to find an address. Suppose a telegraph clerk were to receive the following sign telegram: *f k* 2 *d*. He would refer to volume (*d*), part (2), page (*k*), phrase (*f*), and finding the signification of the message would write it down upon the usual form to be sent to the addressee. With this system there could be expressed in six or seven letters or figures the elements of a telegram referring to a person's health or business, including the address. As illustrations of the benefits which would accrue from the adoption of this project, the author refers to the rates now charged from Washington to Paris (1s. per word), and from La Martinique (11s. per word) to Paris, and states that a great percentage would be saved in each message. Different nations would agree upon the establishment of a uniform type of volume of correspondence in such a manner that the same combination of three or four letters or figures would correspond to the same thought or phrase in all countries. A universal telegraphic language would then be created, a language written but not spoken."

The idea of the formation of a universal telegraphic language is excellent, but we are inclined to think that there are too many difficulties in the way to allow of such an introduction at the present time, or in the near future. The system of universal telegraphy, as proposed by M. Roquet, is certainly not based upon a rocky foundation, but rather upon one of sand, to be soon swept away. There are several objections to it. In the first place, the compilation of the code books would involve the expenditure of a very large sum of money and loss of time, and it is exceedingly questionable whether the different nations could be induced to adopt the language. Its institution would necessitate the employment of a larger staff of telegraph clerks and assistants—certainly a third more than at present—since there would be the additional labour of searching the codes on the receipt of each message in order to obtain the translation. This increase in clerical labour represents a serious item. Then, again, with Roquet's system the cost of sending a telegram would be reduced, so that the decrease in receipts and the increase in working expenses are of themselves sufficiently weighty considerations to cause the projected language to be rejected. It is exceedingly doubtful whether it would be favourably received by commercial establishments, many of which possess their own private codes, which they would by no means care to relinquish; but what, indeed, would be the effect upon the general public? Suppose an individual is in a great hurry to dispatch a message, and not having at hand a set of code books of his own, he proceeds to the telegraph office to look into those which it is fair to suppose the government would provide. On arrival at the office it would happen in ninety-nine cases out of one hundred that the code books would be engaged, that several people would be waiting to use them, and that the person in question would have to wait his turn. This would mean a serious loss of time, more especially as it would often happen that the person using the book on one's arrival would take up a lot of time through his or her ignorance of the code. How three or four letters or figures could be made to correspond to the same thought or phrase in different countries is a problem which we will not attempt to solve, but we have already said sufficient to demonstrate the impracticability and absurdity of M. Roquet's system.—*Electrical Review.*

An Improved Barrel Hoop.—A corrugated steel barrel hoop has been invented, which is said to be elastic and firm, hugging a package tightly. Four steel hoops will take the place of ten wooden hoops on a flour barrel. They are made at Worcester, Mass.

ASPIRATORS FOR LABORATORY USE.

BY GEO. M. HOPKINS.

Wherever a head of water of ten feet or more is available, an aspirator is by far the most convenient instrument for producing a vacuum for filtration and fractional distillation. It is also adapted to a wide range of physical experiments.

Besides the advantage of convenience and compactness the aspirator has the further advantage over piston air pumps in the matter of cost. They may be had at prices varying from $1.50 to $4 or $5.

Two kinds are in general use—one of glass, known as Bunsen's filter pump, and shown in Figs. 1 and 2; the other of brass, shown in Figs. 3, 4, and 5.

The glass aspirator can be purchased at almost any dealer in druggists' sundries or chemical glassware. Any expert glass blower can make it in a short time.

This instrument consists of an elongated bulb terminating in a crooked tube at the bottom and having a tapering nozzle inserted in the top and welded. The lower end of the nozzle is located directly opposite and near the crooked discharge tube. A side tube is connected with the bulb at a point near the junction of the nozzle and bulb.

This aspirator is used in the manner indicated in Fig. 2, *i.e.*, the upward extension of the nozzle is connected with a tap by a short piece of rubber tubing, and the side tube is connected by a piece of rubber tubing with the vessel to be exhausted. When the water is allowed to flow through the aspirator, it leaps across the space between the nozzle and discharge tube, and carries with it the air from the bulb, which is continually replaced by air from the vessel being exhausted.

It is necessary to securely fasten the ends of the rubber tube connected with the tap or the water pressure may force it off, thus causing the breaking of the instrument. To secure the best effects with this pump, it is necessary to connect a vertical tube 25 to 30 feet long with the discharge end of the pump.

The metallic aspirator shown in Figs. 3, 4, and 5 is of course free from all danger of being broken in use, and it has other qualities which render it superior to the glass instrument, one of which is a much higher efficiency, another is its ability to retain the vacuum should the flow of water be accidentally or purposely discontinued. It can be screwed directly on the water tap, and needs no additional pipe to cause it to work up to its full capacity; and where a head of water is not available, it may be inserted in a siphon having a vertical height of ten feet or more.

This instrument is made by Mr. C. E. Chapman, of Brooklyn, N.Y. Like all instruments of its class, it is based on the principle of the Giffard injector. Its great perfection, however, is due to Mr. C. J. Lawler and to its manufacturer. The construction of the aspirator is shown in section in Fig. 3. The water enters at A, as indicated by the arrow. The air enters at B, and both air and water are discharged at C. The water in going through the contracted passage forms a vacuum at the narrower part into which the air enters. The starting of the instrument is facilitated by a diaphragm which half closes the discharge tube. The water is prevented from entering the air pipe by a small check valve shown in the interior of the lateral tube. Much of the efficiency of this instrument is due to the accuracy with which the contracted passage is formed. A slight change in the shape of this passage seriously affects the results.

The vacuum produced by this aspirator is equal to that of