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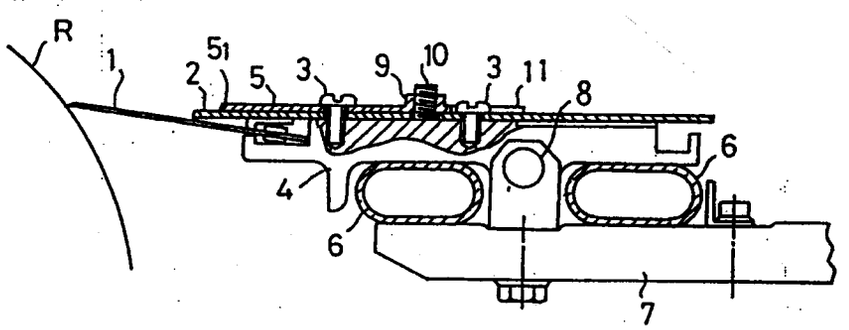
(54) DOCTOR BLADE SUPPORTING STRUCTURE.

(57) A doctor blade supporting structure for paper making rolls, which is provided with a reinforcing plate (5) laminated on a blade holder (2), and a finely adjusting screw (10) for use in regulating the blade holder (2) via the free edge (5_1), which is on the side of the blade (1), of the reinforcing plate (5) so that the blade holder (2) can be moved to engage and disengage from the blade (1). This structure enables a proper posture of the blade (1) to be retained, and the blade (1) in use to be engaged with the mating roll surface with a uniform and constant contact pressure distribution at all times. Moreover, the contact pressure of the blade (1) can be distributed uniformly in the axial direction of the roll surface.

Fig. 1



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Technical Field

This invention relates to a structure for supporting a doctor blade used for permitting a raw material to be satisfactorily accumulated on a paper making roll and water to be satisfactorily fed to the roll and removing foreign matters adhered to a surface of the roll such as paper powders, pitch, tailings or the like from the roll to keep it clean, and more particularly to a doctor blade supporting structure adapted to permit a pressure distributed at an edge of the blade pressedly contacted with the roll to be adjusted so as to be substantially uniform.

Background Art

A conventional doctor blade supporting structure which has been known in the art includes an adjusting means which acts to permit a blade for peeling off dusts adhered to a surface of a roll from the roll to be contacted at a tip end thereof with the roll surface at a uniform linear pressure or a contact pressure of the blade uniformly distributed in an axial direction of the roll.

In general, a blade for a doctor blade supporting structure is required to exhibit satisfactory holding force, stability and flexibility; therefore, the blade for the conventional doctor blade supporting structure is generally made of a relatively thin sheet material such as metal, plastic or the like into any desired thickness depending upon applications thereof. Unfortunately, this causes the blade to be pivotally moved with respect to the roll, resulting in the contact pressure of the blade being apt to be varied. In view of such a problem, a structure as shown in Fig. 7 is proposed and used, wherein a blade (G) is vertically interposed between a blade holder (F) made of a relatively rigid plate material and support members (C) and the blade holder (F) keeps the blade (G) at a posture. The support members (C) each are held directly on a doctor bag (E) using a screw means or pivotally supported on a pivot rod (D). Then, the blade (G) is vertically moved through a pressurized air tube (A) and an open tube (B) each interposedly arranged between the doctor bag (E) and the support member (C) to adjust a position of the blade (G).

The blade holder (F) comprises a single plate member formed into a shape of continuously extending in an axial direction of a roll, to thereby prevent a contact pressure of the blade (G) with respect to the roll from being varied in use. However, in order that the contact pressure of the blade (G) can be uniformly distributed in the axial direction of the roll, it is necessary to uniformly adjust contact between a surface of the roll and the blade (G). Unfortunately, this needs a considerable amount of labor. Further, a width of the blade holder (F) is finished by machining, however, a thickness of a blank for the blade holder (F) and its length are used as those of the holder (F) without being subject to finishing by machining, resulting in failing to form a contact end between the blade holder (F) and the blade (G) with high accuracy.

It would be considered that the accuracy of the contact end is increased by various processing techniques. However, this requires a considerable amount of labor and time and many processing machines, leading to a significant increase in manufacturing costs.

In view of the foregoing, the present situation is to escape an error occurring at the contact end utilizing crook of the blade holder (F); however, in order to accomplish the purpose, it is required to reduce a degree of crook of the blade holder (F) when the doctor blade supporting structure is directed to applications wherein the blade (G) is abutted against the roll at a high pressure, resulting in a relief being lost. This requires to further increase the accuracy of the contact end, so that it is highly difficult to press the blade against the roll at a constant linear pressure.

