E. B. Bigelow.

Sheet 1, 4 Sheets.

Carpet Loom.

No. 2,625.

Patented May 16, 1842.

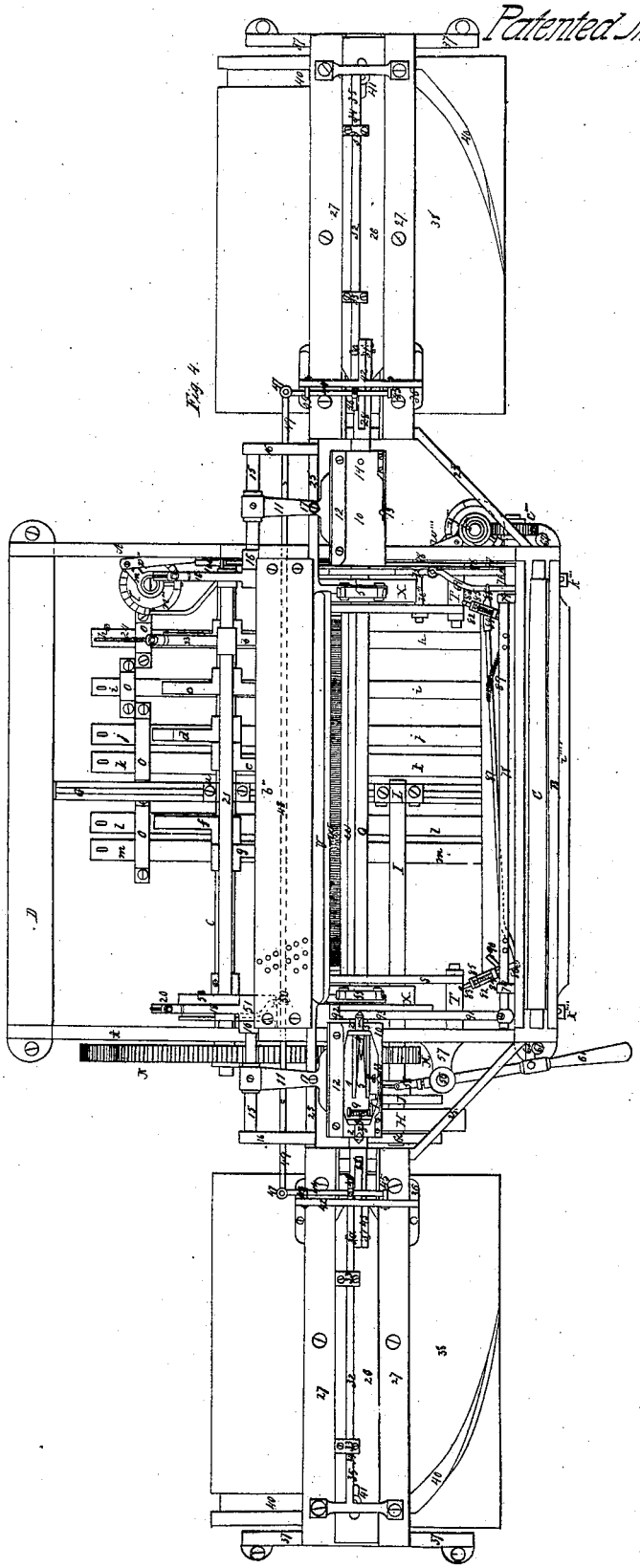


Fig. 4.

E. B. Bigelow

Sheet 2, 4 Sheets

Carpet Loom

No. 2,625. Patented May 16, 1842.

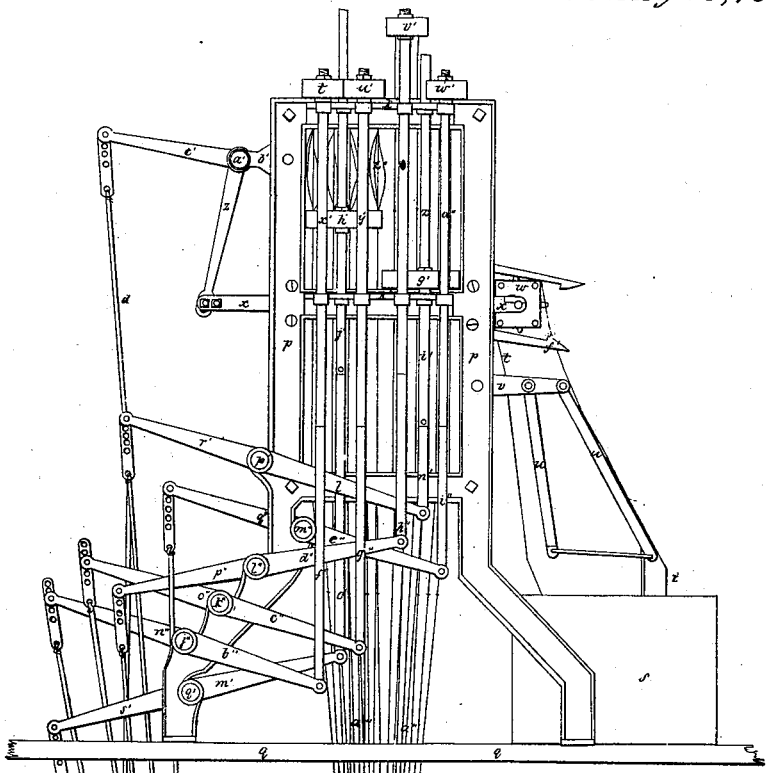
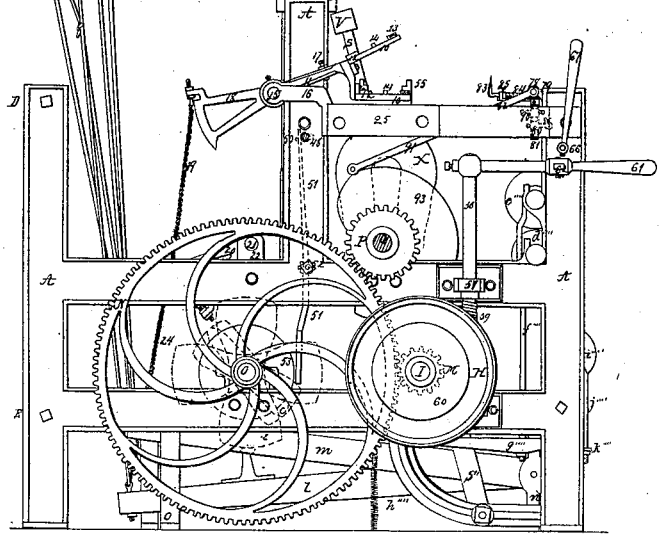


