Sheet 1. 2 Sheets

H. Burt.

Stocking Loom.

No. 3,275. Patented Sept. 23, 1843.

Fig: 6. Vertical Section

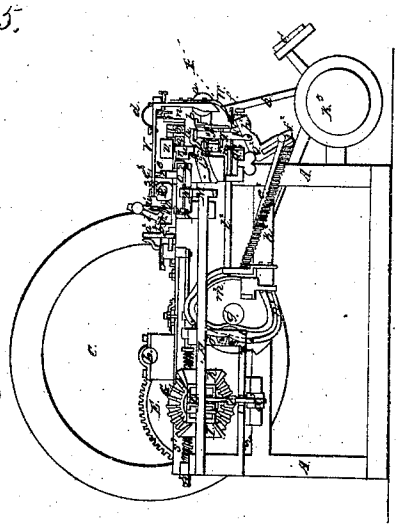


Fig: 4.

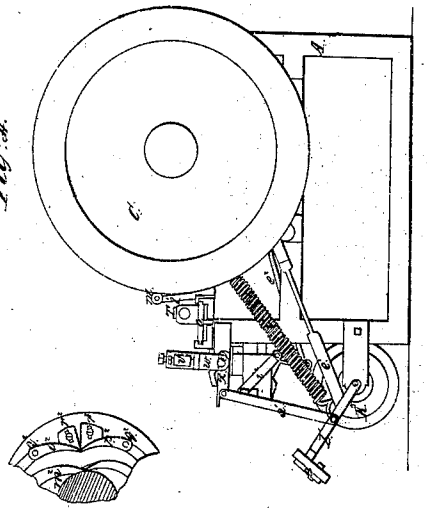


Fig: 11.

Fig: 7. Vertical Section

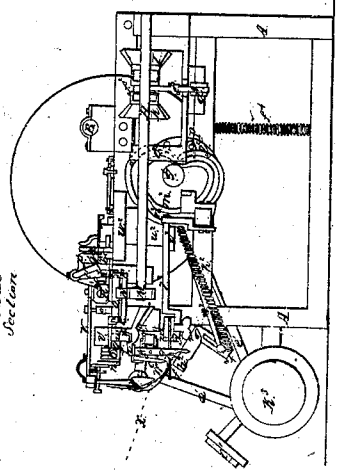


Fig: 1.

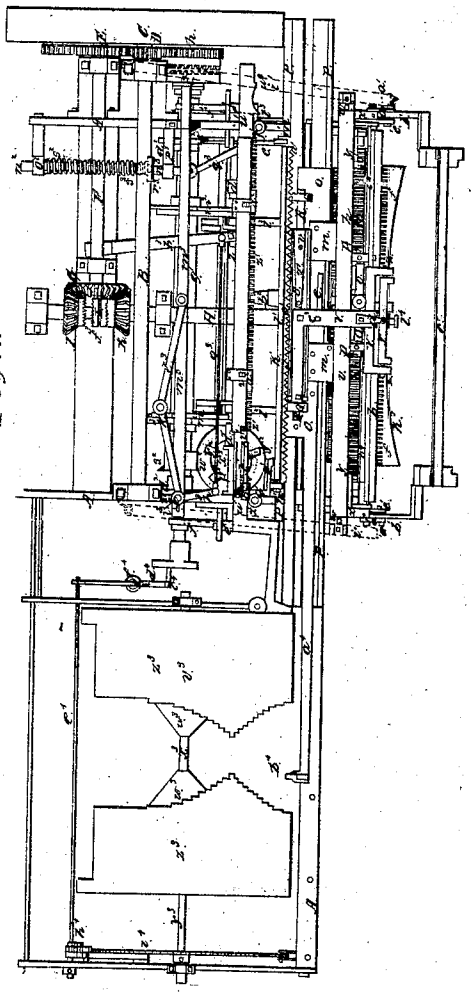
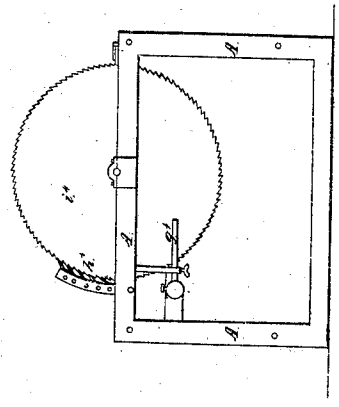


Fig: 5.



