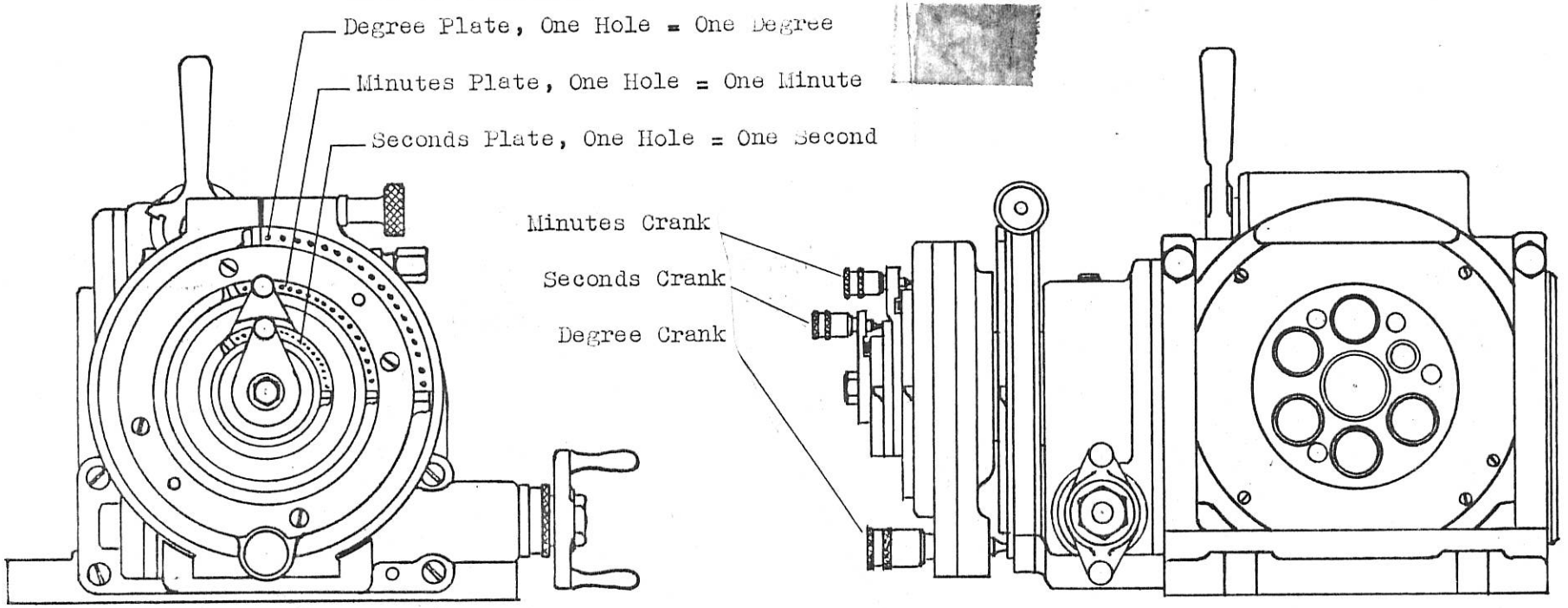
INDEXING WITH THE ASTRONOMICAL DIVIDING ATTACHMENT



With the Astronomical Dividing Attachment the circle is reduced to 1,296,000 divisions or seconds. One second of arc is equal to .000024" on the periphery of a 10" diameter circle. Divisions below 1,296,000 may therefore be indexed with a theoretical inaccuracy not greater than .000024". As it is impractical to make commercial dividing heads with an accuracy of even 10 times this amount (the guaranteed accuracy of commercial heads is one minute of arc which is 60 times this amount) the result of the addition or dropping of one second of arc at periodic intervals or indexings is inconsequential.

The Astronomical Dividing Attachment can be used with the Dividing Head Spindle set at any angle between 5° below the horizontal to 5° beyond the perpendicular.

It can be used with the Spiral Lead Gears in place for Spiral Milling.

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FORMULA

$$\frac{1,296,000}{N} = S + R \quad \text{or} \quad (S+1) - (N-R)^*$$

$$\frac{S}{60} = M + S'$$

$$\frac{M}{60} = D + M'$$

D = Number of Holes on Degree Plate taken at each indexing.
M' = Number of Holes on Minutes Plate taken at each indexing.
S' = Number of Holes on Seconds Plate taken at each indexing.
R = Remainder or total compensation in Seconds
N = Number of Divisions or Indexings Required.
S = Total Seconds in each Division.
M = Total Minutes in each Division.

* When "R" is more than 1/2 "N" it is preferable to add one Second to "S", the Remainder then becoming negative and numerically equal to "N-R".

EXAMPLE: 119 DIVISIONS

$$\frac{1,296,000}{119} = 10890S + 90R \quad \text{or} \quad 10891S - 29R$$

$$\frac{10,891}{60} = 181M + 31S'$$

$$\frac{181}{60} = 3D + 1M'$$

The setting for 119 Divisions is: 3 Degrees, 1 Minute, 31 Seconds, -29 Compensation.

The compensation is most accurately accomplished in the following manner: At the first indexing, $R = -\frac{29}{119}$; at the second, $R = -\frac{29}{119} + (-\frac{29}{119})$ or $-\frac{58}{119}$; at the third, $R = -\frac{87}{119}$; at the fourth, $R = -\frac{116}{119}$; at the fifth, $R = -\frac{145}{119}$. Here R is greater than -1, so one hole is dropped on the Seconds Plate and R becomes $-\frac{145}{119} - (+\frac{119}{119})$ or $-\frac{26}{119}$. Normal indexing is resumed and at the sixth division, $R = -\frac{26}{119} + (-\frac{29}{119})$ or $-\frac{55}{119}$; at the seventh, $R = -\frac{84}{119}$; at the eighth, $R = -\frac{113}{119}$; at the ninth, $R = -\frac{142}{119}$. Here again R is greater than -1 so one hole is dropped as at the fifth division.

This procedure is carried on through the 119 divisions dropping holes at the 5th, 9th, 13th, 17th, 21st, 25th, etc., and R at the 119th division $= -\frac{119}{119}$; this automatically is a check. Compensating in this manner results in the most accurate setting for each division or indexing.