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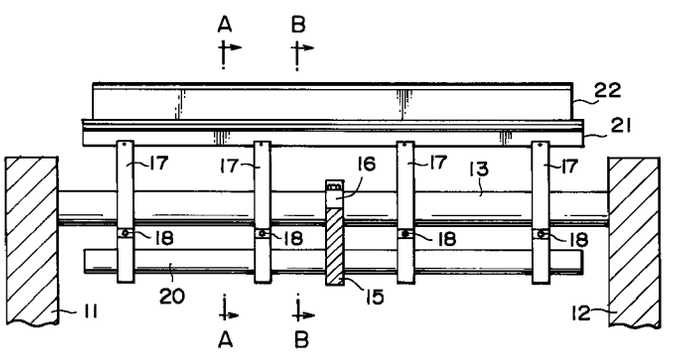
(54) Beating-up apparatus in loom

(57) A plurality of sley swords (17) are disposed in the lengthwise direction of a rocking shaft (13), which is supported between side frames (11, 12) and coupled with the rocking shaft (13). The rocking shaft (13) is supported by being inserted through the respective sley swords (17). A counterweight (20) is approximately as long as the rocking shaft (13) and disposed on the side opposite to a sley (21). The sley (21), the rocking shaft (13) and the counterweight (20) are disposed in parallel with each other so that the center of weight of them is located approximately on the axis of rotation of the rocking shaft (13) as a whole. With this arrangement, there is provided an easily machiable and compact beating-up apparatus.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a beating-up apparatus in looms, and more specifically, to an improved beating-up apparatus, which can excellently keep the rotational balance of a rocking shaft thereof.

2. Description of the Related Art

As is well known in the art, a sley for supporting a reed is adapted to reciprocatingly swing in the forward and backward direction of a loom in response to the reciprocative rotation of a rocking shaft, whereby beating-up is carried out by the reed which swings integrally with the sley.

Although a structure composed of a shaft and the aforementioned sley and reed reciprocatingly rotates about the longitudinal axis of rotation of the rocking shaft, the center of weight of the structure is displaced from the longitudinal axis of rotation when viewed from the longitudinal direction of the structure. The displacement of the center of weight results in the unbalanced rotation of the structure to thereby cause a difficulty such as the vibration of the structure and the twist, bending and the like of the rocking shaft. Thus, there is employed a countermeasure for preventing the unbalanced rotation.

In the apparatus disclosed in Japanese Unexamined Patent Publication No. 4-214445, an oval-cylindrical shaft is engaged with a bearing pin (corresponding to the rocking shaft in the instant application) so that the center of weight of the shaft viewed from the longitudinal direction thereof is displaced from the center of rotation of the bearing pin to the side opposite to a sley.

Since the rocking shaft is a long member whose length is near to the width of the loom, the rocking shaft also must be supported for rotation at the intermediate portion in the longitudinal direction thereof. However, in the arrangement in which the oval-cylindrical shaft is engaged with the rocking shaft, the oval-cylindrical shaft must be machined to a circular shape to prevent the eccentric motion thereof at the intermediate portion where it is supported. Such machining is very troublesome. Moreover, an additional space is needed for the non-eccentric circular arrangement at the intermediate support position.

SUMMARY OF THE INVENTION

Therefore, an object of the present invention is to provide an easily machinable and compact beating-up apparatus to overcome the above problem.

To achieve the above object, a beating-up apparatus according the present invention in a loom including a sley, which is supported for swinging movement by a reciprocatingly rotatable rocking shaft through support means, is arranged such that an elongated counterweight is swingably disposed integrally with the rocking shaft on the side opposite to the sley in unison with the rocking shaft.

According to the present invention, the elongated counterweight disposed on the side opposite to the sley corrects the rotational unbalance of the rocking shaft. Since the counterweight does not surround the entire periphery of the rocking shaft, the rocking shaft can be supported for rotation directly at the intermediate portion thereof in the longitudinal direction.

It is preferable that the size of the counterweight is approximately the same as that of the rocking shaft. At that time, the weight of the counterweight can be distributed uniform in the lengthwise direction with respect to the rocking shaft and an effect for preventing the twist of the rocking shaft is maximized.

