

### TEXTILE INDUSTRY AT THE VIENNA EXHIBITION.—No. XIV.

By DR. H. GROTHE.

BEFORE continuing our report on the finishing machines we shall give here the description of a contrivance which is of great importance in calico printing works. In large works of this class, which produce daily many hundreds of pieces of finished calico, several thousand yards of material have to be sewn together to form a continuous band, which, properly guided, is carried through the various departments of the works. The distribution of this endless band is arranged in such a manner that large quantities of the material are accumulated at certain parts of each department, and that these quantities are always increased and diminished in equal proportions by the continued travelling of the band. Care has to be taken that these accumulations do not cause any confusion or twisting in the material, and that the latter is always laid down in the proper manner. For this purpose Mr. F. Gebauer has designed a suitable apparatus, which is constructed, and which was exhibited at Vienna, by the Actiengesellschaft für Stückfärberei, Appretur und Maschinenfabrication at Charlottenburg, near Berlin (engineering company for the construction of machines for dyeing and finishing works, at Charlottenburg, near Berlin). This apparatus, which is shown in the illustration above, consists of an iron frame which is fastened to the ceiling, and which carries the main shaft with the pulley *a* and the roller *b*, against which a second roller *m*, supported by movable links, revolves. The frame carries at the bottom, by means of a flanged ring, a vertical shaft *c*, which rotates, and upon

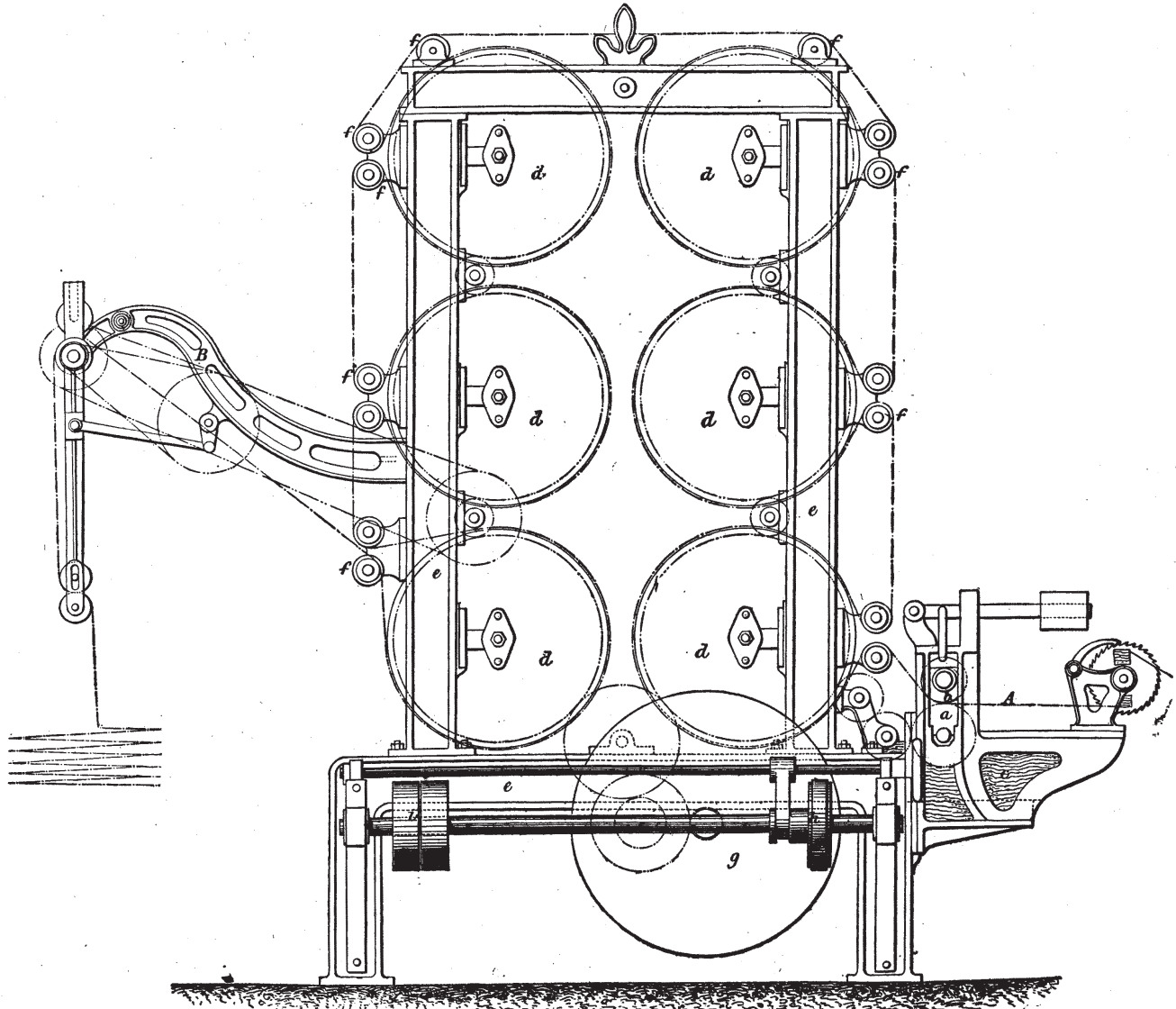
which is fastened the worm wheel *d* with a spur wheel above it; the shaft *c* itself is hollow and is open at the top and at the bottom. The worm wheel *d* is worked by the worm *p*, which is carried by the brackets *n*, and which receives its motion from the main shaft. The wheel *d* is provided with a projection *g* carrying a small axle, upon which the cam or eccentric disc *h* and a wheel *e* worked by *d* are fixed. As shown in the drawing, the eccentric disc *h* is provided on its surface with a curvilinear groove, into which is fitted a pin *i*, which of course has to follow the line of the curve; from this pin *i* the arm *o* with the rod *k* and the cross *l* is suspended, whilst the arm *o* is also directly connected with a shaft which passes through the bush *f*, and carries at the top a pinion gearing into the spur wheel above the worm wheel *d*. The shaft in *f* and the arm *o* thus rotate continually, whilst the pin *i* runs in the groove, and is moved backwards and forwards by the rotation of *h* (on account of the groove not being circular); this backward and forward motion combined with the circular motion of the axle *c* causes the arm *o* to describe spiral and hypocycloidal curves. Whilst the wheel *d* and the shaft *c* thus continuously rotate, the rollers *m* *b* uninterruptedly take off the material which, passing between these rollers, is delivered through the hollow shaft *c* on to the arms or forks *l*, from which it passes downwards according to the travel of these arms. If the rotation of *o* is stopped by taking off the pinion at the top of the shaft, *o*, whilst turning round with *d*, makes lateral movements on account of the rotation of *e* and *h*, whence the material is laid down in curves extending equally outside and inside of the circumference of the main circle. If *e* and *h* are put out of gear, the material is laid down

