L. L. F. MALHÈRE.

JACQUARD.

APPLICATION FILED FEB. 25, 1908.

955,177.

Patented Apr. 19, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

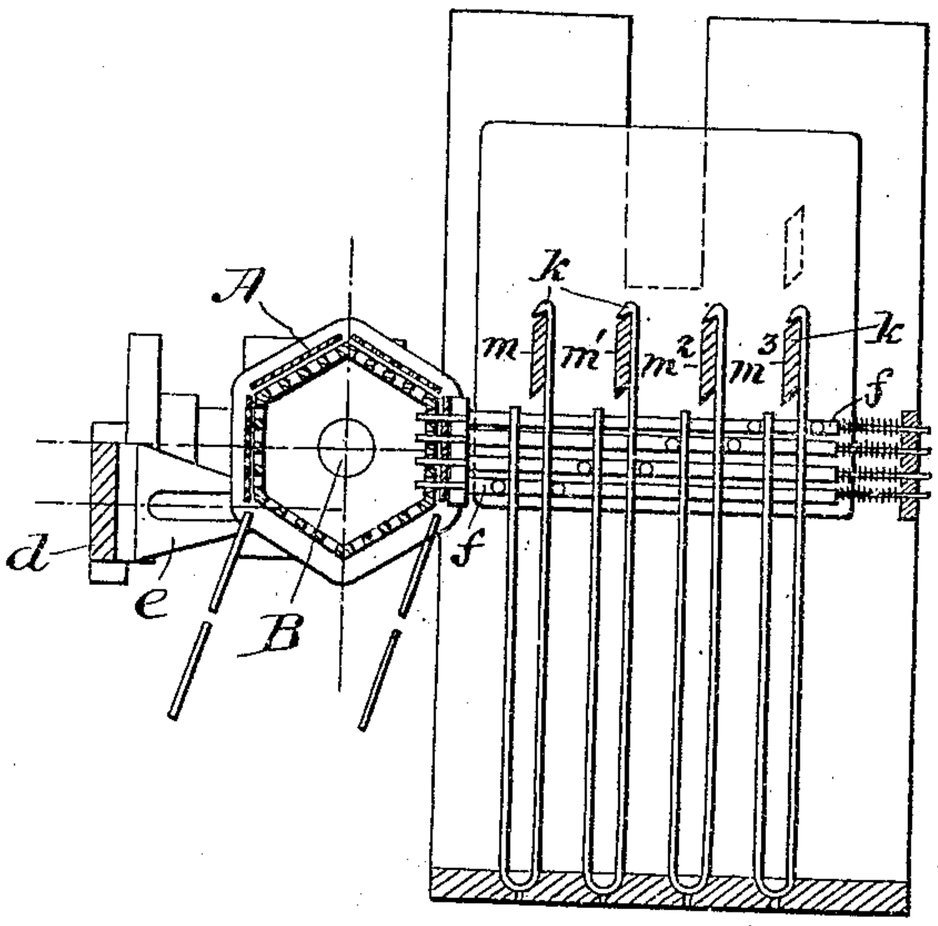


Fig. 2.

