DKP

DIRECTOR OF MECHANICAL & ELECTRICAL ENGINEERING | DERBY

Engineering Instruction

No. MD / 292
ISSUE 5

TITLE

BRAKEWORK - DERBY-TYPE DMU POWER BOGIES.

LOCOMOTIVES, VEHICLES OR EQUIPMENT

Description	Serial Nos.	Lot Nos.
Power Bogies - Class No 104, 105, 107, 108 110, 114, 115, 116, 117, 118, 119, 121, 122.		

LOCOMOTIVE, VEHICLE OR EQUIPMENT CODES

DMU 104, 105, 107, 108, 110, 114, 115, 116, 117, 118, 119, 121, 122.

COMPONENT CODES

0350

LVRS CODE

WORKS | DEPOTS

INSTRUCTION

This Instruction supersedes Engineering Instruction MD/292 Issue 4 dated 1 September 1983 which shall be destroyed.

1. General

1.1 All Bogies (except Class 108) are fitted with R2 Brake shoes.

Class 108 is fitted with LM19 Brake shoes.

1.2 On Power Bogies all vertical levers (Hangers) shall have bosses welded onto the bottom end to eliminate the Girder Washer at the Crossbar connection, see FIG 11. There should be 1/16" clearance between the Vertical Lever and Crossbar Shoulder, see FIG 1.

1.3 At C3 Repair Only

On Power Bogies all vertical lever guide brackets shall have the Ferrobestos Pads removed.

/Continued .....

Type of Instruction	Recurring	/	Non-Recurring	/

Signed _____ Date 25.2.85 Corres. Ref TSU/177-320-302 (CGW)

Approved _____ Business Engineer / Functional Head

Countersigned M V Carey D of M & E E. Telephone No. 056-3525

For B.R.E.L. HQ. USE ONLY

B.R.E.L. Eng. Inst. No.	Type of Instruction		Estimates of unit cost change are/are not required	
	Recurring	Non-Recurring	Recurring	Non-Recurring

Registration Panel

To :- * Divisional / Works Manager _____

* Works / Depot _____

Please acknowledge receipt of this Engineering Instruction

Signed _____ Corres. Ref. _____ Date _____
for D.M.& E.E. / M.D., B.R.E.L.

* Delete whichever is not applicable

Engineering Instruction

(Continuation)

All Vertical Levers shall be fitted with Ferrobestos Pads.

No repairs are to be made to floating lever guide brackets of the "cantilever pin" type. Any floating lever guide bracket of the "Cantilever pin" type requiring repair shall be put to scrap.

All new floating lever guide brackets shall be manufactured to the cast-steel design, i.e. 'double shear pin' type. See drawing No. B-A1-1463 for the replacement bracket. See Table 4 for list of BR Catalogue numbers.

During overhaul of a bogie if one or more of the cantilever pin type brackets requires replacement then remove all floating lever guide brackets and replace with the new cast steel designs.

Floating lever guide brackets to be fitted in the correct location and alignment with respect to horn blocks using a jig locating on horn block fastening holes in bogie frame. (See Fig 3, 4 and 5 and Table 1). Any adjustment of the bracket position necessary may be made by drilling the fastening holes in the bracket to suit the holes already existing in the bogie headstock and trimmers.

1.4 At C4 Repair Only

Examine the floating lever guide brackets for security of the 'Cantilever pins' and 'Ferobestos' pads.

Where any pin is found to be loose, the bracket should be replaced with a sound bracket removed as in 1.3 above in preference to repairing the existing item.

Replace worn 'Ferobestos' pads as necessary.

1.5 On all bogies the castellated or slotted nuts and split pins shall be changed to prevailing torque nuts (bent beam type) (see Figs 1 and 2). When tightened at least two threads should protrude from the nut. Where difficulty in achieving this occurs with bottom crossbeams then a thin prevailing torque nut (bent beam type) (BR Cat No 3/78131) may be used.

2. Brakework Overhaul at Main Works

2.1 Any noticeable distortion in brakework components shall be rectified.

2.2 Brakework components which work in pairs shall be matched. The correct length of pull rod shall be used, (see Tables 1 and 2).

2.3 Crossbars and Additional Tie Bars shall be checked dimensionally over shoulders, (see Tables 1 and 2), Figs 6, 7 and 8.

2.4 Brakeblock Holders:

Gauge holes for wear; if wear at any position or on any diameter exceeds the limits tabulated in Table 5 renew or fit bushes.

2.5 Gauge for wear all pins, bolts, and trunnions, and bushes and unbushed holes used in jointed connections. Gauge inside diameters using a flat plug gauge and not a cylindrical gauge. Renew pins, bolts, and bushes, and repair trunnions and unbushed holes found to be worn in excess of the limits given in Table 5.

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3.0 Setting of Brakework at Main Works and Depots

After brakework overhaul or repairs, and also after tyre turning at Regional Depots, the brakework must be set so that after five repeated full brake applications the following features are obtained:-

i. 1/2" (13 mm) free lift of the brake cylinder piston as indicated by the tops of the holes in the bell crank and in the piston rod being in line. (See fig 12). Ensure piston is at its lowest position. Free lift is adjusted by means of the free lift stop.

ii. Nominal 1/8" (3 mm) clearance between each brakeblock and wheel tread.

iii. Brake cylinder piston reserve stroke with AVB fully applied of at least 5" (130 mm) (see Fig 13), after brakework overhaul.

iv. Correct position and alignment of bogie brakework. This is indicated by:

a) with the brake released a gap of 1/2" to 3/4" (13 to 19 mm) between the back of each of the four floating vertical levers and their brackets (see Fig 14 a/).

and b) the top equalizing beam not lying askew on the bogie (see Fig 14 b/).

Adjust a/ by altering the length of the top adjusting screw, and b/ by altering the length of the block adjusting pull rods on one side of the bogie.

A procedure for setting the brakework is given in Appendix I.

TABLE 1

CLASS	BRAKE BLOCK CENTRES	SHOULDER - SHOULDER DIM. OF CROSS BAR	SHOULDER - SHOULDER DIM. OF TIE BARS	SPACING OF VERTICAL LEVER GUIDE BRACKETS	LENGTH OF PULL RODS
104, 110	4'11.1/2"	4'9.3/8"	4'8.5/8"	4'9.15/16"	7'9.3/16"
105	4'11.3/8"	4'9.1/4"	4'8.5/8"	4'9.13/16"	7'9.5/16"
107, 114, 116, 117, 118, 119, 121, 122, 130 & 131	4'11.1/2"	4'9.3/8"	4'8.5/8"	4'9.15/16"	7'4.13/64" * Slotted Pull Rod Length 3'5.3/4"
115, 127	4'11.1/2"	4'9.3/8"	4'8.5/8"	4'9.15/16"	7'4.1/8"
108	5'0"	4'10"	-	4'10.7/16"	7'9.5/16"

* On vehicles designed for W.R. AWS.

See also Table 3.

