June 9, 1925. 1,541,086

W. W. WHEELER

LOOM

Filed April 24, 1924 2 Sheets-Sheet 1

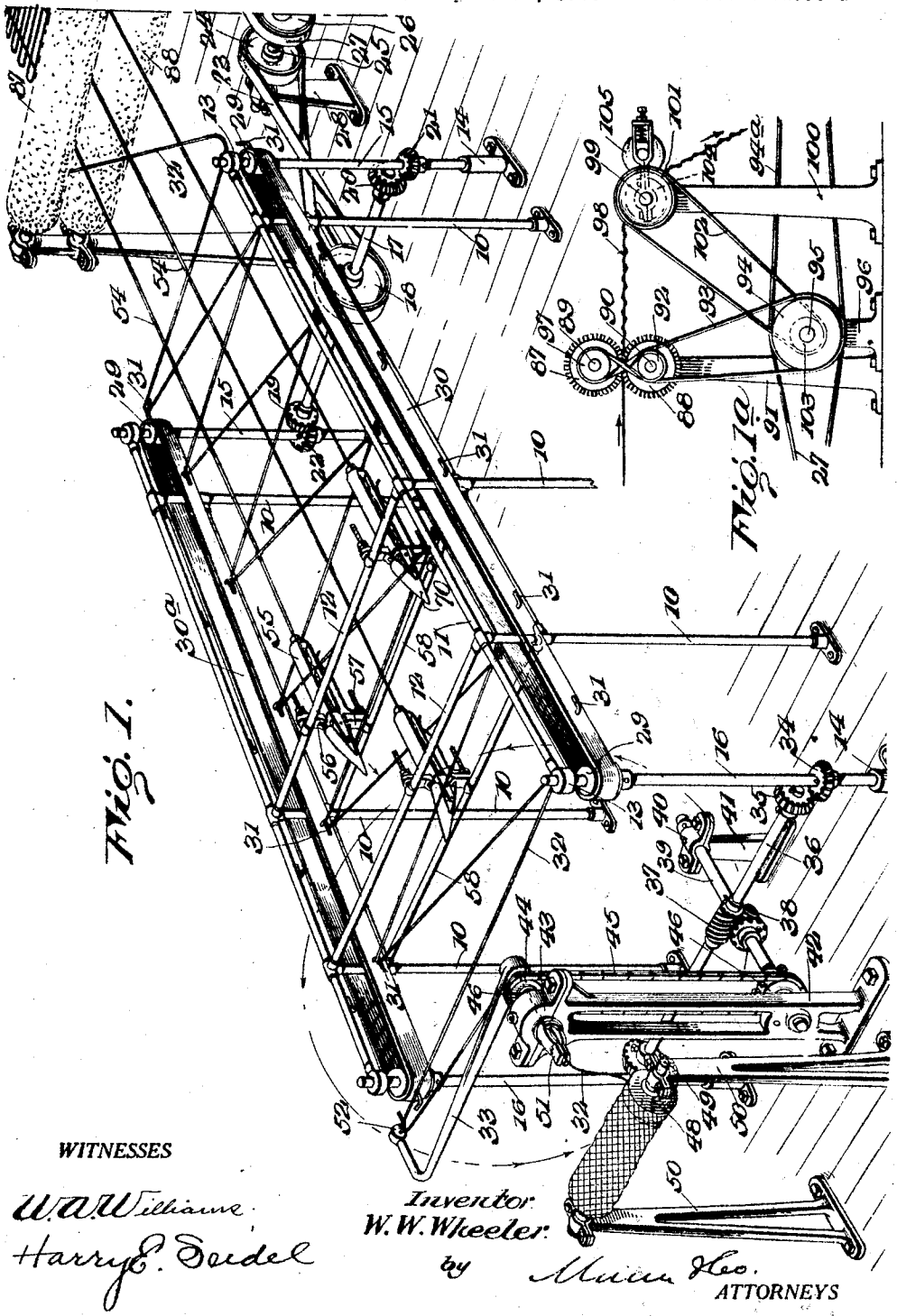

Fig. 1.

