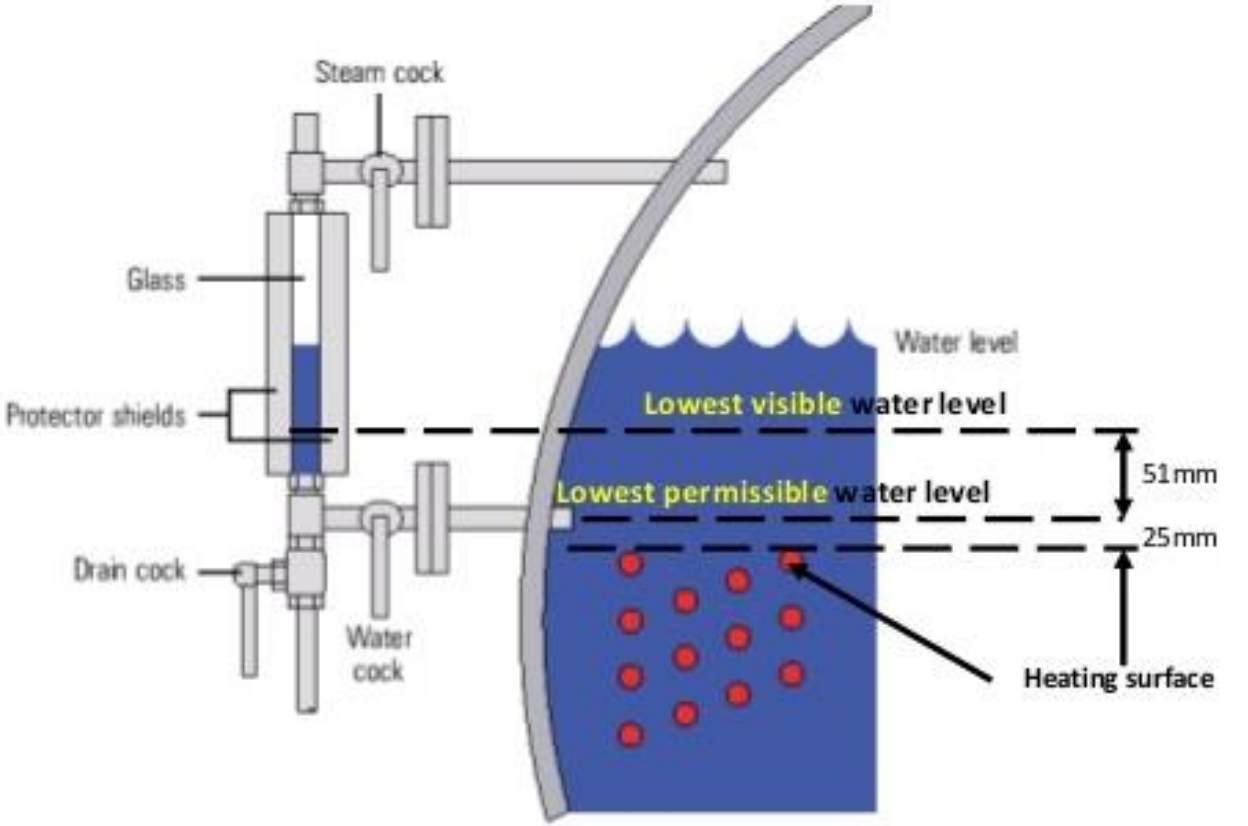
Diamond Power Television Camera

Application to Power Plant Boiler Monitoring

George Lemaster

Conventional Sight Glass Water Level Gauge

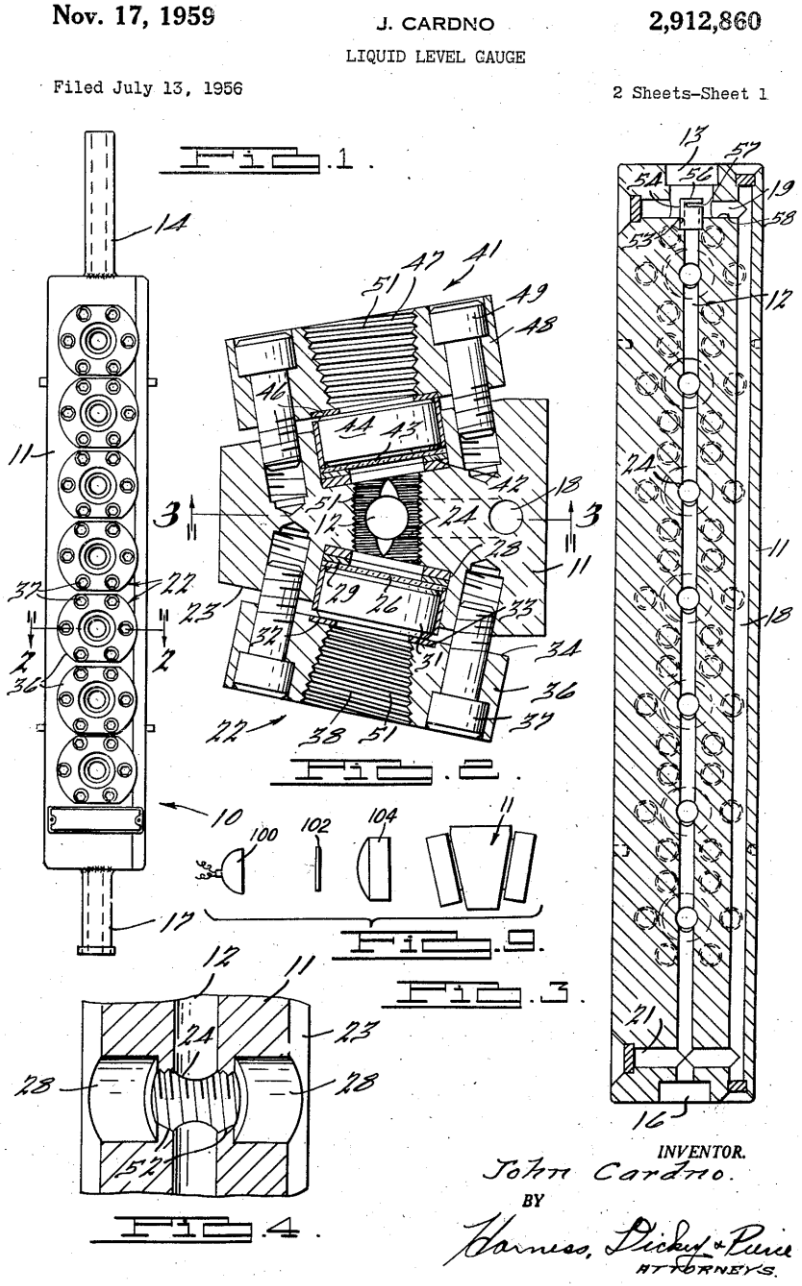


water level gauge boiler pinterest - Bing images

Steam in glass tube makes it difficult to read water level.

Misreading too low water level can be a catastrophic!

