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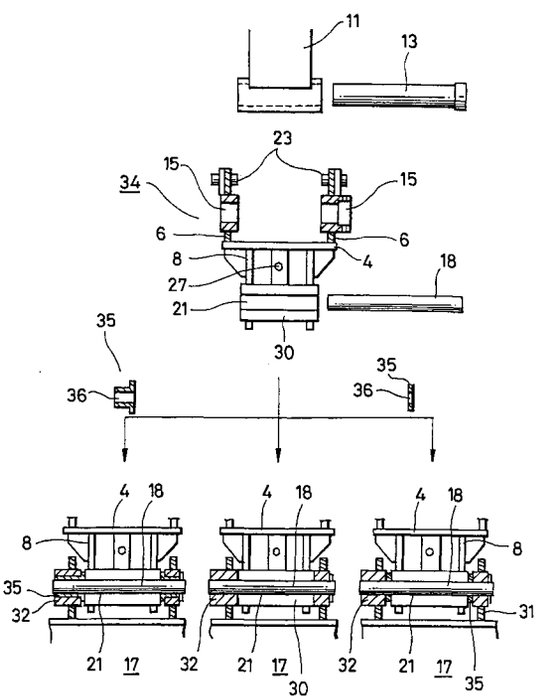
(54) Attachment fixture of power shovel

(57) The present invention relates to a fixture used when an operation attachment of various type is mounted to a power shovel, and the invention provides an attachment fixture capable of being used generally for various power shovels and attachments having different diameters and mounting widths of mounting pins. The attachment fixture comprises a body (34) for connecting an attachment (17) to an arm (11) and afront link (12) of the power shovel, a spacer 35 interposed in a gap formed between the body and the attachment, and/or a spacer (37) interposed in a gap formed between the body and the arm as well as the front link. Each of the spacers (35, 37) is formed into a cylindrical shape, a cylindrical shape having a flange, or a disk-like shape with a center hole (36, 38) having the same diameters as those of mounting pins or those of the connection pins 13, 14 connecting with the power shovel.

FIG. 2



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an attachment fixture used for fixing an operation attachment to a tip end of an arm of a power shovel, and more particularly, to an attachment fixture capable of generally using for various power shovels of different diameter of pin or width of bracket provided for connecting an arm and an operation attachment.

Description of the Related Art

[0002] An attachment in its default to be mounted to a tip end of an arm of a power shovel is a bucket (shovel). Since the arm of the power shovel moves three-dimensionally and energy can easily be supplied to the attachment by a hydraulic pipe, various operation attachment used in replacement of the buckets have been developed. Examples of such attachments of this kind are clamshells, one-claw rippers, breakers, crushers, jaw blocks and so on. These attachments are mounted to the arm in replacement of the buckets when particular operation is required. Therefore, attachment fixtures which can easily and quickly attach and detach or exchange the attachment have been proposed.

[0003] One example of an attachment fixture of this kind proposed by the present applicant is shown in FIGS. 4 to 6. (Japanese Utility Model Application Laid-open No.Hei5-87039). This attachment fixture is provided with links 2, 3, made of two pairs of (four in total) plate materials, and are pivotally supported by a fulcrum pin 23. Each of the links 2, 3 includes a connection pin hole 15, 16 connected to a power shovel arm 11 and a front link 12 at a medium position in a longitudinal direction of the link. A pin hole 29 for the fulcrum pin 23 is formed above the connection pin holes 15, 16, and U-shaped holes 21, 22 to be connected to the bucket are formed below the connection pin holes 15, 16. The pair of links 2, 3 are separately pivotally supported by short fulcrum pins 23 at the side of the arm 11. Long connection pins 13, 14 passing through the opposite link 2 or 3 are inserted in the connection pin holes 15, 16. The connection pins 13, 14 pass through bucket mounting holes provided in the arm tip end of the power shovel and the front link to connect the attachment fixture to the arm tip end of the power shovel.

[0004] An expansion mechanism 26 for swinging the links 2, 3 around the fulcrum pin 23 to open and close the links is disposed between the links 2, 3 located at both sides of the arm 11. The expansion mechanism 26 is a hydraulic cylinder or a screw bar, for example.

[0005] The operation for mounting the bucket 17 to the arm 11 using the above-described attachment fixture will be described below. The mounting pins 18, 19 are previously inserted to the mounting pin holes of the bucket 17. The attachment fixture 1 is mounted to the arm and the front link by the connection pins. Next, the distance between the U-shaped holes 21, 22 is shortened by operating the expansion mechanism 26. Then, one of the mounting pins 18, 19 of the bucket 17 is inserted to one of the U-shaped holes 21, 22, and the other pin is allowed to be opposed to the other U-shaped hole. In this state, the expansion mechanism 26 is operated to widen the distance between the U-shaped holes and finally, the U-shaped holes 21, 22 project in a direction widening the mounting pins 18, 19 to thereby fix the bucket 17.

