J. Jr & J. Turnbull. Sheet 1-3 Sheets.

Loom.

No. 7,061. Patented Jan. 29, 1850.

Fig. 1.

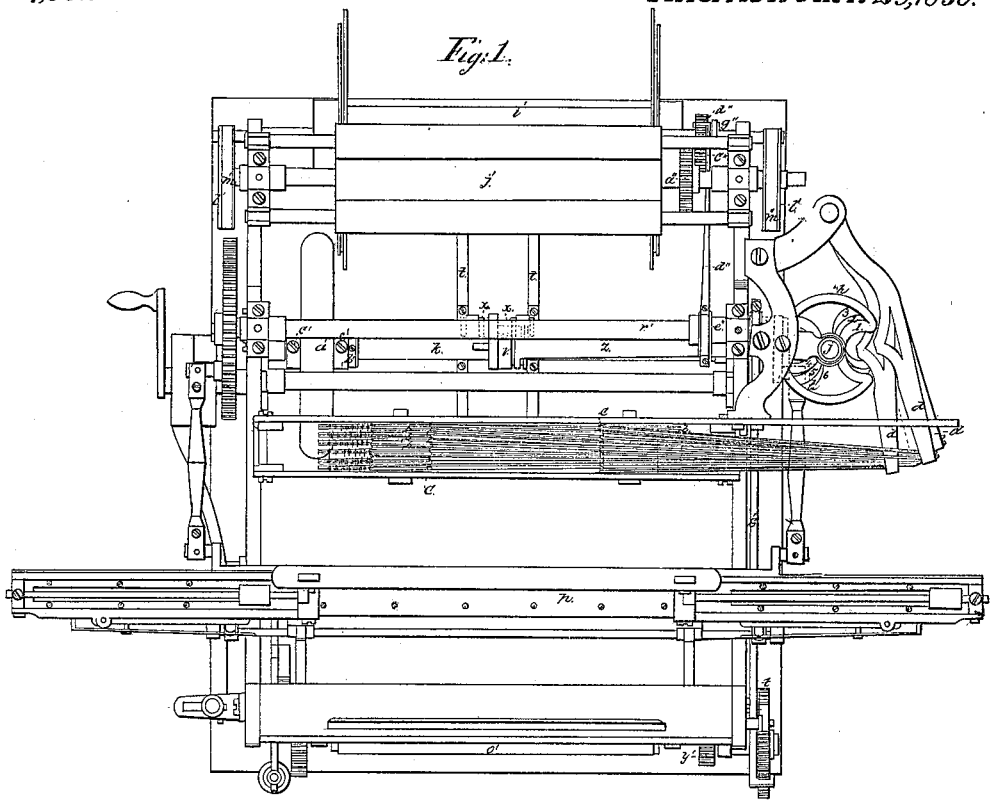
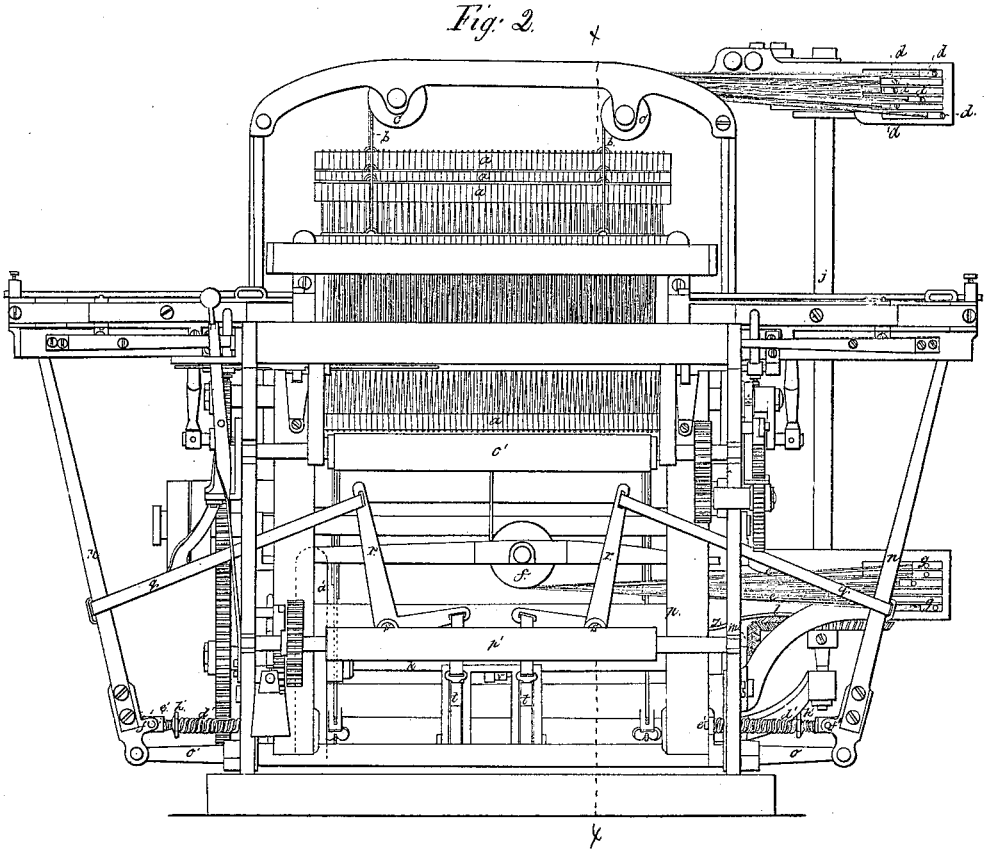