Fig 3

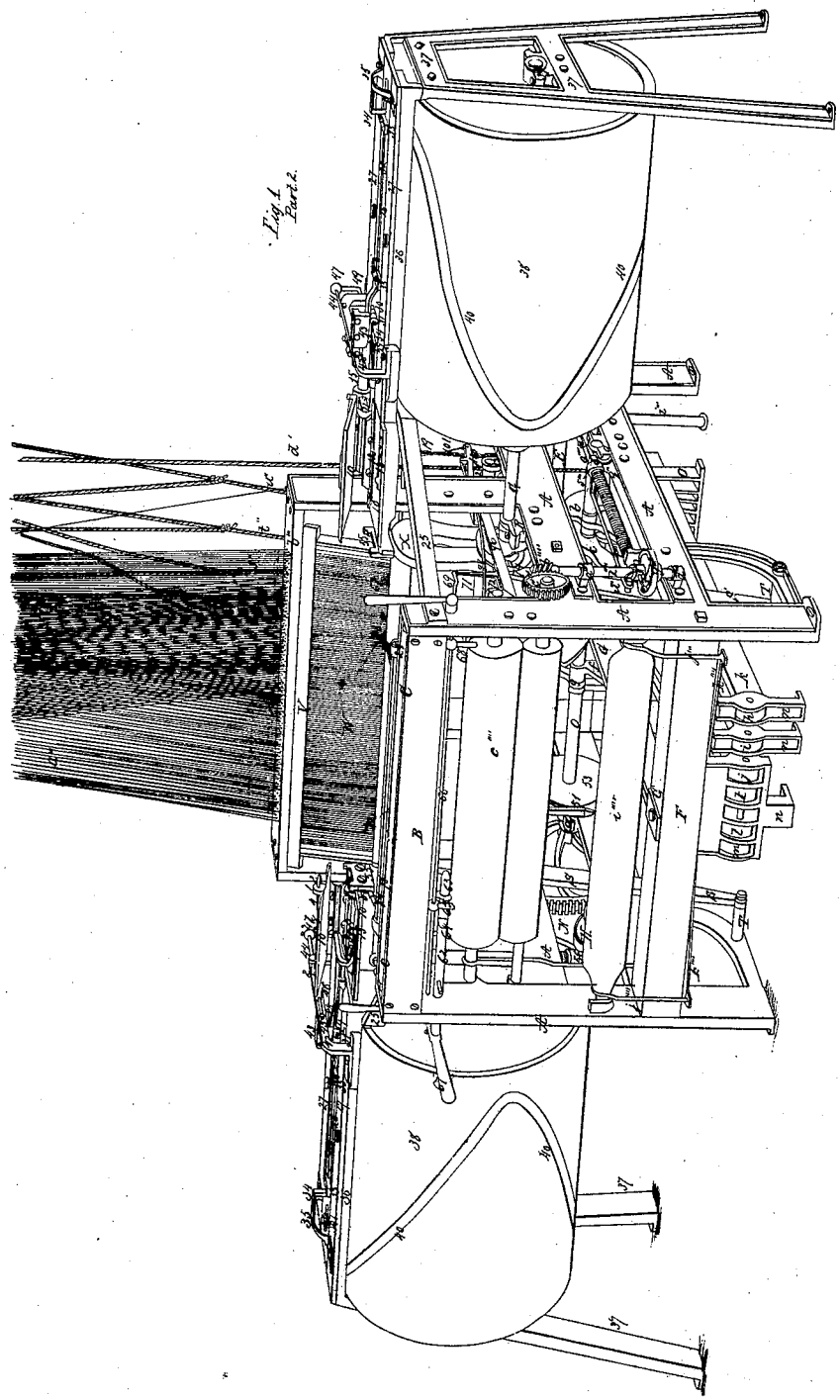


E. B. Bigelow.

Sheet 3, 4 Sheets.

Carpet Loom.

No. 2,625. Patented May 16, 1842.

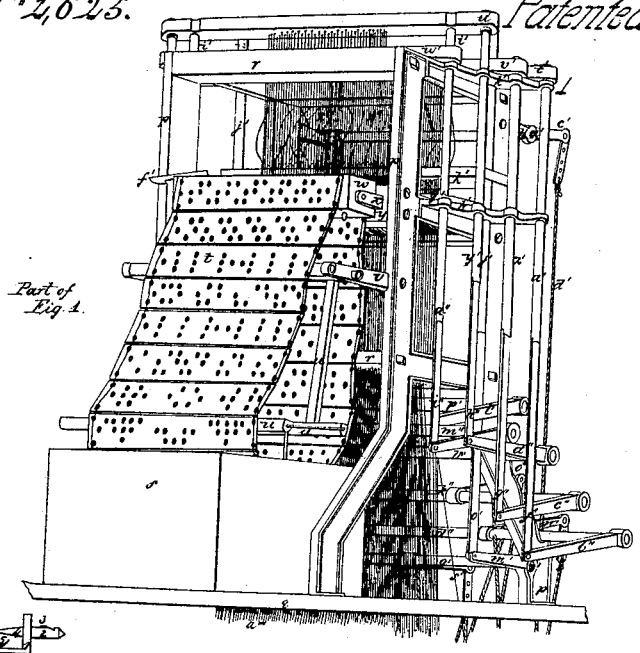


E. B. Bigelow.

Sheet 4, 4 Sheets.

Carpet Loom.

No. 2,625. Patented May 16, 1842.



Part of Fig. 1.

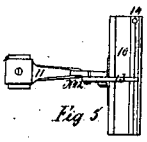
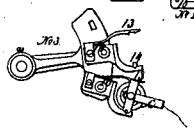


Fig. 5.



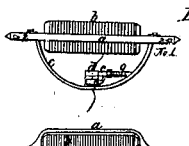
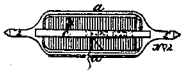


Fig. 6.



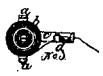
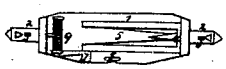


Fig. 4.



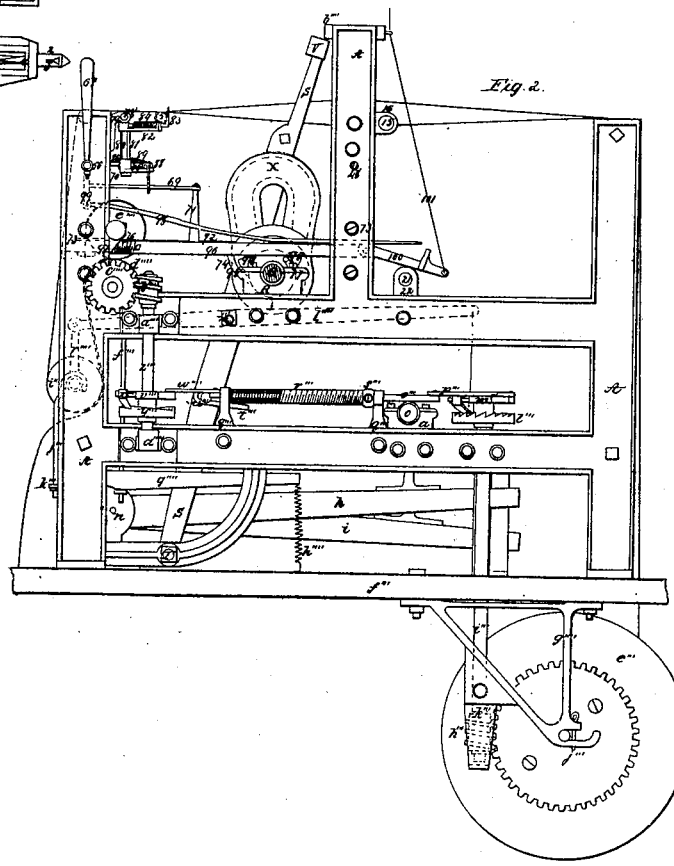


Fig. 2.

