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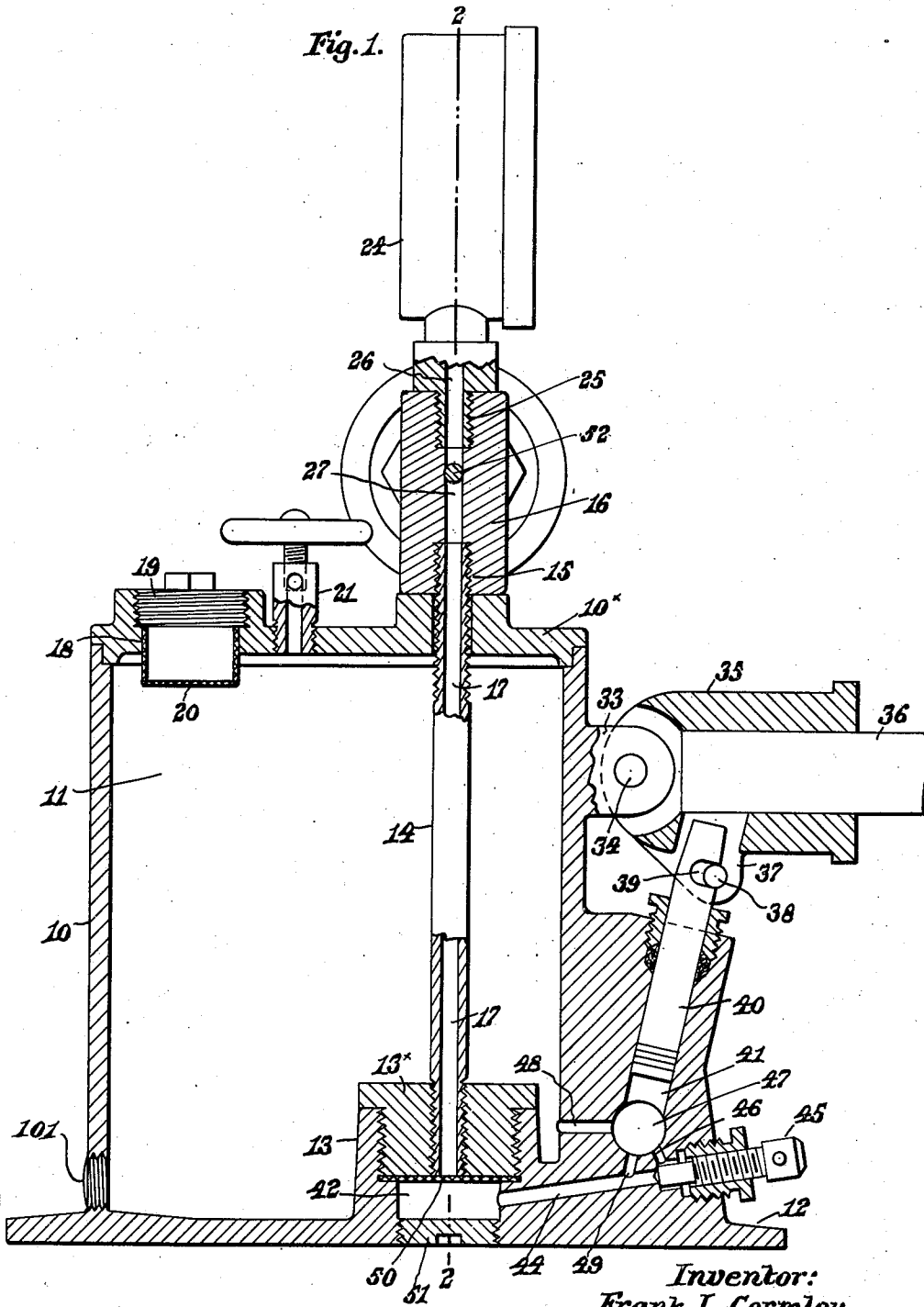
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HYDRAULIC NOZZLE TESTER

