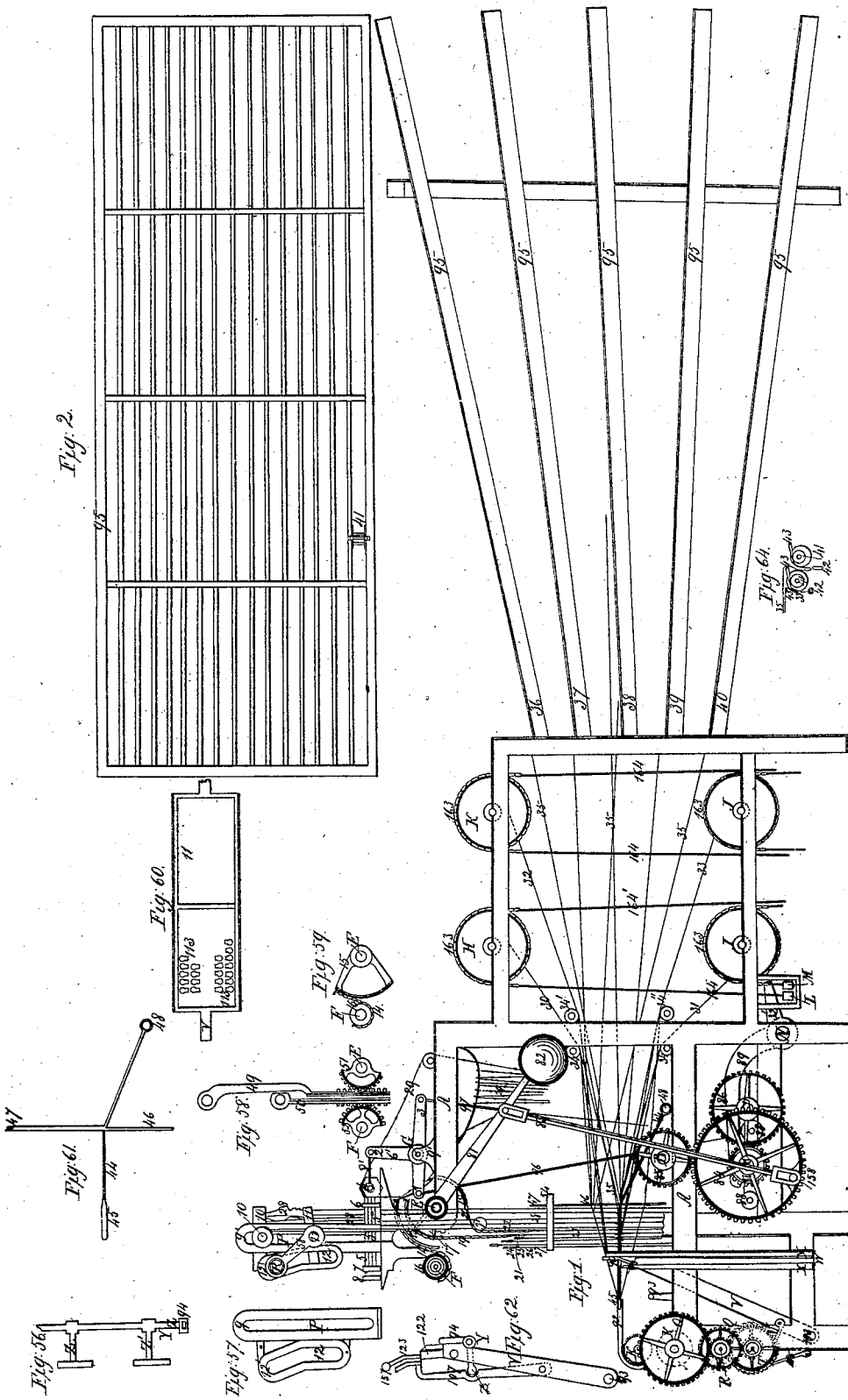


J. Goulding. Loom.

Sheet 1-3 Sheets.

No 15,291.

Patented Jul. 8, 1856.

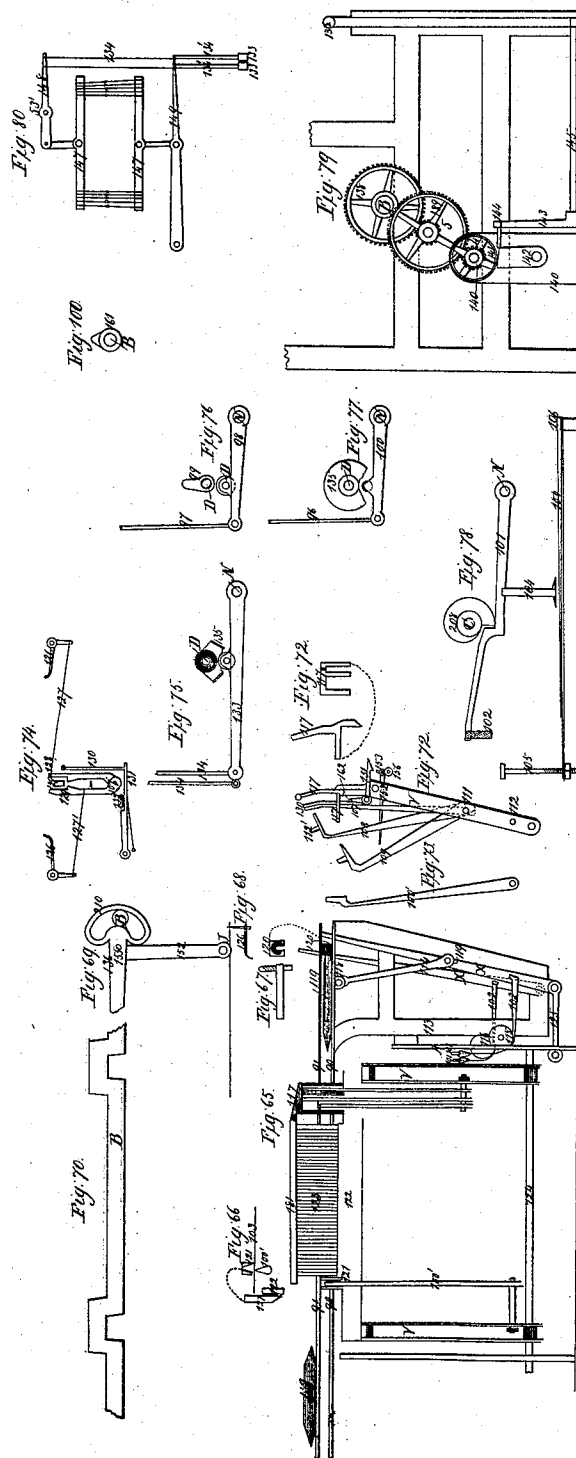


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Loom.