[0006] In the attachment fixture 1 of the above structure, since the connection pins 13, 14 are located at medium positions between the fulcrum pin 23 and the U-shaped holes 21, 22, if the distance S between the pin holes of the bucket is narrow, the distance L between the connection pins is also narrow, while if the distance S between the pin holes of the bucket is wide, the distance L between the connection pins is also wide. Therefore, drawbacks such as variation of operation property due to difference in distance of the pins of the attachment or a limitation of the swinging angle of the bucket can be moderated, various attachments having different distances S of the pin holes of the mounting pins can be used.

[0007] Further, in relation to the above-described prior art, structures in which safety is enhanced are proposed by Japanese Utility Model Application Laid-open No. Hei6-79849, Japanese Patent Application Laid-open No.Hei6-322788 and Japanese Patent Application Laid-open No.Hei7-331690.

[0008] A plurality of power shovels of different type and different size are produced by a plurality of makers, and such power shovels of different types from different makers have different tip end width of arms and different diameter of connection pins in many cases. Therefore, conventionally, an attachment fixture suitable for the particular tip end width of the arm and the diameter of the connection pin is prepared for each of the respective types of power shovel. However, there are requirements that a single attachment fixture can be used for all of the types of power shovel, and an attachment fixture produced by a maker different from that of a power shovel is used.

[0009] However, although the conventional attachment fixture can overcome the difference of distance between the pins of the attachment, if the mounting width or pin diameter is different, gap is generated between the arm and the operation attachment as well as the attachment fixture, and there is an adverse possibility that the operation force may not be transmitted accurately, or the operation force may unevenly to generate accident. Therefore, the attachment fixture could not be used generally.

SUMMARY OF THE INVENTION

[0010] The present invention provides a general-purpose attachment fixture capable of being used even if a tip end width of an arm or a diameter of a connection pin is different and a bracket width of an attachment or a diameter of a mounting pin is different.

[0011] An attachment fixture of a power shovel according to the present invention comprises a body 34 for connecting an attachment 17 to an arm 11 and a front link 12 of the power shovel, a spacer 35 interposed in gap formed between the body and the attachment, and/or a spacer 37 interposed in gap formed between the body and the arm as well as the front link.

[0012] The body comprises upper plates 6, 7 located at opposite outer sides of tip ends of the arm and the front link, and a pair of link 2, 3 including U-shaped holes 21, 22 formed in inner sides of a bracket of the attachment, the links 2, 3 includes connection pin holes 15, 16 connecting the arm and the front link at medium positions in the longitudinal direction of the links, a pin hole 29 of a fulcrum pin 23 for pivotally supporting the pair of links is disposed above the connection pin holes, and the U-shaped holes 21, 22 opposed to each other or directed into the opposite direction from each other are disposed below the connection pin holes.

[0013] The spacer 35 interposed between the gap formed between the body and the attachment is formed with a center hole 36 having the same diameter as those of mounting pins 18, 19 which connect the body and the attachment with each other, and the spacer is formed into a cylindrical shape, a cylindrical shape having a flange, or a disk-like shape with a hole. The spacer 37 interposed in the gap formed between the arm and the front link is formed with a center hole 38 having the same diameter as those of connection pins 13, 14 which connect the body, the arm as well as the front link with one another, and the spacer is formed into a cylindrical shape, a cylindrical shape having a flange, or a disk-like shape having a hole.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIGS. 1 to 3 show one example of the best mode for carrying out the present invention, wherein FIG. 1 is a side view showing the entire attachment fixture;

FIG. 2 is a front view showing a first embodiment of the attachment fixture shown in FIG. 1;

FIG. 3 is a front view showing a second embodiment;

FIGS. 4 and 5 show an example of a conventional attachment fixture, wherein FIG. 4 is a side view and FIG. 5 is a front view; and

FIG. 6 shows a typical technique, and is a side view of a state in which a bucket is mounted to a tip end of a power shovel arm through an attachment fixture.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] An attachment fixture shown in FIG. 1 includes a body 34 for connecting an arm 11 of a power shovel and an attachment 17, and a spacer 35 interposed between the body 34 and the arm 11 or a front link and/or the attachment.

[0016] The body 34 of the attachment fixture includes a pair of links 2, 3 pivotally connected by a fulcrum pin 23 such that a distance between the links 2 and 3 can be freely widened and shortened. The links 2, 3 include bridging plates 4, 5 in the horizontal direction, a pair of upper plates 6, 7 to be located at both sides of the arm, and a pair of lower plates 8, 9 to be located opposite insides of two brackets of the attachment. The bridging plates 4, 5 and the pair of upper plates 6, 7 form a wide U-shape directing upward, and the bridging plates 4, 5 and the pair of lower plates 8, 9 form a narrow U-shape directing downward.

[0017] Connection pins 13, 14 for connecting the attachment fixture 1 to the power shovel arm 11 and the front link 12 are inserted through connection pin holes 15, 16 formed at medium positions of the upper plates 6, 7. The U-shaped holes 21, 22 for fixing the attachment fixture 1 and mounting pins 18, 19 of a bucket 17 are provided on a receiving block 30 which connects tip ends of the lower plates 8, 9 on opposite sides to be faced to the outside.