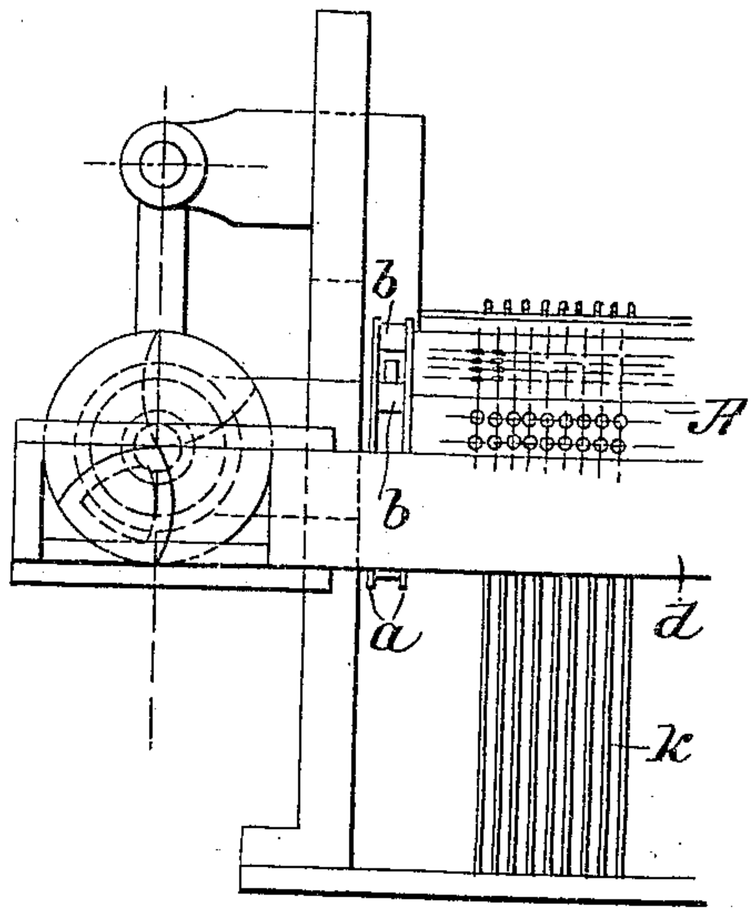


Fig. 3.

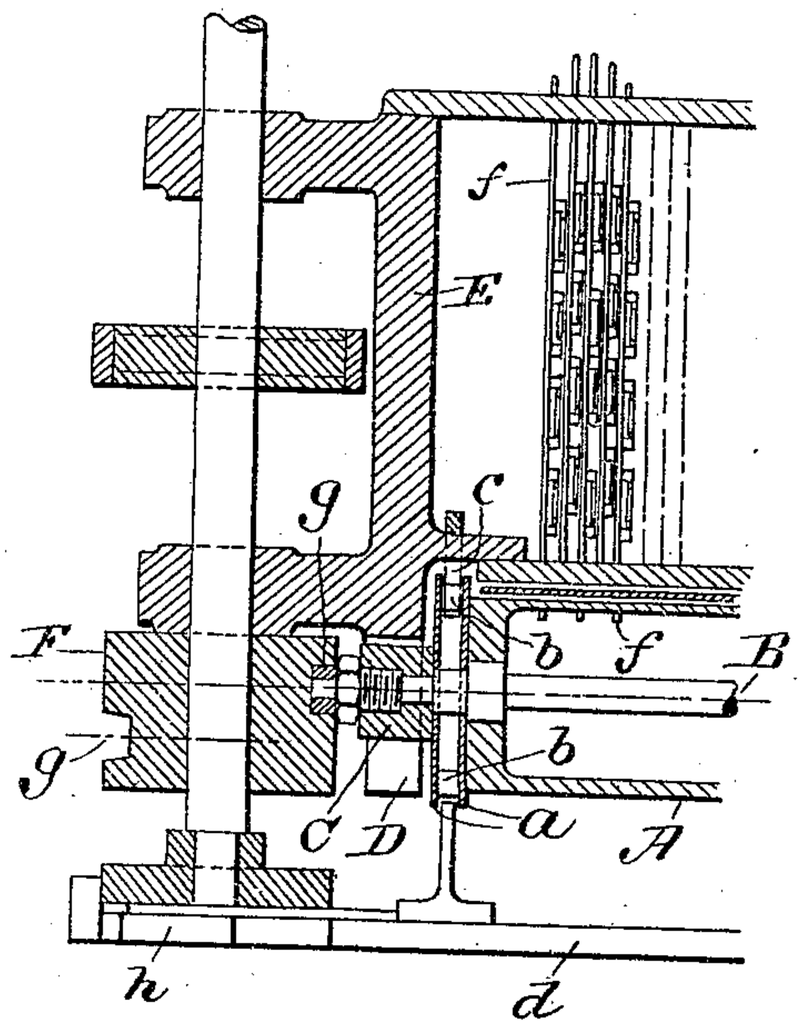
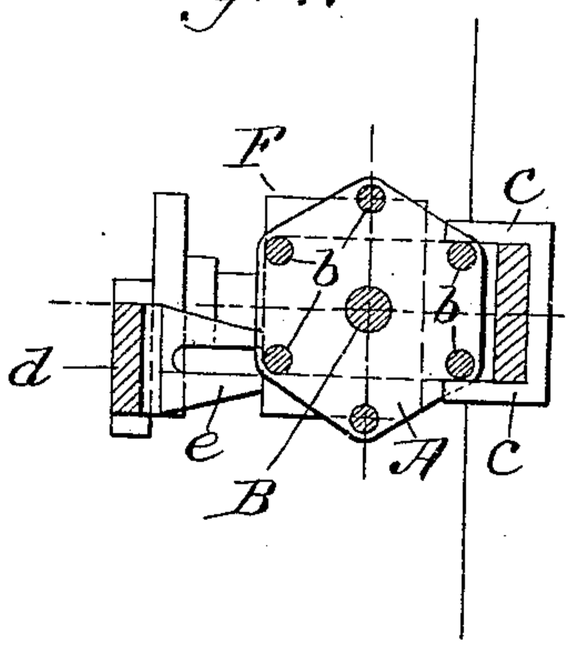