Fig. 2.



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Loom.

No. 7,061. Patented Jan. 29, 1850.

Fig. 3.

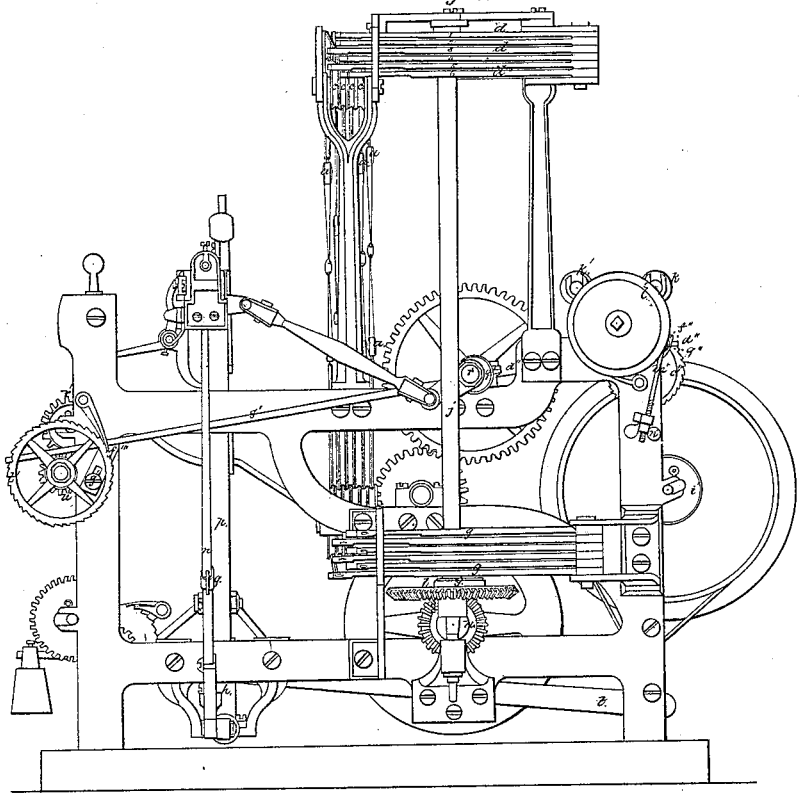
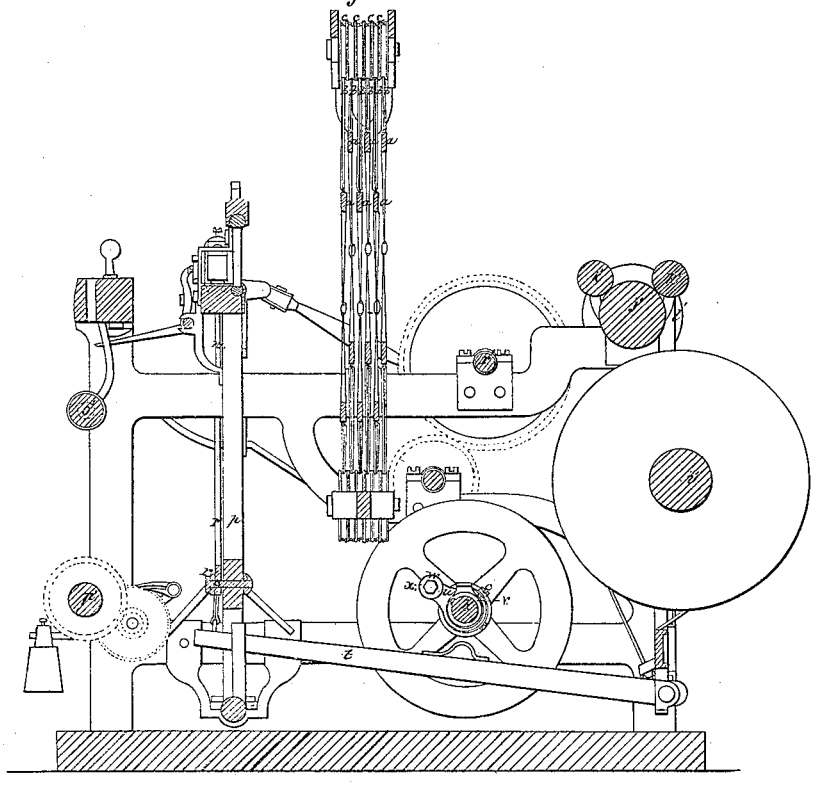


