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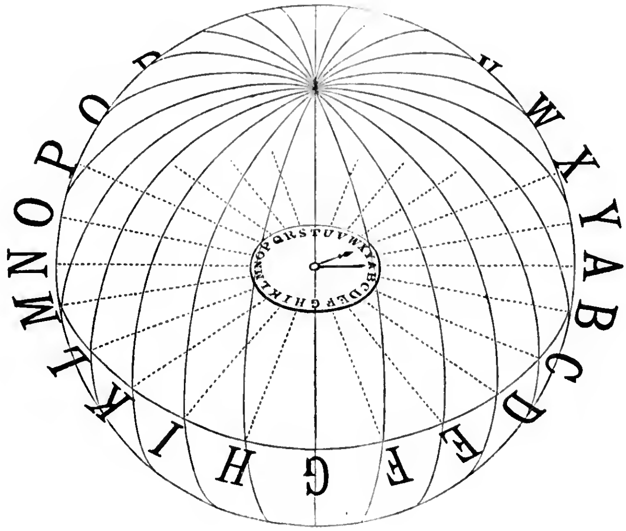
UNIFORM NON-LOCAL TIME

(TERRESTRIAL TIME).



I.—Difficulties arising from the present mode of reckoning time, as Telegraph and Steam communications by land and water are extended over the earth.

II.—Natural and conventional divisions of time.

III.—Time reckoning by ancient and modern nations.

IV.—The importance of having at no distant day, "Uniform time" all over the world.

V.—The practicability of securing all the advantages of uniformity, while preserving existing local customs.

Communications on the subject of the following paper, may be addressed to the Author, Ottawa, Canada.

TERRESTRIAL TIME.

A Memoir, by Sandford Fleming, C.M.G., M. Inst. C.E., F.G.S., F.R.G.S.
Engineer-in-Chief Canadian Pacific Railway, &c.

The question to which I propose to direct attention is not limited to any particular country or continent. It is a question which in different degrees concerns all nations. It is of least importance to the inhabitants of countries of limited extent such as the British Isles and of greatest importance to the populations of great continental countries, advanced or advancing in civilization.

Within a comparatively recent period, the human race has acquired control over a power, which already has, in a remarkable degree, changed the condition of human affairs. The application of steam to locomotion by land and water has given an enormous stimulus to progress throughout the world, and with the electric telegraph as an auxiliary, has somewhat rudely shaken customs and habits which have been handed down to us from bygone centuries. We still cling, however, to the system of Chronometry inherited from a remote antiquity, notwithstanding difficulties and inconveniences which are constantly met in every part of the world, but which are so familiar to us that they are not regarded, or are silently endured.

I do not refer to the mechanism of our clocks and watches. The art of watch making has by no means remained behind in the general advancement. The horological instruments now made are, indeed, of surprising accuracy and beauty; and simply as machines, for measuring time and dividing it into minute portions, they undoubtedly are unrivalled amongst the productions that come from the hand of man. The difficulties to which I allude, are due primarily to the principle of construction by which our clocks and watches are made to indicate time only according to the longitude of places on the earth's surface; and, in a less degree, to the fact, that we adhere to the custom of dividing the day into halves of twelve hours each, one set of hours being described as *ante meridian*, the other as *post meridian*.

To illustrate the points of difficulty, let us first take the case of a traveller in North America. He lands, let us say, at Halifax, in Nova Scota, and starts on a railway journey through the eastern portions of Canada. His route is over the Intercolonial and Grand Trunk Lines. He stops at St. John, Quebec, Montreal, Ottawa and Toronto. At the begining of the journey he sets his watch by Halifax time. As he reaches each place in succession, he finds a considerable variation in the clocks by which the trains are run, and he discovers that at no two places is the same time used. Between Halifax and Toronto he finds the railways employing no less than five different standards of time. If the traveller remained at any one of the cities referred to he would be obliged to alter his watch in order to avoid much inconvenience, and, perhaps, not a few disappointments and annoyances to himself and others. If, however, he should not alter his watch, he would discover on reaching Toronto, that it was an hour and five minutes faster than the clocks and watches in that city.

In the United States the inconvenience is greater. Along the great railway lines leading from Boston, New York, Philadelphia, and other cities on the Atlantic seaboard, to the west as far as San Faancisco, the variation of time is of no trifling importance. The difference between the time of New York and that of San Francisco is nearly three hours and a-half. Between these extreme points there are many standards of time, each city of any importance having its own. The railway companies have to conform to this state of things, and, as in Canada, are obliged to adopt local standards Hence the discrepancies in time which perplex the traveller in moving from place to place.

On the Continent of Europe, and, indeed, wherever lines of communication extend between points differing to any considerable extent in longitude, the same difficulty is experienced. On a journey from Paris to Vienna, or to St. Petersburg, the standard time employed by the railways changes frequently, and the extreme difference in time between the first and last city is nearly two hours.

Suppose we take the case of a person travelling from London to India. He starts with Greenwich time, but he scarcely leaves the shores of England, when he finds his watch wrong. Paris time is used for the journey until that of Rome becomes the standard. At Brindisi there is another change. Up the Mediterranean ship's time is used. At Alexandria Egyptian time is the standard. At Suez ship's time is resumed, and continues with daily changes until India is reached. Arriving at Bombay the traveller will find two standards employed, local time and railway time, the latter being that of Madras. If he has not altered his watch since he left England he will find it some five hours slow ; should he continue his journey to China it will fall eight hours behind.

In the United Kingdom the difficulties due to longitude are felt in a very modified form. The greater island, embracing England and Scotland, [illegible] comparatively limited in extent, particul[illegible] in width. One standard of time is therefore used. [illegible]'s only in respect to the smaller island, Ireland, that the difference in longitude calls for a difference in time; in the whole United Kingdom, consequently, there are practically only two standards, viz., Greenwich time and Irish time, the difference being twenty-five minutes. No one, therefore, whose experience has been confined to the United Kingdom, can form an adequate idea of the extent of the inconvenience arising from the causes alluded to in regions of the world where geographical circumstances render the use of a multiplicity of standards necessary.

The railway system is the principal agent in the development of the difficulties referred to, and the still further extension of steam communications in great continental lines, now begins to force the subject on our attention. Canada supplies a good illustration of what is occurring. The railways built and projected there will extend from the eastern coast of Newfoundland on the Atlantic to the western coast of British Columbia on the Pacific, embracing about seventy-five degrees of longitude. Every existing Canadian city has its own time. Innumerable settlements are now being formed throughout the country ultimately to be traversed by railways; and in a few years, scores of populous towns and cities will spring up in the now uninhabited territories between the two oceans. Each of these places will have its own local time; and the difference between the clocks at the two extremes of Canada will be fully five hours. The difficulties which will ultimately arise from this state of things are apparent; they are already in some degree felt; they are year by year increasing, and will, at no distant day, become seriously inconvenient. This is the case not in Canada alone, but all the world over.

The other class of difficulties arises from the division of the day into halves of twelve hours, each numbered from one to twelve, from midnight to noon, and from noon to midnight consecutively. Inconveniences resulting from this cause, may be familiar to many who have had occasion to consult "Bradshaw," or other railway and steamboat time tables. Simply as an illustration, the experience of a stranger during the first few days of his sojourn in the United Kingdom, may be taken.

A few weeks ago he (the writer) landed at Londonderry by the Allan line of steamers from North America. Circumstances calling him to a place near Sligo, and having two days to spare, he determined, if it could be done within that period, to visit the locality referred to. "The Official Irish Travelling Guide" was consulted, and the several routes were carefully studied. Persons resident in Ireland, and accustomed to travel, were also consulted, and a route was determined on, by which the traveller could, with apparent comfort and certainty, leave Londonderry any morning, and return the night of the day following. The journey was by railway to Enniskillen sixty miles; thence by public car to Manor Hamilton, thirty miles; thence by private carriage to Killennumery, eight miles, which completed the first day's journey. Next day, it was arranged to leave in time to drive to Bandoran, forty-two miles, in order to catch a train, which "The Official Travelling Guide" indicated, would leave at 5.35 p.m., and enable the traveller to reach Londonderry at ten o'clock the same evening. There appeared to be no doubt, about accomplishing the journey within the time and in the precise manner described.

The traveller set out, reached the house of his friend near Sligo on the first day, without difficulty, and, on the second day, started in a conveyance specially engaged to take him to Bandoran in time for the 5.35 p.m. train. The conveyance actually reached Bandoran at 5.10 p.m., apparently affording twenty minutes to spare. But the discovery was soon made that no train would leave that evening. The station master was appealed to for an explanation, and, comparing the "Official Irish Travelling Guide," as it was termed, with the time table hung up in the railway office, it was found that the "Official Guide" should have read 5.35 a.m., instead of 5.35 p.m. Thus, owing to the system of dividing the day into two sets of hours, a most trifling typographical error made a morning train appear to be an afternoon train, twelve hours later than intended.

There was no help for it but to remain at Bandoran until next day, and, as the morning train on the Bandoran branch did not, like the supposed afternoon train, run to meet an express train on the main line, there was no regular means by which the traveller could reach his destination before 1.30 o'clock in the afternoon of the third day, in place of 10 o'clock, p.m., on the second day. An actual loss was thus entailed on him of sixteen and a-half hours, while several other persons were subjected to needless inconvenience and disappointment.

This was the first few days' exper nce of a visitor from a distant country to the United Kingdom, where untold wealth and talent have, during many years, been expended in establishing, developing, and perfecting the railway system !

The question need not be asked, how many or how few similar experiences could be related ? A single case like the one described, is quite sufficient to establish that perfection of system has not by any means been reached, and that the present mode of measuring time and arranging railway time tables, leads to errors which might any day prove serious in their consequences. Such a case as the foregoing should be rendered an impossibility in this age, more especially in the British Islands, where the railway system was cradled, and where it has been nurtured and maintained for half a century.

A remedy for the evils to which attention is directed, is clearly of importance not only to this generation, but to those who are to succeed us. No complete solution to the problems presented may be possible ; but a general enquiry into the subject of Chronometry may suggest some means by which the difficulties may in some degree be met.

Time is measured in nature by the motions of the heavenly bodies. The great natural measures are three in number ; the year ; the (lunar) month ;* and the day. All other divisions of time, as the civil month, the week, the hour, the minute and

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* The Chinese reckon by the lunar month. With them, the age of the moon and the day of the month are identical.

the second, although long in general use, are arbitrary and conventional.

Of the three great natural divisions of time, the period measured by the diurnal movement of the earth on its own axis, constituted the first space of time reckoned by the human race; and is undoubtedly the most important to man in all stages of civilization. It involves the most familiar phenomena of light and darkness, and embraces the constantly recurring periods of wakefulness and sleep, of activity and rest.

A day is the shortest measure of time afforded by nature. It is denoted by the revolution of the earth, and, although the motion of the earth is perfectly uniform, indeed the only strictly uniform motion that nature presents, we have three kinds of natural days all varying in length; the solar, lunar and siderial.

A solar day is the period occupied by a single revolution of the earth on its axis in relation to the sun.

A lunar day is the interval of time occupied by a revolution of the earth on its axis in relation to the moon.

A siderial day is the period required for a complete revolution of the earth on its axis in relation to the fixed stars.

Of these three natural days, the siderial day is the only one perfectly uniform in length. The lunar day, on account of the irregular and complicated motion of the moon in the heavens, is never employed as a measure of time. The solar day is variable in length on account of the form of the earth's orbit around the sun, and the obliquity of the ecliptic. Solar time is that shown by a sun-dial.

Although the siderial day is uniform in length, being perfectly independent of the sun, and having no relation to the daily return of light and darkness, it is not employed for civil purposes. The commencement of the siderial day is constantly changing throughout the year; at one period it comes at midnight, at another period at high noon.

It has been found convenient, therefore, to establish an artificial day, uniform in length, designated the mean solar day.

The mean solar day, as its name implies, is the average length of all the natural solar days in a year, and is the time intended to be indicated by ordinary clocks and watches.

In a year there are 366 siderial days and only 365 solar days. A solar day, therefore, exceeds the length of a siderial by about $\frac{1}{365}$ part of a day, or nearly four minutes (three minutes 55·9094 seconds).

The mean solar day, according as it is employed for civil or astronomical purposes, is designated the civil day, or the astronomical day. The former begins and ends at midnight; the latter commences and ends at noon. The astronomical day is understood to commence twelve hours before the civil day, but its date does not appear until its completion, twelve hours after the corresponding civil date.

