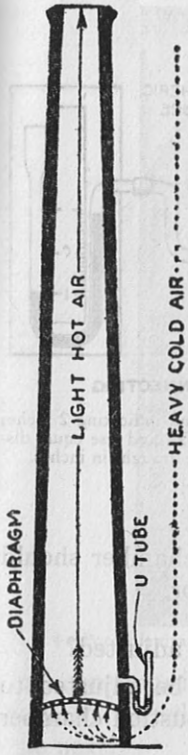
CHAPTER 8



Draught

Ques. What is draught?
Ans. A current of air.

Ques. Name two kinds of draught.
Ans. Natural and mechanical or forced.

Ques. What causes draught?
Ans. A thermal upset in which temperature difference changes the weight of air; the heated air expands, becomes lighter, destroying equilibrium.

Ques. What is the object of a chimney?
Ans. To create draught, as in fig. 1.

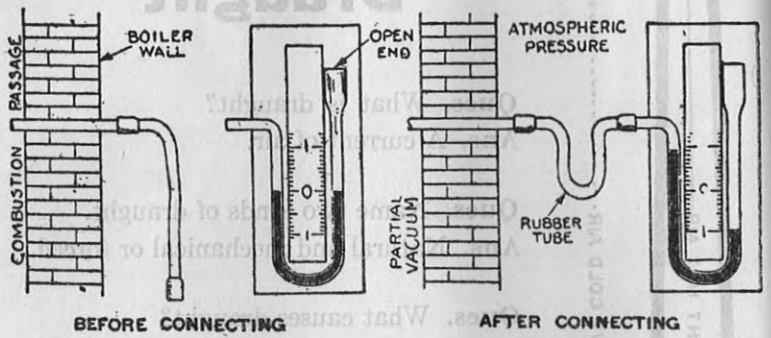
FIG. 1—Action of hot gases in a chimney; the cause of draught. For an actual chimney the draught or difference of pressure inside and outside the chimney may be shown by a U tube partially filled with water, and having one end connected to the inside of the chimney and the other open to the air. The water rises in the leg connected with the inside of the chimney; the difference of level measures the draught.

Ques. How is draught measured?

Ans. By a draught gauge. Fig. 2.

Ques. What difficulties are encountered due to natural draught?

Ans. Natural draught is subject to wide fluctuation, depending upon weather conditions.



FIGS. 2 and 3—U type draught gauge, at zero before connecting, and indicating 2 inches after connection. In reading, since the column in the two tubes fall and rise equal distances, take the reading of one leg only and double it to obtain the draught in inches.

Ques. What control should be provided?

Ans. The draught through the combustion chamber should be controlled by an automatic draught regulator.

Ques. How should the draught regulator be adjusted?

Ans. In the average installation, it should be adjusted to give a draught of not less than .02 in the combustion chamber with the burner running.

In some cases the burner will operate successfully with less draught, but in no case allow so little draught that combustion haze or smoke may be seen coming out of the furnace and into the room when the fire door is cracked open a little.

Ques. Why is it important to keep the draught constant?

Ans. The volume of oil delivered by the nozzle is constant and it is vitally important that the volume of air mixed with it be kept constant.

Ques. Why?

Ans. Because the burner will be no more efficient as regards fuel consumption than your automobile would be if you continually varied the mixture—too rich one moment and too lean the next.

