

J. C. BROOKS.

LOOM.

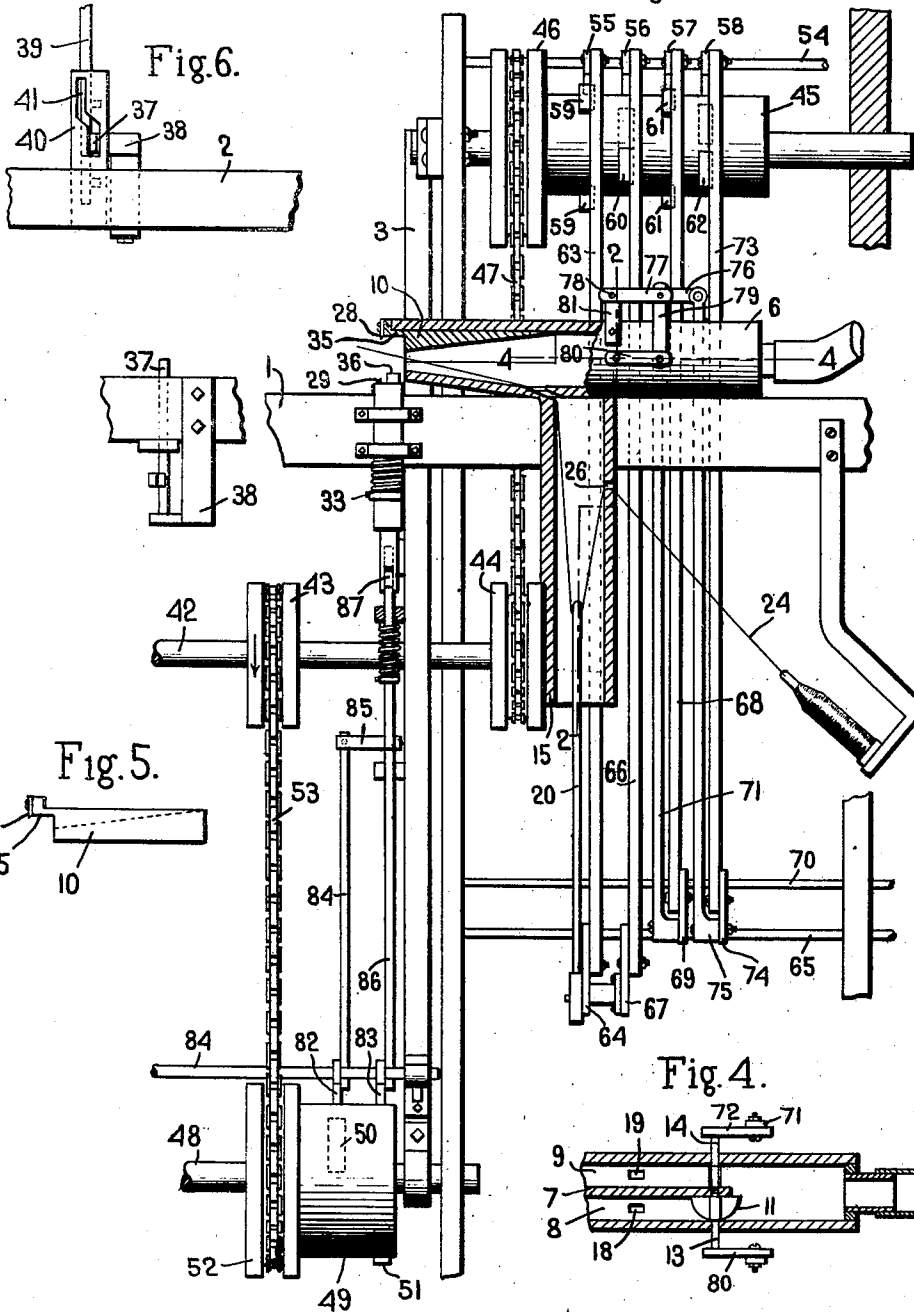
APPLICATION FILED MAY 24, 1911.