Sheet 2-3 Sheets.

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Patented Jul. 8, 1856.

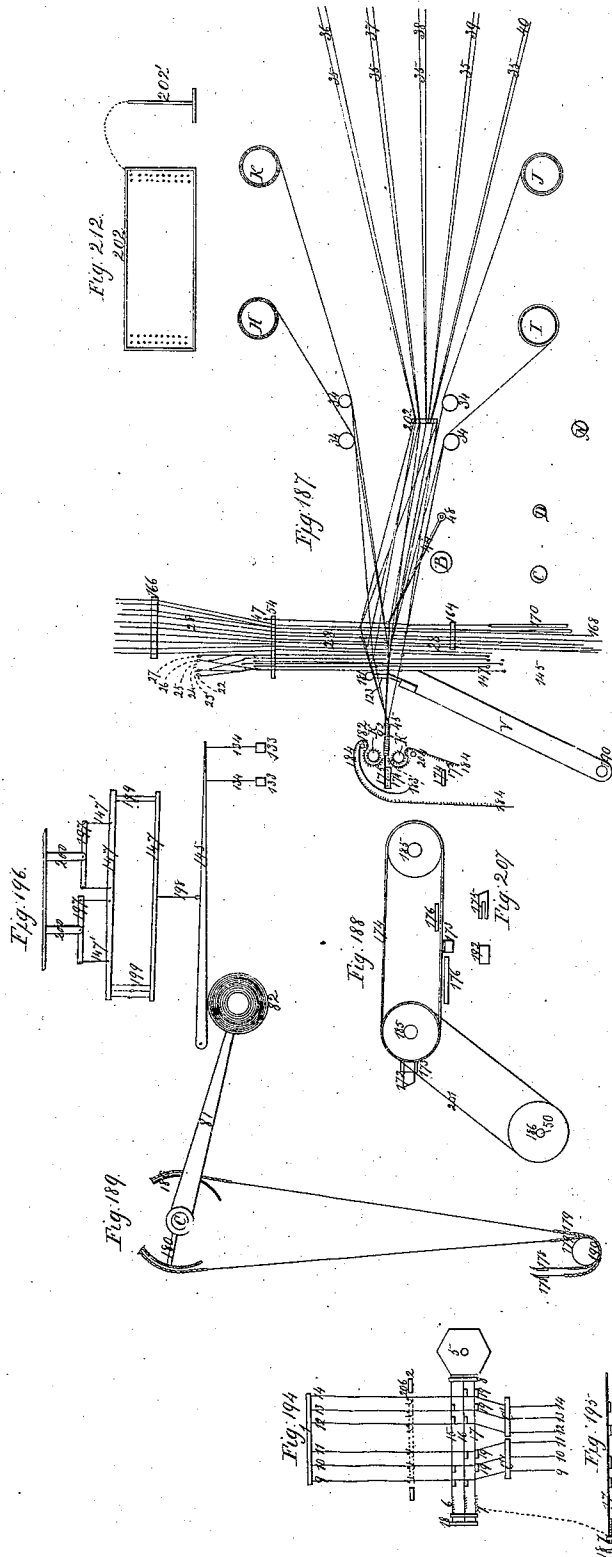


J. Goulding. Loom.

Sheet 3-3 Sheets.

No. 5,291.

Patented Jul. 8, 1856.



UNITED STATES PATENT OFFICE.

JOHN GOULDING, OF WORCESTER, MASSACHUSETTS.

JACQUARD LOOM.

Specification of Letters Patent No. 15,291, dated July 8, 1856.

To all whom it may concern:

Be it known that I, JOHN GOULDING, of the city and county of Worcester, in the State of Massachusetts, have invented certain new and useful improvements in looms for weaving double cloth connected by warp-threads carried across from one cloth to the other and fastened in each, which threads when severed form a pile on each piece of cloth; and I do hereby declare that the following description, taken in connection with the accompanying drawings hereinafter referred to, forms such a specification as will enable any person skilled in the art to make and use the same, and in which I have set forth the nature and principles of the improvements invented by me, together with the parts which I claim.

The nature of my invention and improvements consist in an improved apparatus for operating the suspension and trap boards. Also for locking the beams of the ground and straight warps at the time the reed strikes the fell. Also in an improved mode of giving tension to the pile warp by applying a weight to the yarn drawn off so as to press it against that which remains upon the bobbin to produce the friction required to give the proper tension. Also in arranging a traversing board upon the knot cords or figuring harness below the warps to bring down any of said cords which may catch accidentally so as not to be brought down by the weights. Also in a new mode of arranging and holding the parting wires in double cloth. Also in a new and peculiar construction, arrangement and operation of the eyes and needles in jacquard apparatus so as to operate six cords with three needles. Also in construction and arrangement of a thimble or socket to receive, stop and hold the shuttle. Also in a new apparatus for holding and drawing up the filling or binding weft so as to tighten the selvages of the cloth. Also in an apparatus to carry the weft thread from the fell at the edge of the cloth nearly to where the pile warp crosses the shed so as to make a perfect selvage. Also in the arrangement of a knife or a series of knives upon an endless chain or belt, in combination with its guides.

To enable others skilled in the art to make and use my invention and improvements, I will proceed to describe the several figures on the sheets of drawings hereunto annexed.

The same marks of reference denote corresponding parts throughout most of the figures, hereinafter referred to.

