



# STEAM HEATING APPARATUS L. M. & S. Rly.

## Descriptions and Repair Parts

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**WESTINGHOUSE BRAKE & SIGNAL Co. Ltd.**

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WORKS: CHIPPENHAM, WILTS.

# Westinghouse Brake & Signal Co., Ltd.

H.R.1.

## 3" GILLED HEATER.

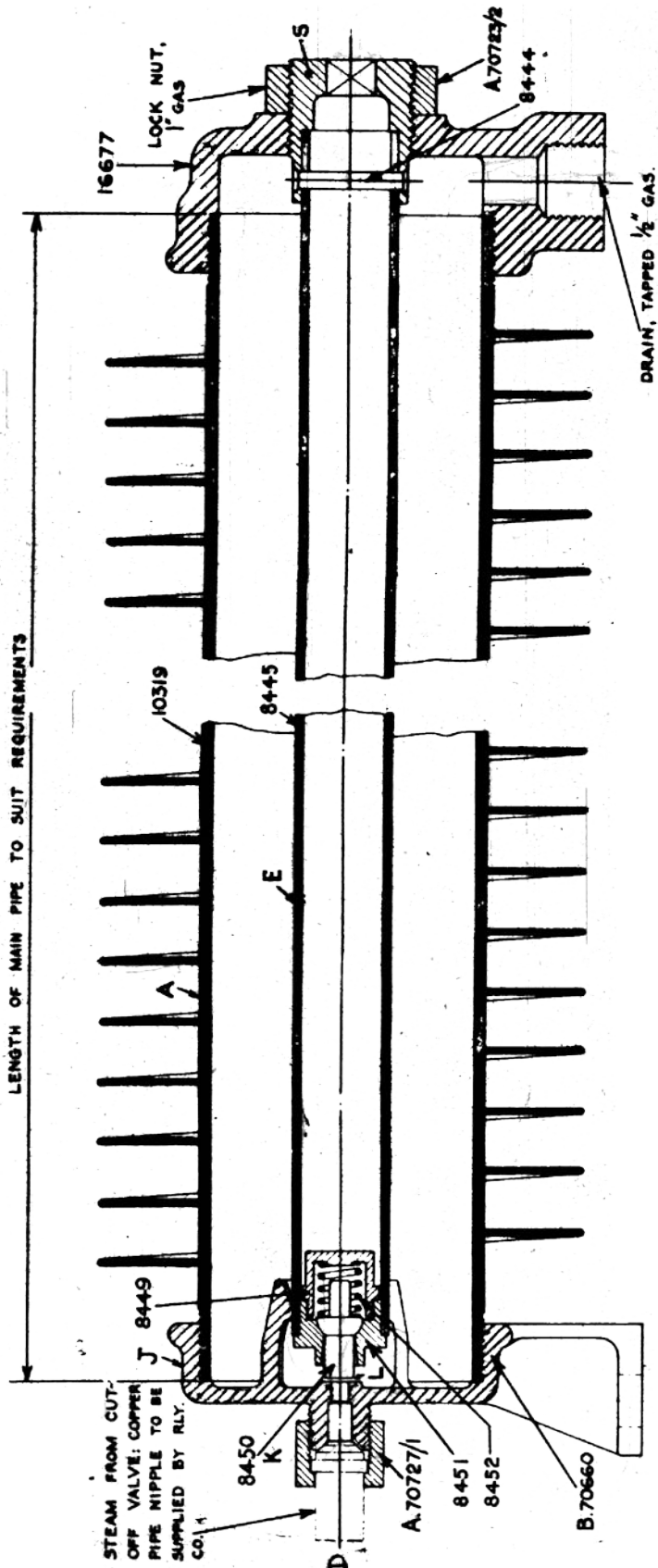
This heater is intended for use with a separate positive cut-off valve.

The gilled tube A is provided with covers B and J. Tube E, which has a high ratio of expansion, carries at one end valve K, for which the edge of the steam inlet forms a seat at L. At the other end it is connected to socket S, where it is locked in position by lock nut T.

When the heater is cold, tube E is drawn back and unseats valve K, allowing a free passage of steam which enters from the positive cut-off valve (described on sheet HR.11 and HR.12) and completely fills the heater, thus rapidly heating up tube A and other parts. The air and water of condensation escape from outlet D<sup>1</sup>, from which a short piece of pipe is led through the floor of the carriage to the outside. As the heater becomes hot, so does tube E, which expands more than tube A for the same rise of temperature. This causes valve K to approach seat L and, when tube E reaches a predetermined temperature, valve K closes the steam inlet and prevents further ingress of steam until the heater cools slightly, when tube E contracts and again allows valve K to open and admit a further quantity of steam. The temperature of the heater is thus maintained practically constant.

# 3" GILLED HEATER

Complete Part No. D70623



Part No.	Name of Part.	Part No.	Name of Part.
B.70660.	Steam Inlet Cover.	A.70727/1	Union Nut.
8450	Valve.	8451	Valve Guide
8452	Valve Spring	8449	Spring Case.
8445	Expansion Tube, 1" x 1/2" (1/8" longer than main tube)	10319	Main Tube, 3" Gilled. (Length as ordered)
16677	Drain Cover.	A.70723/2	Adjusting Screw.
8444	Plain Pin, 3/16" x 1 1/2" (Adjusting screw to expansion tube).	-	Lock Nut, tapped 1" Gas, 1 1/2" hexagon over flats x 1/8" thick.

# Westinghouse Brake & Signal Co., Ltd.

HR.2.

## 3" GILLED HEATER. QUADRANT. BOWDEN.

The gilled tube A is provided with covers B and J. Steam from the branch pipe enters the heater by the inlet D on the lower side of cover J. Tube E has a high ratio of expansion, and is attached at one end to socket F. At the other end of tube E is carried valve K, for which the edge of the steam inlet forms a seat at L.

On socket F is formed a projection C. Attached to the cover B, by two studs G and H, is a plate M. The projection C is kept in contact with plate M by spring N (which also serves to press the gland O against packing p). By adjustment of four nuts plate M is fixed so that one end of it (i.e. the left hand end) is slightly further from the heater cover than the other end. In consequence when socket F is rotated, the projection C slides along the plate M and expansion tube E moves further in or out of the heater as the case may be, causing valve K to approach or recede from seat L. The total movement of tube E can be varied to suit requirements by adjusting the inclination of plate M. Bowden wire turns the pulley U and thereby the socket F.

When the heater is in the "ON" position, i.e. with projection C rotated to the left-hand side, tube E is drawn back and unseats valve K, allowing a free passage of steam which enters and completely fills the heater, thus rapidly heating up tube A and other parts; the air and water of condensation escape from outlet D1, from which a short piece of pipe is led through the floor of the carriage to the outside. As the heater becomes hot, so does tube E, which expands more than tube A for the same rise of temperature. This causes valve K to approach seat L and, when tube E reaches a predetermined temperature, valve K closes the steam inlet and prevents further ingress of steam until the heater cools slightly, when tube E contracts and again allows valve K to open and admit a further quantity of steam. The temperature of the heater is thus maintained practically constant.