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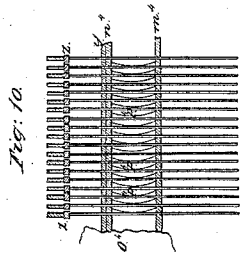
Fig: 10.

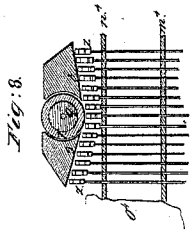
Fig: 6.

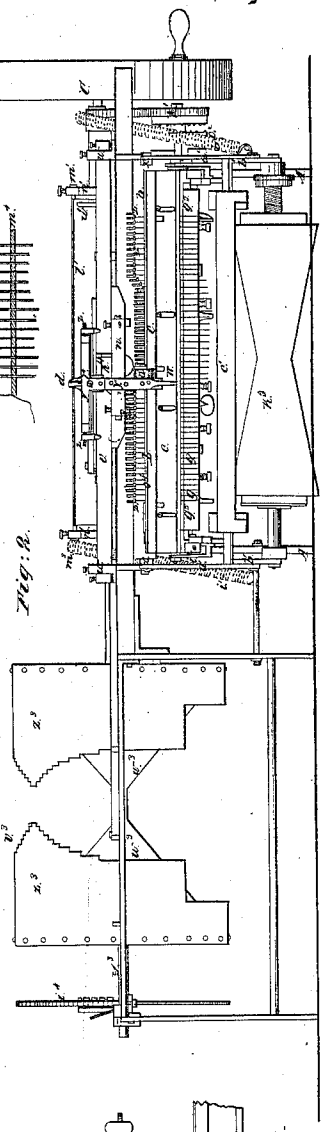
Fig: 9.

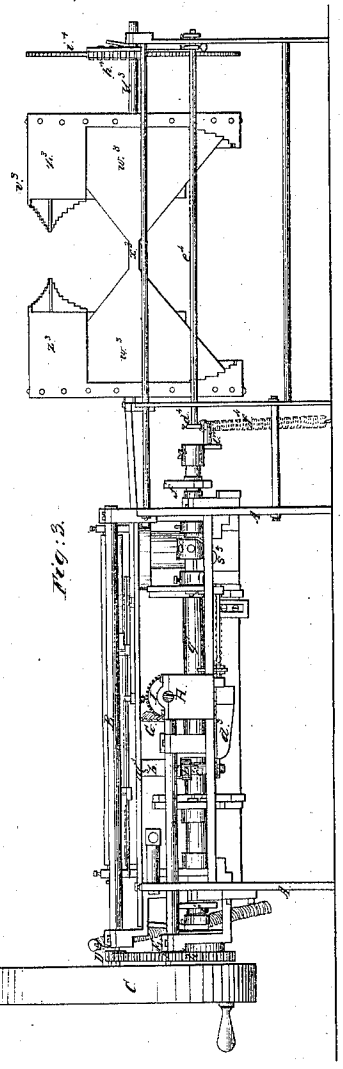
Fig: 8.

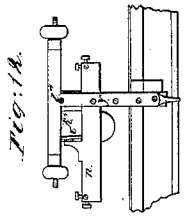
Fig: 11.

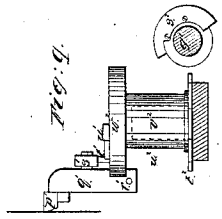
Fig: 7.

UNITED STATES PATENT OFFICE.

HENRY BURT, OF BOSTON, MASSACHUSETTS.

MACHINE FOR KNITTING STOCKINGS, &c.

Specification forming part of Letters Patent No. 3,275, dated September 23, 1843; Reissued February 28, 1860, Nos. 915 and 916.

To all whom it may concern:

Be it known that I, HENRY BURT, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Looms for Knitting Stockings, Shirts, Drawers, and Various other Articles, and that the following description, taken in connection with the accompanying drawings, constitutes a full and exact specification of the same.

