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[Continued on next page]

(54) Title: **BOLSTER MOUNTED BRAKE SYSTEM**

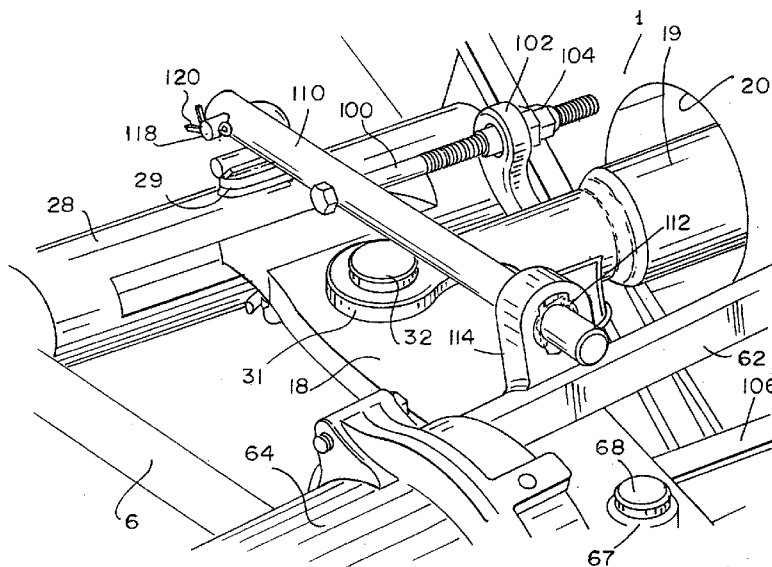


FIG. 2

(57) Abstract: A brake system includes a brake cylinder having a piston rod and a brake lever connecting the piston rod to a brake beam and a slack adjuster. An actuating lever is connected to the brake beam and the brake cylinder. A trigger of the slack adjuster is connected to the actuating

[Continued on next page]



ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, **Published:**

MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM,

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,

ML, MR, NE, SN, TD, TG).

— with international search report (Art. 21(3))

lever. The actuating lever is pivotally and rotationally connected to the brake beam and swivelably connected to the brake cylinder. Also, a piston stroke indicator including an indicia positioned on a support structure of a brake cylinder to be adjacent the end of a portion of a brake piston at its extended position.

BOLSTER MOUNTED BRAKE SYSTEM**BACKGROUND AND SUMMARY OF THE DISCLOSURE**

[0001] The present disclosure relates generally to bolster mounted brakes and, more specifically, to a slack adjuster trigger for bolster mounted brakes and piston stroke indicator.

[0002] Brake systems for a rail car, for example, freight cars, include one or more brake beams to which the brake shoes are mounted and which is moved by an air operated brake cylinder. The brake cylinder is connected to the brake beams via various rods and levers. A slack adjuster is provided in the rods and levers systems to adjust for wear of the brake shoes. The slack adjuster has an actuator which is operated when necessary to allow slack adjustment.

[0003] Some braking systems mount the brake cylinder to the bolster or truck of a car. A typical example is shown in U.S. Patent 5,361,876 and a portion of which is illustrated in Fig. 1. The reference numbers in Fig. 1 correspond to the numbers in the aforementioned patent and reference is made thereto for further details of the complete system.

[0004] The present brake system includes a brake cylinder having a piston rod and a brake lever connecting the piston rod to a brake beam and a slack adjuster. An actuating lever is connected to the brake beam and the brake cylinder. A trigger of the slack adjuster is connected to the actuating lever. The actuating lever is pivotally and rotationally connected to the brake beam and swivelably connected to the brake cylinder.

[0005] A spherical bearing swivelably connects the actuating lever and the brake cylinder. The pivotally connection of the actuating lever and the brake beam includes two orthogonal axes. A support rod for supporting the brake level is removably mounted to the brake cylinder and a brake cylinder mounting structure.