Fig. 4.



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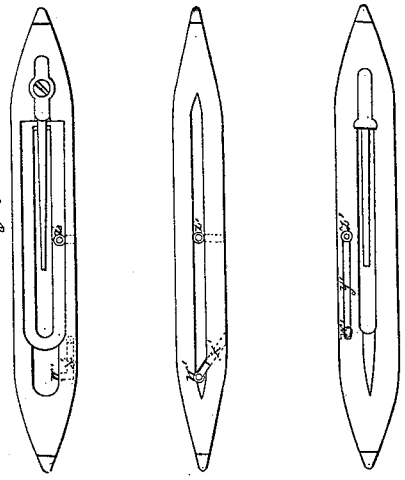


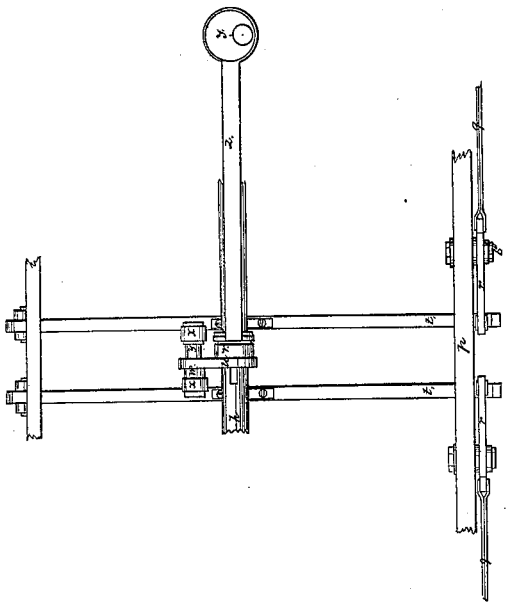


Fig. 6.

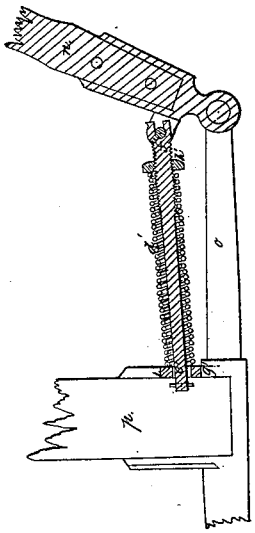
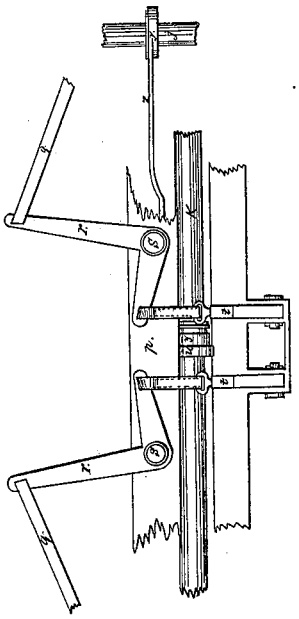


Fig. 5.



UNITED STATES PATENT OFFICE.

JAMES TURNBULL, JR., AND JOHN TURNBULL, OF SIMSBURY, CONNECTICUT.

LOOM FOR PILED FABRIC.

Specification of Letters Patent No. 7,061, dated January 29, 1850.

