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A MODERN INDUSTRY : TEXTILE FINISHING

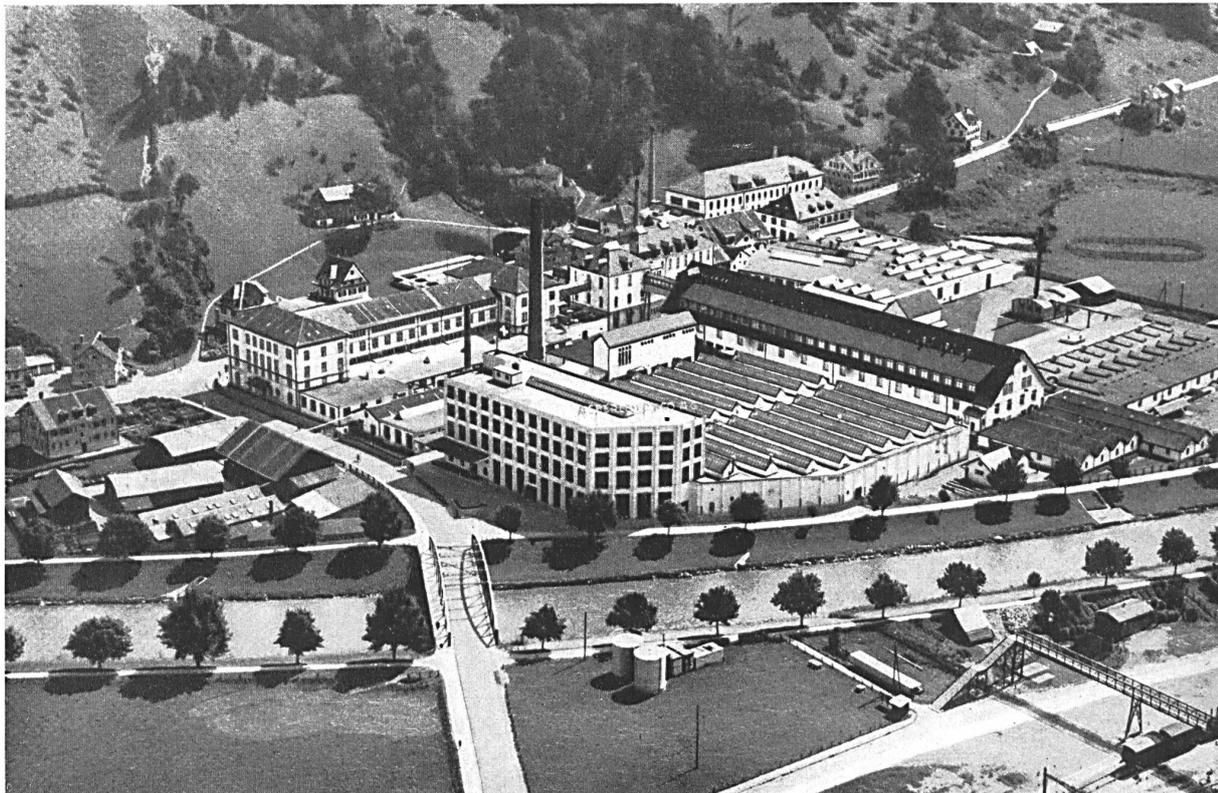
II. In a Textile-Finishing Factory

In a previous number of Swiss Textiles (see No. 2/1945) we gave a brief survey of the origin and development of the modern textile finishing industry. Today we invite our readers to follow our reporter on a tour through an important modern plant.