It is preferable that the support means is a plurality of sley swords disposed in the lengthwise direction of the rocking shaft with intervals defined therebetween and the counterweight is coupled with the sley swords.

According to the above structure, the long counterweight coupled with the sley corrects the rotational unbalance of the rocking shaft. The counterweight coupled with the sley can be spaced apart from the rocking shaft, thus the rocking shaft can be rotatably supported directly at the intermediate portion in the longitudinal direction thereof.

It is preferable that each of the sley swords has through holes and a space defined therein, the rocking shaft and the counterweight being inserted through the through holes and the space causing the through holes to communicate with each other and providing the sley swords with flexibility and the rocking shaft and the counterweight are clamped under pressure by tightening means which extends passing through the sley swords across the space.

According to the above structure, the long counterweight is clamped under pressure by the space of the plurality of sley swords. Therefore, no special member is necessary to mount the counterweight, thus the weight of the structure to be swung together with the rocking shaft is reduced.

When the counterweight is composed of a single bar member, it can be simply mounted to the rocking shaft or the sley swords and the number of parts necessary to the mounting is reduced, thus this composition is preferable.

It is preferable that the rocking shaft, the counterweight and the slay are disposed in parallel with each other and the center of weight of a motion system including the slay and the counterweight which are swung integrally with the rocking shaft when the rocking shaft reciprocatingly rotates is located on the axial center of rotation of the rocking shaft.

Preferably, the rocking shaft is supported by a bracket extending from a breast beam.

The counterweight may be directly coupled with the

rocking shaft.

The counterweight may be an arc-shaped member mounted to the lower end portion of each of the sley swords so as to partially surround the lower end portion from the outside.

It is preferable that a through hole through which the rocking shaft is inserted is defined in each of the sley swords as well as a space communicating with the through hole is defined in the lower end portion of each of the sley swords and the sley swords are clamped and fixed to the rocking shaft as well as the counterweight is clamped and fixed to the respective sley swords by tightening means which extends passing through both the ends of the counterweight and the lower end portions of the respective sley swords across the space.

The counterweight may be mounted to the sley swords by fixing means which extends from the lower portion of the counterweight to the upper portion thereof and is threaded with the lower end portions of the sley swords.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view illustrating a first embodiment of a beating-up apparatus according to the invention;

FIG. 2 is an enlarged cross sectional view taken along the line A - A of FIG. 1;

FIG. 3 is an enlarged cross sectional view taken along the line B - B of FIG. 1;

FIG. 4 is a front elevational view illustrating a second embodiment of the invention;

FIG. 5 is a side cross sectional view of main portions forming a third embodiment of the invention; and

FIG. 6 is a side cross sectional view of main portions forming a fourth embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A first embodiment embodying the present invention will be described based on FIGS. 1 to 3.

As shown in FIG. 1, a rocking shaft 13 is supported for rotation between the right and left frames 11, 12 of a loom. The rocking shaft 13 is reciprocatingly rotated by a not shown crank mechanism. As shown in FIGS. 2 and 3, a breast beam 14 is disposed forwardly of the rocking shaft 13 and interposed between the side frames 11, 12. A fell plate support mechanism for supporting the cloth fell of woven fabric from the lower side thereof, a temple device for preventing shrinkage of cloth and the like are supported by the breast beam 14. As shown in FIG. 3, a middle bracket 15 is fixedly mounted on the rear surface of the breast beam 14. A presser 16 is tensioned and fixed on the top of the middle bracket 15. The intermediate portion in the lengthwise direction of the rocking shaft 13 is rotatably supported between the middle bracket 15 and the presser 16.