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2 Sheets-Sheet 1



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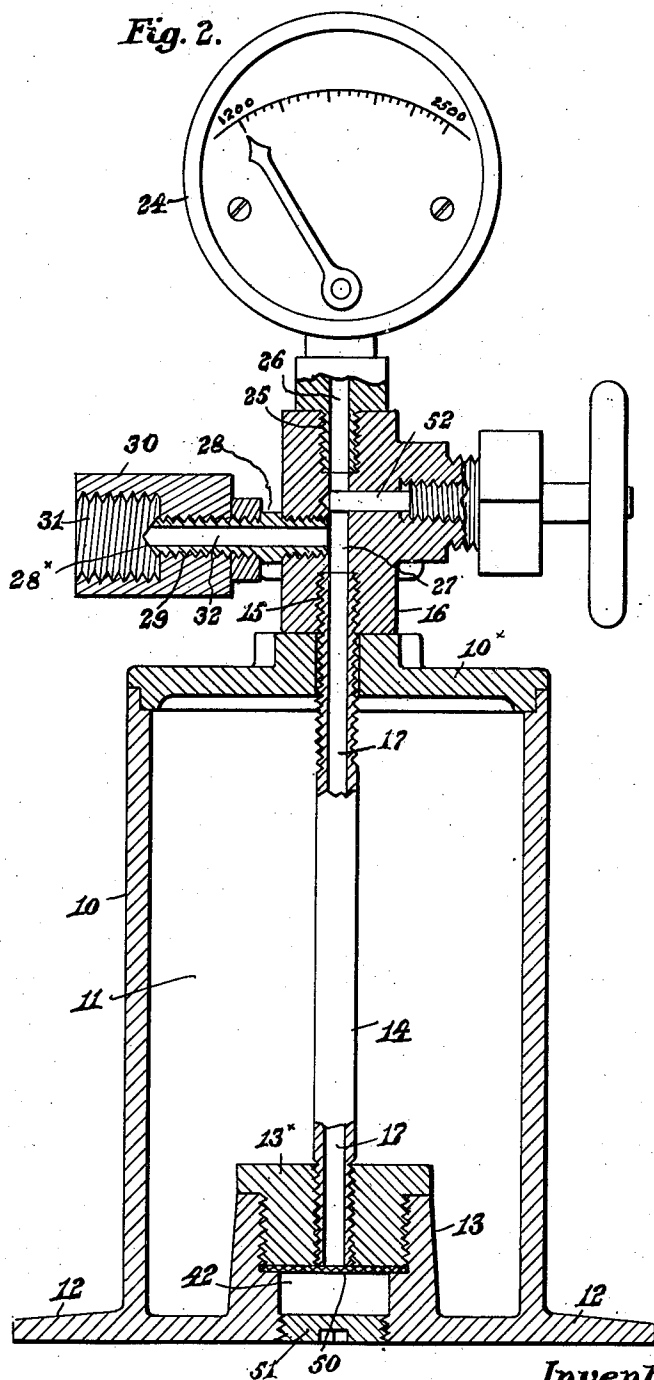
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Fig. 2.



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UNITED STATES PATENT OFFICE

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HYDRAULIC NOZZLE TESTER

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5 Claims. (Cl. 73—51)

The present invention relates to hydraulic testing devices particularly adapted for testing the nozzles used in Diesel engines, oil engines, and the like, the object of the invention being to produce a simple compact nozzle tester which may be transported readily and clamped to any flat surface where its use is desired.

This object is attained by the mechanism illustrated in the accompanying drawings.

For the purpose of illustrating the invention, one preferred form thereof is illustrated in the drawings, this form having been found to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized, and the invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described except as required by the scope of the appended claims.

Of the drawings:

Figure 1 represents a vertical section of a hydraulic nozzle tester embodying the principles of the invention, and

Figure 2 represents a vertical section of the same on line 2, 2 on Fig. 1.

Similar characters indicate like parts throughout the several figures of the drawings.

