Machinery and Appliances.

IMPROVED COMBINED PROGRESSIVE STEAM-DAMPING, GAS-DRYING, AND STRETCHING MACHINE.

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In the finishing processes necessary to giving the final touches to most classes of textile fabrics, in order to render them presentable and attractive to the public and the sale profitable to the manufacturer and the merchant, a tentering or stretching machine is, in most cases, an indispensable part of the plant. It is unnecessary on the present occasion to do more than state that these machines are a development of the simple tentering frames still to be seen in the fields in our woollen manufacturing districts, especially in the localities where flannels are mostly produced. In fabrics other than those composed of wool, and in which shrinkage, but no true felting, takes place, it has been found by experience that the width can be restored much more quickly than it can in woollens, without any injury to the article submitted to the stretching process. It has been found too that a resort may be had to artificial drying, which proves a very economical process in enabling work in all departments to be, greatly accelerated. The same may be said of damping, if such be required, and these can each be conducted separately from the other, or in any desired combination: thus a fabric may be simply stretched or stretched and dampened, stretched and dried, or finally dampened, stretched, and dried at one operation—indeed, any or all of these as required. Of course, machines to do this did not spring up like mushrooms in a night, but have resulted from successive additions to the simple tentering frame referred to above.

The machine to which we wish to direct the attention of our readers on this occasion is one of this class, and embodies all the latest additions to this kind of machine, and independent improvements in details. It is, as stated in its descriptive title, an improved combined progressive, steam-damping, gas-drying, and stretching machine. It is a machine which, as is well known, plays a useful part in the finishing of flannels, calicoes, muslins of all descriptions, flannelettes, and other cotton fabrics, and in fabrics of wool: flannels, woollens, worsteds, etc.

The machine consists of a strong skeleton frame, which is made any length, according to the requirement of the user. It is made in sections, coupled together by a cross rail, which of course determines the width. At the front end of the machine—the one at which the cloth is delivered after its passage through—is the driving gear, consisting of fast and loose pulleys mounted upon one end of the driving shaft, the driving power being derived from a line shaft or a small independent engine, as circumstances may dictate. Upon this shaft are mounted two chain wheels, one at each side. At the back or opposite end of the machine is a similar shaft carrying two corresponding chain wheels. Upon these wheels the endless chains are mounted. They travel in a grooved trough which is covered with a cap, the trough and cap being secured together by small bolts, which are easily and quickly put in and out of their positions, and in connection with which there is no risk of stripping the threads as when screwed holes and bolts are used. The length of the trough is eight feet, and upon one end about two inches in length. Each link is furnished with a brass of the same length, which is fitted with a double row of pins for holding the selvages of the cloth.

The arrangements for steaming consist of three separate boxes, lined with lead, and which extend across the width of the frame. Each contains a perforated steam pipe that blows the steam downward, which rises again in vapour and moistens the cloth. These boxes are furnished with copper slide covers, which can be opened either partially or fully, according to the width of the cloth under treatment. Each box is furnished with separate plug taps, which are fed by a service tap of good construction equal to the work required from it. This can be worked separately.

A short distance beyond the steaming boxes the frame of the machine is cased and furnished with a wood bottom to form a drying chamber, the bottom being supported on the cross rails. Within the box are arranged seven lengths of 1 inch piping, each furnished with a plug stop tap to regulate the supply. On each length are fitted 13 Bunson burners about 15 in. apart and cross pitched. In all they occupy a space of about 13 feet by 6 feet, thus giving 78 square feet area of drying surface. The pipes are supplied with gas by a cross feed pipe, the gas being automatically turned on and off by the starting and stopping of the machine. A bye tap, manifested by the stopping mechanism, supplies the jets with sufficient gas to prevent the extinction of the lights when the main supply is stopped.

At the baking or placing end of the machine are mounted two rollers, the first being a retaining roller, keeping the cloth upon the pins until the chain is carried down, and the pins thus withdrawn. The second delivers the cloth to the baking roller or the plaiting apparatus, with either of which the machine may be fitted. The baking bar carrying the box roller is driven by means of a clutch connection from the first chain wheel shaft.

