

W. R. SCOTT.
 JACQUARD CONNECTION FOR WEAVING MECHANISMS.
 APPLICATION FILED MAR. 17, 1910.

1,076,523.

Patented Oct. 21, 1913.

4 SHEETS—SHEET 1.

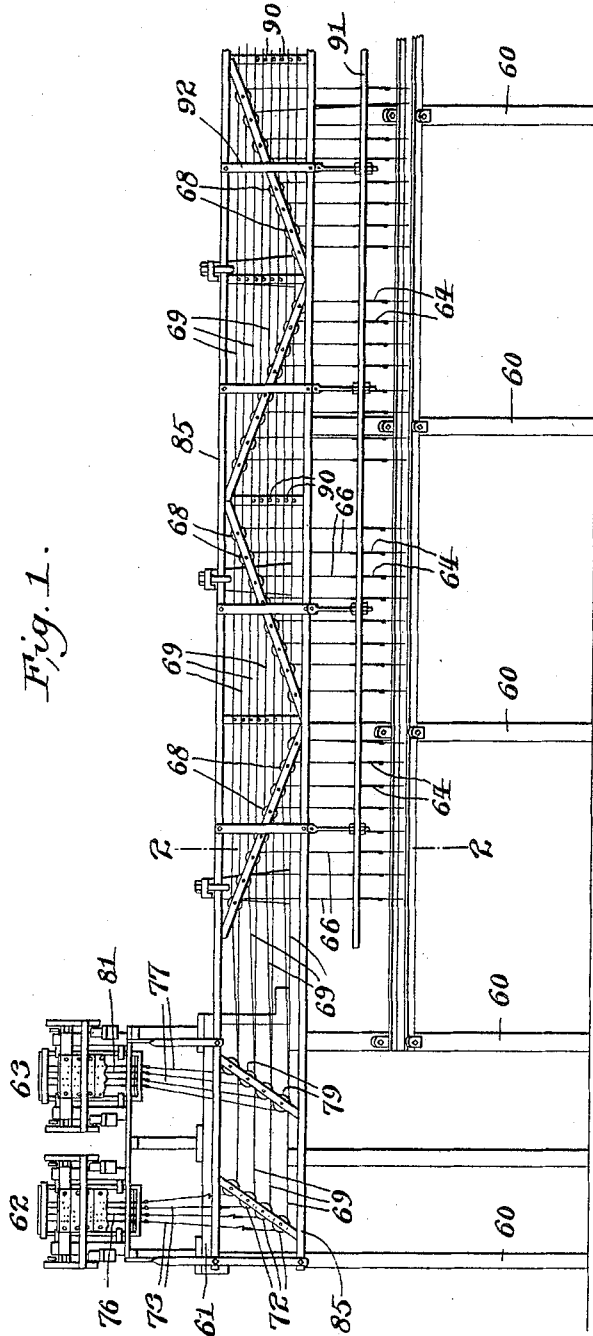


Fig. 1.

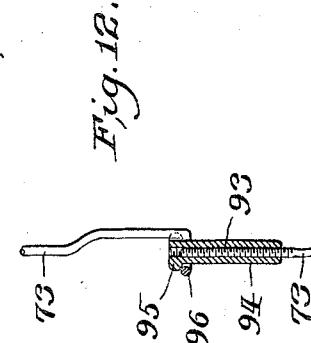


Fig. 12.

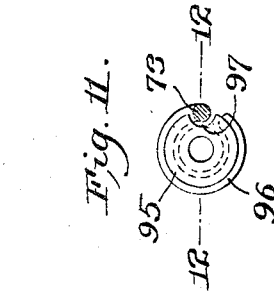


Fig. 11.

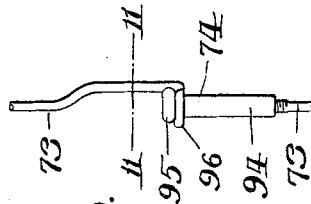


Fig. 10.

WITNESSES:

