case, between the two cranks, where all its working parts are constantly damped with oil. This governor embraces some entirely new and distinctive features, among which are—that the parts subjected to centrifugal effort,—i.e. the governor weights and springs—are not affected by the reciprocating strains, and a much more even speed is maintained with less expenditure of force in the governor. The movement of the weights regulating the cut-off is conveyed to the main eccentric through a secondary eccentric, which relieves the weights of all strain imposed by the working of the valve, and allows them to take their true position due to the speed, without reference to the effort required to move the valve and its connection, a point which it is stated, no other governor possesses.

Perhaps the greatest novelty, however, is the fact that the crank case is constructed to hold a body of water and oil, and the cranks, connecting rods, eccentric, and governor pass through this oil at each revolution, giving a constant and thorough lubrication to all the working parts. A stream of oil and water also passes constantly over the main bearings, and is returned through suitable channels to the crank case, to be used over and over again. An overflow is provided for the escape of the excess of water, so the level in the crank case cannot get too high. This overflow is so constructed as to retain the oil and allow the water only to escape. Thus all the evils of intermittent and often neglected lubrication of the most vital parts are avoided, which will ensure a great prolongation of the usefulness and life of the engine, as will at once become obvious. The wearing parts of the engine are all easily and cheaply renewed, but as from the constant and copious lubrication the wear is very slight, the expenses of repairs are very low.

Having thus described the construction we may devote a short space to an examination of it at work. In operation steam is admitted by the valve to the top of the high pressure cylinder, pressing the piston down and turning the crank and its connections. As the piston moves...
downward, the valve, actuated by the governor, cuts off the admission of steam, and a portion of the stroke is made with expanding steam. Just before the high pressure piston reaches the bottom of its stroke, the valve opens communication between the high and low pressure cylinders, and, as the cranks are opposite, the low pressure piston is then at the top of its stroke, and is immediately pressed downward by the steam discharged from the high to the low pressure cylinder. As the low pressure piston moves down, the high pressure piston is moving up towards the top of its stroke, displacing the steam in its cylinder, which passes over to the piston on its upward stroke, relieving the crank pin of the work of lifting it. If no means were provided for counteracting the effect of the vacuum pulling the piston upward, the connecting rod would be lifted away from the crank pin, and a bad knock each stroke would result; but there is an annular space left below the large piston, so proportioned as to form, by the displacement of the piston itself, a vacuum sufficient to overcome the upward momentum of the piston, bringing it gradually to rest at the top of its stroke.

Great care has been taken to balance, as far as possible, all the working parts, and with this under load, it will not run faster than 304 or 305 when doing nothing, or slower than 300 or 299 when fully loaded. These are the speeds to which they are adjusted in the works, and are constantly verified in their regular working.

In designing this engine the makers have had the following objective points in view:—To make a compound engine whose simplicity would commend itself to all engineers and purchasers. To attain the highest grade of economy possible with a compound engine, and size for size of engine to surpass all competitors in economical results. To render the good working of the engine independent of the neglect of
BLEACHING, DYEING, PRINTING, etc.

ACTION OF HEAT ON THE CHLORIDES OF MAGNESIUM AND CALCIUM.

It is not a new observation that when the chlorides of calcium and magnesium are heated in contact with a portion of the chloride is given off.

In view of the very large quantities of both these substances used in the sizing and finishing of cotton and other goods, it is evidently of considerable interest and importance to define at what temperature, at how low a temperature in fact, and to what extent, the decomposition of these salts proceeds, because if the chloride be liberated without the formation of new substance, it made rise likely that the fabric containing them may be subjected under the ordinary conditions of their use and manufacture, than the chloride or resulting hydroxyde of magnesium be certain to cause more or less deterioration of the fabrics.

We know that at a red heat the chloride of magnesium becomes alkaline to lead oxide, or at any rate, is decomposed at a considerable range of temperature considerably lower than that of the chlorides of magnesium with an appreciable amount of its chlorides. Recently several causes of chlorine of magnesium have been traced to be the action of chloride of magnesium, and we may take it as an undoubted fact that the decomposition of the cotton fibre in such fabrics is due to the action of the hydro- chloric acid formed by the decomposition of the chloride.

Mr. H. Grimshaw has recently made some experiments on this point, and he finds that at atmospheric pressure and at an initial temperature of 117° C. it is not a fact of any importance to chlorine of magnesium. These results would show that chlorine of magnesium is far preferable to chlorine of magnesium as a finishing agent.

THE CHEMISTRY OF HYPOCHLORITE BLEACHING.

In a paper recently read before the Society of Chemical Industry, Mr. C. Cross and Mr. Bevan communicated some valuable notes on this subject.

They give the following summary of their results.

(a) Bleaching by means of the hypochlorites is attended with chlorination of the fibre constituent, more or less, according to the nature of the basic constituent of the bleaching solution and the condition of the fibre itself.

(b) The chlorination is consequently less in the case of magnesium hypochlorite—prepared by the double decomposition of sodium hypochlorite, and still less in the case of solutions prepared by electrolysis of magnesium chloride solutions.

The evidence on this point of the chlorination of the bleaching solution does not revert to chloride, and, in consequence, a portion of the solution in which it was combined as hypochlorite is otherwise combined than as chloride in the exhausted mixture (solution and fibre substance).

(c) "Organic" chlorides are present in the washed pulp.

(d) The factor of chlorination differentiates bleaching by means of hypochlorites from those processes in which the only possible factors are oxidation and hydrolysis—i.e., bleaching with permanen t gases and by means of hypochlorite.

