hole. The balances will then record the forces sought. To measure the pin pressure at *a* release balance B entirely and move balance A around the arc until the pin *a* swings freely at the center of the hole as before. The angle may be read from graduations on the arc *gh*.

In case the truss is symmetrical, the forces at *e* are found by interchanging the loads at *b* and *d*.

Although there are no principles involved in the use of this apparatus that have not been used in many laboratories before, it is thought that the compactness and portability of this device warrant its description. A roof truss such as described here has been in use in the Iowa State College Physics Laboratory for two years and has proven very satisfactory. The results obtained are remarkably accurate.

FIG. 2.

A SIMPLE AND EFFICIENT BOYLE'S LAW AND CHARLES' LAW APPARATUS.

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A simple and efficient design of a Boyle's law apparatus which will keep the mercury clean for years without changing and have no leaky joints is desired by every teacher of physics in high schools and colleges.

A design, the details of which are given in the diagram, has been in use for the past two years in the physics laboratory of Oklahoma A. and M. College and it has given very satisfactory results. The drawing is not done to scale; however, sufficient dimensions are given to enable a glassblower to make it.

A bicycle tire valve is connected at *e* by means of about 1 1-2 inches of thick walled rubber tubing. A bicycle pump is used to force the mercury out of the bulb, *d*, into the open pressure tube, *c*, and the closed tube, *a*, when the stopcock, *k*, is open. The mercury is forced up the tube, *c*, till it reaches the maximum height without entirely emptying bulb, *d*, of its mercury and then the stopcock, *k*, is closed. The pressure in the bulb, *d*, may be decreased gradually by removing the pump, gently pressing the valve stem and then by turning slightly the stopcock, *k*, to let out air enough to fill the glass tube, *e*, and valve with its tubing.