

A ROOF TRUSS FOR THE LABORATORY.

By GEORGE E. THOMPSON,
Ames, Iowa.

It is sometimes desirable, from the standpoint of the student and instructor alike, to have the results of problems in analytical or graphical statics verified experimentally. The following paragraphs state a problem and describe a simple apparatus which may be used to measure the forces acting on the joints of the simple roof truss.

The most complicated problem which can be verified by this device is represented in Figure 1. Snow loads may be represented by weights hung at *b* and *d*; apex load by weight at *c*; wind load by weight at *d*, having its direction determined by a pulley at *f*. The weight of the truss is to be considered as acting equally at *b* and *d* in the case of a symmetrical truss.

The results sought are the vertical reactions at *a* and *e*; the pin pressures at *a* and *e* (both magnitude and direction); and the tension in the tie rod at *e*.

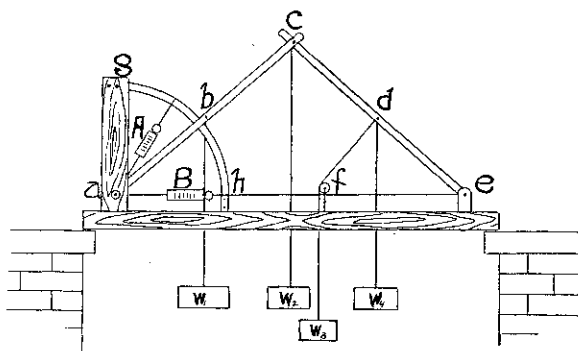


FIG. 1.

The apparatus consists essentially of the roof members *ac* and *ce*, each consisting of two parallel pieces of 1 inch x $\frac{1}{4}$ inch iron, 85 cm. long, separated 12 cm. and made into a rigid frame by bolts at *a* and *b* (or *d* and *e*). The bolt at *c* acts as a hinge. The arc *gh* constructed of 1 inch x $\frac{1}{4}$ inch iron and of 45 cm. radius affords points of attachment for balance *A* at any angle with the horizontal. The pin at *a* works with each end in a hole about one inch in diameter so that the truss cannot get out of alignment. The wooden support is of 2-inch oak. Figure 2 shows an end view.

In order to measure the vertical reaction and the tension in the rod, place balance *A* vertical and *B* horizontal and increase the force on each until the pin *a* swings freely at the center of the

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.

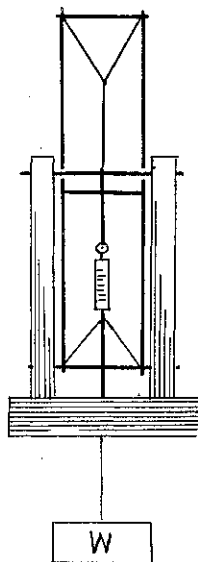


FIG. 2.

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

By J. GARRETT KEMP,

Oklahoma A. and M. College, Stillwater.

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.