[0006] A piston stroke indicator includes an indicia positioned on the support structure of the brake cylinder to be adjacent the end of a portion of the piston at its extended position to indicate the piston stroke range. The width of the indicia represents the piston stroke range.

[0007] These and other aspects of the present disclosure will become apparent from the following detailed description of the disclosure, when considered in conjunction with accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

- [0008] Figure 1 is a perspective view of a portion of a bolster mounted brake system of the prior art.
- [0009] Figure 2 is a perspective view of a portion of a first embodiment of a bolster mounted brake system of the present disclosure.
- [00010] Figure 3 is a perspective view of a portion of a second embodiment of a bolster mounted brake system of the present disclosure.
- [00011] Figure 4 is a perspective view of the brake cylinder of Figure 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

- [00012] Figure 1 illustrates a portion of a bolster mounted brake system of the prior which is shown and described in detail in US Patent 5,361,876. The reference numbers in that patent are used for ease of reference and a complete understanding of the operation of the brake system. Any new reference number will be in the 100's.
- [00013] A brake system includes a bolster 1 connected by side frames to an axle 6 which includes a wheel 9. A brake beam 12, carrying brake shoes (not shown), moves relative to the wheels to apply the brakes. A brake cylinder 64 is mounted by plate 63 to a support structure 62 which is connected to mounting plate 61. Plate 61 is mounted to the bolster 1. A pin 68 connects the piston rod yoke 67 to the brake lever 18. The other end of brake lever 18 is mounted to brake strut 28 of the brake beam 12 by pin 29. A support rod 106 for supporting the brake lever 18 is welded to the brake cylinder 64 and the mounting plate 61.
- [00014] A slack adjuster 19, which is connected to the other brake beam (not shown), is connected to the brake lever 18 by a pin 32 through yoke 31 of the slack adjuster 19. The slack adjuster 19 includes a trigger bolt 100 adjustably positioned with respect to the slack adjuster trigger 102 by nuts 104. The other end of the trigger bolt 100 is connected to the actuating lever 53 by a bolt 54 through clevis 52.
- [00015] The pin 29, which mounts on the brake lever 18 to the strut 28, also mounts one end of the actuating lever 53 of the trigger to the strut 28. Actuating lever 53 pivots about to the pin 29 as the brake beam 12 is moved relative to the brake cylinder 64. The other end of the actuating lever 53 is limited by guide 55 which acts as a stop. This end also is connected to the plate 63 of the cylinder 64 by a chain 57.

- [00016] The operation of the brake system and the slack adjuster are well known and described in U.S. Patent 5,361,876. Thus, detailed explanation will not be provided herein.
- [00017] The bolster mounted brake system of the present disclosure is designed to reduce the number of parts, cost and installation time and increase longevity by reducing the wear and tear of the parts.
- [00018] Figure 2 describes a variation on the actuating lever 53 for the slack adjuster trigger 102 of Figure 1. This structure reduces the number of parts, wear and tear and is easier to assemble and install. The J shaped actuating lever 53 of Figure 1 is replaced by an actuating lever 110 shown as a rod. The trigger bolt 100 is received directly into an aperture in the rod 110. A clevis 52 and pin 54 are not needed. If desired, the clevis 52 may also be used, as shown in Figure 3, and would not affect the operation to be described.
- [00019] The first end of the actuator lever 110 is pivotally received on a U shaped bent rod 118 and held thereto by cotter pin 120. The U shaped rod 118 is welded onto the pin 29 which secures the brake lever 18 to the strut 28. A combination of the bent rod 118 and the pin 29 offers two axes of rotation for the rod 110. Rotation of pin 29 allows rotation about a vertical axis while the bent rod 118 offers an orthogonal horizontal axis of rotation for that end of the trigger actuator rod 110.
- [00020] The other end of the trigger actuating lever 110 is received in a spherical bearing 112 in bracket 114 which is part of or welded on to the support structure 62 for the brake cylinder 64. This spherical bearing provides a swivel or omni-degree of pivotal movement with respect to the brake cylinder 64.
- [00021] These particular connections of the trigger actuator 100 reduces the amount of strain and stress upon the system in that both ends have multiple directions of movement or adjustment during the application and release of the brakes.
- [00022] Figure 3 shows a variation on the actuator lever 110. The trigger bolt 100 is connected to the rod 110 by clevis 52 and pin 54. Also, the U shaped rod 118 welded onto the bolt 29 is replaced by a clevis 122, pin 124 and cotter pin 126. The clevis is welded to or part of the pin 29.
- [00023] The assembly of the mechanism for the slack adjuster trigger begins after the connection of the link 18 to the piston rod yoke 67 by pin 68, to the slack adjuster 19 by pin 32 and to the brake beam strut 28 by pin 29. In the prior art of figure 1, the pin 29 is part of

