

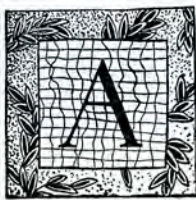
## COURTSHIP AT THE CHURN

BY S. K. BOURNE

- HE—O leave that hateful churning!  
For your company I'm yearning!  
How reluctantly I'm turning  
To the woods and fields away!
- SHE—Pray do not stand and tease, sir!  
Go as quickly as you please, sir!  
Do not wait at all for me, sir,  
I must stay and churn to-day.  
Hark! I have begun already,  
And the cream says "Flap a-tap,"  
And my arm is strong and steady,  
"Flap a-tap, a-tap, a-tap."
- HE—Will it take you all the day, dear?  
Can I help you if I stay, dear?  
Come and welcome back the May, dear,  
Welcome back the lovely spring!
- SHE—Oh, I fear 'twill be too late, sir,  
And too long for you to wait, sir,  
Better seek some other mate, sir.  
I've no time to laugh and sing!  
See! how rapidly I'm turning!  
And the cream says "Flop a-top;"  
Oh, I love the work of churning!  
"Flop a-top, a-top, a-top!"
- HE—Dear, you know how I adore you;  
How my heart is longing for you,  
Since the time when first I saw you  
Full of girlish life and joy!
- SHE—Do not speak of trifles now, sir;  
Say good-bye, and make your bow, sir.  
Sentiment I can't allow, sir,  
Work must all my mind employ.  
Hark! I do believe I hear it!  
For the cream says "Flump a-tump,"  
And the butter sure is near it!  
"Flump a-tump, a-tump, a-tump!"
- HE—Your indifference is killing!  
And your answers, hard and chilling,  
Show too well a heart unwilling;  
I will leave you to your churn!
- SHE—Really now, 'twas all in fun, dear;  
See, my work is almost done, dear;  
And my heart is fairly won, dear,  
Take it for your own!  
Yes, my heart is in a flutter!  
For the cream says "Swish a-wish!"  
And—Hurra! there comes the butter!  
"Swish a-wish, a-wish, a-wish!"

## HOW TIME IS REGULATED

BY CLIFFORD HOWARD



WAY out at the western end of the city of Washington is a wooded hill overlooking the Potomac, and forming part of a large government reservation or park, which reaches down to the river's edge. On the top of this hill, remote

from all the other public buildings in Washington, stands the United States Naval Observatory.

This branch of the Navy Department is of great service to the government, and plays a very important part in the daily affairs of the country; for it is here that standard government time is reckoned for the use of the departments, and for the primary purpose of testing and rating the chronometers used on the United States war vessels, and it is from this observatory that standard time is regulated all over the country.

Precisely at noon each day it sends out an electric signal to the various government offices and buildings throughout the District of Columbia, and, by means of the telegraph, this same signal is flashed over the United States at the same instant.

In order that this signal may be sent out at the right time, it is necessary that the officers in charge of the government time service at the observatory should know at just what instant the sun crosses the seventy-fifth meridian, or is directly above the meridian seventy-five degrees west longitude, which, as you have learned, is one of a number of imaginary lines stretching from pole to pole across the earth's surface, and reckoned according to their distance east or west from Greenwich. Now, this seventy-fifth meridian has been chosen as the standard for regulating time, so that when the sun gets exactly over that line it is twelve o'clock at Washington, eleven o'clock at Chicago, ten o'clock at Denver and nine o'clock at San Francisco; for, as you perhaps know, according to this system of standard or "railroad" time (it being originally adopted for the convenience of the railroads) the country is divided into four sections—Eastern, Central, Mountain and Pacific—each just one hour in advance of the other, and time at all places in the same section is the same. Accordingly, when it is noon at Washington it is also noon at Philadelphia, New York, Boston and every other place included within the eastern section. This, of course, is not strictly correct, for it is really noon at only such places through which the seventy-fifth meridian happens to pass, as the true noonday of a place is when the sun is directly overhead. Washington, for example, is on the seventy-seventh meridian, or two degrees farther west, and, consequently, according to its local time it is only eight minutes of twelve, while the true time of Boston, which is four degrees to the east, is sixteen minutes in advance. But if every city were to use its own time it would, in

many cases, give rise to a good deal of confusion and inconvenience; and it was for the very purpose of avoiding this that the present system of standard time was adopted.