It has been stated that all shorter periods of time than a day, are entirely conventional and arbitrary, there being actually no smaller measure than a day denoted by nature.

The sub-division of the day into parts has prevailed from the remotest ages; though different nations have not agreed, either with respect to the epoch of its commencement, the number of the sub-divisions, or the distribution of the several parts.

The division of the day with which we are most familiar is that which separates the whole space of time occupied by a diurnal revolution of the earth into two equal parts; one part extending from midnight to noon, the other part from noon to midnight. These half-days are sub-divided into twelve portions or hours, and these again into minutes and seconds.

In China and some other parts of the world, no half-days are used. The Chinese divide the day into twelve parts, each being equal to two hours of our time; these they again divide into eight parts, thus subdividing the whole day into ninety-six equal parts. The Italians, the Bohemians and the Poles have a division of the day into twenty-four parts, numbered from the first to the twenty-fourth—from one o'clock to twenty-four o'clock.

In Japan there are four principal points of division,—at noon, midnight, sunset and sunrise—dividing the natural day into four variable parts. These four parts are divided each into three equal portions, together making twelve hours. Each hour is again divided into twelve parts, thus making in all, one hundred and forty-four sub-divisions of the day. The six hours between sunrise and sunset differ in length, day by day from the six hours between sunset and sunrise. During the summer the hours of the day are much longer than those of the night, and shorter on the contrary in winter.

The division of that portion of the day during which the sun is above the horizon into twelve parts, belongs to the remotest ages of antiquity. The division of the other portion, which embraces the period of darkness, into the same number of parts, was introduced at Rome in the time of the Punic Wars.

The system of dividing the day by the rising and setting of the sun, makes the hours indefinite periods, as they continuously change with the seasons. Except at the equinoxes, the hours of the night and day can never be of equal length. Near the equator the variations are least; they increase with every degree of latitude until the Arctic and Antarctic circles are reached, within which a maximum is attained. Even in the latitude of Rome, the length of the hours of daylight and darkness nnder this system have an extreme difference of 75 minutes.

The day is reckoned to begin in China before midnight, the first hour extending from 11·00 p.m. to 1·00 a.m. of our mode ot reckoning. The Jews, Turks, Austrians and others, with some of the Italians, have begun their day at sunset. The Arabians begin their day at noon, and in this respect they resemble the astronomers and navigators of modern nations. It has been customary in Japan to adhere to the practice of the ancient Babylonians in beginning their day at sunrise.

The Babylonians, Persians, Syrians, Greeks and other ancient nations, began their day at sunrise, and had divisions corresponding to morning, forenoon, mid-day, afternoon, evening and night.

The ancient, like the modern, Arabians began their day at noon.

The Chaldean astronomers divided the day into sixty parts; like the modern Chinese they also had a division of the day into twelve hours.

The ancient Egyptians (probably B.C. 1000) divided the day equally into day and night, and again sub-divided each half into twelve hours, numbered from 1 to 12; the night with them commenced six hours before and terminated six hours after midnight; the day began six hours before noon and lasted twelve hours, or until six hours after noon.

These are some of the customs, as gleaned from history, which have prevailed at various times in different countries with respect to the day and its sub-division. To these may be added the customs practised at sea by navigators. The shipping of different nations have had different customs, but the most common practice on shipboard, is to divide the 24 hours into six equal portions called "watches;" and these, again, into eight equal parts known as "bells," and numbered from one to eight. Thus the whole day is sub-divided into 48 equal parts. The period of time called a "watch" is four hours in length, the reckoning being as follows:—

From noon to 4 p.m., the afternoon watch.
,, 4 p.m. to 8 p.m, the dog watches (from 4 to 6 being the first dog watch, from 6 to 8 being the last dog watch).
,, 8 p.m. to midnight, the first (night) watch.
,, midnight to 4 a.m., the middle (or second night) watch.
,, 4 a.m. to 8 p.m., the morning watch.
,, 8 a.m. to noon, the forenoon watch.

From what has been set forth it would appear that man has reckoned the day to begin at sunrise, at sunset, at noon, at midnight, at one hour before midnight, at six hours before midnight, and at six hours before noon, and that he has divided it in a great variety of ways; *firstly*, into two, four, twelve, twenty-four and one hundred and forty-four unequal parts; *secondly*, into two, four, six, eight, twelve, twenty-four, forty-eight, sixty, and into ninety-six equal parts, without including the small subdivisions of minutes and seconds. The common practice at present with most civilized nations is to divide the day into two series of twelve hours each, a custom which corresponds very closely with that followed by the ancient Egyptians long before the Christian era. Thus, while we have made extraordinary advances in all the arts and sciences, and in their application to every day life, we find ourselves clinging to a conventional and inconvenient mode of computing time; one not materially different from that practised by the Egyptians, perhaps thirty centuries ago.

The Chinese system would, without a doubt, suit the requirements of this age much better than that which we now follow. The halving of the day is one source of difficulty which ought not to exist, and it would be an important step to imitate the custom of computing time, which is followed by that old oriental civilization. The adoption of the Chinese system, by which half days would be thrown out of use, would not, however, obviate the very serious inconveniences which have been referred to, resulting from differences in longitude.

To overcome, at once, both difficulties, is the problem which presents itself for solution.

It has been stated that a day is the shortest measure of time which we find in nature. As a consequence, man is left to sub-divide the day in any way best calculated to promote his own convenience. There can be no doubt, whatever, that all divisions, except that produced by the rising and setting of the sun, are entirely artificial and arbitrary.

When the decimal system was adopted by the French, it was proposed to divide the day into ten and a hundred parts: a scheme which would probably be the best at this age of the world had the whole system of horology to be established *de novo*. In view of generally prevailing customs, however, it will, doubtless, be felt that any attempt to introduce the decimal division of the day would be unwise; that it would be futile to propose a change which could only succeed by seriously interfering with the existing system.

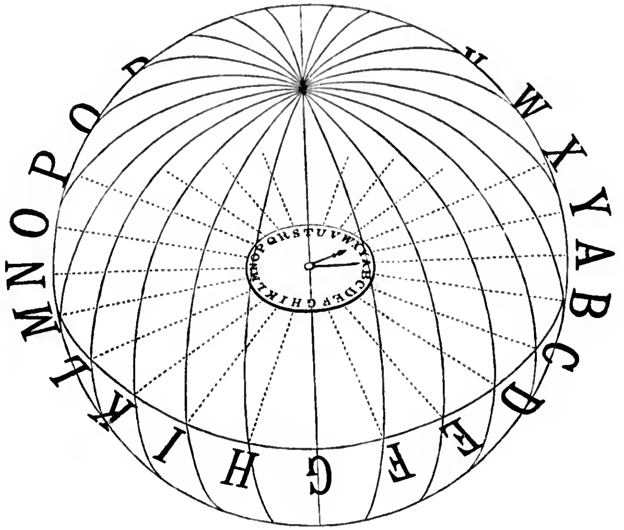
The progress of the world may, indeed, before long, demand a radical change in our Chronometry; but the present method of computing time in the more civilized parts of the earth, is so interwoven with human affairs, that it cannot in the meantime be disregarded. It will be evident that the consideration of any change should be entered on in the full recognition of established customs. Instead of attempting to uproot and supersede the present system, it is considered that a new scheme to meet the requirements of the age, should rather be engrafted on, and be in complete harmony with the old one.

In this view the following suggestions are offered:—

It is proposed to take as the unit-measure of time, the artificial day known as the mean solar day.* This unit

* The siderial day—the only natural day uniform in length—from its uniformity would be well suited for the standard unit of measure required. But it is not sufficiently marked for the ordinary purposes of life. The diurnal return of the sun in the heavens is a phenomenon much easier observed by the generality of man than the culmination of

to be divided into twenty-four equal parts, and these, again, into minutes and seconds by a standard timekeeper or chronometer, hypothetically stationed at the centre of the earth.



It is proposed that, in relation to the whole globe, the dial plate of the central Chronometer shall be a fixture, as in Fig. I; that each of the twenty-four divisions into which the day is divided shall be assumed to correspond with certain known meridians of longitude, and that the machinery of the instrument shall be arranged and regulated so that the index or hour hand shall point in succession to each of the twenty-four divisions as it became noon at the corresponding meridian. In fact the hour hand shall revolve from east to west, with precisely the same speed as the earth on its axis, and shall therefore point directly and constantly towards the (mean) sun, while the earth moves round from west to east.

It is proposed in order properly to distinguish these, as well as the new time indicated by the Standard Chronometer, that the twenty-four divisions shall be known by the letters of

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a star. Hence the solar day reduced to a mean is better suited for civil purposes.

the alphabet, and that the corresponding meridians shall also be so known.

Each of the twenty-four parts into which the day is proposed, as above, to be divided, would be exactly equal in length to an hour; but they ought not to be considered hours in the ordinary sense, but simply twenty-fourth parts of the mean time occupied in the diurnal revolution of the earth. Hours as we usually refer to them, have a distinct relation to noon or to midnight at some particular place on the earth's surface; while the time indicated by the Standard Chronometer would have no special relation to any particular locality or longitude: it would be common and equally related to, all places; and the twenty-four sub-divisions of the day would be simply portions of abstract time.

The standard time-keeper is referred to the centre of the earth in order clearly to bring out the idea, that it is equally related to every point on the surface of the globe. The standard might be stationed anywhere, at Yokohama, at Cairo, at St. Petersburg, at Greenwich or at Washington. Indeed, the proposed system if carried into force, would result in establishing many keepers of standard time, perhaps in every country, the electric telegraph affording the means of securing perfect synchronism all over the earth.

The time indicated by these instruments, it has been stated, would be designated by letters. In order still further to distinguish it from siderial, astronomical, civil or local time, it is proposed, that, as it is common to the whole earth it should be known as "common" or "terrestrial time;" probably "universal time" would be a designation still more appropriate, but for the present the term "terrestrial time" will be used.

Besides the keepers of standard time established at many places, possibly in every civilized country, it is suggested that every clock and watch, should, as far as practicable, move synchronically, all indicating "terrestrial time." As a theory, it is proposed that when the hands of any one time-piece point to A or to G, the hands of each and every other horological instrument in use throughout the globe, should point to A or to G at the same moment.

It is obvious that if clocks and watches constructed on these principles and the scheme of "terrestrial time" were in general use, the difficulties and inconveniences which have been alluded to and which seem inseparable from the present system, would be fully met. Every connecting steam line, indeed every communication on the face of the earth, would be worked by the same standard, viz., "terrestrial time." Every traveller having a good watch, would carry with him the precise time that he would find employed everywhere. *Post meridian* could never be mistaken for *ante meridian*. Railway and steamboat time-tables would be simplified, and rendered more intelligible, to the generality of mankind than many of them are now.

Examples of time-tables placed side by side may be presented. Table A. is an ordinary "through" time-table from Cork to London, extracted from the published sheets of one of the Railway Companies. Table B. shows the application of terrestrial time to the same route.

Table A.			Table B.	
Cork	6·0 a.m.	Irish time.	Cork	Y. 40.
Mallow... ...	6·55 ,,	,,	Mallow... ...	A. 35.
Limerick ...	11·20 ,,	,,	Limerick ...	E. 0.
Tipperary ...	12·40 p.m.	,,	Tipperary ...	G. 20.
Waterford ...	4·30 ,,	,,	Waterford ...	L. 10.
New Milford.	2·55 a.m.	Greenwich time.	New Milford .	V. 55.
Swansea... ...	5·20 ,,	,,	Swansea... ...	Y. 20.
Cardiff	6·33 ,,	,,	Cardiff	A. 33.
Exeter	2·10 p.m.	,,	Exeter	I. 10.
Plymouth ...	4·25 ,,	,,	Plymouth ...	L. 25.
Gloucester ...	8·40 a.m.	,,	Gloucester ...	P. 40.
Swindon... ...	10·10 ,,	,,	Swindon... ...	R. 10.
Oxford	1·25 p.m.	,,	Oxford	U. 25.
Reading	11·13 a.m.	,,	Reading	F. 13.
London (Pad.).	12·10 p.m.	,,	London (Pad.).	G. 10.

Condensed time-tables of the great mail and passenger route now being established through Canada to the Pacific, prepared in accordance with both systems, may also be presented.