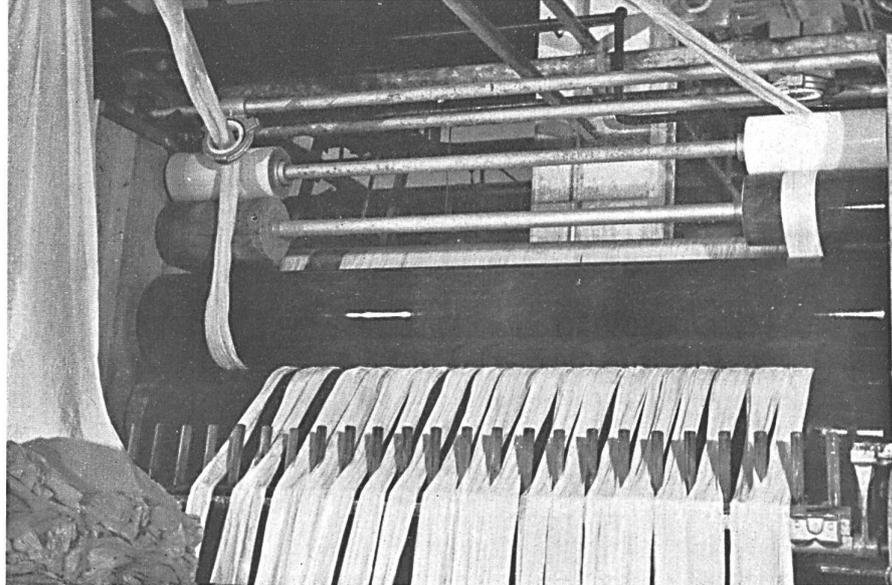
We are in Eastern Switzerland, in a green valley lying among the foothills of the Alps. Near a large, prosperous village a great factory has gradually grown up on the site of a small dyeing plant that formerly used to furnish the dyed yarns in demand for the colour-weaving industry which, in the XIXth century, flourished in this district.

A nearby river provides an abundant supply of water, an indispensable factor for the rinsing processes — and needed today more than ever for bleaching and other operations.

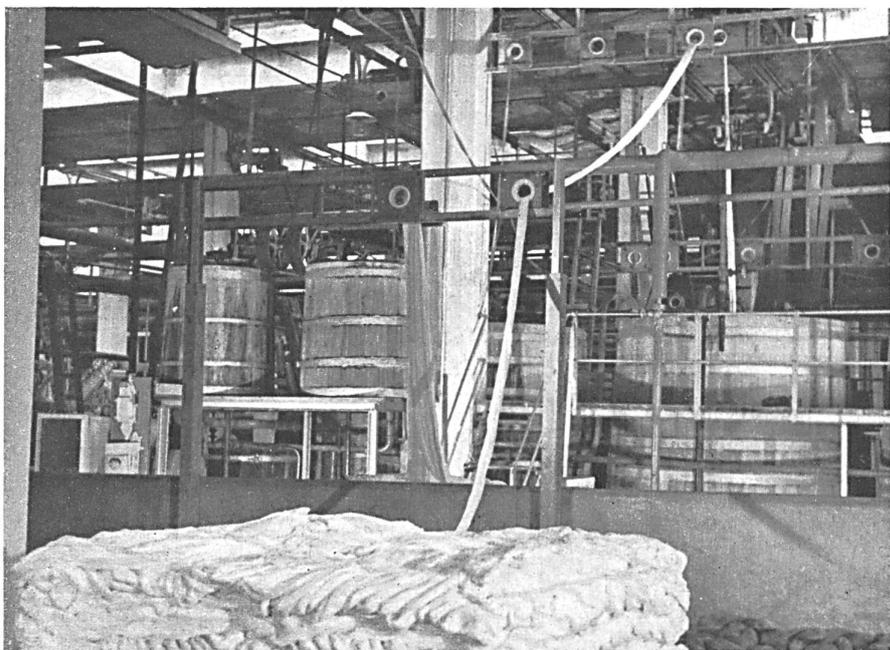
It is at once evident that this is not a « heavy » industry, despite the tall chimney stacks which rise above the



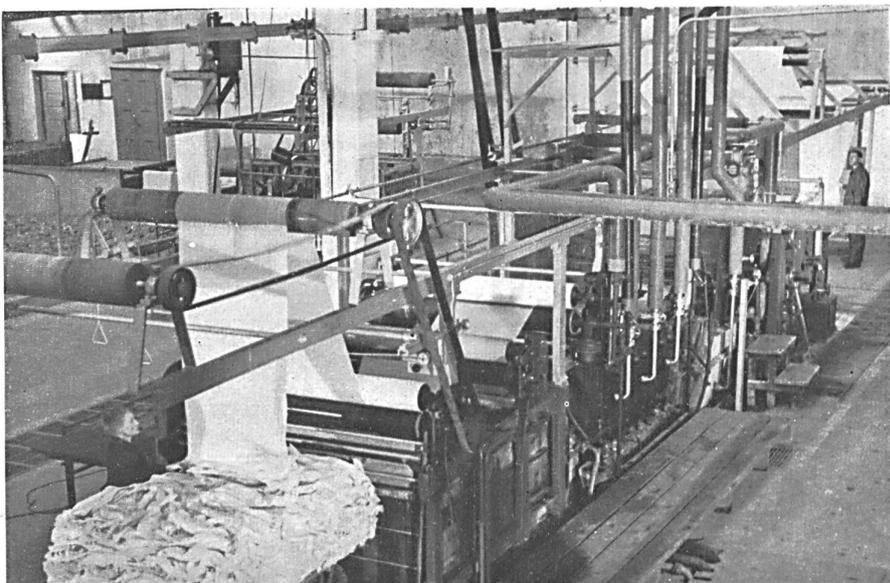
A Swiss Finishing
Factory
(Heberlein & Co.,
Ltd., at Wattwil).