At least 16 dead, as many as 100 injured after boiler explosion at Indian power plant, South Asia News & Top Stories - The Straits Times



2,912,860

LIQUID LEVEL GAUGE

John Cardno, Lancaster, Ohio, assignor to Diamond Power Specialty Corporation, a corporation of Ohio

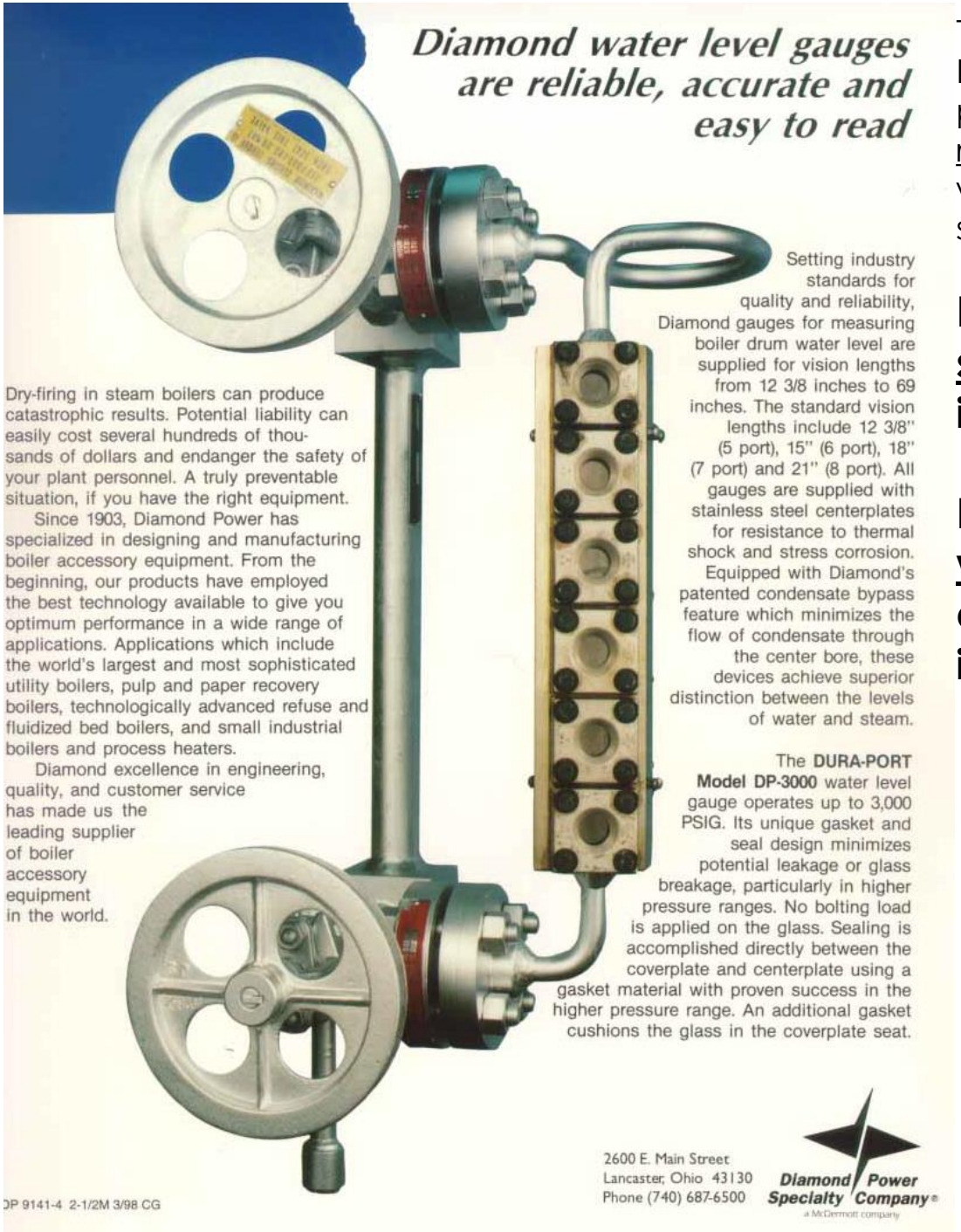
Application July 13, 1956, Serial No. 597,688

