The silk finishers of this time were J. Crew and Thomas Henshall, both accounted as among the most reliable representatives of this branch of the trade, their staff then consisting of about fifty hands in each case. J. Weidman, George Morlot, and See and Sheenan were the only dyers.

There has, of course, been a rapid increase since 1880 in the size of the plant of the above firms, while many new ones have started business.

Reviews of Books.

MESSRS. HOWARD & BULLOUGH, GLOBE WORKS, ACCRINGTON, ENGLAND : ILLUSTRATED CATALOGUE OF PRODUCTIONS. Accrington : Messrs. Howard and Bullough, Limited.

In the way of trade and business works this superb catalogue is one of the finest we have ever seen, being handsomely printed on tinted paper, bound in calf, and gilt-edged and lettered. It opens with a handsome title page and list of contents, after which follow the fine view of the works that we had the pleasure of issuing with our description of them in these columns a few weeks ago.

The contents are divided into several sections, the first being allotted to mill architecture, and containing several handsome illustrations of mills at home and abroad, which the firm have wholly or partially equipped with machinery. These include the model mill of Messrs. Coats, Paisley ; the Arkwright mill, Rochdale ; elevations or plans of mills in India and Brazil ; and diagrams of improved roofs for mills and sheds. Next come boilers, fuel economisers, engines of various types, turbines, gearing, etc., all briefly described and beautifully illustrated.

The next section, and the largest, is devoted to the description and illustration of cotton-spinning and manufacturing machinery, commencing with cotton gins and ending with yarn and cloth bundling presses. The machines in this division are so numerous that we can only mention a few of the firm's leading specialities. These are openers, scutchers, revolving flat cards, and the series of frames fitted with their electric stop-motion and improved differential motion. Next follows the firm's celebrated ring frame, and in connection with this are some beautiful illustrations of the spindles with which they are furnished. Winding frames, reels, and bundling presses come next, and are succeeded by stop-motion warping frames and magnificent illustrations of cylinder and cavity sizing machines, with size mixing becks, and the small frames for drawing in and "looming." This division concludes with a series of beautiful illustrations of looms for numerous kinds of cloths, and warehouse machines.

The next section is devoted to illustrations of tools requisite for furnishing a well-equipped smith's and mechanic's shop, so essential an adjunct to mills abroad. Following this comes the last section, replete with illustrations of nearly every possible accessory needed in the complete and perfect equipment of a modern mill, and which are essential if it be desired to avoid loss and inconvenience. Messrs. Howard and Bullough may be congratulated upon having thus made a record in trade literature.

THE WOOLLEN THREAD ; ITS NATURE AND HISTORY, ITS STRUCTURE AND USE. By CHARLES VICKERMAN. Huddersfield : Alfred Jubb and Son, Ltd. Price 1s.

Mr. Vickerman, who is a well known authority on the matters dealt with in this little work, defines man, on the fourth page, as " a creature that fabricates his own clothing." After this opening definition, Mr. Vickerman goes on to speak of the early history of our woollen manufactures. The book becomes more interesting, however, when what are more strictly Mr. Vickerman's own contributions to the contents commence. The writer's grandfather was carding engineer for the Mr. Horsfall who was shot by the Luddites on Crosland Moor, and he used to tell his grandson about the shepherd-farmers bringing to him a few stones of wool to card at the little mill at the foot of the Wessenden

Valley. After carding it was taken home, and rolled in wrappers. The long winter evenings were whiled away by spinning it on the single-thread wheel, it being deemed unsafe to entrust both carding and spinning operations to machinery. There are some further interesting reminiscences of the early days of the wool trade in Yorkshire. The description of the structure of woollen thread is very minute. Mr. Vickerman says nothing about the new cloth of which we spoke some time ago. The fabric is to be a " cross " between a worsted and a woollen, and, unless we are mistaken, Mr. Vickerman has set himself out to produce it. Should he succeed there ought to be a fortune awaiting him. Yorkshire has already given power-loom plush and alpaca to the world, and the men who first produced these goods are now wealthy. It would be in accordance with the fitness of things if the same county added another to the list of its triumphs in the nineteenth century. Mr. Vickerman's work will command attention out of respect for his admitted practical knowledge ; and it would perhaps be too much to ask him to take the world into his confidence in connection with his ideas of a new cloth.

