United States Patent

Sakamoto

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[54] **NOZZLE POSITIONER**

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[73] Assignee: **Enshu Limited,** Shizuoka-ken, Japan

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[52] **U.S. Cl.** ..... **139/127 P**

[51] **Int. Cl.** **D03d 47/28**

[58] **Field of Search** ....139/127 P; 248/288, 291, 299

[56] **References Cited**

UNITED STATES PATENTS

3,381,721 5/1968 Nydam ..... 139/127 P

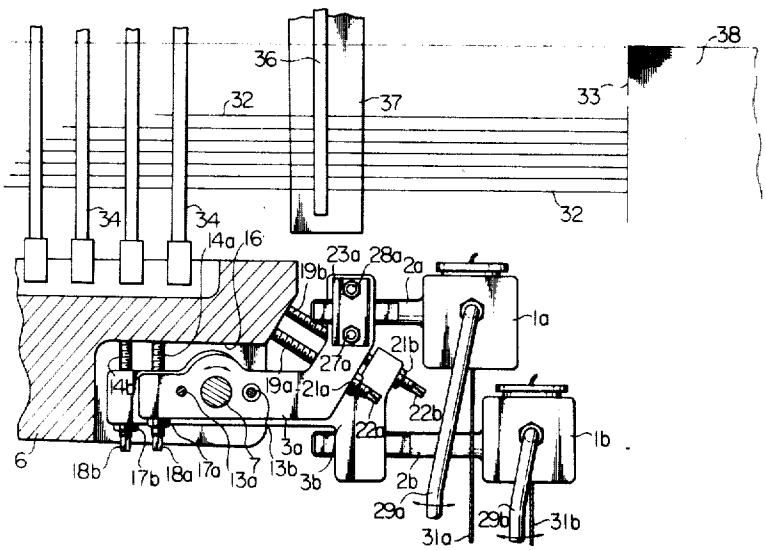
Primary Examiner—Henry S. Jaudon

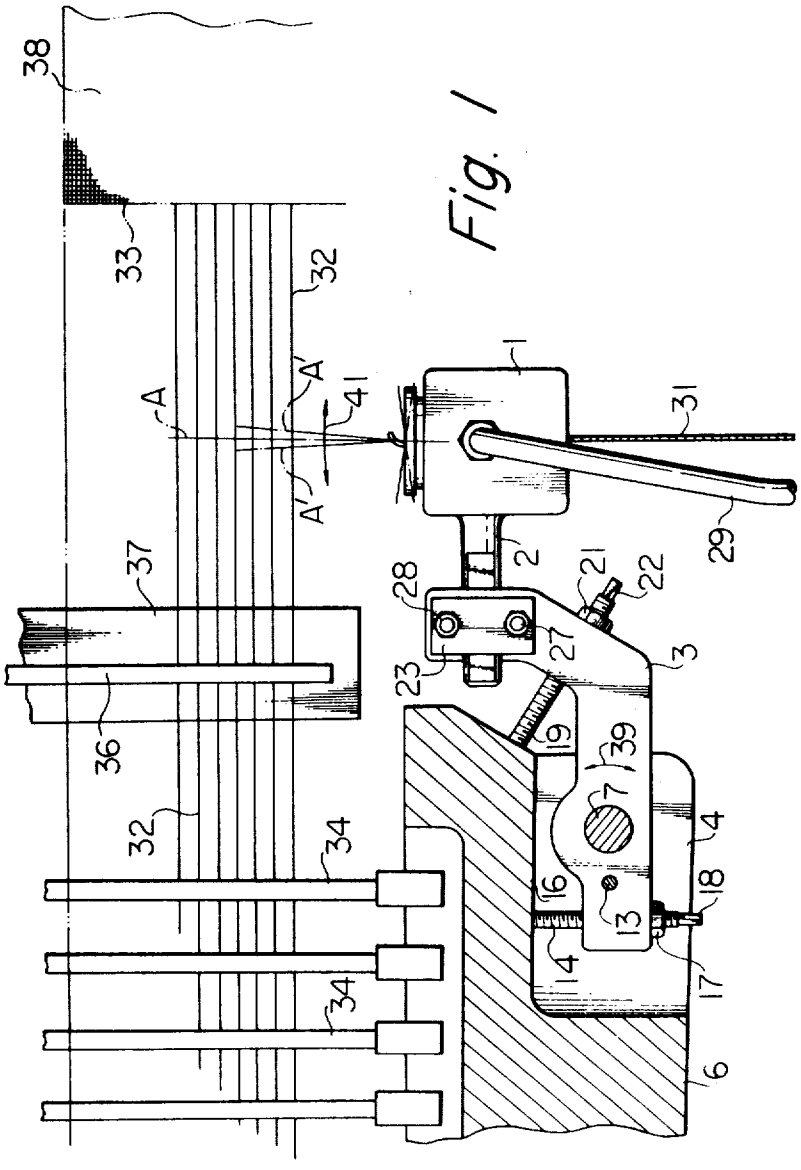
Attorney—Milton J. Wayne et al.