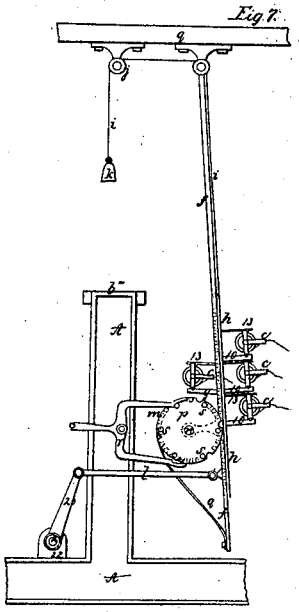


Fig. 7.

UNITED STATES PATENT OFFICE.

ERASTUS B. BIGELOW, OF LANCASTER, MASSACHUSETTS.

LOOM FOR WEAVING CARPETS AND OTHER FIGURED FABRICS.

Specification forming part of Letters Patent No. 2,625, dated May 16, 1842; Antedated May 1, 1842; Reissued September 11, 1849, No. 143.

To all whom it may concern:

Be it known that I, ERASTUS B. BIGELOW, of Lancaster, in the county of Worcester and State of Massachusetts, have made certain Improvements in Looms for Weaving Carpets and other Figured Fabrics; and I do hereby declare that the following is a full and exact description thereof.

These improvements in the mechanism of looms consist in certain new arrangements and combinations of mechanical agents, and the use and application thereof in such a manner as to perform the entire process of weaving two and three plied Kidderminster carpets, and other fabrics by any uniform rotary power. Although these improvements are described and represented in the drawings as applied to the weaving of carpets only, it is not intended to limit their use and application to that branch of weaving alone, as they will in part, answer equally well for weaving many other kinds of goods, and may be advantageously applied, either separately or combined, to looms for the weaving of various fabrics.

These new and peculiar arrangements and combinations of mechanical devices or mechanical agents consist as follows, viz: First. In the particular construction and arrangement of certain parts of the jacquard machine, whereby one trapboard is made to descend while the other rises, and the weight of the harness on the ascending trap-board is made to counteract the weight of the harness on the descending trap-board, thereby equalizing the power required to drive the loom. Second. In the combination and arrangement of the machinery employed to deliver out the chain or warp, and take up the finished cloth; which machinery operates in such a manner as to give a uniform tension to the chain or warp during the process of weaving, and this insures the accurate matching of the pattern or figure. Third. In a novel mode of constructing the shuttle and shuttle boxes, and of connecting said boxes to the main frame of the machine or other stationary support, instead of attaching them to the lay, lathe, or batten, as heretofore done. Fourth. In passing or handing the shuttle through the warps by means of reciprocating arms, instead of throwing it by a sudden impulse of the machinery as heretofore done, said arms working the shuttle in such a manner as to give the filling or woof an equal and uniform tension, and insure a smooth face and a straight and even selvage to the cloth. Fifth. In the particular apparatus employed for preventing the selvage of the cloth from drawing in where the filling or woof is prevented by any cause from escaping freely from the shuttle, and also for stopping the loom when the filling or woof breaks or is exhausted on the bobbin.

After describing the frame-work and main gearing of the loom, the several improvements will be noticed in their respective order.

Description of the drawings.—Figure I is a perspective view of the loom. Fig. II is a view of the right hand end thereof; the shuttle, boxes, and the apparatus which works the shuttle being removed. Fig. III is a view of the left hand end of the loom, with the apparatus which works the shuttle removed. Fig. IV is a plan of the loom with the jacquard machine and harness removed.

Description of the frame work and main gearing of the loom.—A, A, are the end frames of the loom; B, the breast beam which has the roller C, revolving in it so as to allow the cloth to pass freely over it.

D, is the top back girth; E, the bottom back, and F, the bottom front girth.

G, is the middle cross girth.

H, is the driving pulley, which is made so as to revolve on the driving shaft I, and is engaged and disengaged therewith, for the purpose of starting and stopping the loom, by means of the clutch J, which is seen in Fig. 4.

The shaft I, revolves in suitable boxes, one of which is seen at L, and has affixed to it the driving pinion M, which meshes into and turns the cogged wheel N. The cogged wheel N, is affixed to the cam shaft O, and takes into the cogged wheel P, which is keyed to the lathe shaft Q. The relative sizes of the cogged wheels N, and P, are as four of the latter to one of the former; that is, the wheel P, is to make four revolutions to one of the wheel N. The driving pinion M, may be of any size which will give the requisite power to drive the loom. The lathe shaft Q, revolves in the boxes R, R, and operates the lathe in the following manner, viz.—

S, S, are the swards of the lathe, which vibrate in the studs T, T. The race beam U, and the top shell V, support the reed W.

X, X, are double or hollow cams keyed to the lathe shaft Q. The places of the grooves in these double or hollow cams X, X, are shown by the dotted lines in Fig. II. Within these grooves there are friction rollers which are fitted to them—said rollers revolving on studs, which are firmly affixed to, and project from, the outer sides of the swards S, S. The rollers and the studs above named are concealed in the drawing by the cams X, X; but such fixtures are well known, and from the description here given, it is evident that when the lathe shaft Q, revolves, said cams will give the lathe the required motion. The cam shaft O revolves in the boxes *a*, *a*, *a*, (see Fig. 4,) and has affixed thereto the cams or wipers, *b*, *c*, *d*, *e*, *f*, and *g*. In the operation of the loom the cams or wipers, *b*, *c*, *d*, *e*, *f*, and *g*, act on their respective treadles, *h*, *i*, *j*, *k*, *l*, and *m*, which treadles are hung at one end in the treadle hangers, *n*, *n*, and guided in their vertical motion at the reverse ends by the treadle guide O, O. The particular office of said cams and treadle will be described in connection with the parts of the loom which they actuate.

The first improvement to be noticed is the peculiar construction and arrangements of the jacquard machine whereby one trap-board is made to descend while the other rises, and the weight of the harness on the ascending trap-board is made to counteract the weight of the harness on the descending trap-board, thereby equalizing the power required to drive the loom.