Disclosure of Invention

In accordance with the present invention, a doctor blade supporting structure is provided which comprises a blade (1) abutted against a roll (R), a blade holder (2) and support members (4), wherein the blade is mounted on the support members through the blade holder by means of mounting screws (3). The structure is characterized in that a reinforcing plate (5) is arranged in a manner to be superposed on the blades holder (2); and finely adjusting screws (10) are arranged so as to permit a gap to be defined between the blade holder (2) and the reinforcing plate (5) or support members (4) so that the blade holder (2) may be approachable or accessible to the blade (1) through a free end (5_1) of the reinforcing plate (5) defined on the side of the blade. Such construction of the present invention permits the structure to effectively absorb strain of each of the roll (R) and blade (1) occurring during operation of the structure while contacting the blade (1) with the roll (R), so that a linear pressure of the blade with respect to the roll (R) may be automatically corrected so as to be uniform over a whole width of the blade.

In particular, the structure of the present invention is so constructed that the blade holder (2) is pressedly fixed by the reinforcing plate (5) on which the blade holder (2) is mounted by means of the mounting screws (3) and the finely adjusting screws (10) are arranged so as to permit the gap to be defined between the blade holder (2) and the

reinforcing plate (5) or support members (4) so as to render the blade holder (2) approachable or accessible to the blade (1) through the free end (5_1) of the reinforcing plate (5) positioned on the side of the blade. Thus, tightening of each of the finely adjusting screws (10) causes a tip end of the blade (1) to be lowered and pressedly abutted against the roll, whereas loosening of the screw causes pressing force of the blade (1) against the roll to be reduced; thus, adjustment of the pressing force is highly facilitated to satisfactorily increase holding force and stability of the blade, to thereby permit the blade to be uniformly pressed against the roll at a constant linear pressure. Also, the above-described construction permits the crook of the blade holder in a direction of a thickness thereof to be reinforced, so that the blade holder (2) itself may be formed into a reduced thickness as compared with the prior art. This results in distortion and bending of the blade in a longitudinal direction thereof permitting the blade to exhibit improved response performance or characteristics.

Accordingly, the present invention keeps the blade (1) at a satisfactory posture while eliminating a necessity of subjecting the reinforcing plate (5) to fine processing and permits the blade holder (2) to prevent the contact pressure of the blade 11) from being varied because the blade (1) is uniformly abutted against a surface of the roll. Also, the present invention permits the contact pressure of the blade with respect to the surface of the roll to be uniformly distributed in an axial direction of the roll and also permits the reinforcing plate (5) to be formed into a reduced thickness.

Brief Description of Drawings

In the accompanying drawings,

Fig. 1 is a fragmentary vertical sectional view showing an embodiment of a doctor blade supporting structure according to the present invention;

Fig. 1A is a fragmentary vertical sectional view of the structure of Fig. 1 in use;

Fig. 2 is a plan view of the doctor blade supporting structure shown in Fig. 1;

Fig. 3 is a fragmentary vertical sectional view showing another embodiment of a doctor blade supporting structure according to the present invention;

Fig. 3A is a fragmentary vertical sectional view of the structure of Fig. 3 in use;

Fig. 4 is a plan view of the doctor blade supporting structure shown in Fig 3;

Fig. 5 is a fragmentary vertical sectional view showing a further embodiment of a doctor blade supporting structure according to the present invention;

Fig. 6 is a fragmentary vertical sectional view showing still another embodiment of a doctor blade supporting structure according to the present invention; and

Fig. 7 is a fragmentary vertical sectional view showing a conventional doctor blade supporting structure.

Best Modes for Carrying Out Invention

Figs. 1 to 2 illustrate an embodiment of a doctor blade supporting structure according to the present invention. A doctor blade supporting structure of the illustrated embodiment includes a blade 1 adapted to be abutted against a roll R, which blade is mounted on support members 4 by means of mounting screws 3 provided for assembling a blade holder 2. The doctor blade supporting structure also includes a reinforcing plate 5 arranged in a manner to be laminated or superposed on the blade holder 2. Further, the structure includes finely adjusting screws 10 each of which acts to permit a gap to be defined between the blade holder 2 and the reinforcing plate 5 or each of the support members 4 so that the blade holder 2 may be moved through a free end 5_1 of the reinforcing plate 5 defined on the side of the blade 1 so as to be approachable or accessible to the blade 1. The blade 1 is firmly held on the support members 4.