1,096,283.

Patented May 12, 1914.

3 SHEETS-SHEET 1.

Fig. 1.



Witnesses.

J. Morrill Fuller
Joseph D. Ashe.

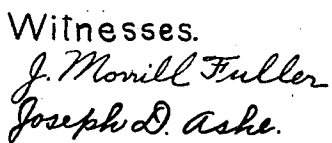
Inventor.

John C. Brooks,
by Heard Smith & Tennant
Attys.

LOOM.

1,096,283.

3 SHEETS—SHEET 2.



Inventor.
John C. Brooks,
by *Heard Smith & Tennant.*
Atty's.

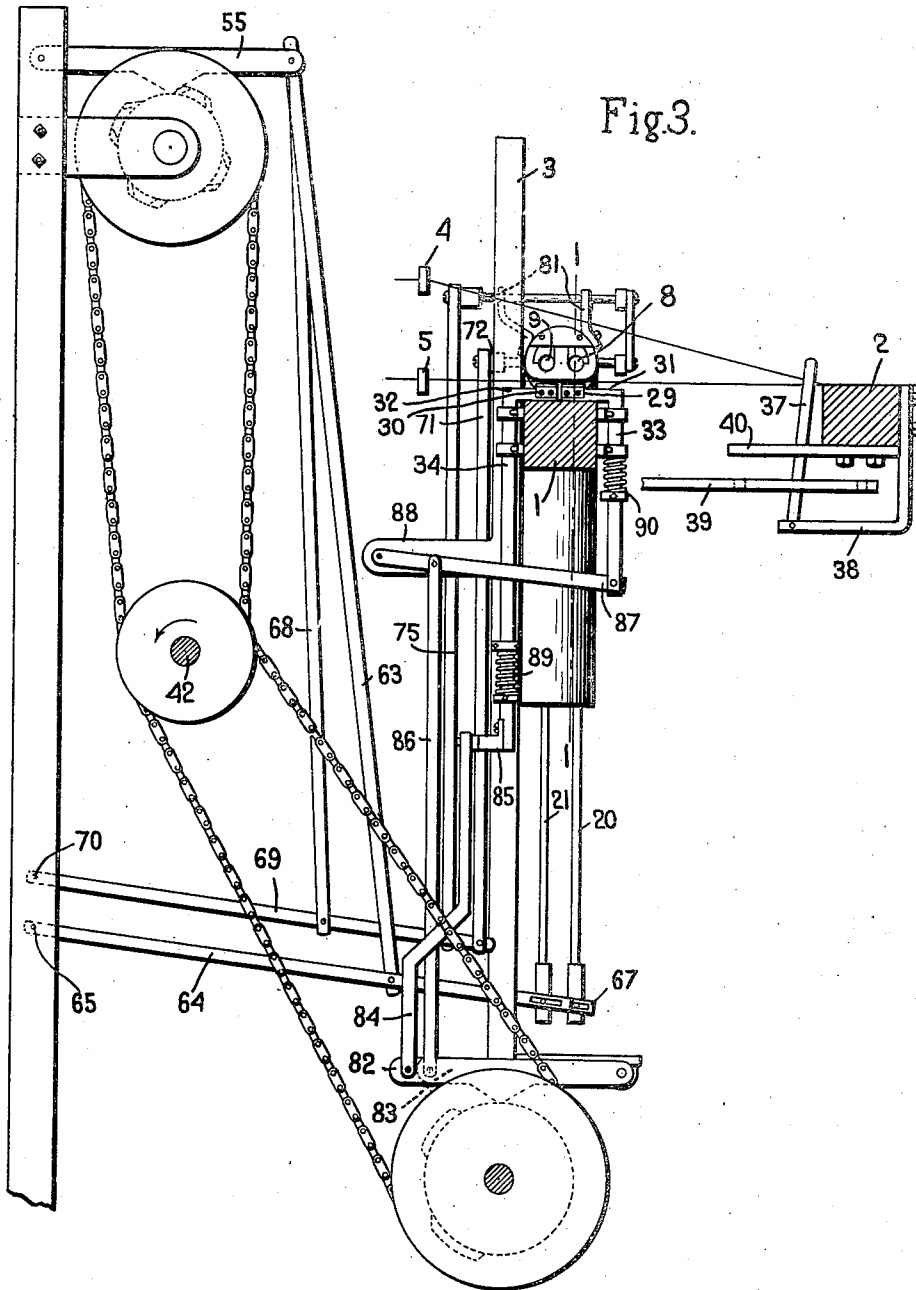
J. C. BROOKS.
LOOM.