To all whom it may concern:

Be it known that we, JAMES TURNBULL, Jr., and JOHN TURNBULL, of Simsbury, in the county of Hartford and State of Connecticut, have invented new and useful improvements in the power-loom for weaving plain and twilled Venetian carpeting, webbing, or girth cloth or any other fabric with a thick set warp, and that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan; Fig. 2 a front elevation; Fig. 3 an elevation of the right hand side; Fig. 4 a cross vertical section, taken at the line (X, X) of Fig. 2; Fig. 5, a plan and elevation of the shuttle motion; Fig. 6, a section on an enlarged scale of the apparatus for throwing back the picker staff; and Fig. 7 a plan, side and bottom view of the shuttle.

The same letters indicate like parts in all the figures.

The first part of our invention relates to the working of the heddles.

In all fabrics having a thick set warp such as Venetian carpet, whether plain or twilled, and webbing or girth cloths, the warps lie so close together or thick that in working the heddles to open the shed the warps are liable to and frequently do catch and hang onto one another, and hence when the shuttle is thrown it is either arrested or an imperfection produced in the fabric.

To avoid this is the object of the first part of our invention, which consists in using four or more leaves of heddles, and working them all successively between each throw of the shuttle that by thus dividing the warp and working parts at a time and in succession but all between each throw of the shuttle, they may the more readily pass without the danger of catching or hanging.

The second part of our invention relates to the mode of throwing the shuttle and consists in operating the picker levers or treadles, by means of a tappet which slides on the shaft to shift from one picker lever or treadle to the other, alternately, that it may make one entire rotation for each pick or throw of the shuttle, instead of having two tappets with the shaft rotating but once, for two picks or throws of the shuttle.

The third part of our invention relates to the mode of regulating the momentum of the loom, and consists in using one of the shafts of the loom, say, the picker tappet shaft, a fly wheel, which is free to turn thereon, so that when the loom is stopped for any purpose whatever, the said fly wheel shall be free to continue turning and thus relieve the loom of much of the jar consequent on the sudden stoppage of a heavy mass of matter.

The fourth part of our invention relates to the mode of throwing back the picker staff, and consists in interposing between the lay and the heel or lower part of the picker staff, a slide rod which is pivoted or joined to the picker staff, and made to slide in a hole in the sword of the lay, when this is combined with a helical spring on the said rod and made adjustable thereon, for the purpose of regulating its tension, and thereby the force with which the staff will be thrown back.

The fifth part of our invention relates to the method of letting off the warps, and consists in passing the warps over a roller, which receives an intermittent motion from a ratchet wheel operated by a hand or pawl, the rod of which embraces an eccentric on the crank shaft the amount of motion being regulated by an adjustable guide pin or roller over which the rod of the hand or pawl slides to determine the number of teeth of the ratchet to be taken at each rotation of the eccentric.

The sixth part of our invention relates to the take-up motion, and consists in operating the roller around which the cloth passes as it is woven, by means of a rod which acts on the teeth of a ratchet wheel, the said rod embracing and being operated by an eccentric on the main shaft and regulated by sliding on an adjustable pin or roller to determine the amount of take-up. And the last part of our invention relates to the mode of delivering the wefts from the shuttle, and consists in carrying the thread, after it passes through the usual eye, down in a groove along the bottom, and then up and out at the side through an eye about the middle of the shuttle, whereby not only the friction of the thread in passing out is increased, but the delivery for each throw of

the shuttle is equalized, instead of being more on one side than on the other, when delivered through the usual eye near the end.

The accompanying drawings represent a power loom, which, in its general structure resembles the ordinary power loom used for weaving the various kinds of fabrics herein indicated, to which are added our improvements.

Instead of the arrangement of heddles generally employed, by which the warps are shifted all at once, between each throw of the shuttle, we use four or more leaves of heddles (a, a, a, a, a,) six being represented in the drawing, as the number which we deem in general to be the most advantageous, as this number will divide the opening of the shed into three successive operations, between each throw of the shuttle.

The heddles (a,) are provided with cords (b, b,) passing over pulleys (c, c,) and attached to six horizontal levers (d), and at bottom with similar cords (e), passing around pulley (f) and attached to a corresponding set of horizontal levers (g), so that they, (the heddles) are suspended between the pulleys (c, c,) and (f) by the cords attached to the two sets of levers which correspond in every particular.