PATENT SELF-BALANCING HYDRO-EXTRACTORS : CATALOGUE. Messrs. Watson, Laidlaw and Co., Engineers, Dundas-street South, Glasgow.

Messrs. Watson, Laidlaw and Co., the eminent specialist engineers and machine makers of Glasgow, have just issued a sectional catalogue of their productions, which is mainly devoted to hydro-extractors, of which they make several types. It is well deserving consultation by those interested in this class of machines, and we commend it to their attention.

ILLUSTRATED CATALOGUE OF ENGINES, BOILERS, AND GEARING. By A. G. BROWN, M.E. Bolton : Messrs. John Musgrave and Sons, Limited. Price 21s.

This is a re-issue of the illustrated catalogue of the productions of the eminent firm of Lancashire engineers in an enlarged and improved form, which we noticed at some length on its first appearance a few months ago. In the new issue several slight defects have been eliminated, and a considerable amount of new matter has been added. Engineers, millwrights, spinners, manufacturers, merchants, and all users of steam power will find that the volume contains much useful information. It is not a mere record of work done in the establishment whence it issues, but the numerous problems arising in steam engineering are ably discussed and elucidated from their scientific sides by Mr. Brown. We hear that the previous edition was so much called for that it was soon sold, and, the demand continuing, the present has been issued in order that disappointment may not be experienced anywhere.

An international exhibition in Berlin is planned for 1896, but there is some reasonable doubt of its success so far as North America is concerned, unless German manufacturers display more interest than they have shewn hitherto in the World's Fair at Chicago.— *Central-blatt.*

CONSIDERABLE excitement has been occasioned in manufacturing circles in Berlin by the dishonourable conduct of an agent. A collection of designs had been left in a place of business to be called for. Before the arrival of the person to whom it ought to have been handed, a commissionaire appeared, requesting the box to be entrusted to his care. As the arrival of the proper person caused enquiries to be made, it was ascertained that the commissionaire had been despatched by an agent who desired to get these designs into his possession. The police repaired to the offender's office, and found him engaged in shewing the stolen designs to an unsuspecting manufacturer. Arrest, of course, ensued.

Designing.

NEW DESIGNS.

DRESS GOODS.

Seldom has a season commenced with such a large choice of dress materials. Plain-made fabrics are very numerous, but they take a

secondary position, the first in choice and favour being given to geometrical patterns, or small shadings and dots. We give a suggestive design, *A*, which repeats on 66 ends of warp, and 66 picks of weft. At the top left-hand corner we shew dots for a plain ground and in other parts of the design a few dots of the 11-shaft satin ground, counting 4 ; but the 6-shaft satin, though imperfect, would make a good ground, as it is the proper measure of 66 ends and picks, and if filled in the following order the imperfection would not be visible to any extent : 1, 4, 2, 5, 3, 6, and repeat. The colourings must be contrasted hues : warp all light ; weft dark shades ; positive colours of weft may be on neutral ground in the warp ; for instance, a sky-blue warp—yellow drab weft for figures and diagonals ; or a pale light pink warp, with very dark emerald green weft. The warp may be made a dark ground, claret-brown, with old gold weft, or sky-blue, buff, pink, cerise, turkey-red, creams, lavender, light lilac, steel-grey— all these coloured wefts will suit a dark warp ground and give a considerable number of samples. A good opportunity also occurs here for the use of wefts having lustre, such as spun silk, mohair, alpaca, and linen. The design is worth a trial on a cotton warp, 30's twist, in 36 dents per inch, two in a dent ; wefts according to judgment as far as counts and picks are concerned. The satin ground will help to make a firm cloth, and the figures are so distributed all over that the tension in the warp will not be unduly taxed.