[0018] The links 2 and 3 are connected to each other by pivotally connecting the upper plates on the opposite sides with each other by a short fulcrum pin 23. The links 2 and 3 are swung around the short pin 23 relative to each other so that the distance between the U-shaped holes 21 and 22 is widened and shortened.

[0019] Between the lower plates 8 and 9 on both sides, block-like trunnions 24, 25 are mounted such that their opposite pins are pivotally supported by the opposite lower plates 8, 9. A base end of a screw rod 26 is pivotally supported by the trunnion 24 on the side of the link 2 rotatably and axially non-movably. The screw rod 26 is threadedly engaged with the other trunnion 25. The screw rod 26 is provided at its base end with a hexagonal screw head 27. By inserting a box spanner or the like into the screw head 26 to rotate the screw rod 26, the distance between the U-shaped holes 21 and 22 is widened or shortened, so that the bucket 17 is attached or detached. The screw head 27 is provided with a split pin hole which passes through the screw head in a direction at right angle to the axial direction. The screw rod 26 is fixed such that a rectangular lock plate having a size capable of fitting between the both lower plates 8, 9 and provided at its center with a rectangular hole fitted to the screw head 27 is inserted to the screw head 27, and a split pin is inserted to the split pin hole to pre-

vent the lock plate from coming off.

[0020] The receiving block 30 is formed such that its width is smaller than the smallest inner width of the bracket 31 among all of the attachments to be mounted to the power shovel, and the U-shaped holes 21, 22 are formed such that their diameters are smaller than the smallest diameter of the mounting hole 32 of the bracket. The mounting pin 18 for connecting the body 34 and the attachment has the same diameter as that of the U-shaped hole 21.

[0021] The spacer 35 is cylindrical in shape, cylindrical in shape having a flange, or disk-like shape having a hole of a size capable of just fitting in gap formed between the body 34 and the bracket 31 of the attachment or gap formed between the mounting pin 18 and the mounting hole 32 of the attachment. The diameter of the center hole 36 of the spacer 35 is the same as that of the mounting pin 18.

[0022] Next, a method for mounting various attachments to the arm using the above-described attachment fixture will be explained. In the case of the lower left attachment shown in FIG. 2, the diameter of the mounting hole 32 of the bracket of the attachment 17 is greater than that of the mounting pin 18, and the width of the receiving block 30 of the body is narrower than the inner width of the bracket 31. To such an attachment, the cylindrical spacer 35 having the flange is inserted to the mounting hole 32 from its inner side, and the mounting pin is inserted into the center hole 36 of the spacer 35. Then, the U-shape hole 21 of the body is fitted over the mounting pin 18 from the outside, thereby mounting the attachment without any gap.

[0023] In the case of the lower center attachment shown in FIG. 2, the mounting hole 32 of the bracket has the same diameter as that of the U-shaped hole 21, and the inner width of the bracket 31 is substantially the same as the width of the receiving block 30 of the body. This attachment can be mounted without any gap without using any spacer.

[0024] In the case of the lower right attachment shown in FIG. 2, although the mounting hole 32 of the bracket has the same diameter as that of the U-shaped hole 21, the inner width of the bracket 31 is slightly wider than the width of the receiving block 30 of the body. In this case, the disk-like spacer 35 having the hole is inserted to the mounting pin 18 such that the spacer 35 is located inside the bracket, and the receiving block 30 of the body is fitted between the spacers 35 from the outside, thereby the attachment being mounted without gap.

[0025] FIG. 3 shows an example of the spacer to be provided on the upper plate, and shows the fixture capable of being mounted to various arms having different tip end width. This fixture includes a spacer 37 interposed between the body 34 and the arm 11 as well as the front link 12.

[0026] The diameter of each of the connection pin holes 15, 16 of the body 34 is formed greater than the outer diameters of the connection pin 13 of the power shovel arm and the front link. The inner width of the upper plate is formed wider than the maximum width of the tip end width of the power shovel arm and the front link to which the body is mounted. The spacer 37 is cylindrical in shape, cylindrical in shape having a flange, or disk-like shape having a hole of a size capable of just fitting in gap formed between the body 34 and the arm 11 or gap formed between the connection pin 13 and the connection pin hole 15. The diameter of the center hole 38 of the spacer 37 is the same as that of the connection pin 13.

[0027] Next, a method for mounting the attachment fixture of the present embodiment to the arms of various shapes will be explained. In the case of the upper left arm shown in FIG. 3, the width of the arm and the inner width of the upper plate of the body are the same, but the diameter of the connection pin is smaller than that of the upper pin hole. In this case, a short cylindrical spacer 37 is inserted to the pin hole 15, and the connection pin 13 is inserted in a state in which the upper plates are located on opposite sides of the arm. With this procedure, the arm and the fixture can be connected to each other without gap.