[57] **ABSTRACT**

A nozzle positioner for a shuttleless loom having one or more nozzles for emission of weft-propelling fluid such as water jet picking purpose wherein three sets of thread engagements are provided so as to carry out multi-directional precise adjustment of fluid emission by the nozzles in a manner quite independent from direction to direction.

2 Claims, 6 Drawing Figures

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A'
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Fig. 1

Fig. 2

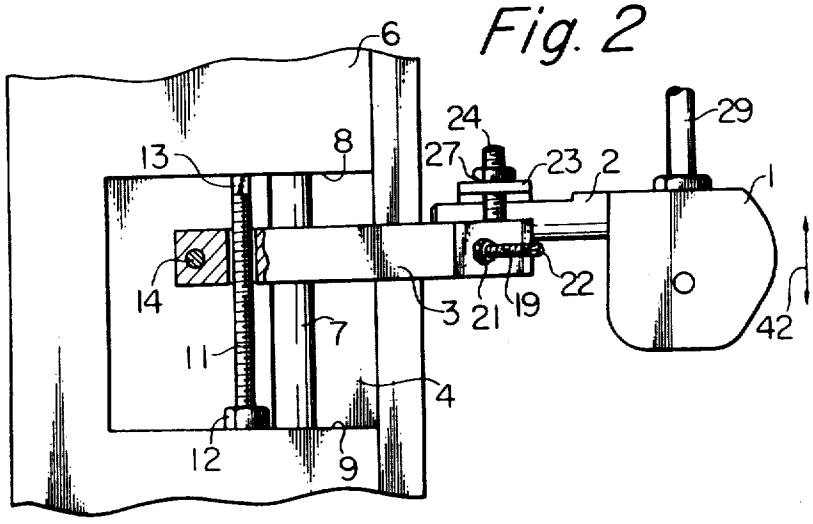
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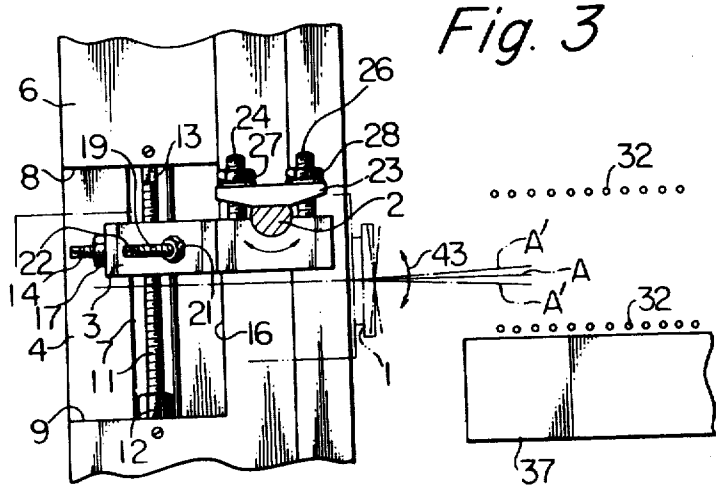