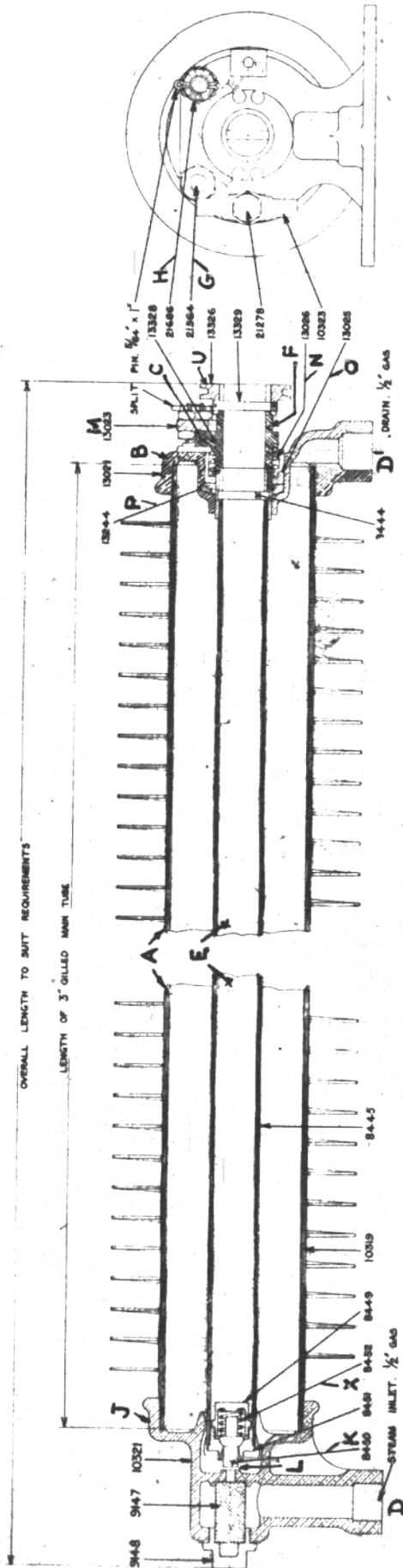
If the pulley is moved towards the "OFF" position, valve K is brought nearer to seat L, so that the steam is cut off sooner, because tube E has to expand less to bring valve K on to its seat.

If the pulley is again moved towards the "ON" position, the opposite effect takes place. The temperature of the heater is therefore regulated to a nicety by manipulating the crank or pulley. When the pulley is moved right over to the "OFF" position, the valve K is brought on to the seat L, thus shutting off the steam; and as the heater cools down and tube E contracts the valve K is kept up against its seat L by the pressure of spring X.

**3" GILLED HEATER  
QUADRANT. BOWDEN**

HR.2

Complete Piece No. 13330



Piece No.	Name of Part.	Piece No.	Name of Part.	Name of Part.
13021.	Adjusting Cover.	13023.	Quadrant.	Quadrant.
13025.	Gland.	13244.	Packing Ring.	Packing Ring.
13326.	Bowden Drum.	13328.	Spigot Sleeve, Horizontal Adjustment.	Spigot Sleeve, Horizontal Adjustment.
13329.	Screwed Pin, 3/16" x 1-11/32".	10321.	Strainer Cover.	Strainer Cover.
10323.	Guide Bracket for Bowden Wire.	10319.	Main Tube, 3" Gilled.	Main Tube, 3" Gilled.
8443.	Expansion Tube, 1" x 7/8".	8147.	Spring Case.	Spring Case.
8446.	Valve.	8449.	Valve Guide.	Valve Guide.
8450.	Plate, Spring 1/16" x 1-1/4".	8451.	Recessed Pin, 5/64" x 1/2".	Recessed Pin, 5/64" x 1/2".
8442.	Plate, Spigot Sleeve to Ex. Tube.	13026.	Split Nut, 3/8" x 1-3/16".	Split Nut, 3/8" x 1-3/16".
21278.	Screw Bolt, 5/16" x 1/2".	21964.	Stud and Nuts, 3/8" x 1-3/16".	Stud and Nuts, 3/8" x 1-3/16".
21278.	Bowden Bracket to Adjusting Cover.		Quadrant to Adjusting Cover.	Quadrant to Adjusting Cover.
21686.	Stud, Nut & Castle Nut: Quadrant to Adjusting Cover.			

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HR.3.

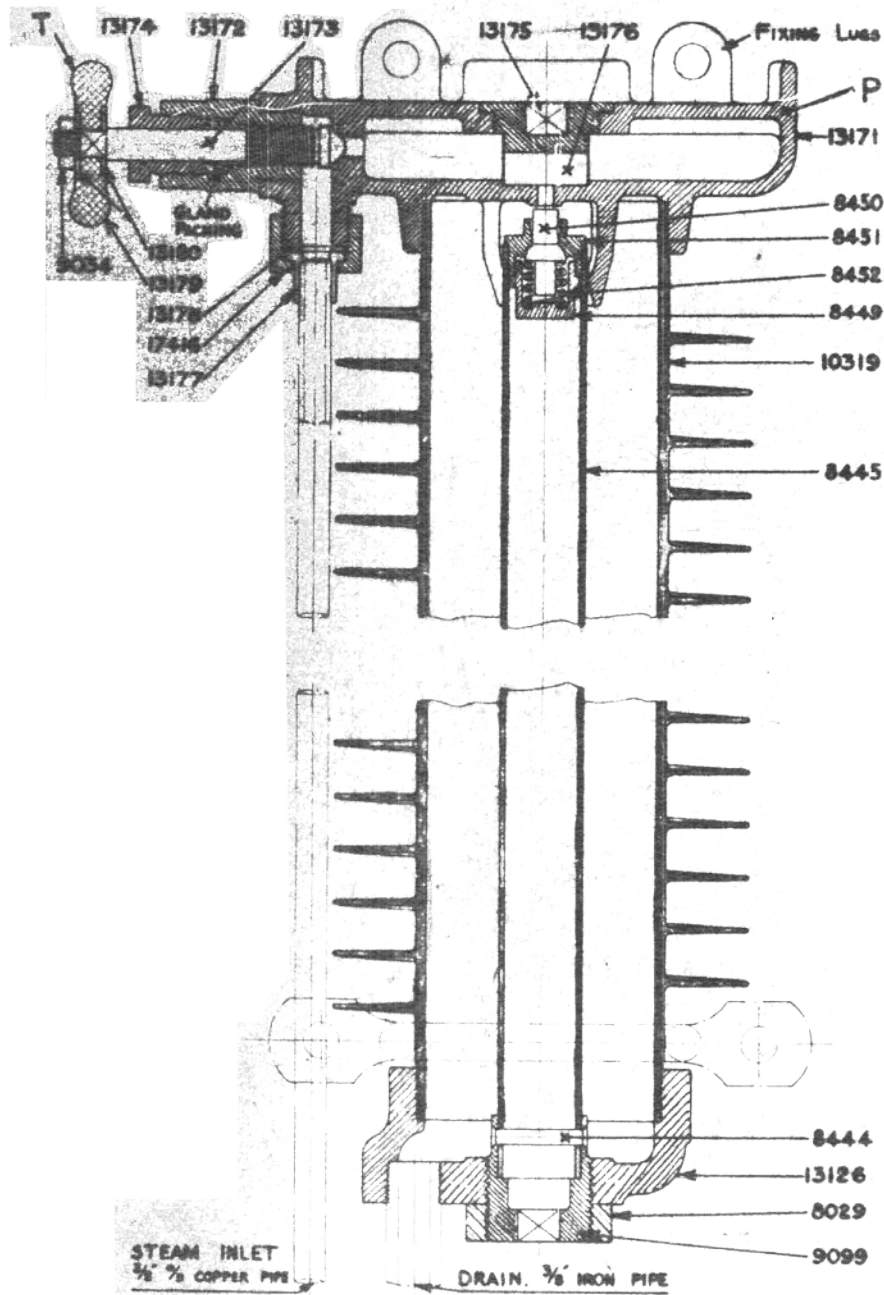
## GUARD'S HEATER WITH SHUT-OFF VALVE (3" GILLED HEATER)

This heater stands vertically in the guard's compartment.

A warming plate P is provided at the top, and the design of the heater is such that steam is always in contact with plate P so long as the valve controlled by handle T is open, while the temperature of the heater is automatically controlled by the expansion tube as in other types of heaters, as already described on Sheets HR.1 and HR.2.