Drawn through the rollers, piece goods are plunged again and again into the rinsing vats.



Bleaching. The fabric is drawn through porcelain rings and dipped in the vat where it undergoes various chemical treatments.



plant. The buildings are bright and clean and one can see at once that they are used only for an industry in which soot and grease are unknown. First, we come to the furnace room where stand aligned an awe-inspiring row of boilers producing the enormous volume of steam required for almost every operation. A little farther on is the water purifying plant, also an important element in the equipment of this factory, for textiles can only be treated with absolutely pure water from which all traces of lime have been eliminated. Lime, or calcium oxide, is in effect extremely detrimental to textiles and its presence in the water might make the dyeing and other processes fail completely. The raw materials employed in the finishing factory are rough yarns and piece goods. Most of the fabrics are plain woven and appear most unattractive; it is difficult for the visitor to believe that these ordinary-looking materials will become sumptuous fabrics, vivid or soft-hued, printed with charming designs, lustrous, vaporous, or soft and heavy to the touch. Before being processed, the materials are carefully controlled (all defects being registered against possible reclamations from the customer) and marked. All the pieces forming part of each order are sewn end to end, so that they can undergo the various treatments without interruption, thus ensuring economy of time and absolute regularity of effect. Sometimes strips, of cloth 20 and even 30 kilometres long are thus obtained, provided that their total volume is not too heavy.

The first important finishing treatment is «singeing». The cloth is drawn swiftly over a gas burner and the flame singes off the waste products and small surface fibres. The process is applied to one or both sides of the cloth, according to its nature and the subsequent treatment it is to undergo. After singeing, the fabric is wound over a roller which extinguishes the sparks and is then cooled by water vapour and sent on for washing, desizing¹ and bleaching. In these processes, water, vapour and lyes are the essential factors. The long strips of cloth are rolled up, piled on trucks and swiftly unwound through the long, steamy processing rooms. They are

¹ The yarns are impregnated with gun or «size», which facilitates weaving, but which must later be eliminated by treatment before the goods are submitted to further processing.

Mercerization.

then passed through porcelain rings and swung down into vats for heat and cold treatment, after which they are carried off again in centrifugal drying machines, then washed, rinsed and dried once more. The cycle is repeated several times with variations in each case according to the nature of the fabric and the purpose for which it is intended. All over the place are enormous vats of wood or cement, winding rollers, hot, revolving cylinders, boiling and spurting water, sizzling steam, and strips of cloth which madly cross and recross each other, hurried through large porcelain rings until they are finally rolled or folded up in gleaming white folds still damp from the bath and warm from the calenders. All these operations are often combined with other treatments, such as a first impregnation with a liquid dressing or stiffening, or again, with the mercerization process. The latter consists of a distending of the fibres with a sodium hydrate (or caustic soda) solution and their subsequent stretching both lengthways and broadwise in special machines built for this purpose.