Of the drawings above mentioned Figure 1, represents a top view of a knitting loom constructed on my improved plan. Fig. 2 is a front elevation of the same. Fig. 3 is an elevation of the rear side. Fig. 4 is an elevation of the right hand end. Fig. 5 is an elevation of the left hand end. Fig. 6 is a vertical section taken through the central part of that portion of the apparatus on which the weaving is accomplished, the eye of the observer being supposed looking toward the right hand end of the machine. Fig. 7 is a similar section taken with the eye of the observer looking toward the left hand end of the mechanism.

Such other figures as may be necessary to fully exhibit the several parts will be hereinafter enumerated and referred to.

All the operative parts are supported in their relative positions by means of a suitable cast iron or metallic frame A. The driving shaft is exhibited at B, Figs. 1, 6, and 7. It revolves in proper boxes or bearings situated on the top of the framework and has a fly wheel C and a geared pinion D on one end, the said pinion engaging with a spur gear E placed on one extremity of a horizontal shaft F, as seen in Fig. 1. A beveled pinion G, secured upon the other end of the shaft F, acts on the beveled wheels I, K and turns a horizontal shaft H either in one direction or the other (by means of a clutch L) according to circumstances as will be hereinafter set forth.

The shaft H has a toothed pinion M, Figs. 6, 7, upon its other extremity which engages with a toothed rack N applied to the underside of a movable carriage or platform O, Fig. 1.

Suitable parallel rails P, P, sustain and guide the carriage O during its movements to and fro. Two vertical standards Q, Q, elevated upon the top of the carriage O, support a cylindrical rod R, extending between them, or from one to the other of them, as seen in Fig. 1.

A long tube S fits closely and slides freely upon the cylindrical rod R. In order that it may slide upon the rod with the requisite degree of friction a spring T is secured upon its upper edge, one end of the said spring having a small stud or pin projecting from its underside and passing through a suitable slot cut through the tube and resting or bearing upon the cylindrical rod R, or any other well known and suitable contrivance for producing friction may be employed in lieu thereof. A screw U, Fig. 1, serves to regulate the pressure of the spring T upon the rod.

A horizontal arm V, extending forward from the top of the sliding tube, supports and carries the yarn guide or tube W, through which the yarn X passes from the bobbin and by which it is supplied to the needles and depressing hooks. This yarn guide is fixed on the lower end of a T piece Y, (see Fig. 2) whose upper ends are supported upon pivots or adjusting screws Z, Z, passing through the arm V, which is shaped for the purpose as seen in Fig. 1. A small roller *a* Figs. 2, 6, is attached upon the lower part of the right hand side of the T piece Y. When the depressing bar *c* descends, the periphery of this roller comes in contact with the projecting edge of a horizontal ledge *b* (arranged upon the upper part of the depressing bar *c*) and thereby throws the yarn guide forward, or from under the depressing bar—the purpose of such a movement of the same being to permit the depressing bar to descend upon the hooks of the needles. On the elevation of the depressing bar the T piece is carried backward or beneath the depressing bar by means of a spring *d* connected to the upper side of the arm V and to the top of the T piece. The sliding carriage O has a small horizontal rail piece *e* affixed to it just by the side of and extending parallel to the sliding tube S, and under the arm V. A screw e^8 passing or screwed through the arm V abuts against the top of the rail piece. This screw serves to elevate or depress the arm in order to regulate the level of the point of the yarn guide with respect to the needles, and such other regulating screws as may be necessary may be used.

The needles upon which the loops for the stitches are formed, are represented at *f*, *f*, *f*. They consist of a series of wires inserted in and projecting from a plate or bar g^5, Figs. 2, 6, 7, and having their upper ends pointed and bent over or hooked as seen in Figs. 6, 7. Each of these needles should have a longitudinal groove formed in its upper side, or that part of it just below the point of the hooked end, the object of the same being to receive the point of the hook when it is bent down by the depresser bar *c*. Each of the needles is arranged between two vertical depressing hooks *g*, *g* of a series of said hooks and these hooks are forced downward by means of a series of short depressing levers *h*, *h*, *h*, one end of each of which rests upon the top of one of the stitch hooks while the opposite moves upon a fulcrum or joint *i* Fig. 6, which permits the lever to rise and fall in a vertical plane. The peculiar shape of the depressing lever is exhibited in Fig. 6, wherein it will be seen that the rear part of it has a projection *k* on its upper side and a cavity *l* directly adjacent thereto, and between the fulcrum of the lever and its end which rests on the stitch hook.