TABLE C.—*The Present System.*

Principal Stations.	Local Time.		Slower than Greenwich.
London...	8·00 p.m. ...	Greenwich time	0·00
Dublin...	8·00 a.m. ...	Irish time	0·25
(*en route*) ...	... 1st noon	Irish time	,,
W. Coast Ireland	1·00 p.m. ...	Irish time	,,
(*at sea*) ...	... 2nd noon	Ship's time	1·00
(*at sea*) ...	... 3rd noon	Ship's time	1·40
(*at sea*) ...	... 4th noon	Ship's time	2·20
(*at sea*) ...	... 5th noon	Ship's time	3·00
St. John, N'f'land	9.00 a.m. ...	Newfoundland time ..	3·30.
(*en route*) ...	... 6th noon	Newfoundland time ...	,,
St. George N'f.l^d.	6·00 p.m. ...	Newfoundland time ...	,,
Shippigan	10·00 a.m. ...	New Brunswick	4·30.
(*en route*) ...	... 7th noon	New Brunswick	,,
Riv. du Loup ...	10·00 p.m. ...	Montreal time	5·00.
Quebec...	2·00 a.m. ...	Montreal time	,,
Montreal	8 a.m. ...	Montreal time	,,
(*en route*) ...	... 8th noon	Montreal time	,,
Ottawa...	1·00 p.m. ...	Montreal time	,,
Nippising	8·30 p.m. ...	Huron time	5·30.
L. Superior... ...	10·00 a.m. ...	Superior time	6·00.
(*en route*) ...	... 9th noon	Superior time	,,
Fort William ...	3·30 p.m. ...	Superior time	,,
Keewatin	1·30 a.m. ...	Winnepeg time	6·30.
Selkirk	6·00 a.m. ...	Winnepeg time	,,
(*en route*) ...	... 10th noon	Winnepeg time	,,
Livingston	3·00 p.m. ...	Saskatchewan time ...	7.00.
Saskatchewan ...	9·30 p.m. ...	Saskatchewan time ...	,,
Battleford ...	1·00 a.m. ...	Athabasca time	7·30.
Edmonton	9·30 a.m. ...	Athabasca time	,,
(*en route*) ...	... 11th noon	Athabasca time	,,
Montbrun	2·15 p.m. ...	Athabasca time	,,
Yellow HeadP	7·00 p.m. ...	Yellow Head time... ...	8·00.
Tete Jaune Cache	8·15 p.m. ...	Yellow Head time ...	,,
(*en route*) ...	... 12th noon	Yellow Head time ...	,,
Pacific Terminus.	11·30 p.m. ...	Pacific time	8·30.

TABLE D.

System of Terrestrial Time.

London	P. 00.
Dublin	C. 25.
1st *Noon* (*en route*) ...	G. 25.
W. Coast Ireland	H. 25.
2nd *Noon* (*at sea*)	H. 00.
3rd *Noon* (*at sea*)	H. 40.
4th *Noon* (*at sea*)	I. 20.
5th *Noon* (*at sea*)	K. 00.
St. John, Newfoundland	G. 30.
6th *Noon* (*en route*) ..	K. 30.
St. George N'f'land ...	R. 00.
Shippigan	I. 30.
7th *Noon* (*en route*) ...	L. 30.
Riv. du Loup	W. 00.
Quebec	B. 00.
Montreal	H. 00.
8th *Noon* (*en route*) ...	M. 00.
Ottawa	N. 00.

Continued.	
Nippising	V. 00.
L. Superior	L. 00.
9th. *Noon* (*en route*) ...	N. 00.
Fort William	Q. 30.
Keewatin	C. 00.
Selkirk	G. 30.
10th. *Noon* (*en route*) ...	O. 00.
Livingston	R. 00.
Saskatchewan	X. 30.
Battleford	C. 30.
Edmonton	M. 00.
11th. *Noon* (*en route*) ...	P. 00.
Montbrun	Q. 45.
Yellow Head Pass ...	W. 00.
Tete Jaune Cache	X. 15.
12th. *Noon* (*en route*) ...	P. 30.
Pacific Terminus.	W. 30.

A comparison of these tables will illustrate the extreme simplicity of Table D, the one prepared on the principle of terrestrial time. The watch of every traveller would agree with the times given opposite each station in this table, an impossibility under the old system.

It is not proposed to do away with local time. It is contemplated by this scheme that each time-piece, clock, or watch should indicate terrestrial time, together with local time. The various methods by which the object may be accomplished, remain now to be considered.

If the practice of dividing the day into two series of hours, each numbering from 1 to 12, could be wholly ignored, the nomenclature proposed for terrestrial time, might very readily be employed for local purposes. The time of day is now known by numerals, but numerals have no special advantage over letters. Habit has undoubtedly rendered the former familiar to the mind in connection with the hour of the day, but if the naming of the 24 divisions had to be done afresh, and letters instead of numerals were adopted, there can be no doubt whatever, that the time of day could be as well expressed, and be as easily understood by the former as by the latter.

It has been stated as part of the scheme, that each letter has a corresponding meridian of longitude and that time-keepers are to be so adjusted as to point to the meridional letter precisely when it is noon in the particular longitude.

Suppose G to be the meridional letter of the British Islands. How easy it would be for an inhabitant to comprehend that it was noon, when the hands of the clock pointed to G, that it was midnight when they pointed to the letter on the dial plate opposite G, viz., T. Or, in speaking of any particular time of day, say four hours before mid-day, it would be just as easy to understand what time was referred to by the use of the letter C as by the use of the roman numeral VIII. It is perfectly obvious that every person living in England, Ireland and Scotland, would soon become familiar with the several letters, and the precise relation which they had to the time of day. If we pass to another part of the world, say where

Fig. 2.

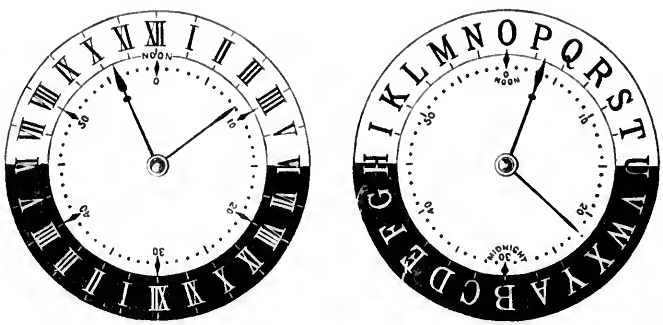
O becomes the meridional or noon letter, as in Fig. 2, there could be no misunderstanding the meaning of the expression, "Time P. 22." It could have but one meaning viz., 1 hour and 22 minutes after mid-day, while the expression, "1.22 o'clock," has a double meaning undetermined without the addition of "*ante-meridian*" or "*post meridian.*"

To render the dial plates of time-pieces perfectly intelligible, in each place when used for local time, the expedient shown in *Fig.* 2 might be adopted. Here the noon and midnight letters are clearly distinguished, and that portion of the day which includes the hours of darkness cannot be mistaken. These or similar expedients, could be employed with the same effect in the clocks and watches used in every place on the surface of the earth.

It would, however, be vain to assume that the present system could be wholly abolished or seriously disregarded. It becomes expedient, therefore, to consider how the advantages of the scheme of terrestrial time could be secured in every day life. It is perfectly obvious that the present system cannot be overlooked; and that, although perhaps not perpetuated, it must for some time be continued. We must therefore look for some means by which the new scheme may be employed in conjunction with the old, until perhaps at some period in the future, the latter may fall into disuse.

The first arrangement which suggests itself, is to have two dial plates to each time-piece, the same wheel-work moving the hands of both, one indicating terrestrial time, the other indicating the local time of the place. Stationary clocks might have the dial plates side by side as in Fig. 3.

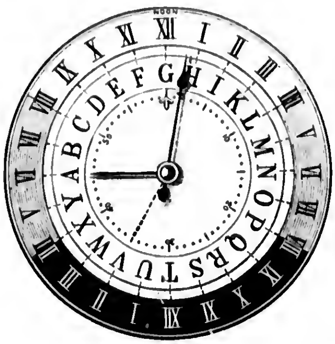
Fig. 3.



Watches, or other portable instruments, on the other hand, might more conveniently have the dial plates back to back. In the latter case, means would be provided for adjusting the local time dial plate to correspond with any new longitude to which the instrument might be moved. Terrestrial time on the other dial plate would remain unaltered.

Another plan of construction may be suggested, by which terrestrial and local time could be indicated on the same face of the clock or watch as in Fig. 4. In this arrangement it is proposed to have the Roman numerals for local time inscribed on a movable disc, which would admit of adjustment for any longitude without in the least disturbing the machinery of the instrument or interfering with the index hands.

FIG. 4.



Church and other stationary clocks, as well as watches, the use of which would be confined to particular districts, would have the local time disc permanently secured in the proper position. Only in the case of persons travelling beyond any particular local time district, would the local time disc require to be changed. Its adjustment, under such circumstance, would be simple; it would only be necessary to move the disc round until twelve o'clock noon coincided with the meridional letter of the new locality. Suppose, for example, the letter G represented the longitude of the new position of the watch, twelve noon placed in conjunction with G would complete the adjustment of the instrument. For every other new position, the same operation would be repeated. Notwithstanding every change that may be made for local time, the machinery of the watch need not be touched, and the hands would continue to indicate correct terrestrial time, The distinction between terrestrial time and local time would always be perfect; the former would invariably be known by letters, the latter as at present by the Roman numerals.

If the change in longitude were but slight—making a difference in local time, of only a few minutes—and in any case it became indispensible that precise theoretical local time should be indicated by the watch, in that case, a third hand for the odd minutes, as shown by the dotted lined (Fig. 4) would be required. It is, however, hereafter suggested that for ordinary purposes this would be quite unnecessary.

As in the diagrams, it is proposed to denote that portion of the day which includes the hours of darkness by a black or dark ground, in order that the night hours could never be mistaken for the hours in the middle of the day, which have the same numerals. It is likewise proposed to distinguish the several "watches" into which the day is divided on shipboard. The local time disc, exhibits a light portion between 8 a.m. and 4 p.m.; this includes and represents the forenoon and afternoon watches, noon being the dividing point. The dark portion, extending four hours before, and four hours after midnight, embraces the two night watches; while the shaded portions, from 4 p.m. to 8 p.m., and from 4 a.m. to 8 a m. represent the dog-watches and the morning watch. This arrangement, would, perhaps prove useful, in view of the vast and yearly increasing number of ships that adopt, and constantly use, the division of the day into "watches," finding it, as they appear to do, the most convenient scheme of division for daily routine at sea.

Navigators are required to employ a standard time to enable them from day to day, when on long voyages, to compute their longitude. For this purpose it is a practice with ships to carry the local time of the national observatory of the country to which they respectively belong. For example: French ships reckon their longitude by Paris time; British ships by Greenwich time. Terrestrial time would serve precisely the same purpose as a standard for geographical reckoning, and it would be some advantage to the marine of the world to have a uniform standard established —the common property of all nations and in common use by land and water everywhere. It has already been said that the telegraph provides the means of securing perfect accuracy at all stations, however remote; indeed, through this agency, timekeepers may be made to beat time synchronously all over the globe. Already the length of telegraph lines in operation approaches 400,000 miles, and we are warranted in believing that ultimately the means of instantaneous communication will ramify through every habitable country and find its way to every port of commercial importance.

It may be said, that with clocks moving synchronically and indicating terrestrial time all over the globe, it would be of little advantage to attempt to maintain precise local time at every place on the earth's surface. Our clocks but rarely indicate true local time; even our most perfect timepieces are for the greater portion of the year either faster or slower than the sun. In fact correct ordinary timekeepers must necessarily at certain seasons be 15 or 16 minutes faster or slower than true solar time, yet no inconvenience whatever is found to result. It will be admitted, that the adoption of Irish time in England or English time in Ireland, would scarcely be felt in civil affairs. The difference between English and Irish time as arbitrarily established, is twenty-five minutes; but in the west of Ireland the local mean time is forty minutes behind English time (Greenwich.) Greenwich time is used throughout England and Scotland, although it is half an hour faster than correct local mean time on the west coast of the latter country.*

In every country, local time is more or less arbitrarily established; it could not be otherwise, without causing great

* True Solar time is sometimes about 45 minutes in the Western coast of Scotland, and 55 minutes in the west of Ireland, behind Greenwich time.

confusion, as no two places, unless in the same meridian, have the same true local time. In considering the whole subject, it is felt, that if some simple rule could be agreed upon for defining local time everywhere, it would materially add to general convenience.