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(Continuation)

TABLE 2

CLASS	BRAKE ARRANGEMENT DRG. NO.	CROSS BAR ITEM NO.	TIE BAR ITEM NO.	VERT. LEVER GUIDE BRACKET ITEM NO.	PULL ROD ITEM NO.
104, 110	DE/21884	P/DE/36804 Q/DE/36804	1,2,3 & 4 B-A0-411	G,H,M,N,L & P DE/36410	N/DE/36804
105	DE/37188	K/DE/36362 L/DE/36362	1/B-A0-411 4/B-A0-411	N',K',L',C',B' & U DE/36082	G/DE/36362
108	DE/46302	2/DE/34730 4/DE/34730	1,2 & 4 B-A0-411	6,7,8,9,10 & 11 DE/34787	3/DE/34787
107, 114 & 130	DE/1863 H/BRAKE-DE/21217	4/DE/21209 7/DE/21209	1,2,3 & 4 B-A0-411	14,15,16,17 & 18 DE/21209	13/DE/1862
115 & 127	DE/21452 H/BRAKE-DE/21217	4/DE/21209 7/DE/21209	1,2,3 & 4 B-A0-411	13,14,15/DE/45927 14 & 16/DE/21209	1/DE/45927
116,117,118 & 119	DE/21309 DE/1863 H/BRAKE-DE/21217	4/DE/21209 7/DE/21209 9/DE/46022	1/B-A0-411 4/B-A0-411 1/B-A0-820	14,15,16,17 & 18 DE/21209	13/DE/1862 13/DE/46022
121,122 & 131	DE/21309 DE/1863 H/BRAKE-DE/21217	4/DE/21209 7/DE/21209 9/DE/46022	1/B-A0-411 2/B-A0-411 4/B-A0-411 1/B-A0-820	14,15,16,17 & 18 DE/21209	13/DE/1862 13/DE/46022

TABLE 3

VEHICLES DESIGNED FOR WR ATC
No. 1 (driving end) bogie only

CLASS	NO. RANGE
116	50050 to 50091, 50092 to 50133 50818 to 50870, 50871 to 50923 51128 to 51140, 51141 to 51153
117	51332 to 51373, 51374 to 51415
118	51302 to 51316, 51317 to 51331
119	51052 to 51079, 51080 to 51107
121	55020 to 55035
122 & 131	55000 to 55019

TABLE 4

BR CATALOGUE NUMBERS FOR REPLACEMENT BRAKE LEVER GUIDE BRACKETS

BR CAT NO	B-A1-1461 BRAKE LEVER GUIDE BRACKET (MACHINED)	
14/2603	Item 1	)
14/2604	" 2	)
14/2605	" 3	) Casting
14/2606	" 4	) B-A -1462
14/2608	" 5	) 14/2612
14/2609	" 7	)
14/2610	" 8	)
14/2611	" 9	)
14/2613	ITEM 6 HEADLESS PIN	

BR CAT NO	B-A1-1458 BRAKE LEVER GUIDE BRACKET (MACHINED)	
14/2614	Item 1	)
14/2615	" 2	)
14/2616	" 3	) Casting
14/2617	" 4	) B-A1-1460
14/2618	" 6	) 14/2622
14/2619	" 7	)
14/2620	ITEM 8 SPACER	
14/2621	ITEM 9 HEADLESS PIN	

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(Continuation)

TABLE 5

LIMITS OF WEAR FOR PINS, BOLTS, TRUNNIONS, BUSHES AND UNBUSHED HOLES USED IN JOINTED CONNECTIONS IN BRAKEWORK

Nominal Pin/Bolt/Trunnion Diameter	Max. wear on any diameter	Nominal Bush inside diameter or hole diameter if unbushed	Max. wear on any diameter
Up to and including 5/8"	0.010"	Up to and including 1.57/64"	0.015"
Over 5/8" and up to and including 1.7/8"	0.015"	Over 1.57/64"	0.020"
Over 1.7/8"	0.020"		

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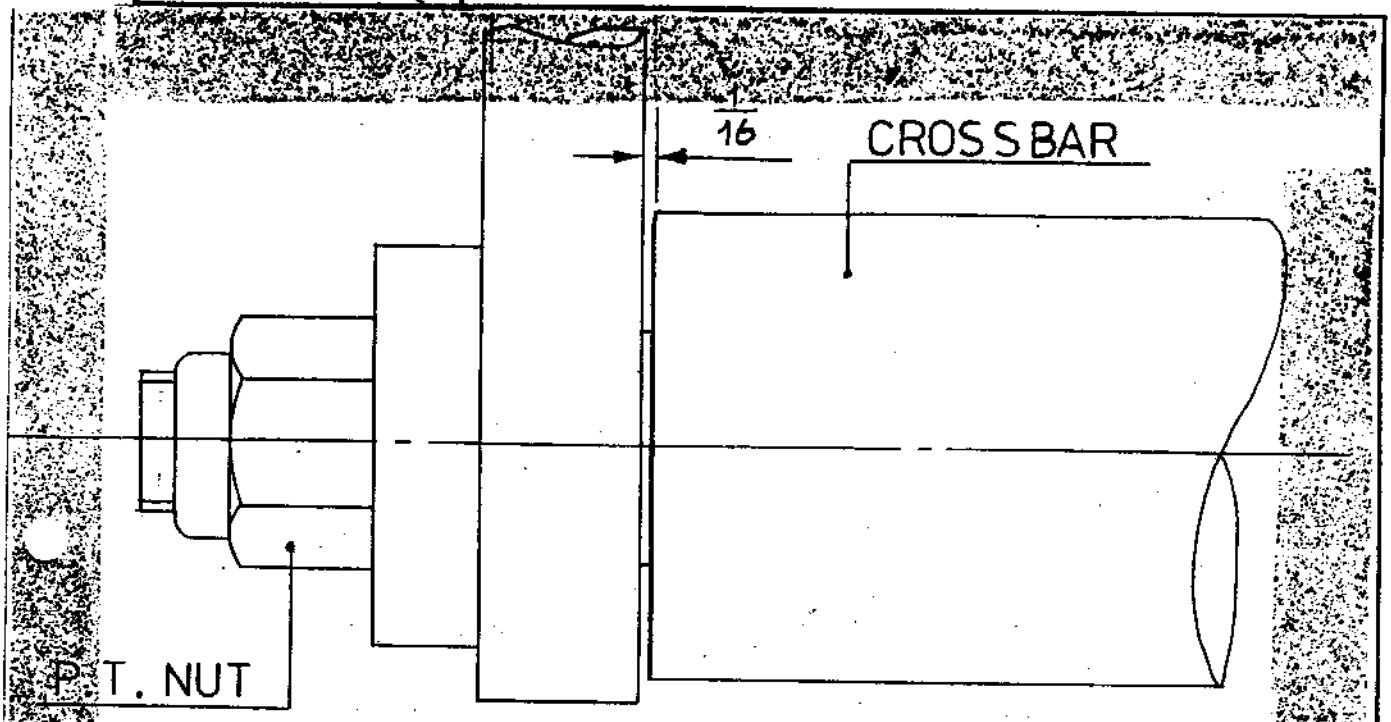

FIG. 1.