The carriage O has two arms *m*, *m*, Fig. 1, extending horizontally from it and united together at their ends by a cross bar *n* Fig. 2. A short horizontal shaft *o* is supported between the arms *m*, *m*, by screw pivots *p*, *p*. From the central part of the shaft *o* an arm *q* extends inward toward the center of the machine, and supports or carries at its inner end a roller *r* and two inclined planes *s*, *t* extending on the sides of the roller as seen in Fig. 8 (which is a vertical section of the roller and the planes together with some of the depressing hooks beneath the same). Directly by the side of the roller *r* there is another and larger roller *u*, which is situated and moves under and against the horizontal bar *v*. This latter roller plays within the recess or cavity *l* of the depressing levers but does not bear upon the said levers; its object being to hold the roller *r* down in its place, and this is accomplished by the horizontal bar *v*, which extends between two uprights *w*, *w*, and has adjusting screws by which it may be raised and depressed. The roller *r* and inclined planes *s*, *t*, act upon the top of the projections *k*, *k* of the depressing levers and the object of each of the inclined planes is to depress the stitch hooks or sinkers before the roll *r* commences to act thereon.

By the said arrangement of inclined plane, in conjunction with the roller the levers are depressed with less friction and liability to injury or lateral pressure than if the roller alone acted thereon. The uprights *w*, *w*, which sustain the bar *v* are screwed to the side crank arms *x*, *x*, Figs. 1, 2, 4, which project from the journals of a plate *y* (Figs. 1, 10) which extends entirely beneath the depressing levers and raises the sinkers or stitch hooks. Each of the sinkers passes through a slit or opening cut in the plate and when the plate is raised it bears against shoulders or cap pieces *z*, *z*, fixed on the top of the stitch hook plates or sinkers. The sinkers or stitch hooks are supported in their vertical positions by being passed through slits sawed into two horizontal plates m^4, n^4 (see Fig. 10, which is a front view of a few of the sinkers, the depresser bar being supposed removed, and the bar or plate o^4, which presses upon the front edges of the sinkers, being partially cut away to represent the plates m^4 and n^4, and the sinkers in the rear of it.)

Friction is applied to the sinkers (to prevent them from dropping downward when they are raised) by small curved pieces of watch spring p^4 placed in rear of them or between them, as seen in Fig. 10. The uprights *w*, *w*, are placed upon the crank arms *x*, *x* and between their fulcra and outer extremities as seen in the drawings, Fig. 4 so that when the arms are elevated the bar *v* will be raised upward and will permit the roll *r* and inclined planes *s*, *t* to rise when the sinkers are elevated by the plate *y*.

The crank arms *x*, *x*, are elevated and depressed by connecting rods *a'*, *a'* jointed to the same, and also jointed at their lower ends to arms *b'*, *b'* (Figs. 4, 2, 1,), which carry what may be termed the cloth bar *c'*. This cloth bar extends between the upper ends of the two arms *b'*, *b'*, and is connected thereto by suitable regulating screws by which it may be correctly adjusted to the position of the needles. The object of the cloth bar is to secure the woven cloth in its place immediately on the needles having carried the stitches through the loops, and during their advancement to their proper position for the formation of the loops thereon. This is accomplished by the edge of the cloth bar pinching the cloth between it and the sinkers. The arms *b'*, *b'* turn on fulcra at their lower ends and they are forced outward by means of rods *e'*, *e'*, connected to them at points between their fulcra and their upper ends. The other end of each of the rods *e'*, *e'* abuts against one of two cams *f'*, *f'* fixed upon what I term the cam shaft *g'*, which is revolved by a spur gear *h'*, fixed upon it and engaging with the gear E, before mentioned. The counteraction of the arms *b'*, *b'*, is effected by springs *i'*, *i'*, or by any other convenient means.