The chain wheels are controlled and adjusted to the width of the cloth by means of the adjusting screws through a projection from the trough, which works in a groove on the boss of the chain wheel, giving it a lateral movement on the shaft derived from the adjusting screws. At the starting end of the machine there are arrangements for tightening the chains.

The fabric is put into the machine by two girls, who extend it to its width and pass it along brass guides to the circular revolving brushes, which press it upon the pins. These brushes are mounted upon small horizontal.
THE TEXTILE MERCURY.

Plate singeing is the oldest of these methods, and is still largely used. In this method a semi-circular copper plate is used, which is fitted to a suitable furnace to a bright red heat; the cloths are rapidly passed over it, and the loose or floating threads are singed away. The ends of the fibres are forced by a stream of air from the copper, working together on to a needle carrying a piece of thread; this is then pulled through the needle and forms a running stitch. A considerable length of thread is left on each side so as to prevent any possible adhesion of the thread and pieces by an accidental drawing out of the thread. The donkey machine is simple and effective; being small, it is very portable, and may be worked by one person. The works are to another as occasion may require, but is not so quick in its working as the more modern methods.

Birch's sewing machine is very largely used in bleach works. It consists essentially of a frame on which the pieces of cloth are fastened to a horizontal flat piece, so as to be driven by power. The pieces are carried under the needle by a large wheel, the periphery of which contains a number of projecting pins that, engaging in the cloth, carry it along. There is also a contrivance by which the pieces to be sewn can be kept stretched: this takes the form of an arm with clips at the end, which hold one end of the cloth while it is running through the machine. The clip arrangement is automatic, and just before the end passes under the needle it is released and the arm flies back, carrying the piece; it is however not necessary to use this arm always. This machine gives a chain stitch sufficiently firm to resist a pull in the same direction as the length of the pieces, but giving readily to a pull at the end of the thread.

The Rayer and Lincoln machine is an American invention, and is much more complicated than Birch's. It consists of a sewing machine mounted on a frame of a large revolving wheel. This carries a number of pins which, engaging in the cloth to be stitched, carry it under the needle. Besides sewing the pieces together, this machine is fitted with a pair of revolving cutters, which trim the ends of the fibres through in a neat and clean manner. There is also an arrangement to mark the pieces as they are being stitched. Like Birch's, it produces a chain stitch.

Both machines are efficient and work quickly, and so far as the quality of the work is concerned one machine is perhaps just as good as the other.

What is important in sewing the ends of pieces together is to get a firm, uniform stitch, that lies level with the cloth with no projecting, which would catch in the bleaching machinery during the process of bleaching, and this might lead to much damage being done. The best result is obtained by using evenly spaced, and free from knots, so that a tenacity of the thread is obtained. The ends of the fibres should be carefully treated before the fining process in order to get a bright white cloth; by singeing, the best thing to use is printers' ink. Gas tar is also much used, and is very good for the purpose. If this is used, it is not necessary to sew the bindings sufficiently well to be used satisfactorily. Vermilion and Indian red are used to give a yellowish colour, the yellowest of the yellows, and Guignolet's green is the only green that will suit the purpose. It will serve for brown. All these colours are used in the form of printing ink.

The next operation is a very important one, which cannot be too carefully attended to, that is:

2nd. Singing—For printing bleachings the clothes are singed. This has for its object the removal from the surface of the cloth of the fine fibres with colouring matter, which would otherwise, if it allowed to remain prevent the designs printed on from coming out with sufficient clearness to give them their value. Singing is done in various ways—by passing the cloth over a hot copper plate, or over a red-hot revolving cylinder, or through a coke flame, or through gas flames, and more recently over a red of platinum made red hot by electricity.

* A paper read by Mr. James Sharp, F.C.S., before the Society of Dyers and Colourists.