the connection of the actuating lever 53. Next the actuating rod 110 is inserted into spherical bearing 112. The other end of actuating rod 110 is connected to the rod 118 or clevis 122. The trigger bolt 100 is connected to the actuating rod 110 and the trigger 102 and adjusted by nuts 104.

[00024] Also shown in detail in Figure 3 is the support rod 106 for the brake lever 18. The support rod 106 extends from the back of and through a hole in the mounting plate 61 into a hole in the head of the brake cylinder 61. The support rod 106 is held in place and removably mounted to the brake cylinder 64 and the mounting plate 61 by cotter pins 108. This allows the support rod 106 to be easily replaced by first disconnecting the mounting plate 61 from the bolster 1 and then removal of the of the cotter pins 108 if the support rod 106 shows excessive wear.

[00025] Details of the piston stroke indicator are shown in Figure 4. A piston stroke indicator includes an indicia 130 is on the piston support structure 62. It may be part of the casting of the support structure 62 or separate and then secured thereto. The width of the indicia 130 indicates the acceptable range of the piston stroke. The nuts 104 of the slack adjuster trigger are adjusted until the end of a portion of the piston in the brake applied piston is adjacent the center 132 of the indicia 130. In Figure 4, the piston guide 134 is aligned with the center 132 of the indicia 130. Other movable part of the piston, for example the piston rod not shown in Figure 4, may be used for alignment. As an example, for a stroke of $2\frac{3}{4}$ inches, the range of width of the indicia would be 1 inch representing a variance of $\frac{1}{2}$ inch.

[00026] Although the present disclosure had been described and illustrated in detail, it is to be clearly understood that this is done by way of illustration and example only and is not to be taken by way of limitation. The scope of the present disclosure is to be limited only by the terms of the appended claims.

What is claimed:

1. A brake system comprising:

a brake cylinder having a piston rod;

a brake lever connecting the piston rod to a brake beam and a slack adjuster;

an actuating lever connected to the brake beam and the brake cylinder;

a trigger of the slack adjuster being connected to the actuating lever; and

the actuating lever is pivotally and rotationally connected to the brake beam and swivelably connected to the brake cylinder.
2. The brake system of claim 1, wherein a spherical bearing swivelably connects the actuating lever and the brake cylinder.
3. The brake system of claim 1, wherein the pivotally and rotational connection of the actuating lever and the brake beam includes two orthogonal axes.
4. The brake system of claim 1, wherein the pivotally and rotational connection of the actuating lever and the brake beam includes a pin rotational connected to the brake beam and a rod connected to the pin and to which the actuating lever is pivotally connected.
5. The brake system of claim 1, wherein the pivotally and rotational connection of the actuating lever and the brake beam includes a pin rotational connected to the brake beam and a clevis connected to the pin and to which the actuating lever is pivotally connected by another pin.
6. The brake system of claim 1, wherein the brake cylinder includes a support rod for supporting the brake lever and the lever support rod is removably mounted to the brake cylinder and a brake cylinder mounting structure.

7. The brake system of claim 6, wherein the support rod extends through a hole in the brake cylinder mounting structure and into a hole in the brake cylinder and is retained by cotter pins.

