

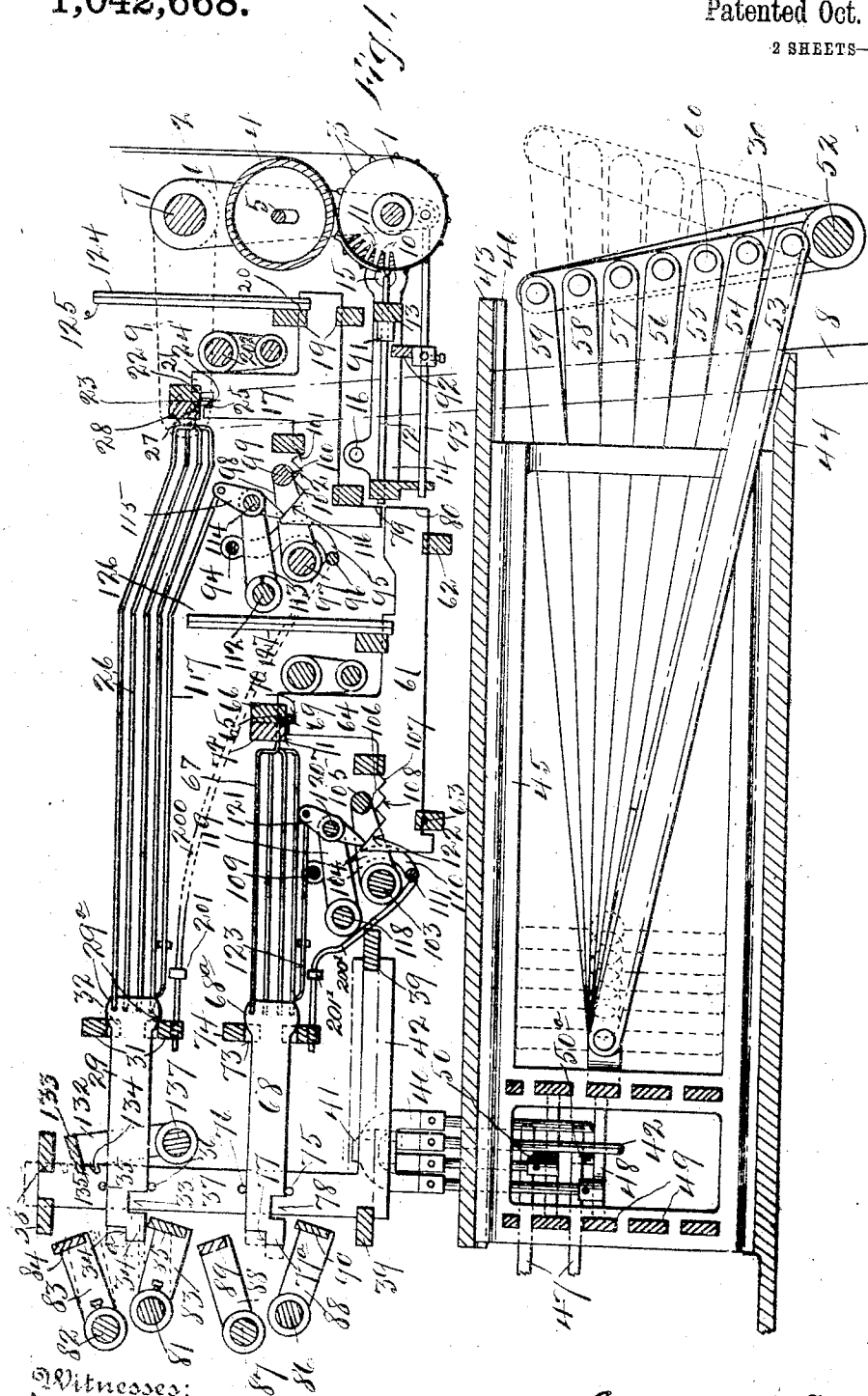
J. A. GROEBLI.
JACQUARD.

APPLICATION FILED JULY 11, 1911.

1,042,668.

Patented Oct. 29, 1912.

2 SHEETS—SHEET 1.



Witnesses:

J. A. Groebli
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Joseph A. Groebli Inventor
by *Charles W. Hensley* Attorneys

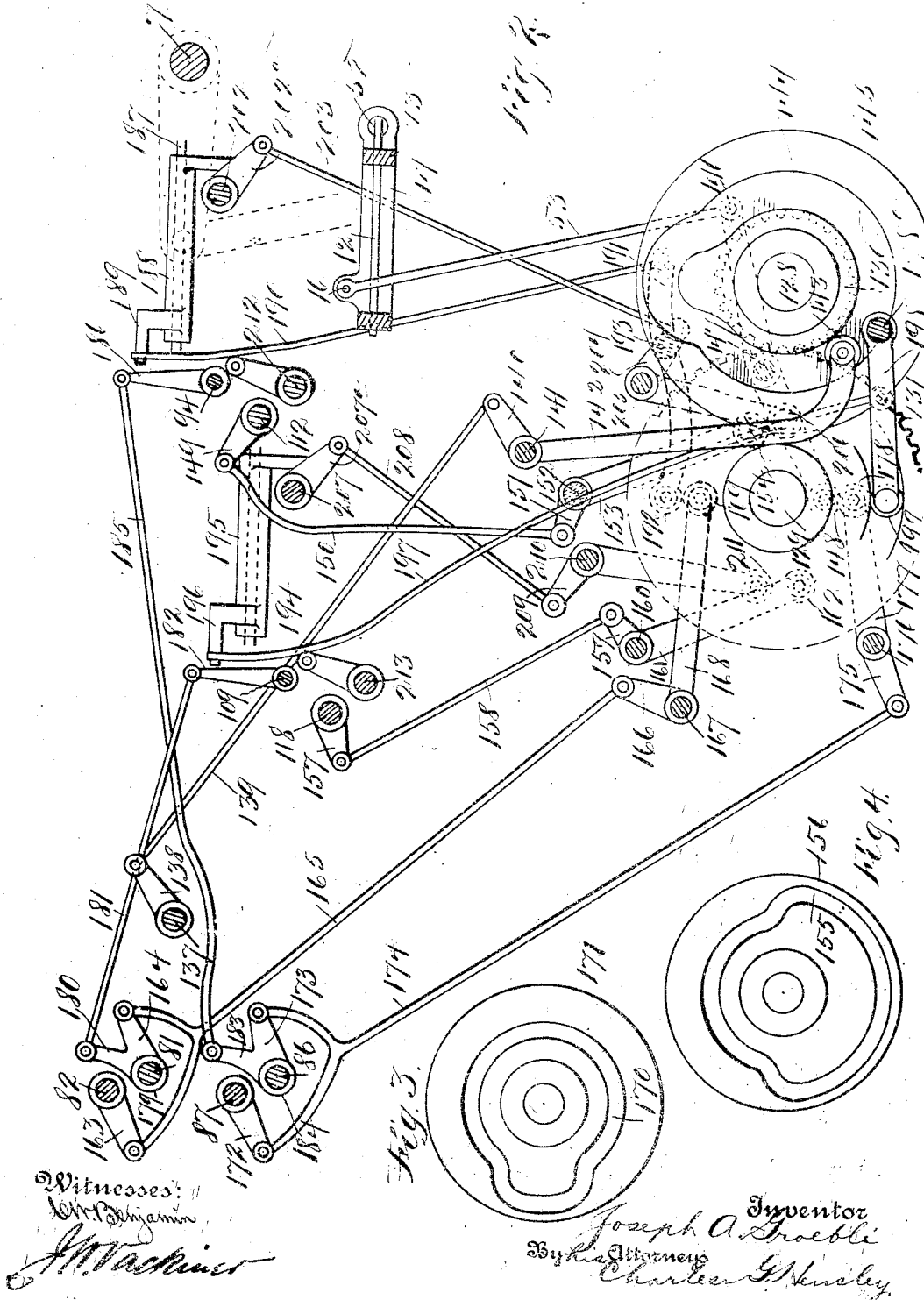
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UNITED STATES PATENT OFFICE.