The next portion of the mechanism to be described, is that by which we are enabled to "narrow and widen" the cloth, or that by which the extent of the movements of the thread guide are regulated at pleasure, in order to give to the cloth the requisite

shape to form a stocking or any other article to be knit.

A long rack k' of teeth is affixed upon the lower part of the side of a vibrating plate or bar l' which is supported at its upper corners on screw pivots or bearings m', m' passing through the tops of fixed standards n', n'. There is a small tooth or projection o' Fig. 1, extending from the side of the sliding tube S, and which, when the stop rack k' is thrown against the same, enters into one of the spaces between the teeth of the rack and this confines the tube S and yarn guide in position, although the carriage o is still permitted to move. The lower edge or part of the bar or plate l' to which the stop rack is applied is actuated or thrown toward the tube by means of an arm p' projecting from a vertical lever or piece q', which vibrates on a pin or fulcrum r' see Fig. 9, at its lower end. The vertical edge of this lever, opposite to that from which the arm p' extends, has a roller s' applied to it, whose periphery rolls upon a little rail t' raised upon the shifting bar u'. This rail has a curved depression v' at each of its ends, into which the roller falls when the stop rack is thrown out of gear with the tube S, the said rack being so thrown out of gear by means of a spring w' which presses against the lower part of the plate to which the stop rack is attached.

The shifting bar u' rests and moves longitudinally upon the top of the frame A. Both ends of it bear against friction rollers x', y', and the said bar has a series of teeth z', z' formed upon its edge next the carriage O; these teeth in number corresponding with the number of needles. Movable shoulder pieces or stops a^2, a^2 are inserted in the teeth z', z' and rise above the same. They may be constructed in any convenient manner so as to be easily attached and removed from the shifting bar, and in order to regulate their correct distances apart from each other they should have one or more teeth applied to their lower side and inserted in the spaces between the teeth z', z'.

A stud b^2 projecting from the carriage O extends between the stops a^2, a^2. When the stud b^2 comes into contact with either of the stops a^2, a^2, it causes the shifting bar to move in one direction longitudinally, according to whichever stop it acts against. This raises the roller s' out of the depression v' and upon the rail t' and throws the stop rack into gear with the tooth of the tube S, and thus holds the yarn guide still while the carriage continues to advance for the purpose of throwing the clutch L out of gear with both of the beveled wheels I, K, or bringing it centrally between them, and causing a clutch c^2 on the cam shaft g' to be engaged with the spur gear h', by which the cam shaft is revolved, and also to move the roll r and inclined planes s, t, on the opposite side of the yarn guide.

The depressing bar c is carried downward upon the needles at the proper time by means of two cams d^2, d^2, fixed upon the cam shaft g', each of the said cams acting against the extremity of one of two pitmans e^2, e^2. The opposite end of each pitman is jointed to one end f^2, of a bent lever f^2, g^2, h^2, which has its fulcrum at its end h^2 and has an arm i^2 Figs. 4, 2, applied to its outer side and extending upward and jointed to the end of the depressing bar c. Each of the levers f^2 g^2 h^2 and its arm i^2, constitute together, a toggle joint by which the bar c is borne down upon the points of the needles with a great degree of force, or with sufficient force to sink all of the said points into the grooves beneath them, counteracting springs k^2, k^2, or other proper contrivances which elevate the depressing bar c at the requisite period of time.

The bar g^5 into which the needles are inserted is arranged so as to be moved or slid forward and back by means of two arms l^2, l^2 projecting from it and connected with cams m^2, m^2 on the cam shaft, by means of small pins extending from them into grooves n^2, of the cams. The revolution of the cam shaft thus actuates the bar g.

By examination of Figs. 6, 7 and 11 it will be perceived that a portion of the groove of each cam m^2, has two curved pieces o^2, p^2, which turn upon centers q^2, q^2, and are capable of being moved upon the plate of the cam and set at variable distances from the center thereof and confined in any position by screws r^2, r^2. The object of these movable pieces of the cam is to regulate the distance to which the needles are drawn back to draw the stitches through the loops, and this distance must vary according to the fineness or quality of the yarn used during the process of knitting or according to the closeness of the work to be produced.

