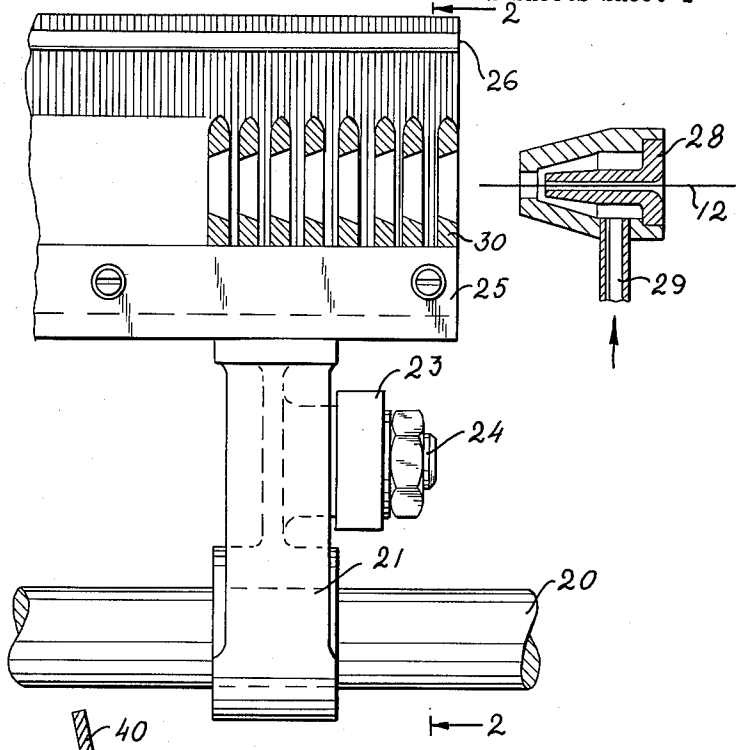
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WEFT CONFINING COMB FOR PNEUMATIC LOOMS