JOSEPH A. GROEBLI, NEW YORK, N. Y.

JACQUARD.

1,042,668.

Specification of Letters Patent.

Patented Oct. 29, 1912.

Application filed July 11, 1911. Serial No. 638,012.

To all whom it may concern:

Be it known that I, JOSEPH A. GROEBLI, a citizen of the United States, and a resident of the city, county, and State of New York, have invented a certain new and useful Jacquard, of which the following is a specification.

My invention relates to a jacquard or automat and it has more direct reference to a jacquard for operating the tambour frame of an embroidering machine.

In embroidering machines of the large type in which the fabric is stretched upon a tambour frame before a large number of needles, which are moved in and out always in given paths, it is necessary to move the tambour frame for each stitching operation, so that the stitches will be formed on the fabric to produce the desired design and the principal, though not only, function of an embroidering machine jacquard, is to move the tambour frame after each stitch, so that the desired design will be produced in multiple, upon the fabric, by the various needles. Inasmuch as the fabric or tambour frame must be moved almost universally within the extreme limits of its motion, the jacquard if operated on a unit system, must be capable of moving the tambour frame many different units in extent in any direction.

In U. S. Patent #528632, dated November 6, 1894, I showed in detail a complete jacquard mechanism for operating embroidering machines, which has proven very successful; and in which a large number of ultimate movements are produced by combining movements of different units in extent, in various combinations. In that patent I showed how the number of slides could be reduced to a comparatively small number (there being 32 such slides) which operated to add and subtract different units of movement, so that a large number of ultimate movements could be produced with a very small number of jacquard elements. The present invention, though not necessarily limited to such use, is of particular advantage when embodied in a jacquard constructed in accordance with said patent. In order to simplify as much as possible the present case, I shall make cross reference to said Letters Patent and the structure therein shown and described. It may be here stated that the machine therein shown may be used

in its entirety as the foundation of the present invention, except in so far as parts of that structure are obviously superseded by the mechanism shown in the present drawings.

In the patent referred to I showed a number of needles (32) which are operated upon by the jacquard card when the latter is reciprocated at each operation, and the needles cause the reciprocation of certain slides, which in turn reciprocate certain selecting slides. These latter cause the coupling of various sliding frames which are reciprocated by a lever which produces different units of movement in the several sliding frames, with certain rack bars. The combinations caused by the interlocking of the different sliding frames with the different rack frames results in various ultimate movements being produced upon the tambour frame of the embroidering machine. The purpose of the slides is to select and combine the various units of movement, while the operating force itself, is introduced through the lever above referred to which operates the sliding frames. The various devices for selecting the slides, locking them, causing the devices to be interlocked, which are selected; and producing the operating force and transmitting it to the tambour frame all operate in regular sequence. The time actually consumed during each complete jacquard operation, in the actual moving of the tambour frame therefore is but a part of the time, consumed in the complete operation, from the movement of the jacquard card to the movement of the tambour frame. In order to have the embroidering machine operate rapidly it is necessary to speed up the jacquard, and as the different parts of the jacquard mechanism must operate in a given sequence it is necessary to operate some parts thereof, very rapidly, in order to allow a sufficient proportion of the time of each operation for the movement of the tambour frame.

The object of my invention is to provide certain mechanism in duplicate relation, with means for causing the duplicate sets to operate alternately to each other. In this way, each separate set of devices may be operated at a reduced speed over the former corresponding devices, when the jacquard is operated at the same speed as heretofore. By arranging the plural sets of devices,

hereinafter referred to in detail, so that one set can overlap the other in its time of movement the jacquard may, if desired, be operated at greater speed than heretofore. This is accomplished without complicating the mechanism beyond practical limits, by providing two sets of slides each of which are operated by the same jacquard card and preferably through one set of needles; and the two sets of slides are arranged to operate through a common coupling mechanism as will appear more fully hereinafter.

In the drawings forming a part of this application, Figure 1, is a sectional view showing many of the features of the present invention, and the structure, shown, is to supersede that portion of the structure of my U. S. Patent #528632 as is therein illustrated in Fig. 5, Fig. 2, is a cross section, showing the various cam and lever devices for operating the several parts of the mechanisms shown in Fig. 1, Fig. 3, is a face view of one of the cams, and Fig. 4, is a similar view of another cam.

As has been said the entire mechanism shown in my said patent is preferably employed except in so far as portions thereof are superseded by the mechanism herein shown, and as the said patent fully describes the whole jacquard the present description will only cover so much as will be necessary, taken with said patent, to teach the present invention.

Herein I have shown a jacquard card roller 1, around which the jacquard card or pattern roll 2, is propelled by the intermittent revolution of the roller, and the roller as in said patent, is provided with pins 3, extending from its periphery, at either end, in equidistant relation, which engage in corresponding apertures in the card 2, for the purpose of propelling the card. Above the roller 1, is arranged the idle roller 4, which revolves freely on its shaft 5; and this roller serves to keep the card in proper contact with the active roller 1. The shafts of both rollers 1 and 4, are journaled in a pair of arms 6, and the latter are rocked with the shaft 7, by a link 8, connected with an arm 9, also connected with the shaft 7, all of which is similar to my said patent. The link 8, is preferably operated by the same mechanism as in my said patent, for the purpose of rocking the shaft 7 and arms 6, so that the rollers will be oscillated at each operation of the jacquard. The roller 1, has a reticulated periphery, formed by the spaced bars 10 the intermediate spaces 11, aligning with the rows of apertures in the jacquard card, as the latter travels around the rollers.

In my said patent I showed a jacquard card having perforations arranged in transverse rows, which effect the reciprocating needles; and I showed twenty eight needles

12, arranged parallel with each other in four groups of seven each, together with certain additional needles for special purposes, such as determining the direction in which the movement of the jacquard parts were to take place and for various other purposes, and I arranged one needle for determining the direction for each of the four groups of slides above mentioned. In the present case I prefer to arrange the same number of needles 12, in the same order of grouping, as in said patent, for somewhat similar functions. There are, therefore, preferably twenty eight such needles arranged in four groups each, with an additional needle in each group for controlling the direction of the movement produced in the tambour frame positioning elements. These needles are carried in a rocking frame, consisting of the plates 13, in which the needles are adapted to reciprocate longitudinally of their length; and the connecting side bars 14 which are adapted to be supported by, and oscillate on the studs 15, on each side of the jacquard frame. The studs 15, it will be noted, are substantially in line with the point where the needles 12, engage the surface of the jacquard card, so that when the opposite ends of the needles are moved, the needles will oscillate from a point near where they contact with the card and the jacquard will not be affected by the oscillating of the needles in the shifting operation to be described herein. On the side bar 14, of the needle frame, I have fulcrumed, at the point 16, a link or rod 17, by which the needle frame is slightly oscillated at each operation of the jacquard for shifting the needles from engagement with one set of slides to the other.