Figure 1, on Sheet 1, of drawings, represents a side elevation of my improved carpet loom, with bobbin frames attached, a portion of the loom framing being broken away, and part of the mechanism and shuttle apparatus removed, to show the arrangement of harness more clearly and prevent necessary complication. Fig. 2, is a plan of a bobbin frame, which is made to contain twice as many as the ordinary frame. The rest of the figures on both sheets of drawings are various details which I shall hereinafter particularly describe and refer to.

A, A, is the loom framing, which carries the crank shaft B, and cams or tappet shaft C, and D.

The swords of the lathe are connected with the crank shaft by an arm or link piece 155, shown in detail plan and elevation at Figs. 6, 9, on Sheet 3, of the drawings. This link piece is formed with a curved slot 210, at one extremity, and in this slot the crank B works. The opposite ends of these links are attached at each sword of the lathe, and the links are each supported near the crank shaft by a vertical vibrating lever arm 154, which is jointed at its upper end to the link, and works at its lower end upon a fixed stud center J.

K, K, are two take-up rollers; they take up the cloth as fast as it is woven, and are covered with wire cord, for the purpose of more securely holding the cloth; the lower roller K, has a spur wheel O, keyed onto its axis, which spur wheel gears into and receives the rotatory motion from the pinion R, which works loose on the stud center attached to the side of the loom framing. A spur wheel Q cast in one piece with the pinion R, receives motion from the pinion S, which is cast onto the side of the ratchet wheel T, working on the steel center; this ratchet wheel which drives the whole of the take-up motion, is actuated or moved one or more teeth forward at each beat up of the lathe by a pawl U attached to the lathe sword V. The spring detent 165, attached to the side of the loom, serves to keep the ratchet wheel steady and firm after each impulse that it receives from the lathe.

The take-up rollers, as well as the gearing which drives them, must be made of such

a diameter, and of such a number of teeth as will be found requisite to bring forward the cloth, this being a positive take-up motion. The cam or tappet shafts C, and D, receive their motion from the crank shaft B, which has keyed on to it the spur wheel 85, gearing into a larger spur wheel 84, fastened on the cam or tappet shaft C. A spur pinion 87 also fastened on this shaft gears into the spur wheel 86, fastened on the end of the tappet shaft D.

The suspension board 10, and trap or figure board 11, of the jacquard mechanism, as well as the heddles 19, 20, 23, which work the dandy or straight warps 30, 31, are all actuated by the transverse rocking shaft E, which is situated at the upper portion of the loom framing; the suspension board 10, is supported at each side of the loom by a vertical arm 49, which is represented in the detail views, Fig. 58, Sheet 1. These arms are formed with a series of rack teeth at their lower extremities. The trap or figure board 11, is similarly supported by vertical arms 50, Fig. 58, which are also formed with rack teeth at or near their lower extremities. These two racks gear into and receive motion from the toothed segments 51, and 52, the segments 51, being keyed on to a transverse shaft E, while the segments 52, are keyed on to the rocking shaft F. The racks and segments are similar on both sides of the loom. To one extremity of the shaft E is fitted a weighted lever arm 81, and to this lever is attached the connecting rod 83, which turns on pin 158, fastened on spur gear 84, whereby a constant vibrating motion is communicated to the lever 81, during the working of the loom.

Motion is transmitted to the shaft F from the rocking shaft E, by means of a chain 14, (Fig. 59), which is passed around and secured to a small pulley 16, on the end of the shaft F, and thence passes over and is secured to the segment 15, which is fast on the rocking shaft E. By this arrangement whatever motion may be imparted to the shaft E, will be transmitted by means of the chain 14, to the shaft F, and thus both the toothed segments 49, 50, are made to work conjointly. It will be obvious however on referring to the drawings, that the trap board 11, will rise and fall rather more than twice the distance of the suspension board 10, by reason of the small diameter of the pulley 16, in proportion to the segment 15, as is clearly shown by the detail (Fig. 59,) of the segment chain and pulley. The trap board 11, shown in detail plan at Fig. 60 raises the figuring knot cords 28, 28, which are brought into action by the jacquard needles 5, 5, 5, and cylinder 4. The suspension and trap boards are kept in their places by two slotted disk standards or

guides 9, shown in detail at Fig. 57, one being situated at each side of the loom. The journals *u*, Fig. 60, of the trap and suspension boards work in the vertical slot P, of the guide 9. On one end of each of the boards 10, and 11, is fitted a short arm 51', one of which is shown attached to the trap board in Fig. 1. This arm has a stud pin and anti-friction roller fitted to it at R, which roller works in the differential groove or inclined slot 12, formed in the guide plate 12', alongside the vertical straight slot P. By this arrangement when the suspension and trap boards rise, the back part of the harness will be elevated rather more than the front part, by which means a more regular and even shed is obtained. By modifying the shape of the differential or inclined slot 12 the suspension and trap boards may be made to assume any required degree of inclination when rising. The arms 51, serve also to keep the suspension and trap board firm and steady in their proper positions at all times. The heddles 23, of the dandy or straight warps 30, 31, are hung at their upper sides to the chains 19, 20, (Fig. 1) which chains are attached to and pass over the segments 17, 18, fastened on the rocking shaft E, the chain 20, being passed over the guide roller 3'. The bottoms of these heddles 23, are connected by chains to two levers 178, 178, Fig. 189, (Sheet 2,) and these levers are again connected to the chains 179, 179, which pass under the guide rollers 190, and are carried upward and secured to the two segments 180, 180, which are fast on the transverse shaft *c*, hereinbefore referred to, or they may be fitted on to the weighted lever arm 81. These last mentioned segments and chains are not shown in Fig. 1, Sheet 1, in order to avoid complication in drawings. This apparatus is situated on one side of the loom only, near the harness. It will thus be obvious, that any movement imparted to the shaft *c*, will be transmitted to the heddles, 23, and consequently the functions of the rocking shaft *c*, are two-fold, that is, it actuates the suspension and trap boards as well as the dandy warp heddles, the whole of such movements being obtained from the tappet or cam shaft C. The jacquard cylinder 4, (Fig. 1, Sheet 1,) is pushed forward toward the needles 5, 5, 5, and drawn back therefrom, by the inverted T lever 6', to the vertical arm 2 to which it is connected by the short link 8'. This lever 6', works in fixed bearings 9' attached to the loom framing, and receives an oscillating motion from the two rods 96, 97, which are connected at their upper ends respectively to the horizontal arms 1, and 3, of the lever 6', while the lower extremities of these rods are attached to the levers 98, and 100, shown in detail at Figs. 76, and 77, on Sheet 3, of the drawings.

