Dec. 5, 1961 B. W. NELSON 3,011,526

LOOM

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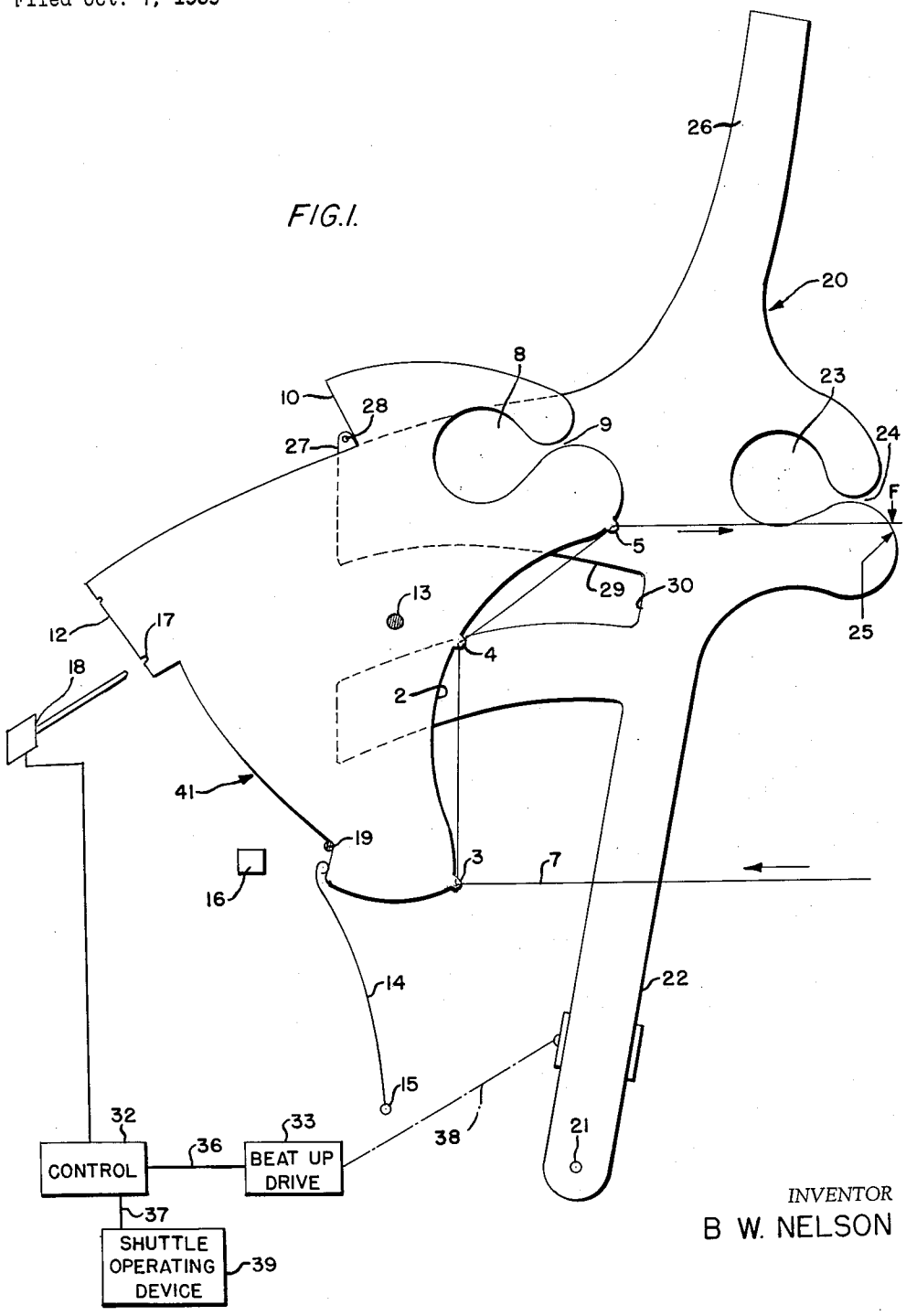
FIG. 1.



INVENTOR

B W. NELSON

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FIG. 3.