NEW PATTERNS IN COTTON DRESS GOODS.

In plain weaves, the following patterns for stripes and checks will be found useful : 40 dents per inch, 2 in a dent of 30's twist ; good clean yarns, bright fast colours ; 80 picks of 40's weft. *First pattern :* 24 light indigo blue, 3 white in one heald, and in one dent, 14 white, two in a dent, 3 white in one heald, one dent, 60 light indigo blue, 3 white in one heald, 14 white, 3 white, one heald, 24 light indigo blue, 3 white, in one heald, 1 white and 1 dark azuline blue, for 13 repeats ; 3 white in one heald, 16 light indigo blue, 3 white in one heald ; 1 white and 1 dark azuline blue, for 13 repeats ; and commence the pattern from first " 24 of light indigo blue." Weft all white, well bleached ; breadth in reed 31 inches. *Zephyr check*, plain weave :—Same counts, etc., as first pattern, 24 sapphire blue, 24 white, 144 sapphire blue, 24 white, 24 sapphire blue, 4 white, 2 black and white print,

——, 4 white, 2 black and white print, 2 white, 2 black and white print, 2 white, 2 black on a white print, 4 white, 2 black and white front, 4 white, and repeat from first " 24 sapphire blue." Weft checking same pattern, although the black and white print weft may be left out and the square form ed by the white shuttle only ; at all events it would give a variation. The pattern may also be made with light china blue for the sapphire and red and white print, also rose pink for sapphire, with blue and white print.

Another pretty *gingham check* or zephyr : 42 coral, 12 light pink, 12 cream, 12 very light green, 42 coral, 36 white, 12 cream, 6 light pink, 8 white, 8 coral, 4 white, 4 light pink, 4 white, 4 light pink, 42 white, and repeat from " 42 coral " at the beginning. Weft check the same. Instead of coral a green, dove, or clear slate may be used. These patterns on plain weaves will give satisfaction.

THE ANALYSIS OF PATTERN.—X.

SETTS.

Attention must now be directed to the methods of indicating the number of ends and picks in a piece, since these particulars, in conjunction with the counts, indicate the weight of the resultant cloth. The ends in a piece are indicated in such a number of ways that in order to render our remarks clear the simplest method shall first be considered, and the more intricate ones explained by means of this.

Evidently the simplest method will be to state always the threads per inch, since the width of the piece is usually stated in inches : thus the

sett multiplied by the width gives the number of ends in the warp.

The "Stockport" system is similar to this, only the number of dents or splits in the reed is indicated along with the number of ends through each; thus, a 12's reed 4's = 12 reeds per inch, with 4 threads through each = 48 threads per inch. For the actual weaving operation, this latter method is perhaps preferable, but in all calculations for cloth the ends per inch method forms a much more convenient standard.

The other important systems are as follows:—

The "Bradford" system, based upon the number of beers (40 ends) in 36 inches.

The "Blackburn" system, based upon the number of beers (20 splits) in 45 inches.

The "Manchester" system, based upon the dents in 36 inches.

The "Scotch" system, based upon the dents in 37 inches.

The "Leeds" system, based upon the number of porties (38 ends) in 9 inches, $\frac{1}{4}$ yard.

To shew clearly the different meaning of a certain sett, say 40's, in each of the above, the following list is given.

40's sett in ends per inch	=	40 ends per inch.	
40's „	Bradford	.. =	44 „ „
40's „	Blackburn	.. =	17 splits „
40's „	Manchester ..	=	$1\frac{1}{8}$ „ „
40's „	Scotch	=	$1\frac{1}{12}$ „ „
40's „	Leeds	=	169 ends „

In all the following calculations, ends per inch and picks per inch will be adopted throughout.

TO FIND THE SETT.

There cannot be any fixed method for finding the sett of a cloth, since the conditions are so varied that a system which might answer admirably in one case might be of no use whatever in another. Of course the simplest method, if possible, is to count the number of ends in $\frac{1}{4}$, $\frac{1}{2}$, or 1 inch, by means of a piece-glass; but this can only be effected in analysing coarse cloths, since in the finer makes the threads and picks become so merged into one another that it is practically impossible to count the number in even a quarter of an inch.