[0028] In the case of the upper center arm shown in FIG. 3, the width of the arm and the inner width of the upper plate of the body are the same, and the connection pin 13 and the pin hole 15 of the upper plate have the same diameter. In this case, the fixture can be mounted to the arm without gas even if the spacer 37 is not used.

[0029] In the case of the upper right arm shown in FIG. 3, the width of the arm 11 is smaller than the inner width of the upper plate 6 of the body, and the connection pin 13 and the pin hole 15 of the upper plate have the same diameter. In this case, the disk-like spacer 37 having the hole is placed inside of the upper plate, the tip end of the arm is inserted between the spacer 37 and the upper plate so that the connection pin 13 is inserted to the pin hole 15. With this procedure, the fixture can be mounted to the arm without gap. If there are gaps between the connection pin and the mounting hole, and between the arm and the upper plate, the fixture can be mounted without gap by using the cylindrical spacer having the flange.

[0030] By using the attachment fixture having both the structure explained in FIG. 2 and the structure explained in FIG. 3, it is possible to mount the arm and the front link and the attachment without gap and therefore, it is possible to provide a general-purpose attachment fixture capable of connecting various types of power shovel and various types of attachment with each other by using one fixture.

[0031] By using the attachment fixture of the present invention, it is possible to connect an arm and an operation attachment having different mounting width and pin diameter and an attachment fixture to one another without generating gap therebetween, and in such a state, it is possible to accurately and safely operate the

operation attachment. Therefore, for a construction worker or construction site using various power shovels or operation attachments, cost and burden required for preparing the operation attachment can be reduced.

[0032] Having described preferred embodiments of the invention with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments and that various changes and modifications could be effected therein by one skilled in the art without departing from the spirit or scope of the invention as defined in the appended claims.

Claims

1. An attachment fixture of a power shovel, comprising a body for connecting an attachment to an arm and a front link of the power shovel, and a spacer interposed in a gap formed between the body and the attachment, wherein the body comprises upper plates located at opposite outer sides pf tip ends of the arm and the front link, and a pair of link including U-shaped holes formed in inner sides of a bracket of the attachment, the links include connection pin holes connecting the arm and the front link at medium positions in the longitudinal direction of the links, a pin hole of a fulcrum pin for pivotally supporting the pair of links is disposed above the connection pin holes, U-shaped holes opposed to each other or directed into the opposite direction from each other are disposed below the connection pin holes, and the spacer is formed into a cylindrical shape, a cylindrical shape having a flange, or a disk-like shape with a center hole having the same diameter as those of mounting pins which connect the body and the attachment with each other.

2. An attachment fixture of a power shovel, comprising a body for connecting an attachment to an arm and a front link of the power shovel, and a spacer interposed in a gap formed between the body and the arm as well as the front link, wherein the body comprises upper plates located at opposite outer sides of tip ends of the arm and the front link, and a pair of link including U-shaped holes formed in inner sides of a bracket of the attachment, the links include connection pin holes connecting the arm and the front link at medium positions in the longitudinal direction of the links, a pin hole of a fulcrum pin for pivotally supporting the pair of links is disposed above the connection pin holes, U-shaped holes opposed to each other or directed into the opposite direction from each other are disposed below the connection pin holes, the spacer is formed into a cylindrical shape, a cylindrical shape having a flange, or a disk-like shape with a center hole having the same diameter as those of connection pins which connect the body, the arm as well as the front link with one another.

3. An attachment fixture of a power shovel according to claim 1, further comprising a spacer interposed in a gap formed between the body and the arm as well as the front link, wherein the spacer is formed into a cylindrical shape, a cylindrical shape having a flange, or a disk-like shape with a center hole having the same diameter as those of connection pins which connect the body, the arm as well as the front link with one another.