Based on 1930's British patents

Blackburn Bi-Color water gauge
Patents 2,024,815
2,115,899

Makes it very unlikely
a gauge column of steam would be mistaken for a gauge column of water.

Principal is water refracts light but steam has relatively low refractive index.



The Diamond® Series II – Ported Level Gauge (Bi-Color) is a **3000 psi** ported gauge that produces a red/green image to indicate the water level in a high-pressure steam drum.

Light projected through steam produces a red image.

Light projected through water is refracted (bent) and produces a green image.

7 port gauge is
18 inches high

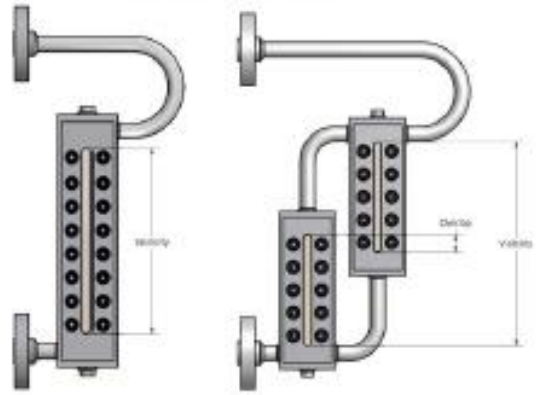
8 port gauge is
21 inches high

https://www.shopcross.com/sites/default/files/data-sheets/Diamond%20Power-Series%20II-Bi-Color-Gage.pdf

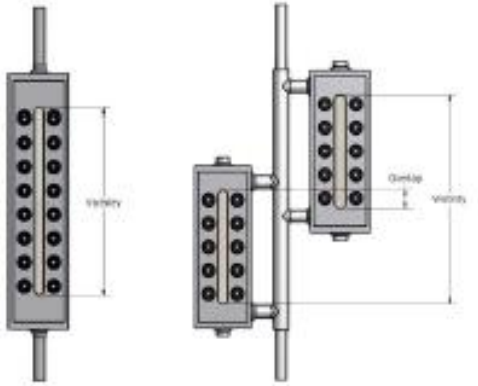
Connections

Standard connections are 0.75 in. (19 mm) pipe nipple or flanged (optional). Custom sizes and configurations are available upon request.