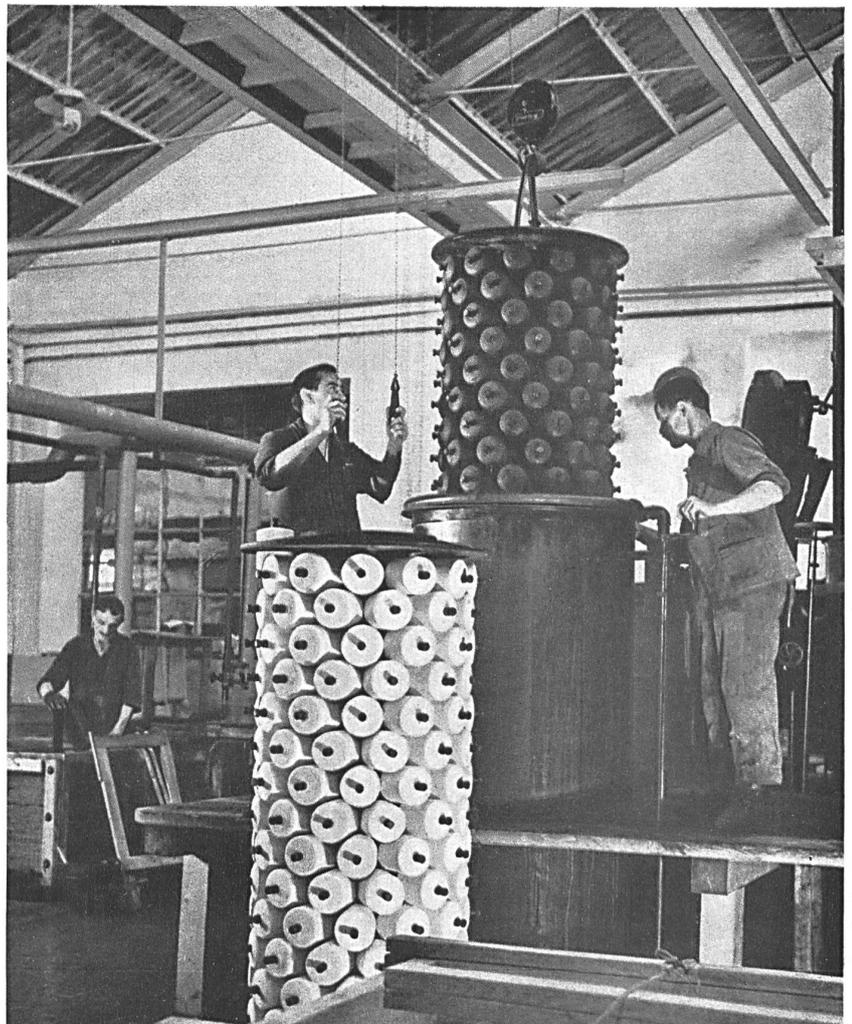
Piece and skein dyeing¹ is a very important operation. Modern chemistry has succeeded in creating a whole range of basic dyes which satisfy many requirements, especially from the point of view of light, boiling and perspiration resistance. Despite standardized methods of application, dyeing — like colour printing — is a delicate operation for which every firm uses its own particular formulas and trade secrets. The mixture of the required quantities of each ingredient must be most exact if the shade desired by the customer is to be obtained. Contrary to what is generally believed, the bleached fabrics and yarns do not immediately assume their definite shade after immersion in the dye vat. It takes a certain length of time for the pigment to bit into and penetrate the fibre ; the textiles are therefore passed through many vats, or left for a long time in the same one but, in this case, constantly stirred, so that the dye can spread and penetrate equally all through the fabric — and all this before the fixing, washing or even developing treatments are applied. Not all dyes appear in their real colours

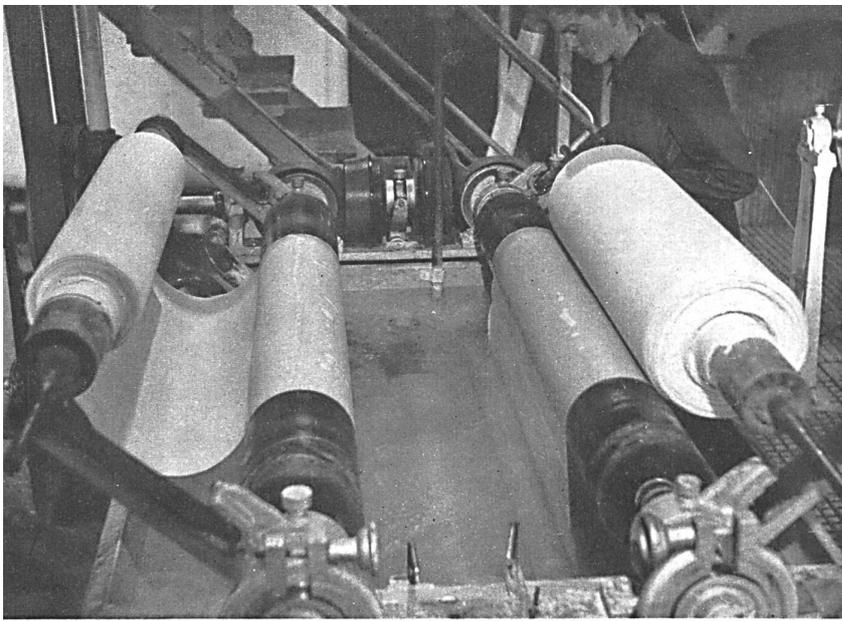
¹ Piece dyeing is the dyeing of piece (or woven) goods, and skein dyeing, that of yarns.