It is suggested that each of the twenty-four lettered meridians, (Fig. 1) should be taken as standard longitudes for establishing approximate local time, and that as a general rule all places should adopt the local time of the nearest of these meridians. This would greatly reduce the number of local time standards, and would divide the surface of the globe into twenty-four "lunes," forming distinct local time sections extending from pole to pole, within one or other, of which every place would find its position. Only in extreme cases would the difference between the true and approximate local time be as much as half an hour. In many cases there would be no difference ; and in no case could the differenec be of the slightest moment in the ordinary business of civil life. Whenever exact time was required for any purpose, terrestrial time, assuming it to be in general use, would be available.

In this view, if we assume one of the lettered meridians, G, to pass through Greenwich,* and terrestrial time for the moment to be G 45, then approximate local time at other places around the globe would simultaneously be as in the plates which follow. In each of the separate figures it will be noticed that the hands and the dial for terrestrial time remain constantly in the same relative position, while the moveable disc on which is inscribed the roman numerals for local time varies in each case. If each figure be examined it will be found that 12 o'clock noon is successively brought in conjunction with the letters which represent the 24 meridians, as in Fig. 1. With each separate figure is given simultaneous time at a number of well known places around the globe—approximate local time of course changing with the meridian terrestrial time remaining constant.

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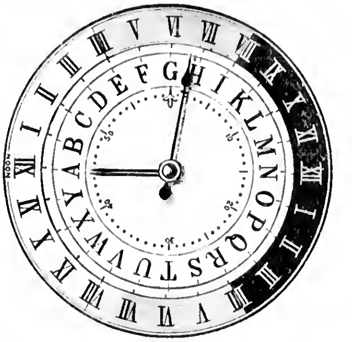
* See Fig. G., Page 25.

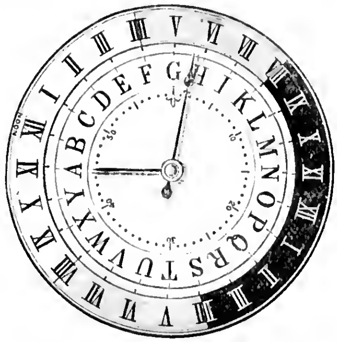
A embracing Yenisaisk, Tomsk (Siberia), Tibet, Calcutta, Bay of Bengal, Andaman Islands.

App. Local 6.45 *p.m.* ... *Ter. G.* 45.



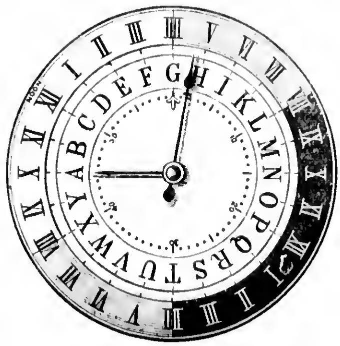
B Gulph of Obi, Omsk (Siberia), Kashmir, Lahore, Bombay, Coralline Islands, Chagos Islands.

App. Local 5.45 *p.m.* ... *Ter. G.* 45.



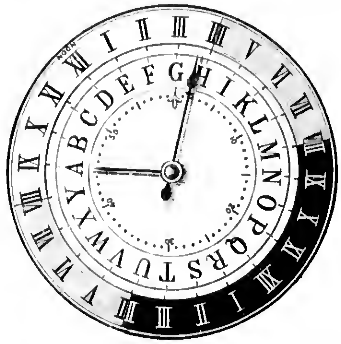
C Nova Zembla, The Ural Mountains, Orsk, Sea of Aral, Khiva, Khorassan, Mauritius.

App. Local 4.45 *p.m.* ... *Ter. G.* 45.



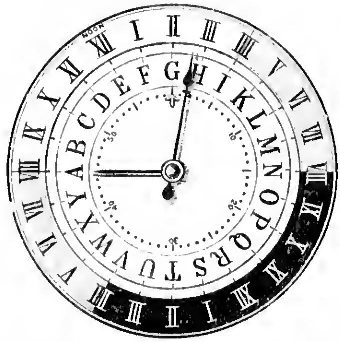
D Archangel, Nizney Novgorod, Astrakhan, Bagdad, Arabia, Aden, Somali, Madagascar.

App. Local 3.45 *p.m.* ... *Ter. G* 45.



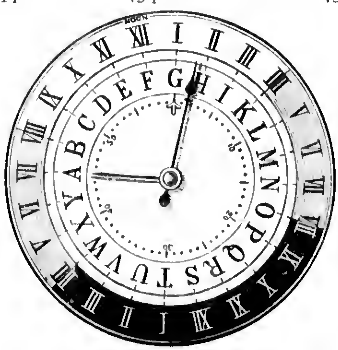
E Lapland, St. Petersburg, Constantinople, Alexandria, Nubia, Ujiji, Transvaal, Natal.

App. Local 2.45 *p.m.* ... *Ter. G.* 45.



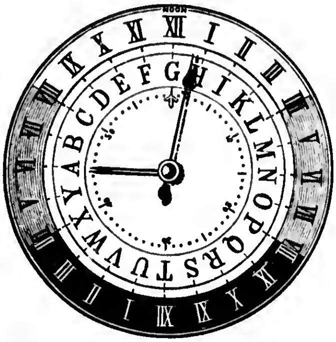
F Spitzbergen, Sweden, Berlin, Naples, Malta, Tripoli, Congo, Cape of Good Hope.

App. Local 1.45 *p.m.* ... *Ter. G.* 45.



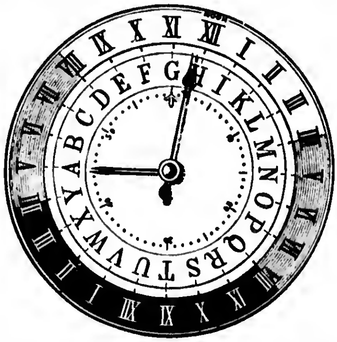
G England, France, Spain, Algeria, Timbucto, Ashantee, St. Helena Island.

App. Local 12.45 *p m.* ... *Ter. G.* 45.



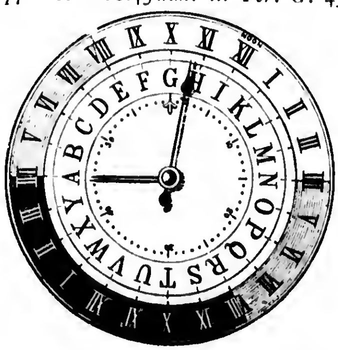
H Iceland, Madeira, Canary Islands, Senegambia, Sierra Leone, Asension Islands.

App. Local 11.45 *a.m.* ... *Ter. G.* 45.



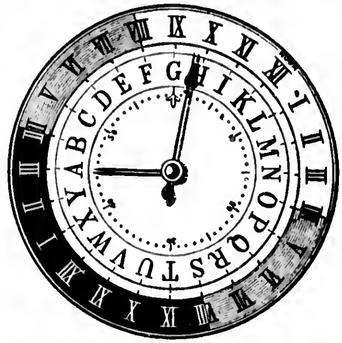
I East Greenland, The Azores, Cape Verde Islands, Fernando Island, South Georgia Islands.

App. Local 10.45 *a.m.* ... *Ter. G.* 45.



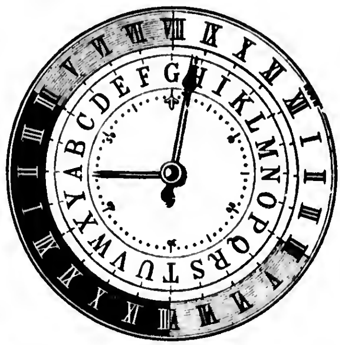
K West Greenland, The Banks of Newfoundland, Maranhao, Eastern Brazil, Rio de Janeiro.

App. Local 9.45 *a.m.* ... *Ter. G.* 45.



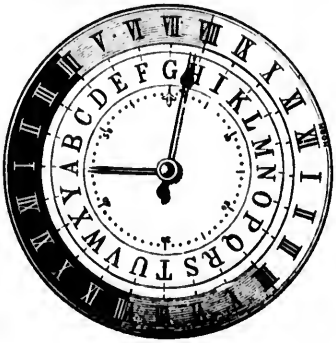
L Baffin's Bay, Labradore, Barbadoes, Trinidad, British Guiana, Buenos Ayres, The Falkland Islands.

App. Local 8.45 *a.m.* ... *Ter. G.* 45.



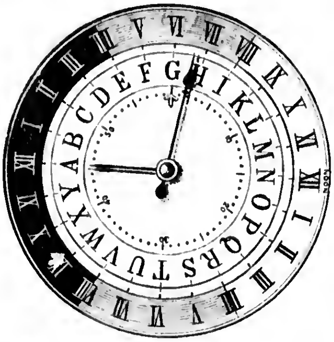
M Hudson Strait, Ottawa. Washington, Cuba, Jamaica, Equador, Peru, Chili, Patagonia.

App. Local 7.45 *a.m.* ... *Ter. G.* 45.



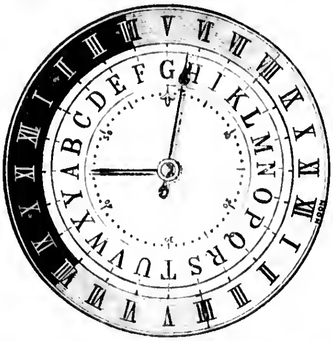
N Hudson Bay, Lake Superior, St. Louis, New Orleans, Yucatan, Guatemala, Galapagos Islands.

App. Local 6.45 *a.m.* ... *Ter. G.* 45.



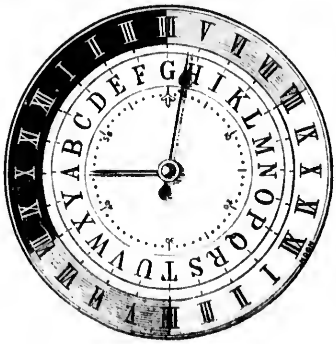
O Melville Sound, Lake Athabasca, Saskatchewan District, Colerado, Mexico, Cape Corrienta.

App. Local 5.45 *a.m.* ... *Ter. G.* 45.



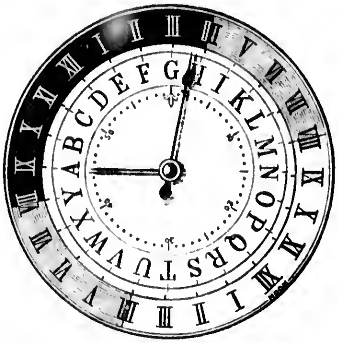
P Banks Land, Great Bear Lake, British Columbia, Oregon, California, Sea Otter Islands.

App. Local 4.45 *a.m.* ... *Ter. G.* 45.



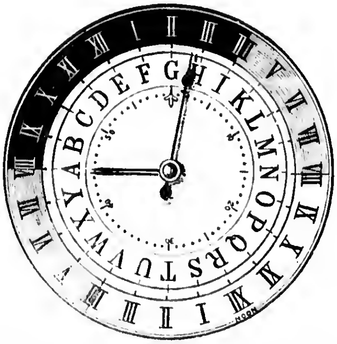
Q Fort Good Hope, Sitka, Queen Charlotte Islands, Paxavos Islands, Gambia Islands, Pitcairn Island.

App. Local 3.45 *a.m.* ... *Ter. G.* 45.



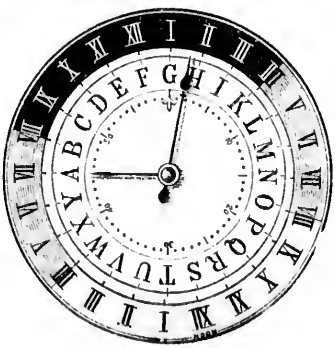
R Alaska, Owhyhee Sandwich Islands, Malden Islands, Starbuck Islands, Society Islands, Tubuai Islands.

App. Local 2.45 *a.m.* ... *Ter. G.* 45.



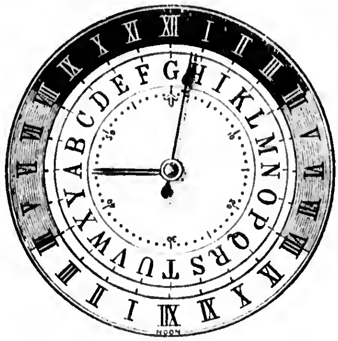
S Behring Strait, Fox Islands, Necker Island, Palmyra Island, Fanning Island, Palmerston Island.