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

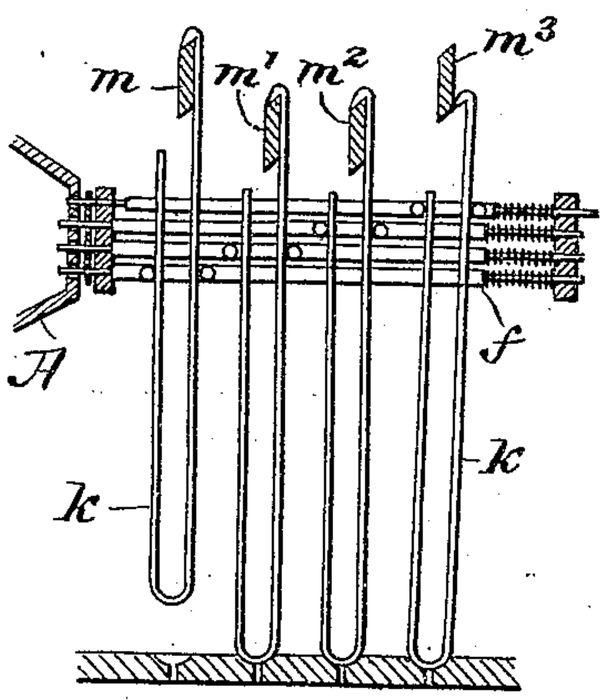


Fig. 6.

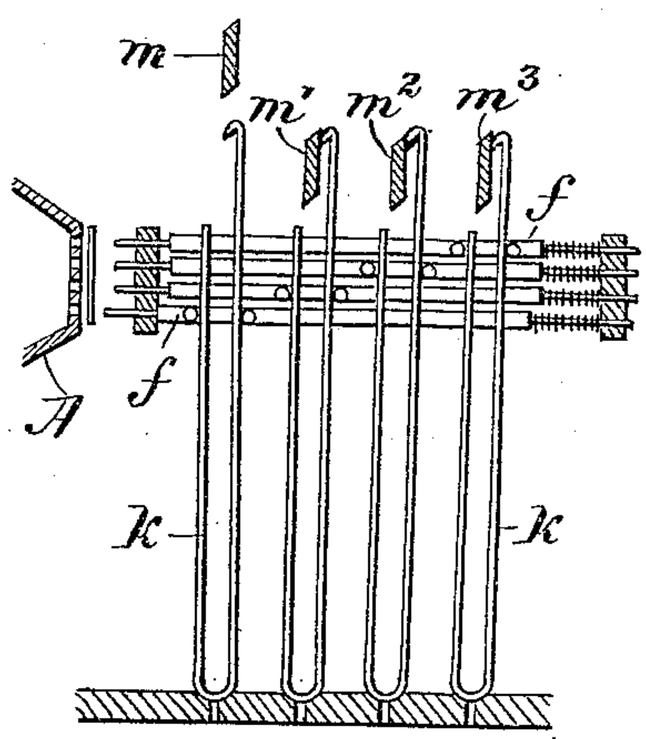


Fig. 7.