Fig. 1a.

WITNESSES

W. A. Williams

Harry C. Seidel

Inventor:
W. W. Wheeler
by Munn & Co.
ATTORNEYS

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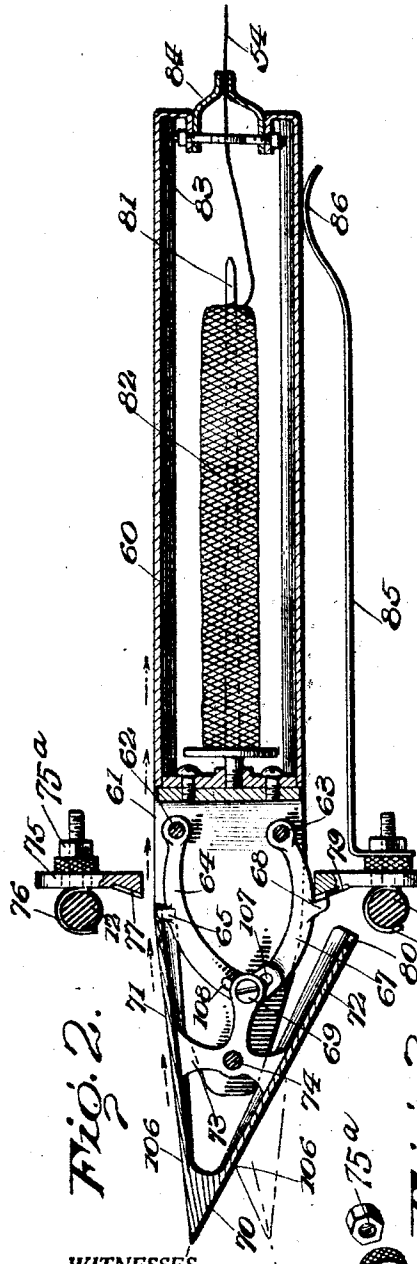

Fig. 2.

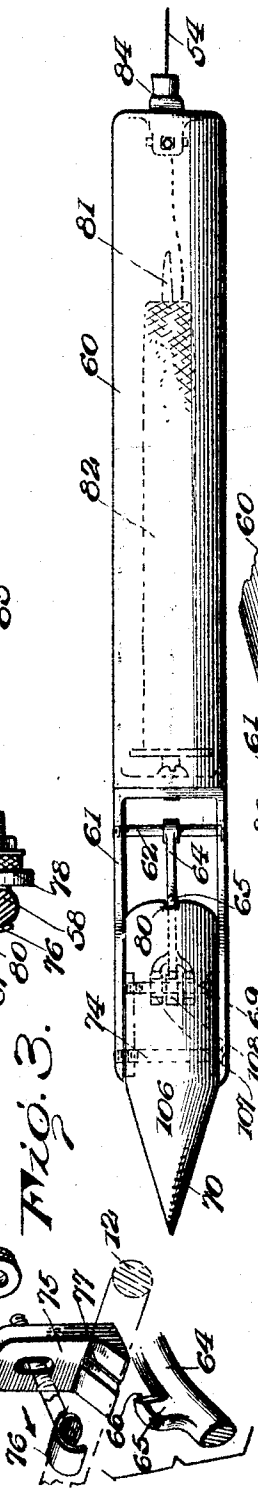

Fig. 3.

Fig. 6.

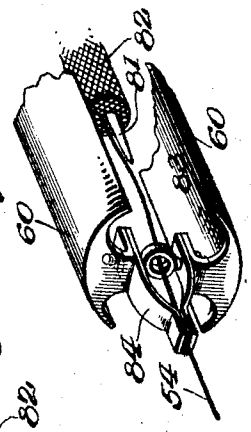

Fig. 5.