These two sets of levers are operated by two sets of cams (h), (both sets are alike and the lower one not seen), one set at each end of a vertical shaft (j), which receives its motion from the picker tappet shaft (K), by means of the beveled cog wheel (l,) and pinion (m), their proportions being such as that the cam shaft shall make one rotation for each throw of the shuttle. Each set of cams corresponds in number with the number of levers, there being one for each lever. Their form is concentric for about one third of a circle and rounded in toward the axis at each end to force the levers and permit them to return. They are arranged in pairs (1, 2, 3, 4, 5, 6,) those of each pair being on opposite sides of the shaft, that one lever may be permitted to move in, as the other is forced out, the two levers operated by each pair of cams, being connected to the two heddles which constitute a pair, so that one may rise as the other falls. The three pairs of cams are so arranged as to succeed each other in the rotation, that one third of the warps may be operated first, and then another third, and finally the last third to complete the opening of the shed for the throw of the shuttle. The lower set of cams is made and arranged in a similar manner, except that they are reversed as they operate the levers which are connected with the bottom of the heddles.

The picker staves (n, n,) which are jointed to the projecting ends (o, o,) of the journals of the lay (p,) are connected by straps (q, q,) to the upper arm of levers (r, r,) which turn on stud pins (s, s,) on the lay, and the lower arms of these levers are in turn connected by straps, with the picker treadles (t, t,) of the usual construction.

These treadles are operated alternately by a tappet (u,) on the picker tappet shaft (k.) The tappet is an arm projecting to the required length from a hub (v) which slides freely on the shaft, and made to turn therewith by a feather, in the usual way, of making such connections, and from this arm projects two stud pins (w, w,) one on each side to receive two rollers (x, x,) which by the rotation of the shaft, act on the treadles to depress them; but the distance between the treadles is so much greater than between the rollers (x, x,) that the two rollers shall not operate on the two treadles at the same time, but that when one is in action, the other shall pass clear of the treadle, and to operate the rollers alternately, the tappet is made to slide on the shaft by means of an eccentric (y,) on the harness cam shaft (j,) and a connecting rod (z), which embraces the eccentric and a groove of the hub of the tappet. As the harness cam shaft (j), makes but one revolution for two throws of the shuttle, the eccentric thereon will move the tappet first to one treadle for one throw of the shuttle, and then back to the other treadle for the second throw of the shuttle, for every rotation; and therefore the shuttle tappet shaft can make one entire rotation for each throw of the shuttle, instead of half a revolution as heretofore, by which an increase of power is obtained for the throw of the shuttle.

On the shuttle tappet shaft which has greater velocity than any other shaft in the loom, there is a fly wheel (a'), which turns freely thereon between collars (b', b'). The hub of this wheel is provided with temper screws (c') to regulate the amount of friction of the shaft that it may be made to turn thereon with any desired degree of freedom. If desired, friction plates may be interposed between the points of the screws and the shaft, to prevent the wear of the shaft by the points of the screws.

By this arrangement, so long as the shaft rotates, the fly wheel regulates the momentum of the moving parts of the whole mechanism; but when the loom is stopped for any purpose whatever the fly wheel continues to turn on the shaft and thus takes the momentum and avoids the injurious effects which would take place, if the fly wheel were fixed to the shaft.

The picker staves are thrown back, after throwing the shuttle by means of helical springs (d', d') each surrounding a rod (e') one end of which is jointed at (f') to the picker staff and the other slides freely through a hole in a plate (g') attached to the lay, the helical spring being interposed

between this plate (g') and a regulating nut (h') tapped on the rod, so that by turning this nut, the tension of the spring can be regulated at pleasure, and with facility to determine the force with which the staff shall be thrown back.

The warps pass from the warp beam (i') over a calender roller (j') and are borne down thereon to prevent slipping by the weight of two other rollers (K', K',). The shaft of the roller (j') has on each end a friction wheel (l',) surrounded by a metal friction strap (m',) regulated by a screw (n',) in the usual manner of making friction straps, by means of which the friction can be increased or decreased at pleasure. And on the shaft of the said roller (j',) there is a cog wheel (a'',) the teeth of which engage a pinion (not seen) connected to and moving with a ratchet wheel (c'',) which is operated at stated times by a hand or pawl (d'',) the rod of which embraces an eccentric (e'',) on the lay or crank shaft (r',) so that each rotation of the crank shaft communicates a given delivery motion to the roller, over which the warps pass; and as the motion of the hand or pawl is aways the same, and the amount to be let off depends upon the quality of the fabric woven, it becomes necessary to regulate; for this purpose the rod of the pawl or hand passes over an adjustable pin or roller (f''',) which can be elevated or depressed at pleasure by the securing screw (g'') and elongated hole; this will determine the number of teeth which the hand or pawl will act upon and thus determine the amount of delivery.