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FIG. 1



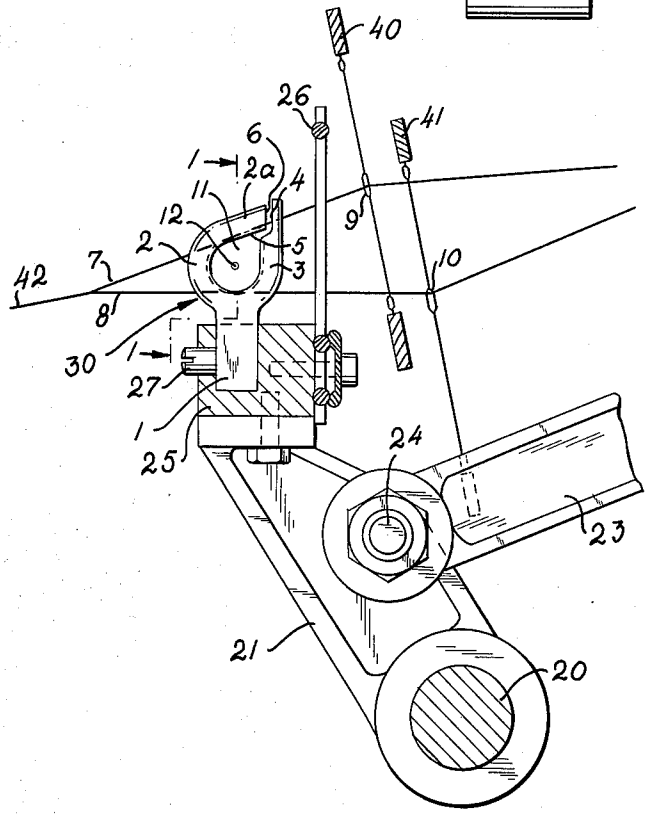


FIG. 2

INVENTOR.
Vladimir Svaty

BY

Michael S. Striker

Aug. 31, 1965 V. SVATY 3,203,452

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FIG. 3

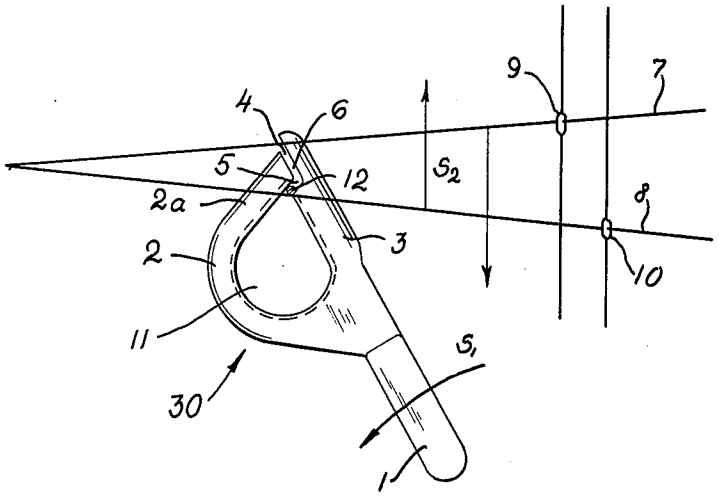


FIG. 5

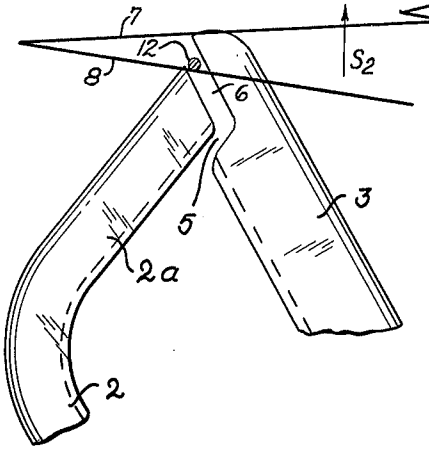
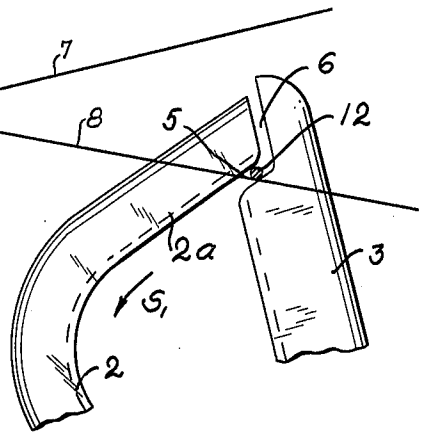


FIG. 4



INVENTOR.
Vladimir Svaty

BY

Michael J. Striker
Atty

United States Patent Office

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3,203,452

WEFT CONFINING COMB FOR PNEUMATIC LOOMS

Vladimir Svaty, Liberec, Czechoslovakia, assignor to Sdruzeni Podniku Textilniko Strojirenstvi, Liberec, Czechoslovakia

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10 Claims. (Cl. 139—127)

The present invention relates to a weft confining comb for pneumatic looms, and more particularly to a comb comprising a row of aligned guiding members having inner openings which form a passage for a jet of air in which a weft is entrained during the weft inserting operation.

It is known to provide a comb structure for this purpose. The guiding members forming the comb of the prior art have narrow gaps through which the weft passes when the insertion of the weft has been completed. The weft is thereupon beaten by a reed means into the fell of the fabric, whereupon the comb is again moved to its weft inserting position.

While it is necessary to provide the gaps for the removal of the inserted weft from the air guiding passage, the gaps have the inherent disadvantage that some of the air of the weft inserting jet of air escapes during the insertion of the weft, and the escaping air may actually carry along the weft moving with the jet of air, so that the weft is not properly inserted into the warp shed.

Even if the weft is retained in the air guiding passage of the combs according to the prior art, a considerable loss of air pressure occurs by the air escaping through the gaps of the guiding members, and this loss may prevent the weft or the leading end of the inserted weft from passing through the entire width of the warp shed to the other side of the fabric.

It is one object of the present invention to overcome these disadvantages of prior art constructions, and to provide a weft confining comb in which loss of air through the gap provided for the removal of the inserted weft from the comb is substantially reduced.