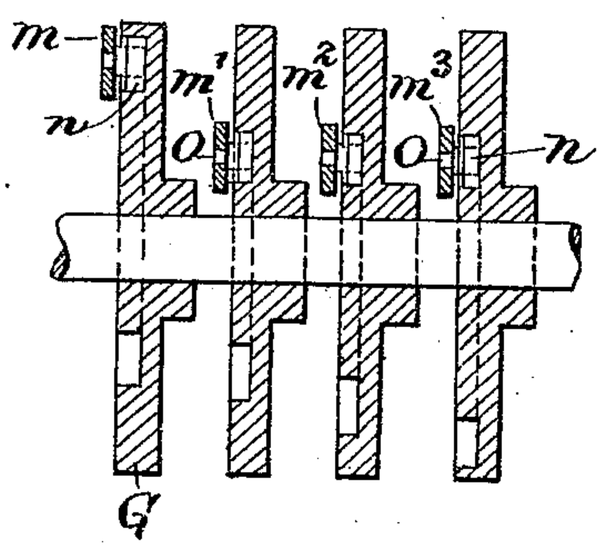
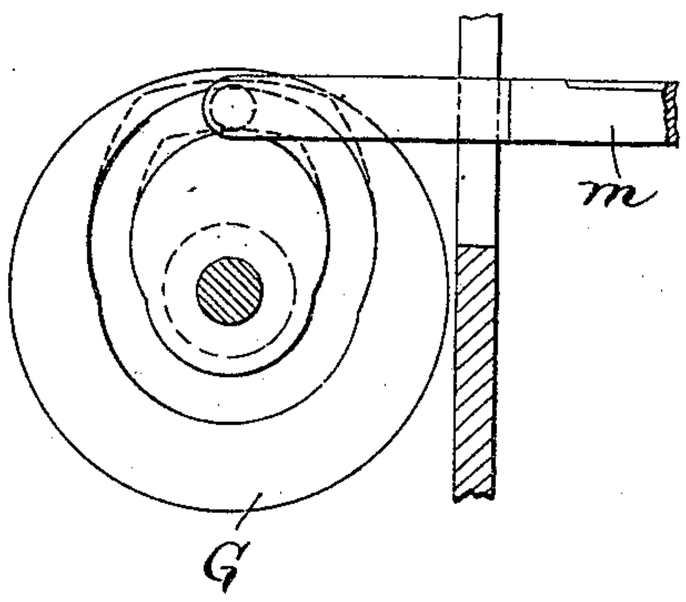


Fig. 8.



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UNITED STATES PATENT OFFICE.

LEON LOUIS FRANÇOIS MALHÈRE, OF BEAUMONT LE ROGER, FRANCE, ASSIGNOR TO THE FIRM OF ALBERT & E. HENKELS, OF LANGERFELD, NEAR BARMEN, GERMANY.

JACQUARD.

955,177. Specification of Letters Patent. **Patented Apr. 19, 1910.**

Application filed February 25, 1908. Serial No. 417,756.

To all whom it may concern:

Be it known that I, LEON LOUIS FRANÇOIS MALHÈRE, of Beaumont le Roger, France, a citizen of France, and whose post-office address is Rue St. Sauveur, Beaumont le Roger, Department de l'Eure, France, have invented new and useful Improvements in Jacquards, of which the following is a specification.

The present invention relates to improvements in jacquard mechanism and particularly to such mechanism designed to be used for controlling the movements of plaiting or lace making machines, and to this end it embodies improvements which allow the loom or other machine to which the jacquard is applied to be driven at a higher speed without the parts of the jacquard mechanism being subjected to excessively quick movements.

The usual jacquard mechanism consists in a pattern chain carried by a card-cylinder which may be of quadrangular, hexagonal or any other section and which is for a longer or shorter time held against horizontal needles so that knives lift selected vertical needles connected with the warp or any other threads. For changing the card the card-cylinder is moved away from the needles, turned by one face and is then again moved against the needles.

The object of the present invention, however, is to considerably reduce the to and fro motion of the card-cylinder and consequently the time required to make such movement.