Flange Connection



Pipe Nipple Connection



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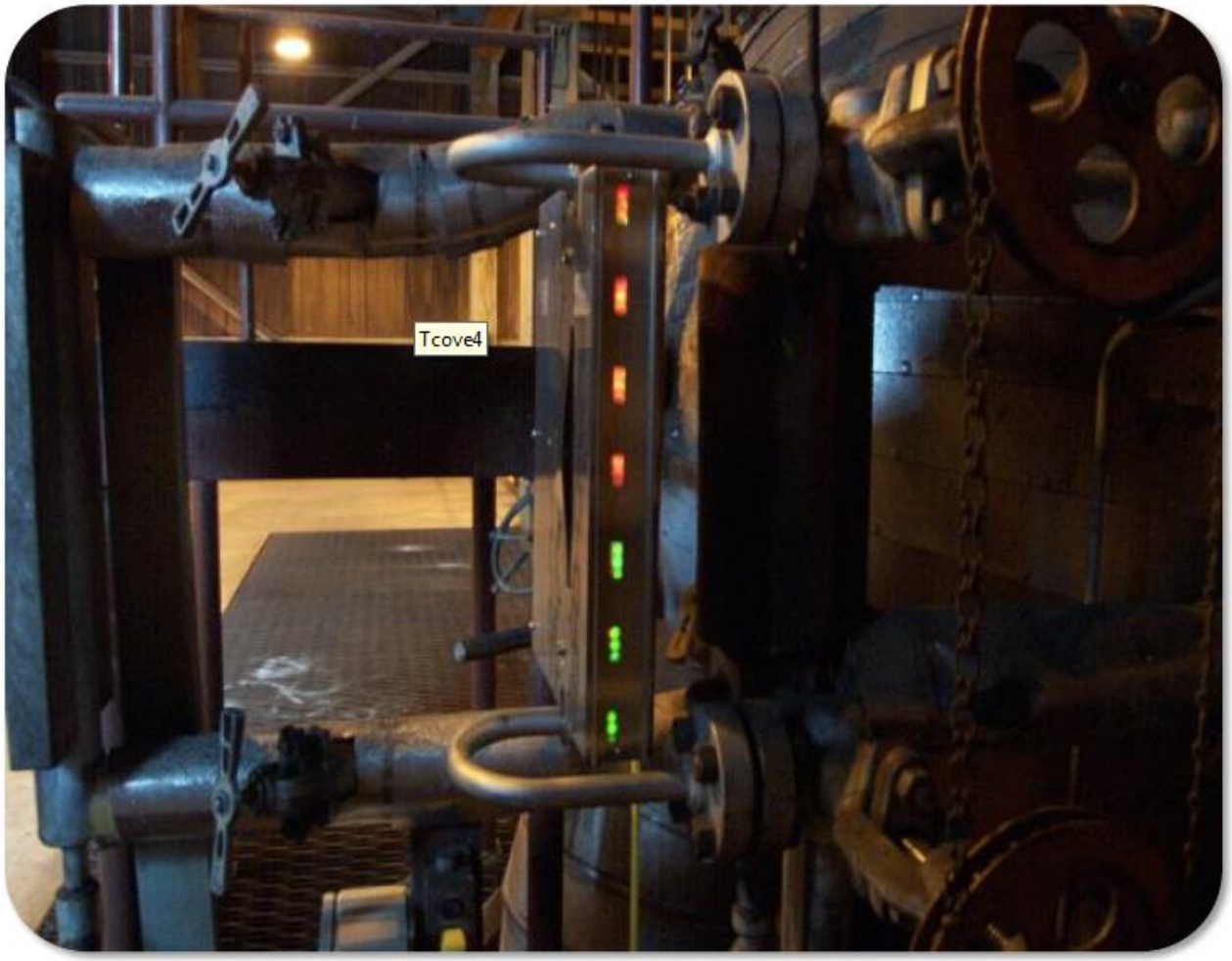
PS-519

Diamond® Series II
LED Illuminator



http://boiler-wrba.org/2016Presentations/2 BoilerCameraAndSiteGlassSystems.pdf

http://www.earlytelevision.org/diamond_camera.html

Note from Don Stephenson, a design engineer at Diamond Power, copied from the ETF Website:

The monitor you have shown was intended to look at a water gauge on the boiler. The aspect ratio was 4:3 but the whole screen was not needed for looking at a gauge that was mounted in the up position.

The gauge is about 6 inches wide and close to 2 foot tall.

The vertical scan really was rotated by 90 degrees in both camera and monitor so the horizontal was scanning up and down instead of across as we are familiar with in most TV systems. The metal plate on the front covered a round picture tube, if I remember correctly, and the plate was cut to show the part of the image needed in the control room. **Water gauge viewing was the first application for the camera.**

LIQUID LEVEL TELEGAUGE

James A. Good, Grosse Pointe, Mich., assignor to Diamond Power Specialty Corporation, Detroit, Mich., a corporation of Michigan