FIG. 1

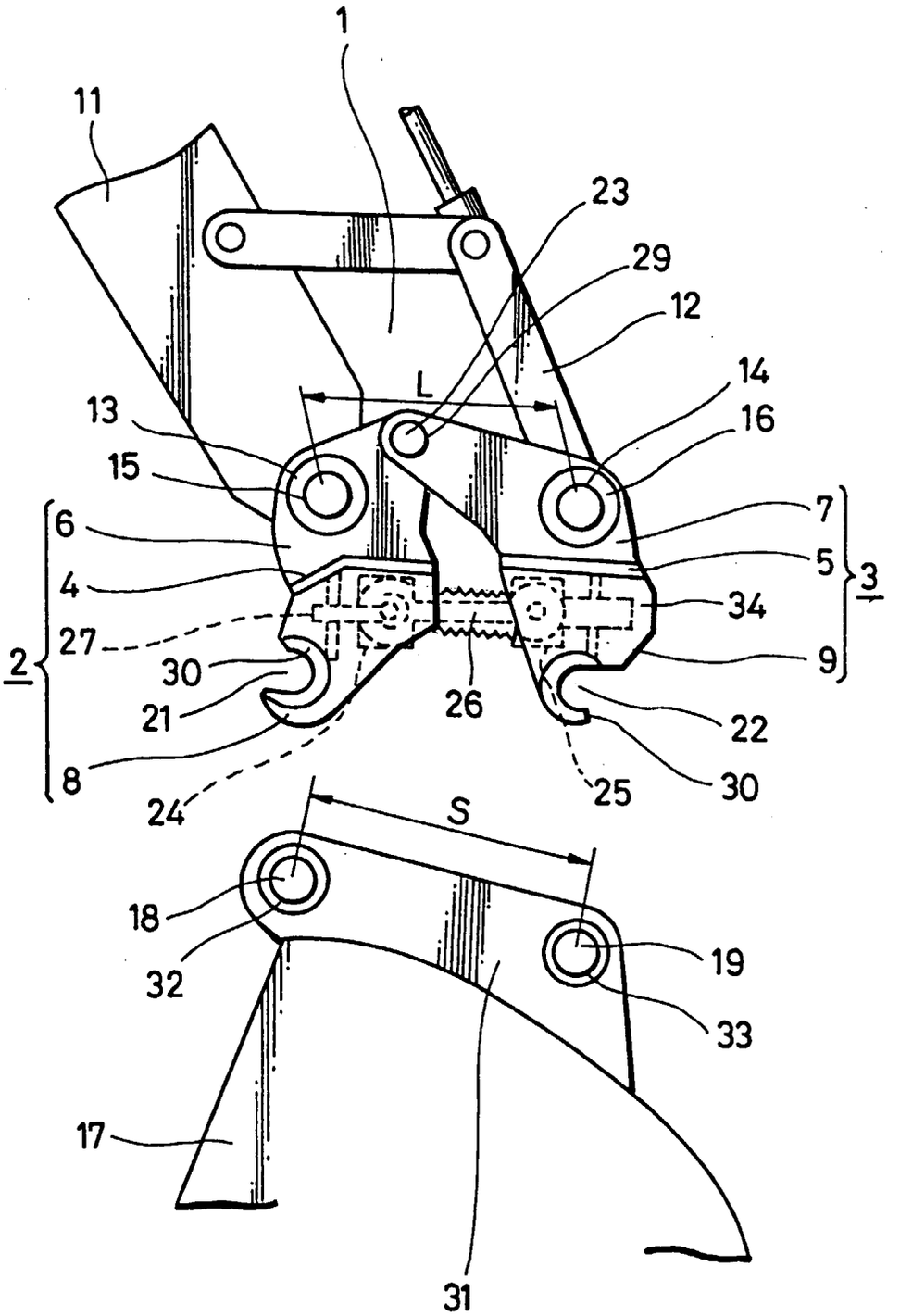
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FIG. 2

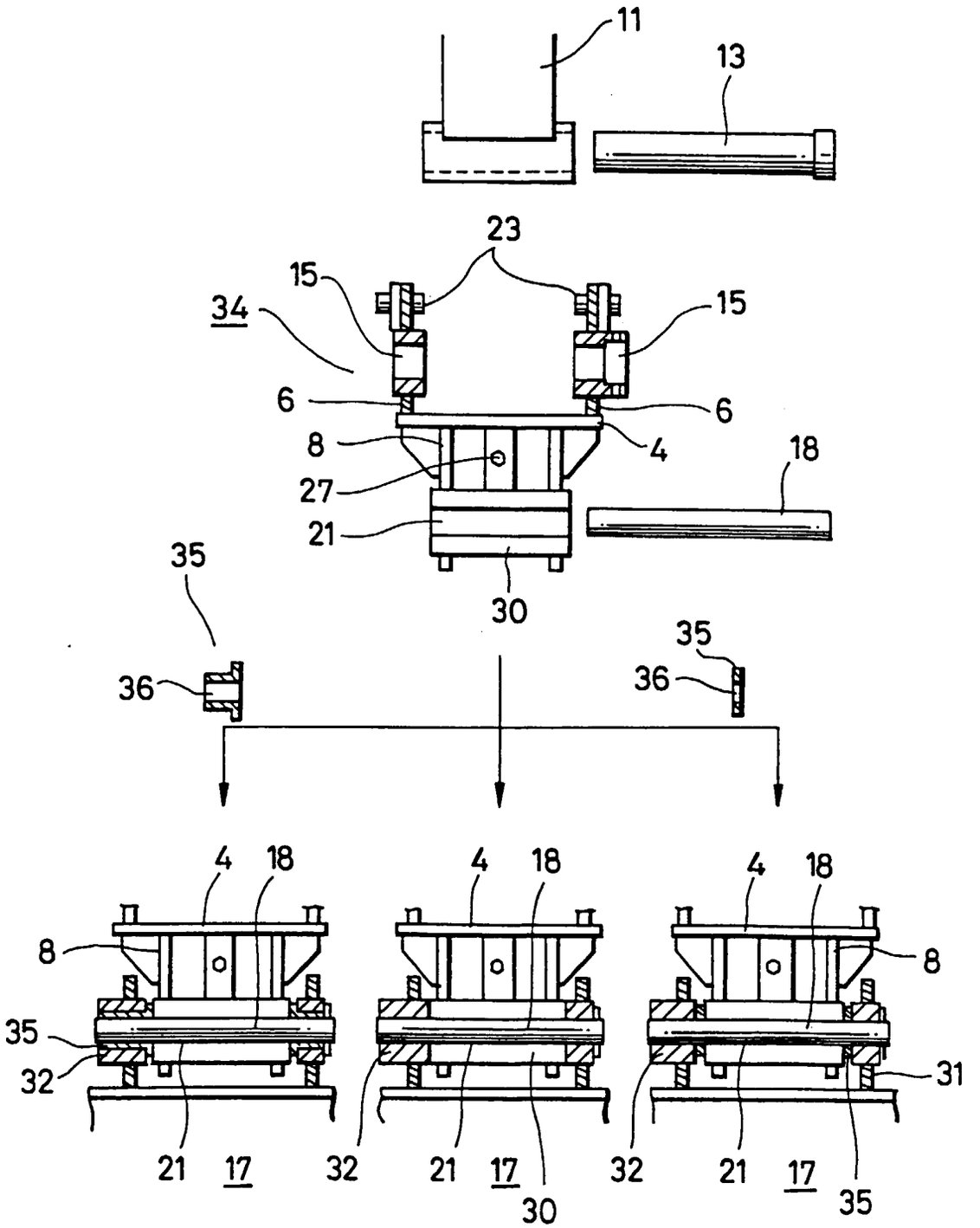
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FIG. 3