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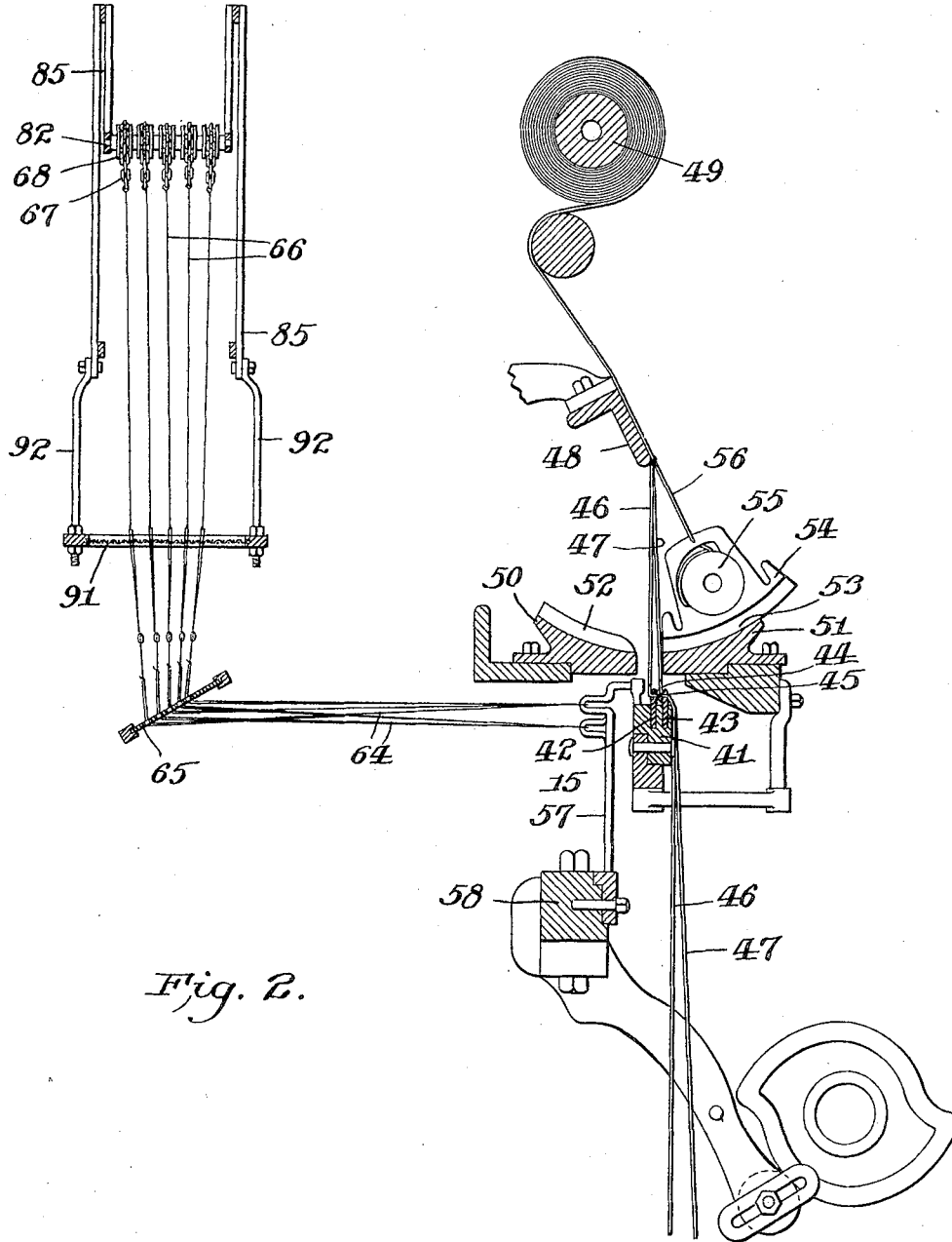


Fig. 2.

WITNESSES:

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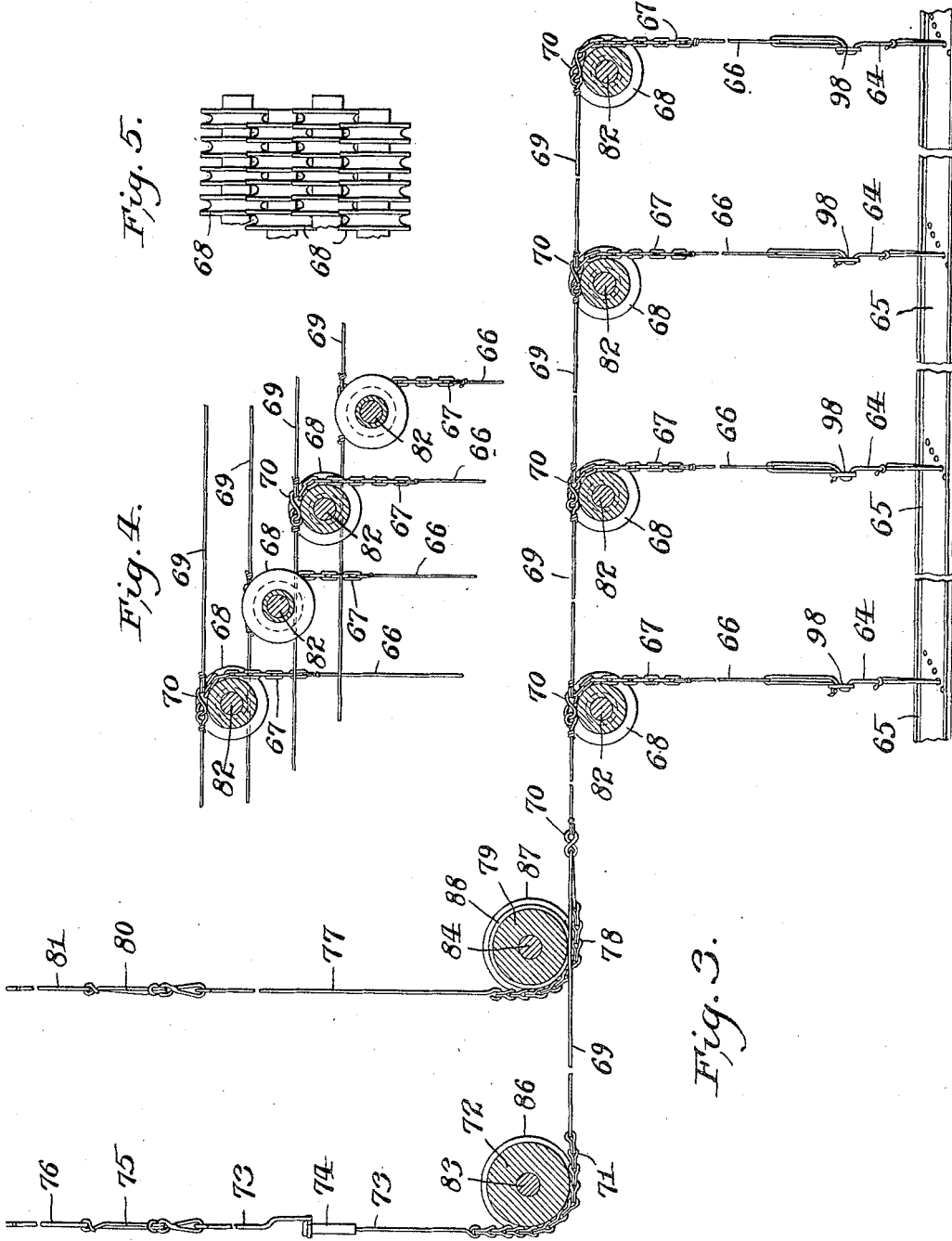
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