Application May 23, 1947, Serial No. 749,964

Oct. 30, 1951

J. A. GOOD

2,573,006

LIQUID LEVEL TELEGAUGE

Filed May 23, 1947

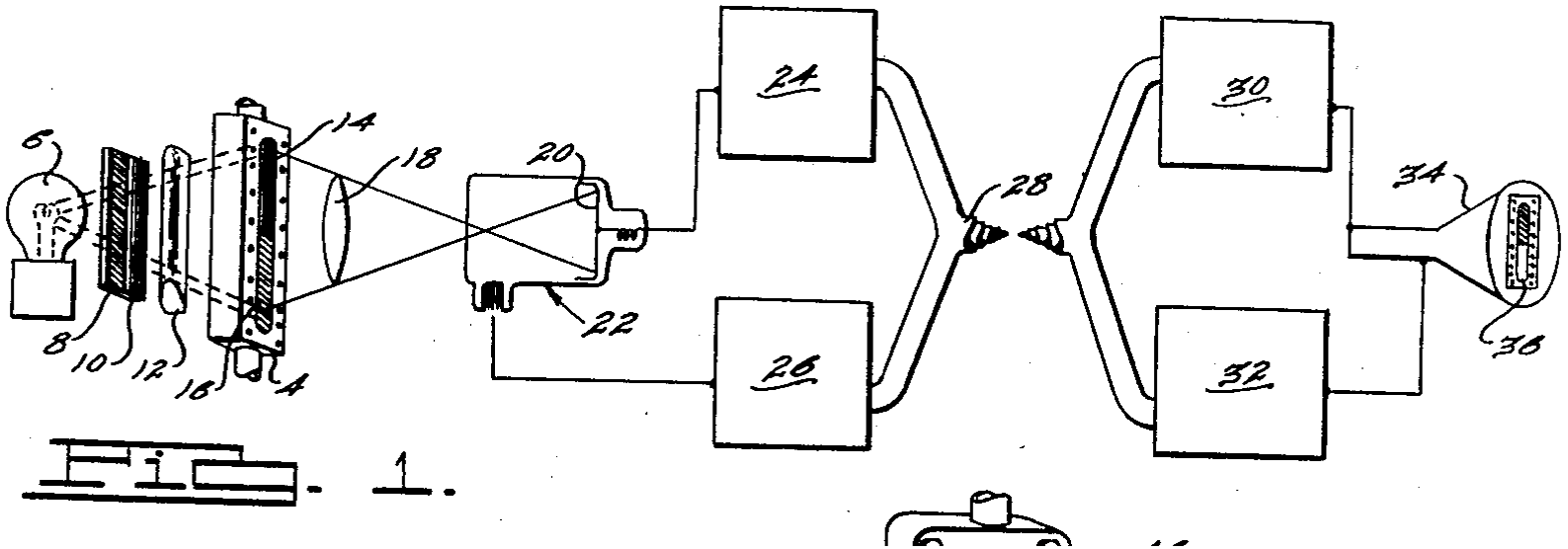
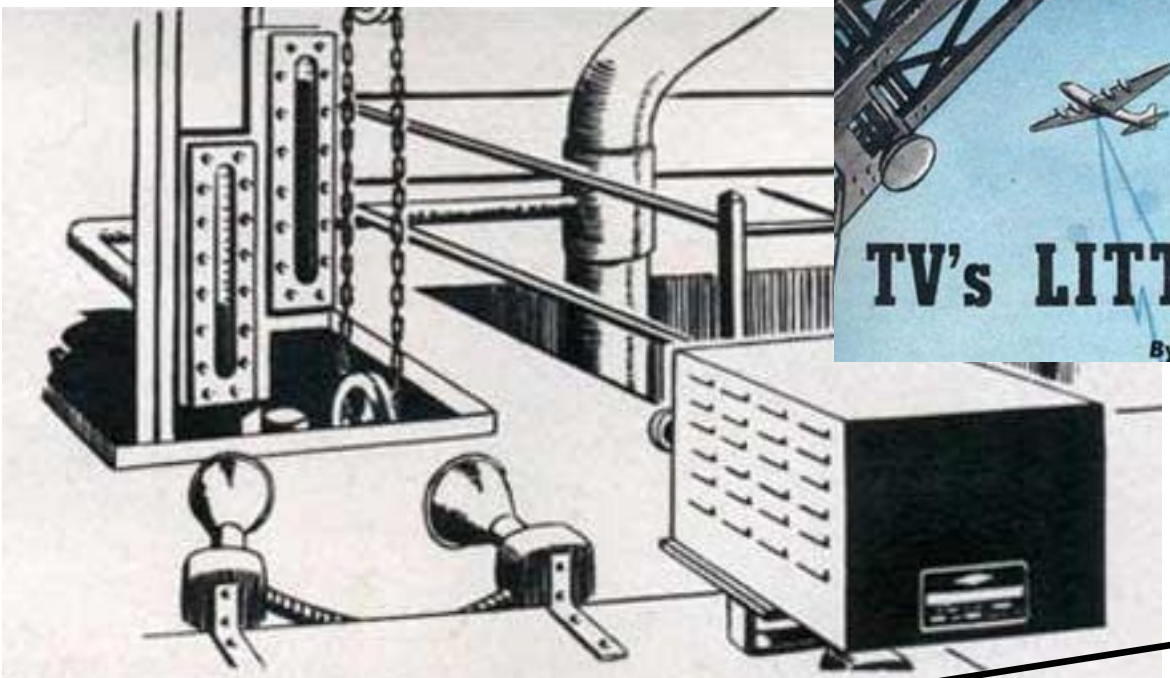


Fig. 1.