The reinforcing plate 5, as shown in Fig. 2, comprises a plurality of rectangular plate elements arranged on the blade holder 2 in a manner to be spaced at intervals. It is preferable that the plate elements of the reinforcing plate 5 are separately fixedly held on the support members 4 by means of the mounting screws 3, respectively. Such arrangement effectively prevents distortion and bending actions of the blade 1 in a longitudinal direction thereof from being deteriorated, to thereby substantially improve responsibility of the blade in the longitudinal direction. In particular, when the blade 1 is pivotally arranged through a support shaft 8 and held on the support members 4 each mounted through air tubes 6 on a doctor bag 7, it is preferable that the plate elements of the reinforcing plate 5 formed into the same width as the support members 4 are fixed together with the blade holder 2 by means of the mounting screws 3.

The finely adjusting screws 10 are threadedly arranged in threaded holes 9 formed through the reinforcing plate 5 in a manner to be movable in an axial direction thereof in the holes 9 and then inserted into through-holes formed via the blade holder 2 so as to be abutted against the support members 4, so that threaded insertion of the finely adjusting screws 10 through the reinforcing plate 5 permits the other end of each of the plate elements

of the reinforcing plate 5 to be approachable or accessible to the blade holder 2 to form a gap therebetween.

In another embodiment of the present invention shown in Fig. 3, finely adjusting screws 10 inserted in through-holes formed via a blade holder 2 each are tapped with respect to a support member 4 and abutted at a head portion thereof against a lower surface of a reinforcing plate 5. Also, the reinforcing plate 5 is formed with holes 10_1 each of which permits a hexagon wrench to operatively engage therethrough with the head portion of the finely adjusting screw 10 to vertically move it, to thereby cause the other end of the reinforcing plate 5 to be vertically moved to define a gap between the reinforcing plate 5 and the blade holder 2, so that a posture of contact of a blade 1 with respect to a roll R may be adjusted.

At least one of the mounting screws 3 may be kept somewhat loosened when the adjustment is carried out, to thereby facilitate operation for the adjustment. Alternatively, in each of the embodiments described above, the plate elements of the reinforcing plate 5 each may be formed with a hole 11 for receiving the mounting screw therein as shown in Figs. 1 and 3.

In the embodiment of the present invention shown in Fig. 3, the reinforcing plate 5, as shown in Fig. 4, comprises a single plate member of a pectinate or rugged shape so that a free end 5_1 of the reinforcing plate may be provided with a plurality of projections. Such construction of the reinforcing plate 5 facilitates assembling, mounting and handling of the reinforcing plate 5.

In a still further embodiment of the present invention shown in Fig. 5, between a support member 4 and a portion of a blade holder 2 overlapped with a reinforcing plate 5 and positioned around a mounting screw 3 arranged on the side of a blade 1 is formed a gap 12, so that threaded insertion of the mounting screw 3 into the support member 4 permits the reinforcing plate 5 and blade holder 2 to be moved together, to thereby vertically adjustably move an end of a blade 1 which is contacted with a roll R. Thus, it will be noted that the mounting screws 3 each function also as a finely adjusting screw.

In still another embodiment of the present invention shown in Fig. 6, air tubes 6 and 6 are arranged below an extension line C_1 defined by extending a line defined between an edge of a blade 1 and a portion of the blade 1 held on support members 4. Also, the air tubes 6 are arranged opposite to each other in a V-like or Y-like manner about an intersection between a line C_2 extending from the edge of the blade 1 at an angle θ of 6 to 30 degrees and preferably 10 to 15 degrees below the extension line C_1 and a vertical line C_3. Such construction permits a contact angle of the blade with respect to a roll R to be increased, to thereby decrease a variation of the contact angle due to wearing of the blade 1, resulting in facilitating adjustment of a contact pressure of the blade with respect to the roll R and removal of any tailings from the roll R. Also, such construction permits the blade 1 to be uniformly pressed against the roll R.