I prefer to employ the T slides similar to the T slides shown in my said patent, but in duplicate sets for accomplishing the new results. Above each of the needles 12, I have arranged a T slide 17, which are preferably of similar shape and numbers to the T slides 1, of my said patent. There are means shown herein for supporting and guiding these slides, consisting of the transverse bars 19, each of which is provided with as many vertical slots 20, as there are T slides in this set. The upper ends 21, of the T slides are preferably guided in vertical slots 22, in the under side of a guide bar 23. Each T slide has a slot 24, in which projects the end 25, of one rod 26, of a group which operate the selecting slides. There is a connecting rod 26, for each T slide 17, corresponding to the rods 2, of my said patent. The rods 26 are guided in the slots 27, in a cross bar 28, and the bars extend forward, and each one is connected at its other end with the oscillating selecting slides 29, which latter correspond with the slides 7, of my said patent. Each

slide of each group of T slides (of the four groups) has a rod 26, connecting with one of the oscillating slides 29, which latter are arranged in seven groups of four each, the seven groups representing each one of the units of motion caused by the operating lever 30. The oscillating slides 29, therefore, correspond in number and groupings with the slides *j*, of my said patent. The oscillating slides 29, which I shall, for convenience, hereinafter term the selecting slides, are supported by the transverse guides 31, and are guided in the vertical slots 32, thereof. The forward ends of these slides are preferably shaped similar to the slides *j*, of my said patent. Each slide has a cutout or notch 33, in its bottom edge, and a cut out or notch 34, in its upper edge, which notches are arranged one behind the other. Each slide is arranged between the engaging pins 35, 36, of the vertically movable plates 37, there being as many such plates 37, as there are slides 29, arranged side by side. The plates are preferably L shape, and are guided by the slotted bars 38, at the top and by the slotted bar 39, at the bottom. For each of the seven groups of four plates 37, there are four coupling devices, as in my said patent. There is a plate 40, which has the lips 41, engaging the longitudinal portion 42, of the plate 37, and the former is therefore adapted to be moved vertically. There are as many such plates 40, as there are plates 37, being arranged in groups of four each, the same as the members *k*, in my said patent. Each member 40, is connected with a coupling rod 42, which serve to couple various reciprocating frames for producing various combinations of units as in said patent.

There are horizontally disposed frame members 43, 44 between which I have arranged seven sliding frames, 45, arranged side by side, and guided by the vertical grooves 46, in said frame members. These sliding frames correspond in function with the frames *G*¹, *G*², *G*³, *G*⁴, *G*⁵, *G*⁶, and *G*⁷, of my said patent, but they are preferably made longer as shown in the drawings. Forward of the frames 45, are arranged horizontal rack frames 47, there being four (only two being shown herein, for simplicity) such frames, which preferably correspond in construction and function with the rack frames *m*, *m*¹, *m*², *m*³, of my said patent. The coupling rods 42, are moved with the sliding frames 45, there being four coupling rods arranged in each such sliding frame operated by separate selecting slides. Each coupling rod has a bar 48, secured to it, which bar 48, is guided between the bars 49, of the sliding frame 45, and each of the bars 48, have a coupling pin 50. The coupling pin 50 engages in an aperture in the upper rack frame 47, while

the pin 50^a, engages in the second rack frame 47, etc., similar to the pins *k*^a, in my said patent.

The lever 30 rocking with the shaft 52, at each operation of the jacquard corresponds with the lever H, in my said patent and this lever is adapted to produce movements of different units, in length. I fulcrum the links 53, 54, 55, 56, 57, 58, 59, at different distances from the shaft 52, on the lever 30, and connect each link with a different sliding frame 45, so that, by reason of the different arcs of movement of the fulcrum points 60, the sliding frames will be reciprocated different extents, representing seven units of movement. It will be noted that the links 53, to 59, are longer than the links shown in my said patent, which is preferable in the present structure.

From the above it will be apparent that with the exception of the size of the parts, the construction from the plates 40, through the coupling mechanism and the mechanism for furnishing the operating force for the tambour frame movements and in fact all the devices following the plates 40, are preferably the same as in my said patent.

Preferably on a lower plane than the first set of slides 17 and rods 26, I have arranged a second set which are adapted to be operated in the same manner as the first set and to perform the same functions, through the same mechanisms, as the first set, but at a different time, to wit in alternate relation thereto.

The T slides 61, are arranged in groups corresponding with, and preferably in vertical line with, the T slides 17. These T slides 61, are guided and supported by the cross bars 62, and reciprocate in the vertical grooves 63, thereof. The upper extensions 64, of these slides are preferably guided in vertical grooves 65, in the cross bar 66. For each T slide 61, there is a connecting rod 67, which extends forward and is connected with a selecting slide 68. The rods 67, have their bent ends 69, extending into recess 70, in the T slides 61, and are guided by the grooves 71, in a bar 72. The oscillating selecting slides 68, are arranged in seven groups of four each, similar to the slides 29, with such additional slides as may be necessary to control the direction of the movement of the tambour frame positioning elements. There will therefore be as many rods 67, as there are slides 68, and likewise as there are T slides 61. The seven T slides 61, of each group of four are adapted to effect, through their rods 67, the movement of the oscillating slides 68, of the seven groups of four each similar to the said T slides 17, and their connecting rods and oscillating slides.

The oscillating selecting slides 68, are guided in the vertical grooves 73, of the cross bars 74, and they extend forward, and

each engages between pins 75, 76, on the plates 37. The selecting slides 68, are preferably arranged in vertical line with the slides 29, and each engages the pins 75, 76, of a plate 37, which are here shown as the same plates as those affected by the selecting slides 29. The slides 68, also have a recess 77, on their upper edge, and a recess 78, on their lower edge, which come one ahead of the other.

It will be apparent that the arrangement of the set of slides 29, and the set of slides 68, are such that both sets perform the same function and by following the construction in the form herein shown, the number of parts may be small because of the selecting slides of each operating upon the same interlocking mechanism.

The ends 79, of the slides 17, and the ends 80, of the slides 61, lie close to each other and in such a position that the needles 12, may be placed in line with either set of slides by a slight rocking of the needle frame.

For each set of selecting slides there is provided means for engaging therewith for the purpose of effecting the operation of the interlocking mechanism. Upon shaft 82, I provide arms 83, which carry a cross bar 84, and on a shaft 81, I provide arms 83, which carry the cross bar 85. By rocking both shafts 81, 82, so that the bars 84, 85, are moved toward the slides 29, the latter are engaged by one or the other of the bars 84, 85, and the respective plates 37, with which the slides engage, are either raised to cause the movement of an interlocking rod, or are held down to prevent the rod from being operated. For the slides 68, I have provided the shafts 86, 87, which carry arms 88, respectively, and these are connected by the cross bars 89, 90. The bars 89, 90, have the same effect upon the slides 68, that the bars 84, 85, have on the slides 29.