This machine is described and represented in the drawing as arranged for two ply carpets. In Figs. 1, and 3, *p*, *p*, is the end frame of the machine shown as standing on the floor *q*, of the mill.

r, *r*, are the cross girths.

s, is the card box to contain the pattern card *t*; *u*, *u*, are guides to conduct the pattern card *t*, properly into the box, *s*, said guides being supported by the stands *v*, *v*, which are bolted to the frame *p*, *p*. The card prism or polygon *w*, for carrying the pattern card *t*, is constructed in the ordinary way, and made to revolve in the sliding bars *x*, *x*, which have a horizontal reciprocating motion through suitable guide stands *y*, *y*, bolted to the frame *p*, *p*.

z, *z*, are vibrating levers affixed to the fulcra shaft *a'*, and are connected to the sliding bars *x*, *x*, by means of rollers working in slots in their lower ends. The shaft *a'* turns in the stands *b'*, *b'*, and has the lever *c'* extending from it at right angles with the levers *z*, *z*. The arm or lever *c'* is connected to the treadle *i*, by means of the cord or rod *a'*, and is actuated by the cam *c*. The cam *c* acts on the treadle *i*, and depresses the lever *c'* and carries out the card prism or polygon *w*, and when the cam *c* relieves its action on the treadle *i*, the card prism *w*, is brought back again against the needle board by the action of a spiral spring encircling and acting upon the shaft *a'*.

f' is the snack, or latch, to turn the card prism *w*, when it is carried out by the levers *z*, *z*. The hammer which secures the prism *w*, in its proper position is concealed in the drawings behind the bar *x*, but its construction and action on the prism *w*, are the same as in other jacquard machines. The needles are also arranged and worked in the same manner as in the machines in common use for hand weaving.

The trap-boards *g'*, and *h'*, are perforated with holes in the usual way and are supported by the guide rods *i'*, *i'*, and *j'*, *j'*,—said rods being guided by the guide stands *k'*, *k'*, bolted to the frame *p*, *p*. The guide rods *i'*, and *j'*, are connected with the vibrating levers *l'*, *m'*, by the bars *n'*, *o'*, said bars being connected to said guide rods and levers at their respective ends by means of a joint pin. The vibrating levers *l'*, *l'*, and *m'*, *m'*, are fastened to their respective fulcrum shafts *p'*, and *q'*, which turn in suitable bearings in the frame *p*, *p*, and have the levers *r'*, and *s'*, extending from them opposite to the levers *l'*, *l'*, and *m'*, *m'*. The journals *t'*, *u'*, *v'*, *w'*, are placed at the top of the jacquard machine, and fastened to their respective rods *x'*, *y'*, *z'*, *a''*; said guide rods being guided by the guide stands *k'*, *k'*. The guide rods *x'*, *y'*, *z'*, *a''*, are connected to the respective vibrating levers *b''*, *c''* *d''*, and *e''*, by means of the connecting bars *f''*, *g''*, *h''*, and *i''*, said bars being jointed to said levers and guide rods at their respective ends, in such a manner as to move up and down freely. The vibrating levers *b''*, *c''*, *d''* and *e''* are affixed to their respective fulcrum shafts *j''*, *k''* *l''* *m''*, which turn in suitable bearings in the frame *p*, *p*, and have, extending from their sides opposite the vibrating levers *b''*, *c''*, *d''*, and *e''*, the arms or levers *n''*, *o''*, *p''*, and *q''*. The arms or levers *n''* *o''* *p''* and *q''* are connected to their respective treadles *j*, *k*, *l*, and *m*, by means of the cords or rods *r''* *s''* *t''* and *u''*. The rods or cords *r''* and *s''*, are connected with the arm or lever *r'* by the cords *v''* and *w''*; and the rods or cords *t''* and *u''* are connected with the arm or lever *s'*, by the cords *x''*, and *y''*. The cams *d*, *e*, *f*, and *g*, work their respective journals *t'*, *u'*, *v'* and *w'*, and the trap board *g'* and *h'* in the following order. Suppose the journal *v'* and the trapboard *h'*, to be raised as seen in the drawings, then the journal *t'*, and the trap board *g'* rise simultaneously with the descent of the journal *v'* and trap-board *h'*, then at the same time that the journal *t'* and the trap-board *g'*, descend, the journal *w'* and trap-board *h'* rise, and when the journal *w'* and trapboard *h'* descend the

journal u' and trapboard g' rise, and as the journal u' and the trapboard g' descend, the journal v' and trap-board h', ascend, to repeat the operation as before.

The card prism or polygon w, is operated by the cam c, while the trapboards g', and h', are at rest, either one or the other of said trapboards being in a raised position. By working the card prism w in this way, one of the trapboards may descend while the other rises, without disturbing the perfect action of the machine. The knot cords z'', z'', are suspended from the journals t', u', v', and w', and pass down through the trapboards g' and h', and the needle eyes, and connect with the neck of the harness a''' a''' in the ordinary way. The neck of the harness a''' a''' passes down from the knot cords z'' z'' through the stationary harness board b''', to the males, from which weights are suspended in the usual manner. The knot cords and the harness aforesaid, are represented in the drawings by the red lines, but the males and the weights are connected behind the reed W, and the breast beam B, and these being the same as those in common use, it is not necessary to represent or describe them.

The second improvement to be described is the peculiar construction and arrangement of the machinery employed to deliver out the chain or warp and take up the finished cloth, which machinery operates in such a manner as to give an uniform tension to the chain or warp during the process of wearing and insure the accurate matching of the pattern or figure. In Fig. 2, e''' is the yarn beam, which for the convenience of having it of large size is placed under the floor f''' in the story of the mill next below the loom, and is supported by the hangers g'''. The endless screw or worm h''' is affixed to the vertical shaft i''', and takes into the cogged wheel j''' on the yarn beam e'''. The vertical shaft i''' is supported by the stands k''', and has affixed to its upper end the contrate ratchet wheel l'''. Above the contrate ratchet wheel l''' is the vibrating lever m''' which turns on the vertical shaft i''' as its fulcrum. To one end of the vibrating lever m''' the click n''' is attached which actuates the contrate ratchet wheel l''', and the other end is connected to the sliding bar o''' by the bar or rod p'''.

The sliding bar o''' slides in the standards q''' q''' and is encircled by the spiral spring r''' one end of which rests against the standards q''' and the other end against the stud or arm s'''. To the end of the arm s''' projecting toward the loom, one end of the rod t''' is attached, the other end of said rod being bent in a hooked form and working in a groove in the stud u''' projecting from the sword of the lathe S. When the lathe approaches the breast beam to beat up the cloth the rod t''' draws the sliding bar o''' forward, and when the lathe returns the spiral spring r''' forces said sliding bar o''' back until the arm s''' strikes against the stand q''' which determines the degree of motion of the sliding bar o'''.

The sliding bar o''' is connected to one end of the vibrating lever v''' by the rod or bar w''''. To the other end of the vibrating lever v''' the click x''' is attached which actuates the contrate ratchet wheel y'''. The contrate ratchet wheel y''' is affixed to the vertical shaft z''' which turns in the stands a'''' a''''. The worm or endless screw b'''' affixed to the upper end of the vertical shaft z''', takes into the cogged wheel c'''' on the shaft of the roller d''''. The roller d'''' turns in bearings in the frame A, A, and is covered with emery, or otherwise rendered rough to increase the friction on its surface. The roller e'''' resting upon the roller d'''' is covered with cloth, and guided by bearings in the frame A, A. The roller e'''' is weighted down upon the roller d'''' to prevent the cloth from slipping between them, by means of the hooks f'''' f'''' the levers g'''' g'''' and springs on weights h'''' h''''.