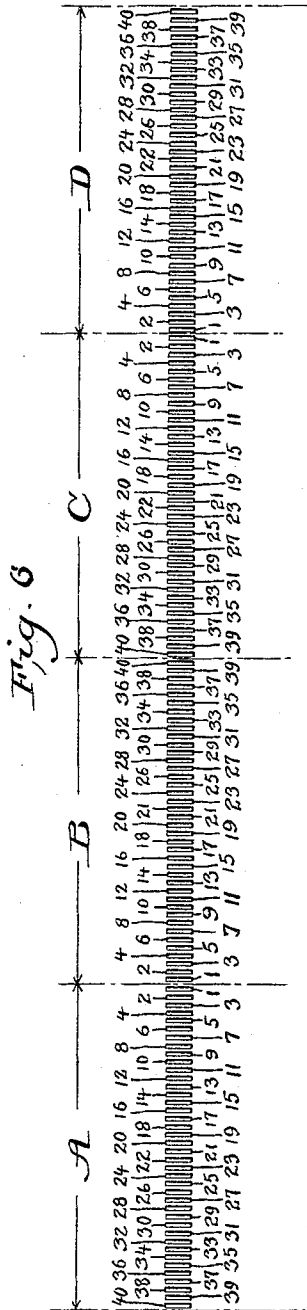


Fig. 6.

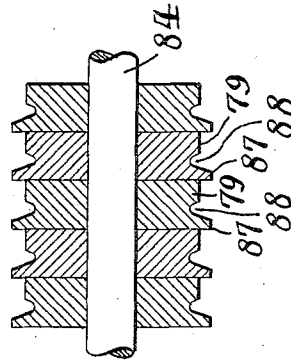


Fig. 7.

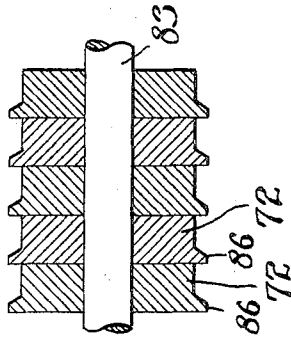
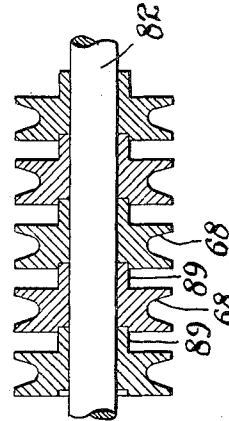


Fig. 8.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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JACQUARD CONNECTION FOR WEAVING MECHANISMS.

1,076,523.

Specification of Letters Patent.

Patented Oct. 21, 1913.

Application filed March 17, 1910. Serial No. 549,967.

To all whom it may concern:

Be it known that I, WALTER R. SCOTT, a citizen of the United States, and resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Jacquard Connections for Weaving Mechanisms, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to jacquard connections for weaving mechanisms, wherein the weaving instrumentalities comprise a series of independently mounted and movable thread-controlling jacks or heddles, arranged in two or more divisions or sections, and operatively connected to and controlled by one or more jacquard machines, to simultaneously produce a plurality of sections of fabric of like design, the corresponding jacks in the several sections being usually operated together, as a "set," and in unison, by connections leading to a single lifting hook of the jacquard machine.