Industrial Applicability

The present invention is so constructed that the reinforcing plate is arranged in a manner to be superposed on the blade holder and the finely adjusting screws each are arranged so as to permit a gap to be defined between the blade holder and the reinforcing plate or support member, resulting in the blade holder being approachable or accessible to the blade through the free end of the reinforcing plate defined on the side of the blade. Such construction provides a relief for fine adjustment without requiring to form the contact end of the blade holder with high accuracy. Also, it permits crook of the blade holder to be reduced during pressing of the blade against the roll, to thereby keep the blade at a natural posture. Further, it permits the blade to be significantly reinforced against the crook of the blade holder while exhibiting a function of pressing the roll at a predetermined line pressure, so that the blade holder may be formed into a reduced thickness as compared with the prior art. This results in distortion and bending of the blade in a longitudinal direction thereof allowing the blade to exhibit a more satisfactory function. In addition, crook of the blade holder in a radial direction of the roll can be reduced to substantially improve response performance or characteristics of the blade in the longitudinal direction and a doctor line pressure can be rendered uniform over a whole width of the roll, so that the doctor blade supporting structure of the present invention is widely and readily applicable to existing apparatus while ensuring positive operation of the blade at a low cost and permitting the blade to positively exhibit satisfactory holding force, stability and flexibility. Thus, the present invention can be highly effectively available as a doctor blade supporting structure for a paper making roll.

Claims

1. A doctor blade supporting structure comprising:

a blade (1) abutted against a roll (R);
a blade holder (2); and
support members (4);

said blade being mounted on said support members through said blade holder by means of mounting screws (3),

characterized in that:

a reinforcing plate (5) is arranged in a manner to be superposed on said blade holder (2); and

finely adjusting screws (10) are arranged so as to permit a gap to be defined between said blade holder (2) and said reinforcing plate (5) or support members (4) so that said blade holder (2) may be accessible to said blade (1) through a free end (5_1) of said reinforcing plate (5) defined on the side of said blade.

2. A doctor blade supporting structure as defined in Claim 1, characterized in that said reinforcing plate (5) comprises a plurality of rectangular plate elements arranged on said blade holder (2) in a manner to be spaced at intervals;

said plate elements of said reinforcing plate are respectively fixed on said support members (4) by means of said mounting screws (3) to hold said blade (1); and

said finely adjusting screws (10) are threadedly arranged on a portion of said reinforcing plate (5) opposite to the blade (10).

3. A doctor blade supporting structure as defined in Claim 1, characterized in that said reinforcing plate (5) comprises a plate member formed with holes (10_1) for operating said finely adjusting screws (10);

said support members (4) each are pivotally arranged through air tubes (6) on a doctor bag (7);

said blade (1) is interposed between said support members (4) and said blade holder (2) and fixed by means of said mounting screws (3); and

said finely adjusting screws (10) each are threadedly inserted into said support member and abutted at a head portion thereof against a bottom surface of said reinforcing plate (5).

4. A doctor blade supporting structure as defined in any one of Claims 1 to 3, characterized in that said blade (1) is mounted on said support members (4) pivotally supported;

said support members (4) each are arranged through air tubes (6) on a doctor bag (7); and

said air tubes (6) are arranged below an extension line C_1 defined by extending a line defined between an edge of said blade (1) and a portion of said blade held on said support members (4) and in a manner to slant to each other at an intersection between a line extending from the edge of said blade (1) at an angle of 6 to 30 degrees below the extension line C_1 and a vertical line.

Fig. 1

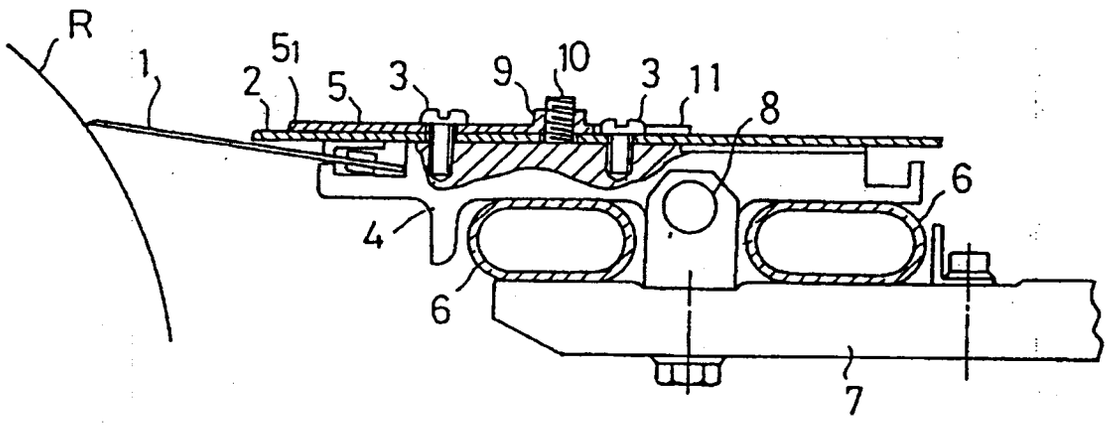


Fig. 1 (A)