I preferably employ separate means for returning the two sets of slides after they perform their operations and separate means for returning the several needles. I have provided each needle with a small block 91. In one bar 13 of the needle frame are arranged the sliding rods 93, which have one end fulcrumed to the arms 6, respectively, of the pattern roller operating device; and extending between the rods 93 is a bar 92, which lies in the path of the blocks 91, of the various needles. When the jacquard card is reciprocated with the roller 1, the rocking arms 6, reciprocate the rods 93, carrying the bar 92, ahead of the blocks 91, of the needles and permit the various needles to be forced forwardly, if they are so required by the pattern; but upon the return movement of the plates or arms 6, and the roller 1, the bar 92, engages the blocks 91, of those needles which were previously ad-

vanced, and returns them to the position shown in Fig. 1, where they will all be in position to be again operated by the jacquard card.

On a shaft 94 I have provided the curved arms 95, which carry the bar 96, disposed in the path of the T slides 17. The purpose of this bar is to engage and return such slides 17, as are reciprocated by the needles, after such slides have performed their function: and this bar will be reciprocated every second operation of the jacquard, since the slides 17, are only operated every alternate operation of the jacquard.

On a shaft 97, I have provided arms 98, which carry a locking bar 99, which is V shaped on its under edge 100, and the purpose of this bar is to engage in the notch 101 of those slides which are moved forward by the jacquard card, and in the notches 102, of the slides 17, which are not affected by the jacquard card, so that the slides will be positioned and locked while the tambour frame of the embroidering machine is being positioned. During every alternate operation of the jacquard, the shaft 97, will be rocked to cause the bar 99, to lock the slides 17, and again rocked after the plates 37, have been selected and locked, to unlock the slides 17, in order that the latter may be returned and afterward again operated by the jacquard card.

For the slides 61, I provide shaft 103, which carries the arms 104, between which is connected a bar 105, having a V shaped edge 106. This bar 105, is adapted to engage in the notches 107, of the slides 61, which are moved forward and in the notches 108, of the slides which are not moved, and the function of the bar 105, in relation to slides 61, is therefore similar to the function of bar 99, in relation to slides 17. The shaft 103, will be rocked to lock slides 61, until the plates 37, have been selected and locked and afterward rocked to unlock slides. The shaft 103, will be operated upon every second operation of the embroidering machine and in alternate relation to the shaft 97.

On a shaft 112, I provide the arms 113, which carry the shaft 114; and the latter forms a fulcrum for the lever 115, which extends downwardly and is adapted to engage on the incline 116, of any of the seven slides 17, of one of the four groups. The arm of the lever 115, is connected with one of the slides 29, corresponding to the slides of the groups $G^{\circ\circ}$, of my said patent, which slides control the locking of the several rack frames. There will be four such levers 115, one for each group of seven slides 17; and each will be connected with one of the slides j of groups $G^{\circ\circ}$, of my said patent, by means of the rods 117, and the lever 115, therefore performs the same functions as in said patent. Similar mechanism is provided for

the slides 61. There is a shaft 118, which carries the arms 119; and on the latter is the shaft 120, which forms a fulcrum for a lever 121. One arm of this lever extends downwardly to be engaged by the incline 122, of the slides 61, and to one arm of the lever 121, is connected a rod 123, which connects with one of the slides 68, similar in all respects to the slides 29, with which the rods 117, connect and adapted to perform the same function through the same means. The levers 115, and their connected parts, may be considered the same as the levers 2^a, of my said patent, and their connected parts, while the lever 121, is a duplication thereof, and arranged to operate through duplicate slides, the same mechanism.

On a shaft 137, I have arranged the arms 132, which carry a locking plate 33, the purpose of which is to lock the plates 37, in either of their two positions, so that when they have been selected and raised they will be held in their raised position, in order that the selecting slides may be returned for the next operation without waiting for the return of the plates 37. For this purpose, I have provided notches 134, and 135, in each plate 37. When the plates are all in their lower position the bar 133, engages in the notches 135, of all the plates and when the plates are to be raised, the bar 133, swings out of the notches 135, when certain of the plates which have been selected by the selecting slides, will be raised, for an operation of the mechanism, and when the raising of the selected plates has been completed, the bar 133, will be rocked back and will engage in the slots 134, of those plates which were raised, and in the slots 135, of those which were not raised; and this engagement will retain the plates in position until the movement of the tambour frame has been completed, after which the bar 133, is moved out to release the raised slides; and again moved into the slots 135 of all the plates until the next selection takes place. This complete action of the bar 133, takes place for each operation of the jacquard.

For preventing error and conflict in the mechanism, I preferably employ the same protective mechanism as that shown in my said patent, but some parts thereof will be duplicated. I have shown the shear blades 124, 125, which are in all respects similar to the shear blades P¹, P², of my said patent, and the parts connected to and operated by the shear blades are preferably in all respects similar to my said patent, the only difference being in their time of operation. These shear blades are arranged to close upon the T slides 17, and to determine when more than one slide of a group remain back in any operation and automatically stop the machine; and since the difference over my said patent is in the time of their operation

only so much of the various details of the shears and the devices operated thereby is here shown as is necessary to teach my present invention. I also provide shear blades 126, 127, which operate in the same manner upon the T slides 61, to determine when more than one slide of a group remain back in any given operation, and these shear blades perform the same operation as to slides 61, as the shear blades 124, 125 to the slides 17, and as the shears P¹, P², of my said patent to the slides 2, therein shown, but the opening and closing of the shears 124, 125, and shears 126, 127, will be in alternate relation, one pair operating at one operation of the machine and the other pair at the next, and so on.

The shaft 202, is similar to and is adapted to perform the same functions through the same mechanisms as the shaft P of my said patent, but it is only operated on every second operation of the machine. An arm 202^a, on this shaft is connected by a link 203, with a lever 204, which rocks on a shaft 205. One arm of this lever has a bowl 206, which travels in a cam groove similar to groove 170, of cam 171, (Fig. 3). The shaft 202, therefore is rocked at every second operation of the jacquard. The shaft 207 is similar to shaft 202, and to shaft P of my said patent and is adjusted to perform the same functions through similar mechanism, for the second or lower set of shears herein. This shaft has an arm 207^a, which is connected by a link 208, with a lever 209 that rocks on a shaft 210. The other arm of this lever has a bowl 211, which travels in the same groove as the bowl of lever 204, but opposite thereto, so that levers, 204, and 209, will rock alternately. Shafts 212 and 213, are similar to each other and correspond to shaft O², of my said patent and are each adapted to perform the same function through similar connections.

