

get the correction  $\Delta T$  it is only necessary to take the difference in degrees between the corresponding longitude given in Table III. and the longitude (approximate only) at the place of observation, for this difference in degrees multiplied by four gives the correction  $\Delta T$  in minutes.

The correction  $\Delta T$  is, of course, to be added when the place of observation is to the east of one of the above standard meridians and subtracted when it is to the west of such standard meridian.

In getting  $\Delta' = 3.94$  (D-E) minutes, it should be remembered that the astronomical day begins at noon and the hours are numbered consecutively from 0 to 24, while the civil day begins at midnight and the hours are numbered from 0 to 12 a.m. then repeated p.m., thus, civil time August 7th 3h a.m. equals astronomical time August 6th, 15h and D would therefore be August 6.6. In the p.m. hours the dates agree.

Table I.

	1913	1914	1915	1916
	E	E	E	E
	April 14.0	April 14.4	April 14.7	April 14.1
Latitude.	F	F	F	F
40°	0.95	0.94	0.94	0.94
41°	0.97	0.96	0.96	0.95
42°	0.98	0.98	0.98	0.97
43°	1.00	1.00	0.99	0.99
44°	1.02	1.01	1.01	1.01
45°	1.04	1.03	1.03	1.02
46°	1.05	1.05	1.05	1.04
47°	1.07	1.07	1.06	1.06
48°	1.09	1.09	1.08	1.08
49°	1.11	1.10	1.10	1.09
50°	1.13	1.12	1.12	1.11
51°	1.15	1.15	1.14	1.14
52°	1.18	1.18	1.17	1.17

Table II.

Hour Angle		Hour Angle	
t	a	t	a
0 hours	— 0 minutes	13 hours	+ 24 minutes
1 "	—25 "	14 "	+47 "
2 "	—49 "	15 "	+67 "
3 "	—69 "	16 "	+82 "
4 "	—84 "	17 "	+92 "
5 "	—93 "	18 "	+96 "
6 "	—96 "	19 "	+93 "
7 "	—92 "	20 "	+84 "
8 "	—82 "	21 "	+69 "
9 "	—67 "	22 "	+49 "
10 "	—47 "	23 "	+25 "
11 "	—24 "	24 "	+ 0 "
12 "	— 0 "		

Table III.

Standard Time.	Longitude West of Greenwich.
Atlantic standard .....	60°
Eastern standard .....	75°
Central standard .....	90°
Mountain standard .....	105°
Pacific standard .....	120°

**Example.**—Suppose an observation is to be made at Baie St. Paul, County of Charlevoix, Province of Quebec, in 1913. By inspection of a map it can be seen that approximately the latitude of this place is  $47^{\circ} 30'$  and the longitude  $70^{\circ} 30'$ . Say, on August 7th at 8h 22m p.m., eastern standard time, an observation of Polaris is taken: The correction corresponding to one degree of longitude is four minutes.

$$\therefore \Delta T = (75^{\circ} - 70\frac{1}{2}^{\circ}) 4 = + 18 \text{ minutes}$$

$$D = \text{August 7.3 and from Table I., } E = \text{April 14.0}$$

$$\therefore \Delta' = 3.94 \text{ (difference in days between August 7.3 and April 14.0) } = 3.94 \times 115.3 = 454\text{m} = 7\text{h } 34\text{m}$$

$$\text{By (1) } t = T + \Delta T + \Delta' = 8\text{h } 22\text{m} + 0\text{h } 18\text{m} + 7\text{h } 34\text{m} = 16\text{h } 14\text{m}.$$

Interpolating from Tables I. and II.

F corresponding to latitude  $47^{\circ} 30'$  is 1.08

a corresponding to hour angle 16h 14m is +84'

$\therefore$  azimuth of Polaris at 8h 22m p.m. is from (2)

$$A = F \times a = 1.08 \times 84 = + 91' = 1^{\circ} 31'$$

That is, at 8h 22m p.m. on August 7th, 1913, the Pole star will be  $1^{\circ} 31'$  to the east of the true or astronomical north, and from this the true bearing can be ascertained of any line taken in connection with the observation of the star.

## GASKETS AND STEAM.

One could easily write fifty-seven varieties of sermons about gaskets, poor packing, and the steam waste incident thereto, but this is not to be one of the regular fifty-seven varieties; it is to be a new and different one. There is many an instance when emergency, and a species of genius, have led a man, back in the woods, into taking his shirt-tail to make a gasket for a cylinder-head. And while this is often a poor and reckless makeshift, it is really better in effect than are some of the uses of thick gaskets where men think they have prepared and are doing the right thing. In the modern steam-engine the clearance space at the ends of the cylinder has been reduced to a point of small fractions, and even the added fraction of an unnecessarily thick gasket may cause useless waste of steam. Some of the old-style engines may be found yet in the rural districts that will show a clearance of an inch between the cylinder-head and the piston at the end of the stroke. And, strange to say, with this staring them in the face, it seems difficult for some to understand why a new engine of the same size will do more work and use less steam when the general construction is the same. In other words, there are some who do not seem to have realized that it takes steam to fill extra space in a cylinder, just the same as it takes steam to drive the engine—and it's the same kind of steam, too. To the class who are thus thick-headed belongs the engineer who puts gaskets an eighth of an inch thick under the cylinder-head simply because he has material of that kind in stock. He might better emulate the back-woodsman in emergencies and use a piece of his shirt-tail. Fortunately, there are not many of this class, even in the backwoods, but as long as the few remain it is in order to point out that all unnecessary space at the end of a steam cylinder calls for the expenditure of unnecessary steam power.—J. Crow Taylor in The National Engineer.

Greater Montreal will erect during the present year forty million dollars' worth of buildings according to the estimate of Mr. R. L. Wherry, secretary of the Builders' Exchange. Last year the figures were \$33,080,000.

The Russian Ministry of Ways of Communication has decided to make an investigation in regard to the projected line from Saratov to Novotcherkask. This line would be 400 miles long, would traverse the grain territories of the Don Cossacks territory, and would be of great importance in connection with the future South Siberian Railway, as it would create a direct transit route to the Black Sea for the Siberian agricultural products.