**GUARDS HEATER  
WITH SHUT-OFF VALVE L.H.  
(8" Gilled Vertical)**

Complete Piece No. 13170



Piece No.	Name of Part.
13171	Top Plate Cover. L.H.
13126	Drain Cover.
8449	Spring Case.
8450	Valve.
8451	Valve Guide.
8452	Valve Spring.
13172	Spindle Guide.
13175	Valve Spindle.
13174	Gland.
13175	Strainer Plug.
13176	Strainer.
13177	Pipe Union Socket.
13178	Pipe Union Washer.
17416	Pipe Union Nut.
13179	Hand Wheel.
13180	Hand Wheel Washers.
9099	Hand Wheel Nut.
10319	Main Tube, 8" Gilled.
8445	Expansion Tube, 1" O/D x 1/2" I/D.
9099	Adjusting Screw.
8029	Lock Nut.
8444	Pin, 3/16" x 1 1/2"; Expansion Tube to Adjusting Screw.
-	Gland Packing.

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HR.5.

## ALUMINIUM HEATER FOR CORRIDORS.

This heater is designed for mounting in a corridor where it would be found inconvenient to fix the long heater.

The thermostatic control is obtained by the difference in expansion and contraction between the aluminium heater and the two external solid rods B, which are fixed at one end to the heater at C, and cause movement of the valve in relation to the seat of the valve mounted at the other end of the heater.

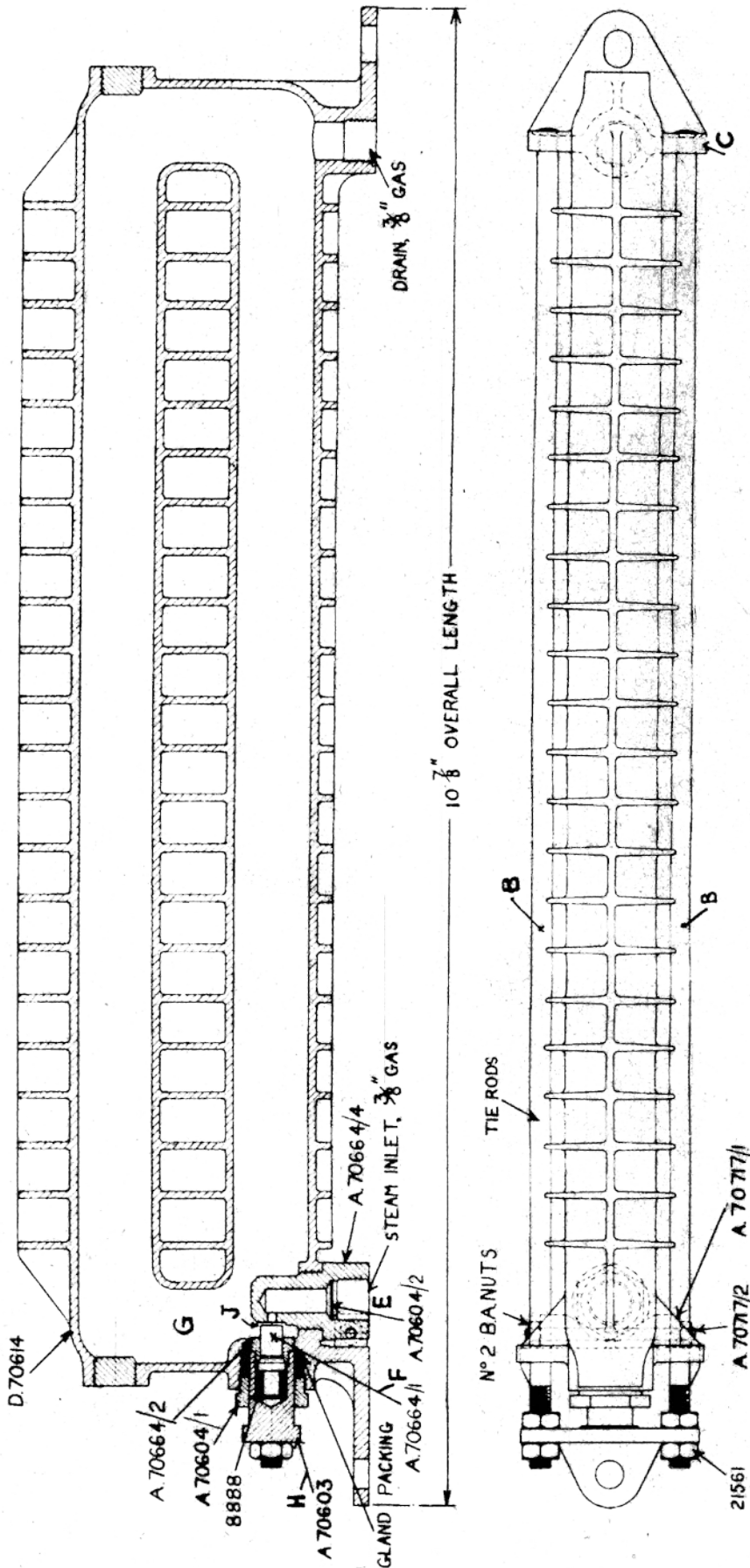
Steam enters at E, and when heater is cold, passes by valve F to chamber G and thence through the top passage, and round by the lower passage. As the heater warms, it gradually expands, while the rods B remain cold, and therefore by means of the cross piece H the valve F is pulled towards the seat J, thereby cutting off the supply of steam. As soon as the heater cools sufficiently to cause contraction, the valve is again opened to admit more steam.



# SMALL RIBBED HEATER OUTSIDE RODS, WITH PASSENGER CONTROL

MRLS

Complete Piece No. D70618



Part No.	Name of Part.	Part No.	Name of Part.
D.70614.	Body.	A.70664/4.	Steam Inlet Nipple.
A.70604/2.	Strainer Disc.	A.70664/1.	Valve.
A.70664/2.	Valve Guide.	8888.	Valve Spring.
A.70604/1.	Gland-Packing.	A.706603.	Cross Piece.
21561.	Gland-Packing.	-	Tie Rods.
A.70717/2.	5/16" Nuts for Tie Rods.	A.70717/1.	Locking Wedges: Steam
	Fixing Screw: Steam Inlet	-	Inlet Nipple to Body.
	Nipple to Body.	-	No.2-BA Nuts for Steam
		-	Inlet Nipple to Body.

# Westinghouse Brake & Signal Co., Ltd.

HR.6, HR.7 and HR.8.

## 2<sup>3</sup>/<sub>8</sub>" CORRIDOR HEATER.

This heater is used for the heating of vestibule carriages and others which are not divided into compartments, such as dining-saloons, etc.

