PATENT SPECIFICATION

Application Date: Nov. 3, 1943. No. 18202/43. **570091**

Complete Specification Left: Oct. 30, 1944.

Complete Specification Accepted: June 21, 1945.

PROVISIONAL SPECIFICATION

Improvements in Flow Testing Apparatus

We, ERIC ERNEST SAMUEL WADE and SYDNEY ALFRED JONES, both British Subjects, and of The Lang Pen Company Limited, 13, Hope Street, Liverpool, in the County of Lancaster, do hereby declare the nature of this invention to be as follows:—

This invention relates to flow testing apparatus with more especial reference to apparatus for testing the flow through tubular assemblies such as the heat exchangers used as radiators for the liquid coolant in internal combustion engines.

Customarily, during the manufacture and assembly of coolant radiators, particularly for aircraft engines, the requisite flow tests have been carried out by complicated apparatus including an elevated header tank remote from, and connected by extensive piping to, the test site where the radiator is placed for the water to flow therethrough to a measuring tank, the monometer and other gauges being remote from the tester and the apparatus being generally cumbersome and difficult to operate.

The present invention has for its object to provide improved, simplified and compact flow testing apparatus which may be cheaply manufactured and erected at any appropriate site where a water supply is available, and which is convenient and effective in operation.

According to the present invention flow testing apparatus comprises a hollow column or header fed with water to maintain a constant head therein, a launder or tank at the top of the column taking the overflow therefrom, a fnunel-shaped conduit connecting the foot of the column with a stop-cock or test valve, and a union through which the water flows from the valve through the article to be tested and thence discharged into a measuring tank.

The funnel-shaped conduit is preferably so formed as to give a constant acceleration in flow from the foot of the column to the valve and is conveniently a short horizontal projection from such column, while the manometer, clock and/or any other gauges requisite are conveniently grouped on the side of the column adjacent to—and readily visible by—the operator carrying out the test.

The stop-cock or test valve may be operated by hand or mechanically by the clock mechanism, and at the head of the column an adjustable ring weir may be provided within the tank or launder, by which the hydrostatic head may be set to give the required manometer reading.

Advantageously the column is of rectangular section,—say one foot square for a hydrostatic head of about seven feet to give a flow of the order of 78 gallons per minute—and rests on a structure or footing which raises the test valve to a convenient height for operation and the union to a position for convenient connection of the radiator to be tested, the measuring tank being situated below the radiator to take the discharge therethrough when the test is being carried out, and being furnished with a graduated measuring scale which is inclined thus to give increased distances between successive graduations and thereby considerably facilitating the tester's task in reading off the contents of the tank.

The pressure-responsive ends of the manometer tube or other differential pressure gauge are conveniently located respectively on the outlet side of the test valve and at the centre of the inlet to the convergent conduit.

The water supply to the header may be through an inlet valve on the wall of the column near the top thereof and may be controlled by hand or automatically in consonance with the test valve, it being understood that the hydrostatic head should be kept constant during the test flow. The header column, launders, tanks and conduit are conveniently fabricated of sheet metal and the simplicity and compactness of the apparatus not only simplify its manufacture and installation but also render it most convenient and effective in carrying out the flow test operation.

Dated this 3rd day of November, 1943.

O'DONNELL, LIVSEY & CO.,
Chartered Patent Agents,
3, Lower Common South,
London, S.W.15,
Agents for Applicants.

[*Price* 1/-]

COMPLETE SPECIFICATION

Improvements in Flow Testing Apparatus

We, ERIC ERNEST SAMUEL WADE and SYDNEY ALFRED JONES, both British Subjects, and of The Lang Pen Company Limited, 13, Hope Street, Liverpool, in the County of Lancaster, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to flow testing apparatus with more especial reference to apparatus for testing the flow through tubular assemblies such as the heat exchangers used as radiators for the liquid coolant in internal combustion engines.

Customarily, during the manufacture and assembly of coolant radiators, particularly for aircraft engines, the requisite flow tests have been carried out by complicated apparatus including an elevated header tank remote from, and connected by extensive piping to, the test site where the radiator is placed for the water to flow therethrough to a measuring tank, the manometer and other gauges being remote from the tester and the apparatus being generally cumbersome and difficult to operate.

The present invention has for its object to provide improved, simplified and compact flow testing apparatus which may be cheaply manufactured and erected at any appropriate site where a water supply is available, and which is convenient and effective in operation.

According to the present invention flow testing apparatus comprises a hollow column or header fed with water to maintain a constant head therein, a launder or tank at the top of the column taking the overflow therefrom, a funnel-shaped conduit connecting the foot of the column with a stop-cock or test valve, and a union through which the water flows from the valve through the article to be tested and thence discharges into a measuring tank.

The funnel-shaped conduit is preferably so formed as to give a constant acceleration in flow from the foot of the column to the valve and is conveniently a short horizontal projection from such column, while the manometer, clock and/or any other gauges requisite are conveniently grouped on the side of the column adjacent to—and readily visible by—the operator carrying out the test.