These levers are both carried by the transverse shaft N (Fig. 1, Plate 1,) and are actuated by the action of the cams 99, and 135, Sheet 3, Figs. 76, 77, respectively, which are fast on the cam shaft D (Fig. 1). It will thus be obvious that when the cam 135, depresses the lever 100, the jacquard cylinder 4, with one of the cards 29, will be brought up against the needles 5, 5, 5, and held there during two draws of trapboard 11, during one revolution of cam 135. The cam 99, then comes into action, which, by depressing the lever 98, draws out the cylinder 4, again, and by turning it over brings a fresh card into action. I. and H, represent the two yarn beams which contain the "dandy" or straight warps 30, and 31. J, K, are the yarn beams for the ground or binding warps 33, and 32. These beams are supported at the back part of the loom by a suitable framing, and are placed one above the other; they are kept at a proper tension by means of flat link chains 163, wound two or more times around their ends, and connected to rods 164, which pass down to the under side of the loom, and are there fastened to weights or springs for the purpose of imparting the necessary drag or friction to the yarn beams. The requisite tension is given to the yarn beams H, and I, by the chains 163, which are wound two or more times around the ends of the beams and are connected at each end to the rods 164', and 164. The rod 164' is attached to weights or springs, and the rod 164 is connected with the transverse levers L, and M, which extend across the loom, and work on fixed centers attached to the loom framing at opposite ends to where the rods 164, 164 are attached.

89, is a bent lever, working on the transverse shaft N, and caused to bring down its short arm 32' on to the transverse levers L, and M, at each stroke of the lug as the reed comes up to the cloth by means of the tappet rollers 88, 88, which are carried by arms made fast on the tappet or cam shaft C. This shaft turns once for every two revolutions of the crank shaft B. Thus each time the lug comes up to the fell of the cloth, one of the rollers 88 is brought into a vertical position and elevates the lever 89, thereby depressing its short arm 32', and bringing it down on to and depressing the transverse levers L, M, which has the effect of tightening the friction chains 163, and of holding the yarn beams H, and I, perfectly fast at that point, the springs or counterweights connection with the opposite ends of the chains serving to prevent the chains from slipping over the beams. By this arrangement any degree of tension can be given to the "dandy" or straight warps. When the transverse levers L and M, however, are released again, the weights or springs attached to the rods 164' are al-

lowed to descend or collapse; but these rods must be made to stop in their descent at any given point, so that in doing so, the chains 163, will be slackened, and the yarn beams left perfectly free to give off the yarn as fast as it is wanted. At the next succeeding beat-up, the yarn is again held fast by descent of the transverse levers L, and M, and again released on the subsequent release of these levers, and so on, during the entire operation of weaving. The transverse levers L, and M, are weighted in order to give that tension to the yarns between the beats that the nature of the goods may require. The two yarn beams J, and K, may be mounted in a similar manner to the yarn beams I, H, but in some kinds of goods they will only require weighting with the ordinary counterweights. The yarns or dandy warp 30, passes from the upper beam H, under the guide roller 34; and through the heddles or harness 23, 23, of the upper web; the yarns or "dandy warp" 31 of the lower beam I, passes over the guide roller 34' and through the heddles or harness 22 of the lower web. The upper binding or ground warp 32, passes from the beam K, under the guide roll 34; and thence through the heddles or harness 26 and 27, of the upper web or fabric. The lower binding warp 33, on the lower beam J, passes over the guide rolls 34'', and through the heddles 24, and 25 of the lower web or fabric.

Fig. 187, on Sheet 2, of the drawings, is a diagram view of the various warps, showing their relative position with each other. This view shows also the position of the knife or cutter 175, (hereinafter more particularly described), and the slay sword V, Figs. 196, Sheet 2 represents a mode of hanging the ground and dandy or straight warp harness.

Fig. 75, Sheet 3, is a detail of the cam and lever for communicating the requisite motion to these harnesses. Two levers 133, Sheet 3 Fig. 75, work loose on the shaft N, as a fixed center, and are connected at their opposite ends with the rods or chains 134. These rods are connected at their upper ends to two long levers 145, which are placed side by side and are each connected by chains 198 with the bottoms of the ground heddles 147. The tops of these heddles in the arrangement shown at Fig. 196, are hung to short jacks 197, by wires 147'; one wire being attached to the top of the front heddle, and the other wire to the top of the second heddle, and so on, throughout the six heddles necessary in this kind of weaving. The jacks are hung on to suspension bars 200, secured to a portion of the loom framing. It will be obvious on referring to the drawings, that when one of the levers 133 is depressed by the cams 135, Sheet 3, Fig. 75, on the cam shaft D, (Fig. 1 Sheet 130

1) it will carry down one heddle and elevate the other. The cams 135, may be made either as shown in Fig. 75, or they may be made of any other form to suit the nature of the goods to be produced. Two harnesses or heddles are required for the "dandy" or straight warps, and four heddles for the ground warp, namely, two for the upper and two for the lower web. The mode of hanging the ground and straight warp heddles or harnesses, represented at Fig. 80, Sheet 3, differs from the arrangement shown at Fig. 196, Sheet 2, merely inasmuch as the jacks 197, are dispensed with and two levers 148 are substituted; these levers working on fixed centers 53', and connected at one end with the front and back harness respectively by the chains on wires 134, and at the other with the levers 133, by the wires 134', which wires are so arranged as to assist in elevating one heddle while the other is brought down by one of the rods or wires 144, and levers 133, as shown in the drawing, rollers may be used instead of jacks if preferred.

