LAVOISIER'S EXPERIMENT.—Apparatus was used like that in the figure. The mercury in the retort was heated for 12 days, during which time the air in the bell-jar was reduced from 50 cubic inches to 42 cubic inches. 45 grains of red precipitate (calx of mercury) was formed on the surface of the mercury; and, when this was taken out of the retort, placed in a tube and heated, 8 cubic inches of gas was obtained—exactly the quantity which had been extracted from the air during the previous heating of the mercury. This proved very definitely that the "something else" concerned in the calcination of metals is derived from the air.

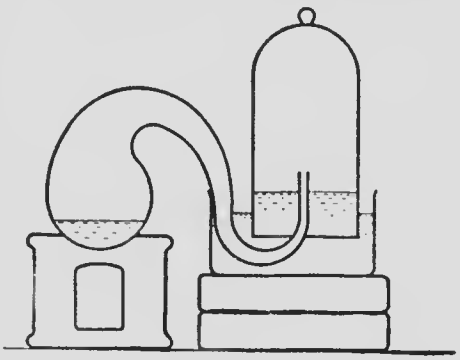

FIG. 2.

This experiment showed that about one-fifth (in this case, one-sixth, in other experiments a little more) of the air is used up when a metal burns in it. Priestley showed that the same thing is true when air is breathed. Further, when fuels are burned in the air, the result is the same. Not only does the same fraction of air disappear when metals are calcined in it, fuel burned, or animals breathe, but the four-fifths left in each case has the same properties—it will not support further burning or respiration. Hence, calcination, burning and respiration must be similar chemically.

By means of such experiments as those described above, especially by paying very close attention to the *quantities* of the substances used and produced, Lavoisier was able to overthrow the phlogistic hypothesis and introduce the new explanation of combustion, *i.e.*, combination with oxygen. The tremendous change in chemical opinions brought about by this work is often spoken of as the "chemical revolution."

From a consideration of the experiments described above, we may formulate the following definition:

Combustion *is an act of chemical union, accompanied by the production of heat and often of light.* One of the uniting substances is usually oxygen.

Red precipitate having been broken up into two constituents, mercury and oxygen, such questions as: Can mercury itself be broken up into two or more constituents? can oxygen be decomposed?, naturally arose. All attempts to do this have failed, and so we consider that these substances are undecomposable and we call them elements. Substances