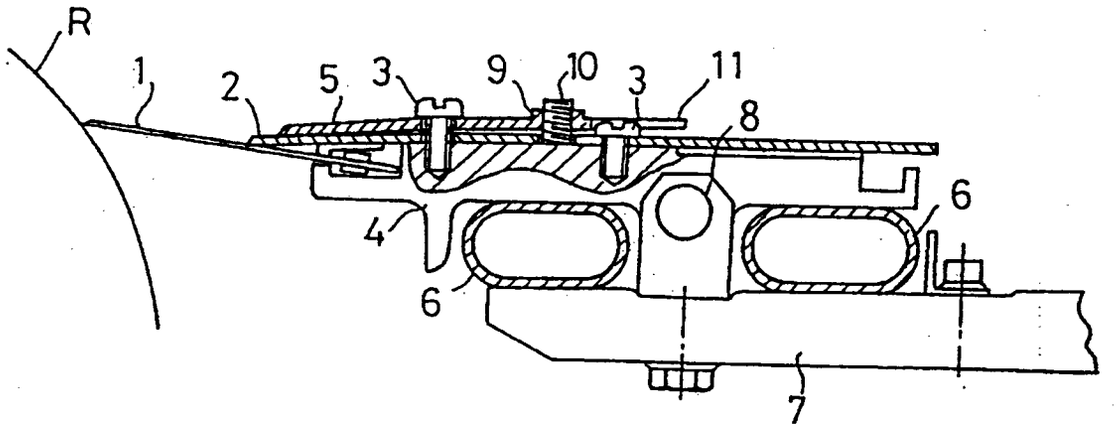


Fig. 2

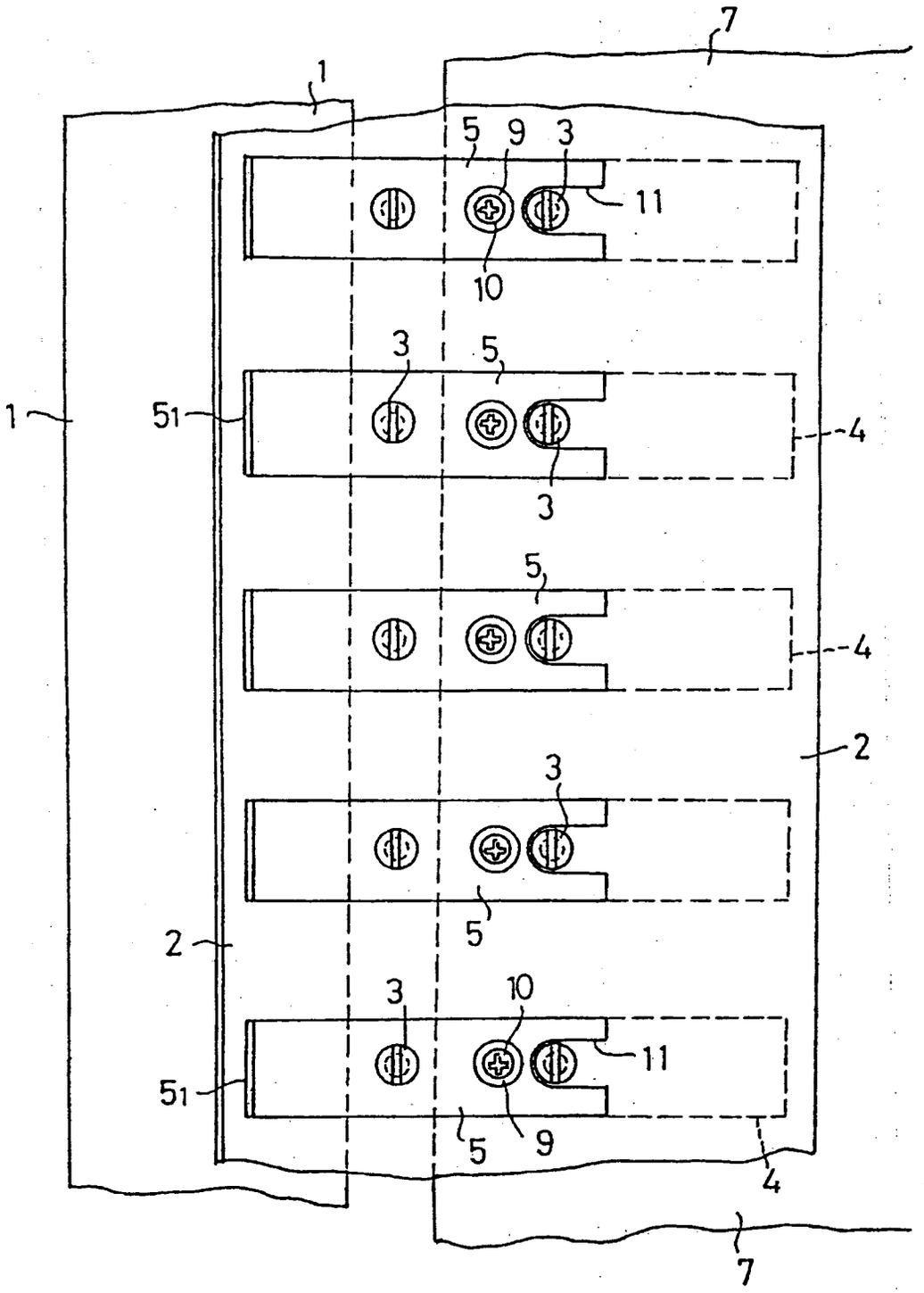