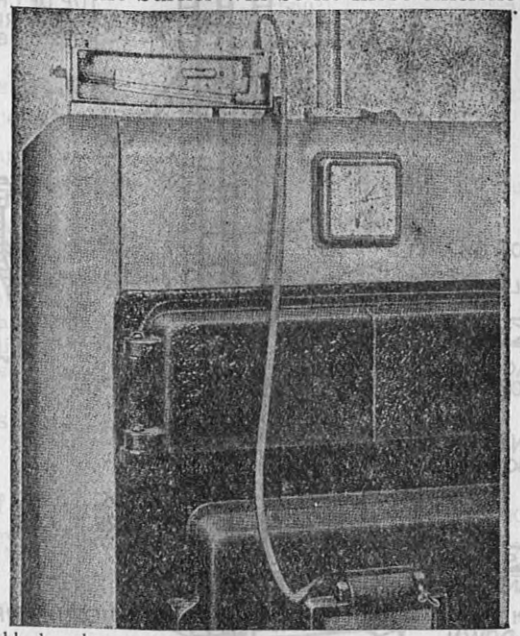
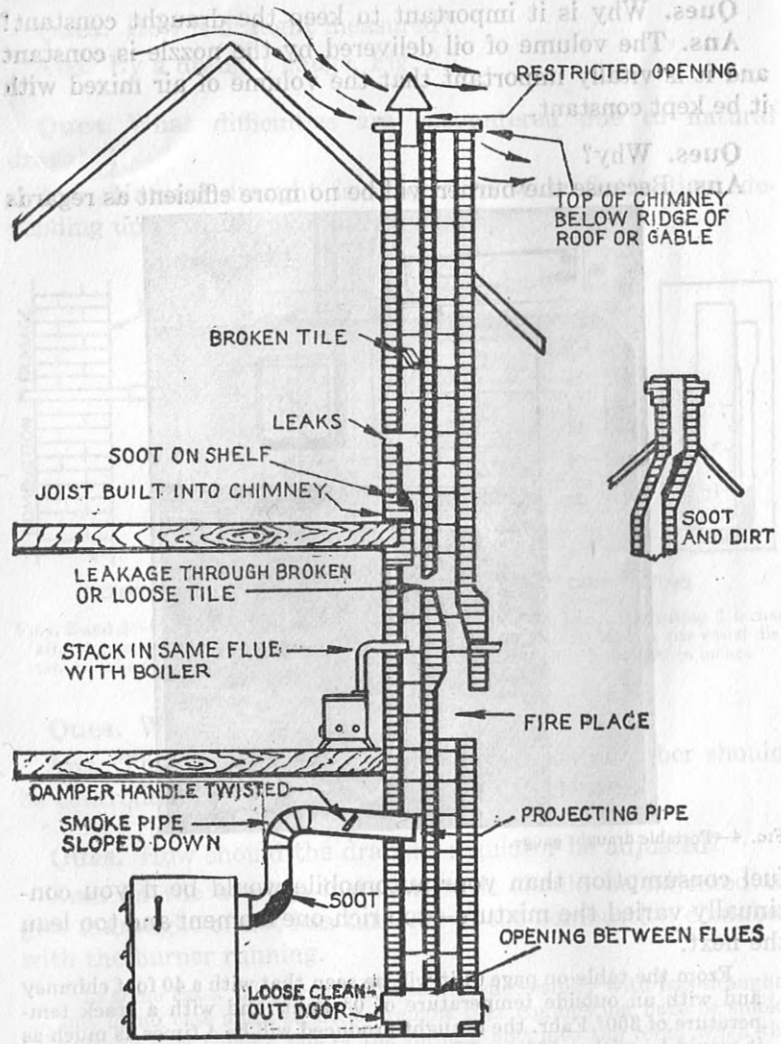


FIG. 4—Portable draught gauge.

From the table on page 61 it will be seen that with a 40 foot chimney and with an outside temperature of 0° Fahr. and with a stack temperature of 300° Fahr. the draught produced will be 4 times as much as it would be with a 50° outside temperature.



Figs. 5 and 6—Various causes of poor draught.

Draughts with 40 ft. Chimney

Temp. Outside	Stack Temp.	Draught
0°	300°	.086 in.
30°	300°	.045 in.
50°	300°	.021 in.
0°	500°	.174 in.

Causes of Poor Draught.—Causes of poor draught generally encountered are:

1. Improper construction of chimney.
2. Air, deflecting surfaces such as a roof gable, surrounding buildings, etc.
3. Leakage.
4. Obstruction in the chimney.
5. Low temperature of the flue gases (very unusual).
6. Composition of the chimney gases.
7. Inadequate ventilation in the boiler room.
8. Chimney too small.
9. Insufficient thickness of brick on outside of chimney.

Various causes of poor draught are shown in figs. 5 and 6.

Size of Chimney.—The calculations for the necessary size of chimney are usually based on an atmospheric temperature of 65° Fahr. with relative humidity of 90%.

A decrease in atmosphere temperature and humidity increases the draught.

In installations burning 6 gallons of oil per hour it will be found that the chimney provided will be adequate and frequently will have more capacity than necessary.

In installations burning less than 6 gallons per hour, it will often be found that the chimney has less capacity than that recommended in the accompanying table. Such chimneys give erratic performance under adverse weather conditions.

Size and Capacity of Chimneys

Dia. of Breeching	Inside Dimensions Unlined Flue	Inside Diameter	Stack Height	Gallons of Oil Burned Per Operating hr.
9	8x12	9″	28′	.75– 1.75
10	12x12	10″	28′	1.75– 3.0
12	12x12	10″	30′	3.0 – 4.0
14	12x16	12″	35′	4.0 – 6.0
16	16x16	14″	35′	6.0 – 9.0
18	16x20	16″	40′	9.0 –12.0
20	20x20	18″	45′	12.0 –16.0
22	20x24	20″	45′	16.0 –21.0

Height above Sea Level	Ratio Increase in Diameter	Ratio Increase in Height
0	1.	1.
1,000	1.015	1.08
2,000	1.03	1.17
4,000	1.06	1.36
6,000	1.10	1.58
8,000	1.13	1.84
10,000	1.17	2.14