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## CC88 Pressure Cooker Gauge Testers

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# Pressure Cooker Gauge Testers

by Arnold Baragar and Mary E. Runnalls

Two types of testers have been developed with which county extension agents can test pressure cooker gauges without taking them off the cooker lids. Both types use air pressure and are modifications of testers which have been used. Either of the testers will greatly reduce the time spent in testing gauges and completely eliminate the possibility of damaging the lid or gauge in taking them apart. Accuracy of testing by this method is discussed in the latter part of the circular.

## PUMP TYPE GAUGE TESTER

A very simple tester, which is a modification of one already in use, is shown in Figure 2. For convenience, this is called a pump type tester because the air pressure is increased for each setting by pumping in more air. The materials needed for this tester are as follows:

- 1 - 3/4 inch floor flange
- 1 - 1/8 to 3/4 inch bushing
- 1 - 1/8 inch Tee
- 2 - 1/8 inch elbows
- 3 - 4 inch nipples of 1/8 inch pipe
- 1 - football inflater stem or its equivalent
- 1 - size 0 rubber stopper
- 1 - master gauge
- 1 - valve stem from an old inner tube
- 1 - pump

The method of assembling the parts is shown in Figures 1 and 2, using the floor flange as the base. Caution! To prevent leaks at the joints use paint or white lead on all pipe connections that carry air.

Weld or braze the 1/8" Tee to the reducing bushing and then screw it into the base. Screw the two elbows on two of the 4" pipes. Screw the pipes into the horizontal part of the Tee. Ream out the end of the other 4" pipe about 3/8 inch or use a file to clean out the inside of the pipe. File off the football inflater stem around the thick end to make a clean surface and

then insert it into the cleaned or reamed end of the 4" pipe. Solder the joint to make it tight. Cut the size 0 rubber stopper to the proper length and drill a small hole through the center using a 1/16" twist drill or a heavy needle, or slim ice pick. Bevel the top of the stopper with shears and smooth it with emery cloth or half round wood rasp. This rubber stopper serves as a tight seat between the gauge and the stem.

In order to admit and keep air in the system, clean an ordinary tire valve, and solder it into a piece of 1/8" pipe about 3/4 to 1 inch long. The pump shown in Figure 2 is a large lamp pump to which has been soldered the valve connection from an automobile pump hose. A piece of cardboard serves as a gasket and makes it possible to fasten the pump rigidly to the tester. Although it is convenient to have the pump fastened in this manner, it is not necessary since any pump having a connection for a tire valve can be used.

The method of using the tester is evident in Figure 2. For convenience and rigidity the tester should be clamped to a table. For convenience in reading, the master gauge should be tilted at an angle of 20 to 30 degrees with the vertical. This can be accomplished by rotating the elbow. The angle of tilt is clearly shown in Figure 6.