Fig. 3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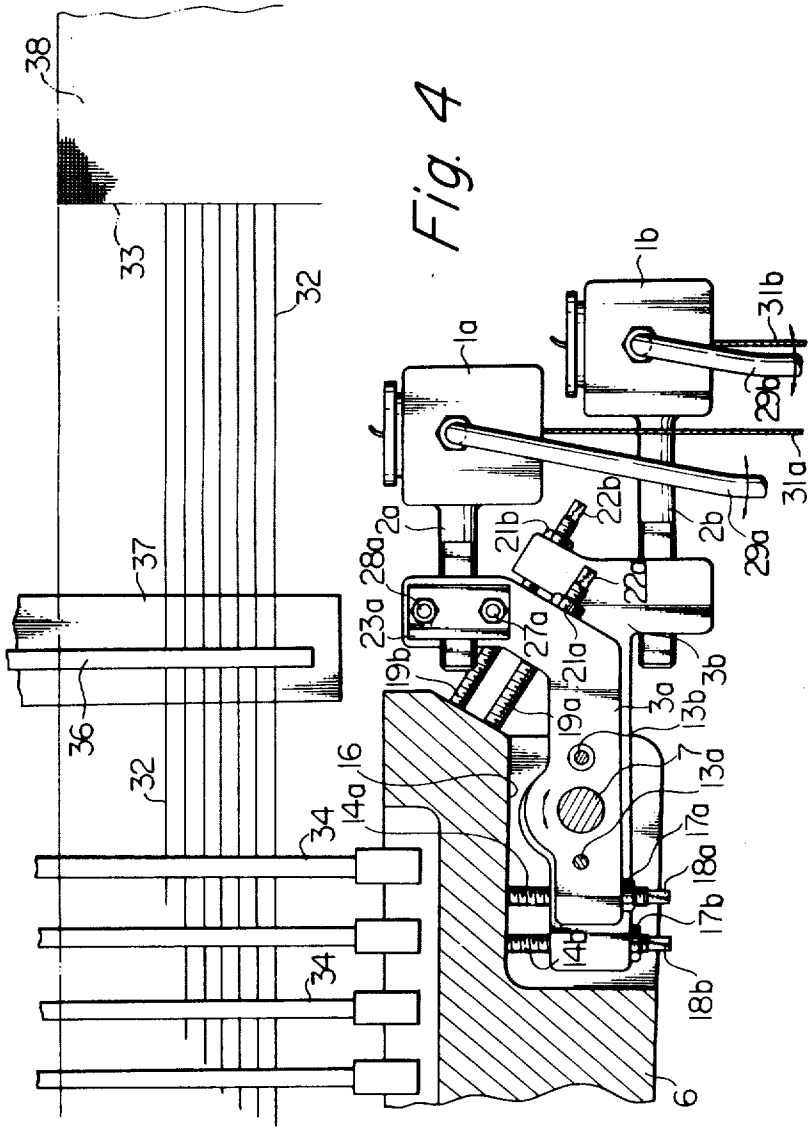
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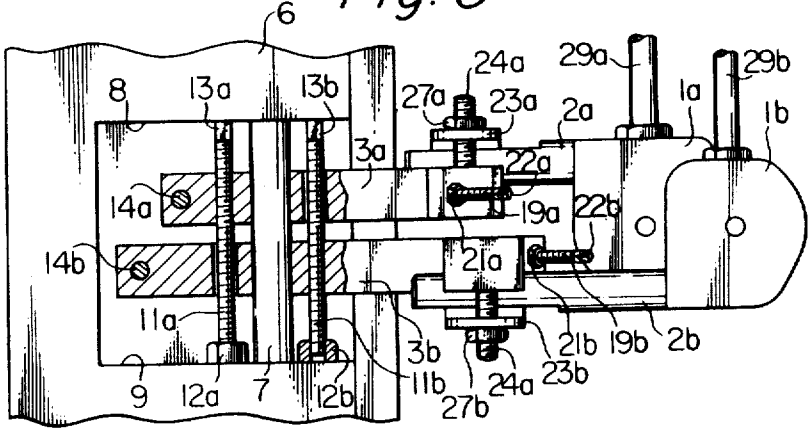
29a
2a
21b
28a
22a
23a
27a
21a
19b
3a
3b
13b
19a
7
13a
17a
18a
17b
18b
6

Fig. 4

Fig. 5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14b
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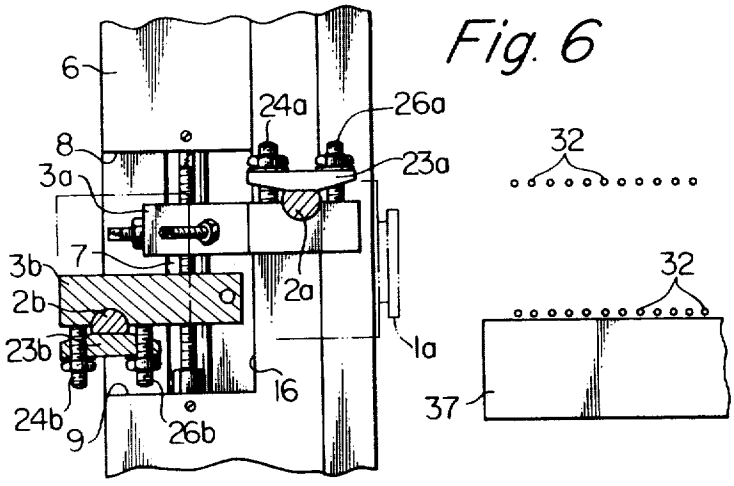
Fig. 6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3b
2a
2b
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23b
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24b
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26b
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NOZZLE POSITIONER