8. A piston stroke indicator comprising:
an indicia positioned on a support structure of a brake cylinder to be adjacent the end of a portion of a brake piston at its extended position.

9. The indicator of claim 8, wherein a width of the indicia represents the piston stroke range.

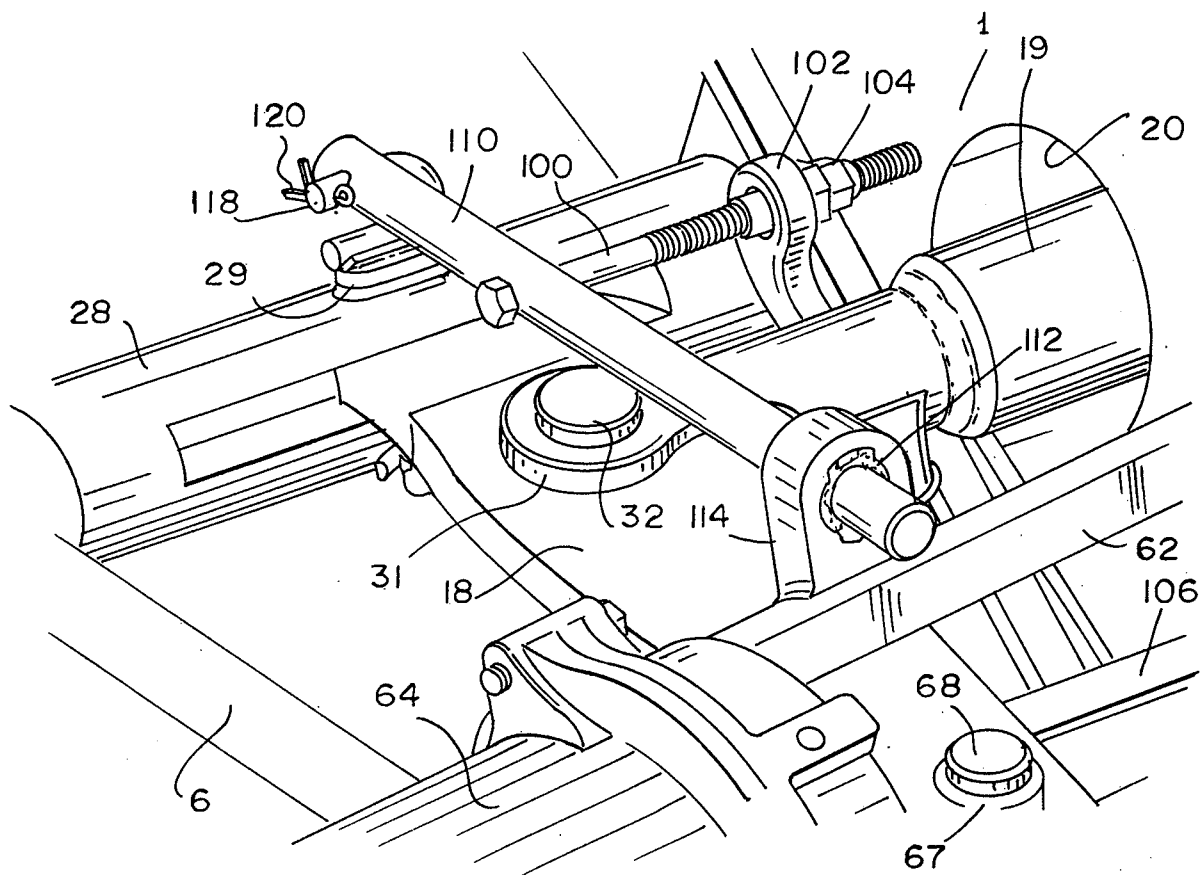
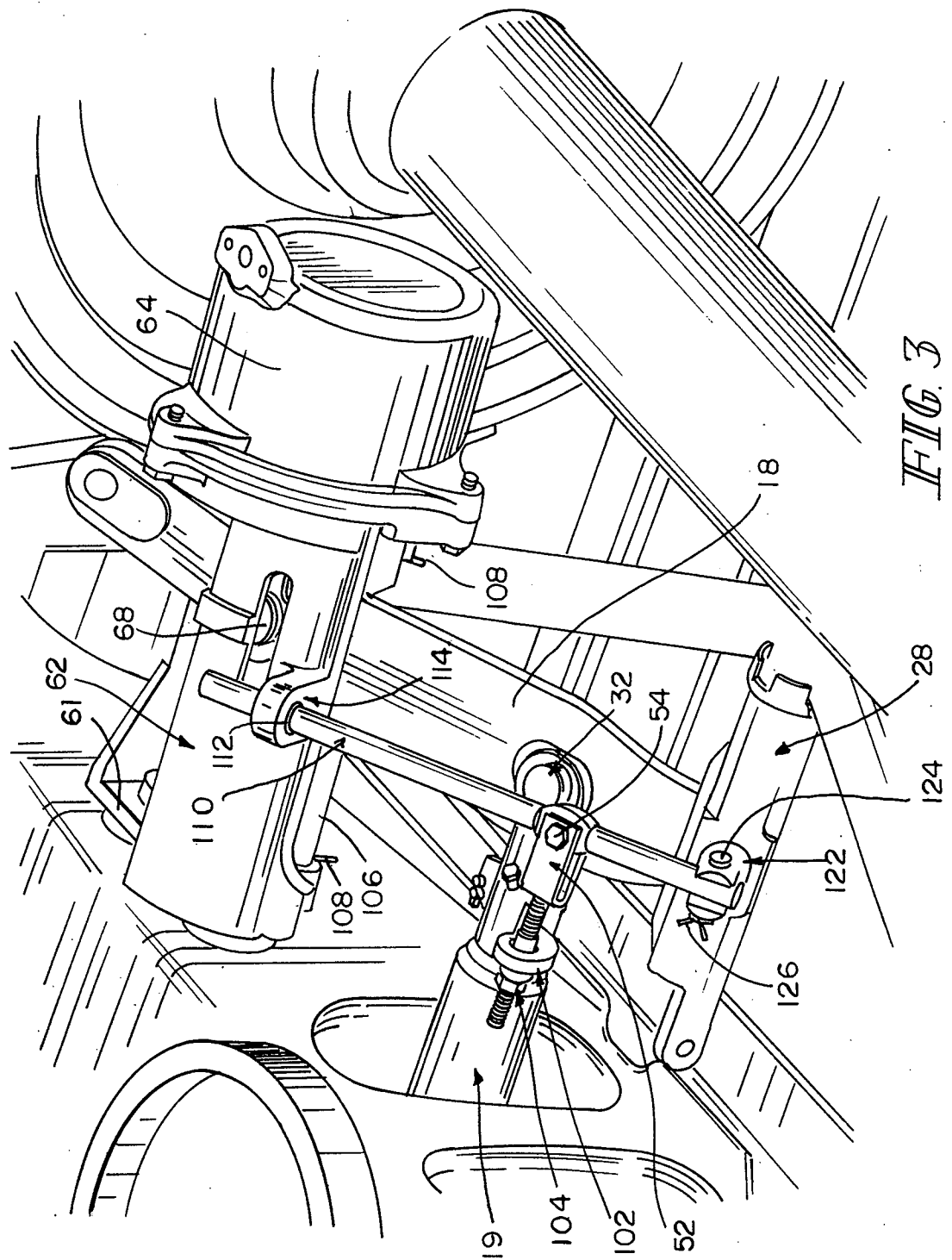
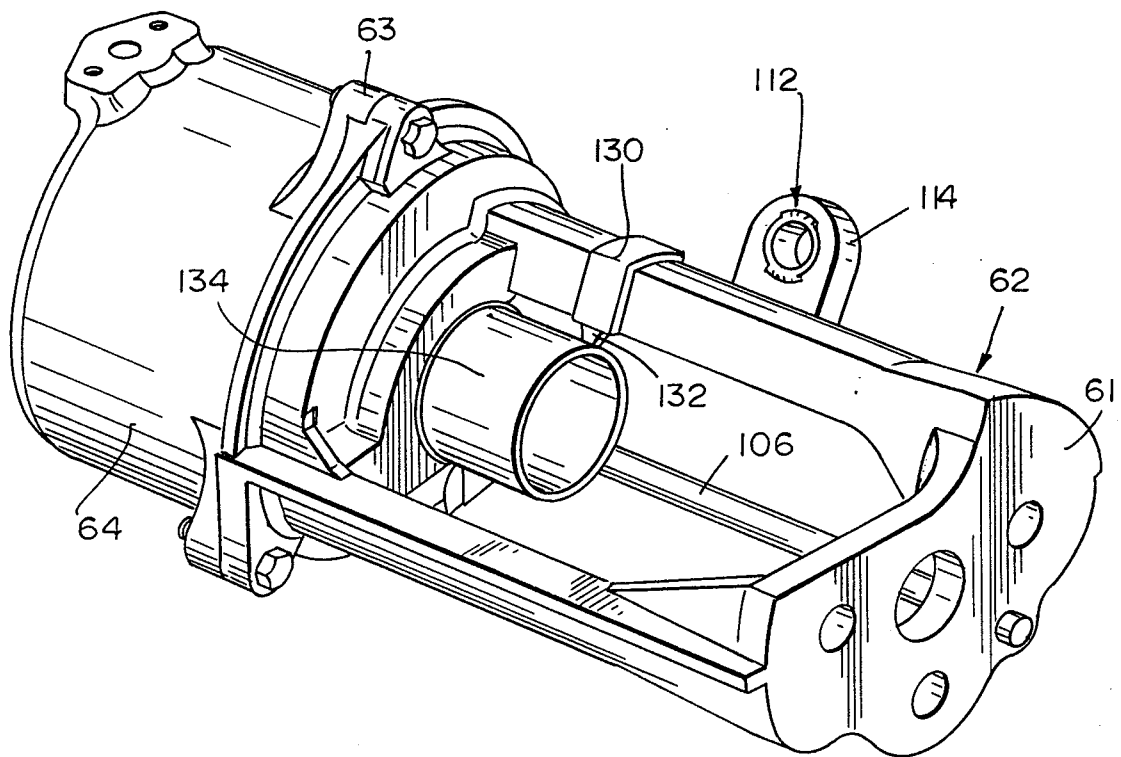