App. Local 1.45 *a.m.* ... *Ter. G.* 45.



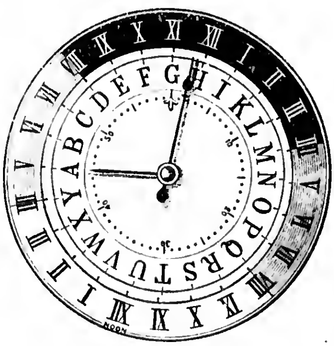
T Wrangel Land, Aleutian Islands, Gilbert Islands, Fiji Islands, North Island New Zealand.

App. Local 12.45 *a.m.* ... *Ter. G.* 45.



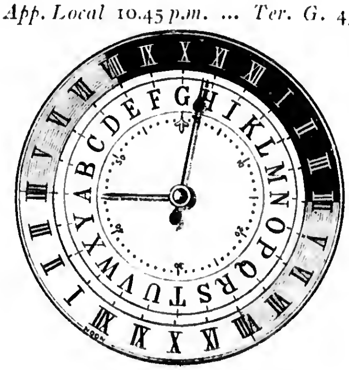
U Kamchatka, Marshall Islands, New Hebrides, Norfolk Island, Middle Island, New Zealand.

App. Local 11.45 *p.m.* ... *Ter. G.* 45.



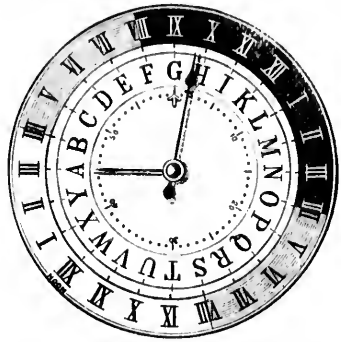
V New Siberia, Sea of Okotsh, Queensland, New South Wales, Victoria, Tasmania.

App. Local 10.45 *p.m.* ... *Ter. G.* 45.



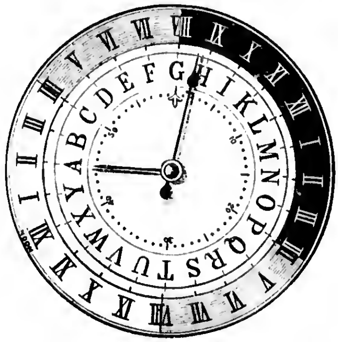
W Verkoansk, Nikolaevsk, Japan, New Guinea, North Australia. South Australia.

App. Local 9.45 *p.m.* ... *Ter. G.* 45.



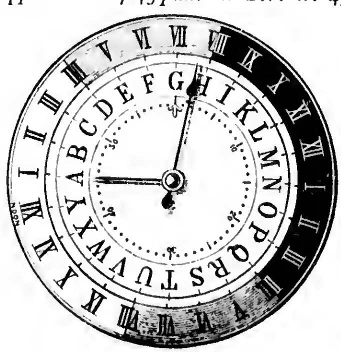
X Central Siberia, Eastern China, Formosa, Philipine Islands, Sandalwood Island, Western Australia.

App. Local 8.45 *p.m.* ... *Ter. G.* 45.



Y Cape Sievero, Irkoutsh, Central China, Cochin China, Singapore, Sumatra, Java.

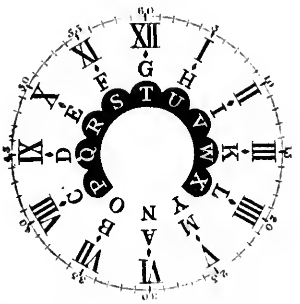
App. Local 7.45 *p.m.* ... *Ter. G.* 45.



It will perhaps be allowed that the scheme of terrestrial time, if put into practice, would, without seriously interfering with the existing customs, completely obviate all the objections to the present system which have been set forth. It has been shown that the use of local time may be retained very much as now, and that it may be indicated along with terrestrial time, by the same clocks and watches. Objections may, however, be raised to the scheme, on account of the apparent neccessity of abolishing all existing clocks and watches, and substituting new ones. This indeed would be an insuperable objection, if it held good, but the necessity of this course is only apparent, as it is proposed to utilize existing timepieces simply by furnishing them with new dial-plates.

If we take a watch or clock to be used in any particular country, it would be a simple matter to inscribe on its dial the letters which designate terrestrial time. A still better plan would be to provide a new dial plate, such as Fig. 5.

Fig 5.



In this design it will be noticed that G is assumed to be the meridional or noon letter of the place and the letters on a dark ground between 8 p.m. and 4 a.m. represent the hours in the two "night watches." With such simple expedients as these it would be perfectly practicable, without superseding existing time-keepers, to secure in a large degree the advantages of the new scheme in any country comparatively limited in geographically extent.

Clocks and watches now in use might thus in a very inexpensive way be so adapted as to show terrestrial in addition to local time. It would only be necessary to have railway and steamboat time-tables prepared in accordance with the new system in order to bring its advantages into common use. But this would apply only to localities or individual countries limited in extent. Mankind, generally, throughout the world, would not participate in the full advantages promised by the scheme until time-keepers for common use were constructed on new principles. A general change could only be a gradual process; but as there are some hundreds of thousands of time-keepers made every year, it would be well, in the event of the subject of this paper being deemed worthy of attention, for the manufacturers of horological instruments to consider the expediency of introducing such changes in their construction as may seem to be advisable. This suggestion applies more especially to the manufacture of portable time-keepers, watches, chronometers, &c.

Figs. 6 and 7, represent one of a variety of arrangements by which terrestrial and local time may conveniently be indicated. Fig. 6, shows the watch open with the terrestrial time dial

FIG. 6.

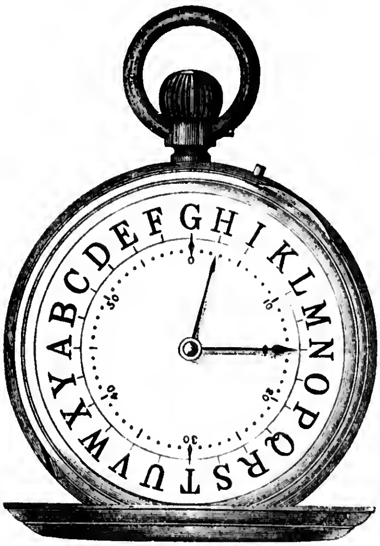


FIG. 7.

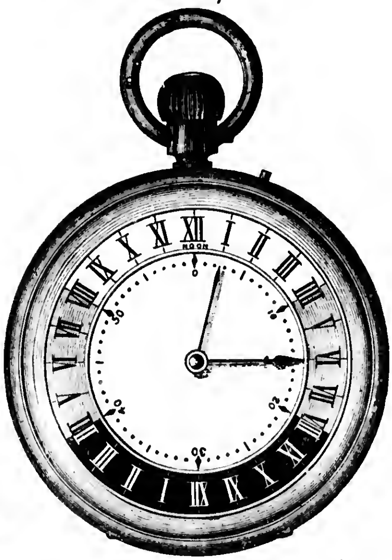


plate exposed. Fig. 7, shows the same watch closed, with the local time numerals engraved on the face of the case; the latter being pierced in order that the hands may be seen. The local time disc is designed to be adjustable for any meridian.

In this communication attention has been directed to the various customs that have prevailed, and which now prevail with respect to the measurement of time; and attention has been drawn to the fact, that of late years the telegraph, and more especially the application of steam to locomotion, have rendered the ordinary practice of reckoning time but ill suited to the circumstances which now exist. It cannot be supposed that these active agents in human progress have completed their mission; nay, we may rather assume, that these extraordinary powers, but recently placed under the control of man, have but commenced their career, and that they will still achieve greater triumphs in the work of colonization and civilization.

On the new continent, America, these wonderful agents have been employed to the greatest relative extent, as the subjoined estimate from late returns will show :—

	Population.	Miles of Railway.
ASIA	824,548,500	7,643
EUROPE	309,178,300	88,748
AFRICA	199,921,600	1,451
N. & S. AMERICA	85,519,800	83,655
AUSTRALASIA ...	4,748,600	1,752
* Totals ...	1,423,917,800	183,248

It has been pointed out that difficulties already met in portions of America threaten to become seriously inconvenient as the Railway system continues to be extended. On that continent, therefore, it may be assumed that a practicable scheme to meet the difficulties alluded to would be favourably received. The importance of the subject is not confined to America. It requires no great foresight to see that all quarters of the globe are now or will eventually be interested. Australia and Africa will before long be pierced, perhaps girdled by railways. Asia, with more than half the population of the world, must in due time yield to the civilizing pressure of steam and participate in the general progress. In North and South America there is indeed room for many times the total length of existing

* Estimate of Behm and Wagner.

railways, but even taking the present mileage and population as a basis, the proportion would give to Europe and Asia together more than one million miles. These two great continents have as yet only 96,000 miles of railway and it would probably be taking too sanguine a view to suppose that so great an increase as that due to the American ratio would speedily be realised. No one, however, can doubt that the network of railways in Western and Central Europe will before long be greatly enlarged; that its branches will extend to Asia, and that offshoots will ultimately be prolonged to the farthest shores of the Chinese and Russian Empires. A comparatively few years may, indeed, witness extraordinary progress made in the direction indicated, when difficulties will undoubtedly be experienced such as those which I have described, on a scale greater than in America.

The subject to which attention is directed clearly concerns all countries. It is especially important to the United States, Brazil, Canada, indeed, to the whole of America. It is important to France, Germany, Austria, and to every nation in Europe. It is of peculiar interest to the gigantic Empire of Russia, extending over nearly 180 degrees of longitude and with a total variation in local time of about twelve hours. It is of still greater importance to the Colonial Empire of Great Britain with its settlements and stations in nearly every meridian around the entire globe, and with vast territories to be occupied by civilized inhabitants, in both hemispheres.

The system of Chronometry which we have inherited, was doubtless, well suited to the purpose for which it was designed two or three thousand years ago; or to the requirements of man two generations back, before the great modern civilizers, steam and electricity began their work. Now we begin to realize the fact, that the system is awkward and inconvenient, and in comparatively a few years, say, by the time the twentieth century dawns, may we not find a radical change imperatively demanded by the new conditions of the human race?

It is probably not too soon, therefore, to discuss the subject. It would indeed be a vain task to attempt to abolish a custom less hoary with age, less generally practised, and even more faulty than our system of computing time. But the scheme submitted involves no great fundamental change. The ancient custom need not be discontinued. It is merely suggested that it be improved, and that such modifications be introduced as are rendered necessary by the conditions of an age in which all portions of the habitable globe are being occupied by civilized communities, and brought into constant communication by steamboat, railway and electric telegraph.

Before the introduction of Railways in England, and the same may be said of other countries, every town and village kept its own time. A person travelling in those days would find his watch varying more and more from the local clocks as he proceeded from place to place. On the establishment of the railway system, this state of things could not be tolerated; any attempt to work them by local time could only lead to needless complication and confusion. The railways demanded a uniform time, and in England Greenwich time was used. This was looked upon as an innovation, and was for a considerable period vigorously opposed; but at last the advantages of a uniform time became so manifest that Greenwich time came into general use.

But for the employment of Greenwich time in England it would be an extremely difficult task to regulate safely the great number of trains which daily travel. The safe working of the railways is indeed a problem sufficiently difficult even with Greenwich time, and we can scarcely conceive how much the problem would be complicated if we were to revert to the system of local time as it prevailed in the days of stage coaches when every town and hamlet kept its own time.

Among the several objects which the scheme of terrestrial time has in view, not the least important is to extend to the world similar advantages to those which have been conferred on England by the general adoption of Greenwich time since the commencement of the railway era.

New World Calendar Would Allow Greater Precision, Efficiency

The World Calendar of 12 months arranged in equal quarters of 91 days will permit greater precision, discipline, order and efficiency in the huge task of prosecuting the war because of better and more perfect correlation of all the various calendar units, Miss Elisabeth Achelis, president of the World Calendar Association said last night.

Addressing a meeting in the Victoria Memorial Museum Hall, arranged by the Ottawa Center of the Royal Astronomical Society of Canada, Miss Achelis said the time to change to the new World Calendar was now.