The stop-cock or test valve may be operated by hand or mechanically by the clock mechanism, and at the head of the column an adjustable ring weir may be provided within the tank or launder, by which the hydrostatic head may be set to give the required manometer reading.

Advantageously the column is of rectangular section,—say one foot square for a hydrostatic head of about seven feet to give a flow of the order of 78 gallons per minute—and rests on a structure or footing which raises the test valve to a convenient height for operation and the union to a position for convenient connection of the radiator to be tested, the measuring tank being situated below the radiator to take the discharge therethrough when the test is being carried out, and being furnished with a graduated measuring scale which is inclined thus to give increased distances between successive graduations and thereby considerably facilitating the tester's task in reading off the contents of the tank.

The pressure-responsive ends of the manometer tube or other differential pressure gauge are conveniently located respectively on the outlet side of the test valve and at the centre of the inlet to the convergent conduit.

The water supply to the header may be through an inlet valve on the wall of the column near the top thereof and may be controlled by hand or automatically in consonance with the test valve, it being understood that the hydrostatic head should be kept constant during the test flow.

The invention will be further described with reference to the accompanying drawings which illustrate a preferred embodiment of the improved flow testing apparatus and in which

Fig. 1 is a side elevation and

Fig. 2 is a front view thereof.

Referring now to the drawings, the apparatus comprises a hollow column or header 1 fed with water to maintain a constant head therein, a launder or tank 2 at the top of the column taking the overflow therefrom, a funnel-shaped conduit 3 connecting the foot of the column 1 with a stop-cock or test valve 4 and a union 5 through which the water flows from the valve 4 through the article to be tested and thence discharges into a measuring tank 6.

The column 1 is of rectangular section and rests on a structure or footing 7 which raises the test valve 4 to a convenient height for operation and the union 5 to a position for convenient connection to the

radiator (not shown) to be tested, the measuring tank 6 being situated below the radiator to take the discharge therefrom when the test is being carried out, and to support the radiator during this operation a stand 8 is furnished which bridges the measuring tank to support the radiator in a convenient position adjacent the union 5 and above the measuring tank.

The funnel-shaped conduit 3 is so formed as to give a constant acceleration in flow from the foot of the column 1 to the valve 4 and is shown as a short horizontal projection from such column, while on the front of the latter above such conduit and readily visible by the operator carrying out the test, is a seconds clock indicated at 9.

As aforementioned a differential manometer giving a reading between the outlet side of the test valve and the inlet to the conduit 3 may be provided, but in the preferred embodiment illustrated, a manometer 14 reading directly on the water column is furnished, its pressure responsive head 15 being located immediately adjacent the union 5 and a duct 16 connecting this with the indicator 17 adjacent a scale 18 arranged in a box 19 formed on the front of the overflow launder 2.

The box 19 holding the scale 18, which is preferably an opal scale illuminated by light within the box, and the sight-glass 17 is placed at an angle to give good visibility and for the purpose of spreading the scale, each inch becoming approximately 1.4 inches. The front or hood part of the box 19 is blackened internally which makes the scale lighter by contrast, while further having the effect on the meniscus at the top of the water column in the sightglass of a black line the width of the column against the graduations on the scale which further assists the instantaneous reading of the manometer.

For adjusting the hydrostatic head to give the required manometer reading, a movable ring weir 21 is provided as a sleeve telescoping within the upper open end of the column or header 1 in the launder 2 over which weir the overflow passes into the launder and thence down a pipe 22 at the right-hand side of the column 1 to a discharge conduit 23 carried by the frame or footing 7.

The water supply to the header is through an inlet 25 on the wall of the column 2 near the top thereof and is controlled by a hand valve 26 is consonance with the stop valve 4, but it will be noted that the pipe 27 leading from the water main to the inlet 25 is bent downwardly so that the handle of the inlet valve 26 can be conveniently manipulated by the operator.

If desired, as will be understood, both the test valve 4 and the inlet valve 26 may be operated mechanically by the clock mechanism.

30 is the scale and sightglass provided on the side of the measuring tank 6 for indicating the contents thereof, that is to say, the volume which has flown through the article tested and, as with the manometer scale 18, the scale 30 is inclined at 45° thus giving increased distances between successive graduations and thereby considerably facilitating the tester's task in reading off the contents of the tank.

The header column, launders, tanks and conduit are conveniently fabricated of sheet metal and the simplicity and compactness of the apparatus not only simplify its manufacture and installation but also render it most convenient and effective in carrying out the flow test operation.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Flow testing apparatus comprising a hollow column or header fed with water to maintain a constant head therein, a launder or tank at the top of the column taking the overflow therefrom, a funnel-shaped conduit connecting the foot of the column with a stop cock or test valve, and a union through which the water flows from the valve through the article to be tested and thence discharges into a measuring tank.

2. Flow testing apparatus according to the preceding claim wherein the funnel-shaped conduit is a short horizontal projection from the column and is so formed as to give a constant acceleration in flow from the foot of the column to the valve.

3. Flow testing apparatus according to either of the preceding claims including an adjustable ring weir at the top of the column within the launder or overflow tank for adjusting the hydrostatic head.

