Correspondence.

Wooden Buildings of San Francisco.

To the Editor of the Scientific Américan:

Permit me to say a few words in correction of a misapprehension as to our buildings which seems to prevail on your side of the continent. In speaking of the fire in San Francisco in your issue of May 12 (delayed in transmission), you several times allude to the "intense heat" of burning redwood. As a matter of fact, we do not build our dwellings or other wooden buildings of redwood, but of what is known in the trade and commonly called Oregon pine, though it is not pine, and most of it comes from Washington. It is the Douglas spruce with some yellow fir, which is universally used on this coast for construction purposes. In an ordinary dwelling the frame, joists, floors, furring, lath, etc., is all spruce or fir, only the weather boarding and shingles are redwood for the reason that they stand the weather better and are much less inflammable. As for the "intense" heat that came from the burning redwood, it is about the poorest firewood we have. A large building of wood like the Pleasanton or Bella Vista hotel, with a diagonal pine sheathing under the weather boarding, is about eighty per cent pine, arranged in the most favorable manner to produce an intense heat, and I have often commented on the risk of such construction. Redwood is too expensive and does not possess the strength necessary for buildings, while the spruce we use is as strong as eastern oak and much cheaper than redwood.

Henry S. Durden.

San Francisco, Cal., May 22, 1906.

A Perpetual Calendar.

To the Editor of the Scientific American:

Some notes and queries in recent issues, discussing the above topic, with the object of rendering us independent of the almanac makers, tempt me to describe a mental date finder of my own, employed by me for many a year past.

The calendar is based on a fact that gave me some little pleasure at the time of its discovery, namely, that Independence Day, as well as the 4th of the 4th month in any year, the 6th of the 6th, the 8th of the 8th, the 10th of the 10th, and the 12th of the 12th month, always fall on the same day of the week.

In 1906 this starting point happens to occur on a Wednesday. Consequently, should the difference between any date in April, June, August, October, or December, 1906, and its month be 0 or a multiple of 7, that date must necessarily be a Wednesday also. For other months a slight correction is requisite, but the adjustment numbers, where such are needed, can easily be memorized from the following simple table:

Months.		Correction for ordinary years.		For leap years.	
1	2	2	5	3	6
3	4	4	0	4	0
5	6	4	0	4	0
7	8	4	0	4	0
9	10	3	0	3	0
11	12	3	0	3	0

The interpretation of which is that in May, June, and July, for instance, 4, 0, and 4 respectively must be added to the month before subtracting from the given day of that month. A remainder, then, of 5 would mean that the date in question, assuming we are still dealing with the year 1906, falls on a Monday (i. e., five days after Wednesday). Similarly a —5 resultant would represent a Friday.

The process of ascertaining the relation of a date in one year to the corresponding date in another has already been explained in your columns. It involves the addition of intervening leap years to the difference between the years under consideration.

To express these conclusions algebraically:

Let $d =$ the day of the month.

$m =$ the number of the month.

$c =$ the correction figure for the month m.

$D =$ the day of the week relatively to that of Independence Day of the year y.

$I\,y =$ the day of the week on which Independence Day falls in the year y^1.

$l =$ the number of leap years between y and $y \pm p$.

$p, q, r =$ any integral numbers.

Then

(1) $d = \overline{D - I\,y} + m + c \pm 7\,q$

gives the days of the month in any year on which a named week day falls.

(2) $a.\ I\,\overline{y+p} = I\,y + p + l \pm 7\,q.$

and

(2) $b.\ I\,\overline{y-p} = I\,y - p - l \pm 7\,q.$

Supply the relation of the radical or Independence Day of the year y to other years.

(3) $d/m/y = I\,y + d - \overline{m+c} \pm 7\,q$

gives the day of the week, relatively to the day on which Independence Day falls in the year y.

Or generally:

(4) $d/m/yr = I\,y + d - \overline{m+c} \pm (yr \sim y + l) \pm 7\,q,$

using the positive sign of $(yr \sim y + l)$ when yr is a year subsequent to y and the negative sign for anterior years.