Note image of two Stacked Water level Gauges on the Diamond Power CRT monitor

http://www.earlytelevision.org/pdf/pop_mech_11-50.pdf

Diamond Power
CRT monitors

Courtesy of Commonwealth Edison Company

A Diamond Power television system monitors water levels inside a boiler at a power station.

Probably the "oldest" installations in continuous service are those of the four Utiliscopes which the New York Edison Company uses to check on the water level in some of its five-story steam boilers. For four years now, two or more of these little TV eyes have been at work 24 hours a day watching the gauges which indicate the water level in drums at the top of the boilers. This information is relayed to the main control panels on the ground floor.

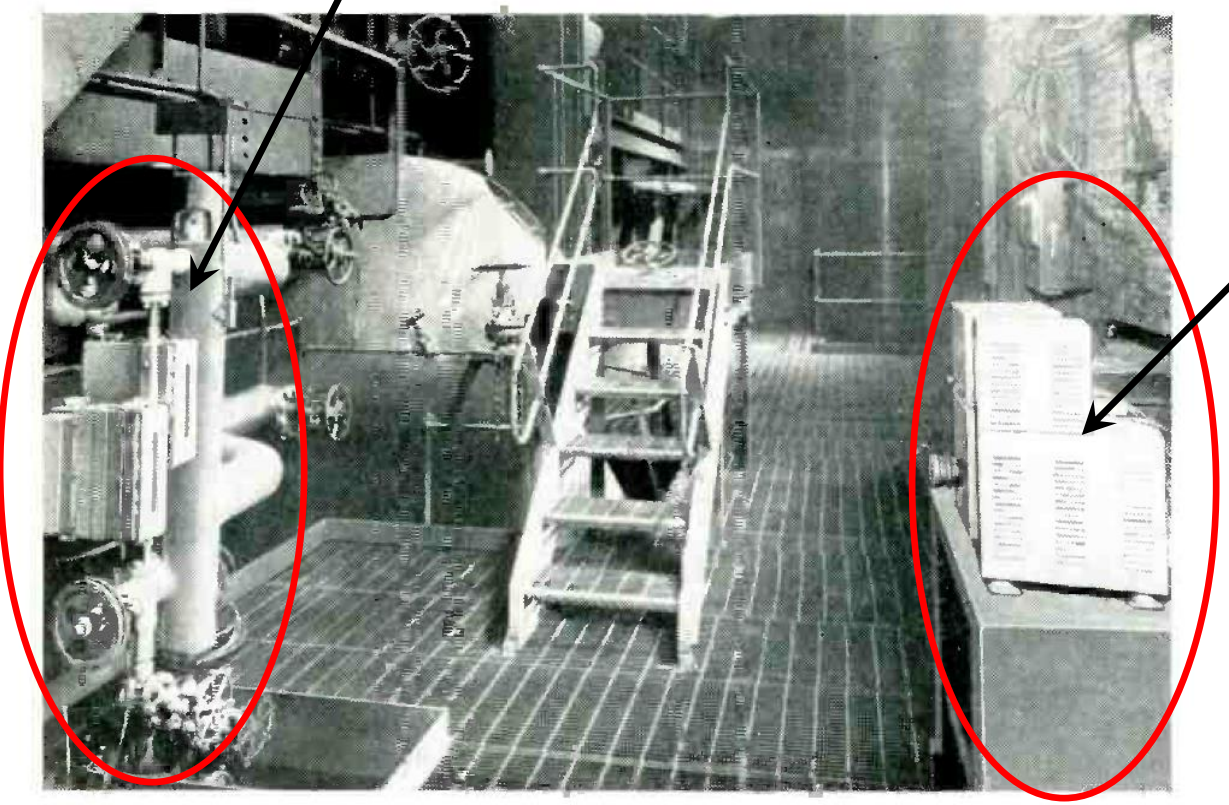
A pressure of 1400 pounds to the square inch, and a temperature of 900 degrees require special mica-coated glass one inch thick—and even this blows out from time to time—so that watching these gauges can be dangerous.

