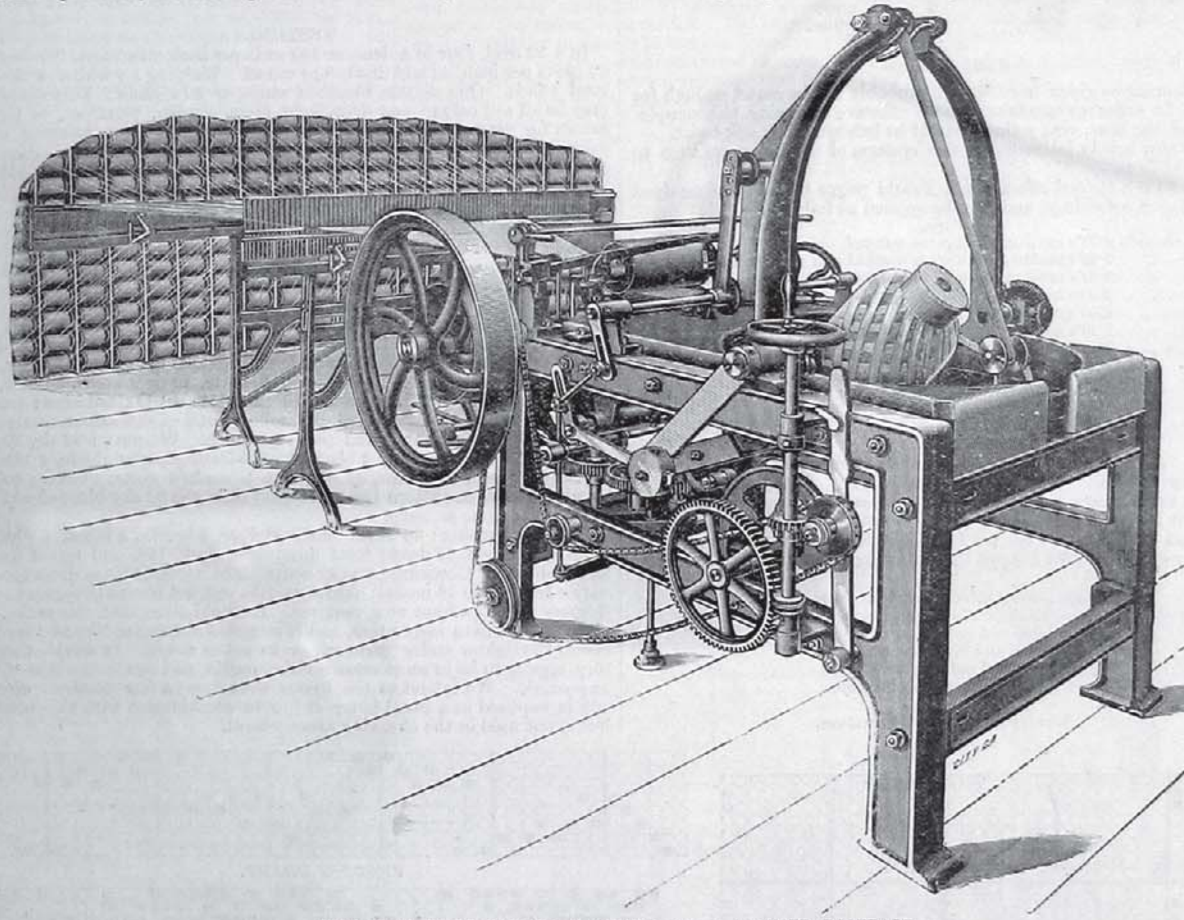
Machinery and Appliances.

THE UNIVERSAL WARP BALLING MACHINE.

MR. J. H. STOTT, ROCHDALE.