We come next to the means for operating the above devices in proper relative order, to produce the desired results. In Fig. 2, I have shown various means for operating the various mechanisms. I have here shown the main shaft 128, of the jacquard disposed transversely thereof, as in my said patent. Inasmuch as many of the devices operate only on every alternate operation of the jacquard I prefer to provide a secondary shaft 129, which is operated from the main shaft 128, through the gear 130, on the latter and a gear 131 on the former of twice the size of gear 130, so that the secondary shaft 129, will operate at half the speed of the main shaft. Those elements which are moved at each operation of the jacquard are operated directly from the main shaft, while those which are moved at every second operation are operated from the secondary shaft. The shaft 137, which carries the means for lock-

ing the plates 37, at each operation, is rocked by means of the arm 138, to which is fulcrumed a link 139. The other end of this link is connected to the arm 140, of a lever which rocks from the shaft 141, and the arm 142, of this lever carries a bowl 143, that travels in a cam groove 144, in a cam 145, on the main shaft. Through the action of the cam on the lever 142, 140, the shaft 137, and consequently the arms 132, with the connected bar 133, will be oscillated at each operation of the jacquard, to unlock and lock the plates 37.

For shifting the needle frame to bring the ends of the needles in line to engage one or the other of the two sets of T slides, I provide a rod 53, which is fulcrumed to the plate 14, of the needle frame, and the other end is fulcrumed to a lever 146, which rocks from a shaft 147. The other arm of the lever 146, has a bowl 148, which travels in a cam groove of a cam on the shaft 129. In order to avoid showing a number of cams, different only in proportions I have shown in Figs. 3 and 4, examples of the cams which are arranged on shaft 129. The cam which operates the bowl 148, of lever 146, is in all respects a duplicate of that shown in Fig. 4, except that the cam groove is made on smaller arcs, as the lever 146, requires to be rocked only a slight extent.

For operating the shaft which carries the levers, 115, I provide an arm 149, on this shaft which is connected by a link 150, with an arm 151, on a shaft 152. The other arm 153, on this shaft 152, extends downwardly, and has a bowl 154, which travels in a cam groove 170, of a cam 171 on shaft 129, which cam is shown in Fig. 3. The shaft 118, which operates the levers 121 in connection with the lower set of T slides, is provided with an arm 157, which is connected with an arm 159, by a link 158. The other arm 161 which, with arm 159, forms a lever rocking on shaft 160, has a bowl 162, which travels in the same cam groove 170, as the bowl of lever 153; but the bowls 154 and 162, are arranged opposite each other in the cam groove. The purpose of this is to impart a rocking movement to the shafts 112, and 118, at every second operation of the jacquard, and so that the two shafts operate in alternate relation.

The jaws which engage the selecting slides are operated as follows: The shaft 82 which carries the arms 83, and bar 84, is provided with an arm 163; while the shaft 81, which carries the arms 83, and bar 85, is provided with an arm 164, directed opposite to the arm 163, of shaft 82. These two arms 163, 164, are connected by a bifurcated link 165, with a lever 166, which rocks on a shaft 167. The arm 168, of this lever has a bowl 169, which travels in a groove of a cam similar to cam 171, shown in Fig.

3. Each revolution of the shaft 129, and therefore every second revolution of the main shaft, causes the shafts 82, 81, to be oscillated in reverse directions, to cause the jaws to close on the selecting slides 29, for the purpose of operating the plates 37. The shafts 87, and 86, have arms 172, 173, arranged in opposite directions from their respective shafts. These arms are connected by a bifurcated link 174, with a lever 175, rocking at 176 and one arm 177 of this lever has a bowl 178, which travels in the cam similar to the cam groove 170 of the cam 171. The shafts 87, 86, are therefore oscillated at each revolution of the secondary shaft and therefore at every second operation of the jacquard, for the purpose of closing the jaws 89, 90, on the selecting slides 68. Since the bowls 169, and 178, are opposite each other in the cam groove the jaws 84, 85, will be operated in alternate relation with the jaws 89, 90.

In order to simplify the mechanism and properly time the movements relative to each other, I preferably take the operating force for the shafts 94, and 109 which return the T slides, from the device for operating the jaws. On the hub 179, of the arm 164, on shaft 81, I have provided an arm 180, which is connected by a link 181 with the arm 182, on the shaft 109. Thus when the link 165, rocks the shafts 81, 82, it also rocks the arm 180, link 181, and through the arm 182, the shaft 109. The movement of the latter in one direction permits the slides 61, to be moved forward, and upon the return oscillation it returns any of the slides 61, which were moved forward and which have performed their function. In similar manner I have arranged an arm 183, on the hub 184, and this is connected by a link 185, with the arm 186, on the shaft 94, so that the oscillations of the shaft 86, will be transmitted to shaft 94. The latter, when it oscillates, causes the bar 96, to return any of the slides which were moved and upon its return movement is moved away from the slides 17, to allow them to be moved forward. From the above connections it will be apparent that the returning rods 96, 111, each operate at every second operation of the jacquard and in alternate relation to each other.

We now come to the device for operating the shears.

In Fig. 2, I have shown the shaft 187, which corresponds with shaft Q' of my said patent, on which the link 188, rocks and the hub 188, corresponds with the hub p of said patent, while the arm 189 corresponds with the arm p', thereof. That is to say the shear mechanism is preferably the same down to the arm p'. The latter is connected by a link 190 with a lever 191, which rocks from a shaft 193; and the lever has a bowl 192, which travels in the groove of a cam on

shaft 129, similar to that shown in Fig. 3. The hub 188 therefore, and its connected parts, will be oscillated upon each alternate operation of the jacquard to wit, the operation when the slides 17, are effective. I have arranged a shaft 194, which is in all respects similar to shaft 187 and a hub 195, which is in all respects similar to hub 188; and to the hub p of the said patent.

The mechanism for operating the shears 124, 125, is duplicated for the shears 126, 127, and the hub 195, and arm 196, therefore correspond with the hub 188, and arm 189. The arm 196, is connected by a link 197 with a lever 198 which rocks from a shaft 200. On the end of this lever is a bowl 199, which travels in the groove of a cam corresponding with that shown in Fig. 3, and which is preferably the same cam which actuates the lever 191. As the bowls 192, and 199 are opposite each other in their cam, the levers 191 198, will be rocked at every second operation of the jacquard, but in alternate relation with each other, and therefore the two sets of shears will be operated alternately, and when the respective slides with which they cooperate are active.

Operation:—Let it be assumed that the parts are in the condition shown in Figs. 1, and 2, when the needles are in line with the T slides 17, and the jacquard card has been positioned so that a line of perforations appears in line with the ends of the needles. The T slides are all in the right hand position, shown in Fig. 1, and the slides 61, are out of line with the needles, because the needle frame is held up at the left end, to present the needles in line with the slides 17. It may also be noted that the jaws 84, 85, and 86, 90, are both open and the locking bar 133, engages in the notches 135, of the several plates 37, and the interlocking rods, all lie in their lower disengaged position. If, now, the shaft 7, is rocked, through the link 8, and arm 9, the arm 6, oscillating to the left in Fig. 1, and back again will cause the card roller 1, to force the jacquard card against the four groups of seven needles 12, which lie in a horizontal line. Where there are no perforations the needles will be moved to the left, but the needles which are in line with perforations in the jacquard card will remain unmoved. The number and position of the needles which are unaffected will differ according to the pattern as represented by the perforations on the card, but in a jacquard of the character shown in my said patent, not more than one needle of each group of seven, will remain unaffected. As the needles 12, in this operation are in line with the T slides 17, comprising the upper set, the needles which are forced forward will move the slides 17, with which they respectively