The present invention relates to a nozzle positioner, more particularly relates to a nozzle positioner utilizing adjustable thread engagement used for a shuttleless loom.

Among various types of shuttleless looms, there is commonly known a shuttleless loom of a type wherein a weft is inserted into warp sheds being entrained on a jet fluid, e.g. a water jet, emitted from a nozzle. In this mechanism, flying course of the picked weft is greatly affected by the fluid emitting direction of the nozzle. Because the picked weft must travel over the entire width of the weaving area, a slight change in the emitting direction of the nozzle results in an enlarged change in the arrival position of the picked weft on the reception side of the picked weft. So, setting of the fluid emitting direction of the nozzle must be carried out very precisely in a close relationship to an expected target point. Otherwise, the picked weft cannot correctly reach the expected target point and, in an extreme case, the picked weft tends to entangle with warps defining the shed. With recent general trend towards an increased weaving width, a precise setting of the fluid emitting direction of the nozzle is becoming a problem of growing importance.

As a solution to this problem, a nozzle positioner utilizing universal adjustable thread engagement has been developed. One typical example of such nozzle positioner is found in the disclosure of U.S. Pat. No. 3,381,721 to J. H. Nydam patented on May, 7, 1968. In the nozzle positioner of this patent, a circular tip end of a supporting arm radially extending from a nozzle is clamped in between two sets of fastening screws, one set extending horizontally from a seat selected on a framework and another set extending horizontally from a clamping plate displacably mounted on the framework. By adjusting fastener screws on the side of the clamping plate, the fluid emitting direction of the nozzle can be changed both horizontally and vertically in a swinging fashion.

However, in relation to this adjusting mechanism, it was empirically learned that adjustment in one direction, e.g. horizontal direction, has a danger of inducing unexpected change in another direction, e.g. vertical direction. In other words, one directional change cannot be absolutely independent from another directional change of the nozzle. Further, in an actual use of the nozzle, there possibly is a case wherein only the vertical level of the nozzle is desired to be adjusted without causing any swinging horizontal and vertical directional change of the nozzle. The mechanism of this patent cannot fairly meet this requirement.

The principal object of the present invention is to provide a nozzle positioner of a type wherein multi-directional precise adjustment of fluid emission by the nozzle is carried out in a manner quite independent from direction to direction.

In order to attain the above-described object, the nozzle positioner of the present invention is provided with three sets of thread engagement. Adjustment of the first thread engagement set causes horizontal swinging of the nozzle, adjustment of the second thread engagement causes vertical displacement of the nozzle and adjustment of the third thread engagement causes vertical swinging of the nozzle. The above-described three adjustments can be carried out quite independently of each other. This basic arrangement can be applied, with a slight modification, to a loom wherein two or more nozzles are used.

In the following description, a term "standard emitting direction" refers to a direction subsequently parallel to the cloth fell line.

Further features and advantages of the present invention will be made more apparent from the ensuing description, reference being made to the accompanying drawings, wherein;

FIG. 1 is a partly sectional plan view of a basic embodiment of the nozzle positioner of the present invention,

FIG. 2 is a partly sectional view of the nozzle positioner shown in FIG. 1 seen from a rear side of the nozzle,

FIG. 3 is a sectional view, with partial omission, of the nozzle positioner shown in FIG. 1 seen from a side front of the loom,

FIG. 4 is a part sectional view of another embodiment of the nozzle positioner of the present invention,

FIG. 5 is a part sectional view of the nozzle positioner shown in FIG. 4 seen from a rear side of the nozzles,

FIG. 6 is a partly omitted sectional view of the nozzle positioner shown in FIG. 4 seen from a front side of the loom.