Warping is the second in the series of processes constituting what is technically termed "manufacturing." It is a very simple process, having merely for its object the arrangement of the threads intended to compose the warp in parallel order. The Hindoo weaver, who makes his own warp, even to this day sticks a few pegs into the ground, and with one or more threads in his hand walks round these, passing the threads upon them, and crossing them at certain points in order to get a "leash." Of course his warps are very short ones. The English hand-loom weaver of the last century had a similar plan. He put his pegs into a wall to save stooping down to them, and, walking backwards and forwards, accomplished the same result as his Eastern competitor. Both these systems are called peg warping. To save the tedious tramping this involved the old reel mill was invented. This consisted of a large reel arranged with its axis vertical. On the bottom of this axis was a small pulley connected to a driving pulley of larger dimensions by a band. A crank handle turned by the warper constituted the driving arrangement. The warp was traversed so as to cover the periphery of this reel, the "leash" being taken at the top or bottom, according to requirement or arrangement. When completed the warp was balled off the reel by the warper, a process which required strength and dexterity. Good warpers were not very common, as they could not be made out of every applicant. Forming an essential link in the chain of manufacturing, and being few in number, the warpers soon recognised their importance, formed themselves into unions, and strongly resisted the admission of any person to the craft who had not received their sanction. This exclusiveness they have to some extent maintained to the present day. Their demands upon their employers were very exorbitant, but being few in number at each mill, the masters generally conceded their requests rather than provoke strikes. The invention of the beam warping machine as a complement of the sizing machine of Messrs. Kenworthy and Bullough, at Brookhouse Mills, Blackburn, was the herald of the warpers' downfall. Since that day they have rapidly diminished in both numbers and importance, having been retained only in a few places where the old methods maintained their hold, or where it began to be found that in using dyed warps in one colour they could be economically dyed in the ball form. Even these are rapidly disappearing before the progress of invention. In a short time the ball warper will be as extinct as the Australasian dodo. It seems as if an edict of nature had gone forth that the manual labourer should everywhere give place to the mechanical one, and in compliance with this decree the ball warper is everywhere disappearing.

Mr. J. H. Stott, of Rochdale, the well-known maker of warping machines, has just introduced into the market a patent warp balling machine, which bids fair to soon become a great favourite in the departments for which it has been specially designed. The accompanying illustration gives a good idea of its general appearance. It has a curved creel and reed, in this respect differing from ordinary warping machines. The balling arrangement consists of a strong frame carrying the working parts. These are composed of a steel flyer, carried by a series of four grooved rollers. Connected to this flyer is a small roller, in which is cut a deep flat groove. This constitutes a guide for the warp, as it passes to the balling mechanism. The latter consists of a spindle suitably arranged, and carrying the balling mandril, which is actuated by a specially-constructed cam, this giving it the suitable oscillating motion required for balling the warp. It has an automatic differential tension apparatus; a measuring and marking arrangement; and an indicator by which at any moment it can be ascertained how many pieces have passed upon the ball. The differential tension apparatus with its connections, is a beautiful piece of mechanism, admirably accomplishing its purpose—that of providing for the difference resulting from the increasing circumference of the ball as the winding proceeds.



UNIVERSAL WARP BALLING MACHINE.—MR. J. H. STOTT, ROCHDALE.

The process briefly described is as follows:—The warp is taken from the bobbins in the creel, passes through the heck and converges upon the measuring rollers, one of which is necessarily positively driven. The piece-marking apparatus is placed in front of these and marks any length required. The yarn next passes upon the tension arrangement and then to a circular flyer, which balls it upon the spindle. From this, when completed, it is doffed and is then ready for sizing or dyeing.

The new machine possesses many advantages compared with the ordinary process. It occupies much less floor space; it balls the warp at an even tension, and without strain upon any portion of it. It affords facilities for making very large balls, or a succession of small balls, without any necessity for severing the warp. Its production is great, as it will ball the warp at the rate of from 120 to 140 yards per minute, and it needs no skilled or costly labour to attend it, young girls being quite competent to do all that is required.

The maker will be pleased to supply any further information on application.

Bleaching, Dyeing, Printing, etc.

BENZOPHENONE COLOURING MATTERS.