In large weaving mechanisms or lace machines, for example those employed for the production of Nottingham lace curtains, the jacks are divided into sections and operated in sets, as stated, and are directly connected with and controlled from the jacquard machine, by a great mass of long textile strings extending from the lifting hooks of the jacquard to each of the jacks in the several sections, most of these strings extending obliquely from the whole series of jacks, because the jacquard as thus connected with the jacks is necessarily mounted centrally over the whole series of jacks and at a very considerable height above the same, necessitating also a high-ceiling building to operate the machine. In consequence the strings vary in length, contracting and lengthening unequally, resulting in irregular and uncertain control of the jacks and inequalities and imperfections in the work produced, aside from the obvious difficulties in reaching the jacquard and "fixing" the machine, as a whole, for the performance of its required functions.

The several objects of my invention, and

the changes I have made in the method of and means for actuating the jacks and of supporting and operating the jacquard in relation thereto, involve a radical reorganization of the elemental and combined mechanisms, and comprise mounting and operating the jacquard machine in a comparatively low horizontal plane, easily accessible, at no appreciable elevation above the series of jacks to be controlled, and also in a vertical plane entirely to one side of the series of them; dispensing entirely with the mass of textile cords of great and unequal lengths, leading from the jacquard to the jacks; and my invention also comprises substituting a series of actuating connections, mainly metallic, between said last-mentioned elements, with guiding devices therefor; the character of such means, individually and in the combination with the jacks and jacquard being such that the direct vertical pull of the jacquard-lifting hooks is properly and effectively transmitted to and exerted on the vertically-actuated shortened cords of the jacks through the medium of an interposed series of horizontally-actuated connections; enabling also a plurality of jacquards to be both connected by corresponding lifting hooks to corresponding "sets" of jacks in the several sections, and to actuate the same either together or independently of each other, a method of operation never before possible.

To these ends my invention consists of the mechanisms and their arrangement in combination, as hereinafter described.

While, as before stated, the invention is peculiarly adapted to and finds its greatest utility in the large weaving mechanism adapted for making lace curtains, it is obvious to those skilled in the art that it is applicable to other jacquard-controlled machines for weaving a plurality of fabrics, in which it is required to move a plurality of thread-controlling elements in unison through connections with a jacquard machine; and it may be added that the construction and arrangement of the wire-guiding devices, elementally, and other detail features, to transmit the control of the jacquard to the several jacks, may be modified

without departing from the principles and scope of the invention.

In the accompanying drawings:—Figure 1 is a rear elevation of a portion of the framework of a lace machine, illustrating the application of my invention thereto. Fig. 2 is a transverse section, partly broken away, on line 2—2 of Fig. 1, including certain parts of the weaving mechanism. Fig. 3 is an elevation, partly broken away, of the jacquard connections for one set of thread-controlling jacks. Fig. 4 is a vertical section showing certain guiding pulleys and the jacquard connections engaged therewith. Fig. 5 is an elevation of the arrangement of pulleys shown in Fig. 4, as seen at right angles thereto. Fig. 6 is a plan view of a series of thread-controlling jacks divided into four sections for controlling the threads in weaving four sections of fabric of light design. Figs. 7, 8 and 9 are vertical sections through different guiding rollers for the jacquard connection including portions of the supporting shafts therefor. Fig. 10 is an elevation of the adjusting devices for one of the two-part wires. Fig. 11 is a horizontal section on line 11—11 of Fig. 10. Fig. 12 is a vertical section on line 12—12 of Fig. 11.

In the drawings, I have shown the invention as applied to a machine for weaving Nottingham lace, and I shall first describe briefly the mechanism directly concerned in interweaving the threads to form the lace, referring to Fig. 2. The main frame of the lace machine supports a longitudinally-extending bar 41 provided in its upper portion with longitudinal parallel slots into which thread guiding bars 42 and 43 are slidingly fitted. The upper portions of the bars 42 and 43 are provided with a longitudinally-extending series of openings 44 and 45 respectively. The eyes 44 receive one set of threads 46 and the eyes 45 receive another set of threads 47. The threads 46 are drawn from a suitable source to and through the eyes 44 in the bar 42 and then to the lace being formed at the lower edge of a fixed bar 48. These threads 46 are commonly termed the warp threads, and they form the main structure of the lace. The threads 47 are drawn from a suitable source to and through the eyes or openings 45 in the bar 43 and thence to the lace being formed at the lower edge of the bar 48. These threads 47 are figuring threads, drawn from spools, and are employed to form plain or shaded figures in the lace being produced, and are commonly termed spool threads.

After the lace has been formed at the lower edge of the bar 48 the finished lace passes over the bar to and around a suitable take-up roller 49. The set of threads 46 extends from the bar 42 to the bar 48

through one plane, and the set of threads 47 extends from the bar 43 to the bar 48 through another plane a slight distance from the plane of the threads 46 directly above the bars 42 and 43.