in circles which can be altered for each revolution by turning *k*, and by an alteration of the position of the axis of the cross or forks *l*. The material may easily be laid down in other figures by cutting other grooves into the surface of the disc *h*.

Returning again to our report of finishing machines, we have now to examine the contrivances for removing the water from the stuffs and for drying them. Both these classes of apparatus have the same purpose, namely, to remove from the stuff the moisture which it has absorbed during the processes of washing and fulling. This moisture is of two kinds, one part being held mechanically by the stuff, whilst the presence of the other part is due to the hygroscopic qualities of the material; this latter portion is known to be very predominant. The mechanically held moisture is now generally removed by means of centrifugal drying machines, whilst artificial heat is required to effect the remainder of the drying. Manufacturers have in general no clear idea respecting the correct application of these two methods of drying, and our technical literature gives very little information on this subject. The author of these articles, however, published some time ago a work in which he proved by practical results, obtained by the use of centrifugal machines, that the rotary drying of moist stuffs is only economical within certain limits. Besides, the construction of the centrifugal machines themselves is not yet perfected; most of them have to drag with them vessels and contrivances which are much too heavy. A well-designed centrifugal machine should represent a correct combination of mass and strength, and should possess at the same time moving parts which offer little friction, and the necessarily rapid motion of which does not produce any loss of power,

CALICO-DRYING MACHINE.

CONSTRUCTED BY MR. ALBERT KIESSLER, ZITTAU.



whilst the machine should also be provided with arrangements for stopping the rotary motion almost instantaneously.

The latter necessity, as well as the former condition, have been fully acknowledged, as is best evidenced by the various modes in which manufacturers try to attain these ends; and this is shown by the centrifugal machines exhibited at Vienna, amongst which we have first to mention that belonging to Messrs. Tulpin Brothers, of Rouen. This centrifugal machine, which is of large dimensions, has a vertical shaft, and is provided with friction gear; this machine is constructed so as to enable the perforation of the sides of the drum to be avoided, although we doubt whether this arrangement will allow of reducing the speed, as is stated by Messrs. Tulpin Brothers. The machine is gradually put in motion by bringing the movable disc on the vertical shaft into contact with the large driving disc on the horizontal shaft, and by moving the former gradually towards the circumference of the latter. The brake stopping the motion of the drum is well arranged. Another centrifugal machine, exhibited by the same manufacturers, consists of a strong frame, with a short vertical shaft upon which the drum is carried. The shaft is moved from below either by a pulley or directly by a small steam cylinder fixed to the frame. The centrifugal machine exhibited by Mr. A. Kiesel (Zittauer