From: Closed Circuit and Industrial Television, Noll, Edward M., 1956, p 7

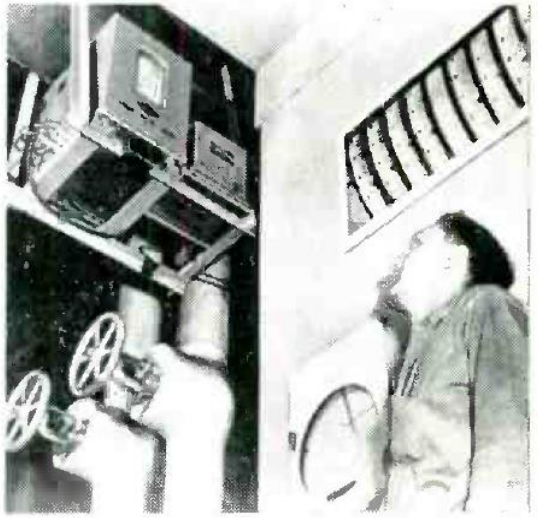
http://www.earlytelevision.org/pdf/pop_mech_11-50.pdf

Water Level Gauge

Camera



Camera at right views level of liquids in two tubes at left in this industrial application of the television system



Operator sees liquid levels on remote monitor screen

'Closed Circuit Industrial Television'
Robert W. Sanders
Capehart-Farnsworth Corp.
Ft. Wayne, Indiana

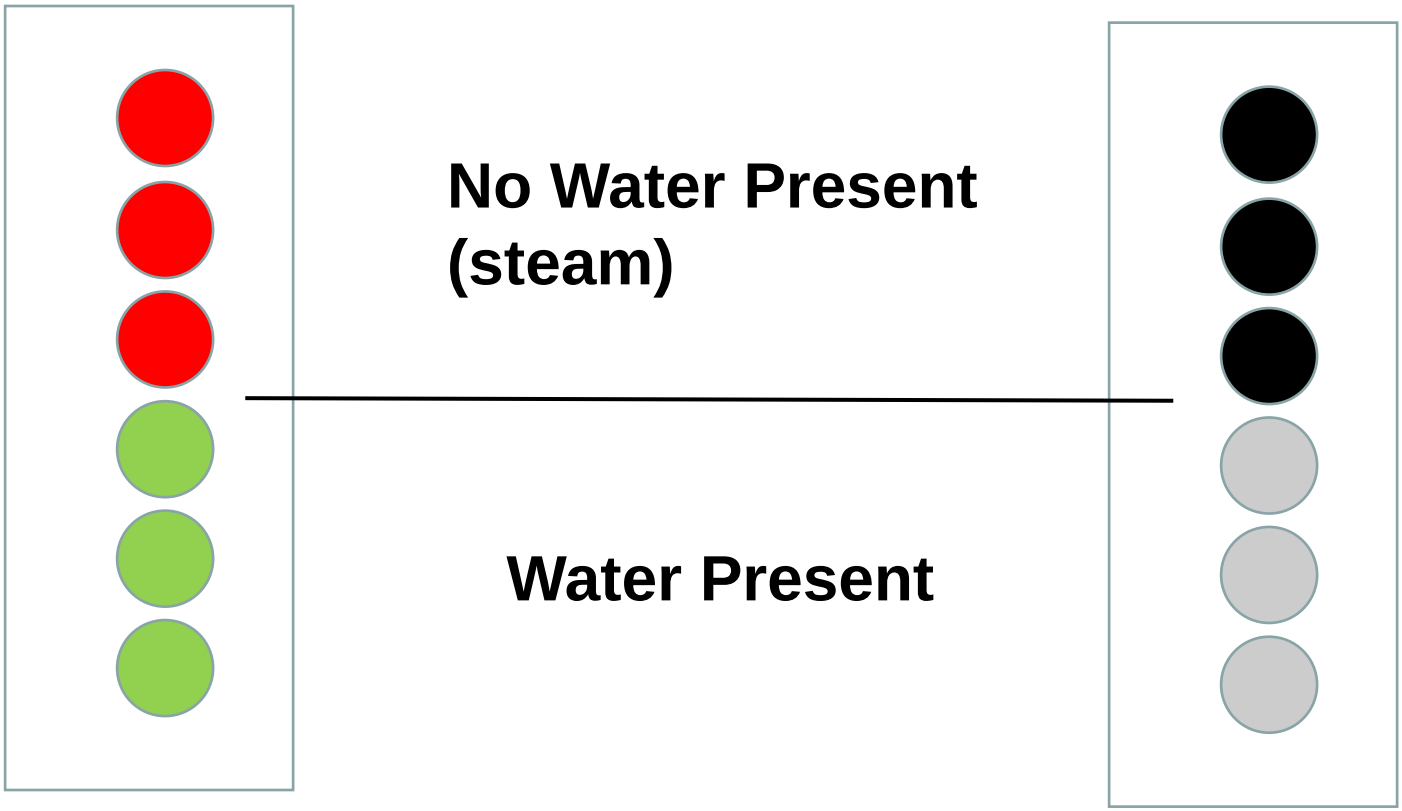
From:
Electronics Magazine
July, 1950, page 88

Discussion in patent 2,578,006 ‘Liquid Level Telegauge’ Application May, 1947 by James Good, Diamond Power Specialty Corp.