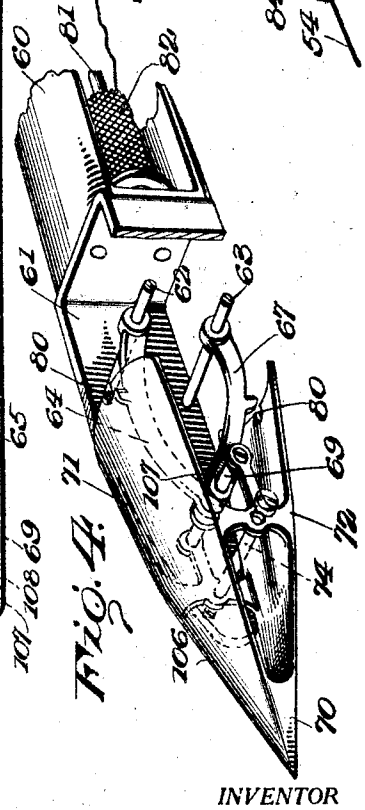

Fig. 4.

WITNESSES

W. A. Williams.

Harry C. Sickel

INVENTOR

W. W. Wheeler.

BY Munn & Co.

ATTORNEYS

Patented June 9, 1925. 1,541,086

UNITED STATES PATENT OFFICE.

WILLIAM WILLIS WHEELER, OF KNOXVILLE, TENNESSEE.

LOOM.

Application filed April 24, 1924. Serial No. 708,777.

To all whom it may concern:

Be it known that I, WILLIAM WILLIS WHEELER, a citizen of the United States, and a resident of Knoxville, in the county of Knox and State of Tennessee, have invented certain new and useful Improvements in Looms, of which the following is a specification.

This invention relates to looms and has for its object the provision of a device having a continuous rather than a periodic feed of the filler whereby the use of a shifting shuttlecock is eliminated and cloth is produced in a more economical manner.

A further object of the invention is the provision of a loom in which the shifting shuttlecock method of weaving is eliminated and a continuous feed of the filler is substituted with each warp thread being individually controlled by a floating mechanism automatically actuated by the filling threads for forming the sheds.

This invention will be best understood from a consideration of the following detailed description, in view of the accompanying drawings forming a part of the specification; nevertheless it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications which shall define no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a view in perspective of the loom in operation.

Figure 1ª is a fragmentary side view of the rear end of the loom.

Figure 2 is a vertical section of a floating device for controlling the transposition of alternate warp threads.

Figure 3 is a plan view of the same.

Figure 4 is a fragmentary view in perspective showing the operating mechanism for causing the weaving of the filling threads with the warp threads.

Figure 5 is a fragmentary view in perspective showing the tensioning means for the warp threads.

Figure 6 is a view in perspective of the unassembled parts of the elements for maintaining the floating warp control in position.

Referring more particularly to the drawings, 10 designates the legs of a supporting frame which comprises the longitudinal bars 11 and transverse bars 12. Bearings 13 are carried at the opposite ends of the longitudinal bars 11. In alinment with the bearings 13 are bearings 14 adapted to be secured to the floor of a building in which the loom is located and pairs of the bearings 13 and 14 are adapted to carry the vertical shaft 15 or 16.

A drive shaft 17 is mounted transversely and at the rear end of the supporting frame and is provided with a pulley 18 and bevelled gears 19 and 20 at its opposite end. The gear 20 is in mesh with gear 21 on rear shaft 15 while the gear 19 is in mesh with a bevelled gear 22 carried by the other rear shaft. A belt 23 entrained over the pulley 18 and pulley 24 drives pulley 18 and likewise shaft 17. Pulley 24 is mounted on shaft 25, said shaft carrying a driving pulley 26 which is connected with a driving pulley through a belt 27. The shaft 25 is carried in bearings at the upper end of standards 28.

Each of the shafts 15 and 16 is provided at its upper end with a pulley 29 upon a pair of which is entrained a belt 30 or 30ª having at spaced intervals hooks 31 projecting laterally from the outer face of each belt and in the direction shown in Figure 1 for a purpose which will be presently described.

