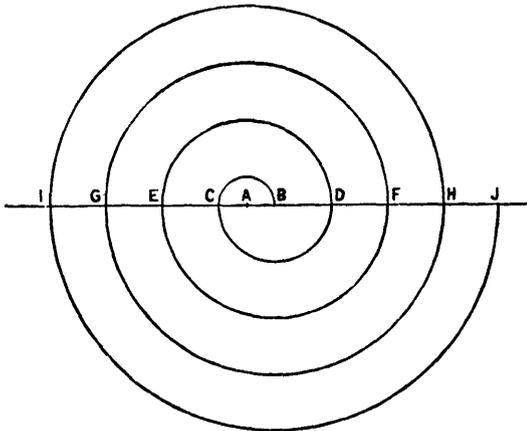


SPIRALS, &C.

A Spiral is a curve described about a fixed point, and which makes any number of revolutions round that point, without returning into itself.

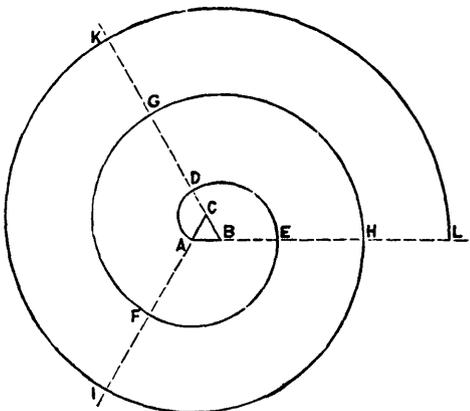
PROBLEM 110.—To CONSTRUCT A SPIRAL, COMPOSED OF ARCS OF CIRCLES OF VARIOUS RADII.



- 1.—Produce **A B** indefinitely both ways.
- 2.—With **A** as centre, **A B** as radius, describe a semi-circle, and let it meet **B A**, produced, in **C**.
- 3.—With **B** as centre, **B C** as radius, describe another semi-circle on the opposite side of the line, and meeting **A B**, produced, in **D**.
- 4.—With centre **A** and radius **A D**, describe another semi-circle, and again with centre **B**, draw the semi-circle **E F**, and so on, using alternately the centres **A** and **B**.

PROBLEM 111.—To CONSTRUCT A SPIRAL COMPOSED OF ARCS OF CIRCLES OF VARIOUS RADII.

ANOTHER METHOD.

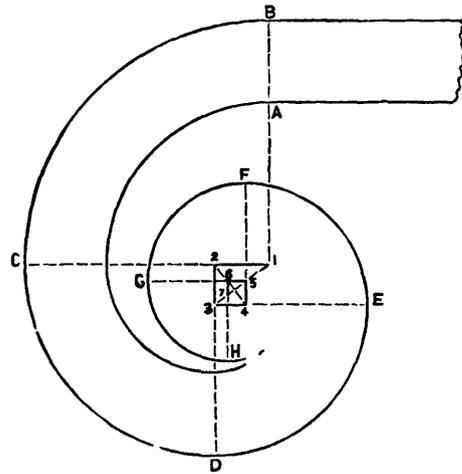


Let **A B C** be a small equilateral triangle.

- 1.—Produce its sides **A B**, **B C**, **C D**, indefinitely.
- 2.—With **C** as centre, **C A** as radius, describe the arc **A D**, meeting the side **B C**, produced, in **D**.
- 3.—With **B** as centre, **B D** as radius, describe the arc **D E**, meeting the side **A B**, produced, in **E**.
- 4.—With **A** as centre, **A E** as radius, describe the arc **E F**, meeting **C A**, produced, in **F**, and so on, using successively the points **C**, **B**, **A**, for centres.

NOTE.—From the preceding example, it is obvious that, by using any regular figure or polygon in the same manner for the initial figure, taking for centres the angular points of such figure successively in order, a varying Spiral will be formed. There is no limit to the possible number and variety of such curves.

PROBLEM 112.—To DRAW A SPIRAL SCROLL ADAPTED FOR HANDRAILING.



- 1.—Draw the straight line **1 B**, equal in length to three times the width of the rail **A B**.
- 2.—Draw **1 2** at right angles to **1 B**, and make it equal in length two-thirds the width of **A B**.
- 3.—Then draw **2 3**, at right angles to **1 2**, and make it equal to three-fourths of **1 2**, and join **3 1**.
- 4.—Through **2**, and at right angles to **3 1**, draw the line **2 4**; then draw the line **3 4** at right angles to **2 3**, and cutting the line **2 4** in **4**.
- 5.—Then draw the line **4 5** at right angles to **3 4**, the line **5 6** to **4 5**, and **6 7** to **5 6**; the points **1, 2, 3, 4, 5, 6**, are centres, from which the arcs of the scroll are drawn.
- 6.—Produce the lines **1 2, 2 3, 3 4, 4 5, 5 6**, and **6 7** indefinitely.
- 7.—From **1** as centre, **1 B** as radius, describe the arc **B C**, meeting **1 2**, produced, in **C**; from **2** as centre, **2 C** as radius, describe the arc **C D**, meeting **3 4**, produced, in **E**; from centre **3** draw the arc **D E**; from **4** the arc **E F**, and so on.

PROBLEM 113.—To DRAW THE SPIRAL SCROLL CALLED THE IONIC VOLUTE.

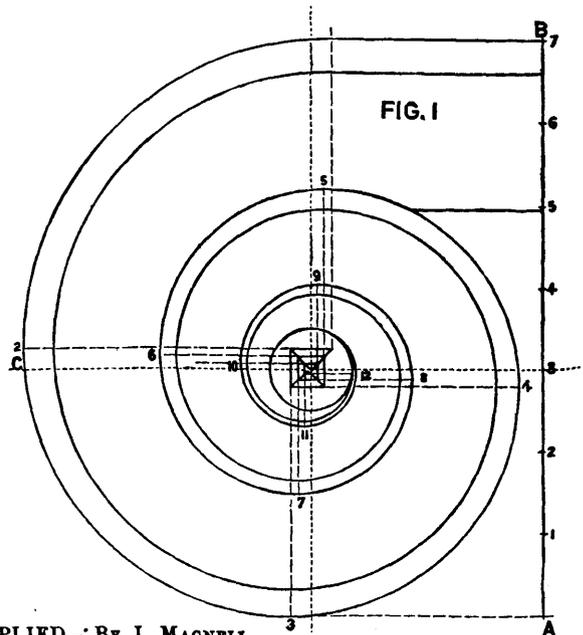


FIG. I