A helical thread or plate s^2 is formed upon the crank shaft, extending about one half the way around the same. This operates in connection with a horizontal toothed wheel t^2 (see Fig. 9, which is a vertical section taken through the cam shaft at the place where the left hand cam m^2 is situated thereon, the said cam being supposed to be removed in order to represent the parts to the left of it) fitted upon a hollow vertical shaft or arbor u^2 which is suitably supported and revolves on a vertical shaft v^2 (denoted by dotted lines in Fig. 9) extending upward through it. A circular and horizontal head w^2 is arranged on the top of the hollow arbor u^2, the same having a circular depression x^2 in its central part and five or any other suitable odd number of cavities or recesses y^2, y^2, radiating from the

central depression x^2 as seen in Fig. 1, the said cavities y^2 being at equal distances apart from each other. A pin a^7 (whose position is represented in Fig. 1, by dotted lines) projects from the lower side of the shifting bar u' and operates within the circular depression x^2 and the recesses y^2. On the side of the shifting bar u' are two projections z^2, a^3, between which one end of a bent lever b^3 is situated, as seen in Fig. 1. The opposite end of the lever is fixed on the top of a short vertical shaft c^3, (see Fig. 3) suitably supported in bearings. The lower end of the shaft c^3 has a horizontal lever d^3 extending from it (in a direction toward the left end or right hand, when viewed in Fig. 3) at right angles to the lever on its upper end, and the left extremity of the lever d^3 has a short fork e^3 extending upward from it and entering into a groove f^3 of the clutch L.

On the upper side of the front end of the lever b^3 one extremity of a long connecting rod g^3 is jointed, the other end of the rod being similarly jointed to a bent lever h^3 i^3, k^3, the fulcrum of the said lever being at i^3, while its opposite end k^3 is jointed to one extremity of a bar l^3 whose other end is jointed to the upper side of a long and horizontal bar m^3. The said bar m^3 is suitably supported in guides so as to move longitudinally a short distance to and fro and is bent downward at its right hand end and forked and inserted in the groove of the clutch c^2 before mentioned. When the arm i^3, k^3, of the bent lever h^3, i^3, k^3, is brought into line with the bar l^3 the clutch L is out of gear with both of the beveled wheels I, K, and the clutch c^2 is thrown into gear with the spur gear h' by which the cam shaft is moved. But when the arm i^3, k^3 and bar l^3 make an angle with each other on the front side of the bar m^3, the clutch c^2 is thrown out of gear with the wheel h', and the clutch L in gear with the beveled wheel I. So, when the said arm and bar form an angle with each other on the rear side of the bar m^3, the clutch c^2 is thrown out of gear with the wheel h' and the clutch L in gear with the other beveled wheel K.

A cylindrical rod n^3, sliding through bearings o^3, p^3, is jointed at its front end to a connecting rod q^3, whose opposite end is jointed to the shifting bar u' at a point near its right hand end. The rod n^3 has a sliding collar r^3 adapted to it and capable of being fixed thereon by a set screw.

One end of a strong helical spring s^3 (encompassing the rod n^3) bears against the collar r^3, while the opposite end rests or abuts against the front side of the bearing o^3. This spring forces the rod n^3 forward or presses the shifting bar close against the friction roller y'. By inspection of Fig. 1, it will be perceived that the shifting bar has two projections t^3, u^3, on the front side of the end of it in apposition with the roller y'. The part of the front side of the bar extending between the said projections is regularly curved from one to the other as seen in the drawing. The peculiar province of these projections is, in connection with the rail t' to determine the distance that the roll r and its inclined planes shall pass beyond the thread guide; and the manner by which the same is effected will be described after the enumeration and explanation of certain other mechanism intimately connected therewith.

The left hand end of the shifting bar is extended toward the left as seen in Fig. 1, and connected with the pattern cylinder v^3 in such manner as to admit of the revolution of the pattern cylinder on its axis, independently of the bar, and at the same time so that when the bar slides longitudinally in one direction or the other it shall carry or slide the pattern cylinder with it.