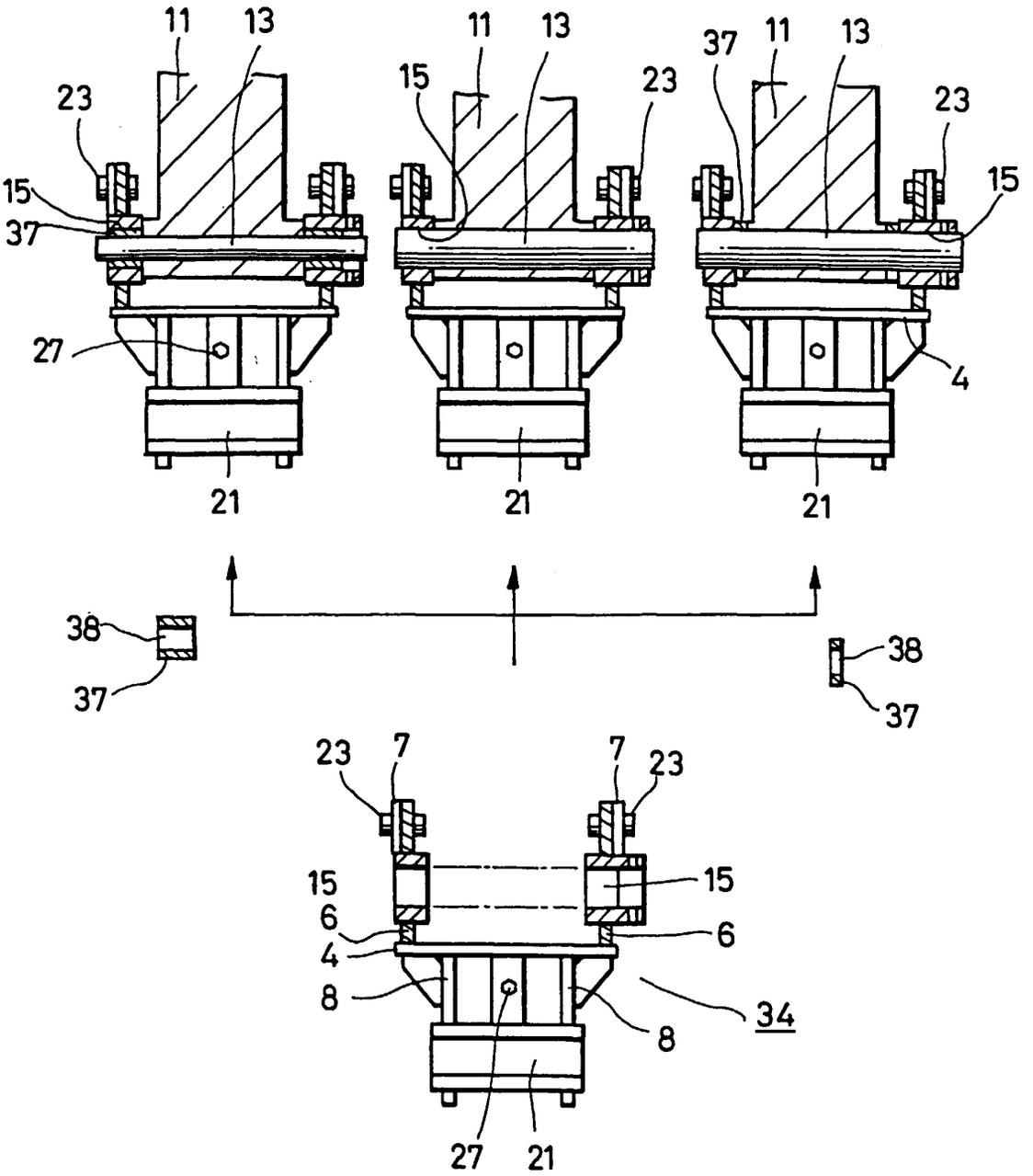


FIG. 4

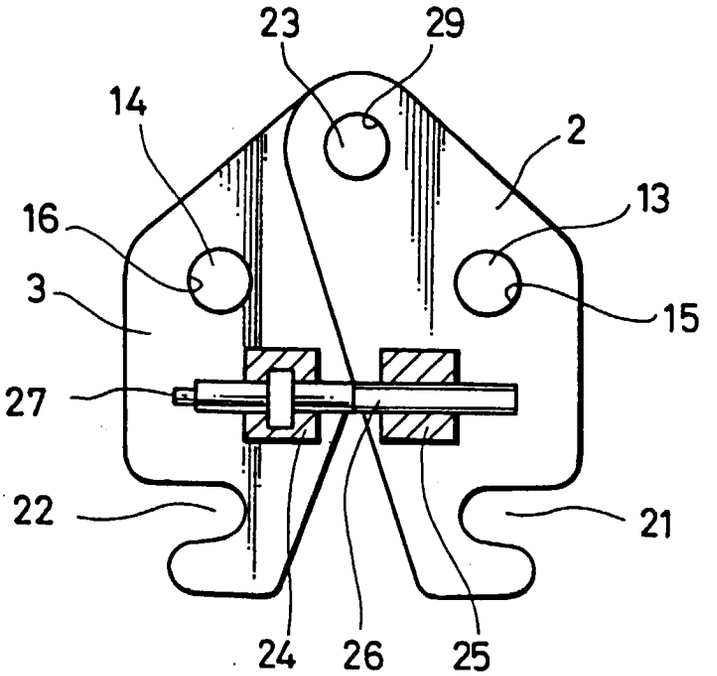


