Important Improvements in the Weaving Art.

It was a real treat to us to make a visit to the works of Messrs. J. & W. Lyall, at 468 to 464 West 33rd street, New York, where the finest and most improved looms in the world are constructed. This statement is no exaggeration, as proved by the fact that some of these improved looms are exported to England and other countries foremost in the weaving industry.

The main improvement which, Mr. James Lyall has effected, and which is really a triumph in the construction of looms and the art of weaving, being so fictitious and odd, is the result of the efforts of the improvements made by Whiteley or Jaggard, the positive motion shuttle. Its motion has only to be watched for a few moments to be convinced of its immense advantage and the extensive range of applications in which the ordinary method of moving the shuttle presents insurmountable obstacles to accomplish the results aimed at.

As it is known, the common method of moving the shuttle is to throw it through the warp; primitive as this was done by hand, and afterward by machines, the sliding hammer at the ends of the shuttle face, which, by means of cords, were connected with a long rod in the center of the loom, in this way could throw the shuttle to the right or left with one hand, while the other hand worked the loom. As soon as steam power was introduced to operate looms, this principle was changed, and the harness or pickers, as they are commonly called, were moved by machinery so as to throw the shuttle through the whole width of the warp.

The inserted and insurmountable defects of this system become evident on a little reflection. First, the shuttle must be moved with a certain velocity, so as to make it reach the end of its course; if it is not moved too slowly, there is danger that it may not pass over the whole fabric, and if moved too rapidly, it may throw the shuttle so violently that it may rebound. In both cases the shuttle may get caught between the loom and the fabric; this is technically called a "smash," and results in damaging the dent of the reed, when the loom must be stopped for repairs, which may take several hours. The speed necessary for such looms requires such a regulation that the engine must be properly adjusted, that its retardation of twenty-twelfths of the velocity is sufficient to cause the accident described. Thus, for instance, if the driving engine is calculated to make 40 revolutions per minute, and by neglect or some other cause, the engineer lets it slow up to 38 revolutions per minute, there is a great chance of several looms breaking at once.

Another objection is the speed with which the shuttle is thrown must vary with the nature of the material to be woven, whether it be cotton, flax, jute, or silk, and also with the fineness of the thread. This, combined with the variation demanded by the weight of the loom, and the width, and it will be seen that the proper adjustment of an ordinary loom is a matter of great difficulty and delicacy. Finally, as there is a limit to the distance to which the shuttle can be thrown, there is a limit to the width of the goods which can be woven.

All these difficulties have been most ingeniously overcome by the positive motion shuttle. It differs from the ordinary shuttle in that it is not thrown, and is never acted upon by the power which propels it. How this is accomplished may be understood from the explanation of Fig. 1, from which the shuttle is shown on its carriage O. Motion is given to the carriage and, through it, to the shuttle by means of a stack belt, which passes over various pulleys fixed to the ends of the loom and communicating with a single large pulley underneath the loom, to which, by special mechanism, hereafter to be described, the proper movement is imparted. The wheel A of the carriage is pivoted to the ends of each horizontal arm; the wheel B is simply journaled in the carriage. The weight of the latter therefore rests on the pivots of wheels A, and as these rest on the top of wheel B, it follows that they must receive a counter motion in the direction of the arrows marked on them, exactly equal to the motion of wheel B, which is likewise equal to the motion of the carriage along the ropery B. Now suppose a shuttle of parallel threads to be stretched above the carriage and beneath the shuttle P. The only points where these threads will be in contact with carriage and shuttle are obviously between the wheels B of the former and wheels A of the latter. If we move the carriage, so that the wheel A revolves to the left, wheel B will rotate to the right; and opposing the shuttle as received, it is clear that while the threads are necessarily raised as wheel B passes under them, the rotation of wheel A produces no lateral motion on their part. It is easy to see that the motion of the shuttle in the plane above the carriage will in no wise affect this result, because the wheels B rotate the wheels A at precisely the same speed, so that the ascending threads for the impracticable instant of time during which they lie between shuttle and carriage, remain so disregarded.

In a period of cost or dwell either in the shuttle or in the loom. Of course the shuttle must stop for repairs, the first to allow the loom to be stopped, and the latter to allow the shuttle to accomplish its whole course. Also the motion of the shuttle ought to be vertical halfway, increasing and decreasing toward the ends, so as to avoid rubbing jaws and stops. How this is accomplished is shown in Fig. 2, where A is a crank disk, from which motion is imparted by a connecting- rod B to a sliding block C is the slider or "vibrating arm," which is therefore an equal motion, which is most rapid when the shuttle is midway in its course, and gradually in the same manner decreases until the pick is made. The shuttle is never returned until the pick is got home, so that no matter what the position of the shuttle is to the fence when the loom is stopped, on starting again the first thing done is to draw it out of the way of the weft. The shuttle in the loom—on ob- serves novelty when the shuttle, in weaving wide fabrics, has to travel a very long distance—is obtained by the device shown in Fig. 3: A is a shuttle or "pulley wheel," in the slot of which is a sliding block, which is attached to the crank of the shaft B, which imparts motion to the loom. The crank is wound with a cord, and as the lever revolves it moves rapidly in the slot, consequently when the center is drawn it imparts an extremely slow or no motion to the shaft B, which movement when it has travelled out toward the circumference.

The home of Mr. Lyall was an exhibition at the Centennial, and we were a very conspicuous position at Marshall Hall, and are represented in the engraving on the opposite page, in which a small model of the loom is shown at the left. Formerly we were required many months to work them, one at each end to throw the shuttle, and one in the middle to move the loy. The loom here represented, weaving in 10 hours fabrics 24 feet wide and 180 feet long, or 3,200 square feet, is attended by a single girl. Notwithstanding the shuttle travels 21 feet every time, it makes 15 such journeys a minute.

As one of the results accomplished by the labors of Mr. Lyall, we may state that our importation of silk from Sundon was lessened, as the solmundo hand loom by which it is made in that country ceased to be competitive with Mr. Lyall's looms.

The great loom, our engraving represents the loom in the foreground, then the ten-quarter loom, the heavy jute carpet loom, and finally the brocure loom in the center. The bag and crepe looms are explained in our next article.