Making a Pressure Chamber

By David E. Parvin, A.L.I.

This is the third in a series of four articles about constructing and using both vacuum and pressure chambers to achieve castings that are bubble free and with greater detail. The first article explained the "why" and the second told how to make a low cost yet very functional vacuum vessel. This one will describe how to assemble a similar pressure chamber. In next month's "Sculpture Journal," I will show how to use both of these to achieve some results that would be impossible without them.

In last month's article, I explained that to make a vacuum chamber one had to find a suitable container, fabricate an airtight transparent lid, attach the right fittings, and provide a vacuum source. The great news is that a pressure chamber, tank, vessel, or pot is much simpler to come by. Our friends in the painting industry have done most of the work for us by providing pressure paint tanks in all kinds of sizes that need only minor modifications plus a pressure source for our purposes.

Pressure paint tanks are available from a number of sources. For this article, I went to what is my closest source, a Harbor Freight Tools outlet. There I was able to purchase for less than $80.00 plus tax a two and half gallon paint tank Model 37515 made by Central Pneumatics. I had better explain paint tank sizes. Generally, paint tanks are designed to hold a specific size container of paint such as one, five, or fifty-five gallons. The painter puts the appropriate container of paint into the pot, seals the lid, and applies pressure to force the paint out through a hose and spray gun. This Model 37515 is different because it will hold two and half gallons poured directly into the tank. While this may make it more difficult for a painter to clean up, it is no disadvantage to us while making a bigger chamber than one designed to hold a one gallon can. (More about sizes and sources later)

While there are any number of different paint tanks available, all that I have seen are similar enough that adaptation for our use is almost identical. Notice the photograph of the paint tank assembled as intended. Attached to the lid is a regulator designed to control the volume of compressed air entering the tank. Attached to the regulator are four things, a pressure gauge, a male air intake coupling, a safety release valve, and a connector that allows air to flow into the pot. What is not visible in the photograph is a pipe (fluid tube) inside the tank that extends to the bottom of the tank as an outlet for the paint. The first step in modifying the tank into a pressure chamber is get rid of this pipe since it would only be in the way. But because this pipe was the path for the paint to escape from the tank, there remains a hole in the lid that would prevent pressurization. Threaded into this hole is an elbow on the outside of the lid that is the attaching

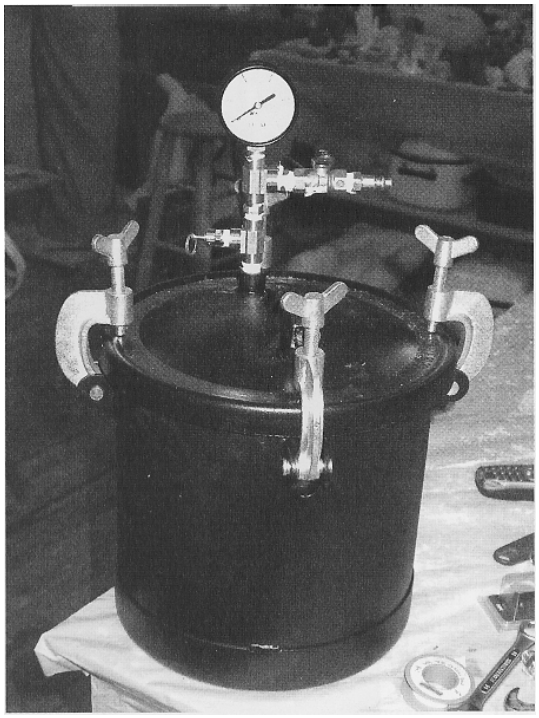
Two of the eight tanks owned by the author. The one on the floor will hold 10 gallons. The one on its side will hold 55 gallons.

the lid that would prevent pressurization. Threaded into this hole is an elbow on the outside of the lid that is the attaching point for a hose to carry the paint to the spray gun. My first thought was to remove the external elbow and install a plug. Unfortunately, the elbow was attached so *firmly* that I couldn't get it loose. I took the easy way out and screwed a plug into the outside threads plugging the hole.