APPLICATION FILED MAY 24, 1911.

1,096,283.

Patented May 12, 1914.

3 SHEETS—SHEET 3.



Witnesses.
J. Merrill Fuller
Joseph D. Ashe.

Inventor
John C. Brooks.
by Heard Smith & Tennant.
Attys.

UNITED STATES PATENT OFFICE.

JOHN C. BROOKS, OF PATERSON, NEW JERSEY.

LOOM.

1,096,283.

Specification of Letters Patent.

Patented May 12, 1914.

Application filed May 24, 1911. Serial No. 629,150.

To all whom it may concern:

Be it known that I, JOHN C. BROOKS, a citizen of the United States, residing at Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Looms, of which the following is a specification.

This invention relates to looms and more particularly to a new type of loom in which a current of gaseous fluid is employed for inserting the weft between the warp threads.

In looms as commonly constructed the weft thread is inserted in the warp shed by mechanical devices of various kinds the most common comprising a shuttle which is driven from one side of the loom to the other through the shed. These shuttles are necessarily heavy and if there is any obstruction upon the lay the shuttle is likely to be deflected and break the warp threads and cause other serious damage, and sometimes serious injury to operatives about the loom.

In accordance with my invention I provide means whereby a current of gaseous fluid carries the weft thread through the warp shed without employing any mechanical device passing between the warp threads. As a convenient embodiment of the principles of my invention I shall herein illustrate and describe means for causing a current of fluid such as air to carry the loose thread through the warp shed.

I do not wish to be understood as indicating that my invention is limited to the embodiment illustrated for so far as I am aware I am the first to provide means for carrying a loose thread end through the warp shed without the employment of mechanical devices passing through the shed.

The main object of the invention is to provide a new and improved loom in which the weft is inserted without using any mechanical parts passing between the warp threads.

Another object of the invention is to provide means whereby fluid pressure may be employed to insert the weft threads between the warp threads.

The novel features of the invention will be fully disclosed in the following specification and the accompanying drawings and particularly pointed out in the claims.

Referring to the drawings in which I have illustrated one embodiment of the principles of my invention;—Figure 1 is a view of an improved weft inserting device as ap-

plied to one side of a loom taken partly in section on the line 1—1, Fig. 3. Fig. 2 is a side elevation of the same taken partly in section on the line 2—2 Fig. 1. Fig. 3 is a side elevation taken from the opposite side and showing the lay and breast beam in section. Fig. 4 is a sectional view showing the valve mechanism in detail and taken on the line 4—4 Fig. 1. Fig. 5 is a detail view of the filler member of one of the nozzles. Fig. 6 is a detail view showing the cam for operating the presser lever. Figs. 7 to 12 inclusive are diagrammatic views showing the various steps in the operation of my improved weft inserting device. Fig. 13 is a diagrammatic view showing one arrangement of warp and weft threads in cloth woven on my improved loom.

Referring to the drawings in detail, 1 indicates the lay, 2 the breast beam, 3 the lay sword and 4 and 5 represent diagrammatically the harnesses for forming a shed in the weft.

