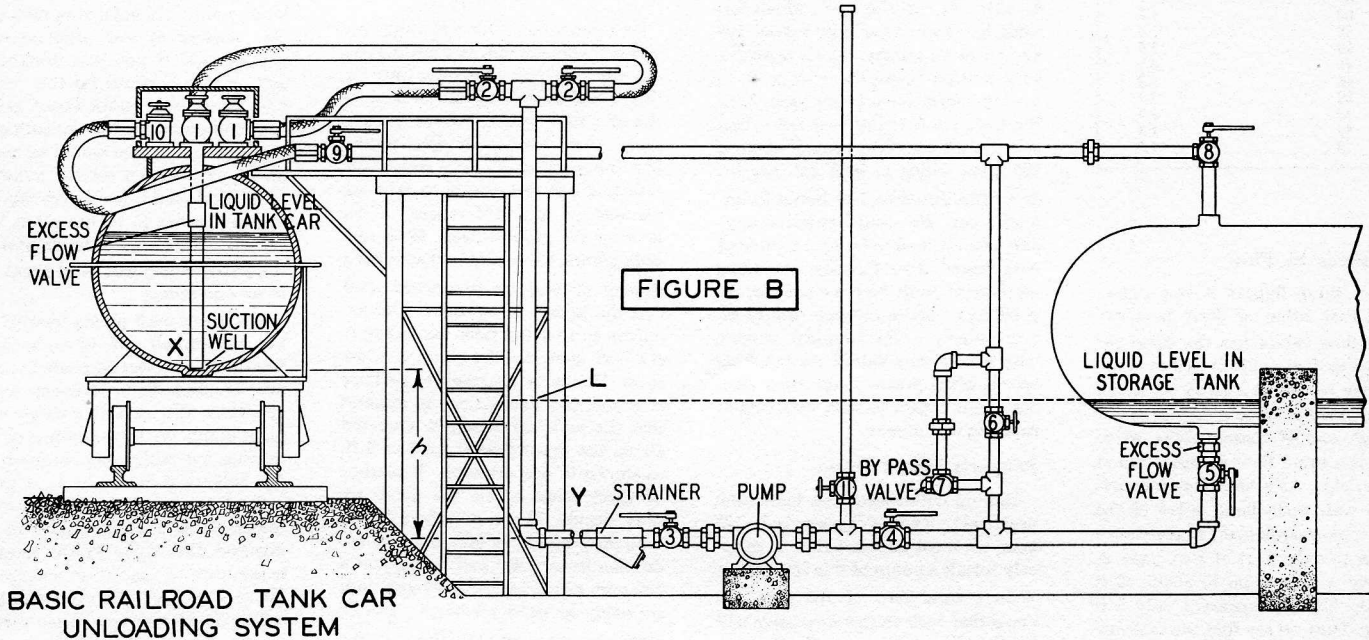


UNLOADING RAILROAD TANK CARS WITH LIQUID PUMPS: PART 2

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BASIC RAILROAD TANK CAR UNLOADING SYSTEM

FOR satisfactory pump operation, LPG liquid has to be brought up to the pump inlet by gravity head. LPG pumps will not efficiently bring liquids to their inlets by suction, because any pressure reduction in the inlet line will result in the formation of a large volume of vapor. Such vapor will displace an equal volume of liquid, and reduce the pump's capacity to deliver. There has to be enough gravity head in the tank being unloaded to move a flow of liquid equal to the pump's capacity through all of the restrictions, small passageways, holes, and turns in all the valves and fittings in the inlet line.

100-gpm Pump

Since the 100-gal.-per-minute pump is the model most commonly desired for unloading tank cars, let us discuss the piping system necessary for this size. The 100-gpm pump, properly installed, will unload all of the liquid in an LPG tank car in less than two hours. Notice we emphasize properly installed. If there are

too many valves and fittings in the pump inlet line, and not enough gravity head to overcome their restrictions, large quantities of vapor will be formed, and it may take twice as long to unload a tank car.

Let's make a list of the valves and fittings in the inlet line, as a basis for further discussion. Referring to the accompanying illustration, and working from the pump back to the car, we have first, hand valve (3); then the strainer; then an elbow; then a tee; then two valves (2) running to two hoses, and two valves (1) in the tank car dome. Is this a complete list of all the fittings? Most of us would say it was, but we have actually failed to list the most important item, the one having by far the most resistance to flow. We have forgotten this because we have never seen it, and most of us have no idea what it looks like. This is the tank car excess-flow valve, one of which is installed in each liquid dip-tube within the car, in the approximate position shown on the drawing.

Data Hard to Obtain

It is difficult to get data on tank car excess-flow valves. They are not manufactured by the people who make the excess-flow valves that we find in our own tanks, such as Bastian-Blessing, Kerotest, Roney, Selwyn-Pacific, etc. None of the catalogs that we usually have in our offices show these valves, so we have no information on them. Tank car excess-flow valves are manufactured by suppliers of railroad items, such as the American Car and Foundry Co. (There may be other railroad companies that make this item, but we have been unable to find them.) However, we have secured the two sizes made by this company, and have carefully tested them to obtain resistance-to-flow data. There is a 2-in. size, No. 1402, and a 2½-in., No. 1401. Actually, these two valves are the same inside; they are merely threaded to take different pipe sizes. The test data on these valves ran as shown in Table 1.