The pattern cylinder v^3 consists of two conical heads w^3, w^3 united to a tube x^3 which rests and slides longitudinally and revolves transversely upon a cylindrical rod y^3 suitably connected to the frame work. To each of these heads a piece or curved plate z^3 of sheet iron, or any other proper material, is attached the inner edge of each of these plates being shaped according to the pattern or form of stocking or other article to be woven, and the said inner edges being arranged at such distances apart from each other as shall determine the distance which the thread guide shall move to and fro laterally. Their object is the same as the movable shoulder pieces or stops a^2, a^2 and in order to effect their intended purpose they are connected with the carriage O by means of a long bar a^4 the right hand end of which is attached to the carriage O while the opposite end is bent at a right angle or has a projection b^4 upon its rear side, which enters and plays between the inner edges of the pattern plates.

When the carriage in its movement brings the projection b^4 in contact with the edge of one of the pattern plates the pattern cylinder commences to move longitudinally and of course to move the shifting bar u' with it, and consequently elevates the roller s' out of the depression of the rail t' and upon the said rail, thus throwing the stop rack into gear with the tooth of the tube S. The pattern cylinder is revolved on its axis with the requisite velocity by means of a crank pin c^4 on the left hand end of the cam shaft g', striking, as the shaft revolves, against the underside of an arm d^4 projecting from a horizontal shaft e^4 and tripping or elevating the said arm until it passes by it, when the arm is drawn back by a spring f^4. The opposite end of the shaft e^4 has another

arm g^4 extending from it, which elevates a series of pawls or clicks h^4, which engage with the teeth of a ratchet wheel i^4 attached to the shaft on which the pattern cylinder moves, or the said pattern cylinder may be revolved on its axis by any other suitable means.

As the cloth is woven it is wound upon a beam or roller k^5. When the yarn guide stops at either termination of a row of stitches woven it becomes necessary to throw its point forward a short distance in order to clear it from the sinkers which are depressed by the continued movement of the roll r and its inclined planes s, t. This is accomplished by a plate k^4, (Fig. 12) of the requisite length, affixed to the front face of the cross piece n. The two vertical sides of this plate are beveled or chamfered off at about an angle of forty five degrees each. A screw l^4 inserted through the T piece of the yarn guide abuts against this plate when the point of the yarn guide is thrown outward or out of the line of the hooks of the sinkers. When the yarn guide is laying the yarn over the needles the end of the screw is against the cross piece n, and as soon as it becomes necessary to move the point of the yarn guide forward the movement of the carriage O and the stationary position of the tube S causes one of the beveled edges of the plate k^4 to meet the point of the screw l^4 and to force it forward while it passes up the inclined plane of the beveled edge and thus removes it out of the way of the sinkers or depressing hooks by which the loops are formed upon the needles.

Having now described the construction of the several parts I now proceed to explain their method of operation.

The carriage O being put in motion carries the yarn guide with it in order to distribute or lay the yarn upon that part of the needles in rear of their points. As soon as the yarn guide has arrived at the extent of its motion (which is determined either by one of the stops a^2, or by one of the sides, of the pattern plate, meeting the projection b^4) the tube S to which it is attached ceases to move (or is stopped by the rack k' being thrown against the tooth or projection o', and the carriage still continues its motion in order to carry the roll r and inclined planes s, t a short distance beyond the yarn guide. During the time the yarn guide has thus moved over the teeth it has been followed by a successive depression of the hooks or sinkers g', g', upon the yarn and between the needles, by which a loop is formed over each of the needles.

As soon as the yarn guide is stopped by the rack k' it is thrown forward by the plate k^4 as before mentioned, in order to clear it from the succeeding stitch hooks depressed by the roll r. The needles then retreat a short distance so as to bring the inner points of their hooks over and beyond the loops. The depressing bar c then descends upon the upper side of the points of the needles and presses the said points down into the grooves formed below them in the shanks of the needles. The needles then retreat and carry their points through the stitches upon them, and at the same time drag the loops through the stitches, thus forming new stitches of the said loops. The cloth bar c' also rises upward against the cloth and retains the same back in its place, or against that part of the sinkers below the stitch hooks thereof, during the advancement of the needles forward to receive a new row of loops. The plate y which elevates the sinkers together with the roller bar v also rise at the same time and as soon as the needles have completed their advancement forward the cloth bar descends or is drawn away from the cloth.