As shown in Figure 1 the hooks 31 when carried by that portion of the belt which is passing on the inner side of the frame extend forwardly and as they pass the rollers 29 at the upper ends of the shafts 16, the position of the hooks is reversed so that as they travel from the rear end of the machine towards the filling end the hooks will point rearwardly. The hooks on the belt 30ª are in staggered relation with the hooks on the belt 30 so that the filling thread 32 when applied to said hooks by the rotating feed arm 33 will be disposed diagonally from side to side, as shown in Figure 1.

A bevelled gear 34 is rigidly connected for rotation with shaft 16 and adapted to mesh with a gear 35 on shaft 36. Shaft 36 is provided with a roller 37 meshing with a worm gear 38 on shaft 39, the last mentioned shaft being mounted in bearings 40 in the upper end of the standard 41 and in a bearing located in the lower end of a standard 42.

The upper end of standard 42 is provided with a bearing 43 in which is mounted a

shaft carrying a sprocket wheel 44. Said sprocket wheel is engaged by a chain 45 which is entrained around a sprocket 46 carried by the rotating shaft 39. The rotating feed arm 33 is rigidly connected with a shaft carrying sprocket 44 so that the feed arm is rotated. A shaft 46 carrying the feed arm 33 is hollow through which is adapted to be passed the filling thread 32 from the spool 48. The spool 48 is mounted for idling upon the shaft 49 which is carried at the upper end of standards 50.

A tensioning device 51 is mounted adjacent the bearing 43 and at the outer end of shaft 46 and acts on the filling thread 32 which passes through the shaft 46, and is fed by arm 33 through the feeder 52 and is maintained sufficiently taut when applied diagonally between the inner faces of the belts 30 and 30a.

A plurality of diagonally disposed portions of the filling thread 32 located between the hooks of the belts 30 and 30a are all in substantially the same plane. Each warp thread 54 is carried by an individual floating mechanism 55 which is maintained in position by a pair of alined brackets carried by the pairs of spaced and vertically alined bars 12 and 58. These brackets or supporting plates will be presently described. The bars 58, like the bars 12, are secured to the uprights 10 but below the moving belts 30 and 30a.

Referring more particularly to Figures 2 to 5 inclusive, each floating mechanism comprises a hollow body 60 to which is secured a head 61. The head, as shown in Figure 3, is U-shaped and is provided with a pair of horizontally disposed pintles 62 and 63 which are in vertical alinement. An arcuately shaped arm 64 is pivoted on the pintle 62 and is provided with a lug 65 having a knife edge 66 for a purpose which will be presently described. An arm 67 is pivoted at its outer free end to the pintle 63 and is likewise provided with an outwardly projecting lug 68 having a similar knife edge. The inner end of the arm 67 is provided with a yoke pivoted upon a floating pin 69. The inner end of arm 64 is pivotally mounted on the floating pin 69 between the legs of the yoke on the arm 67.

A V-shaped guide 70 is provided with a pair of transversely curved wings 71 and 72 extending rearwardly from the guide and connected by a pair of spaced brackets 73. These brackets are centrally perforated for receiving a pintle 74, which is mounted in the legs of the U-shaped head 61 and the guide is adapted to be oscillated on said pintle.

A plate 75 is supported on a bar 12 by means of a clamp 76 which is secured to the plate by means of a threaded stud 75a and nuts. The lower end of the plate is provided with a V-shaped notch 77 adapted to be engaged by the knife edge 66 on the arm 64. A similar plate 78 is clamped to the bar 58 which is located below the bar 12 and is provided with a V-shaped slot 79 adapted to be engaged by the lug 68. The free end of the plate 78 is maintained above the bar 58 and in vertical alinement with the lower end of the plate 75. The inner free end of the wings 71 and 72 are provided with notches 80 adapted to seat at times the lugs 65 and 68.

The barrel 60 is secured at its inner end to the inner end of the head 61 and in longitudinal alinement with said head and is provided with a spool or flanged core 81 and is adapted to receive a wound warp thread 82. The warp thread, as shown at 54 is carried through a tensioning device 84 secured at the outer open end of the barrel 60. It will be noted that the barrel 60 is provided with sight openings 83 through which the spools of warp may be inserted when desired. The jaws of the tensioning device clamp the warp threads sufficiently to maintain said warp threads taut during weaving. When necessary a spring member 85 is secured to the plate 78 by the clamp 76 and projects longitudinally of and below the barrel 60 and has an upwardly curved end 86 adapted to engage the lower portion of the barrel and support the same in position.