At this point I had a barely functional pressure vessel. I could have connected a pressure line to the regulator and pressurized the pot and the pot would have remained pressurized as long as the pressurized input line remained connected. There are two problems with this. Let me explain the simplest one first. It would be convenient if the pressure line could be detached and the vessel would hold its pressure. All that is needed is a on/off valve between the male intake coupling and the regulator and the problem is solved. While the second problem is also easily resolved, it is a little more complicated to explain.

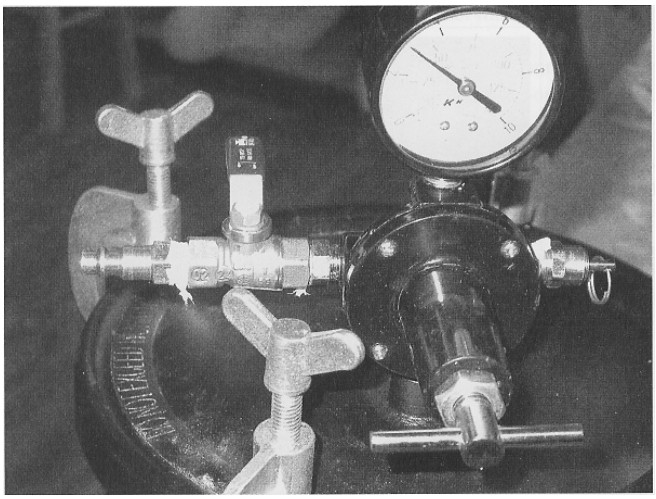
The regulator looks like something we need; if nothing else, it could make spouses, children and visitors respect us more for mastering what is obviously a complicated piece of machinery. But this regulator was designed to regulate the amount of paint coming out of the tank by adjusting the amount of air coming into the tank. It does not restrict the incoming air to a set pressure or it would be of more value (see below). In other words, the pressure inside the tank will eventually equal the pressure in the intake line. The regulator only allows one to regulate how quickly or slowly this

The paint tank assembled for its designed purpose


The modified tank

only allows one to regulate how quickly or slowly this happens. The same control can be had by modulating the on/off valve, the regulator is superfluous. I also found that it was just enough to interfere with the twisting of the thumb screws that secure the lid. As you can see from the photographs of the modified tank, I removed the regulator, unscrewed the attachments, and reattached them to two "T" joints. The cost of the extra fittings was about $20.00 making the total cost only around $100.00. The tank is finished.

Be aware that there is one real safety concern when using these tanks. The problem and danger is that some paint tanks probably put outs. This is especially true with the smaller


A close-up of the modified lid

probably put outs. This is especially true with the smaller tanks. The Model 37515 described in this article another small one that I own will only take 50 p.s.i. I have three larger ones that are designed for 110 p.s.i. It is, therefore, important that the safety valve be retained. Sometimes the valves leak and one might be tempted to remove a leaky one and plug the hole. But one would be smarter and safer to replace it with a new one. I am concerned enough that one of my assistants not blow him or herself up that I have installed a pressure regulator set at 50 p.s.i. branching off my compressor. This allows me to have a "safe" line on my work bench and still retain 110 p.s.i. available for tools and the higher pressure tanks at another location. Of course, I could have adjusted the outflow regulator on my compressor to 50 p.s.i. but I was concerned that switching from high to low to high, etc. was an accident waiting to happen. Another solution would be to install a pressure regulator on each pressure vessel.

Anyone living in a large metropolitan area should have no trouble finding paint tanks through the painting equipment dealers. But for those living in Left Earmuff, Montana or such can contact Grainger at www.grainger.com Granger carries a one gallon pot for $113.00 and a five gallon one for $744.00. The one I purchased for this article is available form Harbor Freight at ww.harborfreight.com. But if you keep your eyes open and be patient, I suspect that you will find any number of used but functional ones. At this time, I have eight vessels from one gallon to fifty gallons. Only three were purchased new and four were actually given to me.

Some of you may be wondering why a pressure tank can't be used as a vacuum chamber eliminating the need for two different vessels. The answer to this along with a great deal more information will be revealed in the fourth and final article next month.

The processes, methods and apparatus presented herein have not been tested or verified by Sculpture Journal magazine in anyway. Anyone using any of this information is doing so at their own risk.

Dave Parvin is a Colorado sculptor whose primary subject is the human form in a variety of materials. He may be reached at: 303-321-1074