The five-bobbin frames 95, are arranged at the back of the loom (Fig. 1, Sheet 1), and are each made to contain as many bobbins as two ordinary frames, the whole being equivalent to a ten frame loom. One of these frames is shown in plan at Fig. 2, and is represented as containing one bobbin 41. The requisite degree of tension or drag is given to the figure warp 35—35, by the arrangement shown in detail at Fig. 64. The yarn 35, on leaving the bobbin 41, is passed around the transverse wire 43, (extending across the frame) and back again over the surface of the yarn on the bobbin; it then proceeds down through the frame and between the bobbins and is then passed through a ring or hook on the small weight 42, thence over the next succeeding transverse wire 43, and onto the figure harness. Before entering the figure harness however the whole of the figure yarns are collected or guided into a suitable perforated board or metal plate 202 (Fig. 187, Sheet 2) shown detached at Figs. 212, and 202', on the same sheet. This board may be about four inches wide, and of a length corresponding to the width of the warps where the board is fixed; it is perforated with as many rows of holes, one above the other, as there are frames; ten rows being here represented, and as many holes in a row as there are threads in a frame or dents in the reed. This board, or its equivalent, such as a comb, bar or reed, may be secured at its ends to the framework or standards of the loom, and is situated between the rollers 34,—34, as shown in Fig. 187, (Sheet 2).

167, in Fig. 187 (Sheet 2) represents a perforated metal plate or board, containing as many holes as there are knot cords in the

figure harness and arranged to correspond with the holes in the harness bore 54. The knot cords 28, are passed through the holes in this board, and the board or plate itself rests with its entire weight upon the weights or hinges 168, on the knot cords or upon knots formed for that purpose, thereby serving to bring down again into their proper position all those cords which have been elevated by the ascent of the trap board, and thus insuring a correct lift the next rise of the top board. The plate or board 167, is connected with the trap board by wires or chains, so that as soon as the trap board has made its selection, the board 167, will rise with it and so prevent the straining of any portion of the knot cord raised by the trap board.

The wires for obtaining the requisite length of pile are shown at Fig. 187, Sheets 2, 44, and 48, and in detail at Fig. 61, Sheet 1. Figs. 55, 44, and 40 which show the mode of securing or holding them steady in the loom. These wires 44, are held firmly and steadily in their proper places by the fixed clasped heddles 46, Figs. 1 and 61, Sheet 1, the shank of the wire being held between the upper and lower loops of the heddles, while the end secured to the rod 48 is bent downward from the heddles entirely out of the way of the various warps, and are secured to the transverse rod 48, attached to the loom framing. The stationary heddles which hold the wires in suspension are retained at the top by ordinary heddle shafts 47, fixed to the loom; and at the bottom by corresponding shafts or by weights attached to each heddle. The wires 44 are enlarged at 45, of sufficient width to give the requisite length of pile to each fabric when cut apart, and the end must extend into, or between the woven fabrics about two inches. The wire between 43 and 45 may be small, say No. 18 wire gage or finer, say 24 or 26, and twisted together so as to be less in the way of the yarns. One shuttle goes above the parting wires for the upper fabric and the other for the lower fabric traverses below the wires. There will be as many of these parting wires required as will be necessary to keep the goods properly apart, say one for every other dent of the reed, 134 wires for carpeting of the Brussels description with 260 dents. The first four dents at each edge may have a wire in each dent. By bending the wires down in the manner shown in the drawing Sheet 1, Fig. 1, it not only leaves the warps perfectly free, but it also prevents any possibility of the wires twisting or turning around as will be obvious on referring to Fig. 61, Sheets 1 and 48, 45, 47, and 46.

Fig. 194 on Sheet 2 of the drawing represents an arrangement of jacquard with three needles, for operating six knot cords, or for what is termed six frames; and Fig. 130

195 is a plan of one of the needles detached, showing the four long eyes formed in it. 1 is the top or suspension; 2, the trap or figure board; C', C', neck boards; 5, the cylinder; 6, spiral spring for pushing forward the needles 19, 19, 19, 19, are four long eyes formed in each needle shown in Fig. 195; 18, the back board. Each needle is kept in its place by a reed dent, and the spiral spring 6, the neck boards C', C', (one for each three cords) are for the purpose of giving the proper direction to the knot cords 9, 10, 11, 12, 13, and 14, which have their angle from the needles toward the center as shown in Fig. 194. The knot cords are hung to the suspension board 1, and pass through suitable slots in the trap board 2, which are arranged in a manner precisely similar to that shown at Fig. 60 (Sheet 1). These knot cords have knots formed on them at 206. The front set of cords next the cylinder are represented as disengaged, or out of their notches or slots in the trap board, and the back set are shown engaged, or in the notches or slots. It will thus be obvious, on referring to the drawings, that if the trap board 2, were raised as the cords now hang it would bring up with it the knot cords 9, 10, 11, while the cords 12, 13, and 14, would remain suspended from the suspension board 1. Supposing however I require to elevate the knot cord 14, I punch the card for the needle 15, and as the cylinder 5, comes up it will allow the needle 15, to stand and carries back the two other needles 16, and 17. The needle 15, standing holds the knot cords 12, and 13, out of the slots and allows the cord 14, to fall into its slot in trap board 2. The needles 16, and 17, on going back carry back also the three cords 9, 10 and 11 out of the slots, and thus as the trap board rises, it will take only the knot cord 14. In order to raise the knot cord 13, I punch the cord for the needle 16; to raise the cord 12 I punch for needle 17; to raise knot cord 11 punch for needles 16 and 17; to raise knot cord 10, punch for needles 15 and 17; and to raise knot cord 9, punch for needles 15 and 16.

The needle board 8, is made to come forward with the cylinder 5, as far as the ends of the needles, and is carried back again with it. This board 8, is connected with the back board 18, and when it comes forward to the ends of the needles, it brings up the back board 18, and with it any needles which may stick behind. The needle board 8, is brought forward to the ends of the needles by springs. The slay sword V, has its fulcrum or working center at 190, Fig. 187, Sheet 2, and is hung forward of the fell of the cloth, so as to bring the bottom of the reed against the cloth when beating up the filling weft. Great strength is required in the reed and weft in making this kind of goods.

The reed 123, is made with a bend near the middle as shown in Fig. 187, Sheet 2, so that when the lay is back the reed for the upper shed will be perpendicular. The shuttle boxes are made to correspond with the reed when the lay is back. The lay is actuated by the crank shaft B, in the manner hereinbefore described with reference to Fig. 69, Sheet 3, the curved slot producing the requisite pause or dwell in its movements. In Fig. 65, Sheet 3, which represents a front elevation of a portion of a carpet loom of the improved construction. 122 is the bottom of the lay to which is fixed the reed 123. The shuttles 119 are shown in their respective shuttle boxes 90 and 91 on each side of the loom.