A pair of brush rollers 87 and 88 are mounted respectively on shafts 89 and 90 carried in bearings at the upper end of standards 91. Shaft 90 is driven by a pulley 92 through a belt 93 entrained around a pulley 94 driven through the power belt 94a. Pulley 94 is mounted on a shaft 95 and carried in bearings at the upper end of standards 96.

The pulley 97 drives shaft 89 through the belt 93 and brush 87 is rotated in a reverse direction from the rotation of brush roller 88 by twisting the belt between the two pullays 92 and 97. The brushes on the rollers 87 and 88 are adapted to engage the warp thread 32 and beat the same in position to form the fabric 98.

A shaft 99 is mounted in bearings at the top of a pair of standards 100 and is driven through a pulley 101 in a belt 102 entrained around a pulley 103 on the shaft 95. The shaft 99 carries a roller 104 which cooperates with a spring pressed idling roller 105 for applying a predetermined degree of tension upon the fabric 98. The fabric is then carried to a roller upon which the same is wound and the fabric may be removed when desired.

While I have shown but three of the floating mechanisms and two pairs of spaced bars 12 and 58 for carrying the floating devices it must be understood that an individual floating device will be required for each warp thread 54 and sufficient numbers of

pairs of horizontal bars 12 and 58 for supporting a plurality of floating mechanisms.

The operation of my device is as follows:

A spool 82 of warp thread is mounted in each barrel 60 and drawn through the tensioning device 84 and then carried rearwardly and clamped to the roller upon which the completed fabric is wound. A spool of filling thread is placed upon the shaft 49 with the thread being carried through the tensioning device 51 through the hollow shaft 46 and around the feeding mechanism 52 of the arm 33. The filling thread is then alternately looped over the hooks 31 on the portions of the belts 30 and 30ª which face each other and the free end is carried between the brush rollers 87 and 88 to the receiving roller for the completed fabric. Alternate guides 70 are tilted in one direction or in the direction shown in Figure 2 while the other guides 70 are tilted in the opposite direction as indicated by dotted lines in Figure 2. It will be seen that the filling threads will engage the sides of the curved wings 71 and 72 at the point marked 106 of Figure 2.

The loom having been set in operation, the belts being in movement are adapted to carry the filling threads engaged by the hooks rearwardly and towards the brush rollers 87 and 88. The rotating arm 33 is so timed that it will apply the filler thread 32 to the hooks 31 as they reach the extreme forward end of the loom, or in other words, when the hooks project outwardly from the pulleys 29 and in longitudinal alinement with a line passing centrally between the two sections of the moving belts 30 and 30ª. Furthermore, the rotation of the arm 33 is so timed that the filler thread 32 will be wrapped around a hook 31 on the belt 30ª and likewise loop the thread around a hook on the belt 30 at the diametrically opposite horizontal position of the arm 33. The hooks on the belt 30 are so positioned relative to the position of the hooks on the belt 30ª that the hooks periodically appear at stated intervals in position to catch the thread 32 so that the threads will assume the diagonally disposed position transversely of the bed of the frame.

All of the filler threads 32 being in the same horizontal plane will engage the tiltable guides 70 at the point 106 on the guides as shown in Figure 2 so that a moving filler thread which engages the guide in the position shown in Figure 2 will ride below the curved surface of the wing 72 and exert a tension on said wing. As the thread passes the pivotal point 74 of the head the tension of the thread 32 will force the wing 73 upwardly at its inner end thereby forcing the inner end of wing 71 likewise upwardly and oscillating the arms 64 and 67. The inner end of the arm 64 is thus moved upwardly causing the lug 65 to be moved adjacent to the notch 77 in plate 75 and cause the knife edge on said lug to engage said notch. In the meantime the oscillation of the guide causes the inner end of the arm 67 to be moved upwardly and thereby forcing the lug 68 out of notch 79 in the plate 78. At this time the rear edge of the lug 68 is seated within the notch 80 in the wing 72 so that the warp thread 32 will slide over the inner end of the wing over the top of the lug 68 and pass through the space between the upper end of the plate 78 and the body 61.