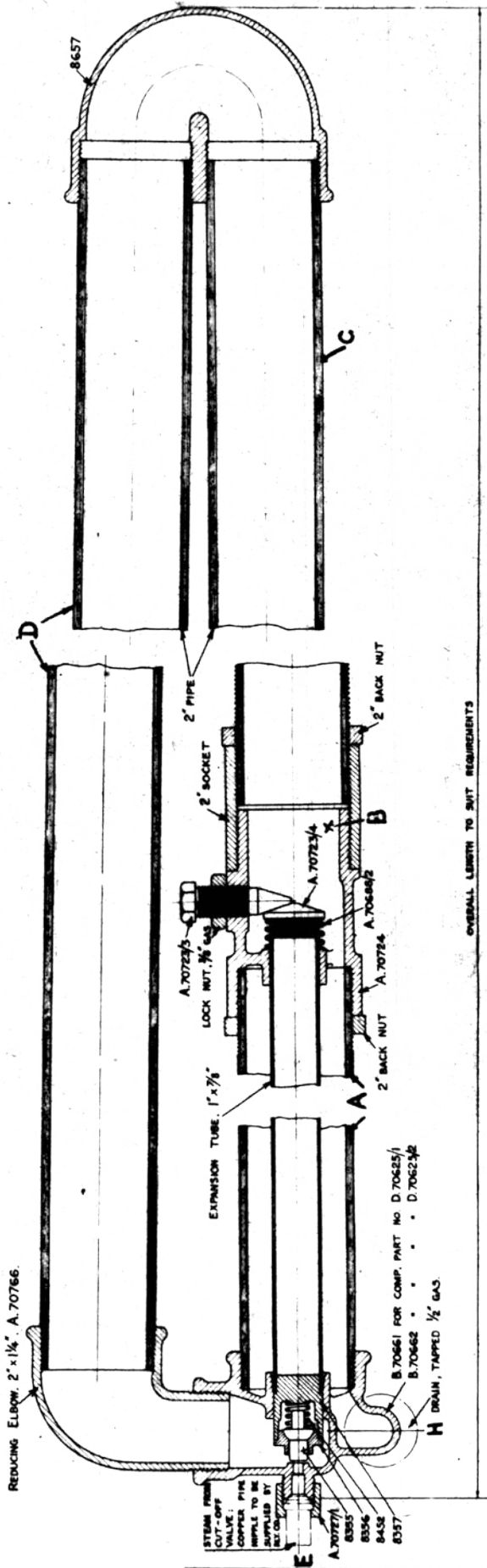
The tube A has a special chamber 13 into the opposite end of which a pipe C of the same diameter as tube A is screwed. Steam enters at E. The chamber B is so constructed that when the steam arrives, it cannot pass directly into the tube A, but must first complete the circuit of the pipes C and D. It then fills tube A and causes the thermostatic tube to expand and close the valve, but only after the whole circuit has reached the desired temperature. A strainer is contained in the chamber B, and can be removed by unscrewing cap F. Water of condensation escapes to the atmosphere by the outlet H. When installing this heater in the carriage, the tube D is kept level, and the water of condensation can then drain back through tubes A and C to outlet H.

In the case of the heater shewn on Sheet HR.6, the steam enters at E from a positive cut-off valve; whereas in the case of the heaters shown on Sheets HR.7 and HR.8, the temperature is controlled by Bowden wire or by handwheel respectively, on the end of the heater.

# 2 3/8" CORRIDOR HEATER

HR.6

Complete Part No. D70625/1 RM  
Complete Part No. D70625/2 LM



OVERALL LENGTH TO NUT REQUIREMENTS

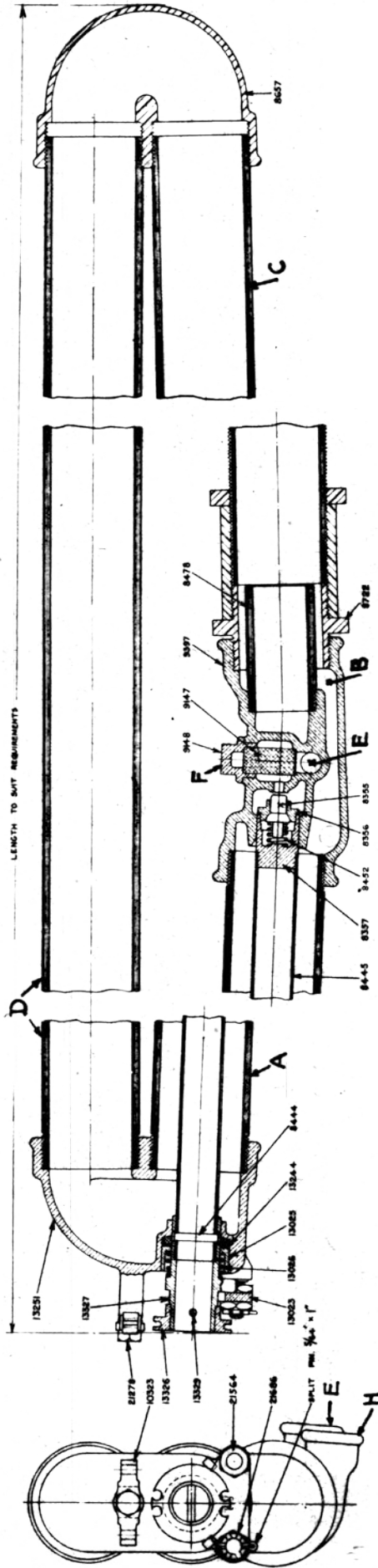
Part No.	Name of Part.	Part No.	Name of Part.
B.70661.	Body, with B.R. Drain, for Complete Part No. D.70625/1.	A.70721/1.	Steam Inlet Union Nut.
B.70662.	Body, with L.R. Drain, for Complete Part No. D.70625/2.	A.70706.	Reducing Elbow, 2" Female x 1 1/2" Male.
8395.	Valve Guide.	8395.	Thermostatic Valve.
8452.	Valve Spring.	8357.	Spring Case.
A.70723/3.	Adjusting Screw for Expansion Tube.	-	Expansion Tube, 1" x 1/4" x 5 1/2" Long.
-	Lock Nut for dr. 3/8" Gas.	A.70688/2.	Retaining Spring for Thermostatic Adjustment.
A.70723/4.	2" Close Return Band.	A.70724.	Expansion Tube Sleeve.
8657.	Lengths of 2" Pipe, Sockets and Back Nuts, as required.		



2<sup>1</sup>/<sub>4</sub>" CORRIDOR HEATER  
 QUADRANT ADJUSTMENT, BOWDEN CONTROL

HW7

Complete Piece No. 13320



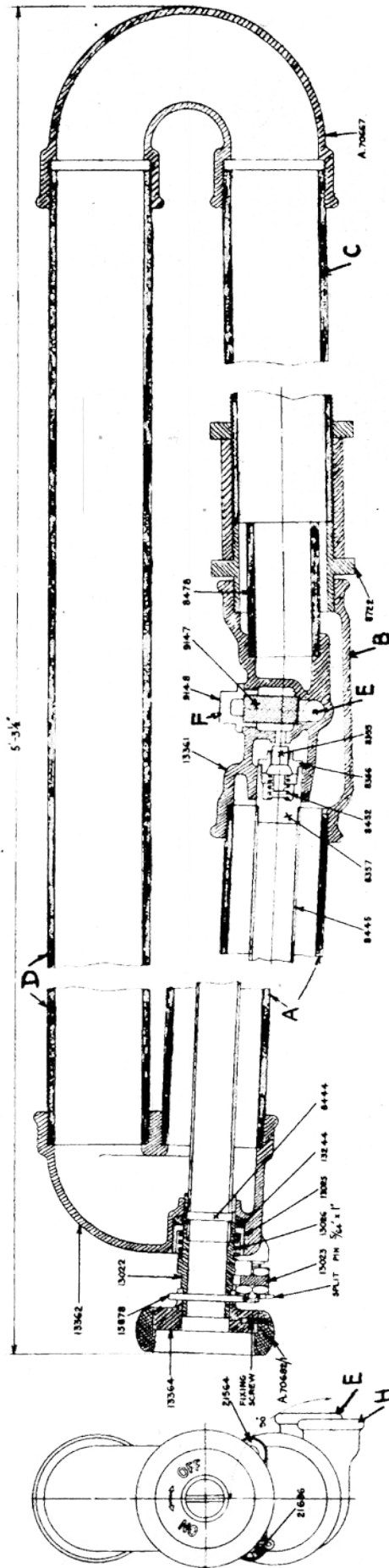
Piece No.	Name of Part	Piece No.	Name of Part.
9397.	Strainer Body, R.H.	13251.	Adjusting Cover.
13320.	Bowden Drum.	13327.	Spigot Sleeve, Vertical Adjustment.
13329.	Screwed Pin, 3/16" x 1-11/32"; Drum to Sleeve.	13023.	Quadrant.
13025.	Strainer.	13244.	Packing Ring.
0147.	Strainer Cap.	8450.	Strainer Cap.
8457.	Valve Guide.	8452.	Valve Guide.
8478.	Expansion Tube, 1" x 7/8".	8445.	Expansion Tube, 1" x 7/8".
8657.	Guide Bracket for Bowden Wire.	10323.	Guide Bracket for Bowden Wire.
0444.	Wire.	8452.	Valve Spring.
			Spigot Pin, 5/64" x 1".
			Castle Nut to Stud.
			Stud & Nuts, 3/8" x 1-3/16".
			Quadrant to Adjusting Cover.
21278.	Screw Bolt, 5/16" x 1/2"; Bowden Bracket to Adjusting Cover.	21564.	Stud Nut & Castle Nut; Quadrant to Adjusting Cover.
8722.	2" Hexagon Nipple.	21686.	Stud Nut & Castle Nut; Quadrant to Adjusting Cover.