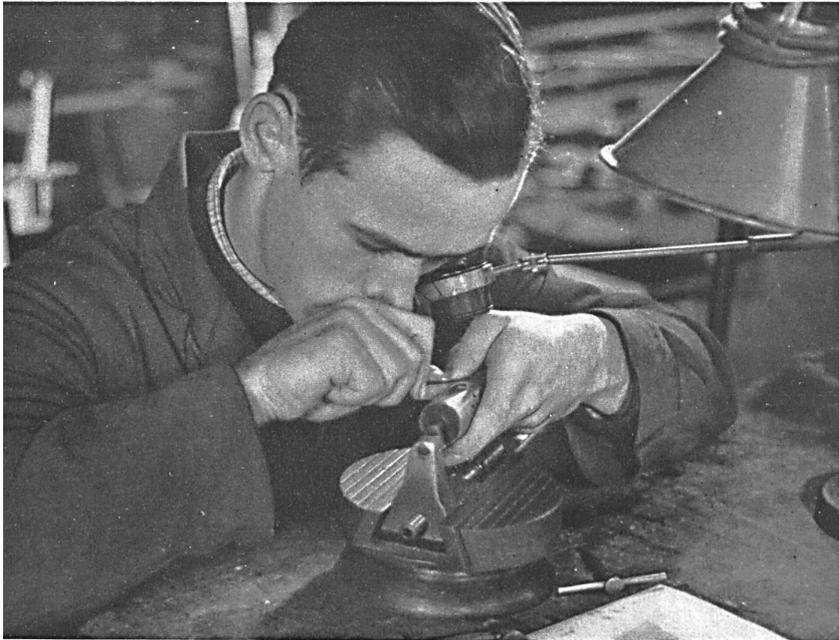
Rolls of fabric.

Yarn dyeing. The bobbins are fixed on perforated tubes and plunged into a hermetically sealed vat. The tubes then drive the dye by pressure through the bobbins,





Bleaching in widths.



Hand-engraving in relief on a steel roller which, in its turn, will be used to sink the design into a copper cylinder for rotary printing.

from the outset ; some only develop under the action of certain chemicals or the oxygen of the ambient air.

Certain lingerie fabrics are « raised » on the wrong side. The soft swanskin effect is obtained by passing the fabric through machines carrying cylinders provided with an infinite number of minute hooked teeth. These graze the surface of the cloth, scratch up the fibre and raise the nap ; the speed of the passage of the fabric through the machine, and the speed of rotation of the cylinders, can be regulated to obtain any special effect required.

The hand-printing of textiles with heavyengraved wooden blocks is still carried on in some parts of Switzerland. This is an old country-craft which has succeeded in surviving industrial progress. It can, of course, only be applied in a small way and is therefore a luxury process. A modern method of printing has been developed for quick serial production. This is the rotary system, similar to that employed in heliogravure. The design is transferred to a copper cylinder by a photographic process and etched in, or stamped in by a tempered steel block bearing the design in relief. The copper cylinders are then placed on the machine, one cylinder being used separately for each of the required colours ; the fabric then passes over a big drum and each cylinder absorbs its colour from a pigment-imbibed roller, the surplus pigment being scraped off by a special device. In this way, only the hollowed out parts of the design are filled with pigment and print it off on to the material. The guiding necessary to assure clean printing is as delicate in this work as in the graphic arts. Rotary printing machines can execute designs in as many as twelve different colours. In the course of the last few years, a new hand-printing process has also been devised which allows for the printing of designs in an unlimited number of colours and at relatively low cost. This is the frame-printing process. Here, the material is