Benzophenone, or as chemists sometimes call it Di-phenylketone, which has the formula, $C_6H_5CO.C_6H_5$, is a compound belonging to a class of bodies called ketones. These bodies are specially characterised by the fact that they contain the group of elements CO in combination with two other groups of elements, and when one of these consists of C_6H_5 phenyl the ketones are called phenones. These bodies are not of themselves colouring matters; benzophenone is a colourless prismatic substance, insoluble in water; its homologue acetophenone forms colourless plates, also insoluble in water; but it has recently been discovered by a large German firm of colour makers that the oxyphenones prepared or derived from these phenones resemble them in not being colouring matters, and yet being capable, under certain conditions, of producing colour and dyeing or printing fabrics much in the same manner as alizarine or gambine is used. Many of these oxy derivatives are known, but with few exceptions none of these have been known to be capable of producing colour. It has recently, however, been discovered that only three of these known ketones—gallacetophenone, benzopyrocatechin, and anhydropyrogallol ketone—are colour producers. Those of them that have this property contain at least two hydroxyl groups in combination with their aromatic residue, and it has been observed that much, if not all, of the colouring power of these ketone bodies depends on these two hydroxyls being in juxtaposition to one another. Among the new and old ketones which have this valuable property mention may be made of a few.

Gallacetophenone, or, as it is better named, trioxyacetophenone, has the formula $C_6H_2(OH)_3CO\,CH_3$. This body has been known for some time, but its colouring properties were unsuspected until lately. It belongs to the same class of colouring matters as alizarine—those that have no colour of themselves but in combination with metallic bases form coloured compounds, thus with alumina, yellow compounds are formed; with chrome, brown colours; and with iron black colours are obtained. The methods of applying these to fabrics is the same as for alizarine and gambine, viz., mordanting the wool or other fibre with the required mordant and then dyeing in a fresh bath with the gallacetophenone, which is sold in the form of 10 per cent. paste. The shades thus produced can be varied very much by using different proportions of mordant and dyestuff, and they are very fast and useful. They may be employed in printing, and the following colours will serve as examples:—

1.—*Yellow.*

37½lb. gallacetophenone paste,
15lb. sulphocyanide of alumina, 30° Tw.,
7½lb. acetate of lime, 15° Tw.,
7½lb. acetic acid, 9° Tw.,
32½lb. of any suitable thickening.

2.—*Yellowish Brown.*

37½lb. gallacetophenone,
15lb. sulphocyanide of chrome, 40° Tw.,
7½ ,, acetic acid 9° Tw.,
40 ,, thickening.

Black.

27½ lb. gallacetophenone,
15 ,, iron liquor 23° Tw.,
7½ ,, acetic 9° Tw.,
40 ,, thickening.

The goods are printed, steamed, soaped and dried.

Another of these oxyketones is trioxybenzophene, obtained by heating pyrogallol with benzoic acid. This body has the formula $C_6H_2(OH)_3, CO, C_6H_5$. It is with difficulty soluble in cold water, but is easily soluble in alcohol, ether, acetone, and glacial acetic acid. It dissolves in alkaline liquors, and the solutions in caustic potash or caustic soda, if the solvents are in excess, rapidly absorb oxygen from the air, forming a green oxidation product. It dissolves in strong sulphuric acid, with an intense yellow colour. This body dyes a golden-yellow colour on alumina-mordanted cotton; on chromed fibre it forms brownish yellow shades, while iron mordants produce olive colours. A very bright yellow is produced in printing with a colour composed of the oxyketone, acetate of alumina, and tin crystals. These yellows thus obtained are as fast to light, etc., as the alizarine colours, which is saying a great deal for them. A tetraoxybenzophenone can be obtained by fusing pyrogallol with salicylic acid; this body produces rather redder shades of yellow than the trioxyketone.

Various other oxyketones have been made, but these are not of so much technical interest as the preceding, and a mere enumeration of their long scientific names would not interest our readers.

RECIPES FOR DYERS.

The following are mostly translations from foreign sources. We do not guarantee the results from these recipes, but give them for the purpose of shewing our readers what their foreign competitors are doing.

FAST BROWN ON WOOL.

For 100 lb. wool. Mordant by boiling for 1 hour in a bath of

2½ lb. bichromate of potash,
3 lb. tartar.

Lift, rinse well, and dye in a fresh bath with

5 lb. alizarine red,
3 lb. fustic extract, 51° Tw.,
3 lb. logwood extract, 51° Tw.

Enter the wool at 160° F., slowly raise to boil, and dye boiling for 1½ hours, lift, rinse well, and dry.

GREEN ON WOOL, FAST.

For 100 lb. wool. Mordant for one hour at the boil with

2½ lb. bichromate of potash,
2½ lb. tartar.