FIG. 5

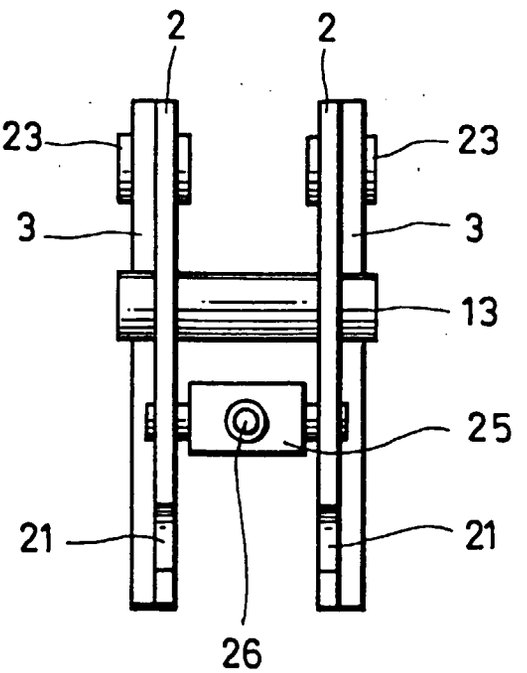
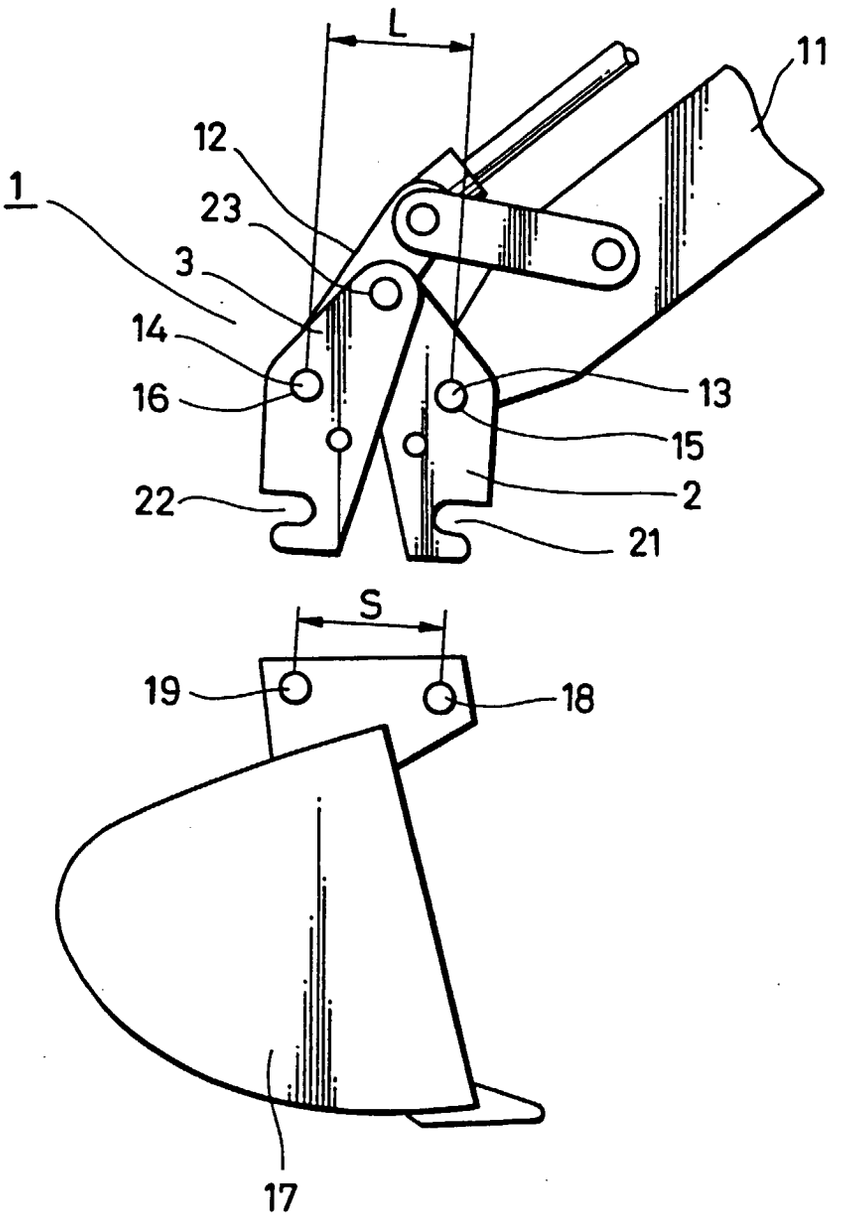


