secure manner. From the specific gravity of the tar the weight of 250 c.c. is calculated and this amount after warming to liquefy, if necessary, is poured into the retort and the opening closed by a cork bored to receive a thermometer. A cold, wet towel may be wrapped around the stem to serve as a condenser. The tar should be heated gradually, and if crude, care should be taken to prevent the material foaming over. When the thermometer registers 110°C. the graduated glass is replaced by another, the towel is removed, and an asbestos hood placed over to prevent radiation. The method of making a hood is shown in Fig. 3. The receiving graduate is changed at 170°C. after melting down by very gentle heat, any solid material that has formed on the inner side of the stem. The next collection is made until the thermometer indicates 270°C., using as many graduates as may be necessary without allowing any to become filed above the mark. The last portion is

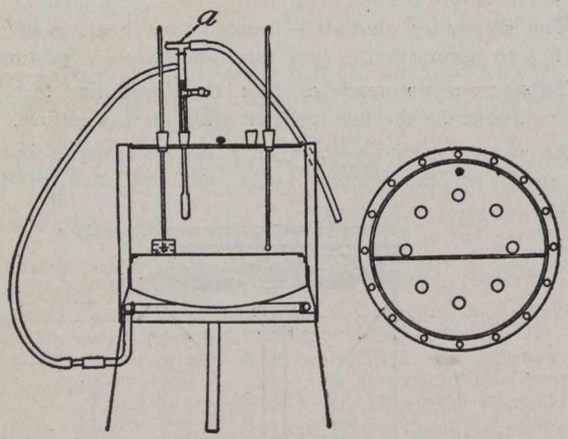

Fig. 2.

collected up to 315°C. when the burner is removed and the gentle heat applied to the stem which melts any solid matter from this portion, which is collected in the last graduate. Any solid matter on the sides of the graduates is melted and the contents cooled to room temperature, their weight is then determined. If water was present in the tar, it will be noticed that the portion collected up to 110°C., separates into two layers, the lower of ammoniacal liquor or water, and the upper of oil.

The distillation test is made upon tar and tar products when it is required to make a determination of water present.

To ascertain the amount of bitumen soluble in carbon disulphide (CS_2) a small Gooch crucible is placed in the opening of a good sized test tube, and the closed end of the tube drawn out and opened. In place of fitting a tube specially, a deep thistle funnel could hold the crucible. Whichever support is chosen, the stem is forced tightly through a cork or rubber stopper which closes a conical flask with a side delivery tube.

Some asbestos felt (amphibole asbestos) is cut with clean scissors into small pieces and shaken up with just sufficient water to pour easily. The crucible is filled with the suspended asbestos which is allowed to settle for a few moments. A light suction is then applied by means of an aspirator, through the side delivery tube of the flask, to draw off the water and leave a firm matt of asbestos in the crucible. More of the suspended material is added and the operation repeated until a dense matt of felt is formed. It should be washed several times and drawn firmly against the crucible, which is then removed to a drying oven, and then ignited to a red heat over a Bunsen burner, cooled in a desiccator and weighed.

From 2-3 grams of bitumen or 8-10 of an asphalt tapping or rock asphalt is now placed in the flask, the weight of which is known. One hundred c.c. of C.P. CS_2 is poured into the flask in small portions, with continual agitation until the lumps disappear. The flask is corked, and set aside for 15 minutes, and the solution decanted through the felt without suction. At the first indications of any sediment coming through, the operation is stopped and the filter allowed to draw. A small amount of CS_2 is used to wash down the side of the flask, after which the precipitate is brought on the felt, and any adhering material removed with a feather from the flask. The contents of the crucible are washed with CS, until the washings run colorless. The crucible and contents are dried in the air bath at 100°C. for 20 minutes, cooled in a desiccator, then weighed. The total weight of insoluble material may include organic and mineral matter. The former is burned off at a red heat leaving the mineral matter or ash which may be weighed and separated or noted, if necessary. The difference between the total weight and the weight of insoluble matter equals the bitumen soluble in carbon disulphide. When difficulty in filtering is experienced, as when Trinidad asphalt is present in quantities, allow to settle for more than 15 minutes.

To determine the bitumen soluble in paraffin naphtha, the above process is practically duplicated with 100 c.c. of 86°B. paraffin naphtha in place of the carbon disulphide. If difficulty is experienced in dissolving the material a rounded glass rod will be found convenient to break the small particles. Not more than one half of the naphtha should be used until the sample is broken up, the balance is then added, the flask twirled a moment or two, then corked and allowed to stand for 30 minutes.

The difference between the material insoluble in CS_2 and in naphtha is the bitumen insoluble in the latter.

In ascertaining the fixed carbon, one gram of the sample is placed in a small platinum crucible and a cover tightly fitted on. It is placed 6-8 centimetres above a Bunsen burner with a flame at least 20 centimetres high. This determination should be made in a position free from drafts. After the lapse of a few minutes the crucible is moved to a desiccator and when cool is weighed. After this has been noted, it is placed in an inclined position over the burner until nothing but ash remains. The weight of ash remaining is deducted from the weight of the residue made after the first ignition of the sample. This gives the weight of the so-called fixed carbon, which is calculated on a basis of the total weight of the sample.

To lay down specifications as to a good asphalt would be somewhat of a difficult problem, as general opinion varies somewhat on this point. The analysis of a good refined Maltha reads as follows:—

	Per cent.
Water and volatiles	.09
Total bitumen	98.33
Ash	1.58
	100.00
Bitumen composed of petrolene	75.15
Bitumen composed of asphaltene	24.85

Specific gravity 1.050.

The analysis of a good California asphalt reads:—

	Hard Bitumen. Per cent.	Maetha. Per cent.
Total bitumen soluble in CS_2	99.10	99.68
Silica and clay	0.36	0.20