A plurality of sley swords 17 are disposed in the lengthwise direction of the rocking shaft 13 and coupled therewith. A pair of inserting holes 171, 172 are defined in each of the sley swords 17 and both the inserting holes 171, 172 communicate with each other through a slit 173. The rocking shaft 13 is inserted through the inserting hole 171 and a single elongated counterweight 20 is inserted through the inserting hole 172 serving as tightening means. Each sley sword 17 is clamped and fixed to the rocking shaft 13 by being tightened by a bolt 18 passing through the slit 173 and threadedly engaging with a nut 19. Further, the counterweight 20 is clamped to and coupled with each sley sword 17 by being tightened by the bolt 18 and the nut 19 constituting tightening means.

A sley 21 is fixedly mounted on the top of each sley sword 17 and a reed 22 extends upwardly from the sley 21.

As shown in FIG. 1, the counterweight 20 is substantially as long as the rocking shaft 13. The counterweight 20 is disposed on the side opposite to the sley 21 by a plurality of the sley swords 17 dispersed between the opposed ends of the rocking shaft 13. The sley 21, the rocking shaft 13 and the counterweight 20 are disposed in parallel with each other so that the center of weight of them is located approximately on the axis of rotation of the rocking shaft 13 when viewed from the lengthwise direction thereof.

The following advantages can be obtained by the above first embodiment:

(1) Since the center of weight of the sley 21, the rocking shaft 13 and the counterweight 20 is located approximately on the axis of rotation of the rocking shaft 13 when viewed from the lengthwise direction thereof, the excellent rotational balance of the member composed of the reeds 22, the sley 21, the rocking shaft 13 and the counterweight 20 can be obtained as a whole;

(2) The single counterweight 20 providing the excellently balanced rotation is coupled with the rocking shaft 13 through the plurality of sley swords 17. Therefore, the rocking shaft 13, the counterweight 20 and the sley swords 17 form a rigid ladder configuration to thereby prevent the twist and bending of the rocking shaft 13;

(3) Since the circular cross-sectioned rocking shaft 13 is directly supported by the middle bracket 15 and the presser 16, the intermediate portion of the rocking shaft 13 at which it is supported may be formed into a simple structure. Thus, a space required for the support position of the rocking shaft is reduced so that the breast beam 14 can be located nearer to the sley 21. The rigidity of the fell plate support mechanism is increased by the positioning of the breast beam 14 nearer to the sley 21;

(4) Since the counterweight 20 is supported by the sley swords 17 which support the sley 21, no addi-

tional mechanism is needed to mount the counterweight 20, thus the weight of the structure to be swung together with the rocking shaft 13 is reduced as a whole, which advantageously increases the speed of the loom;

(5) The weight of the counterweight 20 can be distributed uniform in a longitudinal direction with respect to the rocking shaft 13 by the employment of the counterweight 20 which is approximately as long as the rocking shaft 13, whereby an effect for preventing the twist of the rocking shaft 13 is maximized;

(6) The single elongated counterweight 20 can be easily formed by drawing, which is advantageous in manufacturing cost; and

(7) The employment of the single elongated counterweight 20 contributes to make the structure compact, which is composed of the rocking shaft 13, the counterweight 20 and the sley swords 17.

Next, a second embodiment shown in FIG. 4 will be described. The same numerals as in the explanation for first embodiment are used to designate the same components in the second embodiment.

Sley swords 23 in the second embodiment are used only to support a sley 21 and a long counterweight 25 approximately as long as a rocking shaft 13 is directly tightened to and coupled with the rocking shaft 13 by screws 24. A cutout 251 is formed in the intermediate portion of the counterweight 25 and a middle bracket 15 is inserted through the cutout 251. The center of weight of the rocking shaft 13 and the counterweight 25 is located approximately on the axis of rotation of the rocking shaft 13 when viewed from the longitudinal direction thereof.

The following advantages can be obtained by the second embodiment:

(1) The counterweight 25 resulting in the excellently balanced rotation of the structure is directly coupled with the rocking shaft. Thus, the counterweight 25 prevents the twist and bending of the rocking shaft 13 and further makes the structure composed of the sley 21, the rocking shaft 13 and the counterweight 25 compact; and

(2) Since the circular cross-sectioned rocking shaft 13 is directly supported by the middle bracket 15 and a presser 16, the intermediate portion of the rocking shaft 13 at which it is supported may be formed into a simple structure.

