figured by Riley, and the membranous disk is shown correctly with the sheaths inside, corresponding to the beginning of the boring process. But the position of the abdomen is impossible; indeed at this stage, when the disk is formed, the abdomen is held not only vertically but even bent forward to some extent above the thorax; and at no time during the whole process is the ovipositor inserted as far behind the insect as drawn by Lutz. Like Comstock, Lutz shows the wings in a vertical position and the antennæ are held obliquely upward which is possible but not characteristic. Mention should be made that Riley too, already gave a picture, undoubtedly from a preserved specimen, of the extended membrane, the two sheaths just leaving it, as would be the case as soon as the membrane begins to collapse. This illustration shows very well how the ovipositor at the beginning of the process is held in a vertical direction by being sunk into a ventral furrow of the abdomen, which renders its basal portion quite invisible.

It becomes a matter of interest that, of many authors commenting on such a familiar insect as our large, long-tailed ichneumon fly, and on its oviposition, only comparatively few have watched the process long enough to verify its details, and that, in fact, some of these details have never been clearly established though *Megarhyssa* is common in many localities. Does not this indicate that we have been neglecting the ecological for the systematic aspect of entomology?

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A CONDENSATION PUMP

CONDENSATION pumps of the following particular type have been used in our work for a number of years and the design seems to possess sufficient advantages over others in both simplicity and compactness to merit this note.

The method of operation of this pump, in which the exhausting process is accomplished in two stages, will be made clear by reference to the cut. In the initial or "rough" stage, *A*, the mercury vapor is ejected at relatively high pressure from a small nozzle into a long narrow throat. The nozzle opening is made sufficiently small that the pressure of the vapor

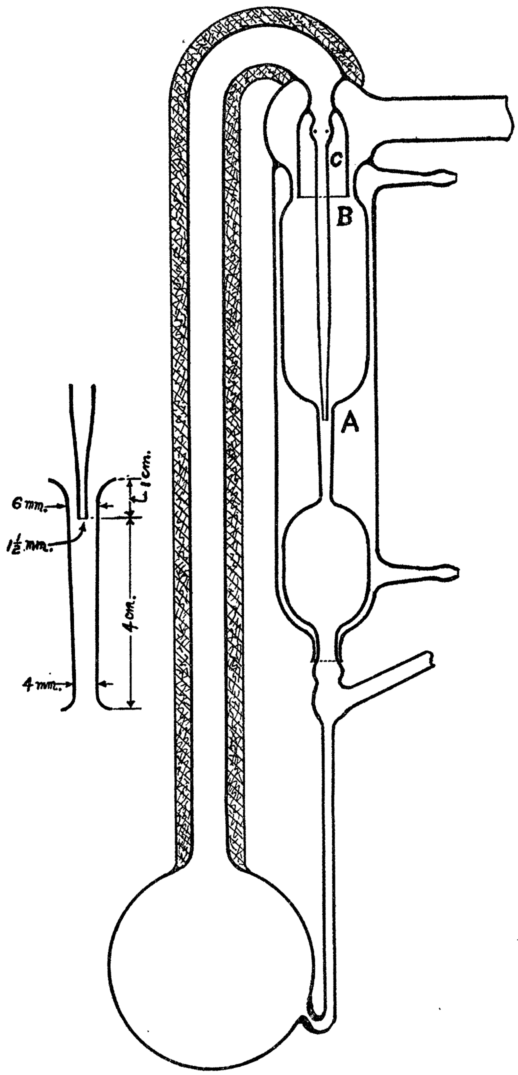

FIG. 1

in the boiler, instead of being practically limited to 2 or 3 millimeters, as in the case of the ordinary vapor pump, may attain a value of 75 millimeters or more depending upon the heating. The efficacy of this arrangement was first pointed out by Stimpson.[1] The evac-

[1] *Washington Acad. Sci. J.*, 7, pp. 477–482, Sept. 19, 1917.

uation is completed through the fine stage, *B*. In this unit a portion of the high-pressure vapor from the central tube is allowed to expand to a low pressure through one or two small openings into the inverted cup, *C*. This vapor then escapes freely into the large water jacketed tube and gives the conditions essential for high-speed exhaustion.

It has found that the high-pressure stage operating alone, without assistance from the low-pressure unit, will produce a high vacuum. The speed of the high-pressure unit by itself, however, is very much less than that of the combination, which possesses a speed comparable with that of a single stage pump of equivalent proportions.

The advantage of the combined units, of course, lies in the fact that such a pump will function in a perfectly satisfactory fashion with a very ordinary fore-vacuum. A mechanical pump capable of reducing the pressure to 2 or 3 millimeters is satisfactory, or even a water aspirator which will give a vacuum of 20 millimeters can be used if nothing better is available.

With regard to the construction of the pump perhaps a little may be said. Glass possessing a low coefficient of expansion such as Pyrex or Corning G702P glass must be used in making it, as otherwise one will almost certainly experience the rather annoying inconvenience of having the boiler crack upon application of the heat. The size of the pump can, of course, be varied considerably, but the general proportions of the parts given in the drawing are found to be very satisfactory. In the pump from which the drawing was made the mecury boiler has a diameter of 90 millimeters and the other dimensions were reduced proportionately. The dimensions of the jet and throat which have been found to work well are indicated in the enlarged sketch of this part. The diameters given apply to the tube openings. The thickness of the nozzle wall should be as thin as is consistent with reasonable strength. The two small openings which serve to furnish a supply of vapor to the upper unit are about the size of ordinary pin holes and are located on opposite sides of a small enlargement in the central tube. The joint between the lower end of the water jacket and the body of the pump is made water tight by binding it tightly with strips of thin rubber. There is some advantage in having a slight constriction where the mercury return tube is sealed to the boiler as the presence of a constriction here tends to preserve the equilibrium of the mercury in the return tube.

The mercury in the boiler should be about 2 centimeters in depth at the center and ordinarily, with a properly adjusted flame, it will evaporate without serious bumping even at the higher pressures. The height of the mercury column in the return tube indicates the vapor pressure in the boiler and the pressure required for satisfactory pumping depends entirely upon the fore-vacuum. There is no harm, however, in running the vapor pressure up as high as the length of the return tube will permit if this be necessary to enable the pump to function.

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(Continued)

DIVISION OF AGRICULTURAL AND FOOD CHEMISTRY

C. E. Coates, Chairman
T. J. Bryan, Secretary

The testing and grading of food gelatins: CLARKE E. DAVIS AND EARL T. OAKES. Loeb's recent work on gelatin is briefly discussed and Bancroft's objections to Loeb's conclusions on the basis of the insolubility of gelatin as based on surface tension measurements by Slobeki are shown to be in error. Methods for determining gel strength and viscosity are given and the effects of various factors affecting these properties are discussed with data. Data on the causes for discrepancies between grading gelatins by gel strength tests and by viscosity measurements are given. Gelatins submitted by the manufacturers as examples in which gel strength does not parallel viscosity are shown to be classified alike by gel strength and viscosity measurements under the methods described.

Active chlorine as a germicide for milk and