which they have been formed. Among interbedded volcanic rocks, the student will meet with some which he may be at a loss whether to class as volcanic, or as formed of ordinary sediment. They consist of an intermixture of volcanic detritus with sand or mud, and pass on the one side into true tuffs, on the other into sandstones, shales, limestones, etc. If the component fragments of a non-crystalline rock give a brisk effervescence with acid, they are calcareous, and the rock (most likely a limestone, or at least of calcareous composition) may be searched for traces of fossils.

2. *The Paste.*—It sometimes happens that the component fragments of a clastic rock cohere merely from pressure and without any discoverable matrix. This is occasionally the case with sandstone. Most commonly, however, there is some cementing paste. If a drop of weak acid produces effervescence from between the component non-calcareous grains of a rock, the paste is calcareous. If the grains are coated with a red crust which, on being bruised between white paper, gives a cherry-red powder, the cementing material is the anhydrous peroxide of iron. A dark brown or black matrix which can be dissipated by heating is bituminous. Where the component grains are so firmly cemented in an exceedingly hard matrix that they break across rather than separate from each other when the stone is fractured, the paste is probably siliceous.

Determination of Specific Gravity.—The student will find this character of considerable advantage in enabling him to discriminate between rocks. He may acquire some dexterity in estimating, even with the hand, the probable specific gravity of substances; but he should begin by determining it with a balance. Jolly's spring balance is a simple and serviceable instrument for this purpose. It consists of an upright stem having a graduated strip of mirror let into it, in front of which hangs a long spiral wire, with rests at the bottom for weighing a substance in air and in water. For most purposes it is sufficiently accurate, and a determination can be made with it in the course of a few minutes.[38] Another and more convenient instrument has been invented by W. N. Walker, consisting of a lever graduated into inches and tenths, and resting on a knife-edge stand, on one side of which is placed a movable weight, while on the long

[38] Jolly's spring balance can be obtained through any optician or mineral dealer from Berberich, of Munich, for nine florins or 27s. In the United States it is manufactured by Geo. Wade & Co., at the Hoboken Institute.