2<sup>3</sup>' CORRIDOR HEATER  
 QUADRANT ADJUSTMENT WHEEL CONTROL

M.R.S

Complete Piece No. 13090



Piece No.	Name of Part.	Piece No.	Name of Part.
13361.	Strainer Body, R.H.	13362.	Adjusting Cover.
13364.	Wheel	A.70682/1.	Insulating Ring.
-	Fixing Screw.	13022.	Spigot Sleeve.
13023.	Quadrant.	13022.	Stand.
13244.	Packing Ring.	0147.	Strainer.
0148.	Strainer Cap.	8755.	Valve.
8756.	Valve Guide.	8757.	Spring Case.
8445.	Expansion Tube, 1" x 7/8".	8776.	Steam Nozzle, 1-1/4" Gas.
13026.	Packing O-ring Spring, 1/4".	8456.	Valve Spring, 1/8" x 1-3/4".
8444.	Plain Pin, 7/16" x 1-1/4".	15976.	Wheel to Spigot Sleeve.
	Expansion Tube to Spigot		Split Pin, 5/32" x 1".
	Sleeve		Castle Nut to Stud.
21564.	Stud & Nuts, 3/8" x 1-3/16".		Stud, Nut & Castle Nut;
	Quadrant to Adjusting		Quadrant to Adjusting
	Cover.	21686.	Cover.
8722.	2" Hexagon Nipple.		Lengths of 2" Pipe, Sockets
A.70667.	2" Open Return Bend,		& Backnuts as required.

# Westinghouse Brake & Signal Co., Ltd.

HR. 9.

## COLUMN RADIATOR WHEEL CONTROL

This radiator is used for heating lavatory compartments, etc. It is connected to the main pipe, by a single branch pipe, and as it is in direct communication with the atmosphere through the outlet of the water of condensation the steam contained in it never exceeds atmospheric pressure.

Steam enters at A, and flows in the direction as shown by the arrows to the top header, and flows down again through tube F. Tube F carries the expansion tube G and valve C, which operate in the same way as in heaters previously described, the temperature being controlled by a handwheel L on the end column.

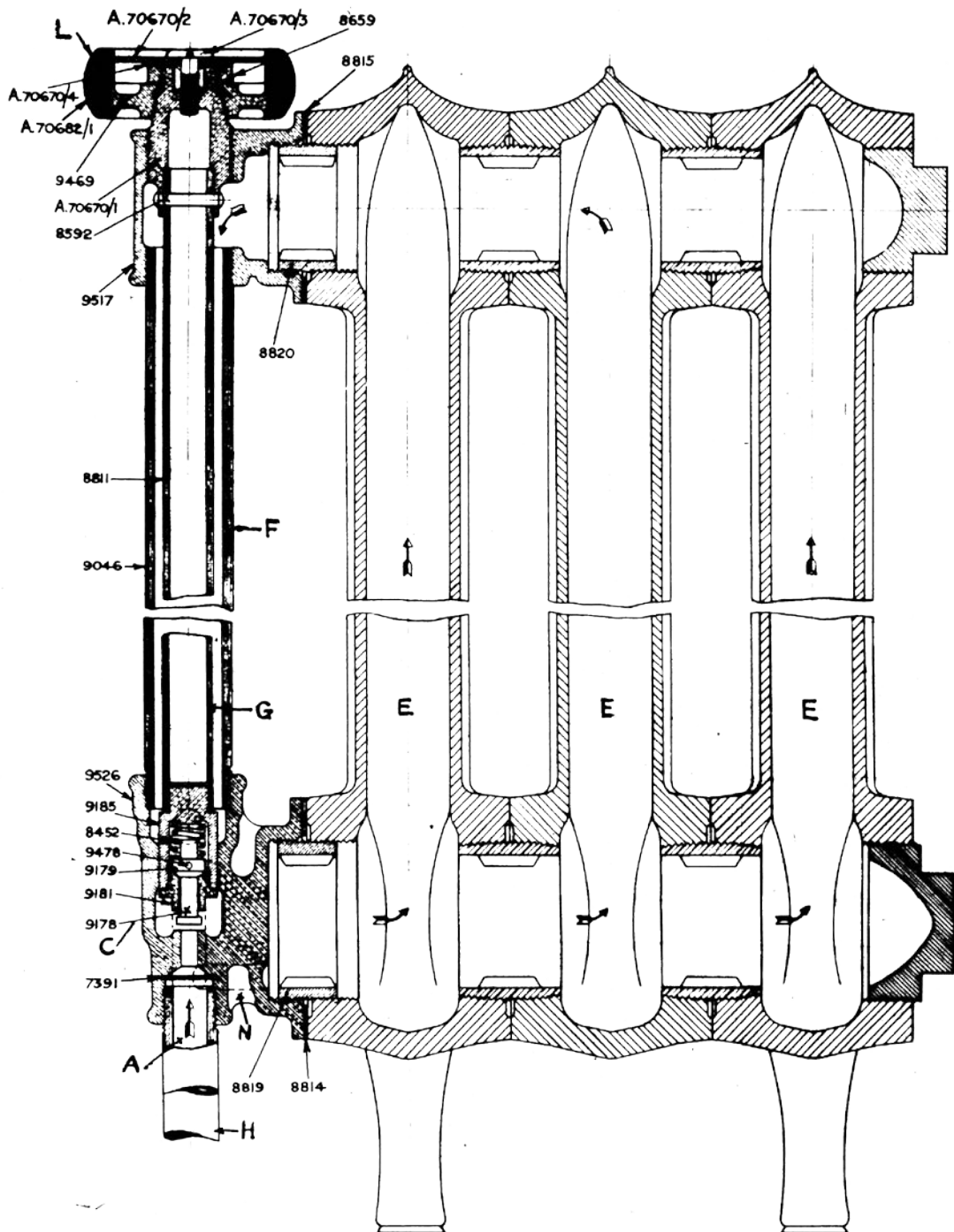
The condensation from the radiator columns E escapes by passage N and outlet H to atmosphere or drain pipe.



# 3-SECTION RADIATOR WHEEL CONTROL

M.L.S

Complete Piece No. 9550



Piece No.	Name of Part.	Piece No.	Name of Part.
9517.	Adjusting Cover.	9526.	Strainer Cover.
A.70682/1.	Insulating Ring.	9469.	Adjusting Wheel.
A.70670/1.	Adjusting Screw.	A.70670/2.	Indicating Plate.
A.70670/3.	Fixing Screw for Indicating Plate.	A.70670/4.	Gasket for Indicating Plate.
8659.	Lock Nut.	7391.	Strainer.
9046.	Main Tube.	9178.	Valve.
8811.	Expansion Tube.	9181.	Valve Guide.
9179.	Valve Collar.	8452.	Valve Spring.
9185.	Spring Case.	9478.	Plain Pin, 3/32" x 9/16":
8592.	Plain Pin, 3/16" x 1": Adjusting Screw to Expansion Tube.	8820.	1-1/2" Nipple: Adjusting Cover to Radiator.
8819.	2" Nipple: Strainer Cover to Radiator.	8815.	Gasket: Adjusting Cover to Radiator.
8814.	Gasket: Strainer Cover to Radiator.		

# Westinghouse Brake & Signal Co., Ltd.

HR.10.

## Lavatory Water Heater with Lock for emptying tanks.

This heater obviates the necessity of using a hot water tank, the water being heated only as and when required.