contact. Whichever of the slides 17 are moved forward will through their respective rods 26, move the selecting slides 29, forward also, and the number and position of the latter which are so operated will correspond with the particular slides 17, which are moved. There is a slide 29, for each slide 17, the same as in my said patent, connected by rods 26. The slides 17, are arranged in four groups representing the number of rack slides 47, in the subsequent description, each group having seven slides. The slides 29, are arranged in seven groups of four each, which groups correspond in number with the number of units of motion produced by the lever 30. This grouping arrangement is fully set forth in my said patent. The selecting slides 29, which are thus moved forward, will extend to the dotted line position shown in Fig. 1, while those connected with the T slides 17, which were not affected, will lie in the full line position shown in Fig. 1. The notches 101, of the T slides which were moved, will now be in line with the locking bar 99, while the notches 100 of those which were not moved, will remain in line with the locking bar. The cam acting on lever 153, will now rock the latter when the shaft 112, will be rocked. The four levers 115, carried by the shaft 114, will be moved downwardly by this operation, and in each of the four groups of slides 17, in which a slide has remained unmoved by reason of a perforation in the card, the lever 115, over such group or groups will be rocked by engaging the incline 116, of such an unmoved slide or slides. The levers 115, operate through their respective rods 117, when thus rocked, to move the selecting slide 29, which is connected therewith, forwardly. The slides moved by the rods 117, are the slides marked G^o, in my said patent and are there shown as four in number, corresponding to the number of groups of T slides. If none of the slides 17, of a group are left behind, in the operation described, then the lever 115, cooperating with such group will not be rocked, and the rack frame representing such group will remain locked, as this condition means that such rack frame is not to be reciprocated. This may be true of any or all of the levers 115. Previous to the reciprocation of the slides 17, the shaft 94, began to be rocked, through the operation of the cam on the lever 177 and the rod 96, is thereby rocked to the left in Fig. 1, to permit the slides to be moved. At about the time of the movement of the slides 17, the shaft 137 was rocked by the cam acting on the lever 143, and the locking bar 133, was thereby moved out of the slots in the plates 37, to permit of the oscillation of the slides. The movement of the slides having been completed, the jaws which cooperate

therewith will come into action. The cam acting on lever 133, will reciprocate the link 135, and this will cause the shafts 81, 82, to oscillate in opposite directions, and cause the bars 84, 85, to approach each other. The selecting slides 29, are all between these jaws 84, 85, but certain of them have been advanced in position. When the jaws approach each other, the slides 29, which were moved forward by the jacquard card and which are in fact the inactive ones, will be engaged by the jaw 85, in the recess 33, and on the upper edge by the jaw 84, which will cause no rocking of the selecting slides, but will simply hold them without movement in the low position and the plates 37, corresponding to such slides will not be moved. Those slides which were not moved forward however, which are the slides that determine the movement to be imparted to the tambour frame, will be differently affected. Owing to their position, these latter slides will be engaged by the jaw 85, at the part 34^a and the jaw will therefore rock such slides upon their curved rear ends 29^a, as a fulcrum preferably until the cut out portion 34 meets the upper jaw 84. The slides which are thus rocked will by reason of their engagement between the pins 35, 36 lift their respective plates 37, and cause the interlocking elements, controlled thereby, to interlock certain of the sliding frames 45, with certain of the rack frames 47, depending upon which of the plates 37, are raised. This determines the particular units of motion as produced by the lever 30, upon the sliding frames that are to be imparted to the several rack frames, and therefore to the several gears in the planetaries which operate the tambour frame moving elements. After the plates 37, were moved upwardly, as just described, the locking bar 133, was rocked by the rocking of shaft 137, through the cam movement upon the lever 142; and the bar 133, was reengaged in the slots 135, of such plates 37, as were not raised and in the slots 134, of those which were raised. In this condition the bar 133, is adapted to retain the plates in the positions caused by the selecting slides so that the slides may be returned while the remainder of the jacquard movements are being carried out. When the interlocking elements were operated by the plates 37, the lever 30, was then caused to rock and the various elements succeeding the same, went on to perform their functions relative to the positioning of the tambour frame of the embroidering machine: while at the same time the slides are returned for the next operation. The oscillation of the shafts 81, 82, returns the jaws 83, 85, to their open position. At the same time, the link 131, transmits the movement to the shaft 109. The needles 12, are returned by the bar 92,

on the rod 93, engaging the blocks 91, of all the needles which were previously moved forward, and the needles are all brought back to original position ready for the next operation. This took place concurrently with the return of the roller carrying arms 6. Previous to the return of the slides, the shaft 112, was rocked to raise the levers 115, from engagement with their respective sets of slides and the return movement of the bar 96, draws back the levers which had been previously operated and the result of this was to return the slides to which the rods 117, and levers 115 are connected.

The greater portion of the above devices and their operations correspond with that of my said patent. However, in my said patent a second operation of the slides cannot commence until all of the elements of the jacquard have performed their operations and the parts have all been restored to their original positions, whereas it will be apparent from the following description that certain elements may be overlapping in their operations so that each set may proceed while the other is still active.

Upon the completion of the above operation the main shaft 128, will have made one complete revolution while the secondary shaft 129, will have made one half a revolution. As soon as the T slides 17, were moved forward in the above mentioned operation, and the needles were returned with the return of the pattern roller, the needles are shifted to a position where they will effect the operation of the second set of T slides 61. The cam acting on lever 146, causes the link 53, to rock the needle frame downwardly, but a slight extent, so that the needles are no longer in line with the slides 17, but are in line with the slides 61, which so far have not been operated, and are in their normal or rear position. Before the slides 29, and the devices cooperating therewith, have performed their functions and have been returned to their starting position, the card roller 1, may be reciprocated again for the second operation of the jacquard. Now as the needles 12, are in line with the slides 61, when the card roller is reciprocated for the second time, the needles will be affected the same as before. That is to say, the jacquard card having been fed one step by the rotation of the card roller, by the mechanism shown in said patent, those needles which are in line with perforations in the card will remain idle, while all the others will be moved forward again, when the jacquard card is reciprocated. This time, the slides 61, will be affected and the ones in line with the needles which are moved forward will be moved by the needles and the others will remain idle the same as in the case of the slides 29, in the previous operation. The slides 61, which are moved

