

THE APPLICATION OF THE HOLLERITH TABULATING MACHINE TO BROWN'S TABLES OF THE MOON.

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Introduction.—Positions of the Moon derived from Brown's *Tables of the Motion of the Moon* were first introduced into national ephemerides in 1923. In these *Tables* over 1400 periodic terms with coefficients as large as $0''.003$ are tabulated. Some idea of the extent of the *Tables* may be gathered from the fact that they contain 180 separate tables and cover 660 pages. Although

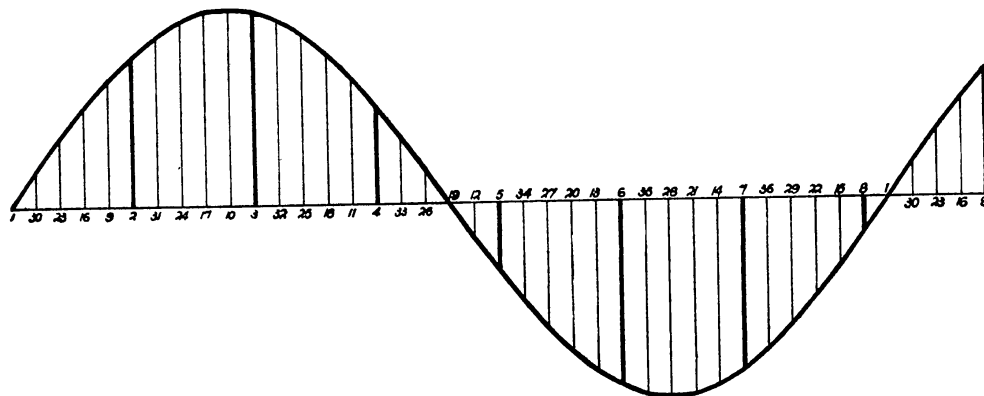


FIG. 1.

they are well arranged, the work of using them is laborious, and, before the advent of the Hollerith machine, represented the continuous work of two skilled computers. The mechanical methods that have been applied to certain portions of the work have eliminated much fatigue, increased tenfold the speed with which results can be obtained, and reduced the cost to one-quarter of its former amount.

The Tabulation of Harmonic Functions of the Time.—The inequalities arising in lunar theory are of the form $a \sin(b + ct)$, where a is the amplitude or coefficient, b is the phase angle at the moment when $t = 0$, and c is the movement of the argument in a unit of time. This expression is called a harmonic; it represents a periodic term, of period $2\pi/c$. The *Tables* present values of these terms, and it is their selection and summation, or the synthesis of a series of harmonic terms, that constitutes the principal work of using the *Tables*. Where the periods of various terms are commensurable, for instance if they depend on $(b + ct)$, $2(b + ct)$, $3(b + ct)$, etc., they are combined into one table; it is this power of combination that has enabled 1400 terms to be tabulated in less than 200 tables. The fundamental periods of individual tables are not commensurable, so that, although the entries from each table are used over and over again, combinations of entries from any one group of