A few examples may be given by way of illustration, starting from $I_{1906} =$ Wednesday:

1. Which dates in May, 1906, are Fridays?

In formula (1) $D - I_{1906} = 2;\ m = 5;\ c = 4;$

$\therefore d = 2 + 5 + 4 \pm 7\,q$

= the 4th, 11th, 18th, and 25th, May, 1906.

2. Give the days of the week for Independence Day, 1951 and 1776.

From formula (2a) I. D. 1951 = Wed + 45 + 11 — 56 = Wednesday;

and from formula (2b) I. D. 1776 = Wed — 130 — 30 + 161 = Wed + 1 = Thursday.

3. 1.12.06 from (3) = Wed + 1 — 12 + 0 + 14 = Wed + 3 = Saturday.

4. 30.9.1910 from (4) = Wed + 30 — 9 + 3 + $\overline{4 + 1}$ — 21 = Wed + 2 = Friday.

5. 24.1.07 from (4) = Wed + 24 — 1 + 2 — $\overline{39 + 9}$ + 28 = Wed + 1 = Thursday.

I venture to think that these methods are simpler, for the purposes of mental calculation, than the others which have hitherto been discussed.

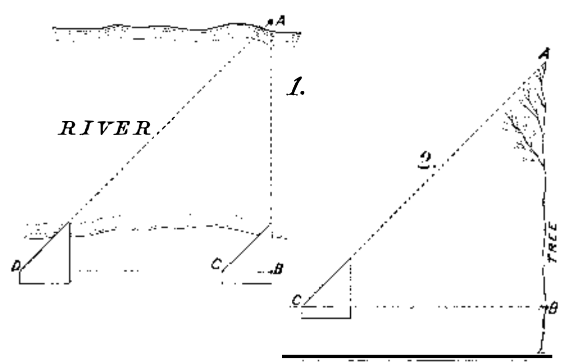
A. H. C. Hamilton,

Allahabad, India. Barrister at Law.

Simple Surveying.

To the Editor of the Scientific American:

I beg to submit to you another simple method for measuring the distance across a river or between two points. For the first purpose, select an object on the opposite bank of the river, as at A in the accompanying drawing, Fig. 1, and at B, on the side of the river at which the observer is stationed, place a page of the Scientific American folded, as shown, into a right-angled triangle with the right angle at the point B and one side coinciding with the line from B to A. A leaf of a note book or other sheet of paper is, of course, also available, and the folded sheet forms a right-



angled triangle having acute angles each of 45 deg. The observer now moves along the bank of the river with the paper triangle in the direction of a line formed by an extension of the side $B\ C$ until a point, D, is reached where one side of the triangle coincides with the line from B to D and the hypotenuse coincides with the line from D to A. $D\ B$ will then be the equal of the distance from B to A. To ascertain when the observer has arrived at D it is necessary to sight along the hypotenuse of the triangle toward A and along the side of the triangle coinciding with the line, $D\ B$, to insure that the latter side still coincides with the line from B to D.

To measure the height, for instance, of a tree, the observer first marks the height of his eyes upon the trunk at B, Fig. 2, and then walks away to a point, C, carrying the paper triangle with him, where the lower side of the triangle coincides with the line from C to B, while the hypotenuse coincides with the line from C to A, the top of the tree. The observer sights along the hypotenuse and a side of the triangle as in the first case. The distance from C to B plus the height of the observer's eyes above the ground is the height of the tree.

W. F. Davis.

Osborne House, Victoria, B. C.

Fireproof Building Construction.

To the Editor of the Scientific American:

Will you allow me the courtesy of your columns to reply to the letter (published June 2) of your correspondent, A. Mayn, who seems to be under the impression that a steel and iron structure would be fireproof?

