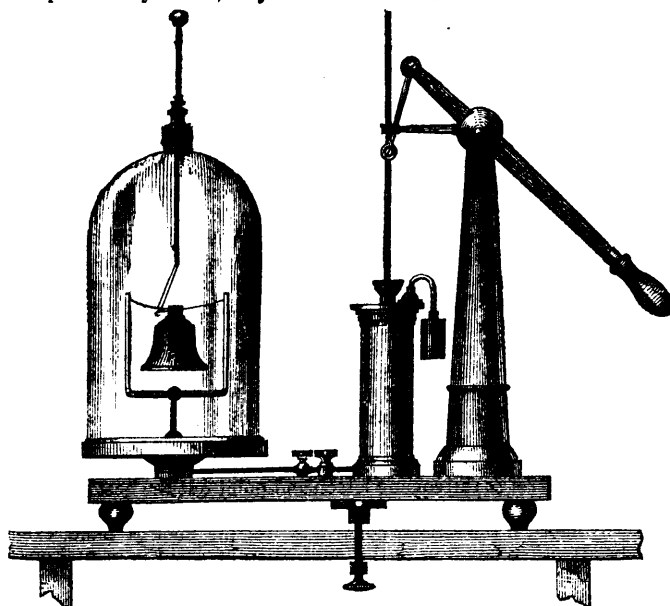


put in motion by a crank or spring. The Telescope, without which we cannot see very far into this science. The Tellurian, of which mention was made on page 85; and the Celestial Globe.

**PNEUMATICS.**—Many beautiful and interesting experiments may be performed with the air-pump. The elasticity, expansiveness, and compressibility of air, may be illustrated by this machine. Four of



AIR-PUMP.—FIG. 1.

our cuts represent experiments which are made by the air-pump. These experiments demonstrate, clearly and practically, some facts,

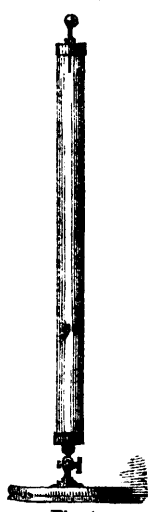
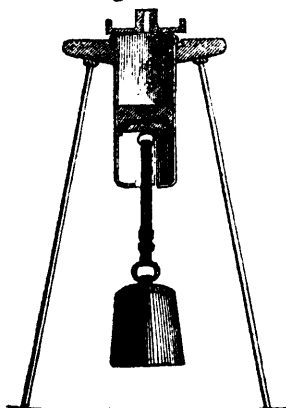
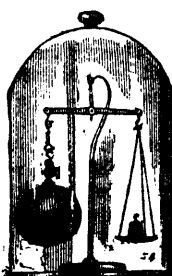
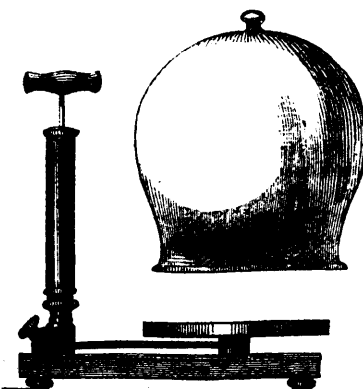


Fig. 4.

which to the uneducated would seem paradoxical. Thus, to prove that air is the means by which sound is transmitted, it is only necessary to place a bell under the glass receiver of the machine, and to exhaust the air, or, in other words, to pump it out, and then by a contrivance, as seen in fig. 1, to ring the bell, and no sound will be heard. If the air is returned to the receiver, and the bell struck, its presence is discovered by the ringing. Again, to ascertain the weight of air, if a hollow sphere of copper, and air tight, is placed as seen in fig. 3, at one end of a delicate balance, under the exhausted receiver, after being weighed in air, the difference of weight will indicate the weight of the air. Fig. 4 shows that the air offers resistance to falling bodies, and that if the long glass tube have the air removed from within it, on being inverted suddenly, the piece of coin and the feather which it contains, will fall to the other end at the same instant. Figure 5 exhibits a glass receiver. The air exerts a pressure of fifteen pounds to the square inch in all directions, up as well as down; so that when the air is exhausted from the glass, it presses upward externally, to fill the vacuum, and carries with it the suspended weight. These and a great variety of others may be subject



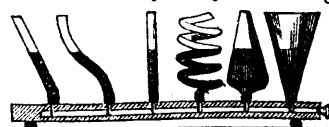
WEIGHT LIFTER.—FIG. 5.