At each side of the loom I provide weft inserting devices for causing a current of gaseous fluid to carry the weft through the warp shed and in the embodiment illustrated this means comprises a plurality of nozzles positioned to direct currents of air through the warp shed with means for supplying air under pressure at predetermined times and means for supplying definite lengths of weft thread to each current of air. As a simple method of forming these nozzles I provide a tubular member 6 divided by a vertical partition 7 into two parallel passages 8 and 9 at its forward portion. The rear portion of this tubular member constitutes an air chamber. In each of these passages 8 and 9 I provide a filler member for reducing the passage to form a nozzle, one such filler member being shown at 10 in Fig. 1. Between the air chamber and the air passages or nozzles valves are provided to control the admission of air to the nozzles and mechanism for operating these valves at predetermined times is provided. In the embodiment illustrated substantially semi-circular valves 11 and 12 are shown. These valves are secured respectively to rock shafts 13 and 14 projecting through the sides of the tubular member and having bearings in the partition 7. These shafts are rotated to open the valves to admit air to the nozzles at predetermined times by operating mechanism hereinafter to be described.

A feeding mechanism is provided for feeding definite lengths of weft thread to the currents of air. This feeding mechanism may be of any desired form. I have illustrated this mechanism as comprising a tubular member 15 which is divided into two compartments 16 and 17 by a longitudinal wall. This tubular member is secured to or made integral with the tubular member 6 forming the nozzles and air chamber. Weft passages 18 and 19 connect these compartments with the nozzles 8 and 9. In these compartments are vertically movable slack forming rods 20 and 21 respectively having weft eyes 22 and 23 in their upper ends. From any convenient source of supply weft threads 24 and 25 are led through inlet passages 26 and 27 into the compartments 16 and 17 through the weft eyes 22 and 23 and thence through the weft openings 18 and 19 into the nozzles 8 and 9. These slack forming rods are given vertical movement at predetermined times by operating mechanism hereinafter to be described.

In some types of weaving with my improved loom it is desirable to provide a thread cutting mechanism for cutting the thread at certain times. In the embodiment illustrated I provide a mechanism whereby the thread may be cut during alternate picks from each nozzle after the thread has been blown part way through the shed, this mechanism being so arranged that it will not interfere with the current of air to prevent the loose cut ends of the threads being blown the rest of the way through the warp shed. This thread cutting mechanism is illustrated as comprising a blade 28 secured to the outer ends of the fillers 10 and companion blades 29 and 30 secured to the heads 31 and 32 of vertically movable rods 33 and 34 which are moved upwardly at certain times after the current of air has carried the thread as far through the warp shed as it is free to go, the thread at such times being held at one end by the warp threads and at the other end by various resistances which are offered to the movement of the thread between the source of supply and the nozzle.

The heads 31 and 32 are of such a size that they may move entirely above the currents of air issuing from the nozzle so that after the threads are cut the currents of air will carry the ends clear through the warp shed. Each filler member 10 is provided with a shoulder 35 just back of the blade 28 and this is engaged by a pad 36 on the corresponding head. These parts are so proportioned that the thread when severed will be clamped and held by the pad operating against the shoulder and the thread will continue to be held during the downward movement of the slack forming rod. By this means the end of the thread will be retained in the nozzle during the downward move-

ment of the slack forming rod and a definite length will be drawn from the source of supply.

In looms of this type it is desirable to provide an auxiliary device to cause those weft threads which are doubled around the outer warp threads to be drawn tight so that a firm and even selvage edge will be produced. In the construction illustrated a presser arm 37 is arranged to press against the outside warp threads during each movement of the lay. This arm is pivoted to a bracket 38 secured to the breast beam and is moved forward and back by a bracket 39 secured to the lay. A cam plate 40 secured to the breast beam and having a cam slot 41 guides the arm as shown in Fig. 6 in such a manner that as the arm moves forward it will move toward the warp threads thereby pressing the outer warp threads toward the center while the weft is being blown through. The outer warp threads resume their normal position as the lay moves forward and a slight tension is thus put upon the weft thread especially at the edge of the cloth. As shown in Fig. 6 the bracket 39 is provided with spaced arms which engage the lever to operate it at proper times.