120 is a thimble or stop (shown in front view detached at Fig. 67;) it is made fast to each shuttle box and is for the purpose of stopping the shuttle when it has arrived as far as is requisite in the shuttle box. The point of the shuttle enters into and conforms to the inside of the thimble, and the ends of the fly stick or picker pass through the slot formed in the underside of the thimble, as is clearly shown in the detail, Fig. 67. The shuttle boxes 90, and 91, are made fast to the sides of the loom by frame 113; the shuttles themselves are thrown by the mechanism shown in Fig. 78, on same sheet of drawings. 100 in this figure is a long blade spring, which rests at one end on the block 106, secured to the floor, and at the other on the adjustable nut and bolt 105, the nut being made to screw up or down to give any degree of tension or strength to the spring; 104, is a stud or fixed arm secured to the under side of the treadles 101, and pressing upon the surface of the spring 100, when brought down by the cam or tappet 202, on the tappet shaft C. The treadles 101, work loosely on the transverse shaft N, (Fig. 1, Sheet 1) hereinbefore referred to and are connected at their free ends by straps 102 with the picking sticks *x*, (Fig. 65), such straps being first passed under suitable guide pulleys 115. As the cam 208 revolves it forces down one of the treadles 101, and by means of the stud or fixed arm 104, strains the spring 100; but when the continued revolution of the cam 208, releases the treadle it is forced upward by the reaction of the spring 100, which thereby effects the throwing of the shuttle, through the agency of the straps 102, and picking sticks *x*. This picking stick is hung by a common parallel motion or otherwise. There are four treadles 101, two being placed on each side of the loom, and each treadle is actuated by a cam and spring of its own, in the manner shown at Fig. 78. The back picking stick *x*, plays against a common picker, which being placed horizontally passes through the back of the top shuttle box, and slides on suitable guide

rods. The shuttles are thrown during the pause or dwell of the lay; that is when the crank is passing along the circular slot in Fig. 69, (Sheet 3).

5 Fig. 72 (Sheet 3) is a detail of the lay and sword, showing the arrangement of apparatus connected therewith. The lever or arm 107, which works on a center 111, in the sword V, is for a two-fold purpose,—first to
10 hold the filling weft, and second, to give notice when the shuttles fail to throw the weft. This lever has 3 or more blades or edges 130, fitted to it at its upper extremity, which
15 blades play into corresponding slots in the piece 117, secured to the lay 122. This piece is represented in detail side elevation and plan at Fig. 72. The blades 130, enter the
20 slots 117, freely when no filling is going in but when the filling or weft is being thrown, then the levers 107, come in contact with it, and the blades 130, are prevented from entering their slots, the thread of the weft being held tightly between the blades 130, and
25 the piece 117, the lever 107, being pressed up with sufficient force to hold the thread by a spiral or other spring. The thread being thus held tight, the lever 102, having a finger 102', on the top is brought forward by means of a spiral or other spring against the
30 filling thread, and by causing it to enter into a slot in the piece 117 tightens the filling thread so as to draw up the selvage on the opposite side of the cloth, to any degree of tightness required.

35 The arrangements of arms or levers shown in Fig. 72 is the same on each side of the loom; each set having their fulcra on the same stud pin 111, on each sword. The arm or lever 109, is for the same purpose as the
40 arm 102, and is similarly constructed; but it tightens the thread of the lower web while the arm 102 performs the same operation on the thread of the upper web; being made rather longer for that purpose; these two
45 arms therefore come into action alternately as the shuttles change sides. When the shuttle through the breakage of the thread or through not boxing, omits to carry the weft in front of the blades on the arm 107,
50 these blades will enter the slot 117, in the piece 117, (Figs. 72,) and come in contact with the catch 152, Fig. 72; the hooked end of the horizontal arm 151, of this catch then falls on to the stud 153, of the second catch
55 152, the horizontal arm of which, by coming in contact with the spring catch 131, Fig. 74, which represents a portion of the stop motion of the loom, pushes it back, and thereby releases the starting handle 132 of the loom,
60 and effects the stopping of the same. A similar apparatus is placed on each side of the loom, with the exception of the handle 132 this being situated on one side only. The arms or levers 102, 107 and 109, Fig. 72,
65 are not allowed to follow back the lay as far

as it goes by about $2\frac{1}{4}$ inches, in order to allow room for the shuttles to pass in and out of the shuttle boxes and they are acted upon by springs of greater or less force according to the relative duty they have to perform. 70
The arm 100, Fig. 73, and shown also in plan at Fig. 66, is for the purpose of carrying the weft thread back from the fell at the edge of the cloth nearly to the point where the pile warp crosses or makes an angle with
75 the shed for the purpose of allowing the thread to be drawn up and tightened at the next throw of the shuttle across the web. This is effected by the upper end of the arm 100' (which is held in its place by a suitable
80 spring) taking into the V-shaped groove or recess 121, Fig. 66,) such groove or recess being fixed to the lay.

As the lay comes up with the recessed piece 121, it meets the arm 100' about $1\frac{1}{2}$ inches from the fell of the cloth. The weft thread 103, being between the arm and the recess (see Fig. 66). The arm 100' on entering the recess 121, takes the weft thread with it, and holds it fast in the recess during the time the lay is coming up to the fell; and as the lay returns again it carries the weft thread back with it for about 1 inch from the fell, or nearly to where the pile warp crosses the shed to enable it, to more
95 effectively draw up the selvage at the next throw of the shuttle. The weft only requires to be operated upon at one side of the cloth one apparatus acting upon both the upper and lower weft. If the top
100 shuttle is thrown from left to right when the figure warp is raised this apparatus will require to be placed on the left hand side of the loom.