Image Dissector tube chosen because it could be made Red sensitive and provide good discrimination between RED and GREEN indicators on a Blackburn Water Gauge.

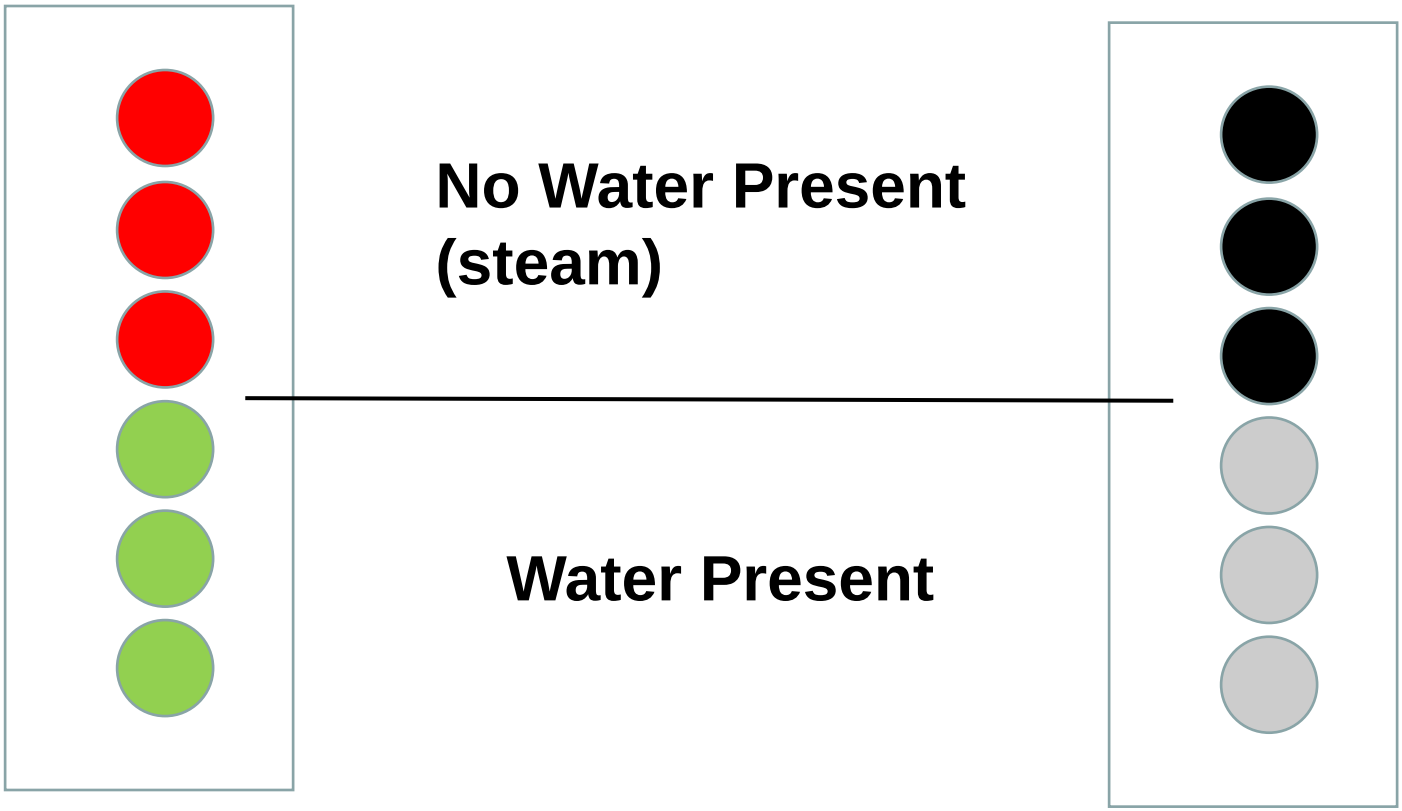
Iconoscope was tried but could not distinguish between the red and green indicators of the bi-color water gauge.

‘..Ordinary television apparatus will not present an image at the receiving station which permits distinguishing the red and green sections from one another’.



Color Display at Water Level Gauge

B&W Display at CRT Monitor



Color Display at Water Level Gauge

Image Dissector is most sensitive to RED so video is High level for red, Low level for Green

B&W Display at CRT Monitor

Inverted Video Signal on CRT so Green (low) Video) appears as ‘white’


EARLY Television MUSEUM