The steam does not come into contact with the water at any time, and the water therefore does not issue from the heater under a pressure greater than that due to the head.

The flow is controlled by two separate push buttons, one for cold water and the other for hot.

Cold water enters the heater by pipe connection A, from the cold water tank. Steam from the main heating pipe enters by connection B.

Two valves are mounted side by side, C being the water valve, and D the steam valve. By depressing the 'Cold' push button, lever E on which valve C is mounted causes this valve to open and admit water, which flows down the space between the outer and inner pipes, and thence to the basin.

The 'Hot' push button, carried on lever F, has mounted on it an arm which bridges valves C and D, and opens them both when the 'Hot' push is depressed. The cold water continues to flow as described, and in addition steam flows in the interior of the inner tube to atmosphere. While flowing, the heat is transmitted to the water flowing in the annular space, in consequence of which the water is hot when it issues to the basin.

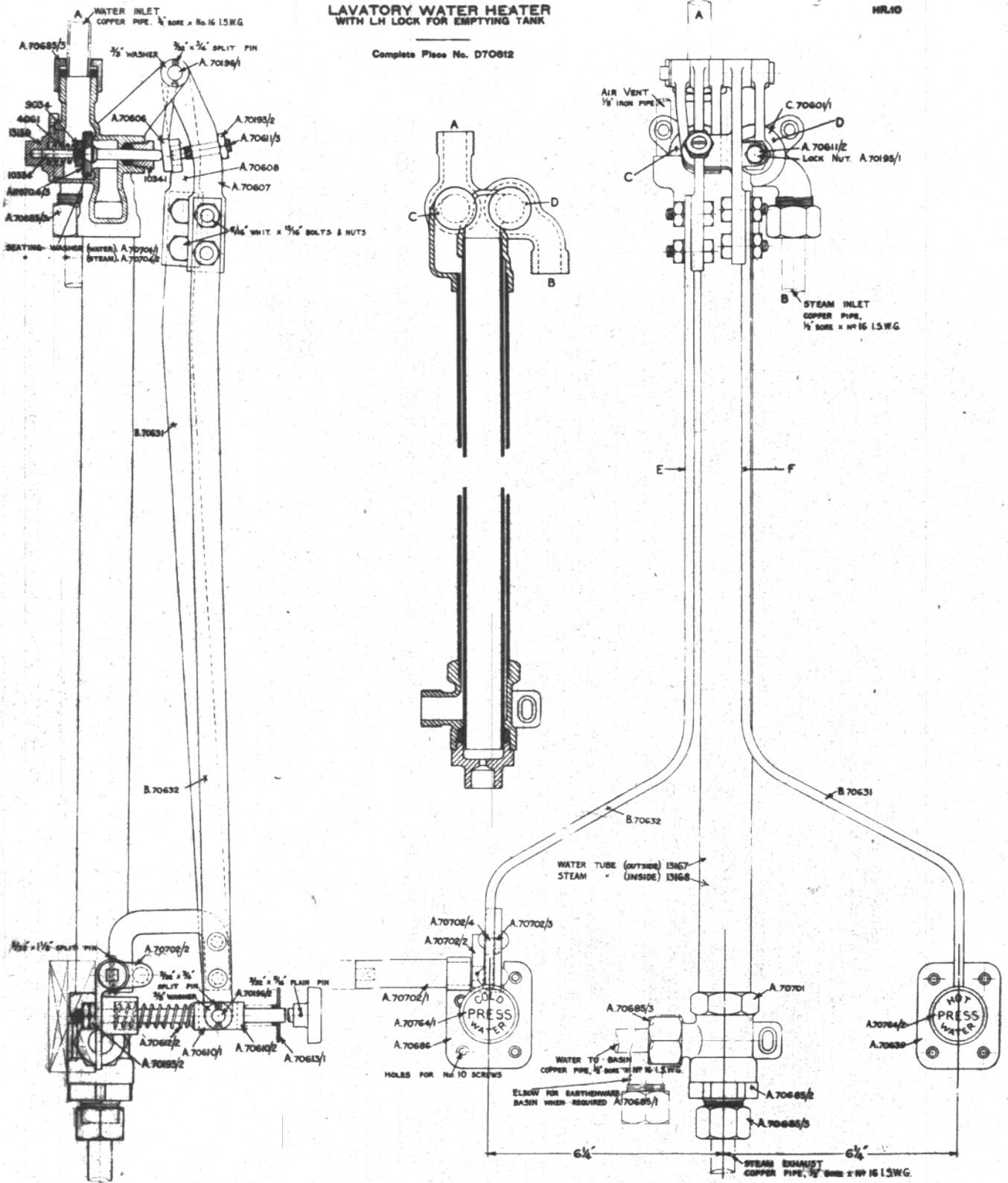
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In the case of the latest heater, a separate cold water pipe and valve is used for the cold water supply.

# LAVATORY WATER HEATER WITH LH LOCK FOR EMPTYING TANK

HR.10

Complete Piece No. D70812



PART NO.	NAME OF PART
C.70601/1	VALVE BODY
10334	VALVE STEM
A.70704/1	SEATING WASHER (WATER)
A.70704/2	SEATING WASHER (STEAM)
A.70704/3	SEATING WASHER CUP
9034	FIXING NUT
4061	SPRING
13159	CAP
10541	GLAND PACKING
13167	GLAND
13168	WATER TUBE
A.70701	STEAM TUBE
A.70652/2	LOWER BODY
A.70655/3	GLAND PACKING
A.70607	EXHAUST NIPPLE
	UNION NUTS (FOR 1/2" BORE X NO. 16 I.S.W.G. PIPE)
	COLD WATER LEVER

PART NO.	NAME OF PART
A.70606	FINGER
A.70608	HOT WATER LEVER
A.70196/1	CHESSHEAD PIN, 3/8" DIA. X 2-15/16" LONG
-	3/8" WASHER
A.70611/2	SPLIT PIN 3/32" X 3/4" LONG
A.70195/1	ADJUSTING SCREW (HOT WATER LEVER)
A.70611/3	5/16" LOCK NUT FOR DITTO
A.70193/2	ADJUSTING SCREW (HOT WATER LEVER)
B.70651	3/8" LOCK NUT FOR DITTO
B.70652	HOT WATER LEVER EXTENSION
A.70659	COLD WATER LEVER EXTENSION
A.70686	5/16" BOLT AND NUT
	GUIDE BRACKET FOR HOT WATER PUSH
	GUIDE BRACKET FOR COLD WATER PUSH

PART NO.	NAME OF PART
A.70610/1	PUSH STEM GUIDE
A.70612/2	SPRING
A.70195/2	3/8" LOCK NUTS FOR GUIDE
A.70610/2	PUSH STEM
A.70196/2	CHESSHEAD PIN, 3/8" DIA. X 1-3/16" LONG
-	3/8" WASHERS
A.70613/1	SPLIT PIN, 3/32" X 3/4" LONG
A.70764/1	PUSH STEM BUSH
A.70764/2	COLD WATER PUSH BUTTON
-	HOT WATER PUSH BUTTON
A.70702/1	PLAIN PIN, 3/32" X 11/16" LONG
A.70702/2	KEY SPINDLE
A.70702/3	CRANK LEVER
A.70702/4	ROLLER PIN
A.70685/1	ROLLER
	SPLIT PIN, 3/32" X 1-1/8" LONG
	WATER ELBOW

# Westinghouse Brake & Signal Co., Ltd.

HR.11 and HR.12.