Another object of the present invention is to provide the guiding members of the comb with gaps shaped in such a manner as to have the effect of throttling ducts.

Another object of the present invention is to provide the guiding members of the comb with open gaps shaped in such a manner as to mechanically obstruct the escape of the weft therethrough during the weft insertion.

Another object of the present invention is to operate the warp shed forming means and the comb in timed relation in such a manner that the inserted weft is guided by the warps through the gaps.

With these objects in view, one embodiment of the invention provides in a pneumatic loom a comb comprising a row of aligned guiding members. Each guiding member according to the invention forms an inner opening and has two end portions with ends forming a narrow gap having an inner gap portion extending to the inner opening and an outer gap portion extending to the outside of the guiding members. The gap portions extend at an angle to each other.

The aligned inner openings of the row of guiding members forming the comb form a passage for the jet of air and for a weft carried by the same. Each gap forms an angular throttling duct for confining the jet of air and a weft carried thereby. In this manner, losses of air, and inadvertent escape of the weft during the insertion into the warp shed are reliably prevented.

In the preferred embodiment of the invention, the comb cooperates with the other elements of a pneumatic loom in a novel and advantageous manner. The pneumatic loom comprises shed forming means for forming the sheds of the warps. The comb is mounted for movement between a weft inserting rearward position and a forward position in which the guiding members are not only closer to the fell of the fabric, but also lowered whereby the air guiding passage is located below the warps.

When the slay moves the comb from the rearward position to the forward position after the insertion of the weft and during operation of the shed forming heddles of the loom, one side of the warp shed engages the inserted weft to effect successive movement of the weft in the direction of and through the inner gap portion and in the direction of and through the outer gap portion.

Near the forward position of the comb, the guiding members are first moved in the direction of the inner gap portion by the slay so that the inserted weft is caused to pass through the inner gap portion, whereupon the movement of the warps under the control of the heddles is combined with the movement of the guide member in a composite movement which causes the inserted weft to pass through the outer gap portion until the weft is located outside of the guide member and in the warp shed, and is ready to be beaten into the fell of the fabric.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a fragmentary view, partly in section on line I—I in FIG. 2, and illustrating one embodiment of the invention;

FIG. 2 is a fragmentary sectional view taken on line 2—2 in FIG. 1;

FIG. 3 is a fragmentary side view illustrating an operational position of a guiding member on an enlarged scale;

FIG. 4 is a fragmentary side elevation illustrating another operational position of a guiding member on a further enlarged scale; and

FIG. 5 is a fragmentary side elevation illustrating a third operational position of a guiding member on an enlarged scale.

Referring now to the drawings, and more particularly to FIGS. 1 and 2, a slay **25** includes arm means **21** mounted on a shaft **20** for a reciprocating movement, and is operated by a lever **23** connected by pivot means **24** to the arm means **21**. On the transverse portion of slay **25**, a row of guiding members **30** is mounted, each guiding member having a supporting arm **1** inserted into a corresponding recess of slay **25** and secured by screw **27**.

Slay **25** also carries a reed **26** including transverse rods and thin elements extending between the warps **42**, and more particularly between the warps **7** and **8** forming the sides of a warp shed which is opened and closed by heddle frames **40** and **41** through whose eyes **9** and **10** alternating warps **7** and **8** pass.

As best seen in FIG. 3, the warps **8** are moved in the direction S2 during the closing of the shed, while the warps **7** move in the opposite direction. During reciprocation of the slay about the axis of shaft **20**, the guiding members **30** move in the direction S1 and in an opposite direction.

Each guiding member forms an opening **11** which is bounded by a substantially circular portion **2**, and two straight end portions **2***a* and **3**. The ends of end portions **2***a* and **3** define a gap **4** composed of an inner gap portion

5 and an outer gap portion 6 which extend at an obtuse angle to each other. End portion 3 has a recess bounded by two shoulders, and end portions 2*a* has a front edge and a lateral edge which are respectively located opposite the shoulders of end portion 3 to form the angular gap 4. The apparatus is operated as follows:

When a shed is formed by the heddle frames 40 and 41 between the upper warps 7 and the lower warps 8, the slay and the comb consisting of the guiding members 30 is in the rearward position shown in FIG. 2 in which the inner openings 11 of the guiding members 30 are between the warp sheets of the open shed. In this position, a jet of air is expelled from nozzle 28 which is aligned with the passage formed by the row of guiding members 30 in the illustrated forward position.