The system most useful and most in vogue is to place the glass on the piece and count the repeats of the weave in the space covered: thus, in *Diagram* 24, a half-inch square encloses 4 complete twills. Should the weave be the 2-and-2 twill, the threads per inch will be $4 \times 4 \times 2 = 32$; if the 3-and-3 twill, $4 \times 6 \times 2 = 48$ threads per inch; and in like manner the threads or picks per inch in any weave may be calculated.

A system very similar to the above is to pull a thread or pick out of the piece and count the number of curves—repeats of weave in $\frac{1}{4}$, $\frac{1}{2}$, or 1 inch. For example, in *Diagram* 4* each curve
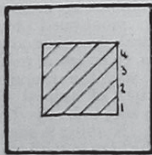
in the pick 2 equals 3 threads, since the weave is the 2-and-1 twill; in *Diagram* 5* each curve in the thread 1 equals 12 picks. Thus under these circumstances the curves in the weft indicate *the threads per inch*, and the curves in the warp *the picks per inch*.

This system is particularly useful in analysing such fancy combinations as indicated in *Design* 8*a*, a thread and pick from which are given in *Diagram* 7.† Having found the weave, the sett may readily be obtained by direct proportion. Example:—If a fancy check, occupying on design paper 40 ends, repeats $1\frac{1}{2}$ times in one inch, what is the sett?

As $1 : 1\frac{1}{2} :: 40 : 60$ ends per inch.

If the design does not repeat once in the inch, say $\frac{3}{4}$ of a repeat to the inch, then:—

As $1 : \frac{3}{4} :: 40 : 30$ ends per inch.

Should the analyst fail to obtain the sett of a cloth by any of the above methods one other may be resorted to, and that is pulling the ends or picks out of, say, $\frac{1}{2}$ or 1 inch of cloth, and counting them in this manner.

THE SETTING OF CLOTHS.

Since the analyst will often be required to build up cloths from the knowledge obtained in pulling them in pieces, a brief consideration of the principles of setting fabrics may be of much use in this treatise. This question is one of such wide scope that we can only touch upon the principal features, leaving the reader to carry out the ideas to their full limits.

There are three modifying influences to consider in setting cloths: firstly, the diameter of

* *T.M.* Feb. 13th.   † *T.M.* Feb. 20th.

the yarn; secondly, the weave or weaves; and thirdly, the characteristics of the yarns to be employed.

Diameters of Yarns.—These may be ascertained by finding the yards per lb. in the counts under consideration and extracting the square root. A deduction from this of 16% for woollen, 10% for worsted, and 8% in the case of cotton and silk yarns will give more accurate results. Example:—A 40's yarn gives the following result:—

$$40 \times 560 = 22,400 \text{ yards per lb., and}$$
$$\sqrt{22,400} = 149 - 10\% = 135 \text{ diameter, } i.e.,$$
$$\tfrac{1}{135} \text{ part of an inch.}$$

From the foregoing it is evident that the square root of any counts, *not the counts*, is in direct proportion to the diameter, so that should it be desired to find the diameter of one yarn from a known diameter, direct proportion may be employed, using the square root of the counts (or, what amounts to the same thing, squaring the diameters). Example:—If a 40's yarn has a diameter of 135, what is the diameter of a 20's yarn?

As $\sqrt{40} : \sqrt{20} :: 135 : 95$ diameter of 20's.
As $40 : 20 :: 135^2 : x^2 = 95$ diameter of 20's.

These rules apply to every system of counting yarns, but it should be remembered that the results obtained are only approximate: they may be influenced in some degree by material or structure and many other influences. Still the designer has no fear in making these the bases of his calculations, and introducing such slight modifications as experience and common sense suggest.

DESIGN A : DRESS GOODS.

DIAGRAM 24.
(*T. M.* Feb. 13th.)