Next, a third embodiment shown in FIG. 5 will be described. The same numerals as in the explanation for the first embodiment are used to designate the same components in the third embodiment.

In the third embodiment, there is defined a slit 262 in the semi-arc portion of each sley swords 26, through which a rocking shaft 13 is inserted, at the lower end thereof. The slit 262 communicates with an inserting hole 261 through which the rocking shaft 13 is inserted. The semi-arc portion is engaged with a semi-arc-shaped counterweight 27 and a screw 28 is inserted through the counterweight 27 so as to be approximately perpendicular to the slit 262. The counterweight 27 is bent or deformed so as to follow the inner side of the semi-arc portion of the counterweight 27 by being tightened by the screw 28 and a nut 29 to thereby narrow the gap of the slit 262 of the semi-arc portion of the sley sword 26. Therefore, the sley sword 26 is also clamped and fixed to the rocking shaft 13 by being tightened by the screw 28 and the nut 29. The center of weight of the sley, the rocking shaft 13 and the counterweight 27 is located approximately on the axis of rotation of the rocking shaft 13 when viewed from the longitudinal direction thereof. The counterweight 27 is spaced apart from the rocking shaft 13 and the intermediate portion of the rocking shaft 13 in the longitudinal direction thereof is directly supported by a middle bracket and a presser which are not shown here.

The following advantages can be obtained by the third embodiment:

(1) The counterweight 27 resulting in excellent rotational balance is coupled with the rocking shaft 13 through the plurality of sley swords 26. Therefore, the rocking shaft 13, the counterweight 27 and the sley swords 26 form a rigid ladder configuration to thereby prevent the twist and bending of the rocking shaft 13;

(2) Since the circular cross-sectioned rocking shaft 13 is directly supported by a middle bracket 15 and a presser 16, the intermediate portion of the rocking shaft 13 at which it is supported may be formed into a simple structure; and

(3) Since the counterweight 27 is supported by the sley swords 26, no special mechanism is needed to mount the counterweight 27, by which the weight of the member to be swung together with the rocking shaft 13 is reduced as a whole.

Next, a fourth embodiment shown in FIG. 6 will be described. The same numerals as in the explanation for the first embodiment are used to designate the same components in the fourth embodiment.

In the fourth embodiment, a semi-arc-shaped counterweight 31 is clamped and fixed to each of sley swords 30, which are supported by a rocking shaft 13, by screws 32. The center of weight of the sley, the rocking shaft 13 and the counterweight 31 is located approximately on the axis of rotation of the rocking shaft 13 when viewed from the longitudinal direction thereof. The counterweight 31 is spaced apart from the rocking shaft 13 and the intermediate portion of the rocking shaft 13 in the lengthwise direction thereof is directly supported by a middle bracket and a presser which are not shown.

The following advantages can be obtained by the fourth embodiment:

(1) The counterweight 31 resulting in excellent rotational balance is coupled with the rocking shaft 13 through the plurality of sley swords 30. Therefore, the rocking shaft 13, the counterweight 31 and the sley swords 30 form a rigid ladder configuration to thereby prevent the twist and bending of the rocking shaft 13; and

(2) Since the circular rocking shaft 13 is directly supported by a middle bracket and a presser which are not shown, the intermediate portion of the rocking shaft 13 at which it is supported may be formed into a simple structure.

As the single counterweight contributes to make the structure composed of the rocking shaft, the counterweight and the sley swords compact, the counterweight is preferably used in the above respective embodiments. However, a plurality of elongated counterweights may be disposed in parallel with each other.

As described above in detail, since the elongated counterweight is disposed on the side opposite to the sley with respect to the rocking shaft and the counterweight is coupled with the rocking shaft, it is understood that an easily machinable and compact beating-up apparatus has been provided.