126, 126, (Fig. 74) represents two feelers, 105 for the purpose of stopping the loom if either of the shuttles should not box. These feelers are fitted to each shuttle box and are connected by the wires 127 and 127' with the two levers or arms 128 and 129
110 which work on a hanging stud center at 107'. The feeler 126, is represented as being in the position it would assume if there were no shuttle in the shuttle box, while the opposite feeler is supposed to be acted on by its shuttle. It will be seen, on referring to the drawing, that when a shuttle omits to box, one of the arms 128, will be brought in contact with an oscillating lever arm 159,
115 which is kept constantly vibrating by means of a cam or tappet placed on the shaft B, Fig. 1, Sheet 1. It will thus be obvious, that when either of the arms are in the position shown by 159, they will both be pushed back in the direction against spring catch
120 131, hereinbefore referred to; thereby releasing the handle 132, and stopping the loom. But when the shuttles box regularly, the arms 129, and 128, will be held back out of contact with the oscillating lever arm 159, 130

as shown by 129, and the lever arm 159, will then be free to vibrate without stopping the loom. A small spiral spring situated between the arms 128, 129, serves to bring them in contact with the vibrating lever 159, when they are no longer held back by the action of the shuttles on the feeler 126—126'. Fig. 79, on Sheet 3, of the drawings represents a side elevation of a portion of a loom framing showing the arrangement of mechanism for starting and stopping the loom, such mechanism being placed on the opposite side of the loom to that seen in Fig. 1, (Sheet 1). 140, is the driving shaft, which is fitted with the ordinary fast and loose driving pulleys 141, and carries also the small spur pinion 4. This pinion gears into the spur wheel 139, running loose on a stud center, and carrying a second pinion 5, gearing into the spur wheel 138, on the crank shaft B, hereinbefore referred to and illustrated in Fig. 1, Sheet 1, of the drawings.

The driving belt 140, is guided from one driving pulley to the other by the fork or guide 144, secured to the upper end of the vertical lever arm 143, which is keyed or otherwise secured on to one end of the horizontal shaft 145. This shaft has fitted on to its opposite extremity the starting handle 132, hereinbefore referred to, which handle is held in its place by the spring catch 131, as hereinbefore described in reference to Fig. 74. A brake block 142 is placed below the fast driving pulley and works at its lower end on a fixed stud center attached to the loom framing. When the starting handle 132, is in its place in the catch 131, the driving belt will be kept on the fast driving pulley by the fork or guide 144, which at the same time bears against the front of the brake block 142, and holds it out of contact with the periphery of the driving pulley; but when the starting handle is released, whether by hand or by the self-acting mechanism of the loom, the guide or fork 144, moves outward, and conveys the driving belt from the fast to the loose pulley; at the same time releasing the brake block and allows it to press or wedge itself against the periphery of the driving pulley, and thereby instantly stopping the loom. In Fig. 1, (Sheet 1,) the loom is represented as being ready to throw the upper shuttle from the left, and the lower one from the right hand shuttle box. The weighted lever arm 81, elevates the suspension and trap bands sufficiently to bring all the figure warp 28, up into the center between the webs and even with the parting wires 44. Half of the upper and lower ground warp as well as the upper and lower straight warps are also brought to the center between the webs and the figure board

11, is also raised with the figure yarn which has been selected, for the figure requisite to form the pattern, above the upper shuttle, in the top shed of upper cloth. The shuttles are now thrown and as the lay comes forward it meets all the seven arms hereinbefore described in reference to Fig. 72, (Sheet 3); these arms being arranged at each side of the loom all of which arms take hold of or come in contact with the weft threads if there be any.

The arm 107, Fig. 72, holds the thread, while the arms 108, or 109, draws it tight on the other edge of the cloth. All these arms vary from each other as to the degree of tightness with which they hold the weft threads, their actuating springs being adjusted accordingly. As the lay comes up to the fell of the cloth, the weft threads are released by the following apparatus:—A small vertical catch 94, (Figs. 56, and 62, Sheet 1) is attached to one end of the roll or spindle Z (Fig. 56), fitted near the under side of the lay. Two T arms Z' are attached to the spindle Z, and when not in action they hang down so as to be perfectly out of contact with the several lever arms 107, 108, and 109, (Figs. 72 Sheet 3), in front of which they are situated. In the drawings Fig. 55 (Sheet 1), these arms (for the sake of compactness) are shown nearer together on the spindle Z, than they would be in the loom, as each arm must be opposite the three levers hereinbefore referred to on each side of the loom. The T arms Z' are for the purpose of throwing the levers 108, 109, and 107, out of action, and effecting the release of the wefts. When the lay, as before stated has arrived at the fell of the cloth; the catch 94, (Figs. 55, and 62,) comes in contact with the fixed stud 93 (Fig. 1, Sheet 1), and being thereby pushed back, it partially turns the spindle Z, and elevates accordingly the two T arms Z; which, by the onward progress of the lay, are brought up against and enter a notch or recess in the three levers 107, 108, and 109; on each side of the loom, as shown at (Fig. 62, Sheet 1), and thereby release the weft, these levers being held back or out of action until the back stroke of the lay permits of the catch 94 returning to its original position, upon which the T arms Z, will fall down and allow the levers 108, 109, and 107, to come into action again, ready to receive the next shot of weft. The next spring of the warp brings up the weighted lever 81, (Fig. 1,) and consequently lowers the suspension and trap board to the bottom of their traverse, the whole of figure warps being thereby dropped to the bottom of the lower shed so that the figure warp, which was previously carried up and bound into the upper fabric is now bound into the lower web or fabric. Thus the figure or pile warp is carried alternately from the

bottom to the top fabric and retained and fastened by the weft so as to form the pile or pile and figure, on each fabric when it is cut as hereafter directed.

5 Having described the construction and arrangement of mechanism for weaving or producing a double fabric; I shall now proceed to describe the cutting apparatus for severing such double fabric, which apparatus
10 is carried in front of the loom, and is attached to the loom framing.