The vibrating or tension roller i'''' may be of any convenient diameter and vibrates up and down in grooves in the frame A, A. j'''' j'''' are hooks hanging in grooves on either end of the tension roller i'''' and connect with the spring k'''' which is adjusted by means of nuts on the lower ends of the hook j'''' j'''' and gives a proper tension to the warp or chain. l'''' is the regulating lever (shown by the dotted lines in Fig. II,) to regulate the quantity of yarn delivered out from the yarn beam e''' and vibrates in the fulcrum stud m''''. The regulating lever l'''' is connected at one end to the tension roller i'''' by means of the bar n'''' and at the other end to the click n''' by means of the cord o'''' so that when the tension roller i'''' is depressed it raises the click n''' off of the ratchet wheel l''' and cuts off its action thereon, and when said roller is raised said click falls down and renews its action on the ratchet wheel l'''. The yarn passes from the yarn beam e''' up through the floor f''' over the girth D, through the snales, and through the reed W, over the roller C, in the breast beam B; thence down around the tension roller i'''', up over the roller e'''', thence between the roller e'''' and the roller d'''' and down through the floor f''' as shown by the red line in Fig. II.

The diameter of the roller d'''' and the number of teeth in the cogged wheel c'''' and in the contrate ratchet wheel y''' are so proportioned that the periphery of the roller d'''' shall pass over as much space every thread of filling that is introduced,

as that thread of filling will occupy in the cloth, that is to say, in case it is required to weave a fabric with forty picks to the inch, the periphery of the roller d'''' must move one fortieth of an inch every thread of filling introduced. It is obvious that the relative velocity of the periphery of the roller d'''' may be varied either by varying the diameter of said roller, or by varying the number of teeth in the cogged wheel c'''', or in the contrate ratchet wheel y'''. The cogged wheel j''' on the yarn beam e''', and the contrate ratchet l''' should be be so proportioned that the click n''' (provided that it is allowed to act on the ratchet wheel l''' continually) will deliver out the required length of chain or warp, when the yarn on the beam is at the smallest diameter, or about exhausted.

The mode of operating the machinery for delivering out the chain or warp and of taking up the finished cloth is as follows. When the lathe approaches the breast beam to beat up the cloth it moves the sliding bar o''', which by means of the parts connected therewith turns the ratchet wheel y''' the space of one tooth, and the ratchet wheel l''', the space of one or more teeth, according as the click n''' is acted on by the roller i''''. Now suppose the roller i'''' to be sunk to such a degree as to raise the click n''' from its action on the ratchet wheel, l''', thereby leaving the yarn beam e''' at rest, it is evident that as the rollers d'''' and e'''' take up a given length of finished cloth every thread of woof or filling introduced, it will raise the roller i'''' and allow the click n''' to renew its action on the ratchet wheel l''', and deliver out a new portion of the chain or warp. In case too much chain or warp is being given out, or, in other words, when more is given out than is taken up by the rollers d'''' and e'''', the roller i'''' descends, raises the click n''', and again cuts off its action on the ratchet wheel l'''.

The third improvement to be described, is, the mode of constructing the shuttle and shuttle boxes, and of connecting said boxes to the main frame of the machine instead of attaching them to the lathe as heretofore done. The shuttles 1, 1, are made of a plate of iron or other metal, with a projection rising at each end, a top view of which is seen in Fig. 4, and a side view in Fig. I; an enlarged view of this part is also given in Fig. 8. The round pins 2, 2, extending from the projections on the shuttle 1, are pointed at the ends, and have a notch filed in the top side. 3, 3, are guide pins the office of which will be described in connection with the parts which operate the shuttles. 4, is the pin or skewer for holding the quill or bobbin which may be made like those in common use. 5, is a spring to secure the quill to the pin or skewer 4. The filling passes from the quill through the eye 6, under the bar or lever 7, and out through the eye 8; the spiral spring 9, encircles the fulcrum of the lever 7, and acts thereon in such a manner as to give a degree of friction to the filling in proportion to the tension required. The shuttle boxes 10, 10, are formed of a table or plate of iron with a piece turned up at right angles on one edge by which they are secured to the arms 11, 11. An end view of the shuttle boxes 10, 10, is seen in Fig. III, a front view in Fig. I, and a plan in Fig. 4. 12, 12, are bars or guides to guide the shuttle 1, 1. The bars 12, 12, are made beveling on the edge against which the suttle 1, bears, to prevent the shuttle from rising up. 13, 13, are springs or binders to secure the shuttles in the boxes. 14, 14, are pins projecting from the plate or table of the shuttle boxes to arrest the shuttle when it enters the box.

The arms or levers 11, 11, are affixed to their fulcrum shafts 15, 15, which turn in the standards 16, 16. The adjusting screws 17, 17, to regulate the downward motion of the shuttle boxes 10, 10, rest on the standard 25. When said boxes are depressed to bring the shuttle in the top box into operation. The standard 25 is bolted to the frame A A. The arms or levers 18, 18, extend from the fulcrum shafts 15, 15, and are connected by the chains or rods 19, 19, to the arms or levers 20, 20, which are affixed to the shaft 21. The shaft 21, turns in the standard 22, 22, and has the arm or lever 23, extending from it, which is connected to the treadle h, by means of the cord or chain 24.

The operation of the shuttle boxes is as follows: Suppose said boxes to be depressed to a position to work the shuttle in the top box, then when it is required to work the shuttle in the lower box the cam b acts on the treadle h, and through the medium of the cords or chains 24, and 19, and arms or levers 20, 18, and 11, raise the boxes to the position shown in the drawings. Now when it is required to work the shuttle in the top box, the cam b, relieves its action on the treadle h, and allows the boxes to descend by their own gravity. Only two boxes are described, but any number may be used which it is practicable to work. One method of using a series of boxes will be noticed under the head of modifications.

The fourth improvement to be described is in the manner of passing, or handing the shuttle through the warp by means of reciprocating arms instead of throwing it by a sudden impulse of the machinery, as heretofore done, said arms working the shuttle in such a manner as to give the filling or woof an equal and uniform tension, and insure a smooth face and straight and even selvege to the cloth. The reciprocating

arms 26, 26, for handling the shuttle through the warp, are usually made cylindrical at their inner ends, or those presenting to the shuttle boxes, and a hole is drilled in the axis of this cylindrical part to receive the round terminations or pins, 2, 2, on the ends of the shuttle. Grooves are made in the top side of the holes in the ends of said arms to receive the feathers or steady pins 3, 3, which entering said grooves, prevent the shuttles from turning around in the holes within which they are received. The arms 26, 26, are grooved on either edge, and slide on the guide ways 27, 27,—28, 28, are latching levers for holding the round pins 2, 2, on the shuttle in the ends of the arms 26, 26,—these levers vibrate on a fulcrum pin 29 (see Fig. 1). The arms of said latching levers, which extend toward the cylindrical ends of the reciprocating arms, are let into said arms, and have on them a catch or hook, which is received within the notch filed in the top side of the pins 2, 2, for that purpose. To the under side of the reverse arms of the latching levers 28, 28, the springs 54 are affixed, which causes said lever to lock into the pins 2, 2, when they enter the holes.