Maschinenfabrik und Eisengiesserei) is provided with double gearing, two face plates being carried at the upper part of the frame on horizontal shafts; the friction disc sliding on the vertical shaft of the drum, is pressed against these face plates. The drum is perforated, and the brake is well arranged, and strongly built. The centrifugal machine exhibited by Mr. Oscar Schimmel, of Chemnitz, is of a similar construction. Messrs. Pierron and Dehaitre, of Paris, build small as well as large centrifugal machines with friction cones, which gear only on one side. The axle of the driving cone is placed horizontally, and it receives its motion from the crankshaft by means of wheel gear. The frame carrying the shafts is fixed upon the casing which surrounds the perforated drum. The larger centrifugal machines are provided with vertical steam engines, in which the cylinder is fixed at the top, and the crank axle at the bottom. The latter carries the pulley, which transfers motion to the upper horizontal axis with the cone. These centrifugal machines are built up to 1.20 metres (3 ft. 11½ in.) diameter of drum, and steam engines of 4 horse power. The centrifugal machines of the Erste Brünnner Maschinenfabrikgesellschaft are imitations of the construction of Messrs. Pierron and Dehaitre, but they have the disadvantage that the brake is not fixed underneath the bearing of the upright shaft, but above it, whilst the cones are also much shorter. The Mannheimer Maschinen-

fabrik exhibited two constructions, one with screw gear and the other with belt gear; in the latter construction the upright shaft is provided above its bearing with a brake-belt, above which is fixed a small pulley 8 in. high, and of a diameter which is little larger than that of the shaft. A crossed belt passes over this small pulley from the crank or driving shaft. The centrifugal machines exhibited by Messrs. Sternickel and Gulcher, of Biala, are similar in construction to that of Messrs. Pierron and Dehaitre. Messrs. Buffaud Brothers, of Lyons, have also adopted for their centrifugal machines conical discs for the transference of motion, without, however, the arrangement for a gradual increasing of the speed. The centrifugal machines exhibited by this firm\* are provided either with small steam engines, the cranks of which are fixed directly to the horizontal shaft, or with pulleys fixed either below the drum or upon the main shaft. The centrifugal machines of Messrs. Buffaud Brothers are well designed and constructed, and belong to the best machines of this class. We have also to mention here the patent centrifugal machine, with heating apparatus, exhibited by Herr John Graf, of Vienna. With the exception of the simple arrangement for conducting steam under the drum, so as to warm the latter, this centrifugal machine

\* We illustrated centrifugal drying machines by this firm on page 386 of our third volume.

does not represent anything new in its construction. A Russian centrifugal machine attracted attention by its exceedingly careful execution, although it represented only a well-known system.

The drying machines intended for removing the more closely combined portion of the moisture by means of heat, are constructed on various systems. Herr S. Huber, of Prague, exhibited two drying machines, one of which, an imitation to a small scale of the drying and flattening machine with a large drum, exhibited by M. Tulpin, *ainé*, at Paris, in 1867, showed nothing worth mentioning, except that it appears doubtful whether the small cylinder can really effect a drying without resorting to a very high temperature, which, on the other hand, is injurious to any fabric; whilst the means adopted for causing the stuff to pass through in a stretched state are entirely insufficient. The second drying machine exhibited by Herr Huber is built on the cylinder system, with nine rollers and a starching apparatus. Six of these rollers are placed below and three above; the arrangement for the beating with steam does not represent anything new, but nothing can be said against the execution of the two machines. Herr C. H. Weisbach, of Chemnitz, in Saxony, exhibited a cylinder drying machine with seven rollers and a starching or gumming apparatus; but as it is our intention to publish shortly detailed drawings and description of this machine, we shall not say any more about it in this article.