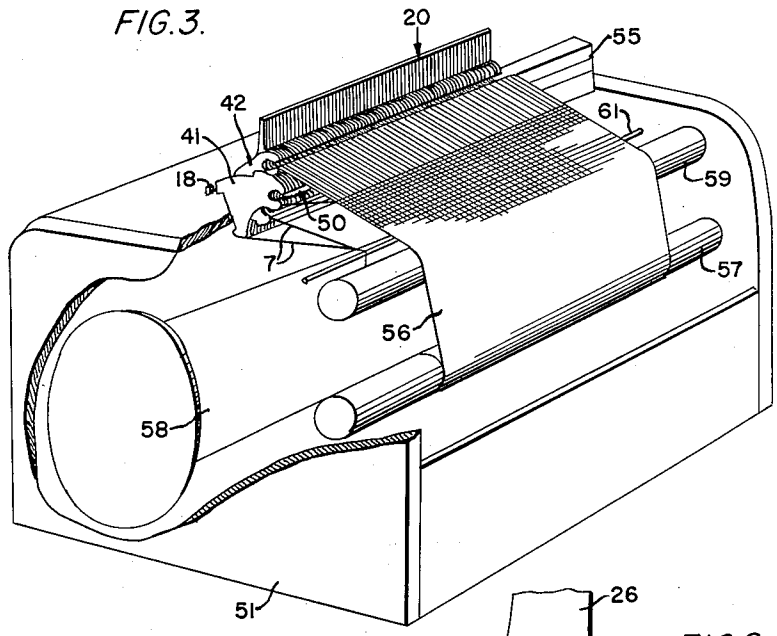
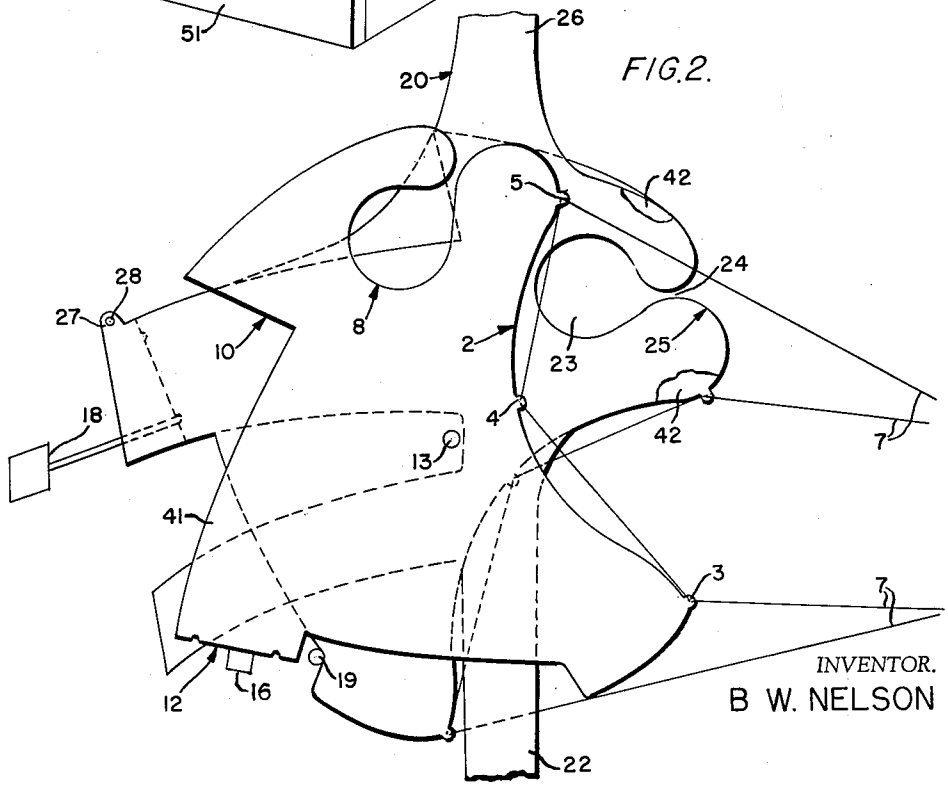


FIG. 2.



INVENTOR.
B W. NELSON

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3,011,526
LOOM

Bernard W. Nelson, Holden, Mass., assignor to Crompton & Knowles Corporation, Worcester, Mass., a corporation of Massachusetts

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6 Claims. (Cl. 139—11)

This invention relates to a loom and more particularly to a means for controlling the position of warp threads in a loom.