30, and 31, are rollers revolving on studs projecting from the latching levers 28, 28. The bar 32 slides in the bearing 33, and is so shaped at the end next to the loom, that when drawn back it acts on the rollers 30, 31, and releases the latching levers 28, 28, from the pins 2, 2, and when said bar is moved forward it relieves its action on the roller 30 and allows the spring 54 to raise the latching levers 28, 28, to a position to lock on to the pins 2, 2, again.

34 is a projection rising from the bar 32, which strikes against the standard 35 when the arm 26 is drawn back and meets said bar while the arm 26 continues to move back.

55, 55, are guides to support the arms 26, 26.

36, 36, are standards to support the ways 27, 27, with one end resting on the standard 37, 37, and the other on the standard 25.

38, 38, are two grooved cylinders or drums, the outer ends of the axles of which turn in the boxes 39, 39, and the reverse ends of which are coupled to the lathe shaft Q.

40, 40, are grooves in said cylinder to which friction rollers are fitted, said rollers turning on studs 41, 41, which extend downward from the arms 26, 26; when the cylinders or drums 38, 38, are caused to revolve, the action of the grooves 40, 40, upon the arms 26, 26, will be such as will cause them to vibrate back and forth, through the warp, in the manner required. The cylinders which I have used are about thirty two inches in diameter and about the same in length; they give a motion to the arms of twenty nine and a half inches.

42, 42, are stands bolted to the standards 36, 36.

43, 43, are cams which act on the rollers 31, 31, and operate the latching levers 28, 28.

44, 44, are shafts turning in the bearings 45, 45.

46, 46, are arms extending from the shafts 44, 44, and made hooked at their outer ends, and there hooked on to the projection 34, and arrests the bar 32. The arms 47, 47, project downward from the shafts 44, 44, and are connected to the rod 48, by the rods 49, 49.

50, is a stud projecting from the rod 48, and playing in a slot in the upper end of the lever 51. The lever 51, vibrates on the fulcrum 52, and has a stud projecting from its lower arm playing into the groove in the periphery of the cam 53. The groove in the cam 53, is so shaped as to give a vibrating motion to the lever 51, and slide the rod 48, which, through the medium of the rods 49, 49, and the arms 47, 47, turns the shafts 44, 44, and raises one of the arms 46, and at the same time depresses the other.

In Figs. 6 and 8, a shuttle and the apparatus concerned in handing it from one of the reciprocating arms to the other, are shown on a larger scale; but the respective parts are designated by the same numbers as in Fig. 1. Their construction is thus clearly shown.

The mode of carrying the shuttles through the warp is as follows: Suppose the loom to be in that stage of its operation in which it is represented in the drawing—that is to say—the arms 26, 26, drawn back free from the shuttle and the bar 32, moved forward so as to relieve its action on the roller 30, thereby leaving the latching levers 28, 28, free to lock on to the shuttle pins 2, 2, the respective parts being in this position, then, when the shuttle is to be handed across the loom, the cylinders 38, 38, being made to revolve as above stated, will, by means of grooves 40, acting upon the friction rollers upon the studs 41, carry the arms 26, 26, forward toward the middle of the loom, and the arm 26, on that side of the loom where the shuttle lies which is to be operated, receives the pin 2′, on the shuttle and carries said shuttle forward until it meets the other arm 26, which also receives the pin 2 on the reverse end of said shuttle.

Now in case neither of the latching levers 28, 28, were released from their action on the pins 2, 2, the arms 26, 26 would be held fast, by being locked to their respective shuttle pins. But to prevent this, and to determine the direction of the shuttle after the arms 26, 26, meet, the arm 46, on that side of the loom from which the shuttle was taken, is depressed by the action of the cam

53, so that the projection 34, strikes against the hook thereon, and draws back the bar 32, and releases its latching lever 28. I have already said that when one of the arms 46, 46, is depressed the other rises, consequently the arm 46, on the reverse side of the loom from which the shuttle was taken would be raised, and the projection 34, pass freely under it, and thereby leave the latching lever locked on the shuttle pin 2. The arms 26, 26, now return, and when they arrive at the proper point to discharge the shuttle, the rollers 31, 31, strike against the cams 43, 43, and release the latching levers 28, 28, and leave the shuttle in the shuttle box, and at the same time the projection 34 on the bar 32, which was drawn back to release the latching lever 28, when the arms 26, 26, meet in the middle of the loom, strikes the stand 35, and carries the bar 32, forward to leave the latching lever 28, free to lock on the shuttle pin 2, on the next operation.

The fifth improvement to be described, is, the apparatus for preventing the selvage of the cloth from drawing in when the fitting or woof is prevented by any cause from escaping freely from the shuttle, and also for stopping the loom when the filling or woof breaks, or is exhausted on the bobbin.

No. 56, is a vertical shaft turning in the standards 57, 57, and has the forked arm 58, extending from it, which acts on the clutch J.

No. 59, is a spiral spring encircling the shaft 56, and acting thereon in such a manner as to turn it in a direction to disengage the clutch from the clutch holder 60, and thereby to stop the loom.

No. 61, is an arm extending from the shaft 56, by which the operator throws the loom into gear.

No. 62, is a rod jointed to the arm 61, and which slides in the frame A, and the stand 63. When the operator moves the arm 61, toward the loom, the notch 64, filed in the side of the rod 62, locks on to the arm 65, and secures the loom in gear; and when the arm 65 is released from the notch 64, the spring 59, throws the loom out of gear. The arm 65 is affixed to the shaft 66, which turns in the end frame A, A, and has the handles 67, 67, projecting upward, by which the operator turns said shaft, and thereby releases the arm 65, to stop the loom.

No. 68, is an arm extending downward from the shaft 66.

69, is a rod one end of which slides laterally in a horizontal slot in the standard 70 (see Fig. II,) and the other end turns on the upright stud 71. The upright stud 71, projects from the sliding bar 72, which slides in the standards affixed to the frame A, A, by which they are hidden in the drawings but are of a character not to need description. From the under side of the bar 72, the arm 74 projects, which is acted on by the cam 75, and carries forward the bar 72, and rod 69; and when said cam relieves its action on the arm 74 the bar 72 is forced back again by the spiral spring 76. The arm 75 is screwed to the cam X, and may be adjusted by the slot 77, and should be so placed as to act on the arm 74 at the time it is desired to throw the loom out of gear when the filling breaks or is exhausted.

When the shuttle is properly carried with filling, the rod 69 is kept to the left hand side of the arm 68, so as to pass freely by it when forced forward by the cam 75, and no action is produced; but when the filling is broken or is exhausted, the vibrating end of the rod 69, is made to present to the side of the arm 68, so that when said rod is moved forward by the cam 75, it turns the shaft 66, and throws the loom out of gear.

The apparatus for regulating the action of the rod 69, on the arm 68, and for preventing the selvage of the cloth from drawing in, when the filling is obstructed in its delivery from the shuttle, is constructed as follows—

78, is a horizontal shaft turning in the stands 79, 79.