Fig. 1

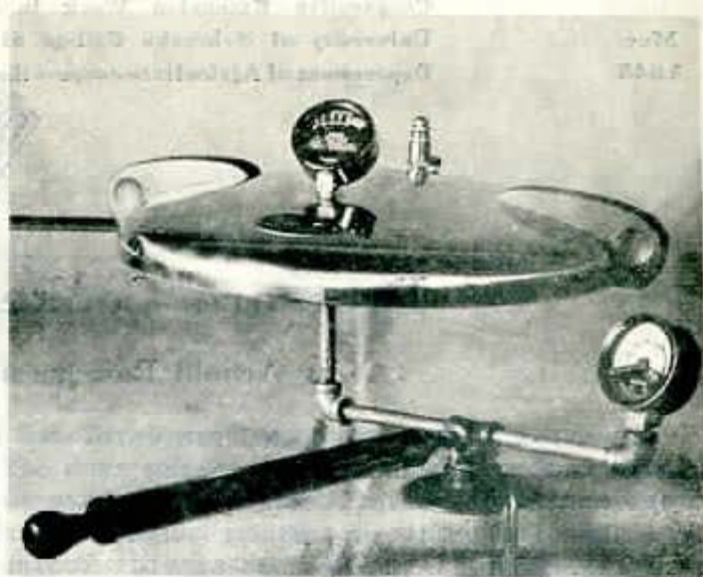


Fig. 2



Fig. 3

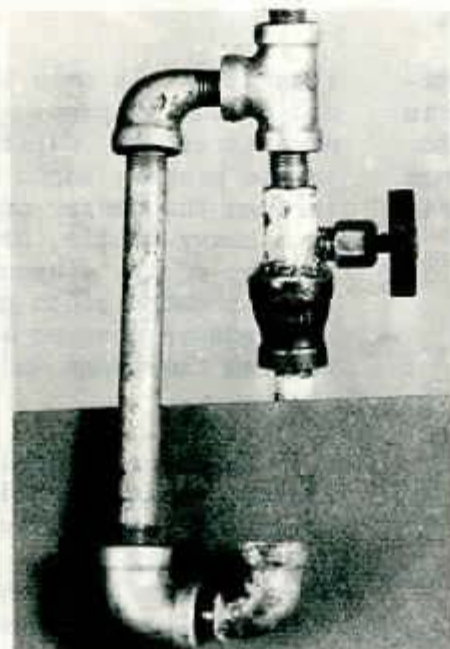


Fig. 4



Fig. 5



Fig. 6

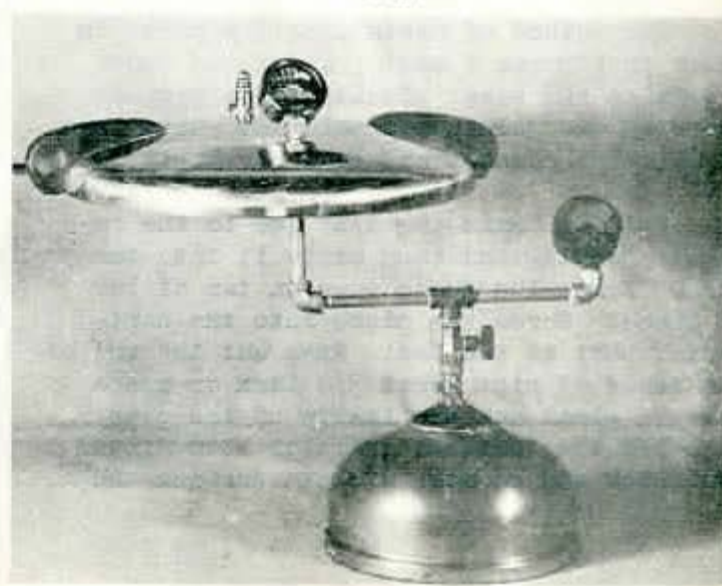


Fig. 7

## TANK TYPE GAUGE TESTERS

Three testing devices have been built on old gasoline lamp founts. The one shown in Figure 3 is the first one to be used by Nebraska extension agents. It was built by Verdon Petersen and Rachel Peterson and used in Lancaster County. Changes are being made to lower the center of gravity and to make it possible to test gauges without taking them off the lids.

Figures 4 and 5 give the construction details of the most acceptable of the three kinds of tank type testers. Figure 6 shows the gasoline lamp stripped down and also the valve stem soldered into place. Figure 7 shows a combination of the arms used on the pump type tester (Figures 1 and 2) and lamp fount like the one shown in Figure 5.

Materials needed for the tester shown in Figures 4 and 5 are:

- 1 - old gasoline fount with valve
- 1 - 1/8 inch Tee
- 1 - 1/8 inch close nipple
- 1 - 4 or 5 inch nipple (1/8 inch pipe)
- 1 - 90° elbow
- 2 - street elbows
- 1 - air regulating valve
- 1 - master gauge
- 1 - football inflator stem or its equivalent
- 1 - size 0 rubber stopper
- 1 - valve stem from an old inner tube

Usually when a lamp fount is obtained the handle or covering over the stem is still on the lamp. Disconnect the valve and remove this covering. The fount or base will then look like the one shown at the left in Figure 6. If the lamp fount is in good condition all joints will be tight and the 1/8" pipe shown in Figure 6 will be securely connected to the tank. First of all, replace the valve and pump air into the tank to about 35 or 40 pounds per square inch pressure and submerge in a pail of water to see if there are any leaks. If there are any leaks, have the holes causing them soldered. A tinsmith or plumber can do this. Note whether the valve leaks, and if it does, refer to the section on alternate construction details. As shown in Figure 6, air must be pumped into the tank by means of a pump made for gasoline lamps.