Fig. 3

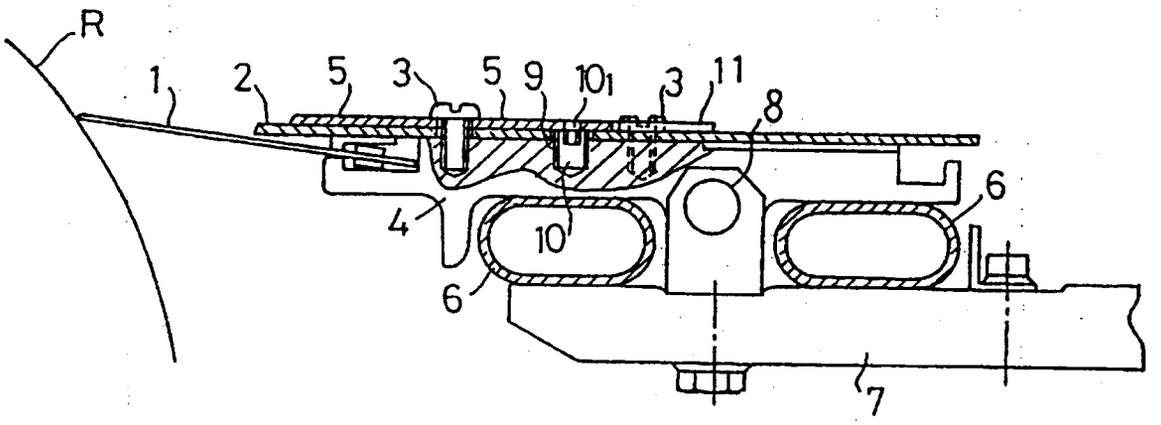


Fig. 3 (A)