"No war is won by delaying improvements and no success is achieved by clinging unwisely to outmoded patterns and systems," she added, "we have already found that the exigencies of the war have changed the clocktime to a 24-hour clock for the armed forces, they being quick to preceive the need of eliminating the confusion of the A.M. and P.M. method."

Similarly in civilian life the World Calendar would overcome the difficulties of the manufacturer, the industrialist, the employer and the wage earner in calculating "how many week days or how many time-and-a-half or double-time days are in a month." Inconsistency in the present calendar sabotaged valuable energy, time, labor and money, she said, and cited specific instances where such "sabotage" occurred.

Dr. T. L. Tanton, Ph.D., president of the Ottawa Center, Royal Astronomical Society of Canada introduced the speaker, who was thanked by A. J. Hills. A question and answer period was conducted by Emerson Brewer, a director of the association.

Following is the text of the address delivered by Miss Achelis:

Although not a scientist, I feel deeply privileged to talk with you this evening on a subject which is closely linked to science. So I am a bit overwhelmed, but very much honored, that we can discuss together a better calendar more fitting our day and age.

The accomplishment of astronomy in the measurement of time, the calendar, is one of proud achievement. It deserves full and lasting praise. From the beginning of science, astronomers first with their naked eye and later with super telescopes have meticulously measured the movements of the celestial bodies and the planet Earth, better to ascertain the regular coming of the seasons and the accurate length of the year. From the earliest moon, star and Egyptian calendars down to the present Gregorian, the work has been admirably done. The calendar rests on a sound basis. We all realize that it is not as yet perfect. The calendar's beginning should really harmonize with one of the seasonal beginnings, but this is not of immediate importance. The present need is to improve the internal arrangement, better to serve the present and coming generations.

Gregorian Calendar.

That the Gregorian calendar does not meet present requirements is clearly proved by the astronomers themselves. They have substituted a more dependable and stable time-system of their own to offset the erratic Gregorian. I refer to the Julian Day method which eliminates entirely the weeks, dates, months and years in their time reckoning. Thus January first of the new year, 1944, was the 2,431,091st day, and the year will close on the 2,431,457th day. The astronomer realizes, however, that counting by days only would be extremely awkward for daily life, entailing unnecessary hardships and inconveniences. The method of counting by the varying time-units as day, date, week, month, season and year is too valuable to discard. But he does demand, and justly so, that there is planning and order in the arrangement of the calendar, which is woefully lacking now.

Order and Stability.

The desire for order and stability in the calendar has also been recognized by the industrial world, and due credit should be given it for initiating the modern movement to meet this need. The various International Congress of Chambers of Commerce and Industrial and Commercial Organizations urged an improved calendar in their bienniel meetings in 1910, 1912 and 1914, and the Swiss government in 1914 was requested to investigate the entire field in order that some international action be taken. The First World War interfered and it was not until 1923 that the question was placed before the League of Nations for consideration. This resulted in an international conference being held in 1931. After a week's conference on the subject which also included a fixed Easter date, the League of Nations at Geneva referred the calendar back again to the various governments for further study and consideration.

500 Plans Submitted.

It was in that self-same year that your retiring president, Dr. H. R. Kingston, devoted considerable space in his annual report to the reform of the calendar. Of the two plans that survived the 500 submitted to the League, were the 13-month plan of 28 days and four weeks to every month, and the 12 months of four identical quarters, each quarter having three months of 31, 30, 30 days respectively, better known as The World Calendar. Dr. Kingston noted that the League report indicated strong opposition to the 13-month plan and general sympathy to the 12-month arrangement. Ever since that year, the Royal Astronomical Society of Canada has shown continued interest. It has proudly placed itself in the vanguard of the movement, from which it has never wavered. Such loyal consistency has been most encouraging to all who are working for an improved calendar.

In the Society's attitude toward a 12-month calendar of equal quarters it followed the conclusion reached by Commission 32 of the International Astronomical Union when it deliberated on the subject in 1922. he Union recommended a perpetual 12-month equal-quarter calendar on the 31, 30, 30 basis. Four years later, the Committee for Maritime Meteorology likewise favored the 12-month perpetual equal-quarter plan. The World Calendar thus rests on good scientific ground, which has been further strengthened by the endorsement given it by the American Association for the Advancement of Science and other American scientific groups.

Time for Change Now.

It is being said that this is not the time to change the calendar, when the world is in mortal combat and turmoil. Why should it not wait until after the cessation of arms and the post-war period? This can best be answered by the following:

Does a person who is ill, wait until a future time to be cured? No, he does not. When the commanding general of our armed forces discovered that the old system of counting clocktime by A.M. and P.M. led to confusion, did he wait until a more propitious time to adopt the better 24-hour system? No, he did not. When the armed forces discover that certain types of airplanes or instruments are outmoded and no longer the best to wage victorious warfare, do they wait for the end of the war to make improvements? No, they do not. When a business man or manufacturer experiences inefficiency and loss of production and earnings because of poor management or tools, does he wait for a future time to improve conditions? No, he does not.

When errors, loss of product or earnings, and waste of time and material are discovered, the causes are remedied immediately to bring desired results.. It is gross folly to do otherwise. No war is won by delaying improvements, and no success is achieved by clinging unwisely to outmoded patterns and systems.

Is At Variance

And now when ideas and ideals are directed toward greater world co-operation with the purpose of building a better way of life for all peoples, it is obvious that the Gregorian calendar is at variance with ideas and ideals. For, gentlemen, the Gregorian calendar has gathered unto itself the barnacles of imperfection for 2,000 years.

You will agree with me that no system, however imperfect, should be discarded until we are convinced that the contemplated change is really an improvement and will stand up under scrutiny and test. The new time-plan should be one that best meets all requirements and takes into consideration all conditions. It should be global in aspect because of our more closely knitted world and should, for the most part, function universally. The perpetual World Calendar has proved itself capable of meeting these tests.

Description.

In its mathematical structure it is well-night perfect. Of 12 months arranged into equal quarters of 91 days, each quarter is further subdivided into months of rhythmic 31, 30, 30 days, that total an even 13 weeks. Each quarters, beginning on Sunday and ending on Saturday, is a prototype of the completed calendar year that will always begin on Sunday, January 1, and close on Saturday, December 30 Every calendar unit—the day, date, week and month—is correlated perfectly at the end of every quarter—four times a year. This correlation among the various time-units is one of the outstanding advantages of The World Calendar. It is the basic structure of the newly well-planned divisible 364-day year.

The 365th Day.

To complete the year, however the necessary 365th day is placed on an extra Saturday, after Saturday, December 30. It is called the Year-end Day or New Year's Eve and is the new World Holiday, dated December W. This new holiday is as far-reaching in its benefit as was the leap-year day introduced into the Julian reform. And the leap-year day, the old February 29, becomes another World Holiday, placed on another extra Saturday—the Leap-year Day, June W. Thus the calendar attains stability, retains the familiar 12 months, and maintains the accurate length of the 365-day year with an occasional 366th day. Like the planets and stars that make harmony as they revolve in their spheres, so would the calendar make rhythm as it revolves within its time-units. Isn't it logical to assume that when a system is well-nigh perfect in plan, it will be well-nigh perfect in practice?

Within the new World Calendar are the one or two new World Holidays which, unique in observance, are bound to exert a unifying influence on all nations. In its physical aspect, the Year-end Day or New Year's Eve World Holiday, coming between a Sabbath and a Sunday, completes and seals every year as to its exact number of 365 days, 52 weeks, 12 months and 4 seasons. Thus there is present at the turn of every year no left-over of the old; the new begins with a clean slate, at scratch. The calendar ledger closes with the Year-end Day, December W, so that the ledger of the new year really begins with a new leaf.

Great Unifying Day.

In its broader aspect the new World Holiday, December W, becomes a great unifying day for all nations, peoples, races, governments and creeds. During its 24-hour-day observance, there will radiate a spirit of greater solidarity, of understanding, of amity and of good-will. Whereas Christmas is the great Christian day of peace, good-will to man, the new World

Holiday may become, as its name implies, the all-inclusive World Day of universal brotherhood and unity, without interference with existing feast days. It may well be a step in the fulfilment of the Biblical prophecy of the "tree of life that beareth 12 manner of fruits and yieldeth her fruit every month, and the leaves are for the healing of the nations." The World Holidays in their cumulative observance truly symbolize the healing leaves of nations.

Advantages.

Now let us contemplate for a few moments the direct advantages the new World Calendar will have on the war and home activities.

We have found that the exigencies of the war have already changed the clocktime to the 24-hour clock for the armed forces. The armed forces were quick to perceive the need of eliminating the confusion of the A.M. and P.M. method. In like manner, The World Calendar will permit greater precision, discipline, order and efficiency in the huge task of prosecuting the war, because of the better and more perfect correlation of all the various calendar units. We all know with what meticulous care war plans are blueprinted and carried out.

In one year the United States alone produced for the Allied armies 85 thousand planes, 60 thousand artillery weapons, 34 thousand tanks and almost 7 million small arms. These mountains of supplies piled up in North Africa, the Near East, India and Australia. And when the invasion of Europe is opened, the Army Service Forces will have the colossal task of supplying every item the invasion needs from tanks to safety pins. And closely following is the Dominion of Canada which has now become the fourth largest producer of munitions among the United Nations.

Important Function.

Entrusted with the responsibility of arming, feeding, clothing, fueling, transporting and healing the Army, and burying its dead, is the important function of the Army Service Forces. It is this perfect and all-embracing planning, which correlates these various functions, that the Military calls logistics. This service in the United States is under the direct supervision of Lieutenant-General Somervell, who has said: "Good logistics alone cannot win a war. Bad logistics alone can lose."

Therefore, what the general has said of logistics applies to the loose and slipshod methods of the Gregorian calendar. It has no plan, the various time-units are in constant disagreement, and it is certainly "bad logistics." Our present calendar is costly and wasteful. It no longer efficiently serves the demands of war nor the needs of the civilians at home.

Advantages to Civilians.

While conditions on the home front are obviously different, they, too, would be greatly aided by an improved time-plan. Consider the difficulty of the manufacturer, the industrialist, the employer and also the wage earner in figuring out how many week-days or how many time-and-a-half or double-time days are in a month Here the Gregorian calendar plays havoc with the best laid plans. Some months have four Saturdays and Sundays, thus less time-and-a-half and double-time wages are paid, whereas in months having five Saturdays and Sundays extra time-and-a-half or double-time must be paid. When quarter-years vary in their lengths of days such as 90, 91, 92, 92 (this year being a leap year, 91, 91, 92, 92) additional inconvenience is encountered. All this inconsistency sabotages valuable energy, time, labor and money.

Examples of Sabotage.

I should like to point out certain specific examples of the sabotage that besets almost every type of business. In 1942, Christmas came on a Friday. Newspaper publishers and their circulation-managers were at their wits end. The publisher did not know how many columns of news and advertising to anticipate for the Saturday after

Christmas, because he did not know how many stores were going to open on Saturday and how many were going to stay closed. The circulation-manager was equally as frantic, because he did not know how many papers he would be able to sell, since he had no idea whether people would go to business, stay at home and rest, or go away for a three day weekend. In consequence of all this, one New York newspaper, with a circulation that exceeds one million, discovered not only that their advertising lineage was off 65 per cent, but that they had overprinted 80 thousand papers. These were returned as useless waste. Had the perpetual World Calendar been in existence, with its regular order and agreeing days and dates, past records comparable from year to year would have better indicated the number of columns to print, the number of papers to publish.

With the constant wavering of the Gregorian calendar, October in 1942 had five Saturdays; and in the previous year, October had four Saturdays. There was thus a 25 per cent adjustment in Saturday's figures alone. In 1943, in the United States, a further adjustment had to be made in that month because the Columbus holiday, October 12th, which was celebrated on Mondays the two previous years, was celebrated on a Tuesday. And we all know a Monday holiday means a long weekend for many prospective store buyers.

Here is a more detailed example: the case of a well known electric utility company that produced 220 million kilowatt hours in January, 1936, as compared with 258 million in January, 1937. This shows an increase of 17 per cent, but we discovered that January, 1936, had an extra Saturday and Sunday on which the day's output is naturally less than on weekdays—30 per cent less on Saturday and 75 per cent less on Sunday. Making allowance for this extra weekend, the rate of increase became 21.5 per cent instead of 17.3 per cent.

On Opening Schools.