Supported by the main frame of the machine, directly above the bars 42 and 43, are two longitudinal comb bars 50 and 51, one arranged on one side and one on the other side of the sets of threads 46 and 47. These bars 50 and 51 are provided with transversely-arranged curved guideways or combs 52 and 53 therein, which are arranged parallel to and in line with each other. Slidingly fitted to these guideways 52 and 53 are the lower curved portions of a set of thin, plate-like shuttles 54, each of which carries a flat bobbin 55 from which a thread 56 is delivered to the fabric or lace being produced by the loom. The shuttles 54 are arranged side by side, and the row or series of shuttles extends parallel to the two sets of threads 46 and 47. The set of shuttles 54 is adapted to be moved bodily through the planes of the two sets of threads 46 and 47 from the guideways 52 in the bar 50 to the guideways 53 in the bar 51, and back again, by the usual well known mechanism, in a manner to move the shuttles 54 and bobbins 55 carried thereby through and from side to side of the two sets of threads 46 and 47.

During the operation of the machine, the thread-guiding bars 42 and 43 are moved longitudinally in the slots in the bar 41 to shift the sets of threads 46 and 47 with respect to the shuttles 54, so that the shuttles, in passing from side to side of the planes of the sets of threads 46 and 47, may pass between different adjacent threads of the two sets of threads each time the shuttles are moved for the proper interlacing of the bobbin threads 56 with the threads 46 and 47 for the formation of the lace, in the usual well-known manner.

Arranged parallel to the sets of threads 46 and 47 is a series of thread-controlling jacks 57 for the threads 46 and 47. These jacks 57 extend upwardly parallel to each other, from a bar 58, the lower ends of the jacks 57 being secured to the bar. The series of jacks 57 is arranged adjacent the bar 41, and the upper ends of the jacks are extended toward the threads 46 and 47 above the bars 42 and 43, the upper ends of the jacks extending into the guide slots in the bar 41. Normally the upper ends of the jacks 57 are away from the two planes occupied by the two sets of threads 46 and 47, and the upper ends of the jacks are adapted to be projected into said planes, when the bar 58 is rocked on its longitudinal center by the mechanism of the loom, in the usual well known manner.

The jacks 57 are made of spring metal, and each jack may be held independently

of the other jacks against being projected into the planes of the threads 46 and 47 when the bar 58 is rocked, while the jacks not so held are being projected; or each jack may be arrested independently of the other jacks after its upper end has been projected into the plane of the set of threads 46 and before it has entered the plane of the set of threads 47. The rocking of the bars 58 with respect to the movement of the shuttles 54 and the bars 42 and 43 is such that the bar 58 is rocked to project the upper ends of the jacks 57 into the planes of the threads 46 and 47 before the bars 42 and 43 are moved to adjust the two sets of threads with respect to the shuttles 54.

If all the jacks 57 be projected into the two planes of the two sets of threads 46 and 47, the movement of said threads under the influence of the bars 42 and 43 will be arrested by the engagements of the threads with the jacks. If, however, certain of the jacks are prevented from being moved by the bar 58 into either of the two planes of the two sets of threads 46 and 47, or are permitted to be moved into the plane of the set of threads 46 and prevented from being moved into the plane of the set of threads 47, only such threads as are engaged by the projected jacks will be prevented from being moved by the bars 42 and 43 with respect to the shuttles 54. Thus it will be seen that the manner of interlacing the bobbin threads 56 with the spool and warp threads 46 and 47 may be controlled by the manipulation of the thread-controlling jacks in conjunction with the operation of the bars 42 and 43, as the shuttles 54 are moved from side to side of the two sets of threads through the planes occupied thereby.

During the operation of the machine, the bobbin threads 56 are wrapped around the spool threads 47 and the warp threads 46 in such a manner as to tie certain spool threads or figuring threads to certain warp threads, and to tie certain warp threads together. Thus, plain or shaded figures may be produced in the lace by floating the spool or figuring threads between two or more adjacent warp threads 46 and tying the spool threads 47 to the warp threads at each end of the float by the bobbin threads 56; or open-work may be produced in the lace, as is common and well known in this art.

During the interlacing of the bobbin threads 56 with the two sets of threads 46 and 47, the bars 42 and 43 are moved longitudinally back and forth to bodily shift the sets of threads 46 and 47 with respect to each other and to the shuttles 54, and certain or all of the jacks are projected into the planes occupied by the sets of threads 46 and 47 to be engaged thereby to control the positions to which the threads may be shifted by the bars 42 and 43 with respect to

the shuttles 54, and thereby control the manner of interlacing the threads for the production of lace having a particular form or design as dictated by the operation of the jacks 57; the jacks, by devices hereinafter described, being selected and controlled as to which jacks shall be projected into the plane of the set of threads 46 for the control thereof, which jacks shall be projected into the plane of the set of threads 47 for the control thereof, and which jacks shall not be projected into the plane of either set of threads 46 or 47 to permit certain of said threads to be shifted to the full extent with relation to the shuttles 54 by the operation of the bars 42 and 43.

Thus far the construction and operation of the machine are common and well known, and no detailed description or illustration thereof is deemed necessary herein. I shall now proceed to describe the novel means invented by me as illustrated in the drawings, applied to such a lace making machine for selecting and controlling the thread-controlling jacks 57 during the operation of the machine, for the production of a prescribed design in the product of the machine, as dictated by the jacquard mechanism.