Weaving machines are well known in the art and have in the past been designed for producing cloth of various patterns and designs. One specific type of loom is that known as the Jacquard type loom. Jacquard looms in use today are complicated, cumbersome and very expensive machines. Further, these machines require trained and skilled operators to produce the desired results. One of the major disadvantages of this type of loom has been the mechanism necessary to control the position of the warp thread, particularly when it is desired to obtain a specific pattern or design of the finished woven cloth.

Accordingly, it is an object of this invention to provide a loom which will perform weaving of designs now limited to the Jacquard type loom which is simple, compact in construction and relatively inexpensive to produce.

A further object of this invention is to provide a loom which requires no special knowledge for its operation.

A still further object of this invention is to provide a loom in which patterns can be changed on the same warp simply by changing the control sequence.

Yet another object of this invention is to provide a loom wherein the warp threads are controlled individually and independently of each other.

Further objects will become apparent to those familiar with this art from the following description when taken in conjunction with the drawings wherein:

FIG. 1 is an elevational view of one operating plate and an associated beat up member;

FIG. 2 is a perspective view of two operating plates in different relative positions together with an associated beat up member therebetween; and

FIG. 3 is a perspective showing of a weaving machine with some parts removed to show the details of the present invention.

Briefly, this invention provides a means for controlling a series of warp threads individually and independently through the use of irregularly shaped operating plates, the warp threads being carried by the irregularly shaped plates which are rotated between two positions to control the position of the warp thread and thus the pattern of the cloth.

FIG. 1 is a detail showing of one of the operating plates **41** together with one of the beat up members generally designated at **20**. Each operating plate **41** has an irregular shape with a curved forward face **2**. Eyelets **3**, **4** and **5** are integral with the forward face of plate **41** and have holes for receipt and delivery of warp thread **7**. This arrangement maintains thread **7** in a plane defined by plate **41** and within the confines of the thickness of the plate. Warp thread **7** is fed in the direction as shown by the arrows in FIG. 1. The upper part of the operating plate consists of an opening **8** which has a channel **9** giving access to the opening **8** for purposes which will be hereinafter explained. A portion **10** extends upward from the plate and the rear of the plate also has an upward extending edge **12**. The plate is supported by a shaft **13** and is free to rotate thereon. Each beat up member **20** is a substantially straight plate member having lower arm **22** which is pivotally mounted at point

21. An opening **23** appears in the forward part of the beat up member, said opening also having a channel **24**. Each member **20** is provided with a beat up surface **25**, FIGS. 1 and 2, to move the filling thread (not shown) as is usual to the fell F, see FIG. 1. This opening and channel are substantially of the same size and configuration as that of channel **9** and opening **8** on the operating plate. The upper vertical portion **26** at the top thereof is provided with the usual handrail, not shown but well understood in the art. An abutting section protrudes from the rear of the beat up member having a cut out section **29** so that the beat up member may pass over shaft **13** in a forward and backward motion. The upper rear part of beat up member **20** has an extension **27** through which a hole is drilled in order to carry a rod **28**. This rod **28** abuts against edge **10** of the operating plate when the beat up member **20** is moved into its forward position, the beat up member being in its forward or beat up position in the showing of FIG. 1. This forward motion of the beat up member causes the operating plate **41** to rotate about shaft **13** in a clockwise direction. The operating plate is prevented from continuing its clockwise rotation by the use of stop bar **19**. The operating plate does not abut against stop bar **19** until the beat up member is in its extreme forward position. During return of the beat up member to its back position as shown in FIG. 2, a tension spring **14** mounted at point **15** forces operating plate **41** to rotate counterclockwise about shaft **13** and return to a position wherein the plate abuts against stop bar **16**, see FIG. 2. The operating plate **41** at edge **12** is notched as at **17** to provide a seating means for the holding device **18**. Holding device **18** is a standard electromagnetically operated plunger of a type well known and in common use today. The holding device is shown in FIG. 1 in its inactivated position which allows plate **41** to rotate counterclockwise after the beat up member **20** has been returned to its backward position. Should the holding device **18** be activated, the rod therein is extended toward the plate a sufficient amount to hold the plate in its extreme clockwise position. If the operating plate is held in its extreme clockwise position by holding device **18**, when the beat up member is returned to its rearward position openings **8** and **23** will align themselves. This is the opening through which the shuttle passes when the loom is in operation, and channel **9** allows the thread from the bobbin on the shuttle to slip into the open shed.

