if, in a series of terms in harmonical proportion, *a* and *b* be two affirmative quantities, and ſuch that *a<b ;* then this series, which is poſitive at firſt, will become negative as ſoon as *n —*2.*b* exceeds *n—* 1.a. But if *a>b*, the series will converge, and although produced to infinity will not become negative.

Let *a* and *b* be equal to 2 and 1 respectively ; then this ſeries becomes 2/1 x 2/2 x 2/3 x 2/4, &c. and ſince, if each term of an harmonical ſeries be divided by the ſame quantity, the ſeries will ſtill be harmonical. Therefore 1/1 x 1/2 x 1/3 x 1/4 x 1/5 &c. is an harmonical ſeries: whence the denominators of this ſeries form a ſeries of numbers in arithmetical pro­greſſion ; and converſely, the reciprocals of an arithme­tical progreſſion are in harmonical proportion.

*Recurring SERIES,* a ſeries of which any term is form­ed by the addition of a certain number of preceding terms, multiplied or divided by any determinate numbers whether poſitive or negative. Thus 2. 3. 19. 101. 543. 2917. 15671, &c. is a recurring ſeries, each term of which is formed by the addition of the two preceding terms, the firſt of which being previouſly multiplied by the constant quantity *2* and the other by 5. Thus the third term 19 = 2 × 2 + 3 × 5; the fourth term 101 = 3 × 2 + 19 × 5, &c.

The principal operation in a ſeries *of* this nature is that of finding its film.—For this purpoſe, the two firſt and two laſt terms of the ſeries muſt be given, together with the confiant multipliers.

Let a, *b, c, d, e, f,* &c. be any number of terms of a ſeries formed according to the above law, each ſucceſſive term being equal to the ſum of the products of the two preceding terms, the firſt being multiplied by the given quantity m*,* and the other by the given quantity *n.* Hence we will have the following ſeries of equations c = ma + nb, d = mb + nc, e = mc + nd, f = md + ne*,* &c. Then adding theſe equations, we obtain c + d + e + f = m × a + b + c + n × b + c + d + e. Now the firſt member of this equation is the ſum of all the terms except the two firſt ; the quantity by which *m* is multiplied in the ſecond mem­ber is the ſum of all the terms except the two laſt ; and that by which *n* is multiplied is the ſum of all the terms except the firſt and laſt. Now let s = ſum of the ſeries ; then

*Reversion of SERIES* is the method of finding the value of the quantity whoſe ſeveral powers are involved in a ſeries, in terms of the quantity which is equal to the given ſeries.

In order to this, a ſeries muſt be affirmed, which be­ing involved and ſubſtituted for the quantity equal to the ſeries, and its powers, neglecting thoſe terms whoſe powers exceed the higheſt power to which it is propoſed to extend the ſeries.

Let it be required to revert the ſeries ax + bx2 + cx3 + dx4 + ex5, &c. or, to find *x* in an infinite ſeries expreſſed in the powers of *y.*

Subſtitute *yn* for *x,* and the indices of the powers of y in the equation will be n, 2n, 3n, &c. and 1, there­fore n = 1; and the differences are 0. 1. 2. 3. 4. 3. &c. Hence, in this cafe, the ſeries to be aſſumed is Ay + By2 + Cy3 + Dy4, &c. which being involved and ſubſtituted for the reſpective powers of *x,* then we have