Cut the lamp fount stem (Figure 6) to a length of 1 3/8 to 1 1/2 inches and re-thread with 1/8" pipe threads. Next assemble the parts shown in Figure 4, painting all connections. Either a globe steam valve or the lamp valve which has been soldered into a 1/4" to 1/8" reducing coupling may be used to regulate the air. Though the reducer coupling and valve do not have the same threads on the 1/4" opening, the brass valve can be screwed into the steel coupling. To make certain the joint is tight it would be best to solder around the joint although paint may be sufficient to seal the joint. For best results a new globe valve or an 1/8" needle valve is preferred. Connect the master gauge to the assembled parts and then connect the entire assembly to the lamp fount. Push the assembly down so that the bottom elbows touch the tank and if necessary tilt the gauge back against the valve.

Use the piece of brass pipe that was cut off the fount to make the gauge testing stem. Drill a 9/32" hole about 3/8" deep in the unthreaded end. Clean the thick end of the football inflator stem, insert in the drilled hole and solder the connection. Mount the rubber stopper as directed for the pump type tester. Drill a 1/4" hole in the filler plug. Solder the connection. Ordinarily the filler plug can be painted tight into the fount, but if a leak should develop, the connection can be made tight by soldering.

The materials needed for the tester shown in Figure 7 are:

- 1 - old gasoline lamp fount with valve
- 1 - 1/8 inch Tee
- 2 - 1/8 inch elbows
- 1 - 1/4 inch to 1/8 inch reducer coupling
- 1 - close nipple, 1/8 inch pipe
- 3 - 4 inch nipples, 1/8 inch pipe
- 1 - football inflator stem or its equivalent
- 1 - gasoline lamp pump
- 1 - size 0 rubber stopper

Also see comments on alternate construction details.

It is evident from Figure 6, that from the valve up, the fittings are assembled as described for the pump type tester, hence connect this assembly to the valve on the lamp fount as discussed for Figures 4 and 5.

## ALTERNATE CONSTRUCTION DETAILS

On the completed gauge tester shown in Figure 6 an automobile tire valve is shown in place of the regular lamp cap valve. The hole in the filler plug was drilled to fit the tire valve and after inserting the valve the connection was made tight with solder. Caution! When soldering a valve stem always remove the core so that the rubber on the valve will not be damaged. On the gauge tester shown in Figure 4, the tire valve was used because the regular lamp valve leaked and, further, the tank could then be filled quickly by using a tire pump or by getting air at a filling station. This advantage of the tire valve is worth the time and effort of installing it.

In the laboratory it was found that better control of air could be obtained by using a globe steam valve for 1/8" pipe or a large needle valve for 1/4" pipe bushed down to 1/8" pipe in place of the lamp valve. Of course these valves may add to the cost of the tester by about \$2.00, but it is believed that the convenience obtained more than justifies the added cost.

## THE IMPORTANCE OF TESTING PRESSURE COOKER GAUGES

An analysis of data gathered in the Equipment Laboratory on 710 gauges has shown that 42 per cent of the gauges had an error greater than 1 pound per square inch and 20 per cent had an error greater than 20 pounds per square inch. It is this 20 per cent of the gauges with which we are concerned because they may be a contributing factor to food spoilage. This becomes more evident when it is realized that about 70 per cent of all the gauges tested read low. (This does not include 16 per cent of the gauges which were correct.) Thus it is possible that the average processing temperature may be too low for the 20 per cent of the gauges and consequently harmful bacteria are not destroyed. To eliminate these low reading gauges, a series of pressure gauge testing stations were started over the state.

When these testing stations were first started, it was recommended that the gauges

be tested against a master gauge using steam for the fluid. The reason for this recommendation was that then any error due to the expansion of the bourdon tube would be corrected. This method required the use of a pressure cooker suitably equipped for testing gauges. Though this method is still the preferred one, it is not popular because many minutes are required to test a gauge. In order to find a test instrument that could be used to quickly check a gauge, experiments were carried out using air as a fluid. First it was determined that by using air instead of steam the error encountered would not exceed 0.2 pound per square inch on the average. Second, a simple gauge tester operated with a bicycle or automobile pump was devised and put into use, but this tester had one disadvantage, namely that the gauge had to be removed from the cooker for testing. Really what was needed was a tester that could be used with the gauge to be tested still fastened to the lid, using air as a fluid and finally taking only a minute or two for each test. Such testers have been described in this circular.