The various controls are shown schematically since any number of control or power units could be used and are not part of this invention. Control device **32** could be any of the now well known electronic control devices. Magnetic tape controls or punched card controls or the like may be used for control equipment **32**. This control equipment determines which of the various operating plates shall be held in their clockwise position and which plates shall be allowed to return to their counterclockwise position when the beat up members are returned to their rearward position as is more clearly shown in FIG. 2. Control device **32** also synchronizes the loom when it is in operation. A connection **36** is shown to the power equipment **33** which operates the beat up member through mechanical connection **38** which is connected to all of the members in any approved manner to effect simultaneous movement of all of the members, see FIG. 1. A control connection **37** is also shown for control of a shuttle operating device **39**. These control and power operating devices are of a standard nature and available commercially.

FIG. 2 illustrates the operation of two plates in a loom. Plate **41** is shown in its extreme counterclockwise position while plate **42**, which is identical to plate **41**, is shown in its extreme clockwise position by holding device

18. In the showing of FIG. 2 the beat up member has returned to its rearward position. With the beat up member in its rearward position the openings 8 and 23 are coincidental for both plate 42 and beat up member 20 as are the channel openings 9 and 25. As will be obvious, a loom can be made up of as many plates as is desired and the number of plates can be reduced or added to in order to provide the desired width of the cloth being woven. A beat up member is provided between adjacent plates and consists of a flat metal shape of the configuration described in FIG. 1. The beat up member is provided with the opening 23 and 24 in order that the shuttle which passes through the opening 8 will be provided with a uniform bearing no matter how many plates are held in their forward clockwise position. The position of the plates as shown in FIG. 2 allows the shuttle to pass below the warp thread carried by plate 41 and above the warp thread carried by plate 42. By providing a series of these plates which are individually operated independently from each other and controlled each by a holding device 18, it may be seen that an infinite variety of designs may be woven into the cloth by manipulating the series of plates through a central control device such as described in FIG. 1. The slotted opening 9 allows the thread from the bobbin in the shuttle to slip into the open shed. The shuttle is sent through the openings when the plates are properly aligned, the control of the shuttle being synchronized with the movement of the plates by the control device of FIG. 1. The rearward extensions of the beat up members 20 are provided for insuring the proper return of the beat up member back and between adjacent plates. The shuttle itself is not part of the invention and is not shown for the sake of clarity of the drawings. It is to be particularly noted that with the arrangement of the plates of the present invention together with the beat up members, the shuttle travels within a restricted area behind the warp threads and does not ride on the warp threads. This is of obvious advantage.

FIG. 3 shows a representative loom using the present invention. In FIG. 3 the shed 50 is shown in open position with two visible plates being shown, one in an extreme clockwise position and the other in an extreme counterclockwise position. The beat up means 20 is shown in its returned back position with its shuttle openings lining up with the shuttle openings on the plates which are in the clockwise position as previously described in FIG. 2. This forms a continuous shuttle guide when the shed is open, the plates as shown being in a position for shuttle transfer. The bobbin change or magazine (not shown) is located to the left of plates 41, 42. The shuttle actuator of FIG. 1 would also be located with the bobbin change. The bobbin change has been removed for purposes of clarity in the drawing. The shuttle box 55 is shown at the opposite end of the plates. Warp beam 58 supplies the warp threads 7 over rod 61 to the various plates, and the finished cloth passes over the breast beam and is rolled onto the takeup roll 57. The electronic equipment as mentioned in FIG. 1 is located in back of the plates just above the warp beam but is not shown in FIG. 3 for purposes of clarity. The holding device 18 is normally mounted on the rear of the loom as shown in FIG. 3.