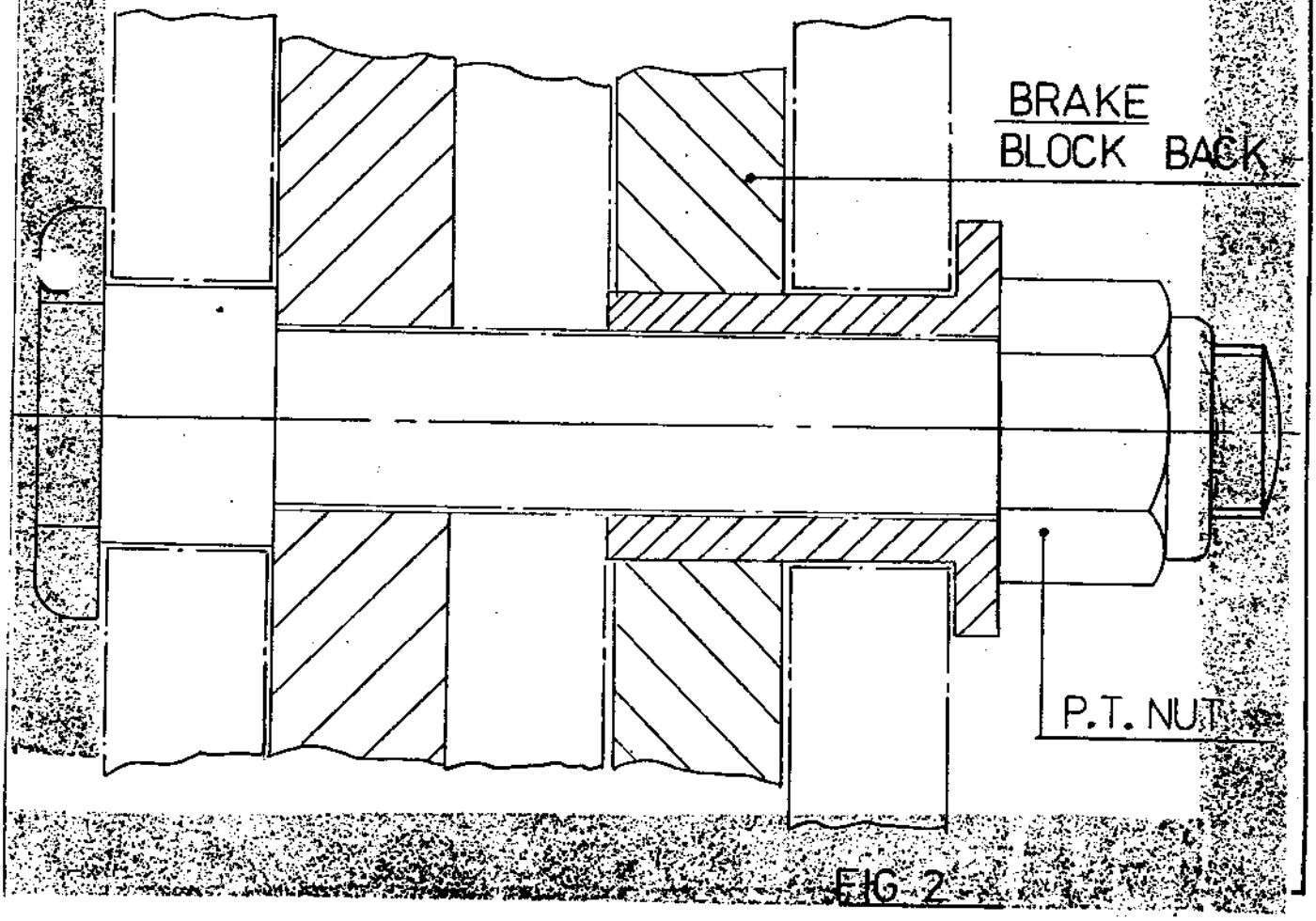

FIG 2

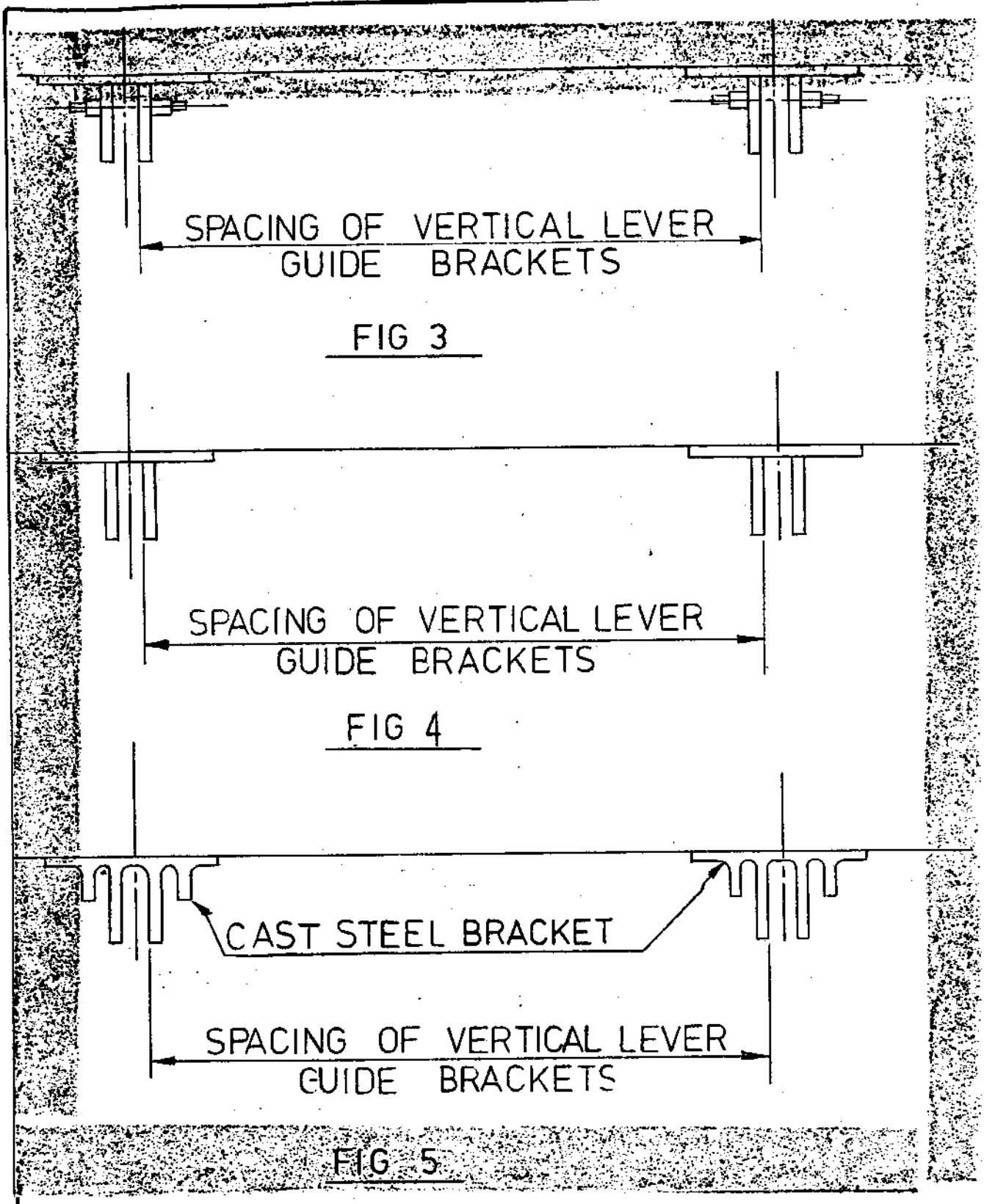

FIG 3

FIG 4