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 99 12 2762

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.7)
A	DE 297 11 553 U (NAGLER JUERGEN) 4 September 1997 (1997-09-04) * claims; figures *	1,2	E02F3/36
A	WO 94 29533 A (CATERPILLAR INC) 22 December 1994 (1994-12-22) * page 6, line 3 - line 6 * * figure 3 *	1,2	
A	US 4 133 121 A (HEMPHILL CHARLES W) 9 January 1979 (1979-01-09) * figures 1,2,5,6,8 * * column 5, line 6 - column 7, line 6 *	1,2	
A	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 04, 30 April 1999 (1999-04-30) -& JP 11 021940 A (YUTANI HEAVY IND LTD;KOBE STEEL LTD), 26 January 1999 (1999-01-26) * abstract * * figures 3-7 *	1,2	
A	WO 99 06317 A (ALLIED CONST PROD INC) 11 February 1999 (1999-02-11) * figures *	1,2	TECHNICAL FIELDS SEARCHED (Int.Cl.7) E02F F16C
A	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 08, 30 August 1996 (1996-08-30) & JP 08 085970 A (SHIN CATERPILLAR MITSUBISHI LTD), 2 April 1996 (1996-04-02) * abstract *	1	
A	US 4 961 667 A (REINSMA HAROLD L ET AL) 9 October 1990 (1990-10-09) * figures 2-4 *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 June 2000	Guthmuller, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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09-06-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 29711553 U	04-09-1997	NONE	
WO 9429533 A	22-12-1994	AU 7042394 A	03-01-1995
		EP 0654106 A	24-05-1995
		JP 8500408 T	16-01-1996
		SG 68569 A	16-11-1999
		US 5494396 A	27-02-1996
US 4133121 A	09-01-1979	US 4037337 A	26-07-1977
		US 4207693 A	17-06-1980
		AT 361860 B	10-04-1981
		AT 540077 A	15-08-1980
		AU 506310 B	20-12-1979
		AU 2697777 A	18-01-1979
		BE 857134 A	14-11-1977
		BR 7704902 A	02-05-1978
		CA 1071263 A	05-02-1980
		DE 2733543 A	23-02-1978
		FR 2362247 A	17-03-1978
		GB 1576048 A	01-10-1980
		IT 1085498 B	28-05-1985
		JP 1209289 C	29-05-1984
		JP 53025001 A	08-03-1978
		JP 58040611 B	07-09-1983
		MX 143237 A	03-04-1981
		NO 772639 A,B,	21-02-1978
		SE 7708428 A	19-02-1978
		US 4123861 A	07-11-1978
		US 4117611 A	03-10-1978
		US 4098013 A	04-07-1978
JP 11021940 A	26-01-1999	NONE	
WO 9906317 A	11-02-1999	US 5927665 A	27-07-1999
		AU 8602798 A	22-02-1999
JP 08085970 A	02-04-1996	NONE	
US 4961667 A	09-10-1990	CA 2035874 A,C	06-03-1991
		DE 69018442 D	11-05-1995
		DE 69018442 T	14-12-1995
		EP 0448648 A	02-10-1991
		ES 2070313 T	01-06-1995
		JP 2688451 B	10-12-1997
		JP 4502805 T	21-05-1992
		WO 9103654 A	21-03-1991

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82