Any suitable operating mechanism may be provided for causing the several parts described to perform their functions in proper order. In the construction illustrated the operating mechanism comprises a drive shaft 42 on which are mounted sprocket wheels 43 and 44. Rotatably mounted in the frame is a cam cylinder 45 having a sprocket wheel 46 secured thereto and connected to the sprocket wheel 44 by a chain 47. Rotatably mounted on the shaft 48 is a cam cylinder 49 having cam projections 50 and 51. A sprocket wheel 52 is secured to this cam cylinder and is connected to the sprocket wheel 43 by a sprocket chain 53. The sprocket wheels 43 and 44 are of the same diameter, and the sprocket wheels 46 and 52 are of the same diameter, wherefore cam cylinders 45 and 49 rotate in unison. A rod 54 is secured in the frame adjacent and parallel to the cam cylinder 45. On this rod are pivotally mounted levers 55, 56, 57, and 58, each having a projection resting upon the cam cylinder in position to be engaged by the projections 59, 60, 61 and 62 respectively during the rotation of the cam cylinder. The levers 55, 56, 57, and 58 are connected to operate respectively the slack adjusting rods 21 and 20 and the valves 14 and 13. The connections between lever 55 and slack adjusting rod 21 consist of the link 63 and a lever 64 pivoted on the rod 65 secured in the frame. The connections between the lever 56 and the slack adjusting rod 20 consist of the link 66 and a lever 67 pivoted on the rod 65. The connections between the lever 57 and the valve 14 consist

of a link 68, the lever 69 pivoted on a rod 70 secured in the frame, a link 71 and an arm 72 secured to the rock shaft 14. The connections between lever 58 and the valve 13 consist of the link 73, lever 74 pivoted on the rod 70, link 75, arms 76 and 77, and a rock shaft 78 to which these arms are secured, link 79 and an arm 80 secured to the rock shaft 13. The rock shaft 78 is secured in brackets 81 secured to the tubular member 6. The cam projections 59 and 60 may be positioned slightly in advance of the cam projections 61 and 62 respectively if desired as indicated in Fig. 1 so that the slack forming devices will be operated slightly in advance of the valves.

The thread cutting devices are operated by the cam cylinder 49 and in the structure illustrated each cutting device is operated during alternate operations of the corresponding valve. The cam cylinders are so timed that each thread cutting device will be operated to cut the thread during the time that the valve is open. These cams are also so timed that the thread cutting head will be held in elevated position until the slack forming rods return to lowest position, thus holding the end of the thread during the downward movement of the rod. To operate the thread cutting devices levers 82 and 83 are pivoted on the rod 84 secured to a bracket on the lay sword and have projections engaging the cam cylinder 49 in position to be operated by the cam projections 50 and 51 respectively. Lever 82 is connected to operate the sliding rod 34 by means of the link 84 and a bracket 85 secured to said rod. Lever 83 is connected to operate the sliding rod 33 by means of the link 86 and a lever 87 pivoted to an arm 88 of the lay sword and connected to said sliding rod 33. I prefer to provide springs 89 and 90 to insure the downward movement of the rods after the thread cutting operation as the friction of the thread cutting blades tends to hold these rods in elevated position.

In Figs. 7 to 12 inclusive the position of the weft threads during the several stages of the operation of the device is diagrammatically illustrated. Fig. 7 illustrates the threads in position ready to be carried through the warp shed. Figs. 8 and 9 illustrate respectively the positions of the thread after one thread has been inserted from each side, and after two threads have been inserted from each side. Fig. 10 illustrates the position of the threads just before cutting the first thread and Fig. 11 after cutting this thread and with another thread end inserted from the opposite side. Fig. 12 represents the position after one complete cycle of operations. Fig. 13 illustrates diagrammatically the position of the warp and weft threads in one form of cloth woven as

above described. It will be obvious to one skilled in the art that numerous variations may be made in the order of inserting the threads and in the time of cutting the threads.