The invention is represented by way of example on the annexed drawing of which—

Figure 1 is a section through the jacquard mechanism along a group of vertical needles, Fig. 2 is a front elevation, Fig. 3 is a horizontal section, Fig. 4 a vertical section of the card-cylinder-arrangement, and Figs. 5 and 6 show details to illustrate the operation of the mechanism, Fig. 7 is a vertical section, and Fig. 8 an elevation of the mechanism for actuating the knives.

The card-cylinder A is shown as having six sides, both ends of its axle B (Fig. 3) are fitted to revolve in blocks C which slide in guides D of the frame E. At both ends of the card-cylinder A there is a pin wheel consisting of two disks *a* with the same number of pins *b* between them as there are sides to the cylinder, and it is through these wheels that the cylinder is rotated and is held from rotation at the time it rests against the horizontal needles. In the position of the cylinder shown in Figs. 1 and 3, the same is held against the horizontal needles *f* the pins *b* of that side of the cylinder, which carries the operating pattern card, are embraced by a pair of fingers *c* (Fig. 4), which fingers prevent accidental rotation of the cylinder. In the front of the cylinder there is a cross-bar *d* ending on each side in a frame for resting on a cam *h* and carrying a forked arm or slotted member *e*. The cross-bar *d* is adapted to be moved in vertical direction by means of said cam *h*. In the drawing it is represented in its lowermost position.

It is apparent that when the card-cylinder A is moved away from the needles *f* by means of the cam F having grooves *g* acting upon the slide blocks C (Fig. 3) the pins *b* embraced by the fingers *c* will be released and the lowermost pin *b* of the opposite side of the cylinder will enter the forked arm *e* (Fig. 4). When the cylinder is so far cleared from the needles that it can turn without endangering the pattern card being torn by the protruding ends of the needles or the ends of the needles being bent, the cross-bar *b* will be moved upward by the triangular cam *h* (Figs. 2 and 3). The cylinder A is thereby rotated sufficiently to present the next pattern face. In this moment the two movements of the cylinder A, viz. the displacement away from the needles by means of the cam disk F and its rotation by means of the forked arm *e* are operated simultaneously, and it is also evident that these movements are independent the one from the other in so far as the rotating movement may be ended when the card begins to move back against the needles or may continue during the return motion, according to the way in which the various cams are shaped. The extent of the movement of the cylinder toward and away from the needles can, therefore, be reduced so as to leave only the play necessary for rotating the cylinder.

It is evident that the forked arm or slotted member *e* retains control of the card cylinder until after the partial revolution thereof is completed and that said cylinder at, or just before, its release from the slotted member *e* comes into control of the stationary double acting stop *c* (see Fig. 4) with

the result that the proper position of said cylinder is secured at all times, and especially at, and just before, the time of its engagement with the spring controlled needles *f*. This permits the rotation of the cylinder to be made at high speed, there being no possibility of its momentum carrying it beyond the next position at which it is to stop, nor of it rebounding backward from the stop.