It must be borne in mind that the filler thread 32 is under tension and when the same passes the lug 68 it will slip into position, engage beneath the bottom of the head 61, and by reason of the smooth surface of the lower edge of the head and the barrel 60, the thread will pass freely beyond the same until it reaches a point at the extreme inner end of the barrel 60 where it will again snap into engagement with the warp thread 54.

The oscillation of the guide 70 has caused said guide to be tilted in the position shown in dotted lines in Figure 2 whereby the wing 71 will be elevated and when the filler thread 32 reaches the guide 70 it will engage the upper surface of the wing 71 about the point 106 and move along the upper edge until the filler thread passes the pivotal point 74 of the head when the filler thread, being under tension, will force the inner end of the wing 71 downwardly and oscillate the arms 64 and 67 so that the lug 65 will become disengaged from the notch 77 of the plate 75 when the filler thread will ride over the top of said lug and over the top of the barrel 60. At the same time the arm 67 being moved downwardly positions the lug 68 adjacent the V-shaped groove 79 in the plate 78 and at the extreme lower position of the arm 67 the knife edge of the lug 68 seats within the V-shaped groove 79 in the plate or bracket 78 thereby supporting the floating mechanism against rearward movement through the tension of the warp thread 54. It will be seen that the alternate engagement of the lugs 65 and 68 with the respective notches in the bracket 75 and 78 supports the floating mechanism in position while permitting sufficient strain upon the warp threads 54 during the operation of the loom. The knife edges on the lugs 65 and 68 engaging the V-shaped grooves in the respective plates 75 and 78 prevents lateral movement of the floating mechanism. One of these lugs is always engaged with the plates 75 and 78 and it is only during a neutral position that both lugs may be engaged with the brackets 75 and 78. The setting of every alternate guide 70 in an opposite direction to an adjacent guide will form

the weave between the filling threads 32 and the warp threads 54.

It will also be noted that any form of design in the weave may be had by varying the positions of the guides 70 before starting the loom. Where it may be desired to change the pattern of the weave during the operation of the loom, means may be employed both above and below the guides but out of reach of the moving filling thread 32 and which may be automatically actuated for tilting the guides 70 and thereby forming various patterns.

As shown more particularly in Figure 1, as a portion of the filling threads 32 reach the extreme rear end of the supporting frame which carries the belts 30 and 30a the looped end of the filling thread is released from the hooks as the hooks are carried around the pulleys 29. In other words, as the hook is carried around the pulleys the looped ends of the filling threads merely slip off the hooks due to the reverse position of the hooks. The brush rollers 87 and 88 which are rotated at a faster rate than the tensioning rollers 104 and 105 engage the diagonally disposed portion of the filling threads 32 and act as a reed for beating the filling threads into position in the woven cloth. The finished product is then carried between the tensioning rollers and wound upon a drum in the usual manner.

It will be noted that the openings 107 at the ends of the fork formed on the inner end of the arm 67 and the opening 108 on the inner end of arm 64 are elongated in order to permit vertical movement of the pin 69 and the inner ends of said arms when the nose 70 is oscillated. At such times the pin 69 will ride in the slots and permit movement of the arms relative to each other, otherwise the arms would be locked against movement.

What I claim is:

1. A method of weaving which comprises disposing a plurality of sections of a weft thread in the same plane with one section at an angle to the adjacent section, carrying said sections along a definite path and simultaneously disposing warp threads alternately above and below the weft threads, and at a definite point in the travel of the weft thread brushing said sections of the weft thread in parallel relation and in close association with each other and in locked relation with the warp threads.