Fig. 188, on Sheet 2, of the drawings represents a front view of the cutting and knife-sharpening apparatus detached; a portion of
15 the same being shown in the act of severing the fabrics at 175, in Fig. 187, (Sheet 2). The actual cutter or knife 175, which is represented in detail detached at Fig. 207, and is attached, as shown at Fig. 188, to the
20 endless belt or chain 174, carried by the two pulleys 185, 185, which are actuated from the pulley 186, by the driving belt 201. The pulley 186 is fast on the shaft 50, which may be driven from the cam shaft C, (Fig. 1,
25 Sheet 1,) at the same speed by miter wheels, or it may be driven faster if required. The knife 175 is hinged to a fixed piece 173 on the carrying belt or chain, so that when it has completed its cut across the fabric, it
30 may be raised up to a vertical position from the belt, as in Fig. 188, in order to bring its edge out of the way of the shaft of the take-up roller K, Fig. 187; otherwise from the position it assumes with regard to this roller
35 it would come in contact with it on passing around the carrying pulleys 185. The knife when cutting stands out horizontally from the edge of the belt or chain which carries it, as shown by the leg 174, and 175, Fig.
40 187, and only resumes its vertical position when passing over the carrying pulley, after which it again assumes a horizontal position on the under portion of the belt or chain when it passes in its traverse under and over
45 two sharpening stones or emery buff 176, which are attached to a fixed portion of the loom. The knife is changed from a horizontal to a vertical position, and vice versa, by passing over fixed inclines formed on or
50 fitted to a supporting bar or rail (Fig. 187) which serves to support and steady as well as guide the knife while in the act of traversing across the fabric to cut the pile. The knife which has a slanting cutting edge may
55 be attached to the carrying belt or chain by a spring hinge, similar to an ordinary pocket knife blade, so that when it is brought into a horizontal position, it will remain fixed until acted upon by the incline, hereinbefore
60 referred to, there may be any number of knives on the above belt or chain say from four to eight.

The double fabric to be cut asunder is drawn forward and presented to the knife
65 by two take-up rollers K, K', Fig. 187, cov-

ered with wire cord diamond pointed No. 18 wire; between which it is passed. When severed the upper fabric passes around the carrier roller 182, and over the curved plate 184, which serves to keep it clear of the
70 knife-actuating mechanism. The lower fabric passes over the carrier roller 204, and thence with the upper fabric down through the floor and underneath the weaver, as found most convenient. As the knife is not
75 shown in action in Fig. 1, Sheet 1, the fabric is represented as passing over the top of the upper take-up roller K, instead of between the two rollers as in Fig. 187, Sheet 2.

The fabric produced by the hereinbefore
80 described apparatus presents a finer and more substantial appearance than the ordinary piled goods. The upper half of the double fabric when cut forms an entirely new description of goods, inasmuch as the
85 figure warp is raised twice therein by each card with the jacquard, thereby producing the same effect as using a thicker figure warp. In the upper fabric another novel
90 feature presents itself also, which is that it contains no running figure warp whatever, the only figure warp contained therein being that which is thrown up as pile to form the pattern in the lower fabric, which is carried
95 up into the upper fabric also. The upper fabric is of new fabrication and differs from that of the lower fabric which is also new. This new fabrication of the upper and lower
100 goods consists in throwing a greater number of shoots of weft per inch than heretofore in piled goods, and also in a different combination of the warp and filling or weft.

The above described apparatus is for the manufacture and production of pile carpetings; but I may here observe that the same
105 or similar construction and arrangement of mechanism may be modified, and so made equally applicable to the manufacture of various other piled goods, such as woolen, worsted, mohair, cotton and silk plush, cotton,
110 silk, or other velvets, either plain or figured; goods with plain ground and pile figures and coach or carriage lace; also when yarns or warps, either plain colored, or printed, are used, whether from bobbins,
115 beams, or other apparatus and with or without a jacquard or figuring mechanism.

Having now described and particularly ascertained the nature of my said invention, and the manner in which the same is or may
120 be used or carried into effect, I would in conclusion say, that, I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe or refer to; as many variations may be made
125 therefrom without deviating from the principles or main features of the said invention.

I believe I have described and represented the construction, operation and use of my
130 improvements in looms for weaving double

piled fabrics, so as to enable any person skilled in the art to make and use the same.

I will now particularly point out and specify what I desire to secure by Letters Patent, viz:

1. I claim the combination and arrangement of the mechanism described for operating the suspension and trap boards in jacquard looms that is to say lever 81, sector 15 on shaft E pulley 16 on shaft F connected by chain or belt having slots P and 12 suspension and trap board 10 and 11 connected to the fitting rods by arms 51.

2. I claim the lever 89, Fig. 1, Sheet 1, or its equivalent operated by the tappets 88, or their equivalents so arranged as to lock the beams or straight and ground warps substantially as described.

3. I claim the mode of giving tension to the warp threads or yarns taken from bobbins as shown in Fig. 64, Sheet 1, by drawing it against itself or the bobbin or yarn which remains upon it by means of a weight or its equivalent so arranged as to be lifted by the yarn when it is drawn and release the bobbin and allow it to turn until the yarn delivered permits the weight to descend again and stop the bobbin by the friction of the weighted yarn against it substantially in the manner described.

4. I claim the traversing board 167, Fig. 187, Sheet 2, or its equivalent arranged upon the knot cords, pile or figuring harness below the warps substantially as described; to bring down any of said cords which may catch accidentally, so as not to be brought down by the weights.

5. I claim holding the parting wires, by hanging them to a rod in rear of the heddles, and passing them between the upper and lower loops of the heddles, substantially in the manner described.

6. I claim the trap boards pierced in the manner described combined with the needles constructed as described when arranged as above set forth for the purpose specified.

7. I claim the thimble or socket 120 Fig. 65, Sheet 3, or its equivalent for receiving, stopping and holding the shuttle in the box substantially as described.

8. I claim the apparatus or its equivalent for holding and drawing up the filling or binding weft for the purpose of tightening the selvage substantially as herein described and represented in Figs. 66 and 72, Sheet 3.

9. I claim the arm 100' and score 121, Fig. 66, Sheet 3, constructed arranged and operated substantially as described or their equivalents to carry the weft thread from the fell at the edge of the cloth nearly to where the pile warp crosses or makes an angle with the shed substantially as described for the purposes set forth.

10. I am aware that a knife revolving on an endless belt has been used. I therefore do not claim this feature, but I claim the application of the knife 175 in combination with its guide arranged in the manner and for the purpose specified.

JOHN GOULDING.

Witnesses:

J. DENNIS, Jr.,

JOHN S. HOLLINGSHEAD.