80, 80, are vertical shafts, the upper ends of which turn in the shaft 78, and the lower ends thereof in the stands 81, 81, screwed to the under side of the shaft 78. From the vertical shafts 80, 80 the arms 82, 82, extend which have two projections rising from their upper sides through which one leg of each of the wire hooks 83, 83, slide.

84, 84, are spiral springs to throw the hooks 83, 83, forward.

85, 85, are collars screwed to the hooks 83, 83, and made flat on their under sides to rest on the top side of the arms 82, 82, to keep the hooks 83, 83, from turning around. The collars 85, 85, limit the motion given to the hooks 83, 83, by the spiral springs 84, 84.

86, 86, are arms one of which extends from the front side of one of the vertical shafts 80, and the other from the back side of the other shaft 80, and are connected together by the rod 87, in such a manner as that when one of the shafts 80, 80, turns in one direction, the other turns in an opposite direction.

88, is an extension of the rod 87, and has a downward projection at the end in which a vertical slot is made to receive the rod 69. This slot allows the shaft 78 to vibrate without moving the rod 69. The spiral spring 89 acts on the rod 87, and throws the arms 82, 82 out of the position seen in Fig. 4. 90, is an arm extending from one of the vertical shafts 80, 80, and which limits the approach of the arms 82, 82, toward the cloth, by striking against the stand 81. The arm 91, extending from the shaft 78, has the roller

92, revolving on a stud at its lower end, which is acted on by the cam 93, and vibrates the shaft 78.

This apparatus operates as follows:—When the loom is in that stage of its operation in which the lathe is falling backward, the warps opening and the shuttle about to start, the cam 93, through the medium of the roller 92, and arm 91, turns the shaft 78, thereby raising up the points of the wire hooks 83, 83, forward of the filling, so that when the shuttle passes, the thread of filling which said shuttle carries, draws round the point of the wire hook which is at that side of the loom from which the shuttle is taken, and draws said hook toward the selvage of the cloth, until the arm 90 strikes against the stand 81, which prevents its further approach, and thereby prevents the filling from drawing in the selvage of the cloth when it is obstructed in its delivery from the shuttle. When the filling is drawn round the hook 83, as aforesaid, the spiral spring 84, 84, allows said hooks to adjust themselves to the face of the cloth. When the hooks 83, 83, are drawn up to the selvage of the cloth as aforesaid, they move the vibrating end of the rod 69, to the left side of the arm 90, and in case the filling is running properly from the shuttle, retain said rod in this position; when it is moved forward by the cam 75, it passes by said arm 90, without producing any effect, but in case the filling is broken, or is exhausted, the hooks 83, 83 recede from the selvage of the cloth, by the action of the spring 89, and bring the rod 69 in a position to act on the arm 68, and throw the loom out of gear. When the loom has proceeded to that stage of its operation at which the shuttle is about to enter the shuttle box, the cam 93, relieves its action on the arm 91, and the weight of said arm draws the hooks 83, 83, out from the filling and allows it to close into the selvage, and also, allows said hooks to free themselves from the lathe when it beats up the cloth. Although there are but two pairs of shuttle boxes described and represented in the aforegoing specification, it is contemplated to use a series of boxes containing any number of shuttles which may be employed to the best advantage; one mode of constructing and operating which, will be hereafter set forth under the head of modifications. In making some descriptions of carpets, however, it may be expedient to use boxes carrying no more than two or three shuttles, in which case, the shuttles containing the different colors of filling for shading the carpets, are to be shifted by the operator, and this may be done, either when the loom is in operation, or by having the loom stop of itself when such changes are to be made. The apparatus for stopping the loom when the shuttles are to be changed is described as follows. No. 94, is a cam screwed to the cam X, in the same manner as the cam 75, and this acts on the arm 95, which projects downward from the sliding bar 96, and moves said bar forward. The sliding bar 96, slides in the stands 73, 73, and when the cam 94 relieves its action on the arm 95, the spiral spring 97 forces the bar 96, back again. 98 is a rod one end of which slides in the stand 73, and the other is jointed to the arm 99 projecting downward from the shaft 96. 100, is a hook jointed to the bar 96, and connected to the Jacquard machine by the cord 101.

This apparatus operates as follows:—When the loom is to be stopped to change a shuttle the Jacquard machine by acting on the cord 101 raises the hook 100, to a level with the rod 98, then at the proper time the cam 94 forces the bar 96, forward, which by the action of the hook 100 on the rod 98 throws the loom out of gear.

Modifications.—I will now proceed to point out certain modifications which may be made in the within described loom, without in any manner departing from the principles upon which its action is dependent.

First. In the aforegoing description, and in the drawings therein referred to, one mode of arranging the Jacquard machine, and of mounting the loom for weaving two plied carpets, is represented and described. There are various other modes of arranging the Jacquard machine and of mounting the loom, which are well understood by weavers, and which may be varied according to the kind or style of goods to be produced. These various mode of arranging the Jacquard machine, and of mounting the loom, may be applied, and I intend to apply them, in connection with my improvements, varying them according to the style of goods to be woven.

Second. The vibrating or tension roller i'''' is represented in the drawings, and is described, as being applied to the cloth on the front side of the loom; but it may also be applied to the chain or warp on the back side of the loom, and still act on the machinery employed to deliver out the chain or warp in a manner similar to that described, and accomplish the same end without varying the principle on which it operates, or changing its combination with the rollers d'''', e''''.

Third. The following is an improved mode of constructing the shuttle—which improvement is represented by Nos. 1, 2 and 3, Fig. 6: No. 1, is a plan of the shuttle; No. 2, a front view thereof; and No. 3, a cross section of it, giving an end view of the bobbin, and showing the mode of delivering the yarn from the shuttle.

The same letters of reference are used in

the modifications, that are used in the preceding parts of this specification to designate parts performing the same office. 2, 2, are the round pins which enter the arms 26, 26, as in the mode of constructing the shuttle before described, and form a part of the shuttle frame *a*, *a*, (see Nos. 1, 2 and 3, Fig. 6). The bottom side of the shuttle frame *a*, is formed in the shape of a V, as shown in No. 3, Fig. 6. *b*, is the bobbin containing the weft or filling, and which turns on a skewer affixed to the shuttle frame *a*, *a*, in the ordinary way. *c*, is a bow, screwed to the frame of the shuttle *a*, *a*, to guide the woof or filling, and support the apparatus which gives tension to the same. *d*, is a bar projecting inward from the bow *c*, and turned up at the end, as seen in No. 3, Fig. 6. *e*, is a shaft, one end of which turns in the bar *d*, and the other in the bow *c*. 7, is an arm projecting from the shaft *e*, and bent in such a manner as to rest on the bar *d*. 9, is a spiral spring encircling the shaft *e*, and adjusted thereto in such a manner as to cause the arm 7, to press on the bar *d*, and give friction to the filling in proportion to the tension required.