A weft 12, which is inserted into nozzle 28, is entrained in the jet of air passing through the passage of the comb, and is thus transported through the open shed until the leading end of the weft 12 arrives at the side of the warp remote from the nozzle 28.

The gap portions 5 and 6 form a devious path for air, and thus constitute a throttling duct which substantially reduces, or prevents the escape of air through gaps 4.

In the event that a weft deviates from its desired path in the center of the openings 11, and enters the gap portion 5, it cannot pass through the gap since the air presses the respective weft portion against the shoulder of end portion 3 bounding gap portion 6.

It is advantageous to select the relative position of the guiding members 30 and the upper warps 7 so that the warps 7 of the upper side of the warp shed extend between adjacent guiding members 30 along the straight end portion 2*a*, and across the outer gap portion 6 substantially at the intersection of the inner and outer gap portions. Such an arrangement further confines the weft and the air stream, but is very difficult to maintain for asymmetrical weaving patterns. However, the throttling ducts 5, 6 sufficiently confine the air stream in the passage, and the angular shape of the gaps prevents the escape of weft thread as explained above.

After a weft 12 has been inserted into the shed, the slay moves in the direction of the arrow S1 in FIG. 3 forwardly and downwardly, and during such movement, the lower warps 8 engage the inserted weft 12 and hold the same during further movement of the guiding members 30 to the position shown in FIG. 3.

In this position, the weft 12 is located at the inner end of the inner gap portion 5 after sliding along one of the straight end portions of the guiding member. As is clearly apparent from FIG. 3, the direction of movement S1 of the guiding member is substantially the direction in which the end portion 2*a* and the gap portion 5 extend, so that during further movement of the comb in the direction of S1, the gap portion 5 moves relative to weft 12 so that first the position of FIG. 4 is obtained, whereupon the weft assumes a position located in the corner between a gap portion 5 and a gap portion 6.

The heddle frames 40 and 41 perform now a shed closing movement during which the warps 8 move in the direction of the arrow S2 while the comb continues its movement in the direction S1. Warps 8 urge the weft 12 to pass through the gap portion 6 in the position shown in FIG. 5 until the comb and the warp shed assume a position in which weft 3 is free of the guide members and located in the warp shed. In this position, the reed means 26 are effective to beat the inserted weft 12 into the fell of the fabric.

The reciprocating slay moves the comb again to the weft inserting position shown in the FIG. 2, and the next weft inserting operation begins.

From the description of the preferred embodiment of the invention, it will become apparent that escape of air, and of the weft through the gaps in the guiding members is efficiently prevented in the weft inserting position, while nevertheless the weft can be easily and reliably separated from the guiding members by passing through the gap 4 under the control of the warps on the lower side of the warp shed.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of pneumatic looms differing from the type described above.

While the invention has been illustrated and described as embodied in a weft guiding comb having an angular throttling outlet passage through which the inserted weft passes under control of warps, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. For use in a pneumatic loom, in combination, a guiding member for forming an inner opening and having two end portions with ends spaced from each other and forming a permanently open narrow gap adapted to permit passage of a weft thread, said gap having an inner gap portion extending to said inner opening and an outer gap portion extending to the outside of said guiding member, said gap portions extending at an angle to each other, said inner opening being adapted to guide a jet of air and a weft carried by the same, and said gap forming an angular throttling duct for confining the jet of air and a weft carried thereby in said opening but permitting passage of the weft out of said opening after insertion of the weft into a warp shed; slay means for moving said guiding member along a path substantially parallel to said inner gap portion; and shed forming means for moving some warps up and some warps down substantially in the direction of said outer gap portion, the movements of said slay means and shed forming means being interrelated and timed so that said guiding member first moves along said path while a weft resting on the lower warp shed passes through said inner gap portion to a position located at the intersection of said inner and outer gap portions, whereupon the weft is moved by the lower warp shed through and out of said outer gap portion by movement of said shed forming means.