(e) The cause of chlorination lies in the presence of ketonic oxygen in the fibre constituents (non-collodion).

Also the following points of practical rather than theoretical interest:

(a) The simple and accurate method of determining the free base in hypochlorite solutions by direct titration after destroying the hypochlorite by means of valerophenone gives results as accurate as those obtained by the theoretical expression under (d), nature and proportion of the basic constituent, both free and combined; the temperature of the solution; and the nature (composition) of the negative or oxidising constituent.

(b) Bleaching consists for the most in the isolation of a pure cellulose from a compound cellulose. Such is the cotton bleach (cloth and yarn) and the linen "bleaching" which are well called "whiteness" bleaches, in which the purpose is to whiten, as far as possible, a compound called cellulose itself, by removing colouring matters, either naturally occurring (e.g. chlorine) or resulting from changes of the change of the fibre substance. In such bleaches the purpose is to reduce the compound cellulose as much as possible, free from all substances which are present in the fibre substance. This is done by a number of different processes, the most important of which are: (1) bleaching by means of chlorine; (2) bleaching with sodium hypochlorite; (3) bleaching with sodium hypochlorite and sodium carbonate; (4) bleaching with sodium hypochlorite and sodium bicarbonate; (5) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate; (6) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate and sodium hydroxide; (7) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate; (8) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate; (9) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate and sodium hydroxide; (10) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate; (11) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate; (12) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate and sodium hydroxide; (13) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium hydroxide; (14) bleaching with sodium hypochlorite and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium carbonate and sodium bicarbonate and sodium hydroxide and sodium hydroxide and sodium hydroxide.

(c) Dyeing with the new red" colouring matter, which will dye animal as well as undyed vegetable fibres, and in any kind of bath, acid, neutral, or alkaline, has been made by a process for preparing a superchloride, 5% of which is added to a 2% solution of magnesium carbonate, and this is added to the dye, and in which it is treated with an acid and a mordant, and then it is ready for use.

DYEING WOOL TOPS.—Mr. Sam Mason, Jnr., of Manchester, has recently patented an improved machine for dyeing wool tops. It consists of a vertical kier, resembling in appearance a bleaching kier, which can be hermetically closed and false bottom, are arranged four perforated pipes, on which the wool tops are placed. These four pipes all unite at the bottom into one common pipe, and into this flowing of a pump, by means of which any liquor in the kier can be forced up into a liquor tank above the kier, and on the other hand with a pipe leading direct to this tank. Other pipes are arranged in connection with the kier, so that it can be worked very conveniently in a variety of ways. The new dyeing kier is used thus:—

The liquor tank is filled with the dyepot, all valves are closed, the liquor is put on the perforated pipes, and the kier is closed; the suction pump is in action, whereby all air is drawn out of the wool; then the valve from the pump is opened in and fills the kier; it is drawn out by the suction pump back into the liquor tank, from whence it again passes into the kier. Thus the kier is constantly filled with the dyepot through the wool tops, which is continued until the dyeing is complete. The dye liquor can be replaced by wash waters, and the wool tops are washed, and then they are ready for taking out.

HYDROLENE.—This is the name that, according to a contemporary, is given to one of the new preparations introduced to the market for dyeing cotton. By using 2 per cent. of acetic acid it is soluble in water, and dyed tannin-mordanted cotton bleeds from the greenest to the reddest shades of a rich bright, unattained; but it is said to surpass all similar products previously offered both in regard to ease of use and uniformity in which it goes upon the fibre and its fastness against soap. The dye baths are readily and completely exhausted, in which respect hydroleine has some advantage over other hydroleines, and is called Hydroleine Night Blue is distinguished even in the lightest and most delicate tints by its perfect pure tint of greenish blue even by daylight.

A NEW RED COLOURING MATTER, which will dye animal as well as undyed vegetable fibres, and in any kind of bath, acid, neutral, or alkaline, has been made by a process for preparing a superchloride, 5% of which is added to a 2% solution of magnesium carbonate, and this is added to the dye, and in which it is treated with an acid and a mordant, and then it is ready for use.

NEW BLUE COLOURING MATTERS are produced by combining to a new and admirable tanning tannin with aniline, or its homologues toluidine and xylidine, and then acting with the condensation products so produced with a dilute solution of nitric acid. Resulting blue colouring matters are crystalline bodies, not soluble in water, but soluble in alcohol, but by treatment with bisulphite of soda they can be reduced into solution, and ready for dyeing cotton, that has been treated with tannin, alum, or mordants, shades varying from a brilliant blue to blue violet, while they can also be applied for pairing calico with either an alum or chrome mordant. By sulphonating the colouring matter instead of treating with bisulphite of soda, sulpho-acid colourings are formed, the amine-copolymers of inanation, and dye in water and dye in the usual acid bath.

A NEW DYEING MACHINE, which is applicable more especially for loose wool and yarns, has been patented in the United States by Charles Vandermeersche. The machine consists essentially of a dye-beck containing the dye liquor in this is placed in a number of pots, cylindrical in shape, and fitted with perforated tops and bottoms. A number of these pots are arranged in horizontal series, and they are so connected with each other on an horizontal axis common to this series, and passing through the middle of the length of each pot. The rotary motion, is, however, not constant, but the dyeing of the next being arranged so that the pots are in a vertical position. Above each pot is arranged a cover with a pipe, which is in communication with the dye liquor in the tank. During the period of rest, this cover descends on and hermetically fits the pot, and by means of a suction pump the dye for passing through the pots for a short time; then the cover is raised, and the pots begin to rotate again. These operations