Fourth. The following is a new and varied mode of constructing the shuttle boxes, as adapted to receive the improved shuttle above described, which new and varied mode is represented in Nos. 1, 2, 3, Fig. 5. No. 1, is an end view of the table or piece of casting, 10, which constitutes the bottom of the shuttle box. No. 2, is a plan of the table or piece of casting 10, bolted to the arm 11, which supports the boxes, and No. 3, is an end view of the arm 11, with two shuttle boxes bolted thereto, one of which contains a shuttle. The table or piece of casting 10, has a V-shaped groove to receive the under side of the shuttle frame, *a*. 14, is the arresting pin, to arrest the shuttle, and 13 is the shuttle binder, which guides the top of the shuttle frame, *a*, and secures the shuttle in the box. The shuttle binder 13 has a notch in its under side, as shown in No. 2, Fig. 5, which guides the top of the shuttle frame, *a*, *a*. The shuttle binder 13 is bolted to the table or piece of casting 10. The shuttle boxes thus formed, are bolted to the arm 11, as shown in Nos. 2 and 3, Fig. 5. The arm 11, is to be attached to a shaft and operated in the same manner as the arm supporting the shuttle boxes described in the preceding part of the aforegoing specification.

Fifth. The following is a mode of arranging and operating a series of shuttle boxes, which is represented in Fig. 7. A vertical frame is suspended from the upper floor of the mill at each side of the loom, to the back side of which frame a shuttle box is attached, and on the front side of said frame, another frame is so arranged, as to slide up and down freely: to this last named frame a series of boxes are attached. The frame carrying this series of boxes is moved up and down by means of a toothed rack and cogged wheel, for the purpose of bringing the different shuttles into operation which contain the filling to form the figure, said cogged wheel being made to operate at proper intervals, by the action of the Jacquard machine. The shuttle containing the ground filling is placed in the box on the back side of the suspended frame; and the shuttles carrying the various colored filling for the figure are placed in the series of boxes on the sliding frame. The shuttle carrying the ground filling, and one of the shuttles carrying the figured filling, are brought into operation alternately, by a swinging motion given to the suspended frame. A, A, Fig. 7, is a part of the end frame of the loom. *q*, is the upper floor of the mill. *f*, is the frame suspended from the floor *q'* with a shuttle box affixed to the back side thereof at *g'*. *h*, is the sliding frame to which is attached a series of boxes varying in number according to convenience; in the present drawing only three are represented. The red line *i*, represents a strap or cord passing over a pulley on the axis of the frame *f*, and over the pulley *j*, to the weight *k*, which is suspended therefrom. The weight *k* is employed to counteract the weight of the sliding frame *h*. A swinging or vibrating motion is given to the frame *f*, by means of the bar *l*, the arm 20, and the shaft 21; said shaft 21, being turned by the action of a cam and treadle, in the same manner in which it is turned to operate the shuttle boxes, as set forth in the preceding part of this specification. This vibrating or swinging motion brings the shuttle carrying the ground filling, and one of the shuttles carrying the filling to form the figure, alternately into operation. The mode of raising and depressing the frame *h*, to bring the various shuttles into operation containing the different colored filling required to form the figure, is as follows:—*m*, is a cogged wheel, (shown in the drawings by dottde lines) affixed to the shaft *n*, and this wheel takes into the toothed rack on the frame *h*. The shaft *n*, turns in the stands *o*, *o*, and has the wheel *p*, affixed thereto. *q*, is a spring, one end of which is affixed to the frame *f*; the other end is formed with a projection which takes into notches made to receive it in the periphery of the wheel *p*; from the outer side of the wheel *p*, the pins *s*, *s*, extend; *r*, is a latch to act on the pins *s*, *s*, in order to turn the wheel *p*. The latch *r*, is connected with the Jacquard machine which, at proper intervals, causes it to act on the pins *s*, *s*, and the upper or under arm is made to

act on its respective pin, according as the frame *h*, is to be raised or depressed.

From this description it will be evident that when the upper arm of the latch *r*, is depressed, as seen in Fig. 7, and the frame *f*, moved backwards, said arm will then act on the pin *s*, and turn the wheel *p*, the space of one pin, will depress the frame *h*, and bring a new shuttle into operation. When the frame *h*, is to be raised, the lower arm of the latch *r*, is made to act on the pin *s*, which will give a reversed motion to the wheel *p*.

This mode of arranging and working a series of shuttle boxes, is applicable, and I intend to apply it, to looms in which the fly shuttle motion is used.

Having thus fully described the manner in which I construct and arrange the respective parts of my loom for weaving carpets, and shown the manner in which the same operates—what I claim therein as new, and desire to secure by Letters Patent is—

1. I claim the placing and working of the journals *t'*, *u'*, *v'*, and *w'*, as shown in Figs. 1, and 3, of the accompanying drawings, above the jaquard machine, for the purpose of keeping the knot cords straight, and thereby securing their proper action on the trap boards *g'*, *and h'*, when said trap boards are raised; and also the raising of one of said trap boards, while the other descends in order to equalize the powers required to drive the loom, and in combination with this arrangement I likewise claim the working of the card prism, or polygon, by means of a cam or other analogous device connected with the loom, said cam or other device operating on, and working said card prism or polygon, when the trap boards are at rest. The respective operations herein referred to, being carried on or effected, substantially in the manner herein fully made known.

2. I claim the combination formed by the two rollers *d''''* and *e''''*, as shown in the drawings, through which rollers the cloth passes, with the vibrating or tension roller *i''''* which is employed to give tension to the warp, substantially as described.

3. I claim the connecting the vibrating or tension roller *i''''* with the machinery employed to turn the warp beam for the purpose of regulating the action of said machinery on said warp beam, and thereby determining the quantity of warp delivered out, in the manner set forth.

4. I claim the manner in which I construct my shuttle and shuttle boxes, as described under the head of my third improvement, and represented in the respective figures therein referred to, together with the modification thereof, herein made known, the said shuttle box consisting of a table, with springs and catches, and having a projecting pin on each end, which is to be received and operated upon by the reciprocating arms, as described.

5. I have represented and described my shuttle boxes as disconnected with the laths, but I do not now claim the mere disconnecting of these parts, this having been the subject of a claim in the specification of a patent for a loom for weaving coach-lace granted to me on the 20th day of April 1837—but I do claim as an improvement thereon, the working of a series of shuttle boxes, so disconnected and supported by the frame of the loom or other stationary part of the structure adapted thereto in the manner set forth, that is to say, having the said shuttle boxes to turn or slide in stationary fixtures attached to the frames of the loom or in any other manner, which is substantially the same,—a series of shuttle boxes so disconnected may be applied, and I intend to apply them to looms in which the fly shuttle is used, and I do not limit my claim therefore to their employment in looms of the kind herein described.

6. I claim the manner of arranging and combining the machinery employed to cause the above-mentioned reciprocating arms, rods, or bars, to receive, retain, or discharge the shuttles, when they are handed through the warp.

7. I claim the manner of constructing and arranging the apparatus herein described, for preventing the selvage of the cloth from being drawn in and of stopping the loom when the filling breaks or is exhausted on the bobbin.

8. I claim the manner of throwing the loom out of gear when a change of color is required in the filling, by means of the connection formed for that purpose between the jacquard machine and the shipper, whether such connection be made precisely in the manner described or in any other which is substantially the same.

ERASTUS B. BIGELOW.

Witnesses:
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