FIG 5

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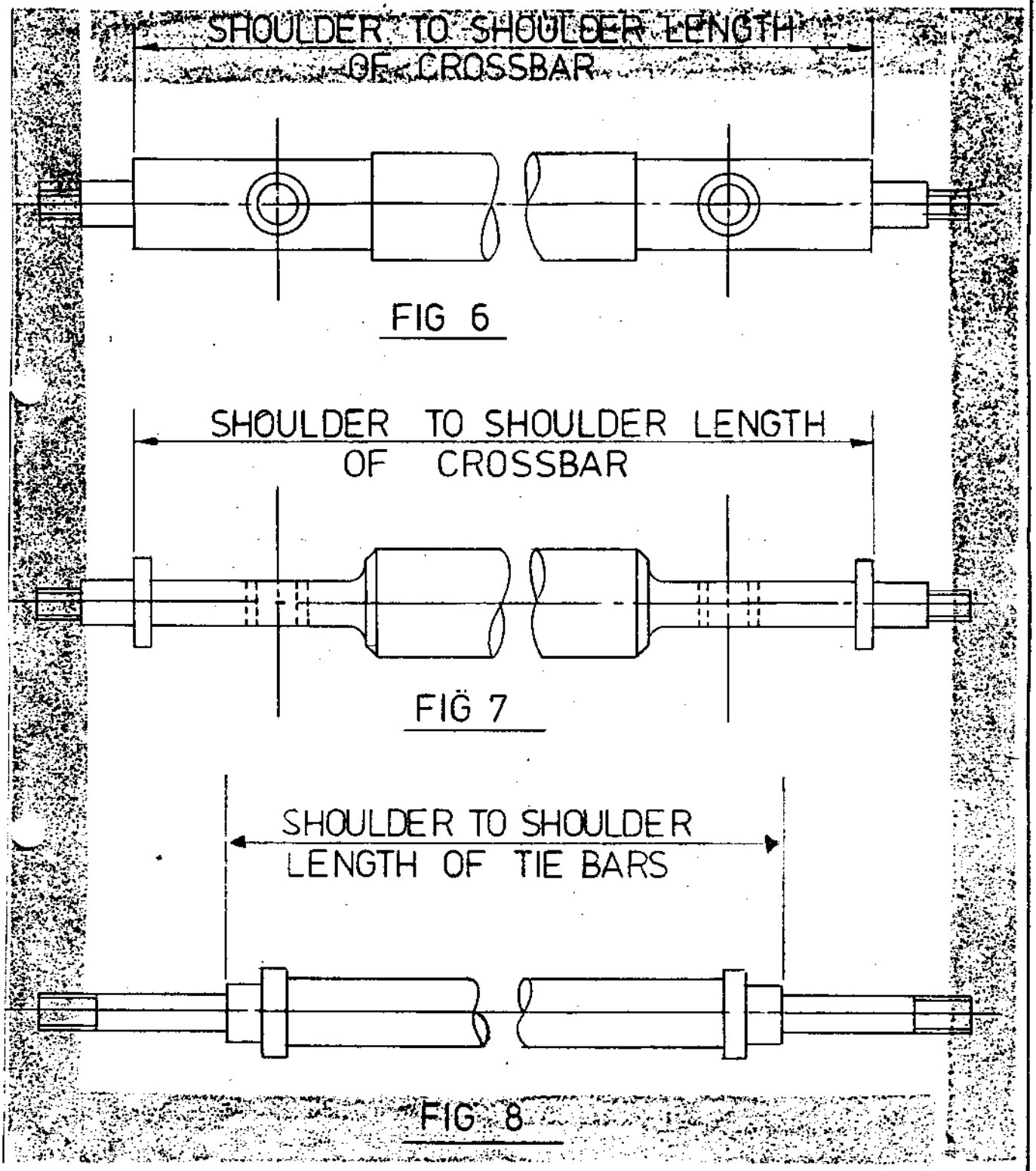