As will now be noted from the above description and drawings a relatively simple mechanism has been provided by this invention whereby an infinite variety of designs and patterns may be woven into a cloth by merely manipulating a series of thin plates individually or in any combination to obtain the pattern desired. Further, the threading of the plates with the warp threads requires no special knowledge and the following of a special pattern of threading is not required. Any person can thread this loom.

Both the loom and the particular configuration of the plates as shown and described are not to be considered as

limitations on this invention. Variations of the design and changes in operation will now be obvious to those familiar with this art in the light of this disclosure without a departure from the essence of the invention as defined in the appended claims.

What is claimed is:

1. A loom for weaving various types of cloth comprising a plurality of operating plates supported by a shaft, said plates being free to oscillate between predetermined actuated and rest positions, a beat up member mounted adjacent to each of said plates and movable between predetermined first and second portions, said beat up members being secured together for simultaneous movement thereof, means on said beat up members for forcing said plates into said actuated position when said beat up members are moved into their second positions, bias means for returning said plates to their rest position when said beat up members are returned to their first position, restraining means for temporarily preventing said bias means from returning a preselected number of plates to their return position, each of said plates having an opening therein for allowing passage of a shuttle through the plates which are held in their activated position by said restraining means, and means on said plates through which the warp threads pass, said shuttle passing below the warp threads carried by the plates which are in the rest position and above the threads carried by the plates in the actuated position.

2. In a loom for weaving various types of cloth, a warp shedding means comprising a plurality of operating plates supported by a shaft, said plates being free to oscillate between an activated and inactivated position, means on said plates through which the warp threads pass, operating means for simultaneously rotating said plates into their activated position, bias means for returning said plates to their inactivated position upon release of said operating means, restraining means for temporarily preventing the bias means from returning a preselected number of plates to their inactivated position, each of said plates having openings therein through which a shuttle passes when the plates are in their activated position, said openings being above said means through which said warp threads pass, said shuttle passing below the warp threads carried by the plates which are in the activated position and above the warp threads carried by the plates which are in the inactivated position.

3. A means for controlling the position of the warp threads in a loom comprising a plurality of substantially identical irregularly shaped operating plates mounted for oscillation between a first and second position on a shaft, each of said plates having holding means for passing a warp thread therethrough, the position of the warp thread being determined by the angular position of the associated plate, operative means for simultaneously rotating said plates from their first to their second position, bias means for returning said plates to their first position upon release of said operating means, restraining means for temporarily preventing a preselected number of plates from being returned by said bias means, each of said plates having openings therein through which a shuttle passes when said plates are in their second position, said shuttle passing above the threads carried by the plates in the second position and below the threads carried by the plates in the first position.

4. A warp shedding means for controlling the position of the warp threads in a loom comprising a plurality of substantially identical irregularly shaped operating plates mounted for independent oscillation about a shaft between a first and second position, each of said plates having means thereon through which said warp threads pass, the position of the warp threads relative to each other being dependent upon the angular position of said plates, and means for temporarily holding a predetermined number of said plates in their second position and the remainder of the plates in their first position, said means for holding

said plates in the first and second position comprising a beat up member mounted adjacent to each of said plates, said beat up members being mounted for simultaneous pivotal movement, means mounted on said beat up members for forcing said plates into said second position upon rotation of said beat up members in one direction, bias means for returning said plates to their first position upon rotation of the beat up members in the other direction and restraining means for preventing said bias means from returning said predetermined number of plates to their first position.

5. The apparatus of claim 4 wherein said beat up members have an opening therein through which a shuttle may pass when said beat ups are in said first position.

6. In a loom for weaving various types of cloth, a warp shedding means comprising a plurality of operating plates supported by a shaft, said plates being independently free to oscillate between predetermined actuated and rest positions, each of said plates having means for carrying warp threads so that the relative position of said

threads depends upon the angular position of said plates, a beat up member mounted adjacent to each of said plates and movable between predetermined first and second positions, said beat up members being secured together for simultaneous movement thereof, means on said beat up members for forcing said plates into said actuated position when said beat up members are moved into their second position, bias means for returning said plates to their rest position when said beat up members are returned to their first position, and a restraining means for preventing said bias means from returning a preselected number of plates to their return position, each of said plates having an opening therein for allowing passage of a shuttle through the plates which are held in their activated position by said restraining means.

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