2. A method of weaving which comprises disposing a plurality of sections of a weft thread in the same plane, with one section at an angle to the adjacent section, carrying said sections along a definite path and simultaneously disposing warp threads alternately above and below the weft thread, and at a definite point in the travel of the sections of the weft thread, changing the angular position of said sections to a parallel relation and beating said sections in locked relation with the warp threads.

3. A method of weaving which comprises continuously disposing a plurality of sections of a weft thread in the same plane with each section at an angle to the adjacent section, disposing a plurality of warp threads in the plane of travel of the sections of the weft threads, carrying said sections of the weft thread along a definite path and threading the plurality of warp threads alternately above and below the angularly disposed sections of the weft threads.

4. A method of weaving which comprises continuously disposing sections of a weft thread transversely of a plane and at an acute angle to the side edges of the plane, carrying the angularly disposed sections in a definite path as defined by the plane, threading a plurality of warp threads through adjacent sections of the weft thread, whereby alternate warp threads will be locked with opposite sides of the sections of the weft thread.

5. A method of weaving which comprises continuously disposing sections of a weft thread transversely of a plane and at an acute angle to the side edges of the plane, carrying the angularly disposed sections in a definite path as defined by the plane, threading a plurality of warp threads through adjacent sections of the weft thread, whereby alternate warp threads will be locked with opposite sides of the sections of the weft thread, and then brushing the angularly disposed sections into parallel relation to form a cloth.

6. A method of weaving which comprises continuously disposing sections of a weft thread transversely of a plane and at an acute angle to the side edges of the plane, maintaining the sections of the weft thread in a definite path, threading a plurality of warp threads through the adjacent section of the weft thread whereby alternate warp threads will be locked with opposite sides of the sections of the weft thread, releasing the angularly disposed sections, and brushing the released sections into parallel relation.

7. A loom comprising a frame, spaced endless belts provided with a plurality of hooks on the frame, means for driving said belts, means for applying a weft thread alternately to the hooks of the belts at one side of the travel of the belts whereby the sections of the weft thread are angularly disposed between the adjacent portions of the belts, said sections of the weft threads being automatically released at the limit of travel of the belts in one direction, means for threading a plurality of warp threads alternately through the sections of the weft thread, and

means engaging the released sections of the weft thread, and brushing said sections into parallel relation with each other and in locked relation with the warp threads.

8. A loom comprising a frame, spaced endless belts provided with a plurality of spaced hooks and mounted on the frame, means for driving said belts, a revolving arm carrying the weft thread adapted to apply said thread over the hooks at one end of the frame whereby the sections of the thread are disposed in angular relation to each other, means for threading a plurality of warp threads alternately through the sections of the weft thread, said sections of the weft thread being adapted to be released at the end of the travel of the belts in one direction and at the end of the frame, and means engaging the released sections of the weft thread and brushing said sections into parallel relation with each other and in locked relation with the warp threads.

9. A loom comprising a frame, driven rollers at the ends of the frame, endless belts extending longitudinally of the frame carried by and driven by said rollers, said belts being provided with a plurality of spaced hooks, the hooks on one belt being disposed in alternate relation with the hooks on the other belt whereby the hooks on one belt will travel in alternate relation around the pulleys at one end of the frame, a rotating arm carrying a weft thread adapted to alternately apply the weft thread to the travelling hooks, means disposed along the path of the travel of the sections of the weft thread for threading warp threads alternately with the sections of the weft thread.

10. A loom comprising a frame, driven rollers at the ends of the frame, endless belts extending longitudinally of the frame carried by and driven by said rollers, said belts being provided with a plurality of spaced hooks, the hooks on one belt being disposed in alternate relation with the hooks on the other belt whereby the hooks on one belt will travel in alternate relation around the pulleys at one end of the frame, a rotating arm carrying a weft thread adapted to alternately apply the weft thread to the travelling hooks, means disposed along the path of the travel of the sections of the weft thread for threading warp threads alternately with the sections of the weft thread, the hooks when travelling around the rollers at the other end of the frame being adapted to release the sections of the weft thread, and means engaging the released sections of the weft thread and brushing said sections into parallel relation with each other.

