TEXTILE INDUSTRY AT THE VIENNA EXHIBITION.—No. XVI.

By Dr. H. Grothe.

MACHINES FOR DYING AND PRINTING.

Although the number of machines for dyeing and printing fabrics exhibited at Vienna was not great, yet all the special varieties of this branch of industry were represented. Thus altogether the following machines were exhibited:

A. For the preparation of dyeing materials and colours: machine for grinding logwood by M. Berendoff, of Paris; a machine for the same purpose by Messrs. Huxham and Brown, of Exeter; colour mills for indigo, cochineal, &c., by G. Stein, of Berlin, and Andres and Frohbe, of Vienna. Wilhelm Sattler, of Schweinfurt, Carl Schrans, of Vienna, Franz Coblenzer, of Cologne, and a colour-boiling apparatus by S. Huber, of Prague.

B. For the dyeing of stuffs, &c., no machines were exhibited, with the exception of that mentioned in our last article, namely, the craging machine shown by the Zittauer Maschinenfabrik und Eisengießerei (Albert Kiewiet and Co.).

C. For the printing of yarn: machines by Mr. Thomas Barretough, of Manchester, and Herr B. Hippe, of Berlin.

D. Machines specially adapted for drying dyed yarns and fabrics by the Sächsische Maschinenfabrik zu Chemnitz, formerly Richard Hartmann, of Chemnitz, and by Messrs. Pierron et Debostre, of Paris (drying machine for dyed pieces of cloth). Besides these there belong to this class the centrifugal wringing and roller drying machines, as well as all the drying apparatus fixed to the cotton-printing machines.

E. Machines for printing fabrics, namely, the three-colour printing machine by M. Ducommun (Messrs. Heilmann, Ducommun and Steinlein), of Mulhouse; the perrotine by Herr C. Hummel, of Berlin; the roller printing machine, by Mather and Platt, of Manchester; the eight-colour printing machine with drying apparatus of the latest construction, by Messrs. Tulpin et Freres, of Rouen; and, finally, a machine for the printing of woollen flock or bauge, and gauze stuffs, by Messrs. Fr. Scheffel and Co., of Reichenbach (patent of Carl Hansen and Son). We may also add to this class the lithographic press, which, as a remembrance of the great Exhibition, printed a view of the Rotunda on many thousands of handkerchiefs.

F. Machines and apparatus for the manufacture of the printing rollers. This class of machines was represented by the new double pantograph engraving machine of Messrs. John M. Sumner and Co., of Manchester (Lockeis, Leake, and Co.'s patent), for whole pieces of stuffs, and by another pantograph engraving machine for borders of shawls, and by the ingenious machine, with various additions, exhibited by Messrs. Ducommun and Steinlein, of Mulhouse.

As intermediate apparatus we have to consider a number of stretching, washing, singeing, drying, measuring, and pressing machines, which we have already mentioned in our former articles on finishing machines. If these various machines are added to those included in the above-mentioned divisions, A to F, we may be well entitled to say that this important branch of industry was fully and successfully represented at the Vienna Exhibition. We shall proceed now with the report on the machines specially mentioned.

The machine for grinding logwood by Messrs. Berendoff, of Paris, may be ranked amongst the best which have hitherto been constructed for this purpose; this machine allows of shavings being cut to various sizes, an arrangement which is of great importance on account of all log and other dye woods not being equally extractive; the wood of one tree is harder and less porous than that of another, so that the machine has to be adjusted according to the character of the material to be cut. On a future occasion we shall give illustrations and full description of this machine.
EIGHT-COLOUR PERROTINE PRINTING MACHINE.

Constructed by Mr. C. Bilan (Late C. Hummel) Engineer, Berlin.

(For Description, see Page 472.)

The logwood-grinding machine exhibited by Messrs. Huxham and Brown, of Exeter, consists of two parts, the first of which is formed by two axles carrying narrow cutting wheels grooved through iron gratings, and is used for cutting the wood; the cuttings thus formed pass along an inclined passage of wirework to the second part of the machine, which performs the grinding operation. This second part consists of a conical grinding roller provided with spiral grooves sharply cut, and moving in a casing having grooves correspondingly formed in it; so that as the cone is adjusting with more or less clearance between it and the casing, the shavings or cuttings of the wood are more or less finely ground. The exhibitions intend this machine for general use—for bark, for tan, for wood used for the manufacture of paper, and for logwood.

