

#### THE LYALL POSITIVE MOTION LOOM.

Shortly after the Main Building of the Centennial Exposition was completed, some one, out of curiosity, asked a noted carpet manufacturer, who was viewing the structure, what the cost would be of covering the immense floor space with the finest quality of carpeting. The manufacturer went through a brief calculation, and replied that he would not take a contract to supply the material for less than two dollars per square foot. As this would aggregate a sum actually more than the entire superstructure itself cost, the fact was widely published, in order to show how cheaply the great building had been erected. It so happened that the present writer had occasion to repeat this story to a well-known inventor and manufacturer of textile machinery, who listened quietly, and then, with a suspicion of a twinkle in his eye, coolly remarked, "Well, to cover the Main Building would require a big carpet; but if occasion required it, I could weave that carpet in a single loom and in a single piece of a width equal to the length of the building."

Now the Main Building is some 1876 feet in length, and to offer to weave a carpet of that width was something well calculated to provoke considerable astonishment. When, however, the inventor gravely proceeded to say that he could probably make the floor covering either of the finest kind of carpet, or of coarse cocoa-nut matting, or of the cobweb-like filaments of the finest silk, or of the strongest vegetable fibre, or of shoddy so weak that a single yard of the yarn suspended would not sustain its own weight, and all on one and the same loom, the hearer did not hesitate to affirm that his powers of credulity were severely taxed.

Subsequent investigation, however, proved that the statements were not exaggerations, and certainly not without the limits of possibility, and, further, that of this every visitor to the Centennial might easily assure himself. True, the immense machine capable of the remarkable work cited was not on exhibition, nor has it ever been built, but others were displayed which embodied the principle, which might be applied not only to looms as wide as the Main Building is long, but to looms of a width limited only by the exigencies of mechanical construction. As an indication of this possibility, the inventor contented himself with building the largest loom in the world, and placing it in his display in Machinery Hall; and there it has worked, weaving a fabric twenty-four feet in width at the rate of forty yards per ten hours, or completing 320 square yards per day, from the opening to the close of the vast fair.

Simplicity is a characteristic of all great inventions—as witness the placing of an eye in the point of a needle, which, with the simple feed motion, is the "gist" of the sewing-machine—and the feature which secures the possibilities outlined above in the loom is simplicity itself. From time immemorial shuttles carrying the weft have been thrown between the opened threads of the warp—literally hurled bodily, and with such

lightning rapidity that the patient prophet finds no better simile to express the brief duration of man's existence than to compare his days in swiftness of passage to the weaver's shuttle. It is not necessary to explain why a shuttle can be thrown only a short distance with accuracy, or that its headlong rush must be injurious to the delicate fibres over which it rubs, or that a slight failure of speed in the machine may result in its not being tossed the proper distance, causing its consequent remaining in the warp, and the inevitable "smash" that must follow, to the destruction alike of delicate mechanism and threads at the next motion of the loom. All these and many more are well-known defects of the "flying shuttle," and generations of inventors have grown gray and died in trying to obviate them. It has been reserved for American ingenuity to accomplish the task, and in so doing also to achieve, or to render possible, the results above noted.

The shuttle, instead of being thrown, is now carried through the warp by devices which it would occupy too much space to describe in detail here, but which are so contrived that although the shuttle travels upon the under warp threads as hitherto, it receives its motion from apparatus below these threads; and yet, as the shuttle passes over them, the threads are not moved a hair-breadth to one side or the other. The consequence is that the shuttle may be carried along any distance, and therefore any length of weft may be laid in the warp. Now it only remains to build the loom in sections, for the sake of easier construction, and to unite said sections in any desired number, and we may construct a machine to weave fabric of any width, and, furthermore, of any material, because the motion of the shuttle is so gentle that it does not injure the finest or weakest filaments.

The inventor of the "positive motion" loom is Mr. JAMES LYALL, of the firm of J. & W. LYALL, of New York city. Not content with his achievement as here described, Mr. LYALL is constantly seeking new applications of its principle. By combining the JACQUARD apparatus with the positive motion shuttle, he has produced a wonderful machine, which weaves corsets with every gore, every gusset, and every welt much nearer perfect than if the articles were made by hand. Five corsets a day was formerly the labor of one workman. The loom weaves eighty-four in the same period of time, in four continuous webs, the individual corsets being afterward cut apart. Another application of the positive shuttle is to the sewing-machine, which is thus enabled to make lock-stitches with double thread at the rate of 2500 stitches per minute when driven by steam. The Centennial judges say in their report that this is the fastest double-thread sewing ever accomplished.

On page 1013 is an engraving of the LYALL loom exhibit at the Centennial. That the invention we have described is rapidly revolutionizing the textile art, the statistics of the weaving industry in this country clearly show. It may fairly be considered as representing the greatest advance in weaving that has been accomplished since the days of CARTWRIGHT and JACQUARD.



THE LYALL POSITIVE MOTION LOOM.  
THE CENTENNIAL—IMPROVEMENTS IN WEAVING.—[PHOTOGRAPHED BY THE CENTENNIAL PHOTOGRAPHIC COMPANY.]