FIG 6

FIG 7

FIG 8

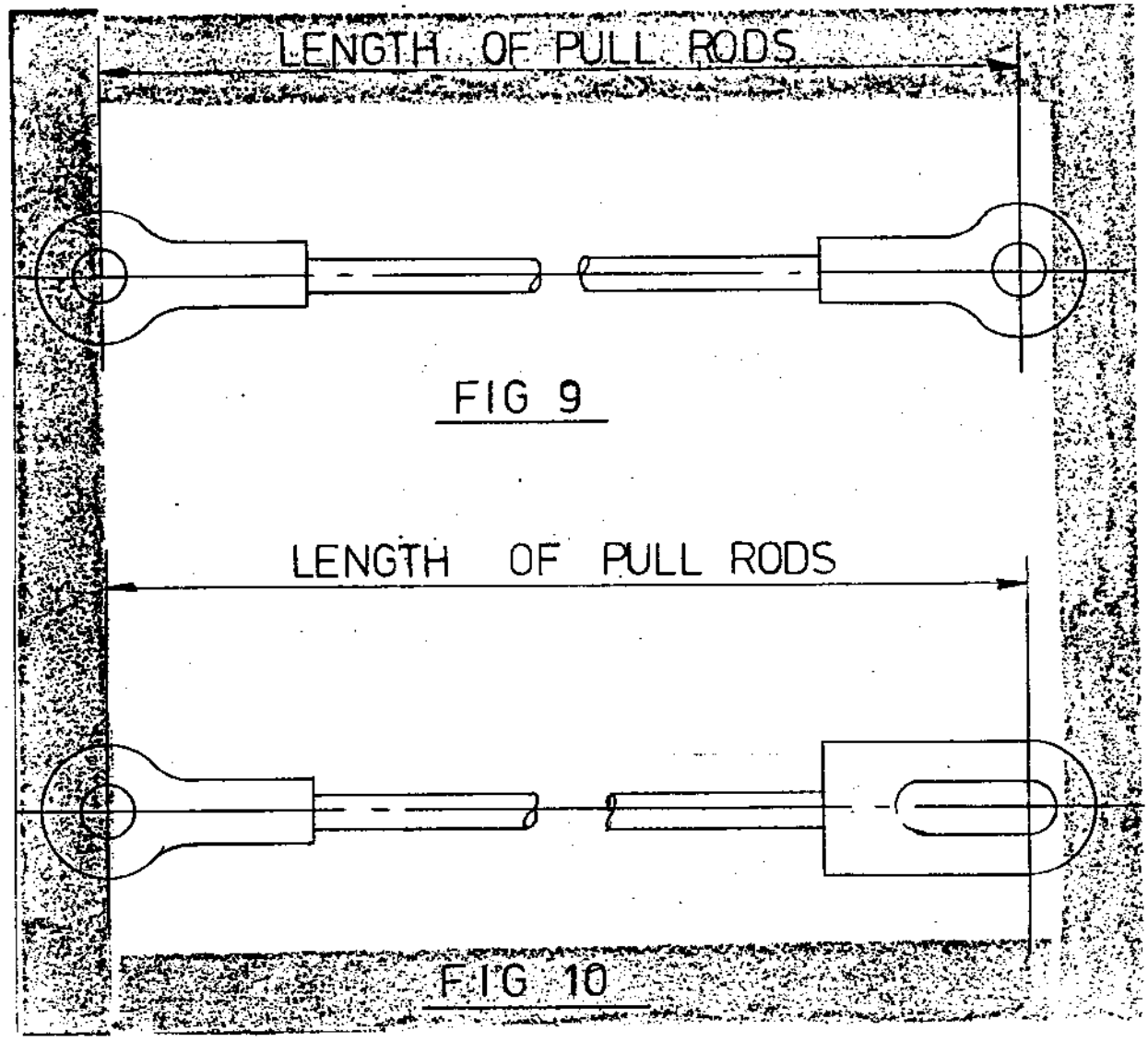

FIG 9

FIG 10

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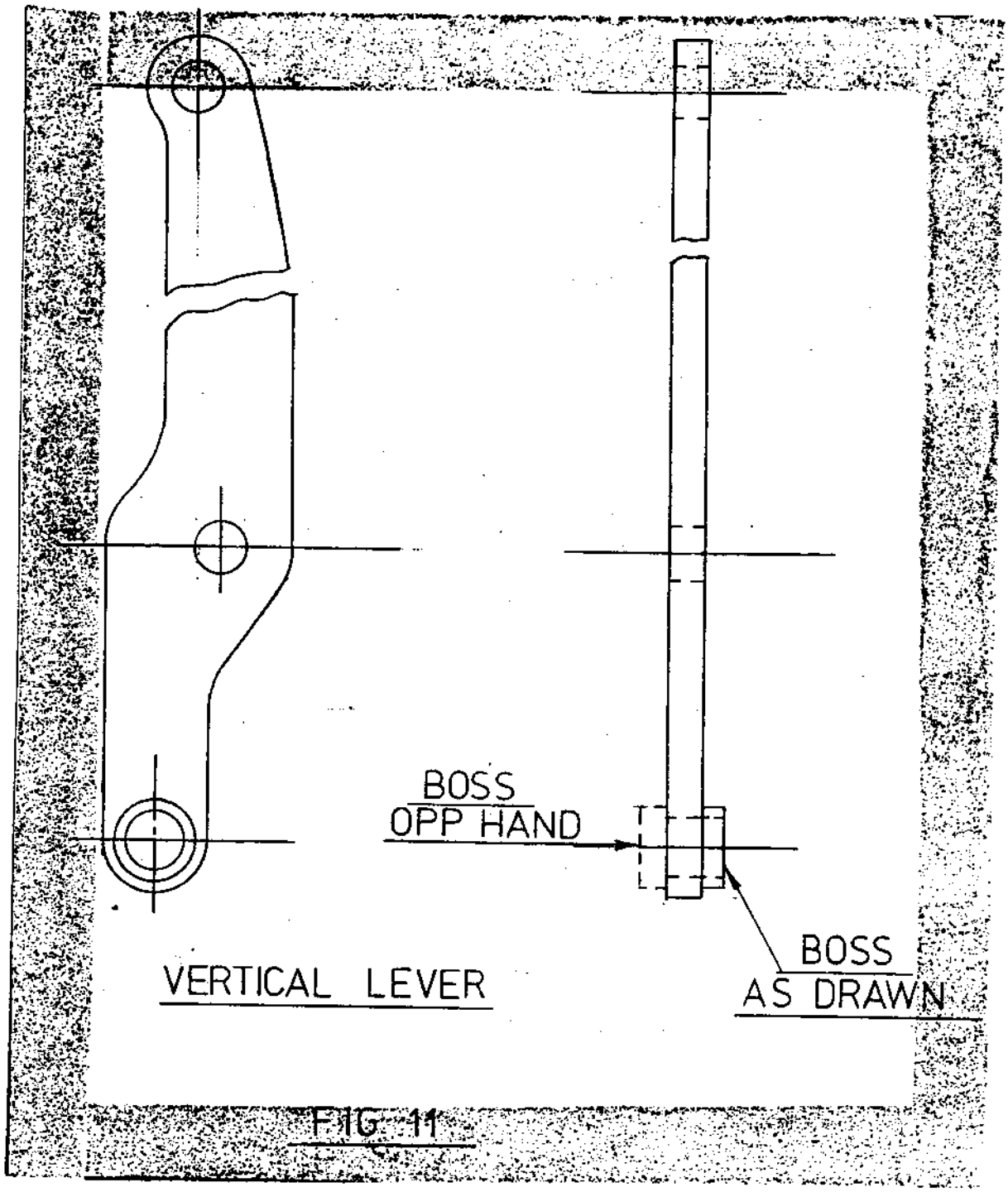

FIG 11

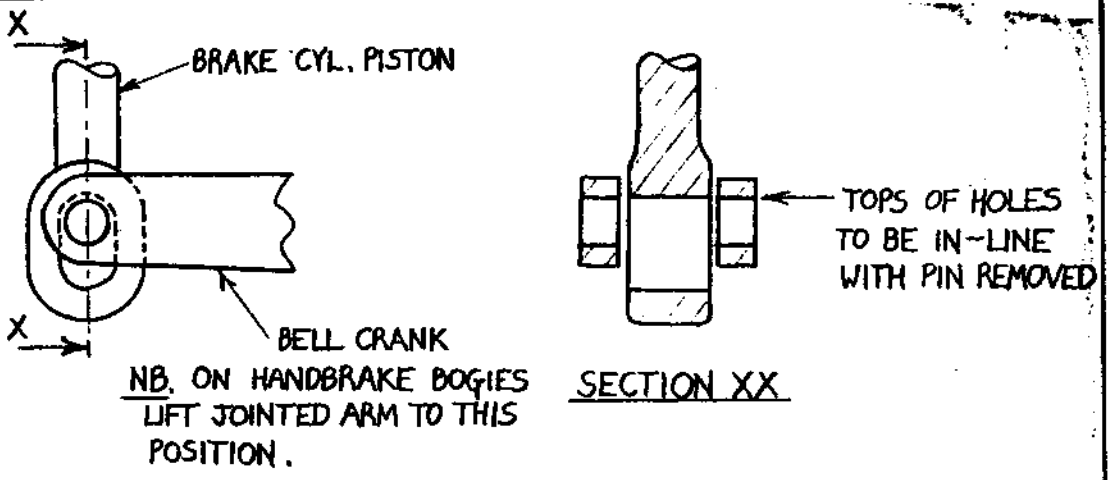

FIG. 12, METHOD FOR CHECKING ½" FREE LIFT.