2. For use in a pneumatic loom, in combination, a one-piece guiding member for forming an inner opening and having two rigid end portions extending at an acute angle to each other and provided with ends spaced from each other and forming a permanently open narrow gap adapted to permit passage of a weft thread, said gap having an inner gap portion extending to said inner opening and an outer gap portion extending to the outside of said guiding member, said gap portions extending at an angle to each other, said inner opening being adapted to guide a jet of air and a weft carried by the same, and said gap forming an angular throttling duct for confining the jet of air and a weft carried thereby in said opening but permitting passage of the weft out of said opening after insertion of the weft into a warp shed; and shed forming means for moving the upper side of the warp shed to a position extending across said gap substantially at the intersection of said inner and outer gap portions to block passage of a weft through said outer gap portion during insertion of the weft into said opening.

3. The loom set forth in claim 1, said slay means including a supporting arm supporting said guiding member for turning movement about an axis, said inner gap portion having an edge and shoulder bounding the same

extending in substantially tangential direction with respect to the movement of said guiding member about said axis.

4. In a pneumatic loom, in combination, a comb comprising a row of aligned guiding members, each guiding member forming an inner opening and having two end portions with ends spaced from each other and forming a permanently open narrow gap adapted to permit passage of a weft thread, said gap having an inner gap portion extending to said opening and an outer gap portion extending to the outside of the respective guiding member, said gap portions extending at an angle to each other, said inner openings being aligned to form a passage for guiding a jet of air and a weft carried by the same, and said gaps being aligned to form an angular throttling outlet from said passage so that the escape of air through said outlet is impeded, and the escape of the weft through said outlet during insertion into a warp shed is prevented; means for mounting said comb movable between a weft inserting rearward position and a forward position; slay means for moving said comb along a path substantially parallel to said inner gap portions; and shed forming means for moving some warps up and some warps down substantially in the direction of said outer gap portions, the movements of said slay means and shed forming means being interrelated and timed so that said comb first moves forwardly along said path while a weft resting on the lower warp shed passes through said inner gap portions to a position located at the intersection of said inner and outer gap portions, whereupon the weft is moved by the lower warp shed through and out of said outer gap portions by movement of said shed forming means.

5. In a pneumatic loom, in combination, shed forming means for forming sheds of warps so that the warps move in a first direction, some up and some down, a comb comprising a row of aligned guiding members, each guiding member forming an inner opening and having two end portions with ends spaced from each other and forming a permanently open narrow gap having an inner gap portion extending to said opening and an outer gap portion extending to the outside of the respective guiding member, said gap portions extending at an angle to each other, said inner openings being aligned to form a passage for guiding a jet of air and a weft carried by the same, and said gaps being aligned to form an angular throttling outlet from said passage so that the escape of air through said outlet is impeded, and the escape of the weft through said outlet during insertion into a warp shed is prevented; means for mounting said comb movable between a weft inserting rearward position and a forward position in a second direction along an arcuate path transverse to said first direction, said inner gap portion extending substantially in the direction of said arcuate path, and said outer gap portion extending transversely thereto when said comb is in said forward position; and operating means for moving said comb from said rearward position to said forward position in timed relation with the operation of said shed forming means so that one side of the warp shed engages said weft to effect passage of the weft in the direction of and through said inner gap portions during movement of said comb and to effect movement of the weft in the direction of and through said outer gap portions during movement of the warps under control of said shed forming means.