Referring to Fig. 1: 60 designates standards forming a part of the framework of the lace machine. The standards at the left hand end of Fig. 1 support a horizontal frame 61 which in turn supports two jacquard machines 62 and 63. These machines are of the well known type commonly employed on lace machines, and they are operated as usual by the driving mechanism of the machine in harmony with the weaving instrumentalities, one jacquard machine being usually operated at a higher rate of speed than the other. The construction and operation of these jacquard machines, whereby their perforated cards control their lifting hooks in accordance with a prescribed design, are common and well known.

The lifting hooks of the jacquard machines 62 and 63 govern the actuation of and control the thread-controlling jacks 57 and the series of jacks 57 is divided into four sections, A, B, C and D, as shown in Fig. 6, an equal number of jacks being employed in each section for controlling the threads in weaving four sections of lace fabric of like design. The jacks of the four sections are connected in sets to be operated by the jacquard machines 62 and 63. Each set consists, in the present instance, of four jacks, one from each section, A, B, C and D, the four jacks, 1, 1, 1, 1, constituting one set; the four jacks 2, 2, 2, 2, constituting another set, and so on, each set consisting of the four correspondingly numbered jacks of the four sections A, B, C and D. The sets of jacks are controlled by the corresponding lifting hooks of the two jacquard machines 62 and

63, each lifting hook simultaneously controlling the four jacks of its set and thereby causing the production of four like designs in the four sections of lace fabric controlled by the four sections of jacks A, B, C and D, during the weaving operation.

In the arrangement of the sets of jacks shown in Fig. 6, the four designs controlled by the sections A, B, C and D will be alike in every particular excepting that the designs controlled by sections A and C will be rights or opposite to the designs controlled by sections B and D which will be lefts. Certain advantages, well known in the art, flow from this arrangement of the jacks for the weaving of the sections of lace fabric in pairs having opposite or right and left designs.

I shall now describe the connections between one set of four jacks, 15, 15, 15 and 15, and one lifting hook of each jacquard machine 62 and 63; and since each set of four jacks is similarly connected to its corresponding lifting hook in each jacquard machine, a description of the connections of one set will suffice for all.

Extending horizontally and rearwardly from the four jacks of the set 15, 15, 15 and 15, are four cords, 64, 64, 64 and 64, one from each jack. These cords extend upwardly through suitably located guiding eyes in a bar 65 extending longitudinally of the loom and supported by the framework thereof. Directly above the bar 65 the cords 64, 64, 64 and 64 are connected to the lower ends of vertically-arranged metal wires 66, 66, 66 and 66. The upper ends of these wires are connected to the lower ends of metal chains 67, 67, 67 and 67, which extend over grooved pulleys 68, 68, 68 and 68, arranged in the same horizontal plane, as shown in Fig. 3. The upper ends of these chains are connected to a metal wire 69 which extends horizontally through the grooves in the pulleys 68, 68, 68 and 68.

The wire 69 is made in sections, as shown in Fig. 3, and the several sections are connected together by suitable links 70, 70, 70, 70 and 70, for convenience in making connections, and the four chains 67 are connected to four of the links 70.

The left hand end of the wire 69 is connected to one end of a metal chain 71 which extends beneath and part way around and upwardly from a pulley 72. The upper end of the chain 71 is connected to the lower end of a vertically-arranged two-part metal wire 73, the upper and lower parts of which are connected by an adjusting device 74, hereinafter described. The upper end of the wire 73 is connected to the tail cord 75 of a lifting hook 76 of the jacquard machine 62 which hook is operated by the corresponding portions of the jacquard cards to simultaneously control the four corresponding jacks

of the set 15, 15, 15 and 15, which is connected thereto as just described.

The wire 69 in addition to being connected to the wire 73, as just described, is also connected to the lower end of a vertical metal wire 77 by means of a metal chain 78 which extends beneath and part way around a pulley 79, one end of the chain 78 being connected to the wire 77 and the other end being connected to a link 70 of the wire 69. The upper end of the wire 77 is connected to the tail cord 80 of a lifting hook 81 of the jacquard machine 63, which hook is operated by the corresponding portions of the jacquard cards to simultaneously control the four corresponding jacks of the set 15, 15, 15 and 15, which is connected thereto as previously described.

From this construction it will be seen that either of the two lifting hooks 76 or 81 of the two jacquard machines 62 and 63, respectively, may be raised independently of the other, and that the raising of the hook 76 corresponding with the set of four jacks 15, 15, 15 and 15, will draw upon the horizontal wire 69 connected to the jacks and to the lifting hook for the control of the jacks during the weaving operation; and also that the raising of the hook 81 corresponding with the same set of four jacks 15, 15, 15 and 15, will draw upon the same horizontal wire 69 connected to the jacks and to the lifting hook for the control of the jacks during the weaving operation.