The woven fabric from the breast beam passes over a rough roller (o'), which governs the take up and thence is wound upon another roller (p',) below which is operated by any known or desired take up motion. But the actual take up motion, which determines the measure of the cloth as it is woven is given to the roller (o'), by means of an eccentric (q',) on the lay or crank shaft (r'), the said eccentric being embraced by one end of a connecting rod (s',) the other end of which is so formed as to act by a pawl on a ratchet wheel (t') the arbor of which is provided with a pinion (u',) which engages a cog wheel (v',) on the shaft of the roller (o'), so that the cloth is taken up by regular positive motion, while the warps are given out by a like motion. The connecting rods (s',) pass over an adjustable pin or roller in the same manner, and for the same purpose as the connecting rod of the let-off motion.

Instead of delivering the thread from the shuttle through the usual eye near one end, as at (w',) it passes down from this eye through an oblique hole (see dotted lines) (x') to and along a groove (y',) in the bottom, thence up and out through an eye (z',) at the side and in the middle of the length of the shuttle. By this means more friction is presented to the passage of the thread; and, as it is delivered at the middle, an equal quantity of thread is given out at each throw of the shuttle, thus tending to produce an equal selvage on each side.

As shuttles have heretofore been made, it is necessary to use a pressure lever to make friction on the thread, a mechanism which is liable to derangement, and which does not effect the contemplated purpose for the reason that the pull of the thread by the throw of the shuttle is liable to throw up the pressure lever and free the thread.

It will be obvious from the foregoing that the first part of our invention is irrespective of the arrangement of levers and cams for operating the heddles, as other arrangements will effect the end contemplated by our invention, which is the working of the heddles by sections between each throw of the shuttle to prevent the catching and hanging of the warp threads in opening the shed. This part of our invention is also irrespective of the number of these divisions whether there be two, three, or more, but we prefer the arrangement of cams and levers, and the divisions herein specified, as we have found them to answer a good purpose in practice.

We do not wish to confine ourselves to the precise mechanical arrangements herein specified for operating or shifting the picker tappets, although we have essayed it with success, and deem it the best, but other arrangements may be devised for carrying this part of our invention into effect.

As to the third part of our invention, any desired known means of regulating the friction of the flywheel on the shaft may be substituted for the temper screws hereinabove described, as the means of regulating the friction is not of the substance of our invention, nor is it essential to our invention that the friction be adjustable, although we deem it advisable to have it so. In the adjustable mode of throwing back the shuttle staffs, we do not wish to confine ourselves to the use of a nut to regulate the tension of the helical spring, as other mechanical equivalents may be substituted therefor, such as a wedge in a slot, but we have described and represented the nuts as the most advantageous, in our estimation.

In relation to the fifth part of our invention, we do not wish to limit ourselves to the number of rollers, nor to the mode of making friction on the rollers, over which the warps pass as our invention is irrespective of these.

We do not wish to limit ourselves to the precise arrangement above described, for connecting the ratchet wheel of the take up

motion with the roller, as this may be varied at pleasure without affecting the mode of operation of this part of our invention.

And finally, with regard to the last part of our invention, we do not wish to be limited to the precise direction in which the thread is carried from the eye near the end of the shuttle to the delivery eye, near the middle of the length thereof, as this may be slightly varied and still retain the character of this part of our invention.

What we claim as our invention and desire to secure by Letters Patent, is—

1. Dividing the heddles into two or more divisions to be worked in succession, substantially as herein described, that the entire opening of the shed may be effected in succession, and thus avoid the evil effects consequent on the opening of the shed may be effected in succession, and thus avoid the evil effects consequent on the opening of the shed, at one operation, as heretofore, as described.

2. Operating the two picker levers or treadles, by means of a shifting tappet operated or shifted alternately for each pick by means of an eccentric or its equivalent that the shaft which carries the tappet or tappets may make one entire rotation for each throw of the shuttle, substantially as herein described, and thus operating the shuttle by a tappet rotating with greater velocity than by any means heretofore known, as described.

JAS. TURNBULL, JR.
JOHN TURNBULL.

Witnesses:
GILBERT A. TAYLOR,
CHAS. ERWIN.