A plurality of sley swords (17) are disposed in the lengthwise direction of a rocking shaft (13), which is supported between side frames (11, 12) and coupled with the rocking shaft (13). The rocking shaft (13) is supported by being inserted through the respective sley swords (17). A counterweight (20) is approximately as long as the rocking shaft (13) and disposed on the side opposite to a sley (21). The sley (21), the rocking shaft (13) and the counterweight (20) are disposed in parallel with each other so that the center of weight of them is located approximately on the axis of rotation of the rocking shaft (13) as a whole. With this arrangement, there is provided an easily machiable and compact beating-up apparatus.

Claims

1. A beating-up apparatus in a loom including a sley (21) swingably supported through support means (17, 23, 26, 30) by a reciprocatingly rotatable rocking shaft (13), wherein an elongated counterweight (20, 25, 27, 31) is swingably disposed integrally with the rocking shaft (13) on the side opposite to the sley (21) in unison with the rocking shaft (13).

2. A beating-up apparatus according to claim 1, wherein the size of said counterweight (20, 25, 27, 31) in the longitudinal direction thereof is approximately the same as that of the rocking shaft (13).

3. A beating-up apparatus according to claim 1 or 2, wherein the support means is a plurality of sley swords (17, 26, 30) disposed in the lengthwise direction of the rocking shaft (13) with intervals defined therebetween and said counterweight (20, 27, 31) is coupled with said sley swords (17, 26, 30).

4. A beating-up apparatus according to claim 3, wherein each of said sley swords (17) has through holes (171, 172) and a space (173) defined therein, the rocking shaft (13) and said counterweight (20) being inserted through said through holes (171, 172), said space (173) allowing said through holes (171, 172) to communicate with each other to provide said sley swords (17) with flexibility, and wherein the rocking shaft (13) and the counterweight (20) are clamped under pressure by tightening means (18, 19) which extends passing through the sley swords (17) across said space (173).

5. A beating-up apparatus according to any one of claims 1 to 4, wherein said counterweight (20, 25, 27, 31) is composed of a single bar member.

6. A beating-up apparatus according to any one of claims 1 to 5, wherein the rocking shaft (13), said counterweight (20, 25, 27, 31) and the slay (21) are disposed in parallel with each other and the center of weight of a motion system including the slay (21) and the counterweight (20, 25, 27, 31) which are swung integrally with the rocking shaft (13) when the rocking shaft (13) reciprocatingly rotates is located on the axis of rotation of the rocking shaft (13).

7. A beating-up apparatus according to any one of claims 1 to 6, wherein the rocking shaft (13) is supported by a bracket (15) extending from a breast beam (14).

8. A beating-up apparatus according to claim 1 or 2, wherein said counterweight (25) is directly coupled with the rocking shaft (13).

9. A beating-up apparatus according to claim 3, wherein said counterweight (27, 31) is an arc-shaped member mounted on the lower end portion of each of said sley swords (26, 30) so as to partially surround the lower end portion from the outside.

10. A beating-up apparatus according to claim 9, wherein a through hole (261), through which the rocking shaft (13) is inserted, is defined in each of said sley swords (26) as well as a space (262) communicating with said through hole (261) is defined in the lower end portion of each of said sley swords (26), and wherein said sley swords (26) are clamped and fixed to the rocking shaft (13) as well as said counterweight (27) is clamped and fixed to said respective sley swords (26) by tightening means (28, 29) which extends passing through

both the opposed ends of said counterweight (27) and the lower end portions of said respective sley swords (26) across said space (262).

11. A beating-up apparatus according to claim 9, wherein said counterweight (31) is mounted on said sley swords (30) by fixing means (32) which extends from the lower portion of said counterweight (31) to the upper portion thereof and is threadedly engaged with the lower end portions of said sley swords (30).