4. Flow testing apparatus according to any of the preceding claims wherein the header or column is carried by a structure or footing raising the test valve on the conduit to a convenient height for operation and the union to a position for convenient connection to the article to be tested.

5. Flow testing apparatus according to any of the preceding claims wherein the manometer, clock, and other gauges requisite are mounted on the column adjacent to and readily visible by the operator carrying out the test.

6. Flow testing apparatus according to any of the preceding claims wherein the

sight glasses and scales are inclined for the purpose specified.

7. Flow testing apparatus constructed and arranged for use substantially as described with reference to the accompanying drawings.

Dated this 30th day of October, 1944.

O'DONNELL, LIVSEY & CO.,
Chartered Patent Agents,
3, Lower Common South,
London, S.W.15,
Agents for Applicants.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1945.

FIG. 1.

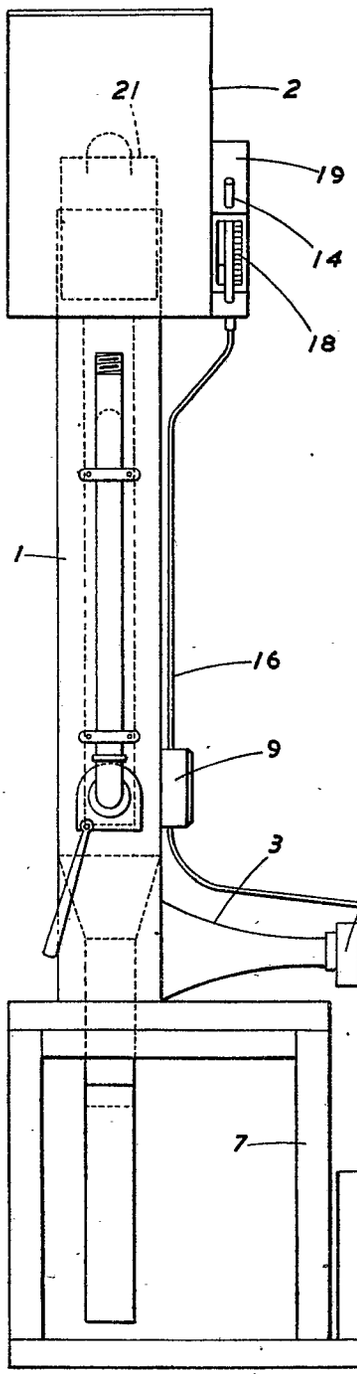
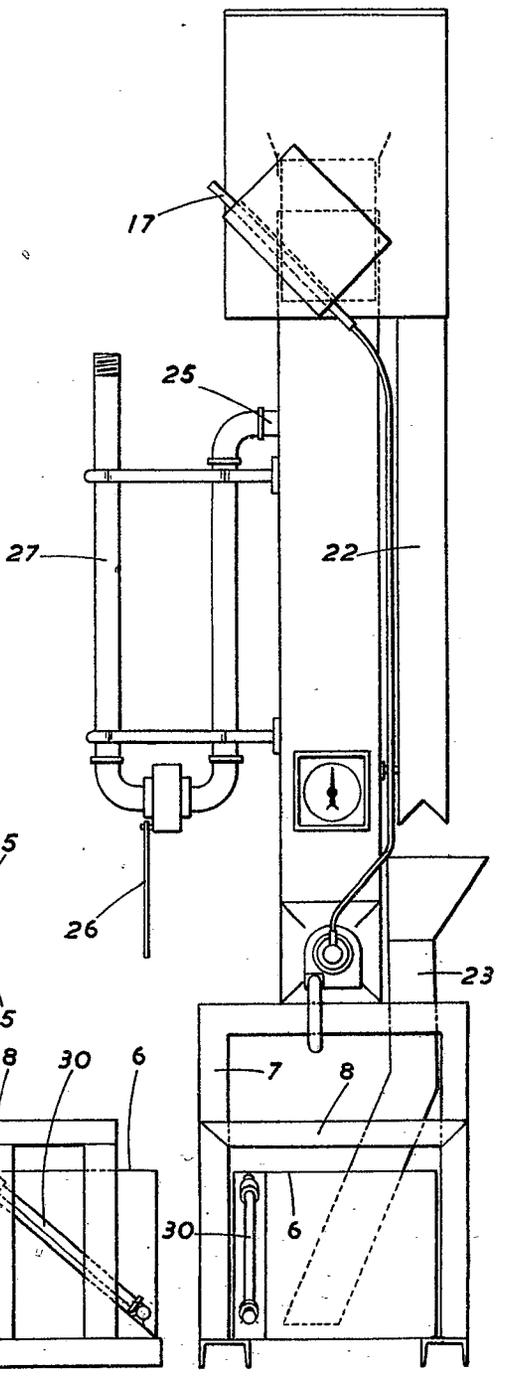


FIG. 2.



[This Drawing is a reproduction of the Original on a reduced scale.]

Malby & Sons, Photo-Lith.