For education, the general custom to open schools in the United States is on the Tuesday after Labor Day. With Labor Day fluctuating from September 1 to September 8, the irregularity of the opening dates for schools, year after year, is most inconvenient. Under the New York state laws, I don't know what the laws are in Canada, a school year must include one hundred and ninety teaching days to participate in the state school funds. The 190 teaching days cause difficulty when, for example, the school year opens on different dates each year. The first half of the year ending on January 25 contains 91 school days, whereas the second half ending on June 21 contains 95 school days. These so-called half-years, or semesters, are far from equal and even, their internal arrangements are quite dissimilar. It is readily seen what a nightmade the Gregorian calendar is and how it causes all kinds of difficulties for the faculties and students in arranging schedules and vacations.

Wandering holidays add to the general confusion and uncertainty. Families are all too often separated at the vacation periods because these are observed differently in grammar and high schools, colleges and universities. And farmers who depend upon the help their sons and daughters can give them during vacations are at a loss to calculate these, because they change from year to year. With the perpetual World Calendar the regular schedule of holidays on agreeing days and dates will do much to smooth the way for educational, social, commercial and welfare activities.

Question is Raised.

The question arises, with the mention of holidays, as to how the one or two new World Holidays will be treated throughout the world. It is natural to suppose that the various nations will place these new holidays in the same category as their other holidays and maintain them on the same economic status. Each country is free to decide this question according to its accepted custom and legal requirement.

That the defects of the present calendar are recognized as serious detriments are clearly seen in the notable endorsements given the World Calendar by the three groups of Chambers of Commerce in England—the London, British and Empire—and by other Chambers in the United States such as the New York State, the Chicago Association of Commerce, the Pittsburgh, St. Louis and Galveston Chambers. In the labor world, the Labor Conference of American States in Chile, 1936, approved it and in the same year the International Labor Office also recogniged that "the present calendar is very unsatisfactory from economic, social and religious standpoints and that recent studies, investigations and reports have shown that there is a marked trend in favor of revision." It thus recommended that the League of Nations study the whole question. In the educational field, the United States National Education Association and the World Federation of Education Associations also favored a world calendar.

To [illegible]rd the last quarter of the 19th century when travel on Canadian, United States and inter-European railroads was more general, some kind of uniformity in clocktime became increasingly urgent to avoid endless confusion and misunderstanding. I refer to Standard Time.

Credit to Canadian.

To a Canadian, Sanford Fleming, has generally been given credit for the idea in 1878 that a series of 24 time belts, each of 15 degrees, should circle our globe. However logical and practical, it did not win favor until in 1883, the railways in Canada and the American Railway Association took the initiative in adopting the new Standart Time. A conference held in Washington a year later brought the rest of the civilized countries into the fold, and it became international in use. The world was now more closely co-ordinated by the regular 24 time zones that brought order and stability to the clock throughout the world. It was instrumental in making the remarkably efficient and smooth performance of radio, easier.

There are others, however, who have contributed toward the principle of Standard Time —notably in the United States, Charles Ferdinand Dowd. In 1872, he published a system that is identical with the Standard Time meridians in use today. Newspapers in the United States in 1883, carried interesting accounts of the history of Standard Time and laid great emphasis on the work done by Mr. Dowd ever since 1869.

Gentlemen, there is usually more than one person to whom credit is due. In this instance, Canada and America are justly proud to give credit to two of their citizens for having provided mankind with the superior Standard Time system.

To Another Canadian.

And this naturally leads me to give credit to another Canadian (by adoption), Moses B. Cotsworth. He contributed greatly in awakening the interest and showing the need for an improved calendar. His work was most valuable. Although his particular 13-month calendar plan has been discarded, as not being the best, every calendar reformer gladly pays tribute to him. He and his associates did the hard spade work which prepared the ground for the superior, more balanced and equalized calendar of 12 months and equal quarters — the World Calendar.

Today with the present war, international communication and transportation by airplanes are expedited and increased everywhere, forming the world into one large organized body. No place on the globe is more than 6 air hours away. The uniformity of the calendar, as ordered and stabilized as Standard Time, becomes imperative. A perpetual new calendar, every year the same, and eventually in use throughout the world, is the natural complement to Standard Time.

Is it too much to hope that, in following the example of adopting Standard Time, Canada and the United States will again join in taking the initiative by adopting another time-measure —the World Calendar?

Opposition.

No improvement, however good, has been accepted without some opposition, and changing the Gregorian Calendar is no exception. Certainly the scientific group has suffered much persecution and opposition in its many achievements. We need only to recall Ptolemy and Tycho Brahe, Copernicus and Galileo, and of more recent date, Bell and Edison, Pasteur and Madame Curie, who though derided and hindered in their sincere efforts to benefit mankind, yet eventually achieved their goal.

Probably the greatest opposition to the World Calendar comes from certain religious orthodox groups. Their objections to the World Calendar arise from the fact that they see in the extra World Holidays an eight-day week, which violates their tradition of "the unbroken continuity of the seven-day week since time immemorial." This alleged concept is not justified by historical fact. For it is known that in the ancient Israel calendars there have been three different calendars employed at different times and that the revisions of the calendar were "in all likelihood, of a thoroughgoing nature."

Years of Conjecture.

Between the Biblical creation of the World and the days of Moses are untold years of conjecture and unproved theory. Even after the days of Moses it is generally conceded that the method of time-keeping was changed and altered. Later even, when the Christians changed the ancient Sabbath to Sunday for their day of worship, in commemoration of the first day of the week when the Lord rose from the dead, Christians all over the world at that moment of change experienced an eight-day week—the interval between the Sabbath of old and the Sunday, the new day of observance. We can not accept such an arbitrary attitude that enslaves man to the past but rather seek open-mindedness and response to normal progress and development.

Here I am reminded of the story of Lot's wife, a sad commentary of all those who, looking backward, stand still. The most notable historical example of opposition to change is, perhaps, that of the fiery zealot, Saul of Tarsus, who, waging incessant war against a new religion, became blinded by his zeal. Notwithstanding this, when light and wisdom came to him, he became its foremost leader. So may we hope for the World Calendar with its one or two World Holidays, that those who come to oppose will remain to approve.

The real fallacy of orthodox objection is that it does not recognize the World Calendar as a civil calendar. In revising the calendar it is not the intention to interfere with religious feast days and ritual. The Vatican in 1912 recognized this in a statement, and I quote:

"The Holy See declared that it made no objection but invited the civil powers to enter into an accord on the reform of the civil calendar, after which it would willingly grant its collaboration in so far as the matthe affected religious feasts."

Among some of the religious endorsers for the World Calendar are the Protestant Episcopal Church and the Methodist Council of Bishops in the United States; the Universal Christian Council for Life and Work at Geneva, of which the Federal Council of Churches of Christ in America is a member. The former Archbishop of Canterbury, in a debate on the calendar before the House of Lords, 1936, declared: "I have found it impossible to resist the plea for reform. . . . I think it would be a real misfortune if this matter were allowed to drift." And the Vatican has stated there exists no insurmountable obstacle to calendar reform.

Adoption.

The question of adoption now becomes all important. The opportune moment to put any new calendar into operation is at that particular time when the day, date, month and year coincide in both the old and the new calendars. By that simple method the transitional year of confusion (when the Julian year became operative), and the dropping of 10 days (when the Gregorian calendar became effective), will be avoided.

Allow me to refer you to our good friend, H. W. Bearce, chief of the Division of Weights and Measures, National Bureau of Standards, United States Department of Commerce. He has compiled the suitable dates as follows:

Begin Year on Sunday.

By transposing Sunday, December 31, of this year 1944, to the extra Saturday, Year-End Day or New Year's Eve, December W, the World Calendar will begin the new year on Sunday, January 1, 1945. In Mr. Bearce's opinion there is another good date, Sunday, July 1, 1945, identical in both the Gregorian and World Calendars. The transition on that day, date, month and year, too, would be extremely simple.

To make the calendar change in the mid-year, on the first day of its second half-year, has the additional advantage for the United States government in that it would coincide with the beginning of the fiscal year. The first real change after the adoption would be felt at the end of August when there would no longer be a 31st of August, and at the end of the year when the first Year-End Day, or New Year's Eve, the extra Saturday, December W, replaces the old December 31. The year 1946 would then begin on Sunday, January 1, and on the same day and date every year thereafter.

Other similar dates available, although not as advantageous, are Friday, March 1, 1946, and Wednesday, May 1, of the same year. Obviously to make the calendar change on a weekday has certain disadvantages that are absent in the other two dates mentioned. Then will follow the lean years, 1947, 1948, 1949, when no beginning of a month coincides with that of the World Calendar. The next possibility would be Sunday, January, 1, 1950.

In the face of all the advantages which I have stated and all the hardships we shall have to endure, I believe the delay has no justification and would prove lamentable. Apathy and indifference have no place in better planning for our modern world.

As the scientists of the old and the new age have ever stood in the foreground of new truths and progress, so may you today uphold their standard by approving and endorsing **the perpetual World Calendar.**

Plan Is Ready.

In the ardent desire and wish to organize and bring the world to saner, healthier and more wholesome conditions, your group can do no better than to sponsor the World Calendar—a plan that is ready at hand, that has been endorsed by 14 nations — (Afghanistan, Brazil, Chile, China, Esthonia, Greece, Hungary, Mexico, Norway, Panama, Peru, Spain, Turkey and Uruguay)—and many international and national organizations.

For the Royal Astronomical Society of Canada to study and endorse the World Calendar would in all probability lead to similar action by the Royal Astronomical Society of London, of which the Royal Astronomer, Sir Spencer-Jones, has so splendidly given his approval. And in my own country, the American Astronomical Society and notably the National Academy of Sciences in Washington will certainly wish to take action.

We stand on the threshold of changes in all ways of life among which belongs unquestionably the World Calendar. For Time to be really a healer, and we certainly have need of it in these catastrophic days, Time itself must be healed through its instrument the calendar, and aid in greater world co-operation, order, balance, stability and above all—unity.

World Calendar Reform Pre-Postwar Objective, Noted Visitor Declares

CALENDAR REFORM—Mr. Emerson Brewer, director, and Miss Elisabeth Achelis, president of the World Calendar Association, who arrived in Ottawa last evening. They hope to impress on Dominion officials the need of calendar reform. Miss Achelis will address members of the Royal Astronomical Society of Canada this evening at the National Museum.

—Photo by Newton.

Calendar reform has cost Miss Elisabeth Achelis of New York about $35,000 per annum for the past few years, but her enthusiasm as president of the World Calendar Association has never waned.

In Ottawa to impress the need of calendar reform upon Dominion government officials whom she will visit today, and members of the Ottawa branch of the Royal Astronomical Society of Canada whom she will address this evening at the National Museum, Miss Achelis last night said:

"The world calendar is a pre-postwar objective, because not only does winning the war necessitate improved logistics, but greater efficiency, greater economy and more careful planning after the war is won. Such things are not as likely to come about while the world uses a calendar that wavers from month to month.

Miss Achelis is a happy woman. She's happy to be in Ottawa, although disappointed that she will be unable to see Prime Minister King today. It's her first visit here and she's impressed.

Unite for Major Role.

"I hope Canada and the United States will unite to play a major role in selling the new World Calendar idea to the rest of the world, just like they did with daylight saving and other measures," she said.

The World Calendar is designed chiefly to do away with the inequalities of the old and next year would be the ideal time to adopt it because then the world can pass from the old to the new system without a break. The idea has the backing of Sir Spencer Jones, British Astronomer Royal, and a long list of United States notables.

To show how the present calendar "wavers," Miss Achelis pointed out that there hasn't been a calendar identical with that of 1944 since 1916—28 years ago.

"That is indicative of how much difficulty is encountered with the old calendar by anyone who wishes to do an adequate planning job," she said. "And we are going to need long term planning after this war."

The change-over to the new calendar would cause the minimum of dislocation, because dates and periods are comparable.

How Calendar Works.

"It works something like this," Miss Achelis explained:

"The modern calendar is based upon the solar year of 365 days with an extra day inserted or 'intercalated' every four years.

"What we felt was needed was a stable, well adjusted, calendar with equal quarters — and as nearly equal months as the number 365 will permit. The nearest equal number is 364 so that is the one chosen. With 364 as the base the year is divided into four quarters of 91 days each. The 365th day is set aside and on that day, the calendar, so to speak, takes a holiday—and so may everyone.

"This yearly holiday is an extra Saturday, called 'Year End Day' and always falls on 'December W,' the day after the 30th of December."