The pigment mills exhibited at Vienna were all built on one system, similar to that just described, and consisted of an iron cone rotating in a corresponding casing, upon which a hopper is fixed for the continual and proper feeding of cochineal, indigo, &c. The best of these mills were exhibited by Herr G. Stein, of Berlin. The pigment-boiling apparatus exhibited by Herr S. Hütter, of Prague, is a close imitation of the apparatus exhibited in 1867, at Paris, by Messrs. Tulpin Brothers, of Rouen, so that we need not refer to it more particularly.

The machines for printing yarn consist generally of two rollers, placed in a horizontal plane parallel to each other; one of these rollers is carried by a fixed frame, whilst the other is supported by a movable bracket fastened to this frame, so that if the bracket is moved towards the frame the two rollers come into contact with each other. These rollers are made either of wood or brass, and they have to act as pressure rollers for printing marks of various sizes at certain points in the yarn; for this purpose the rollers are placed on their surface with projections so placed that if they come into contact, the projections of the one will touch the projections of the other, thus squeezing the yarn, which is passed through them in threads. If the surface of the projections is provided with colouring or printing matter, the latter will be transferred to the threads of the yarn. The colouring matter is supplied to the rollers from a trough underneath each roller by means of an endless sieve-cloth and a feeding roller. The machine exhibited by Herr B. Hopp is provided with wooden rollers, the projections of which are made of boxwood, whilst Mr. T. Barradough's machine has brass rollers with projections of so-called fine pearl print.

Amonton of the drying machines for dyed stuffs and yarns we may first call special attention to the machine exhibited by Pierrat and Dehaire, of Paris. Although this machine is often misunderstood and overlooked, it is, nevertheless, the only properly designed drying apparatus for small pieces. In an early number we intend publishing illustrations and full description of this machine.

The yarn-drying machine, exhibited at Vienna by the Sächsische Maschinenfabrik zu Chemnitz (formerly R. Hartmann), of Chemnitz, which we mentioned in our last article, and illustrations of which we publish on the opposite page, represents a type which has been successfully applied for about four years. At Berlin alone, fifteen of these machines are already in use in the various dying establishments. The chief advantage of the arrangement, which will be easily understood from our illustrations, is that it is continuous in its work. The wet yarn is suspended on one side of the machine, and is taken off in a dried state at the other side, two parallel chains for the support of the drying rods carrying the yarn uniformly through the machine. Drying by means of heated air is another advantage of this machine, and it is chiefly the air which effects the work, this mode of drying being generally acknowledged as the best; high degrees of heat—which were formerly used—and their disadvantageous consequences, are thus avoided. The air is made to act by means of a fan, which draws off the moist air, so that a perpetual current of fresh air passes through
the machine. The air is heated by the steam pipes at the bottom, for which the exhaust steam from the engine is generally used, if the temperature in the machine has not to exceed 90 deg. Fahrenheit (32 deg. Celsius). The machine shown in our illustration, and exhibited at Vienna, is the smallest size of this system built by the Sächsische Maschinenfabrik, and is, as stated already in a former article, 9 ft. 5 in. high, 11 ft. 7 in. wide, and 23 ft. 6 in. long. The machine draws per day 750 kilogrammes (1650 lbs.) of woollen yarns, weighs 33 tons, and is provided with 31 drying bars.

The printing machine exhibited by Messrs. Dusscomm and Co., of Mulhouse, is a three-colour machine, but the system allows of it being extended to any larger number of colours; it is, however, applicable only to stuffs with coloured longitudinal stripes. Under each printing roller a trough is placed, this trough being divided over its length into three or more compartments, each of which is provided with a sloe-cloth and a feeding roller which transfers the printing matter to the rollers at the proper distances. Each compartment contains one colour, and as many colours may be printed longitudinally as there are compartments. This machine has specially been applied, and with success, for silk ribbons.

One of the finest machines to be seen at the Vienna Exhibition was Hummel's patent. As is well known, the printing of woven stuffs of cotton, wool, and silk in one line is chiefly performed by means of two systems of printing machines, namely, the cylinder printing machines and the percolators, these differing from each other in their construction and use. In cylinder printing machines, the surface of the design has been caused to revolve under pressure a larger cast-iron roller, called the pressure roller, and covered with an elastic material.

The surfaces of the copper cylinders are each covered with a colour by means of suitable rollers which carry the excess of colour being taken off against the cylinder by scrapers; the fabric to be printed is passed in a stretched state between the copper rollers and the pressure roller, and the design is impressed upon the stuff. A machine of this kind was the twelfe-colour printing machine exhibited at Vienna by Messrs. Mather and Platt, of Manchester, and of which we hope shortly to publish illustrations and full description.