In the drawings 10 is a casing within which is an oil reservoir 11, the base of the casing 10 having outwardly extending flanges 12 by which said casing may be clamped to a flat surface to hold it firmly in position while the device is being operated. At the lower end of the base 10 and communicating with the bottom of the reservoir 11 is a normally closed opening 101 which when opened permits the oil to be removed from said reservoir.

Extending upwardly from the lower wall of the casing 10 is a cylindrical projection 13 having a female thread to which is secured a closure 13x.

Threaded to the closure 13x is a tubular member 14, the upper end 15 of which extends through the cover 10x of the casing 10 and is threaded to the valve member 16.

The tubular member 14 has a passage 17 extending the entire length thereof.

The cover 10x of the casing 10 is provided with a filling opening 18 adapted to be closed by the threaded member 19.

Disposed within and extending downwardly from the opening 18 is a cup-shaped member 20 of fine wire screen.

This screen 20 provides a means for removing all dirt and other foreign substances from the oil when the reservoir 11 is being filled.

The cover 10x of the casing 10 is also provided with an air relief valve 21 which may be of any usual construction. As this relief valve forms no

part of the present invention it is deemed unnecessary to illustrate the same in detail.

The relief valve 21 is opened when the reservoir 11 is being filled with oil and is then closed.

To the upper end of the valve member 16 is secured a pressure gauge 24 which has extending downwardly therefrom a threaded projection 25 secured to the valve member 16.

This projection 25 has a vertical passage 26 in alinement with passage 17 and extending therethrough into the pressure gauge 24 which may be of any usual construction.

The tubular member 14 has a passage 17 extending therethrough which is adapted to communicate at its upper end with the passage 26 extending into the pressure gauge 24. The valve member 16 has a lateral projection 28 extending therefrom to the outer threaded end 29 to which is secured a threaded nut 30, the outer end of which is provided with a threaded socket 31 in which may be disposed a nozzle to be tested.

The projection 28 has a passage 32 extending therethrough, the inner end of which communicates with the vertical passage 27 extending through the valve member 16.

Projecting from one end of the casing 10 is an ear 33 to which is pivoted at 34 a lever socket 35. This lever socket 35 is movable about the axis of the pivot pin 34 by means of the handle 36.

The lever socket 35 has downwardly extending ears 37 in which is mounted the pivot pin 38 extending into a slot 39 in the upper end of a plunger 40 of an oil pump 41, the housing for which is formed integral with the casing 10.

From the lower end of the chamber 42 beneath the lower end of the tubular member 14 extends an oil passage 44, the outer end of which is adapted to be closed by the relief valve 45.

When the valve 45 is open oil from the chamber 42 may flow through the passage 44 and the side passage 46 into the compartment 47 and from this compartment through the passage 48 into the oil reservoir 11.

The passage 44 is also connected to compartment 47 by means of the branch passage 49.

Suitable valve members control the flow of oil through the passages 48, 49 but as this particular valve mechanism forms no part of the invention it is deemed unnecessary to illustrate the same in detail.

It is sufficient to state when the plunger 40 is moved downwardly oil will be permitted to flow into compartment 47 from which it will be forced through passages 49 and 44 into the chamber 42 and upwardly through the passage 17 in the tubular member 14, from which it may be discharged into the passage 27 in the valve member 16.

In the chamber 42 is a fine wire screen 50 to

prevent sediment in the oil from passing into the passage 17 of tubular member 14 and getting into a nozzle while being tested.

Should any sediment collect in the chamber 42 it may be removed therefrom by unthreading the closing plug 51 in the base of the casing 10.

The valve member 16 is provided with an adjustable valve stem 52 adapted to close the passage 27 and prevent further admission of oil to the gauge 24.

The nozzles used on Diesel engines are set for certain pressures depending on the size of the engines on which they are to be used.

Ordinarily, about three sizes of such nozzles are used and these are set at 1500, 2000, and 2200 pound pressure.

Within each nozzle is a spring and this must be set to stand a certain pressure. For instance, in the case of a nozzle sustaining a 2000 pound pressure, this nozzle would be attached to the testing device by screwing it into the socket 31 shown in the drawings, then with the valve 52 open admitting oil into the pressure gauge 24 the pump 41 would be operated to pump oil from the reservoir 11 into the chamber 42 and through the passages 17, 27, 26, into the pressure gauge, and also through the lateral passage 32 into the interior of the nozzle.