The operation of the device is as follows: The cam cylinders 45 and 49 are rotated in unison by the driving shaft and the gearing previously described. As the cam cylinder 45 rotates the lever 55 is raised by a cam projection 59. This operates to elevate the rod 21 permitting the necessary slack in the weft. At the same time, or immediately thereafter the lever 57 is operated by a projection 61 to operate the valve 14 causing a current of air to pass through the nozzle and be directed through the shed formed in the warp. After the weft is carried through the warp shed by the current of air the lay moves to beat up the weft and the harnesses move to change the shed. The levers 55 and 57 in the meantime are allowed to return to normal position, closing the valve and moving the rod 21 downwardly to pull more weft from the weft supply. The free end of the weft being held between the warps will not be withdrawn by the action of the rod 21. A weft thread end is next blown in from the other side by a mechanism which is substantially a duplication of that shown and is beaten in by the lay. Upon a further rotation of the cam cylinder 45 the levers 56 and 58 are raised to operate the valves 13 and the rod 20 to insert a weft thread from the nozzle 8. Similarly another thread end is inserted from the other side of the loom. Upon further rotation of the cam 45 the lever 55 is again operated, the rod 21 is raised, and the thread 25 is carried by the air current half way through the warp shed as shown diagrammatically in Fig. 10. The cam projection 50 on the cam cylinder 49 now operates to lift the rod 34 thereby cutting the thread 25 and clamping the end thereof against the shoulder of the filler member as previously described. As the head 32 moves above the end of the nozzle a current of air carries the thread entirely through the warp shed as shown diagrammatically in Fig. 11 thus forming a selvage edge. The shape of the cam projection 50 is such that the head 32 is held at elevated position clamping the end of the weft thread 25 until the rod 21 descends pulling another measured length of thread from the weft supply. A similar operation is repeated on the opposite side of the loom and one cycle of operations is completed. During the above described operations the presser arm 37 operates to press in the outer warp threads during the insertion of the weft as previously described.

I have described one embodiment of the principles of my invention by which I am enabled to weave a cloth having selvage

edges which sufficiently protect the edges of the cloth and I accomplish this object by means of a loom in which the usual shuttle or other mechanical element passing between the weft threads is omitted.

I do not wish to be understood as considering my invention in any sense limited to the structure shown as it will be obvious that various structures may be designed which will embody the broad principles of my invention.

So far as I am aware I am the first to provide a loom in which the weft is inserted by means of a current of gaseous fluid and I have merely illustrated one embodiment of the principles of my invention. Accordingly the terms of the accompanying claims are to be broadly construed.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a loom, the combination of an air chamber, air passage ways therefrom, weft thread passage ways leading into said air passage ways, and means to control the passage of air currents through said air passage ways, and means to control the passage of weft threads through said weft thread passage ways.

2. In a loom, in combination, a pneumatic weft inserting device for continuous weft having a main passage way, an air inlet and a weft thread inlet each communicating with said main passage way, a valve at the air inlet, a feeding device for the weft, and separate means for controlling said valve and said feeding device.

3. In a loom, means to admit a succession of currents within warp sheds, means to control the currents, means to feed to the said currents weft threads, and means to control the weft feeding means.

4. In a loom, means to deliver a succession of air currents within the warp sheds and means to feed to said air currents, weft threads from a continuous stationary supply to be carried thereby within the warp sheds.

5. In a loom, a weft inserter comprising a nozzle having an air passage way leading into an air chamber, a valve within the chamber to control the air flow, from the chamber to the nozzle, a weft controlling chamber, having a passage way leading into said air passage way, a weft controlling device within said weft controlling chamber, and means to operate said weft controlling device and means for operating said valve.

6. In a loom, a weft inserter having a passage way for a weft thread, an air chamber communicating with said passage way, a valve to open and close said communication, means to slacken the weft thread within the passage way to allow it to be carried there-
through.

7. In a loom, an air reservoir, a plurality of weft thread passage ways in communication therewith, a plurality of weft supplies, the weft threads from which lead through said passage ways, controlling means between the reservoir and passage ways, controlling means between the weft supplies and passage ways, operating rods and levers engaging said controlling means, and cams whereby said rods and levers are actuated.