In the percolators the printing is effected by flat forms which produce an embossed design, imitating thus the work of the hand-printing. On the previous pages we have illustrated the eight-colour percolator exhibited at Vienna by Herr C. Bialon, of Berlin (formerly C. Hummel); in this illustration, each form is fastened to a support, which is carried by the pressure bars b, b, b, b, b, b, b. These latter act as so-called "interference motions," which may be examined in the case of the pressure bar b, produced by the two crank pins e and d—of which e makes twice as many revolutions as d—by the joint levers c and f, and the stay or frame g. Through the rotation of the crank pins e and d the forms are set at first fully drawn back, whilst by means of a special combination of levers, all the colour plates (chassais) a are placed between the forms a, a, a, a, a, a, and the knitting plates t, t, t, t, t, t. The colour plates are flat cast-iron plates covered with an elastic material upon which colour is transferred while revolting the copper rollers b, b, b, b, b, b. The knitting plates, which are also covered with an elastic material, serve as a support for the stuff during the operation of the printing. The stuff to be printed is rolled off the beam i, and passing over one stretching roller, three stretching bars, and a wooden guide roller, is carried by means of the needle rollers m, m, m, m, m, m, m, m, m, over the printing tables, passing out of the machine at e, and being then led off to a drying apparatus. With a further rotation of the crank pins, the pressure bars advance so far only that the forms touch the colour plates, the embossed design of the former thus being caused to receive colour from the latter. The pressure bars g, g, g, g, g, g, g, g, g, g, g, g, g, g, g, g, g, g, are now withdrawn with the forms covered with colour; whilst the colour-plates pass back in the mean time to the colouring apparatus, where they receive a fresh supply of colour. Another rotation of the crank pins advances the forms close to the printing table, and press the design covered with colour upon the stuff in front of the printing tables. After this operation the forms are drawn back, the colour plates are again placed between the forms and the printing tables, and the same operations are repeated during the following rotations of the crank pins.

During the time the colouring plates are moved up and down again, or, in other words, during the time in which the forms are not in contact with the stuff, the latter advances as much as the width of the form (length of "guide") so that the next impression takes place close behind the one previously executed. The stuff is moved forward by means of the "guide" mechanism, whilst the five needle-rollers, m, m, m, m, m, are moved by means of spur wheels geared into the main "guide" wheel s; this latter is put in rotation by the rack a, and the wheel p, but only in the direction indicated by the arrow, the wheel s is not being moved when the rack is drawn back; this effect is attained by transferring the motion by means of a ratchet with wheel and brake. In order to shift the stuff as much as required by the width of the form, the rack has to be adjusted for each width, and the position of the draw pin of the former, with respect to the centre of the wheel p, has to be altered accordingly, for which purpose the sliding piece is provided with a scale.

By a special contrivance it is rendered possible to cause each form to strike the stuff on one and the same place twice successively, after having taken up colour in the intermediate time. This is accomplished by throwing the "guide" motion out of gear between the first and second print, whence the stuff remains in the same position during the two revolutions of the stuff wheel s, at the same time the "guide" wheel s is again put into motion, and a new impression is made. This processes facilitates finishing heavy stuffs, of which large surfaces have to be printed uniformly with colour, in a clear and proper manner. Herr C. Bialon, builds these machines for one, two, three, four, and five colours, and nearly 500 of them have been supplied to Germany, Switzerland, Austria, Russia, and our own country. They are chiefly used in dyeing establishments for printing coats or other stuffs dyed with indigo, and are preferred to the cylinder printing machines, on account of the flat-formes being considerably cheaper to produce than the engraved copper rollers of the cylinder machines, and on account of their being generally worked by manual power, whilst the cylinder printing machines require steam or other motors.

The cylinder printing machine exhibited by Messrs. Tulipin Brothers, of Rouen, is chiefly interested in a given time of the dyeing apparatus connected with it, and an illustration of which we shall publish in an early number. Finally, with respect to the machine for printing woollen flanks on "barge" and "gauze" stuffs, exhibited by Messrs. Fr. Scheffel and Co., of Reichentzach, we must simply regard it as not likely to become of any importance; besides, it serves only for a special design, which, as an article of the season, may be in fashion only once every eight or ten years.

The two machines for engraving printing rollers which were exhibited at Vienna are both so excellent in the way of construction that we intend to publish, on a future occasion, detailed drawings and full descriptions of both of them.