I should like to emphasize the fact that unprotected steel is not fireproof, although it would seem that this should now be generally known. In the handbook "Fire-Resisting Design," published by the Home Insurance Company, the writer says: "The vital point in fireproofing is unquestionably the proper protection of the structural members against the combined action of fire and water. A building in which the iron and steel work, although heavy, is improperly or entirely unprotected, may prove relatively weaker than a much lighter form of construction in which proper regard has been shown this feature." Also in the Building Code of the National Board of Fire Underwriters it is recommended that "iron or steel columns be protected with not less than four inches of hard-burned brickwork, terra cotta or concrete." The building code of the city of Cleveland, Ohio, says: "Coverings for columns shall be of not less than eight inches of brick or four inches of semi-porous terra cotta."

It is obvious, therefore, that there is a consensus of opinion as to the need for protecting all the structural steel of a building. In the Baltimore fire steel columns, protected by terra cotta, suffered but one or two per cent damage, while unprotected columns buckled and collapsed, bringing down floors and partitions. The report of the committee of the National Fire Protection Association on this conflagration says: "Structural metal work must all be properly protected so as to withstand successfully the effects of severe heat."

Mr. Mayn's question, "Why not use steel and iron only?" is answered by the above. Such a structure as he suggests would be earthquake proof, but would have no chance of surviving the intense heat generated in a great conflagration. In fact, the tendency is now to do away with steel or metal as far as possible. This has recently been shown in the construction of the new Custom House in New York city. The huge dome in the center of the building is built entirely of hollow tile, with hollow tile supporting ribs instead of steel. Not only is the dome self-supporting, but it also carries the 140-ton metal and glass skylight top. The stairways are also built of hollow tile in the form of Guastavino arches with no metal or other support. Similar forms of construction are to be seen in the domic ceilings of the Gorham and Tiffany buildings of this city. The absence of steel and iron in these domes, ceilings, and stairways makes them the most fireproof of any form of modern construction.

New York, June 1, 1906. Ivy L. Lee.

Water Tanks on Buildings Shaken by Earthquakes

To the Editor of the Scientific American:

In the Scientific American of April 28 you have an article on earthquake-proof construction, in which you say: "Moreover, the ability of the fire department to cope with such local outbreaks would be greatly assisted by an elaborate provision of an independent fire-service tank, of extra large capacity, at the top of every building."

In relation thereto the following inquiry arises: When a sky-scraping structure is rocking like a cradle, with an occasional short jerk like a boat in a chopped sea, what is going to become of your extra large tank of water on top of the building, where people are being hurled bodily out of their beds and are stopped by the hard wall of the opposite side of the room, tossed hither and thither like a helpless babe? I imagine that the water in the extra large tank on the top of the rocking building would slop over; or the whole affair, weighing many tons, might come down, carrying everything before it to the basement. You might correspond with Messrs. Woodward & Lathrop as to the large damage they suffered on account of a slight mishap to a water tank on their building. The accident occurred some years ago. I also saw an iron stair-case carry everything before it to the basement.

I think that heavy tanks, even under ordinary circumstances, when placed on buildings are a great risk; in a severe earthquake they would be fearful engines of death and destruction.

I believe that in tall buildings no cornice or trimming work should be allowed except light metal securely riveted to the structural frame of the building. For earthquakes are liable to occur anywhere on earth, and should be considered as a risk.

Seismographs indicate an almost continuous trembling or vibrating of the earth's crust.

I believe that steel tanks of extra large size should be placed in the basements of large buildings, or in the streets, so as to enable the firemen to operate even when the water mains cannot be made to furnish water.

I said steel tanks, advisedly, for there are instances where heavy blasts of dynamite have cracked cisterns miles from the place where the explosion occurred. So in order to guard against seismic disturbances, the underground cisterns should be built of steel imbedded in cement. Now, in case it is desired that water be thrown to the tops of buildings, another tank buried nearby (possibly underneath the water tank) could be so charged with compressed air or other gas (on the principle of automatic fire extinguishers) as to force the water to the desired elevation.

The compressed-air chamber would be thrown out of action if the connection between the tanks were destroyed, so that possibly the safest plan would be to construct the two as one tank with partitions.

Doubtless many millions of dollars' worth of property could have been saved in San Francisco had there been steel cisterns buried at frequent intervals, where the fire engines could have obtained water.

John W. Jones.

Washington, D. C., May 4, 1906.