FIG. 1

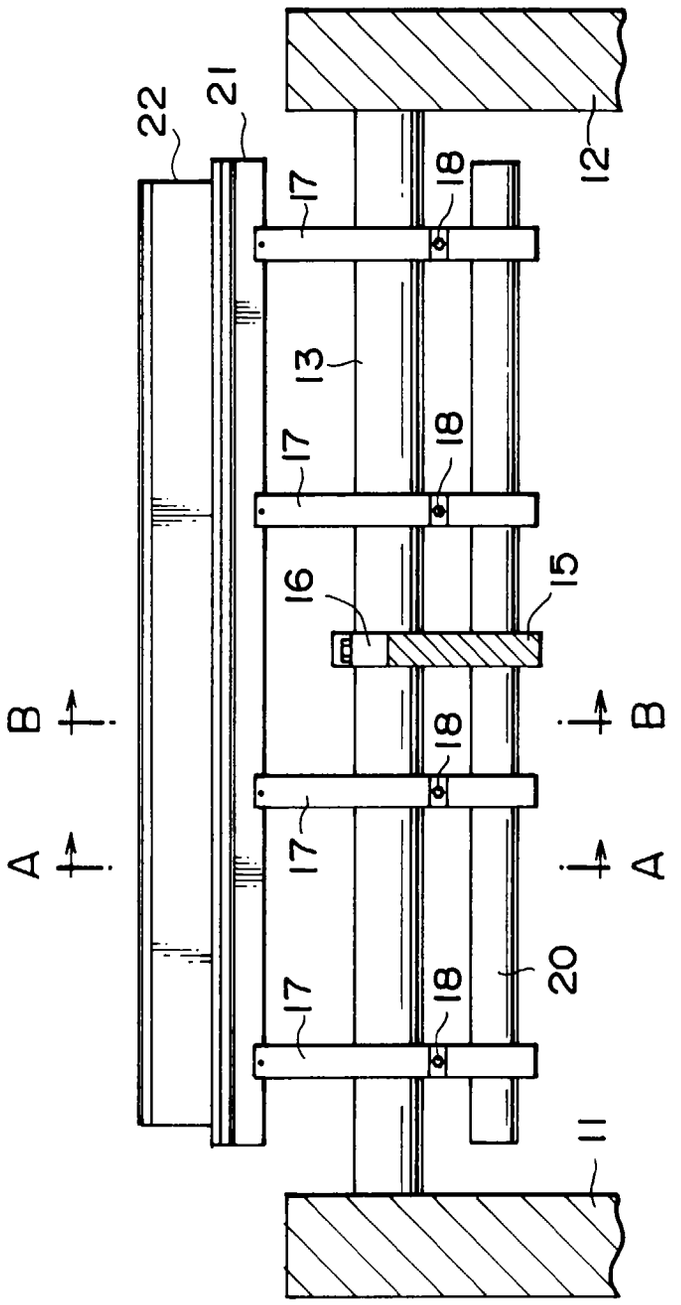


FIG. 2

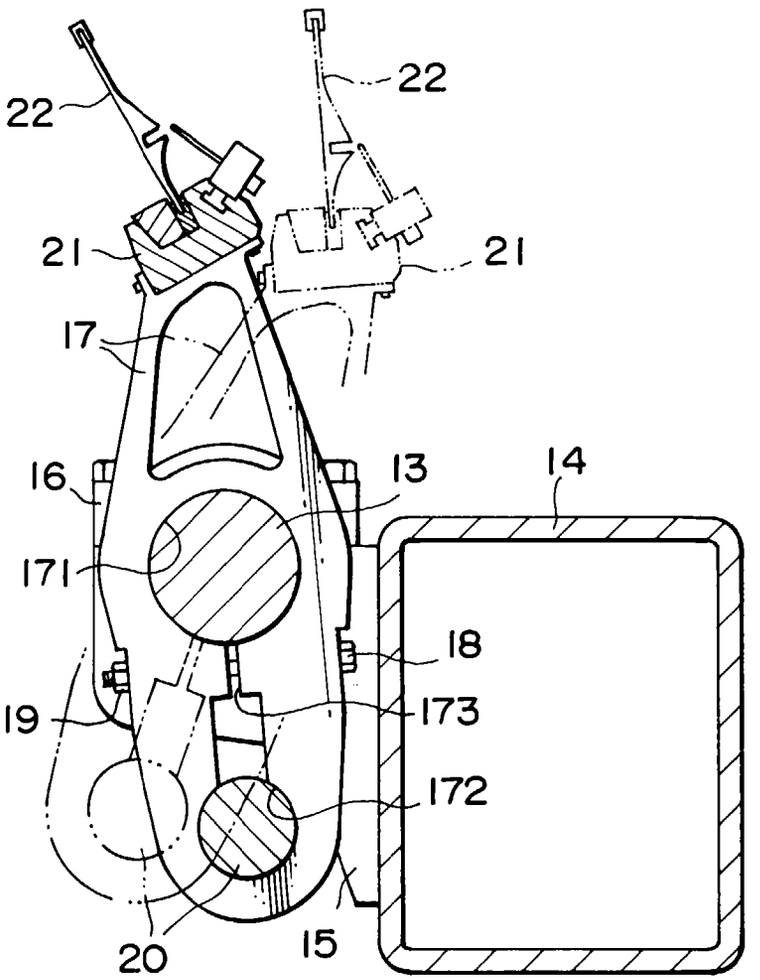


FIG. 3

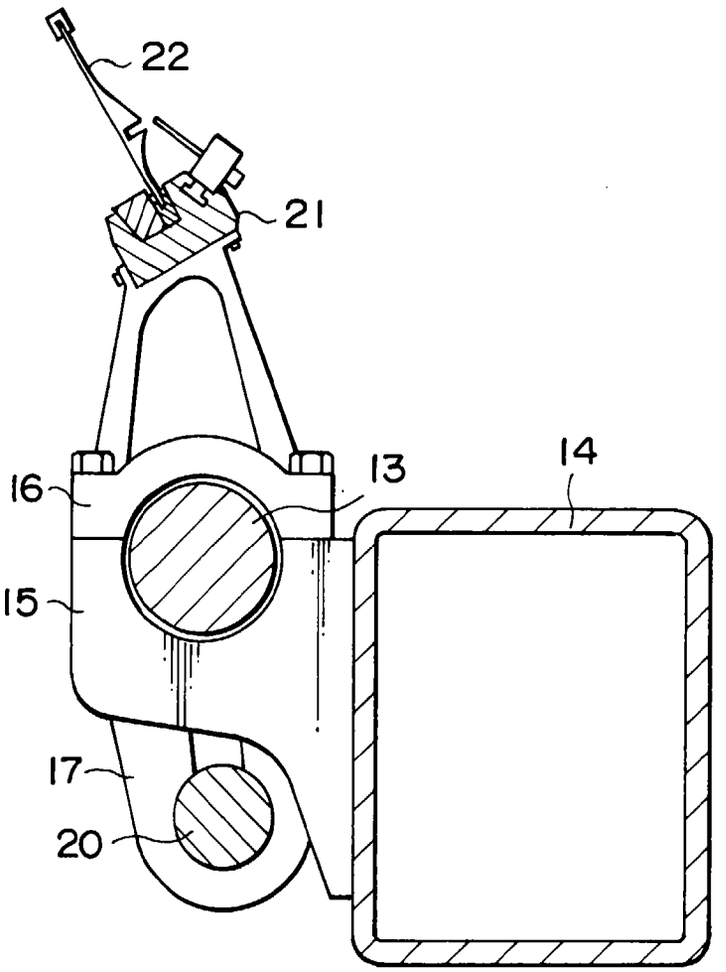


FIG. 4

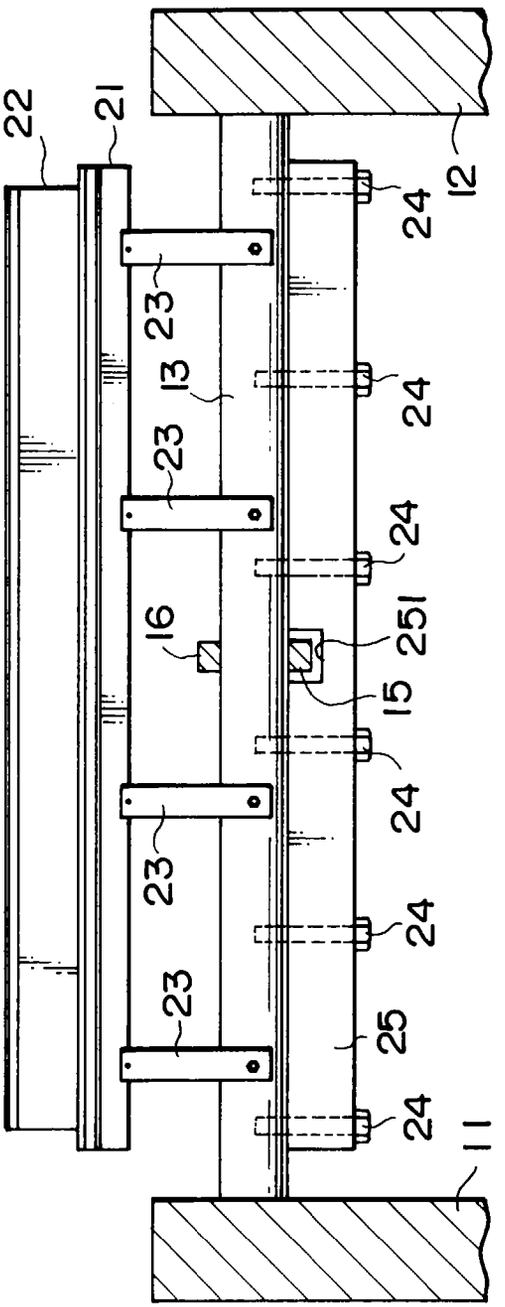


FIG. 5

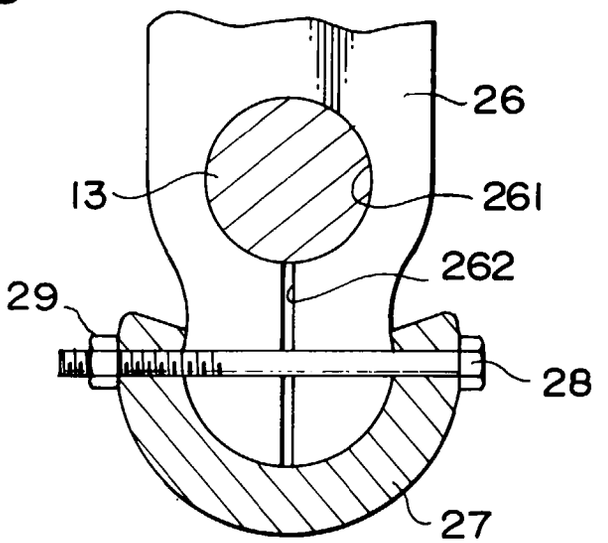
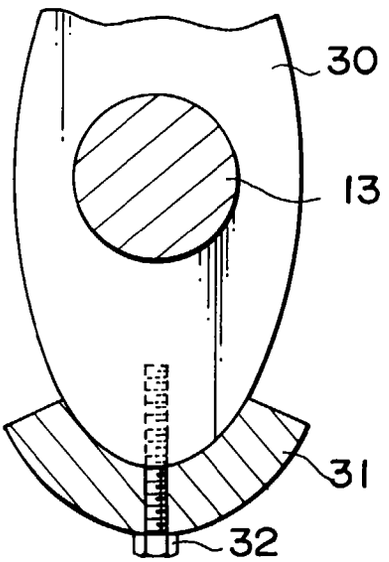


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 97 10 0256

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	US 4 610 277 A (KRAUSE) 9 September 1986 * claim 1; figures * ---	1,3,5,6 2	D03D49/60
Y A	EP 0 191 955 A (PICANOL NV) 27 August 1986 * figure 4 * ---	2 1,3,5,6	
X	FR 2 314 282 A (SULZER) 7 January 1977 * page 2, line 12 - line 19; figures * ---	1,3,5,6	
A A,D	EP 0 446 560 A (SULZER AG) 18 September 1991 * the whole document * & JP 04 214 445 A ---	1,3,5,6	
A	FR 2 326 511 A (ALSACIENNE CONSTR MECA) 29 April 1977 * figures 6,8 * -----	9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 April 1997	Rebiere, J-L

CATEGORY OF CITED DOCUMENTS

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