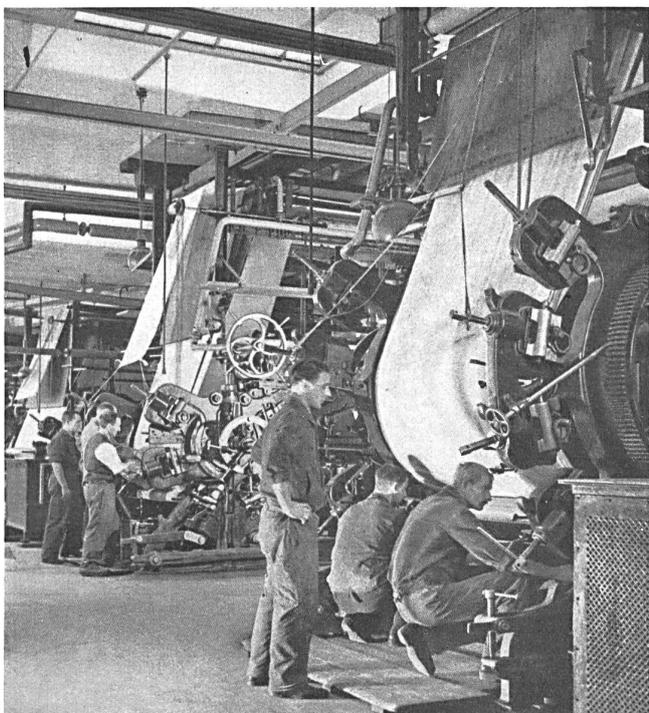
spread flat on a table and each colour is applied by means of a stencil-plate made of gauze stretched over a frame ; certain areas of the gauze are so treated with a special lacquer as to become impermeable, and the pigment is thus only transferred through the non-lacquered parts. This process requires minute care and great precision in adjustment, but it is very much appreciated in the trade, because it allows for the printing of small quantities of fabric at a reasonable cost. Retailers and couturiers can thus secure the exclusivity of certain designs without having to purchase a great many lengths. We cannot enumerate here all the various finishing processes, nor give detailed explanations. Mention must however be made of the many and most diverse fabrics which can be obtained by appropriate chemical treatment. All these operations are similar to those already described. The fabrics are immersed in vats containing solutions compounded according to exact formulas which, moreover, remain a jealously guarded secret of the house ; they are then rinsed, dried, or calendered and dried. Among the various fabrics submitted to aftertreatment are organdies or « transparents »,

as they are called. These well-known fabrics can be obtained in plain or printed styles ; there are many varieties of this material and each firm has its own specialities sold under a particular name.

The calender or roller-machine is a most important factor in the finishing industry, and is used either for drying the fabrics, to give them a special effect or to produce figured materials. It is a machine composed of several plain or engraved metal rollers through which the fabrics are passed. The number of rollers, their heat (they are steam-heated from within) and degree of pressure vary according to the effect desired. As explained in our first article, the aim sought after in the trade is not to give the fabrics a merely temporary aspect which would disappear after the first laundering, but to change the characteristics of the fibre completely. A final dressing, or «finish», is given to secure the definite and lasting appearance of the fabric. The composition of the «dressing» varies in each case and the formula is also kept secret. An almost imperceptible coating is applied by a rotary cylinder. The process is followed by a final calendaring. The finished goods are controlled, then folded and rolled by machines which usually appear so simple in conception as to astonish the layman.

In this brief survey, we have sought to describe only the major operations which particularly strike the visitor to a finishing factory. We cannot do more, for it would be impossible, in the space at our disposal, to mention all the processes in chronological order. In point of fact, all the treatments to which the fabrics are subjected vary according to the nature of the textiles, their weave, and the effects required. Closely woven material are singed on both surfaces, whereas those loosely woven are only treated on one side. Cotton goods can be bleached by boiling, but not rayon ; heavy fabrics are spread out in «jiggers» for dyeing, while more delicate ones which absorb the dyes more easily (rayon, for instance) are passed in rolls through machines which treat them less roughly ; some textiles are «raised» before printing, and others after, and so on. These brief notes will nevertheless enable our readers to understand why the modern textile finishing industry, now highly developed and having at its disposal extensive range of possibilities and means, is bound to evolve still further. A great future lies before it in conjunction with technical and chemical research directed towards the creation of new textiles.

Rotary textile printing machines or «rollers».



Rotary printing, detail. At the bottom, is seen the engraved cylinder absorbing the dye from a small vat ; in the centre, the cylinder carrying the dye in the hollowed-out portions of the design ; at the top, the printed fabric after passing through the rollers.