Lift, rinse, and dye in a new bath with

4 lb. fustic extract, 51° Tw.,
1 lb. methylene blue.

Enter the wool at 140° F., work a few minutes, then heat slowly to the boil, and work for one hour. Lift, rinse well, and dry.

BLACK ON WOOL.

For 100 lb. wool, prepare a bath with

5 lb. acetic acid, 9° Tw.

Enter the wool and boil for 1 hour, then lift, and add a solution of

5 lb. napthol black, 3 B,
½ lb. Indian yellow.

Re-enter goods and boil for 1 hour longer, lift, wash, and dry.

CHESTNUT BROWN ON COTTON FLANNEL.

For 100 lb. cloth, prepare a dyebath with

10 lb. common salt,
2 lb. benzobrown G,
½ lb. benzoazurine G,
½ lb. chrysophenine.

Entre the goods at 150° F, raise to boil and dye boiling for one hour.

PURPLE BROWN ON COTTON FLANNEL.

For 100 lb. flannel, prepare a dyebath with

10 lb. common salt,
2 lb. benzobrown N B
1 lb. Azoviolet.

Enter the cloth at 150° F., raise to boil and dye boiling for one hour. Lift, wash, and dry.

GREEN GREY ON COTTON.

For 100 lb. cotton, prepare a dyebath with

10 lb. Glauber's salt,
1 lb. diamine black, R O,
½ oz. thioflavine S.

Enter at from 150 to Tw. 180° F, raise to boil, and dye for 1 hour. Wash and dry.

SAGE GREEN ON COTTON.

For 100 lb. cotton, prepare a dyebath with

10 lb. Glauber's salt,
½ lb. diamine black R O,
2 lb. diamine yellow N.

Enter at about 150° F., and then raise to boil, and dye boiling for 1 hour; wash and dry.

PATENT BLUE AND ACID VIOLET N.

These colouring matters have been recently put on the market by a well-known firm of colour manufacturers, and possess many unique features. They are the calcium salts of the sulphonic acids of certain oxybases derived from the same base as is present in malachite green. Patent blue is prepared in several shades; the ordinary one is a fine green blue; the "superfine and N" marks are pure blues, which retain their tint even under artificial light; the mark "I" produces shades nearly those of indigo-carmine, and is much superior in use than is the ordinary substitute for indigo-carmine, namely, a mixture of acid violet and acid green. The principal advantages possessed by the patent blues are a characteristic and brilliant shade, dye very evenly, fast or nearly so to acids and alkalies, and considerable fastness to light.

Acid violet N has a different chemical composition from the ordinary acid violet, and possesses many qualities very similar to patent blue.

All these colouring matters dye wool in an acid bath with or without the aid of Glauber's salt or alum. They will also dye on chromed wool, either in a neutral bath or with a little acetic acid; they can therefore be used along with alizarine, gambine, or the dyewoods. The shades will stand a little milling, but it is important to wash off immediately afterwards or there is some risk of the colour bleeding into the whites.

Patent blue and acid violet can also be used for dyeing on silk, to which they have some affinity and give fine shades.

The dye baths should be made of wood, metal baths having a tendency to interfere with the brilliancy of the shades.

NEW COMPOUNDS OF TANNIN FOR CALICO PRINTING.

By heating tannin with glycerine or glucose a compound is formed which is readily soluble in water and dilute acetic acid, and which possesses the property of splitting up on steaming into its two constituents. This is a property particularly valuable in calico printing, and the compound can be used as an excellent substitute for tannin in the making of colours for printing. Experiments made with them have shewn that all colours fixed with tannin can be equally well fixed with the tannin-glyceride or tannin-glucoside. Besides being a mordant, the compounds in question are also solvents for tannin lakes, so that colours made with them keep fluid much longer than those made in the ordinary way; and they do not on standing form insoluble tannin lakes, which are useless, and yet on steaming the tannin is liberated in a free form, and fixes the colouring matter upon the cloth.

These new compounds are made in the following manner:—50 kilos. of tannin are heated with 30 kilos. of glucose until the re-action is complete. The best temperature is 100° C., as higher temperatures are apt to form coloured by-products. The product so formed is a solid body which dissolves in water, forming a syrup. The corresponding glycerine compound is a colourless or faint brownish syrup.