FIG. 3.  
WEIGHING AIR.

AIR-PUMP.—FIG. 2.

of illustration in this interesting department. Apparatus illustrating the principles of Pneumatics, is exceedingly useful, as it teaches that which has a constant application to the business of every-day life.

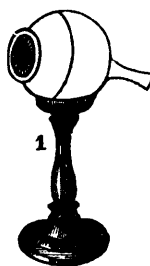
**HYDROSTATICS AND HYDRAULICS.**—This department of science may be illustrated by many interesting and instructive experiments. The



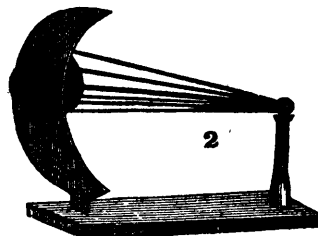
WATER LEVEL.

Water Level exhibits a variety of vessels of different forms and capacities, united at the bottom by an aperture common to all. If water or any other liquid be poured into the funnel-shaped vessel at the end, it will run into each of the others and rise as high in them as in the one into which it was poured, thus demonstrating that a liquid will rise to a common level, without regard to size or shape of the united vessels which contain it.

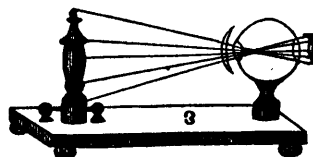
**PHYSIOLOGY.**—In the sciences of Anatomy and Physiology which are taught in all good schools at the present time, anatomical charts and models illustrating the functions of the several parts of the body, or their philosophy in the system, are found necessary. The cuts, 1, 2 and 3, exhibit something of the anatomical structure of the eye, together with the illustration of optical philosophy as seen in that organ. No. 4 represents the "spectacle instrument." The object of this instrument is to show the reason why the concave glass is suitable for one eye, under certain conditions,



1



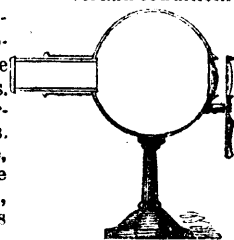
2



EYE MODELS.

and the convex glass, in different circumstances, is better suited to the necessities of another; or in other words, to show why the boy cannot see with his grandfather's specs. Every school in which these studies are pursued, should be provided with such facilities.

A Maniken or model of the human figure, with the muscles and other parts removable at pleasure, and of the form and color of life, will be found of great use and value in this study. A set of physiological plates, at least, should be in every good school.



No. 4.

**CASE OR CLOSET FOR APPARATUS.**—It will be seen, by reference to the chapters on the construction of school-houses, that some provision has been made, in every instance, for the keeping and preserving of such apparatus as would receive injury by constant exposure in the school-room. Instead of wooden closet-doors, sash-doors with glass, where deemed advisable, might be substituted. The glass should be of good quality. The panes should be of large size, in order to give the most light, and to exclude all particles of dust. The door should be furnished with a good lock, that it might be closed against all intruders. Within, the shelves should be so arranged as to be easily raised or lowered, so as to suit the height of different instruments, and that all the apparatus may be exposed to view, thus adding much to the appearance of the room. Every article should be so placed that it might be easily taken out, and at the same time show to the best advantage. The light, small articles might be hung at the back of the closet, on small hooks; while the larger and heavier ones should occupy the shelves. There should be a place for everything, and special care should be taken to keep every thing in the place allotted to it. Neatness, order, and convenience will thus be secured.

In those schools where the ordinary closet would not be sufficiently large to accommodate the apparatus, a neat case should be prepared, of the required length and height, made of thoroughly seasoned stuff, and closely joined together. The doors should be made like large sash, and filled with large, strong panes of glass, well put in. Instead of being hung on hinges, the doors should be double, and made to slide like sash, only horizontally instead of vertically. Dust can thus be more effectually prevented from entering and injuring the apparatus. The shelves should be constructed to move up and down at pleasure, like those of a book-case, in order to accommodate large articles, and facilitate their removal at pleasure. One apartment of this case might accommodate the library of the school.