If the spring in the nozzle has been properly adjusted when the hand on the gauge 24 reads 2000 pounds, the oil passing through the passage 32 will pass through an opening in the end of the nozzle. This will indicate that the nozzle is satisfactory.

However, it is also desired to test the spring within the nozzle and this is done by closing the valve 52 while the hand of the gauge is indicating a 2000 pound pressure.

With the valve 52 closed and the passage 32 opened, the pump 41 is operated by quick strokes rapidly forcing oil at a greater pressure through the passage 32 against the spring within the nozzle.

In operating the pump 41 at this time the handle 36 is given short quick strokes which will produce on the spring in the nozzle what is termed a "shock test."

After this shock test the valve 52 is again opened and a pressure of 2000 pounds applied, and if under these conditions the spring in the nozzle releases at this pressure, it is in satisfactory condition and ready to be applied to a Diesel engine.

When it is desired to remove the nozzle from the testing device, before such removal the relief valve 45 is opened which releases the pressure in the nozzle so that when said nozzle is removed there will be no oil in the passage 32 to spray over, which obviously would be quite objectionable.

The projection or stud 28 is threaded to the valve member 16 and is stationary.

The nut 30 is double ended, one end being a loose fit for the outer end of the stud 28, while the threaded socket 31 is formed in the opposite end and the nozzle to be tested is loosely fitted to this socket.

The thread on the stud 28 is finer than the thread of the socket 31 and both threads are right handed.

Consequently, when the nozzle is disposed in the socket 31 and the nut 30 is rotated, the inner

end of the nozzle will be drawn up in tight contact with the tapered end 28c of the stud 28, thus insuring that all oil in passage 32 will enter the nozzle.

A different nut 30 is required for each size of nozzle being tested.

The entire testing device is very compact, is practical in service for the purpose for which it is designed, and may be manufactured at a very reasonable price.

It will be noted that injection nozzles in Diesel or other oil engines must necessarily be kept in proper adjustment in order to obtain the maximum efficiency from the engine.

The present invention provides a means whereby this testing of the nozzles may be accomplished very easily.

It is believed that the operation and many advantages of the invention will be understood without further description.

Having thus described my invention, I claim:

1. In a device of the class described, an enclosed oil reservoir, a tubular member extending upwardly therein with its upper end projecting through the upper wall of the reservoir and provided with a restricted passage therethrough, a valve member secured to the upper end of said tubular member and provided with a vertical passage therethrough and having a laterally extending threaded projection to receive a nozzle to be tested, said projection having extending therethrough a lateral passage communicating with the vertical passage of said valve, a pressure gauge surmounting said valve member and having a passage therefrom communicating with the vertical passage of said valve and adapted to be closed by said valve, and means for pumping oil from said reservoir to the interior of said tubular member.

2. A device as set forth in claim 1 in which the lower end of the tubular member communicates with an oil chamber in the lower wall of the reservoir with its upper end threaded to said valve member.

3. A device as set forth in claim 1 in which a relief valve is provided permitting the return of the oil in said tubular member into said reservoir.

4. A device as set forth in claim 1 in which the lower end of the tubular member communicates with an oil chamber in the lower wall of the reservoir with its upper end threaded to said valve member, said chamber being provided with a removable closure in its lower wall.

5. In a device of the class described, a unitary structure including a manually actuated hydraulic pump forming a part of said device and provided with a vertical pipe having a restricted discharge passage therethrough, a pressure gauge, and a valve member secured to the upper end of said pipe between the gauge and pump and provided with one passage to said pressure gauge and a second passage to a tubular projection integral with said valve member and adapted to receive a nozzle having a spring therein, said second passage communicating with the discharge passage from said pump, and said valve member controlling the admission of liquid to the pressure gauge when liquid is forced through said second passage to determine the amount of pressure the spring in said nozzle will sustain.

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