In the single jacquard mechanism here described all vertical needles *k* operate simultaneously lifted by griff blades or knives m^1, m^2, m^3 connected with each other and all moved by one common mechanism. If, however, it is desired to work the jacquard at a higher speed the knives for each row of vertical needles are operated independently the one from the other in such a manner that the knife *m* nearest the card-cylinder is first lifted and the second knife m^1 commences its upward motion when the first knife *m* begins to fall and so on, that is to say the third knife m^2 goes up when the second knife m^1 goes down, and the fourth knife m^3 is lifted when the third knife m^2 descends. It is in this way possible to make the pattern card on the face of the card-cylinder A operate on four series of needles in succession and to form a whole cycle of movements before the cylinder is moved away from the needles to be turned for receiving the next card. Of course the movement of the knives must be timed to the to and fro movement of the card-cylinder, and this is done in the following way:—As already described one of the knives *m*, m^1, m^2, m^3 is always in motion. So for instance when the card-cylinder has ended its movement toward the needle the knife m^3 is lifted to its full height as shown in Fig. 1 in dotted lines and the other knives *m*, m^1, m^2 are each just under the hooks of the corresponding vertical needles. When now the horizontal needles have under the action of their springs entered the perforations in the card-cylinder that are not covered by the pattern card the hooks of the corresponding vertical needles are about to be engaged by the knives. Now the three knives *m*, m^1, m^2 begin to move, the first knife *m* in upward direction, this upward movement being coincident with the descending movement of the last knife m^3. m^1 and m^2 have moved only by so much as just to be about to engage the hooks of the corresponding needles and have here come to rest. Fig. 5 shows the knife *m* on half the way of its upward stroke, the knife m^3 on half the way of its downward stroke and the knives m^1 and m^2 in the position of just having engaged the hooks of the vertical needles. On the movement being continued the knife m^3 ends its descent, and its vertical needle held by spring action against the knife is on the point of being caught by the knife. Without stopping in the lowermost position the knife rises a little as this has above been described with reference to the knives m^1 and m^2. All the vertical needles are held against their corresponding knives except those that are pushed back by the horizontal needles that find no perforations in the pattern card to enter. The card-cylinder can now be moved away from the needles and turn because all vertical needles which were by action of the pattern cards pushed away from the knives are now again held against them without the knives actually engaging their hooks which are all now more or less disengaged as shown in Fig. 6. The movement of the card-cylinder against the horizontal needles takes exactly the same time as the knife m^3 takes for descending and rising to a position ready to engage the hook of the vertical needle. This time is about one fourth of the full cycle, the other three fourths can be utilized to turn the card-cylinder by one face to make it receive another card. During this rotation of the cylinder, the knife *m* descends, and knife m^1 and the other knives rise successively as before described.

The means for moving the knives upward and downward are shown in Figs. 7 and 8. They consist in four cams G with grooves keyed on the same shaft, which carries the cam disks F and *h*. The knives on each side end in pins *o* carrying rollers *n* which engage the grooves of the cams G. Fig. 8 represents the constructional form of the cam G for the knife *m* and shows this knife to have reached the full height of its stroke (Fig. 6). If it should be necessary to give the knives a short rest on their way the groove and the cam can be constructed as shown in Fig. 8 by dotted lines.

The specification describes and the drawing illustrates a four cycle jacquard machine with a single chain of cards, but it is obvious that the machine can always be constructed for a greater number of knives.

The placing of the grooved cam F, which reciprocates the card cylinder, on the same shaft that carries the triangular cam *h* which rotates it insures accurate timing of the pattern feed mechanism, and yet by shifting or modifying said cams or either of them the two movements of the cylinder may be independently varied.

Of course other mechanism than that illustrated could be employed for giving the series of knives or griff blades *m*, *m'*, m^2, m^3, etc. the consecutive or wave-like motion hereinbefore described, and the character of this motion can be varied widely with the mechanism described by modifying the shape of the cam grooves.

What I claim and desire to secure by Letters Patent of the United States, is:—

1. In a jacquard mechanism, the combina-

tion of the card cylinder, mechanism for reciprocating said cylinder and independent mechanism for rotating said cylinder comprising a reciprocating member slotted at right angles to its direction of reciprocation, a series of pins on the cylinder adapted to engage the slot one by one, and mechanism for reciprocating the slotted member.

2. In a jacquard mechanism, the combination of the card cylinder, mechanism for reciprocating said cylinder and independent mechanism for rotating said cylinder comprising a reciprocating member slotted at right angles to its direction of reciprocation, a series of pins on the cylinder adapted to engage the slot one by one, and mechanism for reciprocating the slotted member, comprising a triangular cam.

3. In a jacquard mechanism, the combination of the card cylinder, mechanism for intermittently reciprocating the cylinder, a stationary double acting stop which engages and locks said cylinder against rotation during a portion of its reciprocating movement, and rotating mechanism which positively controls the revolution of the cylinder during the remaining portion of its reciprocating movement.

4. In a jacquard mechanism, the combination with the card cylinder of a grooved cam engaging the end of the cylinder shaft to horizontally reciprocate same, a set of vertically reciprocating fingers and carrier therefor adapted to intermittently impart partial rotation to the cylinder and a cam engaging the carrier, both said cams being mounted on the same shaft.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LEON LOUIS FRANÇOIS MALHÈRE.

Witnesses:

GABRIEL BELLIARD,

HANSON C. COXE.