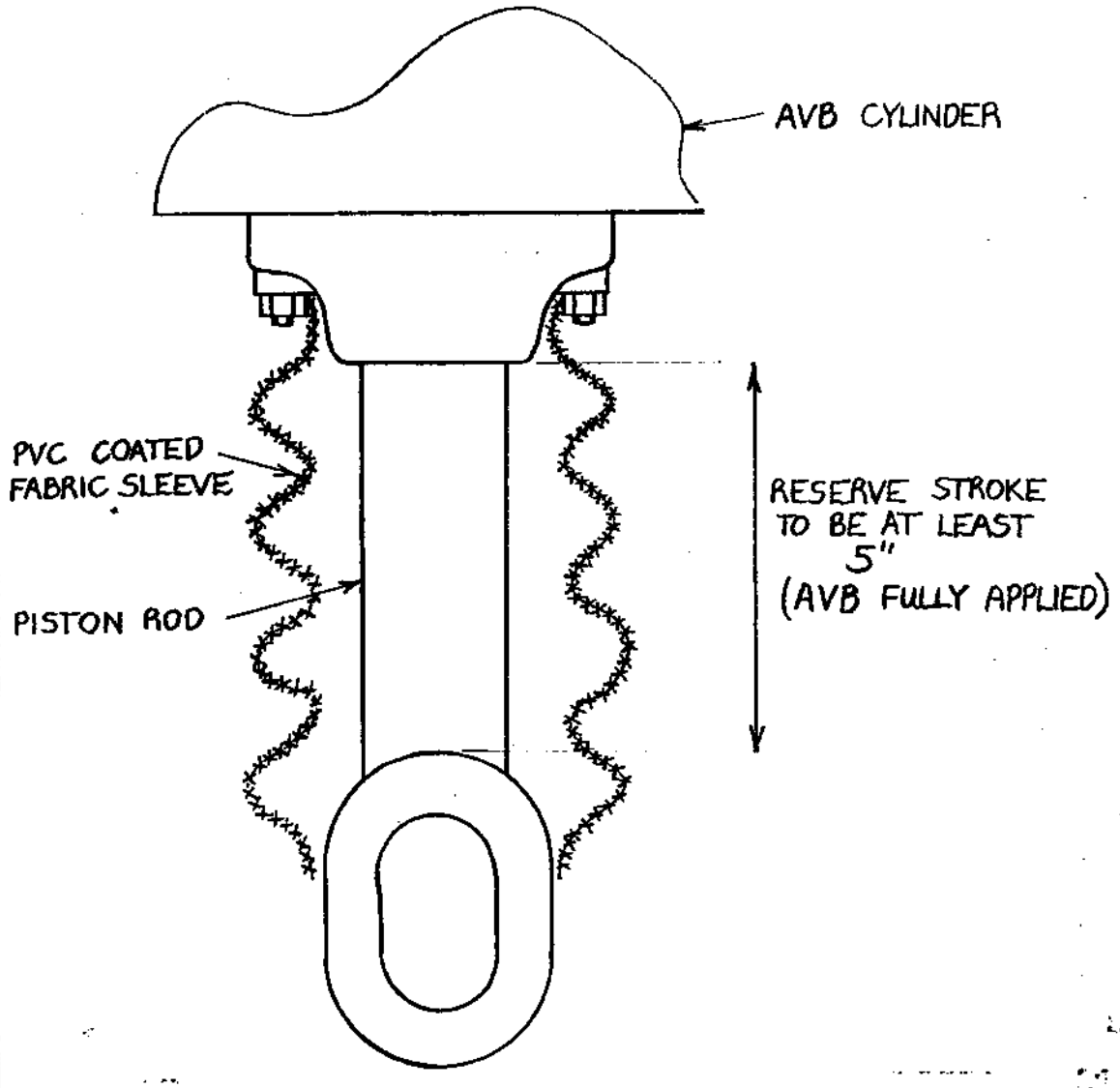

FIG. 13, MEASUREMENT OF RESERVE STROKE

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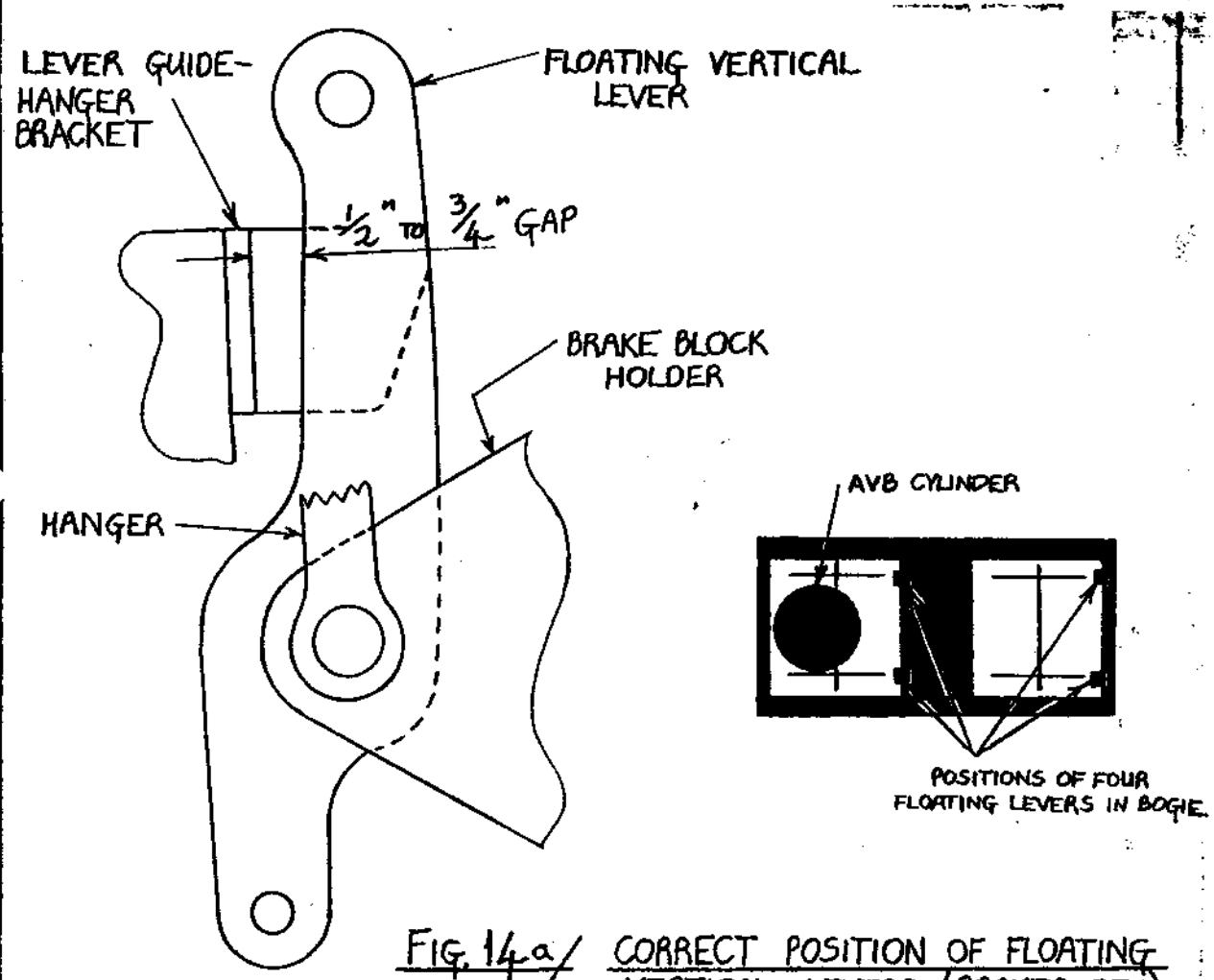