The rollers 68, 72 and 79 for the connections for the different sets of jacks, are mounted to turn on shafts 82, 83 and 84, respectively, which extend transversely between the side bars of a skeleton frame 85 supported by the standards 60 or the framework of the loom, a plurality of rollers being arranged on each shaft. One side of each roller 72 is provided with a flange 86 and the other side thereof is made plain, and the plain side of one roller 72 is adjacent the flange 86 of the next adjacent roller 72, thereby providing grooves between the flanges 86 to receive and guide the chains 71. One side of each roller 79 is provided with a flange 87 and the other side thereof is made plain, and the plain side of one roller 79 is adjacent the flange 87 of the next adjacent roller 79, thereby providing grooves between the flanges 87 to receive and guide the chains 78. Further, each roller 79 is provided with a groove 88 to receive and guide the wire 69 to which the chain 78 guided by the roller is connected. Each grooved roller 68 is provided with a hub 89 extending from one side thereof and engaged with the next adjacent roller 68, thereby holding the body portions of the rollers 68 in spaced relation to each other, as clearly shown in Fig. 9.

The general arrangement of the rollers 68, 72 and 79 and the wires 66, 69, 73 and 77,

is clearly shown in Fig. 1, as seen from the rear of the loom. The wires 66 extend substantially parallel to each other, and are arranged to be maintained out of contact with each other, and are conveniently distributed to be connected to the jacks 57. The wires 73 and 77 also extend substantially parallel to each other, and are arranged to be maintained out of contact with each other, and are conveniently distributed to be connected to the lifting hooks 76 and 81, respectively, of the jacquard machines. The wires 69 are arranged above each other, and also laterally adjacent each other, and they are guided within the grooves of the rollers 68 through which they extend, and they are also guided between the side walls of other adjacent rollers 68, as shown in Figs. 4 and 5. Thus the wires 69 are supported and guided and maintained out of contact with each other.

In order to support long stretches of the wires 69 between the rollers 68 supporting the same, I provide suitably arranged rods 90 which extend transversely through and are supported by the frame 85 and upon which the wires rest; and I preferably employ a horizontally-arranged wire screen 91 above the bar 65 and through which the cords 64 pass and by means of which they are guided in proper spaced relation to each other. This screen 91 is supported by arms 92 depending from the frame 85.

Normally, or when the lifting hooks 76 and 81 of the jacquard machines 62 and 63 respectively are down and the jack bar 59 is rocked, all the jacks will be projected into both planes of the two sets of threads 46 and 47. When, however, certain of the hooks 76 of the machine 62 are raised they will draw upon their connections with the corresponding sets of jacks and prevent them from being moved by the bar 58 into the plane of either set of threads 46 or 47; and when certain of the hooks 81 of the machine 63 are raised they will draw upon their connections with the corresponding sets of jacks and arrest the movement thereof after they have been projected into the plane of the set of threads 46, thus preventing them from reaching the plane of the set of threads 47 during the rocking of the bar 58. It will thus be seen that each set of four jacks of the four sections A, B, C and D may be independently controlled by the lifting hooks of either of the two jacquard machines 62 and 63; that the machine 62 will control the sets of jacks independently of each other with respect to the planes of both sets of threads 46 and 47; that the machine 63 will control the sets of jacks independently of each other with respect to the plane of the set of threads 46; and that the different sets of jacks so controlled will cause the weaving of the four sections of lace fabric, corresponding with the four sec-

tions of jacks A, B, C and D, said sections of fabric being of like design as dictated by the jacquard cards of one or both of the two jacquard machines 62 and 63.

The bar 65 extends parallel to the entire series of jacks 57, and the textile cords 64 extending from the jacks 57 to and through the bar 65 and connected to the lower ends of the metal wires 66, are of substantially uniform lengths; and also the textile tail cords 75 and 80 connecting the metal wires 73 and 77 to the lifting hooks 76 and 81, respectively, are all short and of substantially uniform lengths. It follows, therefore, that any expansion and contraction of the textile cords due to variations in the amount of moisture present in the atmosphere, will be inappreciable and in any event will tighten and loosen to substantially the same extent all the connections of the jacks with the jacquard lifting hooks, the metal wires being unaffected by the variations in the amount of moisture.

While there is no particular objection to textile cords coming into contact and rubbing against each other as heretofore employed in the jacquard connections, it would not do to have the metal wires of my present invention rub against each other with the consequent quick wearing out of the same. Therefore, the supporting and guiding of the many metal wires employed in the connections whereby they are maintained out of contact with each other, forms an important feature of my invention. Also, the arrangement of the vertical wires 66 and the vertical wires 73 and 77, and the arrangement of the horizontal wires 69 connecting the vertical wires, together with the supporting and guiding means for the wires, forms another important feature of my invention, as it enables me to locate the jacquard machines 62 and 63 and also the connections therefrom to the jacks 57, comparatively near the floor to be readily accessible and to permit the loom to be installed in a factory room having a lower ceiling than would be otherwise required.