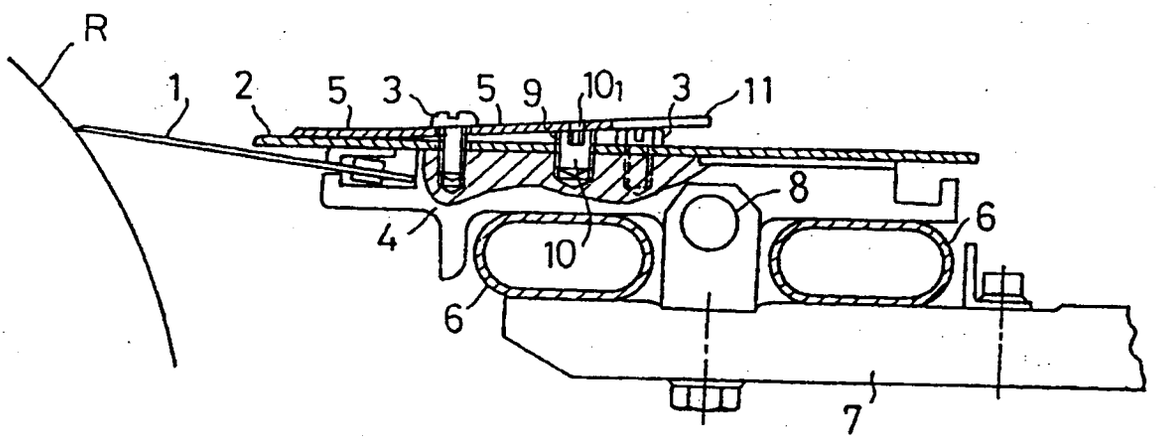


Fig. 4

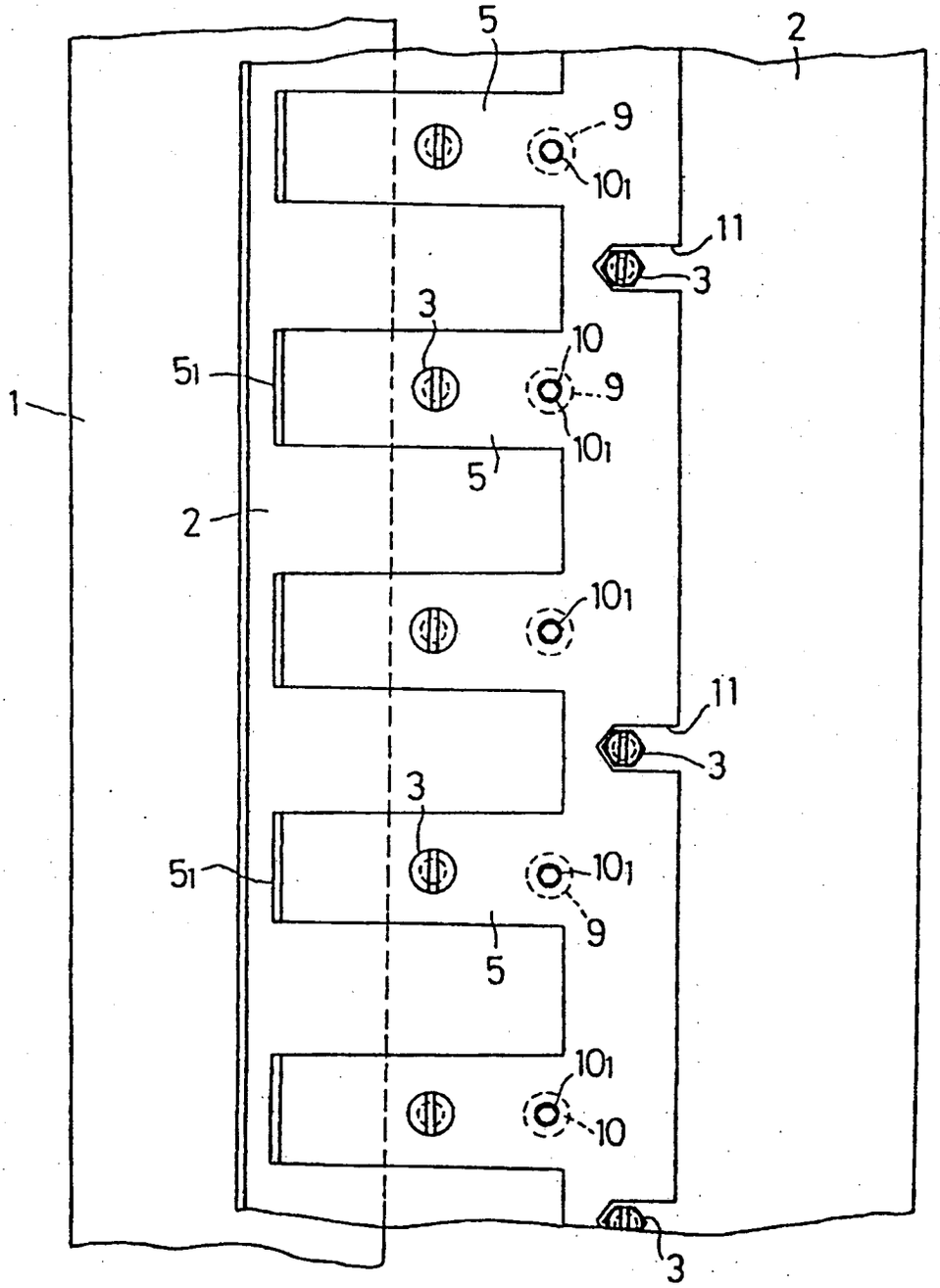


Fig. 5

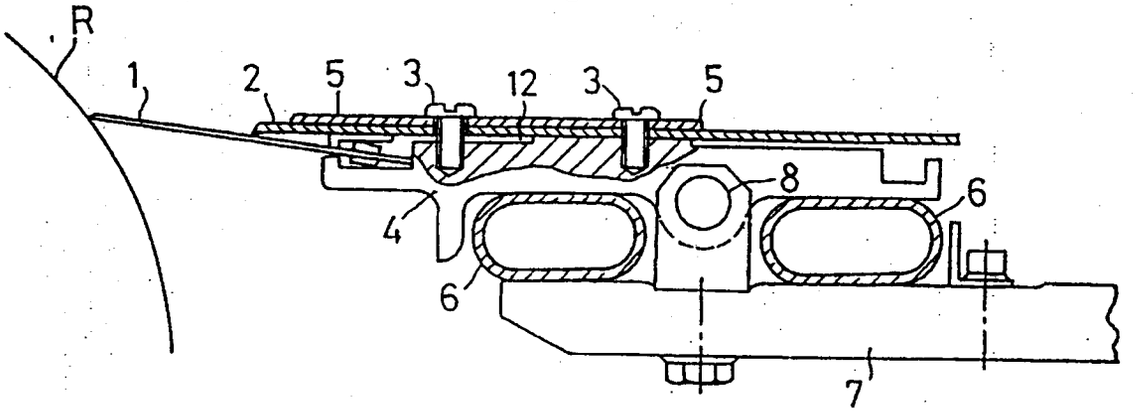


Fig. 6

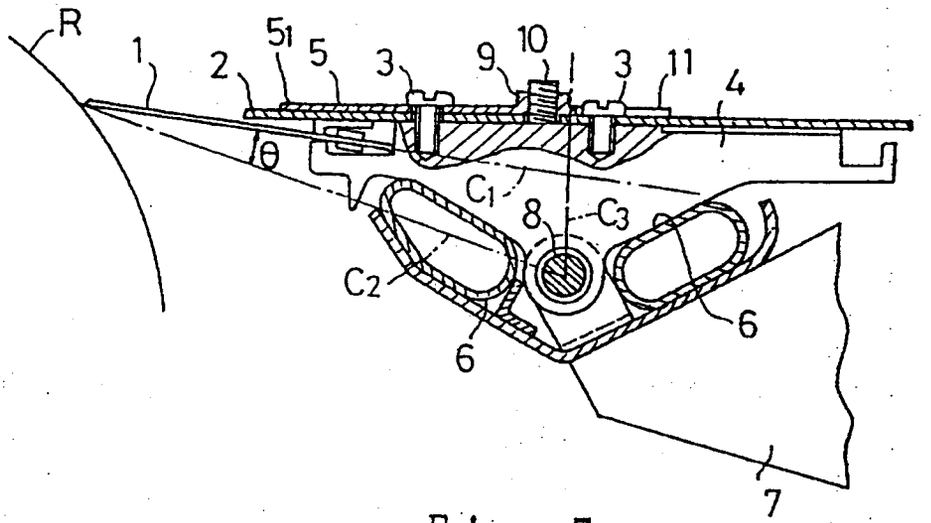
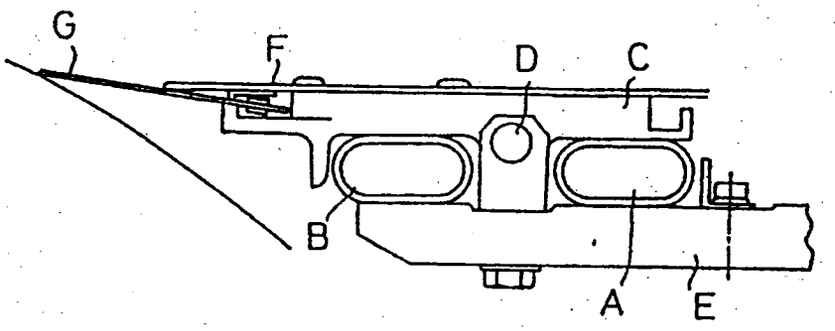


Fig. 7



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP90/00611

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl[5] D21G3/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC	D21G3/00 - 3/04

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

Jitsuyo Shinan Koho	1926 - 1990
Kokai Jitsuyo Shinan Koho	1971 - 1990

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	JP, U, 64-53797 (Aikawa Tekko K.K.), 3 April 1989 (03. 04. 89), (Family: none)	1 - 4
A	JP, A, 63-309697 (Thermo Electron Web Systems, Inc.), 16 December 1988 (16. 12. 88) & US, A, 4789432	1 - 4
A	JP, Y1, 47-37526 (Honshu Paper Co., Ltd.), 14 November 1972 (14. 11. 72), (Family: none)	1 - 4

* Special categories of cited documents: [10]

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"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
May 23, 1990 (23. 05. 90)	June 4, 1990 (04. 06. 90)
International Searching Authority	**Signature of Authorized Officer**
Japanese Patent Office	