The new calendar is on the familiar basis of a 12 month year, there is no sharp unnatural break of habit. The first month of each quarter contains 31 days, the other two 30 days each. There is then a pattern for the quarter, 31, 30, 30, repeating itself regularly four times yearly. This gives January, April, July and October 31 days each, the other months having 30 days each.

Common Sense Move.

The next move of the World Calendar Association, she said, was a commonsense one, to have every year and consequently each quarter begin on Sunday, the first day of the week. This meant that the same date of the month would come on the same day of the week every year—a boon, if there ever was one, to business and industry.

The national holidays under the new plan could be arranged to come on Monday's, thus producing desirable long week-ends. Christmas would fall on Monday every year.

Finally, the association deals with another intercalary day to be reckoned with—Leap Year day existing in the present calendar on February 29 once every four years. This day coming once in four years, represented an approximate adjustment to take care of the extra five hours, 48 minutes and

46 seconds that astronomical calculation shows to be in excess of the solar year over an exact 365 days. The World Calendar places Leap Year at the end of June in the middle of the year, balancing the calendar. Again, like December W it is an extra Saturday and a world holiday called 'June W' (or the 31st).

Logical Year.

"The year 1945 is the most logical year to put the new calendar into effect because in both the present and the new world calendars, December 30, 1944, falls on a Saturday. If the following day is designated as an extra Saturday (the first world holiday) civilization would then be ready to initiate the new year and the new time pattern with Sunday, January 1, 1945.

"Truly then, we should and can have, a new calender for a new world," Miss Achelis said. "Industry, labor, the government, law, retailing, agriculture, finance, science, education, home, religion, and all world peoples, should advance under the new simplified system."

"There is no effort to change the basic units of the day, week, month or year, as used in the present calendar. It is merely an improved, scientific budgeting of the time units to which the world is accustomed. It is the civilized, logical grown-up calendar of a progressive new world."

"If it is adopted we shall have, for the first time in human history, a calendar that correlates all the different time units, day, week and month—all three coming together at the end of every quarter."

Over

On Streamlining The Cal

A new book, "The Calendar for Everybody," by Elisabeth Achelis, s… form the advantages of the World Calendar.

It is more than six thousand years since the first calendar based on the solar year was invented. This was the Egyptian sun calendar, which came into being about 4236 B.C. It was an epochal achievement, and it brought some sort of order out of chaos.

Then came the Julian calendar in 45 B.C., so called after Julius Caesar. This one really got down to business, and it is still the basis of the style and nomenclature of the present calendar. Next, Pope Gregory XIII introduced the Gregorian calendar in 1582. He reorganized the Julian calendar. Because of religious differences it was nearly two hundred years before some countries accepted the Gregorian calendar. But it is the Gregorian calendar that is in use today.

What will be the next calendar to be adopted? Unquestionably, it will be the World Calendar, and if we are logical it will be introduced in 1945, when the change can be conveniently made. But men are not logical and are slow to move in such matters, so it may happen that the opportunity will be missed. The next convenient year would be 1950, but to wait until then would be an unjustifiable delay.

* * *

In this book, Elisabeth Achelis tells in simple and attractive language the many advantages of the World Calendar. She is the founder of the World Calendar Association, which has been in existence since 1930. Since then she has worked unceasingly and travelled far for calendar reform, done much to checkmate the inferior 13-month calendar, and today has the satisfaction of being able to say that the adoption of the World Calendar is a foregone conclusion.

Why should we adopt a new calendar? Because it is time we modernized our civil calendar and brought it into tune with the times. The present one is full of drawbacks and eccentricities. The World Calendar will give us the most perfect time measurement yet devised.

The outstanding virtue of the World Calendar is that it will make every year the same. The quarters are of equal length. Each quarter begins on Sunday and ends on Saturday, and contains 3 months, 13 weeks, 91 days.

Every year begins on Sunday, January 1, with the World Calendar, and every year is comparable to every other year. What is of the utmost importance, as Miss Achelis points out, is that days and dates always agree. This means that significant dates become significant days. For example Pearl Harbor (to take a recent significant date) was attacked on a Sunday. The Japanese deliberately chose that day for special reasons. Had the World Calendar been in use in 1941, the anniversary of Pearl Harbor would always fall on a Sunday instead of wandering all over the week as now. This year, for example, the anniversary falls on Thursday.

* * *

The 365th day necessary to complete the year and the 366th day in leap years, hitherto called supplementary days, are known in the World … new World Holidays. T… the much-needed stab… year is like every othe… gins, as stated, on Sun… year also closes with… December W, a World … extra Saturday. The 3… is the new Leap-Year… year, thereby keeping… and equalizing the ha… another World Holi… June W. In this si… calendar unit fits … quarter, bringing co-o… known.

A fixed Easter ha… times in the past. … wandering festival. … March 24; in 1943 … month's difference. … April 9, which is "ju… World Calendar woul… as Easter each year, a… method of having it f… after the first full m… after the spring equin…

But Easter is a f… the religious life of m… stabilize it rests main… authorities. If the ch… to a stable Easter, it… arguments for reform… World Calendar can … fixed Easter, since it … as Miss Achelis says, … on a fixed Easter wo… earth and good will … fulfillment."

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In civil life, the … would bring many in… but one phase of civi… —the World Calenda… task substantially. … begin always on the … would materially sim… statistics. The recor… income taxes, interna… and interest paid or … easily computed. An… ernment department… ate quarterly financi… vantage of the Worl… equalized quarterly c… The same considerat… other branch of mod…

Miss Achelis feels … of the new calendar. … tribute towards maki… ing life more beautif… lowmen happier." A… one begins to catch th… one's-self.

("The Calendar … Elisabeth Achelis; … 141 pages; $1.50.)

(Miss Achelis will … Calendar" at the Nat… nesday night of this … auspices of the Ottaw… nomical Society of … The lecture is free to…

Origin (

By MOS

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Built For Accuracy

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to 29th of February,
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Origin Of Leap-Day

By MOSES B. COTSWORTH.

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great pyramid was the most
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Built For Accuracy.

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ates equivalent to our 27th
h of February, the high
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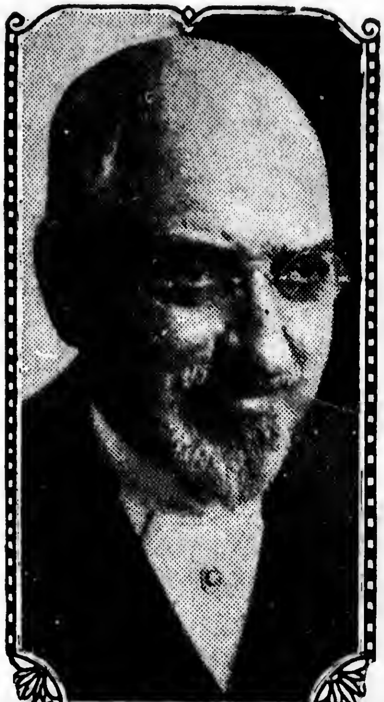

MOSES B. COTSWORTH

their sacred rod on the meridian floor, like the native calendar makers of Borneo now do.

The measuring rod used by the great pyramid priests was not less than 4-feet long, because the shadow's length on February 28th was 4 feet shorter than it was on Feb. 27th. They found that the shortest shadow's length in every year could be measured on that white 4-foot rod, and that during each of the three successive years the shadow lengthened yearly one foot more, and that 365 days were counted between each of those 3 years.

Next they made the important discovery that at the end of 4 years their day-count amounted to 366 days instead of 365, and that the noon shadow leaped back to less than its length 4 years before. Therefore if the Leap-year's shortest shadow at noon measured 1-2 a foot, that for the first of 3 years was 1 1-2 feet long; the second 2 1-2 feet; the third 3 1-2 feet, but in the fourth year the 365 day's length was 4 1-2 feet and reached beyond the 4 foot rod. Then next day was Leap-day when that 366th day counted in as its shadow leaped back 4 feet, to less than half a foot in length. That was visible evidence of the need to then insert Leap-day.

If the pyramid's pointed apex had not since been destroyed, together with the casing-stones which originally formed the perfect shadow slope, that evidence would now be completely visible on February 29th. The reality of that phenomenon is nevertheless borne out by photographs of the shadow changes I had taken last February and which I am having taken this year on Leap-day and March 1st. That was the ancient Egyptian Leap-day. because Augustus Caesar moved the Roman Feb. 29th to make his August 31st.

Cuts Off the Shadow.

The great pyramid's slope of 52 degrees now yearly cuts off the shadow on March 1st when the sun peeps over its apex, 484 feet high, and shines down the slope without making any noon-shadow until October 14th, when the noon-shadow reappears because the lower sun is then behind the apex. Those dates, March 1 and October 14, were not so numbered in the ancient Egyptian calendar, but are the dates in our calendar to which the dates in the old Egyptian calendar correspond.

It is significant that in the present Coptic calendar of Egypt, the 14th of October is recorded as the date when "The general cultivation of lands begin." No less impressive is the fact that March 1 is denoted as their first day of spring, when trees and shrubs show their first budding signs.

These two season-finding dates were of the greatest importance in Egypt. It was only after many trials in building pyramids that their designers at the great pyramid fixed its slope at 52 degrees, as the basis of what later proved to be their successful experiments in finding the true length of the year, by use of the Leap-year measuring of the pyramid's shortest shadow.

By that means was provided their double checks on their Sun-god's yearly progress through his seasons, which enabled them to direct in advance the agricultural and other affairs of all Egyptians throughout each year, to establish permanent prosperity for their rulers and people.

Those early astronomers not only kept that most valuable calendar knowledge secret from other nations, but from all outside the priesthood, by never inserting Leap-day in their public calendars. That kept a mighty weapon in priesthood hands, until Julius Caesar conquered Egypt and wrung from Sosigenes, the Egyptian astronomer, their vital secret that the Leap-day insertion was only made in the controlling calendar used by the priests on the 10th, 20th and 30th days of each month, to declare to the people what agricultural and so forth operations must be done during the next ten days.

By Order of Caesar.

Julius Caesar's adopted rule invariably inserted a Leap-day in every 4 years. That was too much because nature's year is only .24 of a day longer than 365 days,—not .25 of a day longer. That fractional difference caused an excess of 10 Leap-days to be inserted before Pope Gregory's reform of the calendar in 1582. Pope Gregory established his rule whereby three Leap-days are omitted during every 400 years.

The reason why we insert Leap-day as February 29th is, that the pyramid's shadow by its 366 day count indicated Leap-day. News of that fact enabled the Roman king. Numa, in 713 B.C., to end future years on February 29th.

Again, when Julius Caesar reformed the Roman calendar in 46 B.C., he for the same pyramid reason ended his Julian calendar on February 29th.

Thus the young ladies who hail Leap-year as an open season for capturing husbands, may give thanks to the priests of ancient Egypt for discovering that we cannot have a true calendar without inserting the Leap-day, which confers on them the right to exercise their privilege throughout each 4th year.

New Incorporations

The following new incorporations are included in the list in the current issue of the Canada Gazette:

Silveradium Mines Syndicate, Limited, 1,500 shares, n.p.v., Toronto, Ont.; Mackey Signal Co., Limited, $30,000, Ottawa, Ont.; the Fulton Co. of Canada Limited, 5,000 shares, n.p.v., Toronto, Ont.; Sterling Automotive Products Limited, 40,000 shares, n.p.v., Niagara Falls, Ont.; Shell Petroleum of Canada, Limited, 500 shares, n.p.v., Toronto, Ont.

TEN MILLION DOLLARS WORTH OF JEWELS displayed by model Mara Byron at a preview of a United Hospital Fund art project in New York. On her forehead is the Hope diamond, 44½ carats. Pear-shaped diamond earrings are 30 carats each. Necklaces, from top to bottom, are Earl of Dudley emeralds, the Spanish Inquisition period emerald and diamond necklace and, attached to a diamond necklace, the 100-carat Star of the East diamond. Flanking the latter are two pear-shaped largest perfectly matched twin diamonds in the world totalling 100 carats. Below the Star of the East is the 26-carat Jonker diamond. On right arm is the largest sapphire in the world, 337 carats. On third finger of right hand is marquise ring, over 40 carats. On left arm is 100-carat diamond bracelet made of diamonds from Gary estate. On third finger left hand is the 60-carat Mabel Boll ring and on small finger the 35-carat McLean ring.

Jean Richard Gets

'Petticoat Fever'