11. A loom comprising a frame, spaced endless belts provided with a plurality of hooks on the frame, means for driving said belts, means for applying a weft thread alternately to the hooks of the belts at one side of the travel of the belts whereby the sections of the weft thread are angularly disposed between the adjacent portions of the belts, said sections of the weft threads being automatically released at the limit of travel of the belts in one direction, means for threading a plurality of warp threads alternately through the sections of the weft thread, and a pair of brush rollers adapted to receive the warp and weft threads therebetween for placing the sections of the weft thread in parallel relation.

12. A loom comprising a frame, spaced endless belts provided with a plurality of hooks on the frame, means for driving said belts, means for applying a weft thread alternately to the hooks of the belts at one side of the travel of the belts whereby the sections of the weft thread are angularly disposed between the adjacent portions of the belts, said sections of the weft threads being automatically released at the limit of travel of the belts in one direction, means for threading a plurality of warp threads alternately through the sections of the weft thread, and a pair of brush rollers adapted to receive the warp and weft threads therebetween for placing the sections of the weft thread in parallel relation, means for receiving the finished cloth and placing the warp threads under tension, and means for driving the brush rollers at an increased speed over the receiving means for the finished cloth.

13. In a loom having means for disposing a plurality of sections of a weft thread in angular relation and in substantially the same plane, means for threading a plurality of warp threads alternately through the sections of the weft thread and comprising a body member providing a holder for a ball of warp thread and a tiltable nose adapted to be engaged by the sections of the weft thread for oscillating the nose alternately and for causing the sections of the weft thread to be threaded above and below alternate warp threads.

14. In a loom having means for disposing a plurality of sections of a weft thread in angular relation and in substantially the same plane, means for threading a plurality of warp threads alternately through the sections of the weft thread and comprising a body member providing a holder for a ball of warp thread and a tiltable nose adapted to be engaged by the sections of the weft thread for oscillating the nose alternately and for causing the sections of the weft thread to be threaded above and below alternate warp threads, stops located upon opposite sides of the tiltable nose, lugs adapted to be projected alternately into engagement with the stops for maintaining the threading means in a fixed position.

15. In a loom, a combined threading and warp thread holding device which comprises

a barrel, means within the barrel adapted to hold a ball of warp thread, a tiltable V-shaped nose pivotally mounted upon one end of the barrel, a lever projecting inwardly from the tiltable nose, a pair of arms pivoted at one end to the body member and having pivotal connections at their opposite ends with the free end of the projecting lever, said arms being provided with lugs, fixed stops in the path of the lugs and upon opposite sides of the body member adapted to be alternately engaged by the tilting of the nose for maintaining the body member in a fixed position.

16. A loom comprising a frame, spaced endless belts provided with a plurality of hooks on the frame, means for driving said belts, means for applying a weft thread alternately to the hooks of the belts at one side of the travel of the belts whereby the sections of the weft thread are angularly disposed between the adjacent portions of the belts, said sections of the weft threads being automatically released at the limit of travel of the belts in one direction, means for threading a plurality of warp threads alternately through the sections of the weft thread.

17. A loom comprising a frame, driven rollers at the ends of the frame, endless belts extending longitudinally of the frame carried by and driven by said rollers, said belts being provided with a plurality of spaced hooks, the hooks on one belt being disposed in alternate relation with the hooks on the other belt whereby the hooks on one belt will travel in alternate relation around the pulleys at one end of the frame, a rotating arm carrying a weft thread adapted to alternately apply the weft thread to the travelling hooks.

18. In a loom having means for disposing a plurality of sections of a weft thread in angular relation and in substantially the same field, means for threading a plurality of warp threads alternately through the sections of the weft thread and comprising a body member providing a holder for a ball of warp thread and a tiltable nose adapted to be engaged by the sections of the weft thread for oscillating the nose alternately and for causing the sections of the weft thread to be threaded above and below alternate warp threads, and means connected to the stop for supporting the body member in a predetermined position.

WILLIAM WILLIS WHEELER.