6. In a pneumatic loom, in combination, shed forming means for forming sheds of warps so that the warps move in a first direction, some up and some down, a comb comprising a row of aligned guiding members, each guiding member forming an inner opening and having two end portions with ends spaced from each other and forming a permanently open narrow gap, adapted to permit passage of a weft thread, one of said ends being formed with a recess bounded by shoulders extending at an obtuse angle to each other and the other end having two edges extending at said obtuse angle to each other and being respectively located opposite said shoulders so as to form

an inner gap portion extending to said opening and an outer gap portion extending to the outside of the respective guiding member, said gap portions extending at said obtuse angle to each other, said inner openings being aligned to form a passage for guiding a jet of air and a weft carried by the same, and said gaps being aligned to form an angular throttling outlet from said passage so that the escape of air through said outlet is impeded, and the escape of the weft through said outlet during insertion into a warp shed is prevented; means for mounting said comb movable between a weft inserting rearward position and a forward position in a second direction along an arcuate path transverse to said first direction, said inner gap portion extending substantially in the direction of said arcuate path, and said outer gap portion extending transversely thereto when said comb is in said forward position; and operating means for moving said comb from said rearward position to said forward position in timed relation with the operation of said shed forming means so that one side of the warp shed engages said weft to effect passage of the weft in the direction of and through said inner gap portions during movement of said comb and to effect movement of the weft in the direction of and through said outer gap portions during movement of the warps under control of said shed forming means, said shed forming means moving the upper side of the warp shed to a position extending across said gap substantially at the intersection of said inner and outer gap portions to block passage of a weft through said outer gap portion during insertion of the weft into said opening.

7. A loom as set forth in claim 6 wherein said shed forming means are heddle frames moving opposite to each other up and down in said first direction, the movement of said heddle frames and of said slay being in timed relationship so that the movement of said slay mainly causes movement of the weft through said inner gap portion by the lower side of the warp shed, and so that the movement of the heddle frame associated with said lower side of the warp shed mainly causes movement of the weft through said outer gap portion.

8. For use in a pneumatic loom, in combination, a support; a one-piece guiding member mounted on said support for movement along an arcuate path, said guiding member forming an inner opening and having two rigid end portions with ends spaced from each other and forming a permanently open narrow gap adapted to permit passage of a weft thread, said narrow gap being composed of an inner gap portion communicating with said opening and an outer gap portion extending to the outside of said guiding member, said inner gap portion extending substantially in the direction of said arcuate path and said outer gap portion extending substantially normal to said arcuate path, said inner opening adapted to guide a jet of air and a weft thread carried by the same and said gap forming an angular throttling duct for confining the jet of air and a weft carried by said jet of air during introduction of said weft into said opening by said jet of air but permitting passage of the weft out of said opening after introduction of the weft into said opening by said jet of air.

9. For use in a pneumatic loom, in combination, a support; a one-piece guiding member mounted on said support for movement along an arcuate path, said guiding member forming an inner opening and having two rigid end portions with ends spaced from each other and forming a permanently open narrow gap adapted to permit passage of a weft thread, said narrow gap being composed of an inner gap portion communicating with said opening and an outer gap portion extending to the outside of said guiding member, said inner gap portion extending substantially in the direction of said arcuate path and said outer gap portion extending transversely to said arcuate path, said inner opening adapted to guide a jet of air and a weft thread carried by the same and said gap forming an angular throttling duct for con-

fining the jet of air and a weft carried by said jet of air during introduction of said weft into said opening by said jet of air but permitting passage of the weft out of said opening after introduction of the weft into said opening by said jet of air.

10. For use in a pneumatic loom, in combination, a support; a one-piece guiding member mounted on said support for movement along a predetermined path, said guiding member forming an inner opening and having two rigid end portions with ends spaced from each other and forming a permanently open narrow gap adapted to permit passage of a weft thread, said narrow gap being composed of an inner gap portion communicating with said opening and an outer gap portion extending to the outside of said guiding member, an inner gap portion extending substantially in the direction of said predetermined path and said outer gap portion extending substantially transversely to the direction of said predetermined path, said inner opening adapted to guide a jet of air and a weft thread carried by the same and

said gap forming an angular throttling duct for confining the jet of air and a weft carried by said jet of air during introduction of said weft into said opening by said jet of air but permitting passage of the weft out of said opening after introduction of the weft into said opening by said jet of air.

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DONALD W. PARKER, *Primary Examiner.*

RUSSELL C. MADER, *Examiner.*