## POSITIVE CUT-OFF VALVE

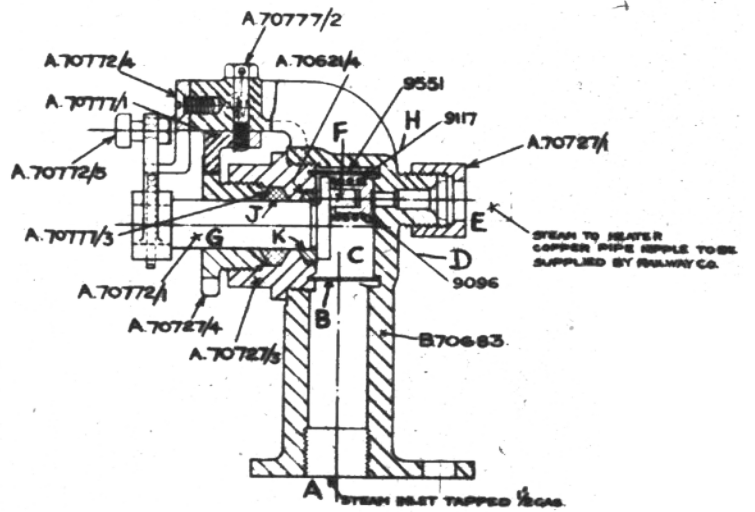
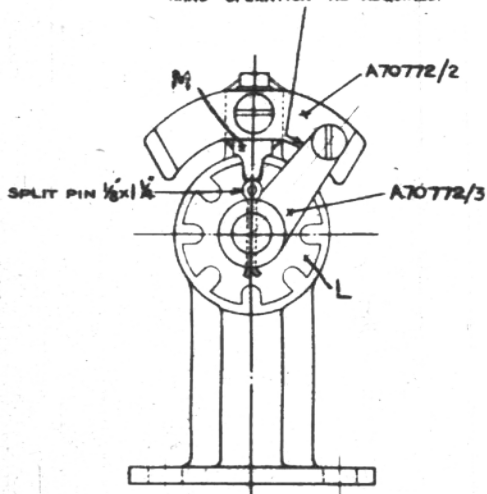
This valve is operated by the passenger's regulating handle through "Arens" control (Sheet HR.11) or by bowden wire (Sheet HR.12), and is used to admit the steam to the heaters or to cut it off when required, the temperature of the heater being controlled by the thermostat contained therein, as previously described.

Steam enters at A, passes through a cylindrical strainer B into chamber C, and when valve D is open it passes by the outlet E to the heater. The valve D is of the disc type and is guided by the crank F on the spindle G, being kept pressed on its seat by spring H. The steam packing rings J and K are provided to prevent escape of steam into the compartment. Gland L is provided with notches, and when it is correctly adjusted gives the necessary pressure on the packing without causing the spindle to seize. In the case of the valve shown by sheet HR.11, a locking bracket M is provided to keep gland L locked in position.

## POSITIVE CUT-OFF VALVE "ARENS" CONTROL

Complete Part No. B.70682

NOTE: THIS LEVER IS REVERSIBLE  
TO PERMIT EITHER RIGHT OR LEFT  
HAND OPERATION AS REQUIRED.

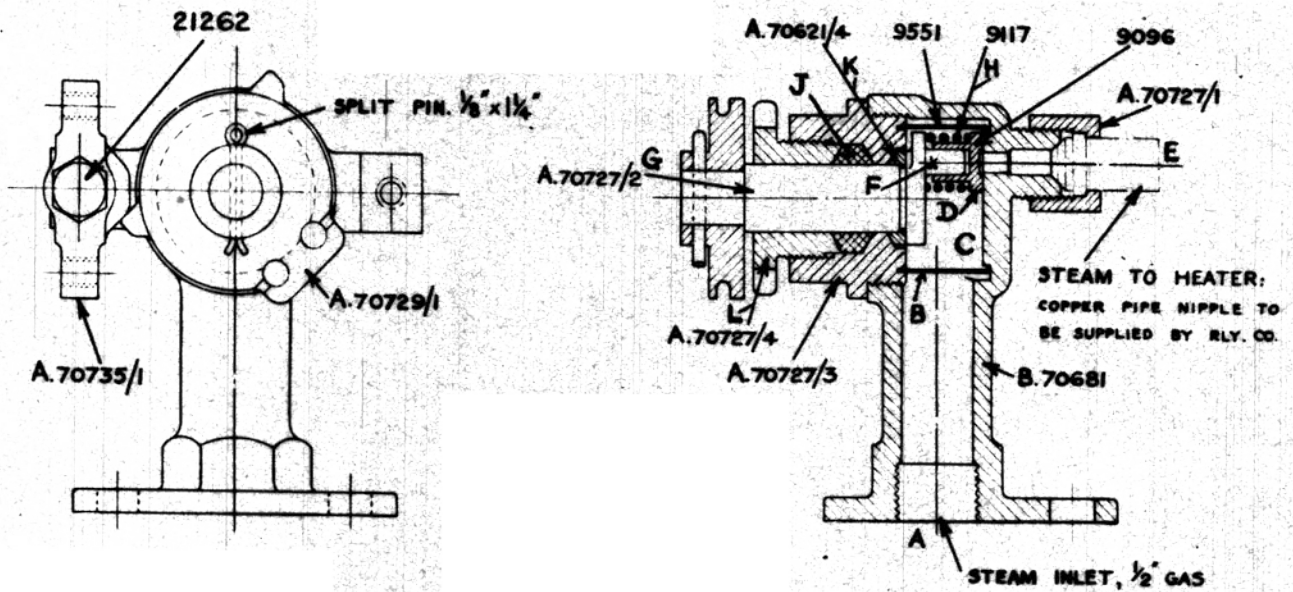


Part No.	Name of Part.
B.70682.	Body.
A.70772/1.	Spindle.
A.70772/3.	Lever.
A.70772/2.	Stop Plate.
A.70772/4.	Chk. Fixing screw for do. 1/4" Whit. x 1/2" Long.
A.70772/5.	Lever Pin for "Arens" Control.
-	Split Pin, 1/8" x 1-1/4" Long. (Lever to Spindle).
9096.	Disc Valve.
9117.	Spring for ditto.
A.70621/4.	Spindle Washer.
9551.	Strainer.
A.70771/4.	Gland.
A.70771/3.	Stuffing Box.
A.70771/2.	Union Nut.
A.70771/5.	Gland Washer.
A.70771/1.	Locking Bracket.
A.70771/2.	Ball for do. 3/16" Whit. x 7/8" Long.
-	Seal, 3/8" Dia.



**POSITIVE CUT-OFF VALVE**  
 (for use with 3" Gilled Heater).  
**BOWDEN CONTROL**

Complete Part No. B70680



Part No.	Name of Part.
B.70681.	Body.
A.70735/1.	Guide Bracket for Bowden Wire.
21262.	Screw Bolt for Ditto, 5/16" Whit. x 7/8" Long.
A.70729/1.	Bowden Drum.
-	Split Pin 1/8" x 1-1/4". (Bowden Drum to Spindle).
A.70727/2.	Disc Valve Spindle.
9096.	Disc Valve.
9117.	Spring for Ditto.
A.70621/4.	Spindle Washer.
9551.	Strainer.
A.70727/4.	Gland.
-	Gland Packing.
A.70727/3.	Stuffing Box.
A.70727/1.	Union Nut.

# Westinghouse Brake & Signal Co., Ltd.

HR.14 and HR.15.