FIG. 14a/ CORRECT POSITION OF FLOATING VERTICAL LEVERS (BRAKES OFF)

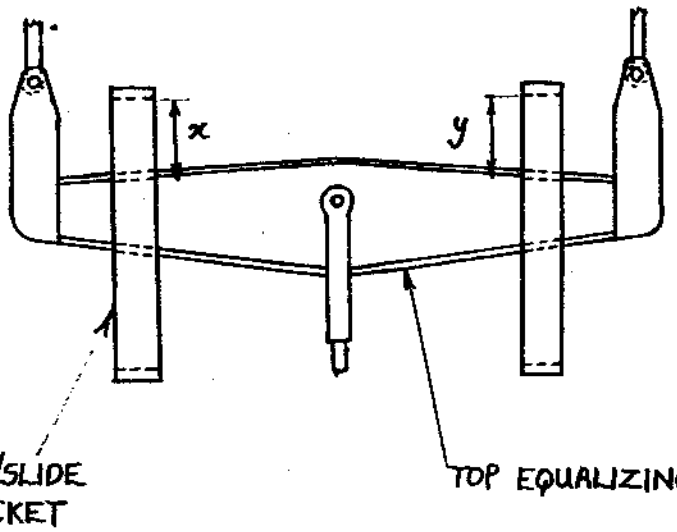

FIG. 14b/ CORRECT POSITION OF TOP EQUALIZING BEAM

APPENDIX I

PROCEDURE FOR SETTING BRAKEWORK
DERBY TYPE POWERED BOGIES

Vehicle should stand on level, straight track with a centre pit. Vehicle must be scotched. Procedure is written for one bogie.

i) Release brake, including handbrake if fitted.

ii) Slacken off brakeblock adjusting pull rods, allowing vertical fixed and floating levers to hang freely; run both star nuts on each pull rod away from lever ends.

iii) Remove pin connecting upper swing levers with top adjusting screw (see Fig. A1).

iv) Adjust free lift stop to obtain 1/2" initial free lift of brake cylinder piston. (see 3.0 i) and Fig. 12 of main text).

v) Move equalizing beam to a position such that 1/2" to 3/4" gap is obtained behind each floating vertical lever and its guide/hanger bracket. (see 3.0 iv) a) and Fig. 14a) of main text).

Use a crowbar to move the equalizing beam against the pull-off (release) springs and use hardwood packings placed between back of beam and the beam slide brackets to hold beam in required position. (see Fig. A2) Suggested sizes of wooden packings; 2" x 1.1/2" with thicknesses of 1", 3/4", 1/2" and 1/4".

Note: The gaps behind the two floating levers on one side of the bogie can be made the same by moving the equalizing lever on that side of the bogie. (See Fig. A 3)

vi) Turn top adjusting screw so that hole in screw aligns with holes in upper swing levers. Refit pin removed in iii) (see Fig. A1)

vii) Adjust clearances between brakeblocks and wheeltreads to a nominal 1/8" per block using brakeblock adjusting pull rods.

viii) Apply and release brakes several times (on the first application remove wooden packings from behind equalizing beam (see v)) and make the checks of free lift, brakeblock clearance, brake cylinder piston reserve stroke, and brakework alignment and position described in 3.0 of the main text.

ix) If necessary make further adjustments and repeat checks.

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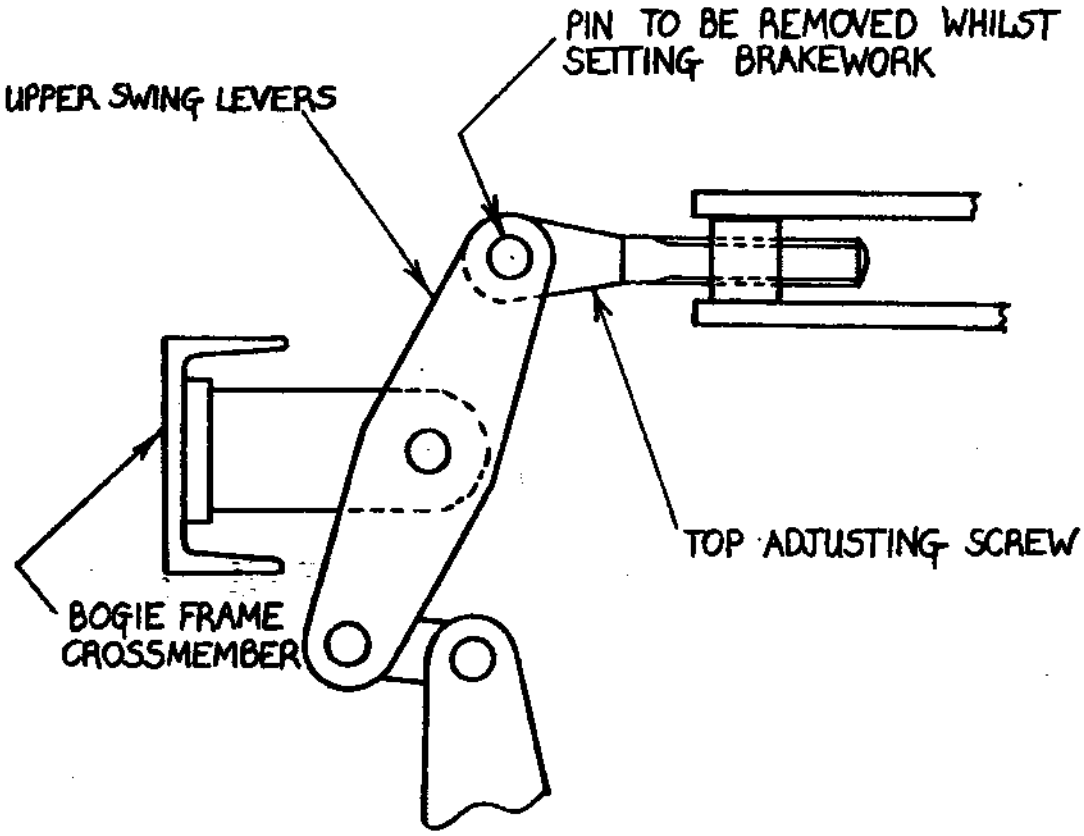