Referring to FIGS. 1, 2 and 3, a basic embodiment of the nozzle positioner of the present invention is there shown. In the shown arrangement, a nozzle 1 for emitting a weft propelling fluid is provided with a supporting arm 2 which is rigidly attached to an outer surface thereof. Although the supporting arm 2 extends horizontally in a direction perpendicular to the fluid emitting direction of the nozzle 1, the employable arrangement of the supporting arm 2 is not limited to the illustrated example only. A free end portion of the supporting arm 2 is held by a supporting bracket 3 of an L-shaped form in a manner hereinafter described in more detail. Another end portion of the supporting bracket 3 extends into a cavity 4 formed in a stationary framework 6 of the loom.

In the cavity 4, an upright pole 7 is located with its both ends fixed to the ceiling 8 and the floor 9 of the cavity 4 and the supporting bracket 3 is pivoted to the upright pole 7. In parallel with this upright pole 7, a screwed rod 11 is vertically threaded through the supporting bracket 3 with its both ends in pressure contact with the ceiling 8 and the floor 9 of the cavity 4. At one end thereof, the screwed rod 11 is provided with a nut 12 threaded thereon and, at another end thereof, with a shaped portion 13 suited for adjustment by a wrench or the like. Also in the cavity 4, another screwed rod 14 is horizontally threaded through the supporting bracket 3 with its one end in contact with a side wall 16 of the cavity 4. On a side opposite to the side wall 16, the screwed rod 14 is provided with a nut 17 threaded thereon in pressure contact with the supporting bracket 3 and, at a free end thereof, with a shaped portion 18 suited for adjustment by a wrench or the like. In the vicinity of the other end of the supporting bracket 3, a further screwed rod 19 is threaded horizontally through the supporting bracket 3 at a portion outside the cavity with its one end in a contact with an outer side wall of the stationary framework 6. On a side opposite to the

side wall of the framework **6**, the screwed rod **19** is accompanied by a nut **21** threaded thereon in pressure contact with the supporting bracket **3** and, at a free end thereof, with a shaped portion **22** suited for adjustment by a wrench or the like.

As briefly described already, the free end of the supporting arm **2** is held by the outer end of the supporting bracket **3** and this holding arrangement will be clearly seen in FIG. **3**, wherein the free end of the supporting arm **2** is firmly clamped in between a holder cover **23** and the free end of the supporting bracket **3**. So as to assure a stable holding of the supporting arm **2**, i.e. the nozzle **1** secured to the other end of the supporting arm **2**, the elements constituting this holding arrangement must be specially designed as hereinafter described. The free end of the supporting arm **2** must be provided with a flat upper surface and a round lower surface. The free end of the supporting bracket **3** is provided with a transversal groove of a semicircular cross sectional profile which is receptive of the round lower surface of the free end of the supporting arm **2**. A lower surface of the holder cover **23** is at least locationally formed flat so as to fit the flat upper surface of the free end of the supporting arm **2**. Specially sandwiching the above-described transversal groove, a pair of upright bolts **24** and **26** are planted to an upper surface of the supporting bracket **3** and the holder cover **23** is provided with vertical holes allowing free passage of the bolts **24**, **26** therethrough. So as to press the holder cover **23** to the supporting arm **2**, a pair of nuts **27** and **28** are threaded on the bolts **24** and **26**, respectively. Lower surfaces of the nuts **27**, **28** are semi-spherically formed for a reason later described in detail.

The nozzle **1** is connected to a given supply source (not shown) of the pressured weft propelling fluid by a conduit **29** and the weft **31** is introduced to the nozzle **1** from a given supply source (not shown). The nozzle positioner of the present invention is located sideways of a shed formed by warps **32** at a position upstream of a cloth fell **33**. The warp shed is formed by the up-and-down movement of the healds **34** and the inserted weft **31** is beaten to the cloth fell **33** by a reed **36** on a swinging lathe **37** so as to weave a fabric **38**.

With the above described mechanical construction of the nozzle positioner, adjustment of the fluid emitting is carried out in the following fashion.

In the first place, the actual fluid emitting direction A' is supposed to be inclined horizontally with respect to a standard fluid emitting direction A of a given level as shown in FIG. **1**. In this case, manual adjustment is applied to the screwed rods **14** and **19** so as to turn the supporting bracket **3** around the upright pole **7** as shown by an arrow **39**. Following this turning of the supporting bracket **3**, the location of the nozzle **1** moves and the fluid emitting direction moves in a direction shown by an arrow **41**. Because this adjustment of the fluid emitting direction is carried out in the horizontal direction only, no disturbance will be applied to the positioning of the nozzle **1** regarding some other direction, e.g. vertical inclination.