The projections t^3, u^3 before mentioned are intended to effect the change of clutches of the impelling shafts. When the shifting bar has thrown the rack bar forward so as to arrest the movement of the tube S it becomes necessary to apply some retentive power to the shifting bar in order to counteract the tendency of the spring s^3 to slide it longitudinally and change the clutches before the requisite time and this is attained by means of the projections t^3, u^3 and the friction curve between them, for while the roll r and inclined planes are passing beyond the thread guide the friction roller y' is in contact with either the right or left half of the curve between the projections and is rising up the said curve and pressing the right end of the shifting bar laterally until the roll r has attained the extent of its motion beyond the thread guide when the projection or end of the curve passes by the center of the roll and thus throws the whole power of the spring s^3 upon the shifting bar and slides the same longitudinally and effects the change of the clutch and stops the carriage O during the time of the revolution of the cam shaft. In order to prevent the power of the spring from throwing the clutch L into gear with one of the beveled wheels the pin, before mentioned, as projecting from the underside of the shifting bar and entering into the circular depression x^2 strikes against that part of the vertical periphery of the circular depression which is between two of the spaces y^2, y^2 radiating therefrom. Then while the cam shaft is revolving the helical thread or plate s^2 turns the toothed wheel t^2 and the arbor u^2 a sufficient distance to bring one of the recesses y^2 in apposition with the pin, which being accomplished the spring s^3 will throw the shifting bar a still farther dis-

tance longitudinally or the pin thereof into the said recess, and thus again effect a change of the clutches in order to move the carriage O and the yarn guide in an opposite direction.

Having thus explained my invention I shall claim—

1. The mechanism for "narrowing and widening" the same consisting of the movable stops a^2, a^2 combined with a rack of teeth or other suitable contrivance formed upon the shifting bar and acting upon the carriage O of the yarn guide as set forth, or of a pattern cylinder v^3 combined with the shifting bar and the carriage O and operating therewith substantially as described.

2. Also the stop rack k' combined with the tube S of the yarn guide and actuated in the manner and for the purpose as set forth.

3. Also the mechanism which effects the changes of the clutches the same consisting of the shifting bar, the arbor u^2 having a circular depression and radial recesses in its head, and levers and other parts connected to the same and connecting the same with the clutches the whole being arranged and operating substantially as hereinbefore specified.

4. Also the stationary roller y' and the projections t^3, u^3 and their intervening curve (formed upon the shifting bar) in combination with the spring s^3 of the sliding toggle bars; and also in combination with the rail t' and its depressions, the whole being for the object as described.

5. Also the cloth bar c' arranged and operating in the manner and for the purpose as set forth.

6. Also the particular method by which the depressing bar c is carried and forced down upon the pointed ends of the needles in order to press them into the grooves in their shanks—viz. by a combination of bent levers f^2, g^2, h^2 and arms i^2, the same being actuated substantially as described.

7. Also the manner of raising the stitch hooks, viz. by an elevating plate y, through which they extend and which is combined with and operates them as set forth.

8. Also the method of clearing the point or lower end of the yarn guide from the depressing bar when the latter descends upon the needles, viz, by a ledge b in the latter in combination with a roller a applied to the T piece of the yarn guide the whole being as specified.

9. Also the method of clearing the point of the yarn guide from the stitch hooks when the roll r passes by the thread guide or as soon as the lateral motion of the thread guide is stopped, viz—by the beveled edge plate k^4 (applied to the cross piece n) in combination with the screw or other contrivance of similar character projecting from the T piece of the yarn guide.

10. Also the mode of adjusting or regulating the distance to which the points of the needles shall retreat, viz, by the movable curved pieces o^2, p^2 making part of the cam m^2 the same being arranged and operating substantially as explained.

11. Also the combination with the mechanism (the arm q, and shaft o, supported by pivots p, p) which sustains and carries the roller r, of the depressing and elevating bar v raised and depressed by machinery substantially as described.

In testimony that the above is a correct specification of my said invention I have hereto set my signature this fifteenth day of July in the year eighteen hundred and forty three.

HENRY BURT.

Witnesses:
R. H. EDDY,
G. DAVIS DANA.

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