As we have seen, the time for sending out the noon signal from Washington is the instant the sun crosses the seventy-fifth meridian. This, however, is not the sun which gives us light and heat, but an invisible, imaginary one; because, for certain reasons, the true sun does not cross the meridian at the same moment every day, but during one part of the year he gets over it a little more ahead of time each day, and during the other part he is correspondingly behind time; and so this fictitious sun is used, because its apparent path around the earth brings it exactly over the same line at the same moment every day. Now at just what instant this sun crosses the meridian is determined by means of the stars; for time at the observatory is not reckoned by the sun, but by the stars.

Every clear night an astronomer at the observatory looks through a large telescope for certain stars which he knows must cross a certain line at certain times, and by the use of an electrical machine he makes a record of the time each star passes, as shown by a clock which keeps sidereal or star time. He then consults a printed table, which shows him at just what time each star must have passed, and by as much as this time differs from that recorded by the clock the latter is wrong, and in that way the sidereal clock is regulated. This star time is then reduced to sun time, which requires some calculation, as there is a difference between the two of about four minutes each day, a sidereal year consisting of just one day more than a solar year.

These two clocks—the one keeping star time, and the other sun time—are of very fine quality, and are as near perfection as possible. Although they cannot help being affected by changes of temperature and different conditions of the atmosphere, they very rarely are more than a fractional part of a second out of the way. No attempt is ever made to correct such errors, but they are carefully noted and allowed for in making calculations.

For the purpose of distributing time a third clock, known as a transmitter, is used. This is set to keep time by the seventy-fifth meridian, and is regulated by the standard clock before mentioned. It is, in all respects, similar to the other clocks, except that it has attached to it an ingenious device by which an electric circuit may be alternately opened and closed with each beat of the pendulum. This clock controls two such circuits, one of them being used for dropping the Washington time-ball, and the other one connecting with the several telegraph instruments, known as repeaters, which stand on a case near by. These instruments in turn connect with the telegraph company's offices at Washington and New York, and control the Washington fire-alarm circuit and the observatory clock line. By means of the former the alarm bells in all of the fire-engine houses in the city are struck, the horses unhitched and the doors thrown open, all by a single spark of electricity, just as is done when an alarm of fire is sent in; for the noon signal to the engine houses is used for the additional purpose of striking the alarm for the daily practice of the fire department. The observatory clock-line connects with the several hundred clocks in the government offices and buildings, including the White House and the Capitol, and sets them to correct time at noon by means of a simple mechanical device in each clock, operated by electricity; so that, whether a clock loses or gains during the twenty-four hours, its hour and minute hands spring to twelve, and its second hand to sixty.

A few minutes before noon the transmitter is compared with the standard clock, and if it is not found to be exactly eight minutes, twelve seconds and nine one-hundredths of a second ahead of the standard clock (that being the exact difference between Washington and standard time) it is set right by making it gain or lose, as the case may require, by quickening or retarding the pendulum with a gentle touch of the finger.

At fifty-six minutes and forty-five seconds after eleven, everything being in readiness, a switch is turned on, and the next instant the beats of the pendulum begin to tick the seconds on the telegraph instruments in the Washington and New York telegraph offices. At this signal all work on the telegraph lines is at once suspended, and connections made from one office to another, from town to town, and from State to State, until the tick, tick of the clock at Washington is heard in the telegraph office of every railroad station, town and city in the United States.

Every twenty-ninth tick is omitted, because there is no signal goes out at the twenty-ninth second; so that a pause of a second signifies that the next click of the instrument will mark half a minute, or thirty seconds, and the first click, after a pause of five seconds, indicates the beginning of a minute, as the ticks corresponding to the fifty-fifth, fifty-sixth, fifty-seventh, fifty-eighth and fifty-ninth seconds are omitted. In order to distinguish the last minute, and afford time for making connections with time-balls, clocks, etc., the signals stop at the fiftieth second, or ten seconds before twelve.

Then, precisely at noon, the instant the sun crosses the seventy-fifth meridian, the signal is flashed over the wires, there is a single throb from one end of the land to the other, the telegraph instruments from Maine to California give a final click, the time-ball on the building of the State, War and Navy Departments drops, and, simultaneously with it time-balls drop at Havana, Cuba, and at all the prominent seaports from Boston to New Orleans, those on the Pacific coast being operated by a branch observatory in California, the hands of every government clock point to twelve, while the fire-alarm bells throughout the city of Washington sound forth their clangorous announcements of noon, and the whole nation is informed of the correct standard time.