In the second place, the standard fluid emitting direction itself is supposed to be changed vertically while keeping its parallelism with respect to the cloth fell line, as shown in FIG. **2**. In other words, the level of the standard fluid emitting direction is to be changed. In this case, the manual adjustment is applied to the screwed rod **11** and the supporting bracket **3** together with the nozzle **1** is displaced vertically as shown by an arrow **42**. In this manner, the actual fluid emitting direction A' can be changed vertically without affecting its inclination with respect to the standard fluid emitting direction A.

In the third place, the actual fluid emitting direction A' is supposed to be inclined vertically with respect to the standard fluid emitting direction A of a given level as shown in FIG. **3**. In this case, the manual adjustment is applied to the upright bolts **24** and **26** so as to axially turn the supporting arm **2** in the transversal groove formed in the free end of the supporting bracket **3**. With this turning of the supporting arm **2**, the holder cover **23** is inclined from its horizontal disposition. However, because the lower surfaces of the nuts **27**, **28** are semi-spherically **182** formed, the holder cover **23** can be duly pressed against the supporting arm **2** by fastening the nuts **27** and **28** against the upper face of the holder cover **23**. Following the turning of the supporting arm **2**, the nozzle **1** is turned as shown by an arrow **43** in the illustration. Apparently, this change of the fluid emitting direction can be carried out with no affect upon positioning of the nozzle **1** regarding some other direction, e.g. horizontal inclination.

As is apparent from the foregoing description, adjustment of the fluid emitting direction can be carried out precisely as desired with complete independency of one directional adjustment from some other directional adjustment. Further, level of the standard fluid emitting direction can be adjusted as desired without changing the degree of inclination of the actual fluid emitting direction with respect to the standard fluid emitting direction.

The above-described meritorious features of the present invention should be further appreciated when two or more nozzles are used in combination.

In FIGS. **4** to **6**, there is shown an embodiment in this sense, wherein the concept of the present invention is applied to a combination of two nozzles. In the illustration, like reference numerals are used for like elements already illustrated in FIGS. **1** to **3** and suffixs *a* and *b* are used for similar parts of the two sets of nozzles.

However, because the two sets of nozzles **1***a* and **1***b* must be subjected to the positional adjustment without any interference with each other, some modification is added to the basic construction already explained in relation to the foregoing embodiment as follows.

In the first place, leveling of the two supporting brackets **3***a* and **3***b* must be carried out independently from each other. For this purpose, in FIG. **5**, the screwed rod **11a** is in a thread engagement with the supporting bracket **3***a* but in a freely turnable engagement with the other supporting bracket **3***b* whereas the screwed rod **11***b* is in a thread engagement with the supporting bracket **3***b* but in a freely turnable engagement with the other supporting bracket **3***a*. When the manual turning is applied to the screwed rod **11***a*, it causes a vertical displacement of the supporting bracket **3***a* without any affect upon the supporting bracket **3***b*. Conversely, when the manual turning is applied to the screwed rod **11***b*, it causes a vertical displacement of the supporting bracket **3***b* without any affection upon the supporting bracket **3***a*. Although, the

holder cover **23***a* and its related parts are mounted on an upper face of the supporting bracket **3***a* and the holder cover **23***b* and its related parts are mounted on a lower face of the supporting bracket **3***b* in the illustrated embodiment, their disposition can be changed as desired in accordance with the actual mode of the spacing surrounding the nozzle positioner.

What is claimed is:

1. A nozzle positioner for a shuttleless loom having at least one nozzle for emitting weft-propelling fluid for picking purposes comprising, in combination as regards each nozzle, a supporting bracket pivoted to a framework of said loom; a pair of adjustable screwed rods disposed horizontally in a thread engagement with said supporting bracket with their one ends abuting against said framework; another adjustable screwed rod disposed vertically in a thread engagement with said supporting bracket with its both ends abuting against said framework a supporting arm radially extending from said nozzle; a mechanism for clamping one end of said supporting arm in cooperation with said supporting bracket; and a pair of adjustable thread engagement members for affecting clamping by said clamping mechanism.

2. A nozzle positioner of claim **1**, wherein two or more nozzles are provided and said second named screwed rod pertaining to one nozzle passes through said supporting bracket of another nozzle or the other nozzles in a freely turnable condition.

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