In order to shorten or lengthen the two-part wires 73 for purposes of adjustment, I provide each wire 73 with the adjusting device 74 hereinbefore mentioned, and the adjusting device for each wire is as follows:—Referring to Figs. 10, 11 and 12, the upper end of the lower part of the two-part wire 73 is screw-threaded, as at 93, and screwed thereon is a sleeve 94 provided with a head 95 on its upper end. The lower end of the upper part of the two part wire 73 is bent to form an eye 96 which surrounds the sleeve 94 below the head 95. The head 95 is provided with a notch 97 adapted to engage the wire 73 extending upwardly from the eye 96 and prevent the turning of the sleeve 94 when the parts are in the

normal position shown in the drawings. When it is desired to shorten or lengthen the two-part wire 73 the lower part carrying the sleeve 94 is drawn upwardly and the sleeve is moved upwardly through the eye 96 until a slight tilting of the two-parts of the wire will permit the notch 97 to be disengaged from the body of the wire 73; whereupon the sleeve 94 may be turned in one direction to lower it upon the screw-threads 93, or turned in the opposite direction to raise it upon the screw-threads 93. After the necessary adjustment has been made, the parts are permitted to spring back into normal position with the head 95 engaging the eye 96 and the notch 97 engaging the body of the wire 73 and preventing the turning of the sleeve 94. If desired, each of the wires 77 may also be made in two parts and provided with adjusting devices like the devices 74.

The ends of the cords 64 connected to the wires 66 are each provided with a well known form of adjusting device 98 by means of which the cords 64 may be independently lengthened or shortened for purposes of adjustment.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a machine of the character recited comprising a series of independently-movable thread-controlling jacks, constituting a set, and a jacquard machine providing a series of depending lifting hooks, of a supplemental frame adjacent the main frame of the machine adapted to operatively support the jacquard and its adjuncts in a vertical plane entirely to one side of the series of jacks and in a horizontal plane slightly above but adjacent thereto, vertically acting lifting means for each jack in the series, and horizontally-disposed connecting and actuating mechanism, with suitable guiding devices therefor, interposed between said last mentioned means and corresponding lifting hooks of the jacquard adapted to transmit the controlling movement of said hooks to the series of jacks in the set.

2. In a machine of the character recited the combination with a jacquard machine having depending lifting hooks, of means to mount it on the frame of the machine in a plane over but adjacent to and entirely to one side of the weaving instrumentalities, a plurality of independently-movable jacks, constituting a section, independent and vertically-acting lifting cords for each jack, a series of horizontally disposed wires connecting with and actuating each of the lifting cords of the several jacks in the section, a single shaft, a series of rotatable guiding devices thereon adapted to direct horizontal motion to each of said connecting and actuating wires, and other connecting and guid-

ing devices between said series of horizontally-actuated connecting means and corresponding vertically-actuated lifting hooks of the jacquard.

3. In a machine of the character recited, a jacquard machine, means to mount it on the frame of the machine in a horizontal plane slightly over but adjacent to and entirely on one side of the weaving instrumentalities, a plurality of independently movable thread-controlling jacks constituting a series of sections, with a vertically-acting lifting cord for each jack, devices operatively connecting the lifting cords of corresponding jacks in the several sections to cause them to be actuated in sets, other devices separately imparting horizontal motion to corresponding jacks in each set of jacks, through the aforesaid connecting devices, and connecting and guiding devices between the vertically-depending needles of the jacquard and each connected set of jacks in the several sections.

4. In a machine of the character recited, the combination with a plurality of sections of independently-movable jacks, vertically disposed lifting cords for each jack, horizontally disposed actuating means with guiding devices therefor operatively connecting the lifting cords of corresponding jacks in the several sections to actuate them in sets, a pair of jacquard machines mounted on the main frame of the machine and adjacent the weaving instrumentalities in vertical and horizontal planes entirely to one side of the jack sections, and actuating connections with guiding means therefor, interposed between corresponding lifting-hooks of both jacquards and the recited horizontal connecting and actuating devices for each of the series of connected sets of jacks in the several sections.

5. In a machine of the character recited, the combination with a jacquard mounted to provide a series of depending lifting hooks, means to mount the jacquard and its adjuncts on the end of the main frame of the machine in substantially the same horizontal plane with the weaving instrumentalities, a plurality of thread-controlling jacks, vertical and horizontal connecting and actuating devices between each jack and a lifting hook of the jacquard, said connections including a screw-threaded wire, a sleeve screwed on to said wire and provided with a head, and a member provided with an eye surrounding the sleeve and engaging said head.

6. In a machine of the character recited, the combination with a jacquard mounted to provide a series of depending lifting hooks, means to mount the jacquard and its adjuncts on the end of the main frame of the machine in substantially the same horizontal plane with the weaving instrumen-

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talities, a plurality of thread-controlling jacks, a shaft, a set of grooved rollers mounted on said shaft, in spaced relation to each other, each roller having a plain side and a flanged side adjacent the plain side of the next adjacent roller, and horizontally-disposed means, including parts guided by the grooves in the rollers and parts guided between sides of adjacent rollers, connecting the lifting cords of the jacks with corresponding lifting hooks of the jacquard.

In testimony whereof, I have hereunto affixed my signature this tenth day of February A. D. 1910.

WALTER R. SCOTT.

Witnesses:

A. M. BIDDLE,

R. A. DUNLAP.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."