forward will operate through their respective rods 67, to move the selecting slides 68, which constitute the second set. This may take place before the slides 29, have been returned from their operation, and before the plates 37, have been returned to position, because the movement of the slides 68, forward, in no way affects the plates 37. When the slides are moved forward, they will be locked by their locking bar, 105 in similar manner to the first set of slides. The levers 121 will be moved downwardly, and will be actuated by the inclines 122, of any of the slides 61, which remain idle, the same as the levers 115, operated in the previous operation. This will operate, through the rods, 123, to move one or more of the slides 68, which correspond with the slides which are connected with levers 115, and which are duplicate of the slides G^{oo}, in my said patent. The shaft 109, is rocked in this instance to permit the slides 61, to be moved forward in the same manner that the bar 96, operated on the slides 17. The locking bar 105, will also be operated to perform the same locking action upon the slides 61, that the locking bar 99, did upon the slides 17. When the locking bar 133 is released from the plates 37, following the completion of the first operation, and the plates 37, are free to move the second set of jaws will come into operation upon the selecting slides 68, and again position the plates 37, for the second operation. Since the slides 68 engage between the pins 75, 76 of the plates 37, they are adapted to have the same action upon the plates as the slides 29. The jaws 89, 90 will now be moved toward each other by the rocking of the shafts 86, 87, when the jaw 99, will engage the cut out 78, of the slides 68, which have been advanced and will have no action thereon, except to retain them in position: while those slides which were not moved forward in the above operation, will be engaged by the jaw 90, at the part 77^a and will be raised oscillating from their ends 68^a. The upper jaw 89, cooperates in keeping the advanced slides from moving. The upward movement of the slides which were raised by the jaw 90, will raise the plates 37, with which they respectively engage. The locking bar 133, having been swung out of the slots 135, to permit of this movement, the same as in the previous operation and returned therein, to retain the plates 37, in their raised, or low position, as positioned by the selecting slides, so that the slides may be released by the jaws 89, 90, and be returned to their original or normal position. When the jaws 89, 90, in the operation just described were closed upon the slides 68, the arm 183, moved simultaneously with the shaft 86, and this caused the link 185 and arm 186, to rock the shaft 94. The rod 96, moving

with the latter shaft, caused all the slides 17 which had been moved forward in the first described operation to be returned to their original or starting position. Upon the completion of this second operation, the main shaft will have been revolved two complete revolutions while the shaft 129, will have made one complete revolution. The next or third operation of the jacquard will bring the slides 17, into action, and so on; and the needles will be rocked into line for the operation of the slides 17. This alternating operation will go on so long as the jacquard is in operation. The slides 68, 61, which were moved forward in the second operation described will be returned when the third operation has partially taken place. When the jaws 84, 85 are closed in the third operation, the arm 180, link 181 and arm 182, will rock shaft 109; and the movement of the bar 111, will return the slides 61, and 68, to their normal position.

The different devices for selecting and combining the units of movement, must necessarily operate in a given sequence, and where one set only is employed their operations must be rapid in order to operate the jacquard at the desired speed and allow a sufficient proportion of the whole movement for the actual positioning of the tambour frame. By providing a duplicate set of selecting devices and operating them in alternate relation and at least partly concurrently each may be operated at relatively half the speed. The jacquard operations under such conditions are smoother and less trying, and if desired, the speed of operations of the jacquard as a whole may be increased over former practice. By utilizing plural mechanisms with some parts operating through common mechanism the above results are obtained with the least possible increase in the number of parts.

It will be apparent that a jacquard under my present invention will be as positive and accurate in its operations as heretofore.

While I have described in great detail the construction and operation of my invention in the preferred form, and referred to the number of different parts used in such form I do not wish it to be understood that I am limited thereto, as my invention is of a broad character and it may be embodied in various forms without departing from the scope of the appended claims.

Having described my invention, what I claim is:

1. In a jacquard for embroidering machines, embodying operating mechanism, tambour frame operating mechanism adapted to be operated by said operating mechanism, a plurality of series of selecting devices, needles for operating the selecting devices, jacquard card mechanism adapted to operate a jacquard card to select a needle for

action and means for causing said needles to operate said series of selecting devices alternately.

2. In a jacquard for embroidering machines embodying operating mechanism, tambour frame operating mechanism adapted to be operated by said operating mechanism, a plurality of series of selecting devices, needles for operating the selecting devices, jacquard card mechanism adapted to operate a jacquard card to select a needle for action, and means for causing said needles to operate said series of selecting devices alternately, and said series of selecting devices being adapted to alternately effect the operation of the tambour frame operating mechanism by the said operating mechanism.

3. In a jacquard embodying means for producing movements of different extents, tambour frame positioning mechanism operated thereby and a plurality of sets of devices for controlling the operation of said tambour frame mechanism by the device for producing movements of different extents, the elements of each of said sets being adapted to perform the same functions, means for causing said sets to operate alternately and means for operating said controlling devices.

4. A jacquard embodying means for producing movements of different extents, means adapted to effect various combinations of the movements of said means for producing movements of different extent, tambour frame positioning mechanism operated by said combining means, a plurality of sets of devices for controlling the operation of said combining devices, the elements of each of said sets being adapted to perform the same functions, means for causing said sets to operate alternately and means for operating said controlling devices.

5. In a jacquard embodying means for producing movements of different extents, mechanism operated thereby adapted to operate an embroidering machine tambour frame, a plurality of sets of devices for controlling the operation of said tambour frame operating mechanism by the means for producing movements of different extents, the elements of each of said sets being adapted to perform the same functions, means for operating said controlling devices, and means for causing said sets of controlling devices to be operated alternately by their operating means.

6. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, means for coupling the tambour frame operating mechanism with the various means for producing movements of different extent, and controlling means, comprising a plurality of sets of slides, each of said sets being adapted to effect the operation of the same coupling

devices, common means for operating said sets of slides, and means for causing said sets of slides to be operated alternately by their operating means.

7. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, means for coupling the tambour frame operating mechanism with the various means for producing movements of different extent, and controlling means, comprising a plurality of sets of slides, each of said sets being adapted to effect the operation of the same coupling devices independently of each other, means for moving said slides to effect the operation of the coupling devices and common to both sets of slides, means for returning said sets of slides after their controlling operation, and means for causing said sets of slides to be operated by their operating means alternately.

8. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, means for coupling the tambour frame operating mechanism with the various means for producing movements of different extent, and controlling means for the coupling means, comprising a plurality of sets of slides, each of which sets is adapted to perform the same functions, jacquard card mechanism for causing the slides to be operated by a jacquard card, and means for causing said sets of slides to be operated alternately by the jacquard card mechanism.

9. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, means for coupling the tambour frame operating mechanism, with the means for producing movements of different extent, and controlling means for the coupling means, comprising a plurality of sets of slides, each of which sets of slides is adapted to control the coupling devices independently of the other set, jacquard card mechanism, needles adapted to be operated by the jacquard card and means for causing said sets of slides to be operated alternately by said needles.

10. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, means for coupling the tambour frame operating mechanism with the various means for producing movements of different extent, and controlling means for the coupling means, comprising a plurality of sets of slides, each of which sets of slides is adapted to control the coupling devices independently of the other set, jacquard card mechanism, needles adapted to be operated by the jacquard card, and means for rocking said needles whereby they will engage and operate the said sets of slides alternately.

11. A jacquard embodying means for pro-

ducing movements of different extents, tambour frame operating mechanism, means for coupling the tambour frame operating mechanism with the various means for producing movements of different extents, and controlling means for the coupling means comprising a plurality of sets of slides, each of which sets is adapted to perform the same function independently of the other, jacquard card mechanism for reciprocating a jacquard card, needles adapted to be operated by the jacquard card, a needle frame in which said needles are adapted to slide, said frame being adapted to oscillate on a line in juxtaposition with point of contact of the needles and jacquard card, and means for oscillating said frame whereby the needles will be positioned to alternately engage said sets of slides.

12. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, means for coupling the tambour frame operating mechanism with the means for producing movements of different extent and controlling means for the coupling means, comprising a plurality of sets of slides, which sets are adapted to select from the same coupling devices, jacquard card mechanism, needles with which the jacquard card is adapted to cooperate, said needles being adapted to operate either set of slides, and means for causing the needles to engage said sets of slides alternately.

13. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism jacquard card mechanism adapted to intermittently propel and reciprocate a jacquard card, and means operated thereby and adapted to control the combining of the various movement producing and tambour frame operating mechanism, embodying a plurality of sets of slides, each set being adapted to perform the same functions, means operated successively by the jacquard card and adapted to cause the operation of said slides and means for causing said sets of slides to be operated alternately by their operating means.

14. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, a plurality of sets of slides each of which sets is adapted to effect the combination of the devices for producing movements of different extent with the tambour frame operating mechanism, jacquard card mechanism, needles operated thereby at each operation of the jacquard and means for causing the needles to operate said sets of slides alternately.

15. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, and means for controlling the operation of the

tambour frame operating mechanism by said means for producing movements of different extent, comprising a plurality of sets of slides each of which sets is adapted to perform the same functions, jacquard card mechanism, needles operated thereby, and means for causing the needles to operate said sets of slides alternately, means for returning said needles, after each operation thereof and means for returning said sets of slides alternately.

16. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, a plurality of sets of slides each of which sets is adapted to effect the combination of the devices for producing movements of different extent with the tambour frame operating mechanism, a jacquard card roller and means for reciprocating the card roller, needles operated by the jacquard card at each operation of the jacquard, means whereby the card roller reciprocating means will return said needles, means for causing said needles to operate said sets of slides alternately, and means for returning said sets of slides alternately.

17. In a jacquard embodying means for producing movements of different extents, rack frames, means for coupling the movement producing means and rack frames, means for locking and unlocking the said rack frames, jacquard card mechanism, a set of slides adapted to be operated by the jacquard card and adapted to control the said coupling devices, slides adapted to control said locking and unlocking means, and means whereby said latter slides will be made operative by said set of coupling controlling slides, a second set of slides adapted to be operated by the jacquard and in alternate relation to said first set of coupling controlling slides, other slides for controlling said locking and unlocking means and means whereby said last mentioned slides will be made operative by said second set of coupling controlling slides.

18. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, coupling devices, for coupling said first and second devices, jacquard card mechanism, jacquard slides operated by the jacquard card and adapted to select the coupling devices, and jaws for engaging said slides to effect the operation of the coupling devices by the slides, a second set of slides for selecting the said coupling devices, jaws for engaging said second set of slides to effect the operation of the coupling devices, means for making said sets of slides operative upon alternate operations of the jacquard, and means for operating the jaws of the several sets of slides alternately.

19. In a jacquard embodying means for

producing movements of different extents, means for operating a tambour frame, coupling devices, for coupling said first and second devices, jacquard card mechanism, jacquard slides operated by the jacquard card and adapted to select the coupling devices, and jaws for engaging said slides to effect the operation of the coupling devices by the slides, a second set of slides for selecting the said coupling devices, jaws for engaging said second set of slides to effect the operation of the coupling devices, means for making said sets of slides operative upon alternate operations of the jacquard and means for operating the jaws of the several sets of slides upon alternate operations of the jacquard, and means for retaining the coupling devices in their operative condition at each operation of the jacquard.

20. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, coupling devices for coupling said first and second devices, jacquard card mechanism, jacquard slides operated by the jacquard card and adapted to select the coupling devices, and jaws for engaging said slides to effect the operation of the coupling devices by the slides, a second set of slides for selecting the said coupling devices jaws for engaging said second set of slides to effect the operation of the coupling devices, means for making said sets of slides operative upon alternate operations of the jacquard, means for operating the jaws of the several sets of slides upon alternate operations of the jacquard, means whereby the first set of slides will be returned upon the operation of said second jaws and the second set of slides will be returned upon the operation of said first jaws.

21. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, coupling devices, for coupling said first and second devices, jacquard card mechanism, jacquard slides adapted to be reciprocated by the jacquard card and adapted to select the coupling devices, means for locking said slides during the action of the coupling devices, a second set of slides adapted to select said coupling devices and adapted to be operated by the jacquard card, means for locking said second set of slides during the action of the coupling devices and means for causing said sets of slides to be operated upon alternate operations of the jacquard.

22. In a jacquard embodying means for producing movements of different extents, tambour frame positioning mechanism a set of slides adapted to effect the coupling of said first and second means, a second set of slides for effecting the coupling of the said first and second means, jacquard card mechanism for operating said slides, means for causing said sets of slides to be operated in alternate relation, means for separately testing the first and second sets of slides to determine a conflicting operation thereon, means whereby said testing means will cause the stopping of the machine upon a conflicting operation in the slides, and means for causing the said sets of slides to be moved alternately.

23. In a jacquard embodying means for producing movements of different extents, tambour frame operating mechanism, coupling devices for coupling said first and second means, means for selecting said coupling devices, comprising reciprocating slides, jacquard card mechanism adapted to reciprocate said slides, a second set of slides adapted to effect the selection of said coupling devices and adapted to be operated by the jacquard card, each of said sets of slides being adapted to be advanced before the return of the other set, means for causing said sets of slides to be operated in alternate relation by the jacquard card mechanism, and means for returning the slides.

24. In a jacquard embodying means for producing movements of different extents, and means for operating a tambour frame, coupling devices for coupling said first and second devices, embodying coupling plates, a set of slides adapted to effect a selection of the coupling plates, jacquard card mechanism adapted to reciprocate said slides, means for locking said slides when advanced by the jacquard card, jaws cooperating with the slides to operate the coupling plates, means for retaining the coupling plates in their operative position during each operation of the jacquard, a second set of slides adapted to be reciprocated by the jacquard card mechanism, and to select from the same coupling plates as said first set, means for locking said second set of slides, jaws cooperating with said second set of slides to effect the operation of the coupling plates, means for returning each set of slides while the other set is advanced and means for causing said sets of slides to be operated alternately by the jacquard mechanism.

25. In a jacquard embodying means for producing movements of different extents, and means for operating a tambour frame, coupling devices for coupling said first and second devices and embodying coupling plates, a set of slides adapted to effect a selection of the several coupling plates, jacquard card mechanism, adapted to reciprocate said slides, means for locking said slides when advanced by the jacquard card, jaws cooperating with the slides to operate the coupling plates, means for retaining the coupling plates in their operative position during each operation of the jacquard, a second set of slides adapted to be reciprocated

by the jacquard card and to select from the same coupling plates as said first set, means for locking said second set of slides, jaws coöperating with said second set of slides to effect the operation of the coupling plates, means for returning each set of slides while the other set is advanced and means for causing said sets of slides to be operated alternately by the jacquard mechanism, a main shaft adapted to operate the jacquard card mechanism and the means for causing

the sets of slides to be operated alternately and a secondary shaft operated from said main shaft at reduced speed, and adapted to operate the slide locking means, said slide jaws, and said slide returning devices.

Signed in the city, county and State of New York, this 30th day of June 1911.

JOSEPH A. GROEBLI.

Witnesses:

W. H. KURSHEED,
HENRY EGLI.