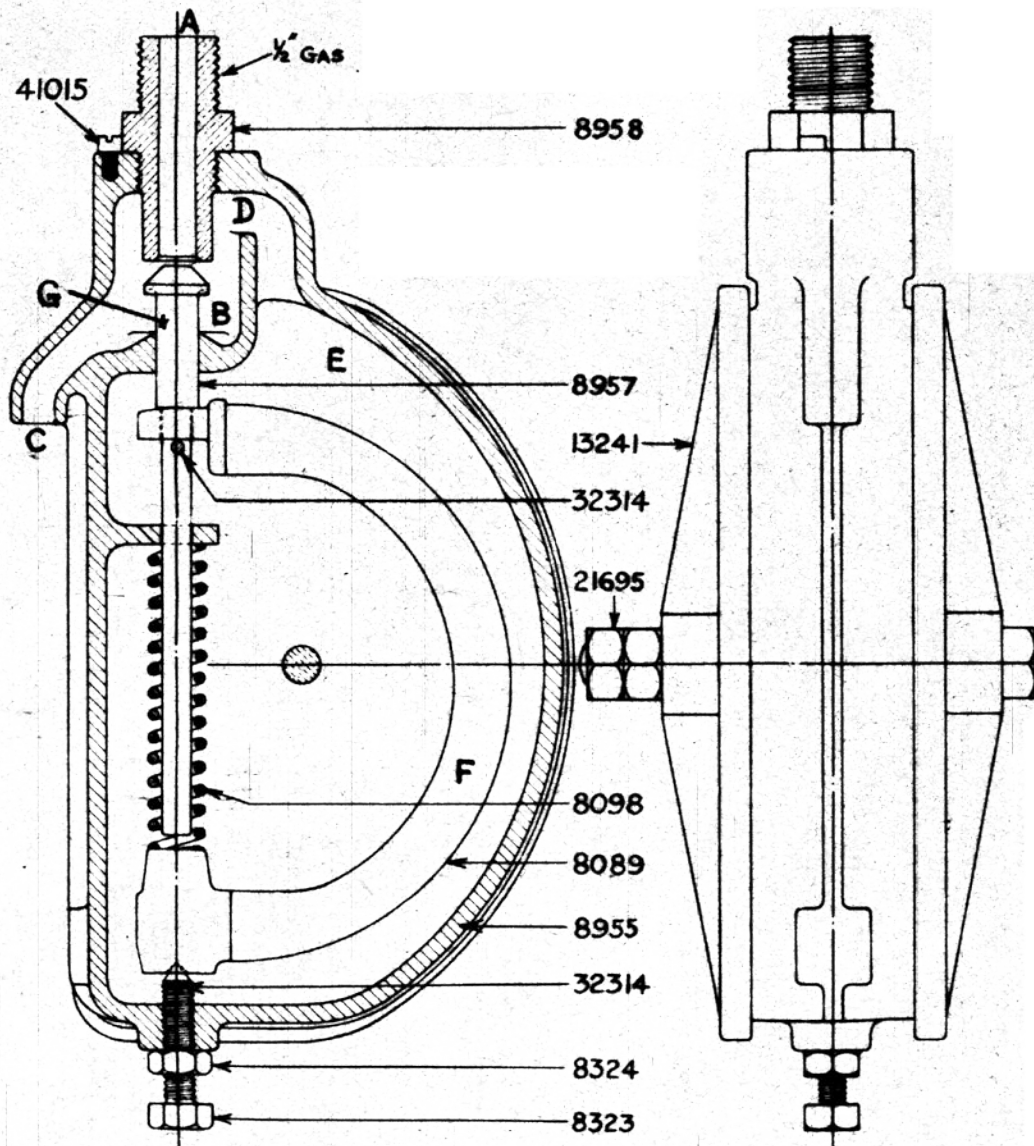
## STEAM TRAP

Water of condensation enters the steam trap at A and escapes to the atmosphere by the outlet C. As soon as all the water has escaped, steam enters the small chamber B and flows by the passage D into the large chamber E where it heats the thermostatic tube F, causing it to expand and close the valve G, preventing further escape of steam. Water then accumulates until tube F cools slightly, when the tube contracts and again opens valve G.



# STEAM TRAP WITH C.I. COVERS

Complete Piece No.13240

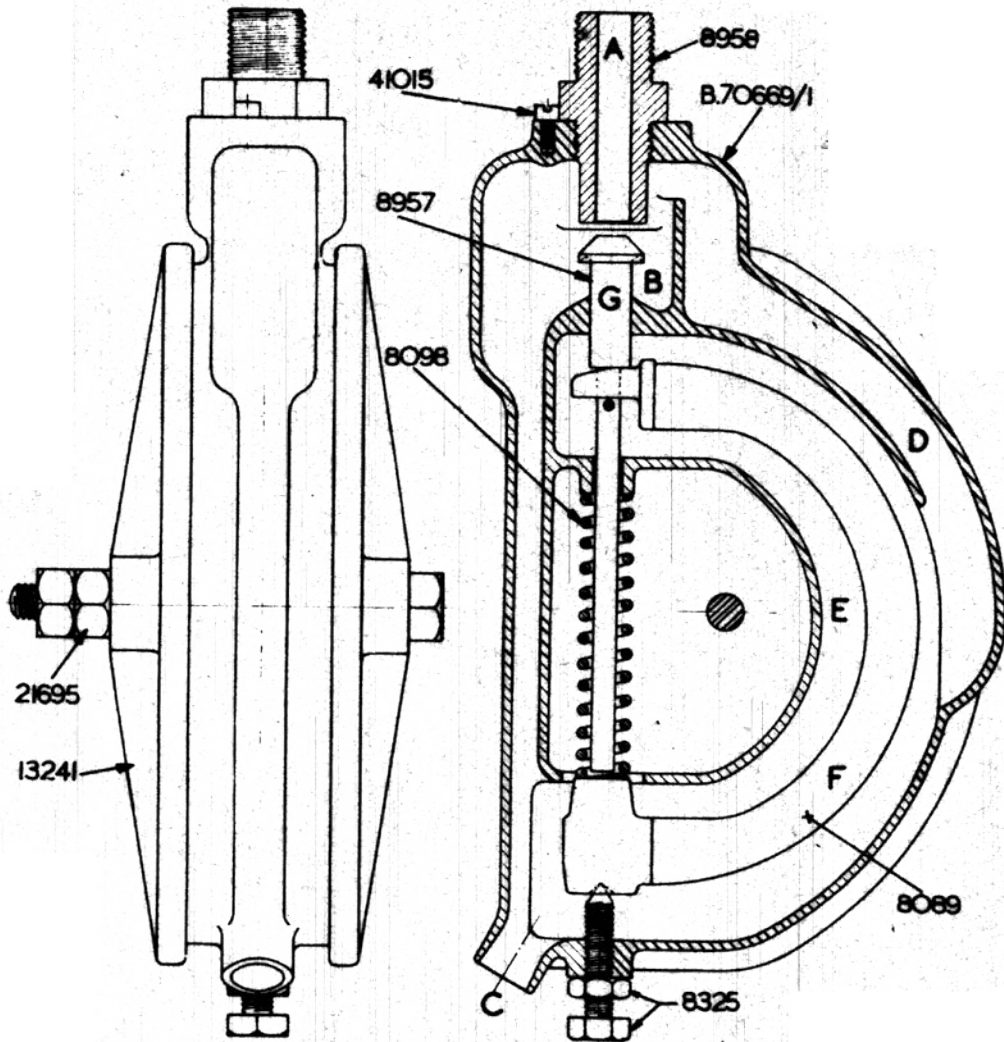


Piece No.	Name of Part
13241	Side Covers
8955	Body
8958	1/2" Nipple (Steam trap to separator)
41015	Locking Screw for do. No.4.B.A. x 5/16" long.
8957	Valve
8089	Expansion Tube
8323	Adjusting Screw, 5/16" Whit.
8324	Lock Nut for do.
8098	Spring
32314	Split Pin, 3/32" x 1/2".
21695	Cover Bolt and Nuts, 1/2" Whit. x 4 1/2"



**STEAM TRAP  
TYPE "C"  
WITH C.I. COVERS**

Complete Part No. B70668/3



Piece No.	Name of Part
13241	Side Covers.
B.70669/1	Body.
8958	$\frac{1}{2}$ " Nipple (Steam trap to separator)
41015	Locking screw for do. No. 4, B.A. x $\frac{5}{16}$ " long.
8957	Valve.
8089	Expansion tube.
8325	Adjusting screw and nut complete.
8098	Spring.
-	Split pin, $\frac{3}{32}$ " x $\frac{3}{4}$ " (2)
21695	Cover bolt and nuts, $\frac{1}{2}$ " Whit. x $\frac{1}{4}$ "