FIG. A1 : Pin to be removed whilst setting brakework

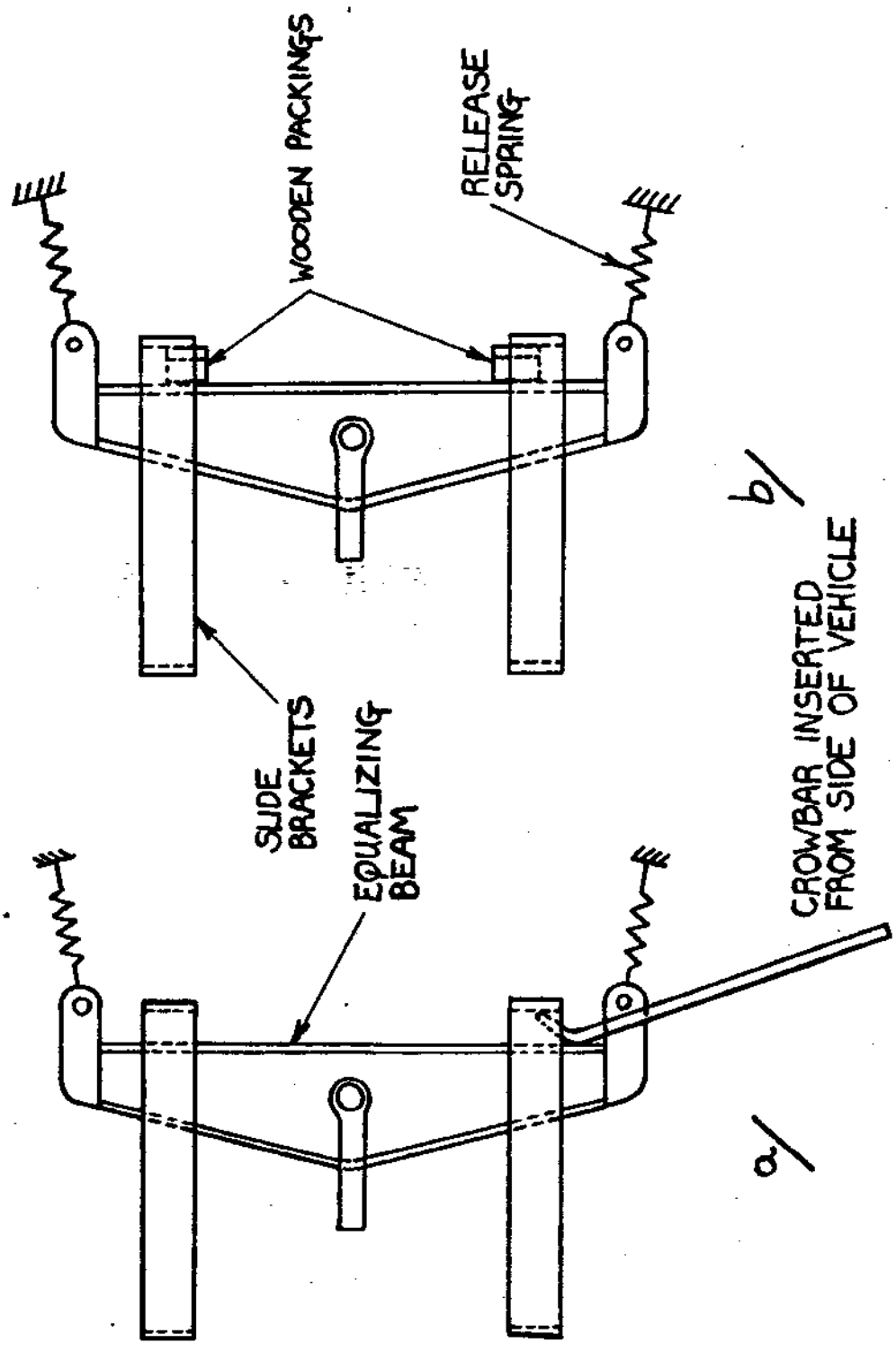
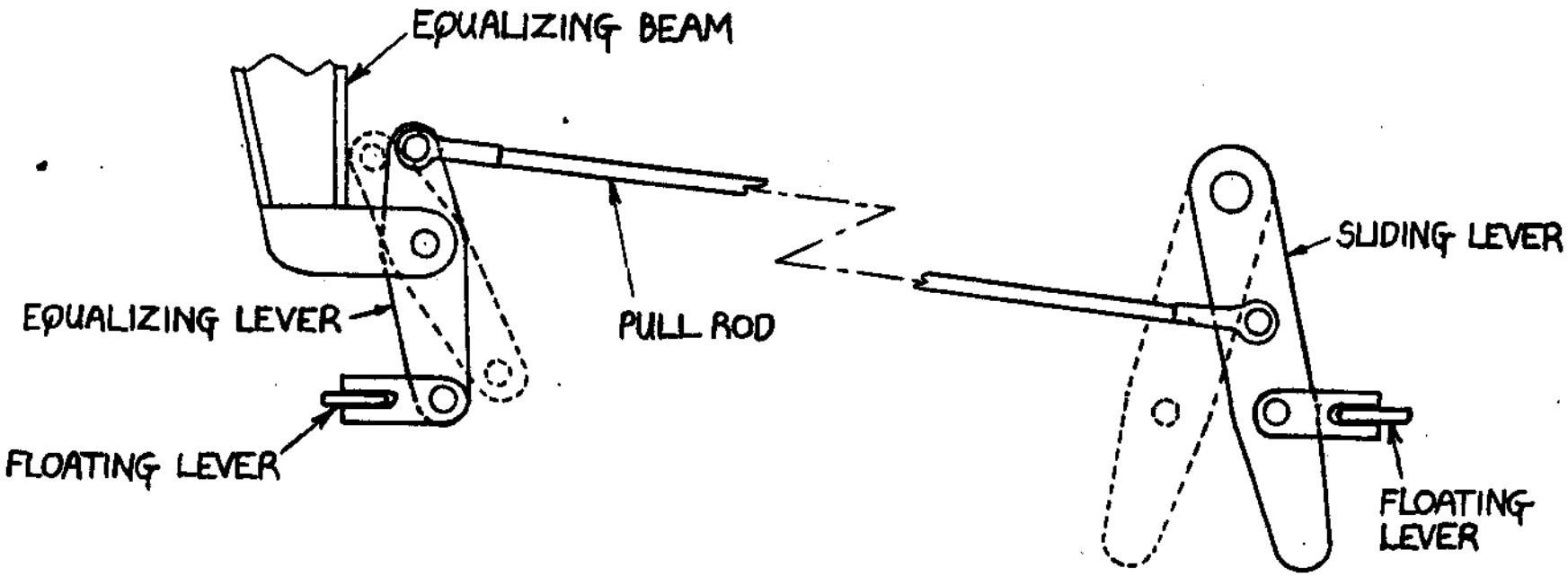


Fig. A2 : Method for positioning equalizing beam



Note: Movement of equalizing lever causes the gap behind one floating lever to increase and the gap behind the other to reduce.

Fig. A3 : Adjustment of Equalizing Lever.