8. In a loom, a weft inserter having an air chamber, air passage ways leading from said air chamber, valves within said chamber to control the flow of air through said air passage ways, weft thread passage ways leading into said air passage ways, feeding devices for the weft threads, rods and levers engaging said valves and weft feeding devices and cams whereby said rods and levers are actuated.

9. An air reservoir, weft thread passage ways communicating therewith, a weft cutter to grasp and cut the weft, a weft control to draw a predetermined length of weft from its supply and deliver it to an air current released from said reservoir through said passage ways, with means to control the communication between the air reservoir and weft thread passage ways, and separate means to actuate the weft cutter and weft control.

10. In a loom a weft thread supply and a weft inserting nozzle communicating with a weft thread passage way located at the cloth making point, means to hold the weft thread between the selvage and source of supply, an air reservoir communicating with said passage way, a weft cutter to sever the weft between the passage way and selvage, and a cam controlled lever to contract the width of the cloth.

11. In a device of the class described the combination of means for forming a shed and means for blowing a weft thread end through the shed.

12. In a device of the class described the combination of means for holding warp threads in position, means for moving said warp threads to form a shed, and means for forming a current of air to blow a weft thread through the shed.

13. In a device of the class described the combination of means for supporting warp threads, means for forming a shed, a nozzle positioned to direct a current of air through said shed, a source of air supply for causing a current of air to issue from said nozzle and means for feeding a definite length of thread to the air current issuing from said nozzle.

14. In a device of the class described the combination of means for forming a shed, a nozzle positioned to direct a current of air through said shed, means for holding a supply of weft thread, means for permitting a

definite length of weft thread, to be fed from said supply to said air current at intervals, means for cutting the thread adjacent said nozzle and means for supplying air to said nozzle intermittently.

15. In a device of the class described the combination of means for holding warp threads in position, means for moving said warp threads to form a shed, a pair of nozzles arranged to direct currents of air through said shed, means for alternately supplying air to said nozzles to produce currents of air passing through said sheds and means for permitting definite lengths of weft thread to be intermittently fed to the said air currents.

16. In a device of the class described the combination of means for supporting warp threads and for forming a shed therein, means for directing currents of air through said sheds from opposite sides thereof, means for feeding weft threads to said currents of air in definite lengths and means for severing said weft threads.

17. In a device of the class described the combination of means for holding warp threads in position, means for moving said threads to form a shed, a plurality of nozzles positioned adjacent each other to direct the currents of air through the shed, means for supporting a supply of weft thread for each nozzle and means to permit definite lengths of said weft thread to be fed to said nozzles successively, whereby the weft may be fed to said warp shed from said nozzles successively.

18. In a device of the class described the combination of means for holding warp threads in position, means for moving said warp threads to form a shed, means for directing intermittent currents of gaseous fluid through the shed, means for supporting sup-

plies of weft thread and means for drawing definite lengths of said weft thread from the supplies in rotation whereby the weft from different supplies will be fed successively.

19. In a device of the class described the combination of means for holding warp threads in position, means for moving said warp threads to form a shed, means for directing intermittent currents of gaseous fluid through the shed, means for supporting supplies of weft thread and means permitting definite lengths of said weft threads to be fed from the supplies in rotation to said currents of gaseous fluid whereby the weft from different supplies will be fed successively, and means for severing the weft fed from each supply after alternate feedings of said weft.

20. In a device of the class described the combination of means for supporting warp threads, means for moving said warp threads to form a shed, means for causing a current of gaseous fluid to carry weft thread through the shed and means for pressing the outer warp threads toward the other warp threads at predetermined times and afterward releasing the same.

21. In a device of the class described the combination of means for supporting warp threads, means for moving said warp threads to form a shed, means for causing a current of gaseous fluid to carry weft thread through the shed, and means to sever the thread and to hold one end thereof for a definite period.

In testimony whereof I have set my signature in the presence of two attesting witnesses the 11th day of March, 1911.

JOHN C. BROOKS.

Witnesses:

PETER MACDONALD,
E. CURRIE.