The Zittauer Maschinenfabrik und Eisengiesserei (Herr Albert Kiessler) exhibited a drying machine of a new construction, an illustration of which we publish on page 417. This drying machine is, as will be seen from the engraving, arranged on the vertical system, and is used for effecting the simultaneous drying and starching of woollen and half-woollen stuffs, which are starched on one side only. For this purpose the stuff passes at first through the starching apparatus A, consisting of the squeezers *a b* and the box *c*, which contains the finishing or covering matter through which the lower roller *a* revolves; the stuff passing through the two rollers *a b*, the finishing matter is very uniformly transferred to and impressed upon the surface, and the small irregularities formed in weaving are thus completely covered. From here the stuff passes into the drying apparatus proper, this consisting of six copper cylinders *d d* heated by steam through the hollow frames *e e*. These cylinders, which are constructed for a pressure of from two to three atmospheres, are provided with cast-iron bottoms, the latter being fixed in such a manner that they may easily be removed. The guide rollers *f f* pass the stuff with the unstarched side on to the cylinders, so that the breaking up of the finishing matter, the clouding of the stuff, and the greasing of the cylinders is prevented, whilst the drying of the matter is well and uniformly accomplished. From the last cylinder the stuff passes into the folding apparatus carried by the arm B. The water arising from the condensation of the steam is continually taken off from rollers and frame. The motion of the cylinder is produced by the friction gear, *g h*; and the pulleys *i*; and according to the speed required for the cylinders, the friction pulley *h* is moved along its axle either towards the centre or the circumference of the face plate *g*. One advantage of this machine is that it occupies a small space only. Messrs. Mather and Platt, of Manchester, also exhibited a drawing of a drying machine with seventeen cylinders, which is especially interesting on account of the inner arrangement of the latter. In this machine the cylinders are provided on their inner surfaces with a spiral band 2 in. or 3 in. wide, which runs through their whole length. This band communicates at the two ends of each cylinder with chambers which are connected with each other by means of ports along the whole inner length of the cylinder. The steam which is condensed in the cylinder runs along the spiral projection to the accumulators or chambers, which communicate by means of a tube across the cylinder, with the hollow shaft of the latter and the water discharging contrivance. This tube is so connected with the shaft, that no loss of steam can take place. The spiral projections, which are used also for strengthening the walls of the cylinder, collect the condensed steam very effectually and quickly, and the perpetual run of the water along these projections protects the inner walls of the cylinders from precipitations and accumulations of greas.

Messrs. Tulpin Brothers, of Rouen, exhibited a

large cylinder drying machine with starching apparatus, which is excellently constructed in all its parts. This machine contains in a horizontal plane seven copper cylinders, of a diameter of about 0.7 metre (2 ft. 3½ in.); from the starching apparatus the stuff passes over a stretching contrivance with twelve rods and an expanding apparatus covered with thin corrugated brass plates. From here the fabric is drawn through the drying machine, and by an ingenious arrangement of rollers is brought as much as possible in contact with the surface of the cylinders. An important detail of this machine is the arrangement for the transferring of the motion, adopted from the original design of Hefter; according to this arrangement the gear with the large face plate is fixed at the side where starching and drying machine come together. At the right-hand side motion is transferred from this face plate to the friction pulley on the shaft carrying the conical gear for the starching apparatus, whilst the motion for the cylinders is obtained from the left-hand side of the face-plate. This machine is a fine specimen of the work supplied by this excellent firm. The machines exhibited by Messrs. Neubarth and Longtain, of Verviers, and by the Sächsische Maschinenfabrik zu Chemnitz (R. Hartmann), are of a different kind, and they are especially used for woollen stuff and cloth. These machines consist of a longitudinal arrangement of chambers through which the stuff, stretched by endless tentering chains, is passed in a hot atmosphere. Messrs. Neubarth and Longtain's machine has four rows of heating tubes placed above each other at certain distances across the width of the machines; the tubes of each row are connected with each other by bending into sections of nine tubes, which sections are again connected with each other by flanges; nine of these sections form one row or tier of tubes. Between these tiers the tentering chain passes, sliding in guides, and supported by rollers; this chain consists of single links, carrying plates at the top, provided with small pins, to which the border of the cloth, when passing into the machine, is fastened by means of a roller. By means of a suitable arrangement, the position of the two chains with regard to each other may be altered, whilst the width and the length of the stuff is ascertained by a measuring apparatus. Both at the front and at the back of the machine the stuff passes round copper drums made of one piece, into the second, third, or fourth story respectively. The chain is made of malleable cast iron, and the pins are made of steel; there are 300 cross tubes. The moist air is drawn from the machine by means of a fan, an arrangement which accelerates the drying to a great extent. The machine has a height of 1.80 m. (5 ft. 11 in.), a width of 2.30 m. (7 ft. 2½ in.), and a length of 11 m. (36 ft. 1 in.), requiring for its working, with the exception of the fan, not more than half a horse power.

The drying machine exhibited by the Sächsische Maschinenfabrik zu Chemnitz, Richard Hartmann, of Chemnitz, belongs to the same system, but is chiefly used for the drying of yarn. The machine, which we shall illustrate and describe in detail on a future occasion, is 2.87 m. (9 ft. 5 in.) high, 3.53 m. (11 ft. 7 in.) wide, and 7.13 m. (23 ft. 4½ in.) long, although larger machines on this system are built by the Sächsische Maschinenfabrik.