FIG. 2.



*FIG. 4*

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2010/026476

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B61H 13/00 (2010.01)

USPC - 188/33

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - B61H 13/00, 15/00 (2010.01)

USPC - 188/33, 52, 205R, 207

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3,386,533 A (TAYLOR et al) 04 June 1968 (04.06.1968) entire document	1, 4-5
Y		2-3, 6-7
Y	US 2003/0024774 A1 (HUBER, Jr. et al) 06 February 2003 (06.02.2003) entire document	2-3, 6-7
Y	US 3,378,108 A (MCCLURE et al) 16 April 1968 (16.04.1968) entire document	7

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Further documents are listed in the continuation of Box C.

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* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

08 June 2010

Date of mailing of the international search report

18 JUN 2010

Name and mailing address of the ISA/US

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2010/026476

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees need to be paid.

Group I, claims 1-7 are drawn to a brake system.
Group II, claims 8 and 9 are drawn to a piston stroke indicator.

The inventions listed in Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1, because under PCT Rule 13.2 they lack the same or corresponding special technical features for the following reasons:

The special technical features of Group I, a brake system including a brake lever, an actuating lever, and a trigger, are not present in Group II; and the special technical features of Group II, a piston stroke indicator including an indicia representing stroke range, are not present in Group I.

Since none of the special technical features of the Group I and II inventions are found in more than one of the inventions, unity is lacking.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-7

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.